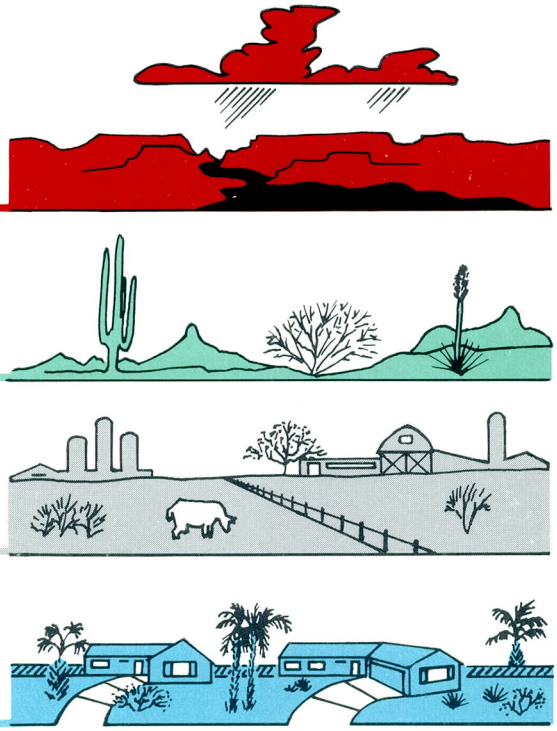


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Arizona Canal Diversion Channel Reach 4 Letter of Map Revision

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Arizona
Canal Diversion Channel
Reach 4
Letter of Map Revision

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

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

     Explain _____
2. **Flooding Source:** ACDC Watershed (AZ Channel Diversion Canal)
3. **Project Name/Identifier:** ACDC Reach 4
4. **FEMA zone designations affected:** Zone A

   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, VE, B, C, D, X)
5. **The NFIP map panel(s) affected for all impacted communities is (are):**

	Community No.	Community Name	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
	040037	Unincorporated	Maricopa	AZ	040037	1690	4/15/88
	040049	Town of Paradise Valley	Maricopa	AZ	040049	1670 & 1690	4/15/88 4/15/88
	040051	Phoenix	Maricopa	AZ	040051	1690/70	4/15/88

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

Types of Flooding	Structures	Disciplines*
[ ] Riverine	[X] Channelization	[X] Water Resources
[ ] Coastal	[ ] Levee/Floodwall	[ ] Hydrology
[ ] Alluvial Fan	[ ] Bridge/Culvert	[ ] Hydraulics
[ ] Shallow Flooding	[ ] Dam	[ ] Sediment Transport
[ ] Lakes	[ ] Coastal	[ ] Interior Drainage
Affected by wind/wave action	[ ] Fill	[X] Structural
[ ] Yes	[ ] Pump Station	[ ] Geotechnical
[ ] No	[ ] None	[ ] Land Surveying
[ ] Other (describe)	[ ] Other (describe)	[ ] Other (describe)
_____	_____	_____

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

Floodway Information

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

If yes, give reason: Construction of the ACDC a collector channel for flood waters

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? ☒ Yes ☐ No

If yes, attach a copy of a letter notifying the appropriate State agency of the floodway revision and documentation of the approval of the revised floodway by the appropriate State agency.

Proposed Encroachments

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 increase at any location by more than 0.000 feet? NA, requesting Zone A designation ☐ Yes ☐ No

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 increase at any location by more than one foot (or other surcharge limit if community or state has adopted more stringent criteria)? NA, requesting Zone A designation within ACDC ROW ☐ Yes ☐ No

If 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No
- Does this revision request have the endorsement of the community? ☒ Yes ☐ No

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

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

Forms Included

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 riverine flooding differs from that used to develop FIRM	[X] Hydrologic Analysis Form (Form 3)
• Hydraulic analysis for riverine flooding differs from that used to develop FIRM	[ ] Riverine Hydraulic Analysis (Form 4)
• The request is based solely on updated topographic information	[XX] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[XX] Channelization (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 or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[ ] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

- The minimum initial review fee for the appropriate request category has been included.

  [ ] Yes [XX] No

  If yes, the amount submitted is $ _____.

  or

- This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

  [X] Yes [ ] No

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? [X] 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 The Flood Control District of Maricopa County (FCDMC (entity) & CORPS with a maximum interval of 6 months between inspections.

B. Based on the results of scheduled periodic inspections, appropriate maintenance of the flood control facilities will be conducted by FCDMC (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, [X] has [ ] has not been prepared for the flood control structure.

D. The community is willing to assume responsibility for [ ] performing [X] overseeing compliance with the maintenance and operation plans of the (Name) ACDC 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

Requested Response from FEMA

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

___a.	CLOMR	A letter from FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision (LOMR or PMR), or proposed hydrology changes (see 44 CFR Ch. I, Parts 60, 65, and 72).
_X_b.	LOMR	A letter from FEMA officially revising the current NFIP map to show changes to floodplains, floodways, or flood elevations. LOMRs typically depict decreased flood hazards. (See 44 CFR Ch. 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 _____

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

Ron Merritt
Signature of Revision Requestor

Ron Merritt
Printed Name and Title of Revision Requestor

Flood Control District
Company Name

Date November 10, 1993

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

Raymond U. Acuna
Signature of Community Official

Raymond U. Acuna, P.E.
Floodplain Management Engineer
Printed Name and Title of Community Official

City of Phoenix
Community Name

Date 11/4/93

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.

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

Ron Nevitt
Signature of Revision Requestor

Ron Nevitt
Printed Name and Title of Revision Requestor

Flood Control District
Company Name

November 10, 1993
Date

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

William C. Mead
Signature of Community Official

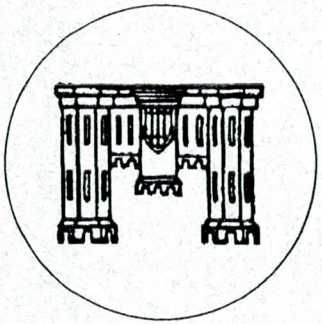
TOWN OF PARADISE VALLEY
Printed Name and Title of Community Official

PARADISE VALLEY
Community Name

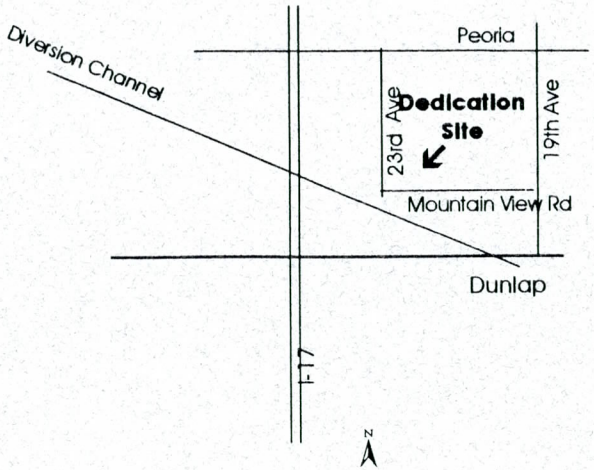
NOVEMBER 4, 1993
Date

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.



ACDC Dedication



Arizona Canal Diversion Channel

The Arizona Canal Diversion Channel, or ACDC, is a 16.5-mile flood control channel that parallels the Arizona Canal on the north side. The channel diverts stormwater that formerly flooded large areas of metropolitan Phoenix. It now conveys these flows safely across the city to Skunk Creek.

The channel is the final element of the Phoenix and Vicinity (including New River) Flood Control Project, authorized by Congress in 1965. The entire project includes four flood-control dams and channel improvements, and was designed and constructed by the U.S. Army Corps of Engineers in partnership with the Flood Control District of Maricopa County.

The District's responsibility includes obtaining all land and rights-of-way; relocating people, utilities, roads and bridges for the entire project; and maintaining and operating the completed project.

The Maricopa County Board of Supervisors, as the

Flood Control District Board of Directors,

and the

U.S. Army Corps of Engineers

cordially invite you to a dedication ceremony for the

Arizona Canal Diversion Channel

Friday, October 8, 1993

9 a.m.

23rd Avenue and Mountain View, east of Cave Creek Wash

(see map, reverse)

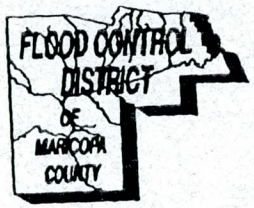
Flood Control District Board of Directors

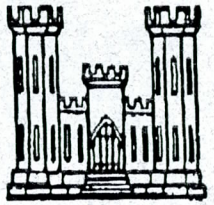
Jim Bruner, Chairman, District 2
Tom Rawles, District 1
Betsey Bayless, District 3
Ed King, District 4
Mary Rose Wilcox, District 5

Flood Control District Citizens Advisory Board

William J. LoPiano, Chairman
John E. Miller Jr., Vice Chairman
Samuel K. Wu, Secretary
Marcella Peters, Member
Ron Wheat, Member
James Matteson, Ex Officio Member, City of Phoenix
Paul Cherrington, Ex Officio Member, Salt River Project

recycled paper



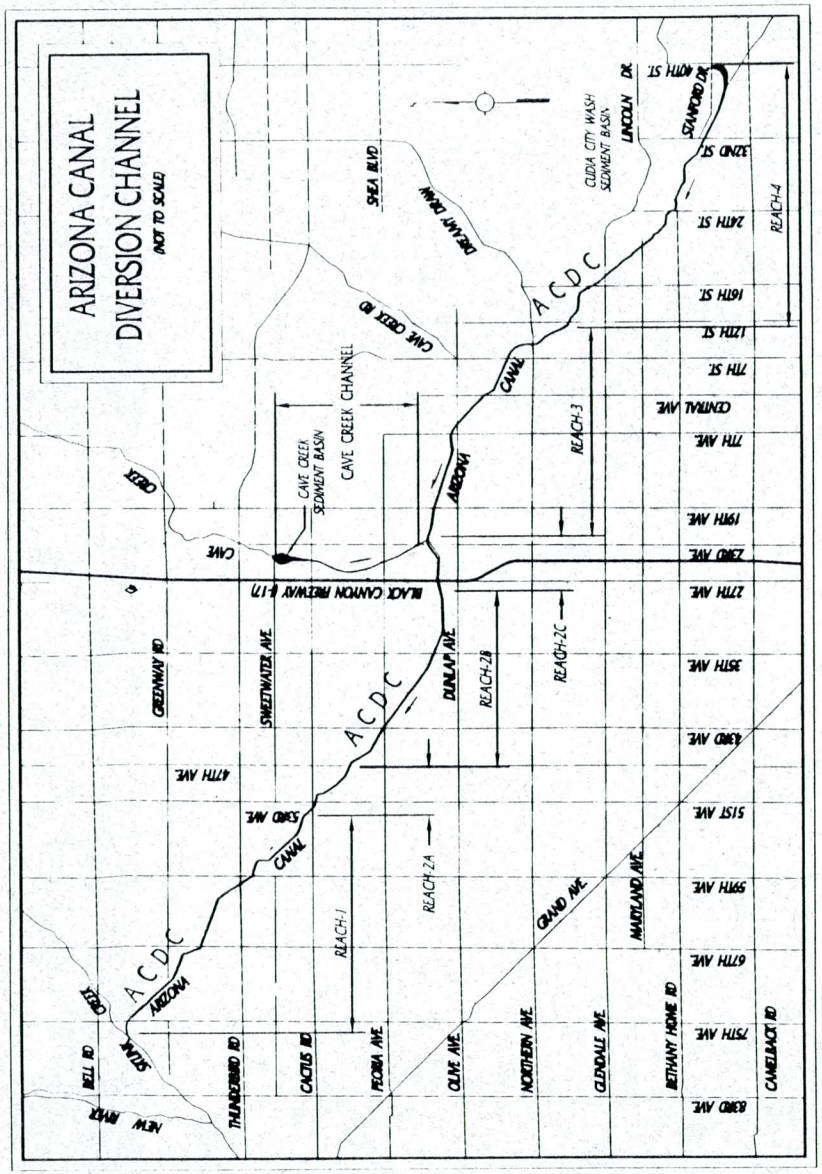


Dedication

Arizona Canal Diversion Channel

9 a.m. Friday
October 8, 1993

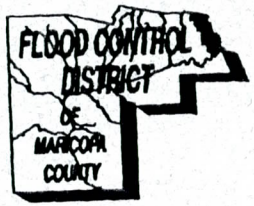
23rd Avenue and Mountainview
Phoenix, Arizona

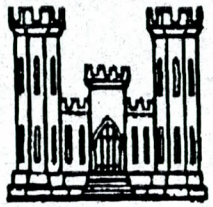


PROGRAM

MASTER OF CEREMONIES	***The Honorable Jim Bruner*** *Chairman, Flood Control District Board of Directors*
POSTING OF THE COLORS	***County Sheriff's Honor Guard***
PLEDGE OF ALLEGIANCE	***William LoPiano*** *Chair, Flood Control District Citizens Advisory Board*
INVOCATION	***The Rev. Ed Delph*** *Pastor, Hosanna Christian Fellowship*
INTRODUCTION OF DISTINGUISHED GUESTS	***Supervisor Bruner***
REMARKS	***The Honorable James McAllister*** *Vice Mayor, City of Glendale*
	The Honorable Ken Forgia *Mayor, City of Peoria*
	The Honorable Paul Johnson *Mayor, City of Phoenix*
	The Honorable Mary Rose Wilcox *Board of Directors/Supervisors, District 5*
	The Honorable Ed King *Board of Directors/Supervisors, District 4*
	The Honorable Betsey Bayless *Board of Directors/Supervisors, District 3*
	Col. R. L. VanAntwerp *District Engineer* *Los Angeles District, U.S. Army Corps of Engineers*
	The Honorable Jim Bruner *Chairman, Board of Directors/Supervisors*

UNVEILING OF MONUMENT
CHRISTENING OF CHANNEL
REFRESHMENTS





Dedication

Arizona Canal Diversion Channel

9 a.m. Friday
October 8, 1993

23rd Avenue and Mountainview
Phoenix, Arizona

THANK YOU

It required the efforts of many people to successfully complete a project as large as the Arizona Canal Diversion Channel. To all those who contributed to the project, we extend our thanks and appreciation for a job well done. While it is impossible to list all those involved, some of the many are listed here.

Flood Control District
Shelby Brown, Administrative Coordinator
Roberta Combs, Administrative Coordinator
Francis Crosby, Engineering Drafting Spec
Leanna Cumberland, Eng Contract Spec
Mike Cuneo, Controller
Betty Dickens, Revegetation Ecologist
Paul DiPierro, Construction Inspector
Neil S. Erwin, P.E., Chf Eng/Gen Mgr
Chris Franklin, Land Management Specialist
Fred Fuller, Chf of Construction Inspection
Ken Green, Real Property Engineering Assoc
Hedy Hall, Land Management Specialist
Kumar Hanamaiah, P.E., Civil Engineer
Jonathan Hughes, Construction Inspector
David Johnson, Hydrology Manager
Diane C. Johnson, Land Management Aide
Ken Johnson, Property Mgt Specialist
Joy Ketchum, Administrative Coordinator
Bill Knight, Revegetation Ecologist
Lisa LaMarche, Administrative Coordinator
John Lang, Civil Engineering Technician
Jim Langford, Property Management Assist
Paul Lindgren, O & M Supervisor
Erv McLuty, Chf, Real Estate Engineering
Dick McNamara, Property Acquisition Mgr
Catesby Moore, Environmental Program Mgr
Edgar Moreno, Engineer Associate
Amir Motamedi, Hydrologist
John Palmieri, Property Acquisition Coord
O. Don Park,P.E., Construction & Ops Mgr
Bill Poppe, Civil Engineering Technician
Edward A. Raleigh, P.E., Engineering Manager
Don Rerick, Project Management Engineer
John Sanchez, Real Property Engin Assoc

Flood Control District
Jim Schwartzmann, Land Mgt Manager
Gary Shapiro, Civil Engineering Tech
Shewa Shivaswamy, Const Inspector
R. W. Shobe, P.E., Project Mgt Engineer
Stanley L. Smith, P.E., Dpty Chf Engineer
Laurence Spanulescu, Const Inspector
Jan Staedicke, Civil Engineering Tech
John Svechovsky, P.E., Water Res Planner
Charles Wainwright,P.E.,Civil Engineer
Ray Warriner, Prop Acquisition Coord
Larry Wong, Engineering Drafting Spec
Connie Yanez, Administrative Assistant
Linda Young, Administrative Coord
and ACDC Maintenance Crews...thanks!

General Counsel
Larry J. Richmond, P.C.
Julie Lemmon, Attorney

Former District Employees
Warren "Andy" Anderson, Chf,Const Insp
John Burke, Chf, Land Mgt
Herbert P. Donald, P.E., Chf Eng/Gen Mgr
Susan Fitzgerald, Public Involvement Coord
Nickolas Karan, P.E., Chf Engineering Div
William Mathews, P.E., Chf Eng/Gen Mgr
Emily Marak, Land Management Assistant
Sue Mutschler, Public Involvement Coord
Edward Opstein, Chf, Land Management
Robert Payette, P.E., Chf Construction & Ops
John Rodriguez, P.E., Chf Plan/Project Mgt
Daniel E. Sagramoso, P.E., Chf Eng/Gen Mgr
Mary Williams, Administrative Assistant

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

Arizona Canal Diversion Channel
Fact Sheet

Arizona Canal Diversion Channel

16.5-mile flood control channel, originating near 40th Street and Stanford Drive on the grounds of the Phoenix Country Day School, and terminating at 75th Avenue and Greenway Road where the storm drainage flows into Skunk Creek. The Channel protects large portions of Phoenix, and areas of Glendale and Peoria from 100-year flood damage. A 100-year flood has a 1% chance of happening in any year.

The Diversion Channel is part of the Phoenix and Vicinity (including New River) Flood Control Project proposed by a citizens' committee in 1963, and funded by Congress in 1965. The project also includes four dams: Dreamy Draw, completed 1974; Cave Buttes, on Cave Creek Wash, completed 1979; Adobe Dam, on Skunk Creek, completed in 1982; and New River Dam, completed 1985. Related improvements include channelization of Cave Creek Wash from the confluence with the ACDC upstream to Sweetwater Avenue; channelization of Skunk Creek downstream of its confluence with the ACDC; and channelization of the New River downstream of confluence with Skunk Creek; and channelization of the Agua Fria River near the Gila River.

Designed and Built by: U.S. Army Corps of Engineers, with the Flood Control District of Maricopa County as local sponsor.

ACDC Cost:

$254 million total; $152 million for construction, paid 97.7% by Corps of Engineers and 2.3% by local sponsor, Flood Control District; $102 million for property acquisition, relocation of people, roads, bridges, utilities, paid by the Flood Control District.

Total cost for the Phoenix and Vicinity (including New River) Flood Control Project, including the dams, is $422 million ($254 million federal; $168 million local).

Contractors:		
	Reach 1, Skunk Creek - 53rd Avenue:	Kiewit Western
	Reach 2a, 53rd Avenue - 47th Avenue:	C.S. Construction
	Reach 2b, 47th Avenue - 27th Avenue:	Kasler Corp.
	Reach 2c, 27th Avenue - 21st Avenue (+ 2.5 miles of Cave Creek channelization):	Pulice Construction
	Reach 3, 21st Avenue - 12th Street:	Pulice Construction
	Reach 4, 12th Street - 40th Street:	SundtCorp

Design capacity: Peak discharge into Skunk Creek is 29,000 cubic feet per second.

Channel dimensions:		
	Upstream end near 40th Street/Stanford Drive:	36 ft. wide x 21 ft. deep
	At confluence with Cave Creek Wash:	110 ft. wide x 20 ft. deep
	Downstream confluence with Skunk Creek:	500 ft. wide x 20 ft. deep

Construction specifications:

Concrete lined channel; covered box at Sunnyslope High School and from upstream end near 40th St. to just west of 24th St. (including the covered channel portion at the Arizona Biltmore Hotel) ; fenced to prevent entry; earthen channel starting at 55th Ave. to Skunk Creek.

(over)

Maintenance:

Flood Control District performs full maintenance of the channel, with a work station established in Sunnyslope; crews work 5 days a week. Phoenix maintains pedestrian underpasses at 35th Avenue, I-17, Central Avenue, Dunlap Avenue, Northern Avenue, Peoria Avenue, Cactus Street, 7th Street, 12th Street, 16th Street; Glendale maintains the recreational facilities at Thunderbird Paseo Park, in the channel between 56th and 71st Avenues. The Flood Control District has established a link between its electronic rain gauge system and Glendale's Fire Department to provide timely flood alert and evacuation of the park.

Recreational features:

As the responsible party, the Flood Control District will maintain a part of the channel bank as a 16.5 mile long segment of the Sun Circle Trail. While state law prohibits the District from funding recreational facilities, the Corps funded these features in conjunction with the listed cities on a 50% cost sharing basis:

--Paths for biking, walking, jogging
--Glendale Thunderbird Paseo Park, with ball fields, gardens, and amenities
--Phoenix pedestrian underpasses
--Phoenix recreation facilities along Cave Creek Channel north of Cactus Road

Landscaping:

As a result of citizen input, enhanced landscaping includes 5,378 trees and over 90,000 shrubs and groundcover plants maintained by the Flood Control District.

Aesthetic features and citizen input:

Starting in the mid 1980s, citizen groups provided input that was adopted by the Corps of Engineers to make the Channel more acceptable aesthetically to residents immediately adjacent to the project. Such suggestions included:

--tinted concrete (tan instead of gray/white)
--wrought-iron-look fencing (instead of chainlink fencing)
--enhanced landscaping
--staggered masonry walls to screen the channel from view

Environmental regulations:

Since first approved by Congress in 1965, plans for and construction of the Arizona Canal Diversion Channel have met the continually changing and progressively more strict federal environmental criteria and regulations.

Construction challenges:

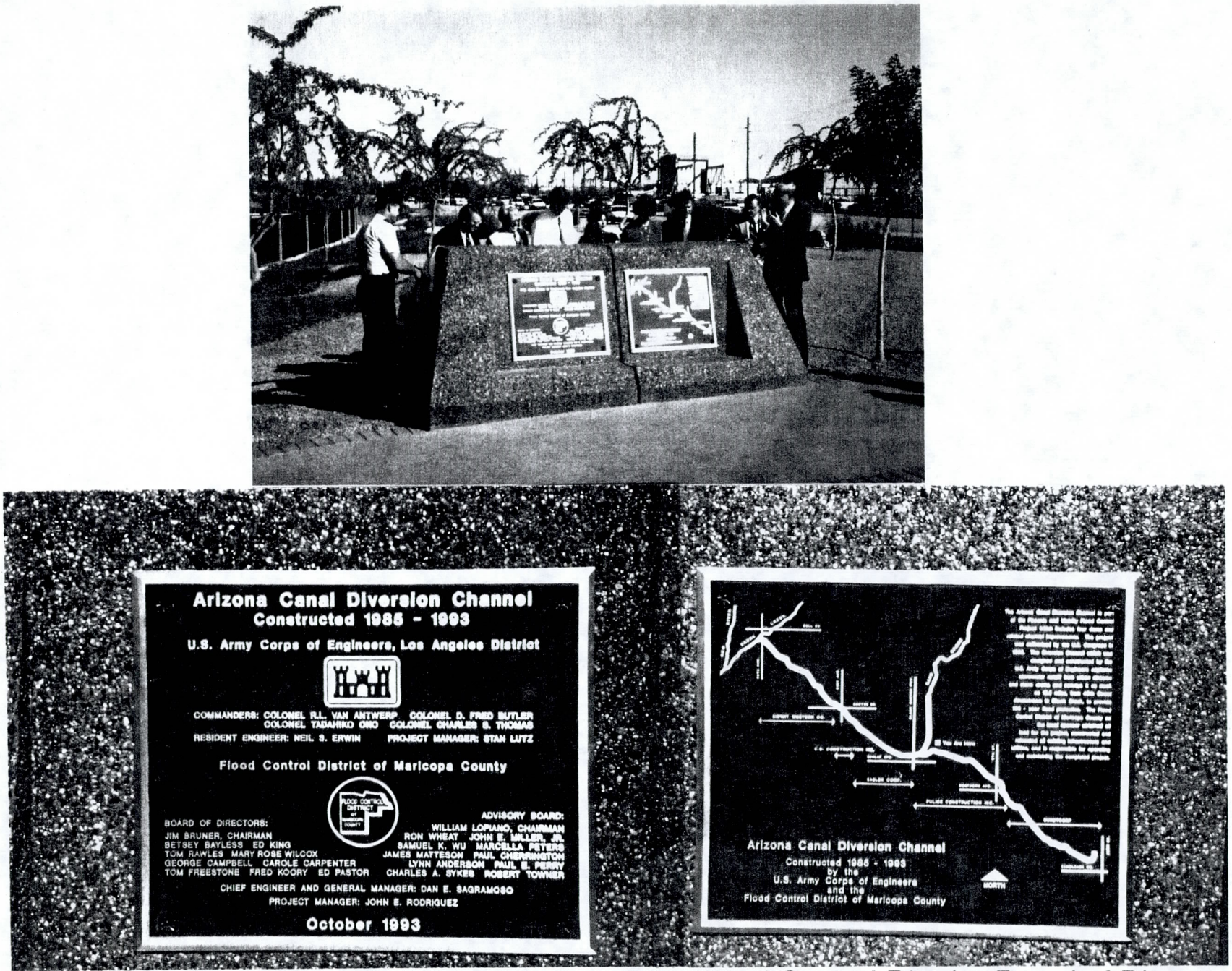
--Completion of excavation, concrete work and covering of the channel at the Arizona Biltmore in 100 days...completed 2 days ahead of schedule, with kudos from the Hotel management.

--Maintaining schedule after Congress approved additional funding at the request of Paradise Valley to cover an additional 4,360 feet of channel, after construction of that portion of the channel was already underway. Flood Control District engineering staff redesigned the channel to support the cover and associated landscaping features, and drainage inlets to direct storm runoff into the covered channel.

--Keeping 6 lanes and frontage roads open on I-17 while constructing a bridge over the channel.

Safety Record:

During the seven years of construction of the channel, 2.5 million manhours were dedicated to the completion of this project. Due to the diligence of the construction contractors and the work crews, no lives were lost, no one suffers from a permanent disability, and only 6 accidents occurred where any days were lost by a member of the work force.



The Maricopa County Board of Supervisors, as the Flood Control District Board of Directors, and the U.S. Army Corps of Engineers, dedication ceremony for the Arizona Canal Diversion Channel
Friday, October 8, 1993

ACDC DEDICATION CEREMONY MAILING LIST

Corps of Engineers

Mr. Michael Borden
C. S. Construction
22023 North 20th Avenue
Phoenix, AZ 85027

Brad & Michele Caron
4150 E. Blanche Drive
Phoenix, AZ 85032

Mr. Michael Murphy
SundtCorp
2604 S. 20th Place
Phoenix, AZ 85034

Mr. Greg Bode
SundtCorp
7301 N. 14th Street
Phoenx, AZ 85020

Mr. Bob Jones
SundtCorp
7301 N. 14th Street
Phoenix, AZ 85020

Mr. Steve Lewis
SundtCorp
4101 E. Irvington Road
Tucson, AZ 85714

Mr. Paul Cranfield
SundtCorp
4101 E. Irvington
Tucson, AZ 85714

Mr. Kenneth Brunker
SundtCorp
4101 E. Irvington Road
Tucson, AZ 85714

Mr. Ron Pulice
Pulice Construction
2033 W. Mountainview Road
Phoenix, AZ 85021

Ms. Denise Schmoldt
SundtCorp
7301 North 14th Street
Phoenix, AZ 85020

MG John B. Sobke
Deputy Chief of Engineers
U. S. Army Corps of Engineers
20 Massachusettes Ave., N.W.
Washington, D.C. 20314-1000

BG Milton Hunter
Commander, South Pacific Div
U. S. Army Corps of Engineer
630 Sansome Street
San Francisco, CA 9411-2206

Ms. Marie Torres
SundtCorps
2604 S. 20th Place
Phoenix, AZ 85034

Al Shapiro
U. S. Army Corps of Engineers
South Pacific Division
630 Sansome Street
San Francisco, CA 94111-2206

Frank Dunn
U. S. Army Corps of Engineers
South Pacific Division
630 Sansome Street
San Francisco, CA 94111-2260

Steve Temmel
Office of Counsel
Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Gary Ditch
U. S. Army Corps of Engineers
South Pacific Division
630 Sansome Street
San Francisco, CA 94111-2206

Walter Day
U. S. Army Corps of Engineers
South Pacific Division
630 Sansome Street
San Francisco, CA 94111-2206

Charles Hooppaw
10345 East Clinton Street
Scottsdale, AZ 85254

Dave Fulton
U. S. Army Corps of Engineer
South Pacific Division
630 Sansome Street
San Francisco, CA 94111-2206

Jack Farless
U. S. Army Corps of Engineer
South Pacific Division
630 Sansome Street
San Francisco, CA 94111-220

Mr. Bob Koplin
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Stanley L. Lutz
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Tom Luzano
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Vance Carson
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Girish Desai
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Cliff Ford
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Robert Hall
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Lawrence Lauro
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Ted Ingersoll
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Joe Evelyn
U. S. Army Corp of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Bill Halczak
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Carl Enson
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. George Beams
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Dan Gee
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Pat Kimura
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Chris Kronick
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Nino Issakhan
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Martin Dense
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Mike Evasovic
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Ms. Ruth Villalobos
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Ron MacDonald
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Brian Moore
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Ted Gula
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Thomas E. Brock
3841 North 8th Avenue
Phoenix, AZ 85013

David B. Reichardt
2231 West Whitton
Phoenix, AZ 80515

Dennis. M. Duffy
10038 N. 49th Drive
Glendale, AZ 85302

Raymond L. Coker
6522 N. 16th Drive
Phoenix, AZ 85015

Paul Berger
CRSS Construction Inc.
2500 Michelson Drive

Joe Gross
City of Scottsdale
3939 Civic Center Boulevard

Mr. Robert Hall
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Lawrence Lauro
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Ted Ingersoll
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Joe Evelyn
U. S. Army Corp of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Bill Halczak
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Carl Enson
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. George Beams
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Dan Gee
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Pat Kimura
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Chris Kronick
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Nino Issakhan
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Martin Dense
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Mike Evasovic
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Ms. Ruth Villalobos
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Ron MacDonald
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Brian Moore
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Mr. Ted Gula
U. S. Army Corps of Engineers
P. O. Box 2711
Los Angeles, CA 90053-2325

Thomas E. Brock
3841 North 8th Avenue
Phoenix, AZ 85013

David B. Reichardt
2231 West Whitton
Phoenix, AZ 80515

Dennis. M. Duffy
10038 N. 49th Drive
Glendale, AZ 85302

Raymond L. Coker
6522 N. 16th Drive
Phoenix, AZ 85015

Paul Berger
CRSS Construction Inc.
2500 Michelson Drive
Irvine, CA 92715

Joe Gross
City of Scottsdale
3939 Civic Center Boulevard
Scottsdale, AZ 85251

Jenny Baker
Corps of Engineers

Satsuki Carrington
Corps of Engineers

Larry Flatau
Corps of Engineers

Joe Robertucci
Corps of Engineers

Joe Salinaz
Corps of Engineers

Blaine Brillhart
Corps of Engineers

Kelly Ryan
Corps of Engineers

Ruth Tegeler
Corps of Engineers

Major Robert Van Der Like
Corps of Engineers

Leo Snyder
Corps of Engineers

Joe Pickens
Corps of Engineers

Mr. Mike Abels
Manager-Engineering
US West
6350 South Maple, Room 125
Tempe, AZ 85283

Mr. Ray Acuna
City of Phoenix
Street Transporation
Floodplain Management
125 E. Washington
Phoenix, AZ 85004

Basilio F. Aja
Az. Cattlefeeders Association
Buckeye, AZ 85326

Mr. Grant Anderson
City Engineer
City of Glendale
5850 West Glendale Avenue
Glendale, AZ 85301

Mr. Andy Andrade
US West Communications
2233 W. Dunlap
Room 232
Phoenix, AZ 85021

Mr. Bob Ardizonne
John Carollo Engineers
3877 North Seventh Street, Suite 400
Phoenix, AZ 85014-5005

Mr. James Attebery
Greiner, Inc.
7310 N. 16th St., Suite 160
Phoenix, AZ 85020-2402

Jenny Baker
Corp of Engineers

Mr. Frank Barrios
Area Director

Phoenix Active Mgmt. Area
15 S. 15th Ave.
Phoenix, AZ 85007

Mr. Bill Bates
Public Works Director
City of Avondale
525 N. Central
Avondale, AZ 85323

Mr. John Baudek
Town of Paradise Valley
6401 E. Lincoln Dr.
Paradise Valley, AZ 85253

Neil Bibler
Associated Press
505 N. Second St., Ste. 120
Phoenix, AZ 85004

Mr. Greg Bode
Sundt Corp
7301 N. 14th Street
Phoenix, AZ 85020

Michael Borden
C.S. Construction
22023 North 20th Avenue
Phoenix, AZ 85027

Mr. Bob Bortfeld
City of Phoenix
Engineering Department
125 East Washington
Phoenix, AZ 85004

Blaine Brillhart
Corp of Engineers

Mr. Richard Broman
Public Works Director
City of Apache Junction
1001 N. Idaho Road
Apache Junction, AZ 85219

Mr. Kenneth Brunker
Sundt Corp
4101 E. Irvington Road
Tucson, AZ 85714

Mr. Tony Burd
Tanner Companies
P.O. Box 52131
Phoenix, AZ 85072-2131

Mr. John Burke
City of Phoenix
Real Estate Department
234 N. Central, Suite 112
Phoenix, AZ 85004

Mr. Jim Burke
City of Phoenix
Parks, Recreation & Library Depart.
125 East Washington
Phoenix, AZ 85004

Ms. Janis Burke
Western Heritage Estates
6924 West Roeser
Phoenix, AZ 85009

Ms. Janice Burnett
Arizona Consulting Engineers Assoc.
24 W. Camelback, Ste. M
Phoenix, AZ 85254

Mr. Bill Burton
Corps of Engineers
U.S. Army Engineer District
3636 N. Central, Suite 740
Phoenix, AZ 85012

Mr. Hector Cardona
US West
6350 South Maple, Room 125
Tempe, AZ 85283

Mr. & Mrs. Brad Caron
4150 E. Blanche Drive
Phoenix, AZ 85032

Mr. Ted Carr
orps of Engineers
.S. Army Engineer District
P.O. Box 2711
os Angeles, CA 90053

Mr. William Childress
U.S. Bureau of Land Mgmt.
ower Gila Resource Area
2015 West Deer Valley Road
Phoenix, AZ 85027

r. Bruce Crandall
Public Works Manager
ity of Mesa
ox 1466
Mesa, AZ 85201

Ms. Lisa Dent
909A E. Northern Avenue
hoenix, AZ 85020

r. Bill Kantor, P.E. Civil Design
ntranco Engineers, Inc.
2400 W. Dunlap
Suite 100
hoenix, AZ 85251

oard of Directors
County Administration

Mr. Herbert P. Donald
5338 E. Camelback Manor Dr.
aradise Valley, AZ 85253

arolyn Engel-Wilson
Urban Program Coordinator
Z. Game and Fish Dept.
21 West Greenway
Phoenix, AZ 85023

. Joe Falbo
Maricopa Water District
O. Box 900
adell, AZ 85355-0900

Satsuki Carrington
Corp of Engineers

Mr. Stephan Cleveland
City Manager
119 N. Litchfield Road
Goodyear, AZ 85338

Mr. Paul Cranfield
Sundt Corp
4101 E. Irvington Road
Tucson, AZ 85714

AZ. State Land Department
Hydrology Division
1616 West Adams Street
Phoenix, AZ 85007

Randy Baca, Director
Maricopa County
Community Develop. Agency

Board of Directors
Dreamland Villa
320 North 55th Place
Mesa, AZ 85205

Ms. Betty Drake
649 N. 3rd Avenue
Phoenix, AZ 85003

Mr. William Erickson
Floodplain Administrator
City of Scottsdale
7447 E. Indian School, #20
Scottsdale, AZ 85251

Al Field
Arizona Public Service
P.O. Box 53999, Sta. 3278
Phoenix, AZ 85072-3999

Ms. Ruth Chase
Corps of Engineers
U.S. Army Engineer District
P.O. Box 2711
Los Angeles, CA 90053

Mr. Jim Colley
City of Phoenix
Parks, Recreation & Library Depart.
125 East Washington
Phoenix, AZ 85004

Mr. John J. DeBlske
Maricopa Assoc. of
Governments
1820 W. Washington St.
Phoenix, AZ 85007

Mr. Girish Desai
Corps of Engineers
U.S. Army Engineer District
P.O. Box 2711
Los Angeles, CA 90053

Roy Stegal, Exec. Director
Arizona Rock Products Assoc.
1825 W. Adams Street
Phoenix, AZ 85007-2603

Mr. Joe Dixon
Corps of Engineers
U.S. Army Engineer District
3636 N. Central, Suite 740
Phoenix, AZ 85012

Anne Drobney
League of Women Voters
101 West Interlacken Drive
Phoenix, AZ 85023

Roger Evans
Executive Director
Salt River Agency
Route 1, Box 120
Scottsdale, AZ 85251

Ms. Gaye Fillmore
5635 North Homestead Lane
Paradise Valley, AZ 85253

Mr. Lowell Flannery
Corps of Engineers
U.S. Army Engineer District
P.O. Box 2711
Los Angeles, CA 90053

Mr. Gene Florez
9 South 43rd Ave.
Phoenix, AZ 85009

Mr. R.J. Friess
Public Projects Coordinator
US West
2233 West Dunlap, Room 331
Phoenix, AZ 85021

City of Glendale
Park Maintenance/RecreationDepart.
5850 W. Glendale Ave.
Glendale, AZ 85301

Mr. Larry Gura
273 W. Maya Drive
Litchfield Park, Az 85340

Mr. Glen Harless
Dushoff & McCall
345 E. Palm Lane, Suite 100
Phoenix, AZ 85004

Russell Haughey
AZ Riparian Council
1018 East 7th Place
Mesa, AZ 85203

Mr. Manuel Hernandez
US West
2233 West Dunlap, Room 331
Phoenix, AZ 85021

HNTB
Renaissance II
40 North Central, #1100
Phoenix, AZ 85004

Ms. Donna Flannigan
Laveen Planning Comm.
P.O. Box 50
Laveen, AZ 85339

Mr. Cliff Ford
Corps of Engineers
U.S. Army Engineer District
P.O. Box 2711
Los Angeles, CA 90053

Erin Garrett
News Director
KOOL-TV Adams
2196 E. Camelback Rd.
Phoenix, AZ 85016

Dennis Godfrey
Republic/Gazette/N. Cent. Ed.
120 E. Van Buren St.
Phoenix, AZ 85004

Mr. Bill Halczak
Corps of Engineers
U.S. Army Engineer District
P.O. Box 2711
Los Angeles, CA 90053

Mr. David Harmon
7841 E. Crestwood Way
Scottsdale, AZ 85250

Mr. Jasper Hawkins
4621 N. 16th Street
Phoenix, AZ 85016

Mr. Humberto Hernandez
Soil Conservation Service
201 E. Indianola, Ste. 200
Phoenix, AZ 85012

Mr. Neil Hoffman
P.O. Box 383
Buckeye, AZ 85326

Larry Flatau
Corp of Engineers

Mr. E.C. "Sid" Friar
P.O. Box 52025
Phoenix, AZ 85072

John Genzale
Managing Editor
Mesa Tribune
P.O. Box 1547
Mesa, AZ 85211

Bill Grimes
KPHO-TV
4016 N. Black Canyon Hwy
Phoenix, AZ 85036

Mr. Bill Hamann
Engineering Department
City of Phoenix
125 E. Washington
Phoenix, AZ 85004-2342

Mr. Kenny Harris
City Engineer
City of Phoenix
125 E. Washington
Phoenix, AZ 85004

Mr. Tim Henley
Dept. of Water Resources
15 S. 15th Ave.
Phoenix, AZ 85007

HNTB
40 N. Central Ave.
Suite 1100
Phoenix, AZ 85004

Mr. L. Craig Hoffman
Manager
US West
6350 South Maple, Room 125
Tempe, AZ 85283

Mr. Chuck Hughes
Senior Power Consultant
SRP
P.O. Box 52025
Phoenix, AZ 85072-2025

Mr. Jim Jones
Public Works Director
City of Tempe
31 E. 5th Street
Tempe, AZ 85281

Mr. Ray Jordan
ADOT
Urban Highway Division
205 S. 17th Avenue, 216E
Phoenix, AZ 85007

Mr. Kevin Kadlec
Public Services Director
City of Peoria
8401 W. Monroe Street
Peoria, AZ 85345

Mr. Lynn Kartchner
Public Works Director
City of Goodyear
119 N. Litchfield Road
Goodyear, AZ 85338

Larry Klein
KTSP-TV
511 W. Adams
Phoenix, AZ 85003

Mr. Lucius Kyyitan
Chairman, Mat. Res. Comm.
Gila River Indian Comm.
P.O. Box 97
Sacaton, AZ 85247

Mr. Larry Landry
Landry & Associates
2 North Central #1950
Phoenix, AZ 85004

Mr. Richard Lee
4742 N. 24th Street
Court One, Fourth Floor
Phoenix, AZ 85016

Mr. Terry Hughes
Technician
Southwest Gas
P.O. Box 52075
Phoenix, AZ 85072-2075

Mr. Bob Jones
Sundt Corp
7301 N. 14th Street
Phoenix, AZ 85020

Col. Robert L. VanAntwerp, Jr.
U.S. Army Corps of Engrs.
Los Angeles District
P.O. Box 2711
Los Angeles, CA 90053

Mr. John Karakawa
Corps of Engineers
U.S. Army Engineer District
P.O. Box 2711
Los Angeles, CA 90053

Ms. Emmett Kelley
SRP
P.O. Box 52025
Phoenix, AZ 85072-2025

Mr. Robert Koplin
Corps of Engineers
U.S. Army Engineer District
P.O. Box 2711
Los Angeles, CA 90053

Arthur N. Brooks, P.E. , L.S.
Brooks, Bersey & Assoc., Inc.
5246 S. 40th Street
Phoenix, AZ 85040

Mr. Bob Larchick
SRP
P.O. Box 52025
Phoenix, AZ 85072-2025

Mrs. Julie Lemmon
1212 E. Osborne
Phoenix, AZ 85014

BG Milton Hunter
Commander, South Pacific Division
U.S. Army Corps of Eng.
630 Sansome Street
San Francisco, CA 9411-2206

Mrs. Marlyne Jones
6628 E. Thunderbird
Scottsdale, AZ 85251

Don E. McDaniel, Jr.
Deputy County Manager

Nicholas P. Karan
8831 N. 17th Lane
Phoenix, AZ 85021

Mr. Kyle Kindemann
Buckeye Irrigation District
P.O. Box 726
Buckeye, AZ 85326

Mr. Chris Kronick
Corps of Engineers
U.S. Army Engineer District
P.O. Box 2711
Los Angeles, CA 90053

Paul Lagwig
KPNX-TV
P.O. Box 711
Phoenix, AZ 85001

Maryann Laskey
Editor
Daily News-Sun
10102 Santa Fe Drive
Sun City, AZ 85351

Ms. Cindy Lester
Corps of Engineers
U.S. Army Engineer District
3636 N. Central, Suite 740
Phoenix, AZ 85012

Mr. Steve Lewis
Sundt Corp
4101 E. Irvington Road
Tucson, AZ 85714

Mr. Ron G. Long
Public Works Director
Town of Buckeye
Box 157
Buckeye, AZ 85326

Mr. Tom Luzano
Corps of Engineers
U.S. Army Engineer District
P.O. Box 2711
Los Angeles, CA 90053

Mr. Kenneth Lewis, Project Manager
Boyle Engineering Corporation
7600 North 16th Street, Suite 110
Phoenix, AZ 85020

Dan McCarthy
Editor
Tempe Daily News
P.O. Box 3099
Tempe, AZ 85281

Mike McGrevey
City Editor
The Phoenix Gazette
120 E. Van Buren St.
Phoenix, AZ 85004

Mr. William Mead
Town of Paradise Valley
6401 E. Lincoln Dr.
Paradise Valley, AZ 85253

Mr. Rod Troyer, P.E., Project Mgr.
John Carollo Engineers
3877 North 7th Street, Suite 400
Phoenix, AZ 85014-5005

Mr. Ronald P. Morency
Distribution Engineer
Southwest Gas
P.O. Box 52075, Sta. 42W5
Phoenix, AZ 85072-2075

Major Robert Van Der Like
Corp of Engineers

Mr. Charles K. Luster
City Manager
P.O. Box 1466
Mesa, AZ 85211-1466

Al Macias
KPNX-TV
P.O. Box 711
Phoenix, AZ 85001

Mr. Roger S. Manning
AZ. Mun. Water Users Assoc.
4041 N. Central Ave., #900
Phoenix, AZ 85012-3309

Mr. Richard McComb
Community Development
Town of Surprise
12604 Santa Fe Drive
Surprise, AZ 85374

Mr. Richard McKinley
Phoenix Country Day School
3901 East Stanford Dr.
Paradise Valley, AZ 85253

Mr. Gene Merritt
Public Works Director
Town of Gila Bend
644 W. Pima Street
Gila Bend, AZ 85337

Robert Mickelson
Deputy State Engineer
ADOT
205 S. 17th Ave., Rm. 200E
Phoenix, AZ 85007

Terri Mulholland
Public Information

Julia Lobaco
The Arizona Republic
251 W. Washington St.
Press Room, 9th Floor
Phoenix, AZ 85003

Mr. Stan Lutz
Corps of Engineers
U.S. Army Engineer District
P.O. Box 2711
Los Angeles, CA 90053

Mr. Cruz Maldonado
3221 N. 16th Street
Phoenix, AZ 85016

Mr. Bill Mathews
Mathews, Kessler, & Associates
4045 E. McDowell Road
Phoenix, AZ 85008

Dan Sagramoso, MCDOT

Mr. Michael McNulty
Town Administrator
Town of Queen Creek
22350 S. Ellsworth Road
Queen Creek, AZ 85242

Mr. Don Metz
U.S. Fish and Wildlife Service
3616 W. Thomas Road, Suite 6
Phoenix, AZ 85019

Ms. Terri Miller
Engineering Division
Dept. of Water Resources
15 S. 15th Avenue
Phoenix, AZ 85007

Jack Mullins
Republic/Gazette/N.Cent. Ed.
120 E. Van Buren St.
Phoenix, AZ 85004

Mr. Michael Murphy
Sundt Corp
2604 S. 20th Place
Phoenix, AZ 85034

Mr. Robert Musselwhite
Public Works Manager
City of Litchfield Park
214 W. Indian School Road
Litchfield Park, AZ 85340

Ms. Sue Mutschler
3833 N. 35th Place
Phoenix, AZ 85018

Mike Neilson
Az. Wildlife Federation
644 N. Country Club Dr.
Mesa, AZ 85201

Mr. Steve Nielsen
City of Tempe
115 E. 5th Street, #2
Tempe, AZ 85281

Paul Nordin
Town Manager
Town of Fountain Hills
P.O. Box 17958
Fountain Hills, AZ 85269

Mr. Joe Nyikes
Roosevelt Water Conservation
P.O. Box 100
Higley, AZ 85236

Coney Orosco
Public Works Director
Town of Wickenburg
Box 1269
Wickenburg, AZ 85358

Douglas C. Nelson, P.C.
1001 N. Central Avenue, #601
Phoenix, AZ 85004

Louis A. Schmitt, P.E.
Assistant County Manager

Mr. Brian J. Fry, P.E.
NBS/Lowry
2600 North 44th Street
Phoenix, AZ 85008-1599

Mr. Harold E. Ditzler, P.E.
Executive Vice President, Project Mgr.
RGA Engineering Corporation
2633 E. Indian School Road, Ste. 401
Phoenix, AZ 85016-6741

Mr. Bob Herz, P.E.
Utilities & Roadway Design
RGA Engineering Corporation
2633 East Indian School Road
Suite 401
Phoenix, AZ 85016-6741

Mr. Stephen R. Walker, P.E.
CH2M Hill
P.O. Box 28440
Tempe, AZ 85285-8440

Mr. Harold E. Gerdin, P.E.
Creegan + D'Angelo
Principal Engineer
650 North Second Avenue
Phoenix, AZ 85003

Mr. Jerry Arakaki, P.E.
Waste & Wastewater
City of Phoenix
455 N. 5th Street
Phoenix, AZ 85004

Mr. John Fischer, P.E.
Sverdrup Corporation
Project Manager
432 North 44th Street, Suite 250
Phoenix, AZ 85008

Mr. Jack Gonsalves, P.E.
URS Consultants
Two Gateway
432 N. 44th St., #163
Phoenix, AZ 85008

Mr. George E. Shirley, P.E.
John Carollo Engineers
3877 North Seventh Street, Suite 400
Phoenix, AZ 85014-5005

Mr. Richard J. Morris P.E.,
RGA Engineering Corporation
Civil Engineer
2633 E. Indian School Road, Ste. 401
Phoenix, AZ 85016-6741

Mr. Roger E. Baele, P.E.
David Evans & Associates
2929 East Camelback Road
Suite 240
Phoenix, AZ 85016

Mr. Ross Blakely, P.E.
City of Phoenix
125 East Washington
Phoenix, AZ 85004

Mr. Dennis L. Richards, P.E.
Simons, Li & Associates, Inc.
4600 S. Mill Avenue, #280
Tempe, AZ 85282-6759

Mr. Frank K. Duren, Jr., P.E.
JMM COnsulting Engineers, Inc.
6245 North 24th Pkway #208
Phoenix, AZ 85016

Mr. Rosendo Gutierrez, P.E.
Vice President
RGA Engineering Corporation
2633 E. Indian School Road, Ste. 401
Phoenix, AZ 85016-6741

Mr. Seetha V. Ramaiah, P.E.,
Project Mgr.
Parsons Brinkerhoff Quade & Douglas
1501 West Fountainhead Parkway,
Suite 400
Tempe, AZ 85282

William Kantor Jr., P.E.
Entranco Engineers
2400 West Dunlap, #100
Phoenix, AZ 85021

Mr. Mike Padgett
Phoenix Gazette
120 E. Van Buren St.
Phoenix, AZ 85004

Mr. Bob Payette
9803 Pebble Beach Dr.
Sun City, AZ 85351

Mr. Richard Perry
NBS/Lowry
2600 North 44th Street
Phoenix, AZ 85008-1599

Joe Pickens
Corp of Engineers

Mr. Ron Pulice
Pulice Construction
2033 W. Mountainview Road
Phoenix, AZ 85021

Larry Reiley
Arizona Game/Fish Dept.
2222 W. Greenway Rd.
Phoenix, AZ 85023

Mr. Larry Richmond
1640 W. Thomas
Phoenix, AZ 85015

Joe Robertucci
Corp of Engineers

Mr. Paul Ruff
Professor
Engineering Center
Arizona State University
Tempe, AZ 85287-5306

Mr. Bill Parrish
MCDOT
Engineering Division

Mr. Jonathan Pearson
Town Engineer
Town of Carefree
Box 740
Carefree, AZ 85377

Mr. Alfred Pfahl
Asst. Public Works Director
Clty of Chandler
200 East Commonwealth
Chandler, AZ 85225

Bill Polish
News Director
KTAR-AM/KKLT-FM
301 West Osborn Road
Phoenix, AZ 85013
Ken Quartermain
Home Builders Association
2111 E. Highland, #190
Phoenix, AZ 85016

Mr. Chris Reinesch
Sunward Material
2625 S. 19th Ave.
Phoenix, AZ 85009

Mr. Hector Riojas
Superviosr, Engineering/Papago Div.
Southwest Gas Corporation
9 South 43rd Ave.
P.O. Box 52075
Phoenix, AZ 85072-2025

Mr. John Rodriguez
220 West Country Gables
Phoenix, AZ 85023

Mr. Joe Ruiz
Public Works Director
Town of Guadalupe
9050 S. Avenida Del Yaqui
Guadalupe, AZ 85283

Ms. Monica Pastor
Maricopa County Farm Bureau
3401 E. Elwood, Suite 100
Phoenix, AZ 85040

Jack Penland
News Director
KTVK-TV
3435 North 16th Street
Phoenix, AZ 85016

Mr. Tim Phillips
Operational Support
SRP
P.O. Box 52025
Phoenix, AZ 85072-2025
Pat Powers
News Director
KOY
840 North Central Ave.
Phoenix, AZ 85004

Adron Reichert
6402 S. 107th Avenue
Tolleson, AZ 85353

Mr. Sam Richardson
Corps of Engineers
U.S. Army Engineer District
P.O. Box 2711
Los Angeles, CA 90053

Mr. Al Risinger
SRP
P.O. Box 52025
Phoenix, AZ 85072-2025

Mr. Jim Rowley
SRP
P.O. Box 52025
Phoenix, AZ 85072-2025

Frank Russo
Emergency Management

Kelly Ryan
Corp of Engineers

Mr. George Sabol
1331 17th Street
Suite 700
Denver, Colorado 80202

Joe Salinaz
Corp of Engineers

Mr. Tom Sands
SRP
P.O. Box 52025
Phoenix, AZ 85072-2025

Bill Scalzo
Parks and Recreation

Mr. Ron Schlosser
320 N. 1st Ave., Suite 900
Phoenix, AZ 85003

Ms. Denise Schmoldt
Sundt Corp
7301 N. 14th Street
Phoenix, AZ 85020

Mr. Dennis Schroeder
Project Manager
Bureau of Reclamation
P.O. Box 9980
Phoenix, AZ 85068

Mr. Vernon S. Schweigert
President
Rostland Arizona, Inc.
2626 E. Arizona Biltmore
Phoenix, AZ 85016

Mr. Dennis Sholtz
City of Phoenix
125 East Washington
Phoenix, AZ 85004

Mr. Gary Siders
P.O. Box 1806
Vickerville, CA 92393

Mr. Bob Sleigher
Mountain Bell
4425 West Olive Avenue, Room 211
Glendale, AZ 85302

Mr. Dave Smutzer
Pima County Flood Control
201 North Stone, 4th Floor
Tucson, AZ 85701-1207

MG John B. Sobke
Deputy Chief of Engineers
U.S. Army Corps of Engineers
20 Massachusettes Ave., N.W.
Washington, D.C. 20314-1000

Mr. Jose Solarez
City Manager
City of El Mirage
14405 North Palm Street
El Mirage, AZ 85335

Mr. Wayne Stamper
Mesa Materials, Inc.
3410 N. Higley Road
Mesa, AZ 85205

Mr. Carl J. Stephani
Town Manager
Town of Cave Creek
37622 N. Cave Creek Road
Cave Creek, AZ 85331

Don Steuter
Sierra Club-Palo Verde Group
2508 East Heatherbrae
Phoenix, AZ 85016

Mr. Charles Strand
Public Works Director
Town of Gilbert
459 N. Gilbert Road
Gilbert, AZ 85234

Ms. Ginnie Ann Sumner
4739 East Lewis
Phoenix, AZ 85008

Leo Synder
Corp of Engineers

Ms. Blair Tanner
Dimension Cable
17602 N. Black Canyon Hwy
Phoenix, AZ 85023

Ruth Tegeler
Corp of Engineers

Mr. Charles Tipton
Phoenix Country Day School
3901 East Stanford Dr.
Paradise Valley, AZ 85253

Ms. Marie Torres
Sundt Corp
2604 S. 20th Place
Phoenix, AZ 85034

Chief William Trotter
Building Department
City of Tolleson
9555 W. Van Buren Street
Tolleson, AZ 85353

Ms. Kris VanDenburgh
7033 N. Wilder Road
Phoenix, AZ 85021

Mr. Clarence VanDerHart
Sr. Customer Service Rep.
APS
P.O. Box 53999
Phoenix, AZ 85072-3999

Mr. Bill Wheeler
Central AZ Project Assoc.
6317 N. 14th Street
Phoenix, AZ 85014

Ed Wolfe
Clerk of the Board

Dennis Zwagerman
Dir. of Planning & Develop.
General Services

Ms. Sally Vanderlaan
2618 N. 51st Street
Phoenix, AZ 85008

Governor Thomas White
Gila River Indian Comm.
P.O. Box 97
Sacaton, AZ 85247

Michael Wong
Execitive Prod. of Az Weekly
KAET-TV
Arizona State University
Tempe, AZ 85287

Mr. Grant Ward
Central Arizona Water
Conservation District
23636 North 7th Street
Phoenix, AZ 85024

Ms. Lois Winkler
Liaison Agent
APS
P.O. Box 53999, Sta. 3278
Phoenix, AZ 85072-3999

Mr. Terry Zerkle
City Manager
P.O. Box 5002
Tempe, AZ 85281

extensive recreation activities in the channel area (approximately 500 feet wide and 20 feet deep), called "Thunderbird Paseo."

Reach 2 extends 4.7 miles from Cactus Road to Cave Creek (23rd Avenue). It is a 110-foot wide concrete rectangular channel with the exception of the 160- to 200-foot wide concrete trapezoidal area from Cactus to 47th Avenue (0.75 miles). The walls through Reach 2 are approximately 21 feet deep.

Reach 3 is a 50- to 60-foot wide, 20.5- to 23.5-foot deep concrete channel that runs 3.6 miles from Cave Creek to Dreamy Draw (12th Street). In this reach, the channel will be covered for 2,565 feet so Sunnyslope High School can continue to use its athletic fields.

Reach 4 stretches 4.2 miles from Dreamy Draw to Cudia City Wash near 40th Street. It is also a concrete rectangular channel, but is 36 to 40 feet wide and 20.5 to 24.5 feet deep. From 24th Street to approximately 30th Street, through the Arizona Biltmore Hotel area, the channel will be covered because the cost of covering it is less than the cost of obtaining additional rights-of-way. Also, 1,297 feet beneath Stanford Drive east of 32nd Street will be covered to avoid the cost of relocating Stanford Drive.

In 1991, Congress approved $5.5 million in additional funding (at the request of the City of Phoenix and Town of Paradise Valley) to cover portions of the ACDC that were originally planned to remain open. In Reach 3, 150 feet east of Central Avenue will be covered. In Reach 4, two other areas will be covered: 1,760 feet west from 32nd Street, and beginning 1,250 feet east of 32nd Street to the Cudia City Wash Spillway. Phoenix and Paradise Valley will provide 10% of the cost of covering the areas in their respective jurisdictions.

The *Cave Creek Sediment Basin* is south of the Sweetwater alignment. The City of Phoenix has already developed some of its adjoining right-of-way for recreational activities.

The *Cave Creek Channel*, a concrete channel within Phoenix's Cave Creek Park, will convey storm runoff from the Cave Creek Sediment Basin to the ACDC. Underpasses at Peoria and Cactus Roads and six pedestrian bridges have been constructed. The maintenance road will be available for hiking, bicycling, equestrian, and other non-vehicular recreation uses.

The *Cudia City Wash Sediment Basin* is on the grounds of the Phoenix Country Day School near 40th Street and Camelback Road. The basin slopes gradually, and is unlined and relatively unobtrusive. The school's athletic fields, but no structures, will be located within the basin.

Under the direction of the Flood Control District, twenty-four vehicular bridges were built at all present crossings of the Arizona Canal, as well as several new pedestrian bridges.

As a part of its construction responsibilities, the U.S. Army Corps of Engineers is providing landscaping to blend with the existing neighborhoods and other aesthetic treatments, often adapting recommendations from citizen committees in the affected areas. Additionally, bridge railings, screening walls, existing back yard fences, and the banks of the Arizona Canal will help screen the ACDC from the adjacent neighborhoods. Additionally, the Arizona Canal and the ACDC will share a maintenance road, which will also double as a bike path. The existing equestrian path will be adjacent to the maintenance road.

A wrought-iron-look safety fence will prevent access to the channel. It will be built at the top of the channel and will be partially visible because of the slope from ground level to the channel walls. In most areas, the south walls will nearly adjoin the north boundary of the Salt River Project right-of-way.

COSTS and Sponsors

Using Federal money, the U.S. Army Corps of Engineers designed and constructed the overall project, including the ACDC. The Flood Control District of Maricopa County is the local sponsor and is responsible for acquiring land, building bridges, and relocating utilities. The Flood Control District also supplies the manpower and finances to maintain the ACDC, including maintaining the landscaping on the banks. The Flood Control District is funded by a secondary tax levy on all real property in Maricopa County.

The cities along the ACDC's path—Paradise Valley, Phoenix, Glendale, and Peoria—studied and approved the project through their city limits, and Glendale and Phoenix share the maintenance responsibilities in areas where there are recreation features. The cost of the Phoenix, Arizona and Vicinity (including New River) Flood Control Project and of the ACDC is outlined below.

	Cost (million)		
	Federal	Local	Total
Overall Project	$254	$168	$422
ACDC	$152	$102	$254

For more information on this or any other District project, contact:

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

On the cover: Cyclists enjoy the recreation paths in the Thunderbird Paseo part of the ACDC. Recreational amenities were funded by the City of Glendale.

THE ARIZONA CANAL DIVERSION CHANNEL

Another flood control project for Maricopa County

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

WHAT is the ACDC?

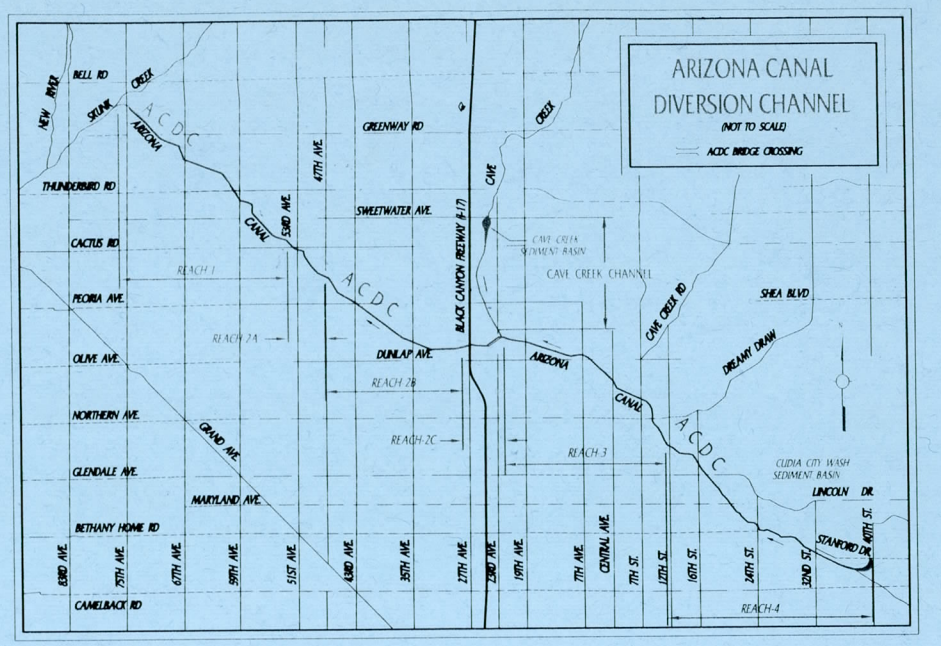
The Arizona Canal Diversion Channel (ACDC) is a 16.5-mile channel designed to intercept stormwater runoff that occurs north of the Arizona Canal from large urban washes such as Cave Creek, Dreamy Draw, and Cudia City Wash, as well as city stormdrains. The ACDC drains the stormwater to Skunk Creek to prevent flooding on city streets in large portions of Phoenix, as well as Peoria and Glendale.

The ACDC is an integral part of the Phoenix, Arizona and Vicinity (including New River) Flood Control Project. As a part of the overall project, the ACDC is designed to protect developed areas—including parts of Phoenix, Glendale, Peoria, and the state Capitol complex—up to the 100-year level (the level that has a 1% chance of happening every year). In the metropolitan Phoenix area, the 100-year flood would inundate 31,540 acres.

WHAT is the Phoenix and Vicinity Project?

The Phoenix and Vicinity (including New River) Flood Control Project is part of a five-phase flood control plan for the metropolitan Phoenix area. The plan was developed between 1959 and 1963. Congress authorized federal funding for the Phoenix and Vicinity project in 1965. The project was designed by the U.S. Army Corps of Engineers. The Flood Control District of Maricopa County, as the local sponsor for the project, acquired rights-of-way, built bridges, and relocated utilities to clear the way for construction.

The entire Phoenix and Vicinity Project includes dams on Dreamy Draw, Cave Creek, Skunk Creek, and New River; channelization of Cave Creek; and bank stabilization and acquisition of flowage easements on Skunk Creek, New River, and Agua Fria. These structures work together with the ACDC to provide substantial flood relief for residents in Phoenix, Glendale, and Peoria.



WHAT causes Area Flooding?

Late-winter frontal storms and high intensity summer thunderstorms (monsoons) can produce flooding throughout the greater Phoenix area. The natural paths of the streams and overland flows that carry the stormwater from the mountain, desert, and urban areas run southwesterly across the metropolitan area and into the Salt and Gila Rivers. Although the Arizona Canal was built to distribute irrigation water, it also acts as a dam to these natural flows. After its construction, the water either ran into the canal, or ponded along its northern bank—resulting in flooding.

South of the Arizona Canal, the natural channels were leveled by agricultural, then residential, development which resulted in flooding problems during major storms. Significant rains drained into the Arizona Canal and quickly exceeded its capacity, pouring over spillways to the south. These flows caused breaks in the south bank, and in the absence of the natural channels, frequently raced down streets, through yards, and into homes and businesses.

HOW will the ACDC help?

Within its 100-year design capacity, the ACDC will eliminate the overtopping and levee failures along the Arizona Canal and the subsequent flooding of urban Phoenix.

It will be constructed below ground surface, so stormwater will flow into it easily through inlet structures where the flows from major drains enter the channel; pipes will be used where local ponding occurs. Stormdrains constructed by the City of Phoenix will also empty into the ACDC.

Completion of the ACDC will allow existing drainage to be modified by: 1) Placing storm drains north of the Arizona Canal that empty into the ACDC where water will be carried to Skunk Creek, preventing ponding on the north side; and 2) Intercepting flows that would have gone into the Arizona Canal preventing flooding south of the canal.

The ACDC also introduces a new drainage concept south of the canal. Since the ACDC carries away runoff from areas north of it, storm drains south of the ACDC carrying water to the Salt River can be made much smaller. With the decreased drain size, the cities save a large amount of money without decreasing protection.

WHAT are the elements of the ACDC?

The ACDC project is composed of four reaches, two sediment basins, the Cave Creek Channel, vehicular and pedestrian bridges, as well as recreation areas, bicycle and equestrian paths, and underpasses. Primarily a rectangular concrete channel, the different elements of the ACDC have different specifications.

Reach 1 is a 4-mile long earthen channel extending from Skunk Creek to Cactus Road, within the cities of Glendale and Peoria. Glendale has built

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

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

2. I am licensed with an expertise in Civil Engineering
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 18 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 design, were performed in accordance with sound engineering practices:

7. Based upon the following review, the modifications in place have been constructed in general accordance with plans and specifications.

Basis for above statement: (check all that apply)

a. ☒ Viewed all phases of actual construction.
b. ☐ Compared plans and specifications with as-built survey information.
c. ☒ Examined plans and specifications and compared with completed projects.
d. ☐ Other _____

8. All information submitted in support of this request is correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Neil S. Erwin
(please print or type)

Title: Chief Engineer and General Manager
(please print or type)

Registration No. 13870 Expiration Date: September 30, 1996

State Arizona

Type of License Engineer/Civil

Signature

11-10-93
Date

Seal
(Optional)

*Specify Subdiscipline

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

CS92110 5

61425

When Recorded, Return to:
FLOOD CONTROL DISTRICT
2801 West Durango Street
Phoenix, Arizona 85009

INTERGOVERNMENTAL AGREEMENT #91012
AMONG THE FLOOD CONTROL DISTRICT
CITY OF PHOENIX AND TOWN OF PARADISE VALLEY
FOR IMPLEMENTATION OF ADDITIONAL COVERING
FOR ARIZONA CANAL DIVERSION CHANNEL, REACHES 3 AND 4

This Agreement is entered into by and among the Flood Control District of Maricopa County, a municipal corporation and political subdivision of the State of Arizona (DISTRICT), the City of Phoenix, Arizona, a municipal corporation (PHOENIX) and the Town of Paradise Valley, Arizona, a municipal corporation (PARADISE VALLEY).

This Agreement shall become effective as of the date it is filed with the Maricopa County Recorder, pursuant to Arizona Revised Statutes 11-952, as amended. DATE FILED: Feb 24, 1992 # 92-090163.

STATUTORY AUTHORIZATION

1. The DISTRICT is empowered by Arizona Revised Statutes 48-3603 to enter into this Agreement.

2. PHOENIX is empowered by Chapter II, Section 2 of the Phoenix City Charter and by Arizona Revised Statutes 11-952, as amended, to enter into this Agreement.

3. PARADISE VALLEY is empowered by Arizona Revised Statutes 11-952, as amended, to enter into this Agreement.

BACKGROUND

4. The Arizona Canal Diversion Channel, part of a federal flood control project authorized by Congress in 1965, was designed as an open concrete-lined channel, with the exception of three covered areas in Phoenix and the Town of Paradise Valley. In 1991, Congress approved and the President signed into law the National Defense Authorization Act (NDAA) for fiscal years 1992 and 1993, which directs and authorizes the U.S. Army Corps of Engineers to cover portions of the Arizona Canal Diversion Channel, the term CHANNEL for this Agreement being defined as the newly authorized areas to be covered:

9. The DISTRICT will:

9.1 Establish an account solely for the purpose of administering the funds to pay for the CHANNEL cover. At the conclusion of the installation of the CHANNEL cover, funds remaining in the account, if any, will be returned in amounts proportional to the funds received from the parties for the CHANNEL covering, as set forth in Parts 4(b) and 4(c) above. Any of the cost-sharing funds contributed by PHOENIX for the CHANNEL covering set forth in Part 4(a) above which may remain in the account shall be refunded entirely to PHOENIX.

9.2 Provide PHOENIX and PARADISE VALLEY the opportunity to review the Corps of Engineers' landscaping plans for the covered CHANNEL. If either PHOENIX and/or PARADISE VALLEY determine that additional landscaping is required, the DISTRICT will work with them to develop an Intergovernmental Agreement, at no cost to the DISTRICT, for the purpose of preparing plans and specifications for the additional landscaping.

9.3 Invoice PHOENIX and PARADISE VALLEY for the required 10% cost-share for the covering of the CHANNEL, upon receipt of such bills from the Corps of Engineers.

9.4 Provide no funds for the design or implementation of the covering of the CHANNEL except the 2.3% pursuant to the "221 Agreement". All funds for the 10% cost-share for the covering, will be paid by PHOENIX and PARADISE VALLEY.

10. PHOENIX will:

10.1 Provide citizen input and access to a conceptual landscaping plan to be used by the Corps of Engineers for the preparation of a landscaping plan for the covered CHANNEL within the boundaries of PHOENIX.

10.2 Deposit with the DISTRICT, its share of funds sufficient to cover the cost of the required 10% cost-share for the CHANNEL cover within the boundaries of PHOENIX upon receipt of such invoices from the DISTRICT, in accordance with Paragraph 9.3 of this Agreement.

10.2.1. If actual costs exceed the estimated costs identified in Paragraph 5 of this Agreement, PHOENIX will, subject to City Council approval and appropriation, contribute those additional costs.

11. PARADISE VALLEY will:

11.1 Provide citizen input and access to a conceptual landscaping plan to be used by the Corps of Engineers for the preparation of a landscaping plan for the covered CHANNEL.

11.2 Deposit with the DISTRICT, its share of funds sufficient to cover the cost of the required 10% cost-share for the CHANNEL cover within the boundaries of PARADISE VALLEY upon receipt of such invoices from the DISTRICT, in accordance with Paragraph 9.3 of this Agreement.

11.2.1. If actual costs exceed the estimated costs identified in Paragraph 5 of this Agreement, PARADISE VALLEY will, subject to Town Council approval and appropriation, contribute those additional costs.

12. All parties agree to indemnify and save harmless each other and any of their departments, agencies, officers or employees, from and against all loss, expense, damage or claim of any nature whatsoever that is caused by any activity, condition or event arising out of the nonperformance by any party of any of its obligations under the provisions of this Agreement. All parties shall in all instances be indemnified against all liability, losses and damages of any nature for or on account of any injuries to, or death of, persons, or damages to or destruction of property arising out of, or in any way connected with each party's performance or nonperformance of this Agreement, except such injury or damage as shall have been occasioned by the negligence of that party. The above cost of damages incurred by any party or its department, agencies, officers or employees, shall include in the event of an action, court costs, expenses for litigation and reasonable attorney's fees.

13. This Agreement will remain in effect until the CHANNEL cover is implemented and paid for in full in accordance with the cost share obligations identified in this Agreement, by PHOENIX and PARADISE VALLEY.

14. This Agreement may be amended or terminated upon mutual written agreement of the parties, in accordance with Arizona Revised Statutes 38-511.

TOWN OF PARADISE VALLEY

John L Bauder, city Manager

By: John L. Bauder

Attest:

By: Lenore Lancaster 1/3/92
City Clerk Date

The foregoing Intergovernmental Agreement has been reviewed pursuant to Arizona Revised Statutes 11-952, as amended, by the undersigned attorney, who has determined that it is in proper form and within the power and authority granted to the Town of Paradise Valley under the laws of the State of Arizona.

12.20.91

Town Attorney Date

CITY OF PHOENIX

Frank Fairbanks, City Manager

By: Assistant City Manager

Attest:

By: Vicky Mack
City Clerk Date

The foregoing Intergovernmental Agreement has been reviewed pursuant to Arizona Revised Statutes 11-952, as amended, by the undersigned attorney, who has determined that it is in proper form and within the power and authority granted to the City of Phoenix under the laws of the State of Arizona.

ACTING City Attorney 1/16/92 Date

1992 JAN 17 AM 11:32
CITY CLERK DEPT.

FYI. VLH

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AGENDA FORM

Contract/Lease for ☐ NEW ☐ RENEWAL ☐ AMENDMENT ☐ CANCELLATION
(for existing, record Encumbrance No. below)

LOW ORG. NO. 6900 DEPARTMENT: Flood Control District CONTROL NUMBER: FCD-1324

ENCUMBRANCE NO. CS921105 AGENCY: _____ CONTROL NUMBER: PW-92

1. BRIEF DESCRIPTION OF PROPOSAL AND REQUESTED BOARD ACTION: It is requested that the Board of Directors approve an intergovernmental agreement among the Flood Control District of Maricopa County, the Town of Paradise Valley, and the City of Phoenix to permit the District to establish a special account to convey funds from the City of Phoenix and Town of Paradise Valley to the U.S. Army Corps of Engineers (Corps) for the 10% local cost-sharing required of those two municipalities for additional covering of the Arizona Canal Diversion Channel (ACDC) as approved by Congress and signed by the President. The District, as the local sponsor for the channel, has been asked by the municipalities to coordinate, accept and transfer the funds to the Corps in an effort to save time and expense that would result if they were to negotiate separate agreements with the Corps.

This agreement requires no District funds, only administrative support.

The Flood Control Advisory Board was apprised of this agreement and its importance at its December 18, 1991 meeting.

2. COMPLIANCE WITH MARICOPA COUNTY PROCUREMENT CODE XIX article N/A paragraph Procurement Officer

SOLE SOURCE JUSTIFICATION _____

3. CONTINUED FROM MEETING OF _____
DISCUSSED IN MEETING OF _____

4. ☐ THIS DEPARTMENT WILL CAUSE PUBLICATION
☐ CLERK OF THE BOARD TO CAUSE PUBLICATION

5. MOTION: It is moved that the Flood Control District of Maricopa County Board of Directors . . . approve Intergovernmental Agreement FCD-91012 to establish a special account to coordinate, accept and transfer to the U.S. Army Corps of Engineers funds deposited to that account from the City of Phoenix and Town of Paradise Valley as their 10% federally required cost-share for additional covering of the Arizona Canal Diversion Channel, of which the Flood Control District of Maricopa County is local sponsor.

6. FINANCIAL: ☐ Expenditure ☐ Revenue ☐ Budgeted ☐ Contingency ☐ Budget Amendment ☐ Transfer ☐ Grant or other

$ _____ Total _____ Fund _____ Financial Officer _____ Date

7. PERSONNEL:
_____ Personnel Director _____ Date

8. FLOOD CONTROL DISTRICT:
Stanley G. Smith 1-20-92
Action Recommended by Date

9. MATERIALS MANAGEMENT:
A. _____ Materials Management Director _____ Date
B. _____ M/WBE Representative _____ Date

10. LEGAL: Approved as to form and within the powers and authority granted under the laws of the state of Arizona to the Flood Control District of Maricopa County Board of Directors.
Julie M. Lemmon 1/20/92
General Counsel Date

11. OTHER: _____
_____ Signature _____ Date

12. APPROVED FOR AGENDA:
James A. Schmutt 1-21-92
Approving Official Date

13. OTHER: _____
_____ Signature _____ Date

14. BOARD OF DIRECTORS: Action taken:
☐ Approved ☐ Amended ☐ Disapproved ☐ Deleted
Continued to: _____ (Date and type of meeting)
Fran McCarroll FEB. 18 1992
Clerk of the Board Date

15. RECOMMENDATION OF COUNTY MANAGER:
☐ Approve ☐ Disapprove
Comments:
_____ County Manager _____ Date

Federal Emergency Management Agency

Washington, D.C. 20472

Phoenix File

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
102A

The Honorable Paul Johnson
Mayor, City of Phoenix
251 West Washington
Phoenix, Arizona 85003

Community: Maricopa County, Arizona
and Incorporated Areas
Map Panel Numbers: 04013C1655 F
04013C1665 E
Effective Date
of This Revision: MAY 5 1992

Dear Mayor Johnson:

This is in response to a letter dated March 30, 1992, from Mr. Ron Nevitt, Floodplain Representative, Flood Control District of Maricopa County, regarding the effective Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. Mr. Nevitt requested that we revise the effective FIRM to show the effects of the Arizona Canal Diversion Channel (ACDC) from Dunlap Avenue to the zone break for the Tenth Street Wash near Butler Drive. The ACDC is a Federal flood control project designed and constructed by the U.S. Army Corps of Engineers. Mr. Nevitt submitted all necessary data in support of his request with his letter dated March 30, 1992.

We have completed our review of the submitted data with regard to the data used to produce the effective FIRM and have revised the FIRM to modify the floodplain boundary delineations of a flood having a 1-percent probability of being equaled or exceeded in any given year (base flood) along the ACDC from Dunlap Avenue east to the zone break for the Tenth Street Wash just upstream of Butler Drive. The 100-year flood is shown to be contained within the right-of-way of the ACDC for this reach. Although the Special Flood Hazard Area (SFHA) increases in the vicinity of Central Avenue and Ruth Avenue, this flooding is still contained within the right-of-way of the channel.

The modifications are shown on the enclosed annotated copies of FIRM Panels 04013C1655 F and 04013C1665 E. This Letter of Map Revision (LOMR) hereby revises these panels of the effective FIRM dated September 4, 1991.

Because of current funding constraints, we must limit the number of physical map revisions. Consequently, we will not publish a revised FIRM for Maricopa County and Incorporated Areas to reflect modifications at this time. However, we will incorporate the previously described modifications in our next physical map revision for Maricopa County, Arizona and Incorporated Areas. The tentative date for the next preliminary FIRM is summer 1992.

These modifications have been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 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, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR, Part 65. As required by the legislation, a community must adopt and enforce floodplain management measures to ensure continued eligibility to participate in the National Flood Insurance Program (NFIP). Therefore, your community must enforce these regulations using, at a minimum, the base (100-year) flood elevations, zone designations, and floodways in the SFHAs shown on the FIRM and Flood Boundary and Floodway Map for your community, including the previously described modifications.

This response to your request is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all proposed floodplain developments, 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 the City of Phoenix has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP requirements.

The basis of this LOMR is a channel-modification project. NFIP regulations, as cited in Section 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 channel modification rests with your community.

The community number and suffix code listed above will be used for all flood insurance policies and renewals issued for your community on and after the effective date listed above.

The modifications described herein are effective as of the date of this letter. However, a review of the modifications and any requests for changes should be made within 30 days. Any request for reconsideration must be based on scientific or technical data.

This LOMR will not be printed and distributed to primary map users such as local insurance agents and mortgage lenders; therefore, the community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR widely throughout the community in order that interested persons such as property owners, insurance agents, and mortgage lenders may benefit from this information. We also encourage you to consider preparing an article for publication in the community's local newspaper that would describe the changes that have been made and the assistance the community will provide in serving as a clearinghouse for these data and interpreting NFIP maps.

If you have any questions regarding the modifications described herein, please call the Chief, Natural and Technological Hazards Division, Federal Emergency Management Agency, in San Francisco, California, at (415) 923-7177, or Mr. Karl F. Mohr of my staff in Washington, D.C., at (202) 646-2770.

Sincerely,

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

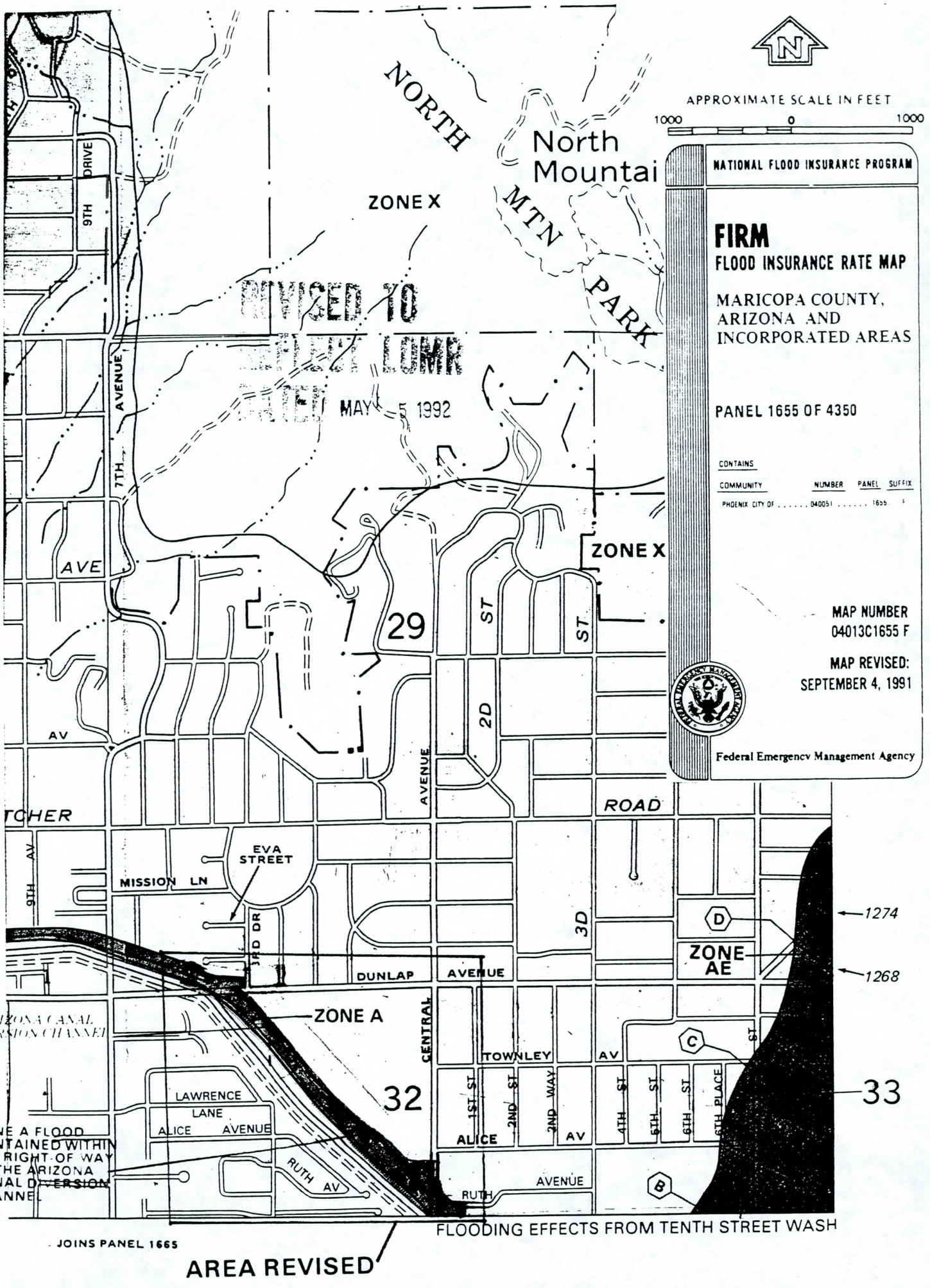
Enclosures

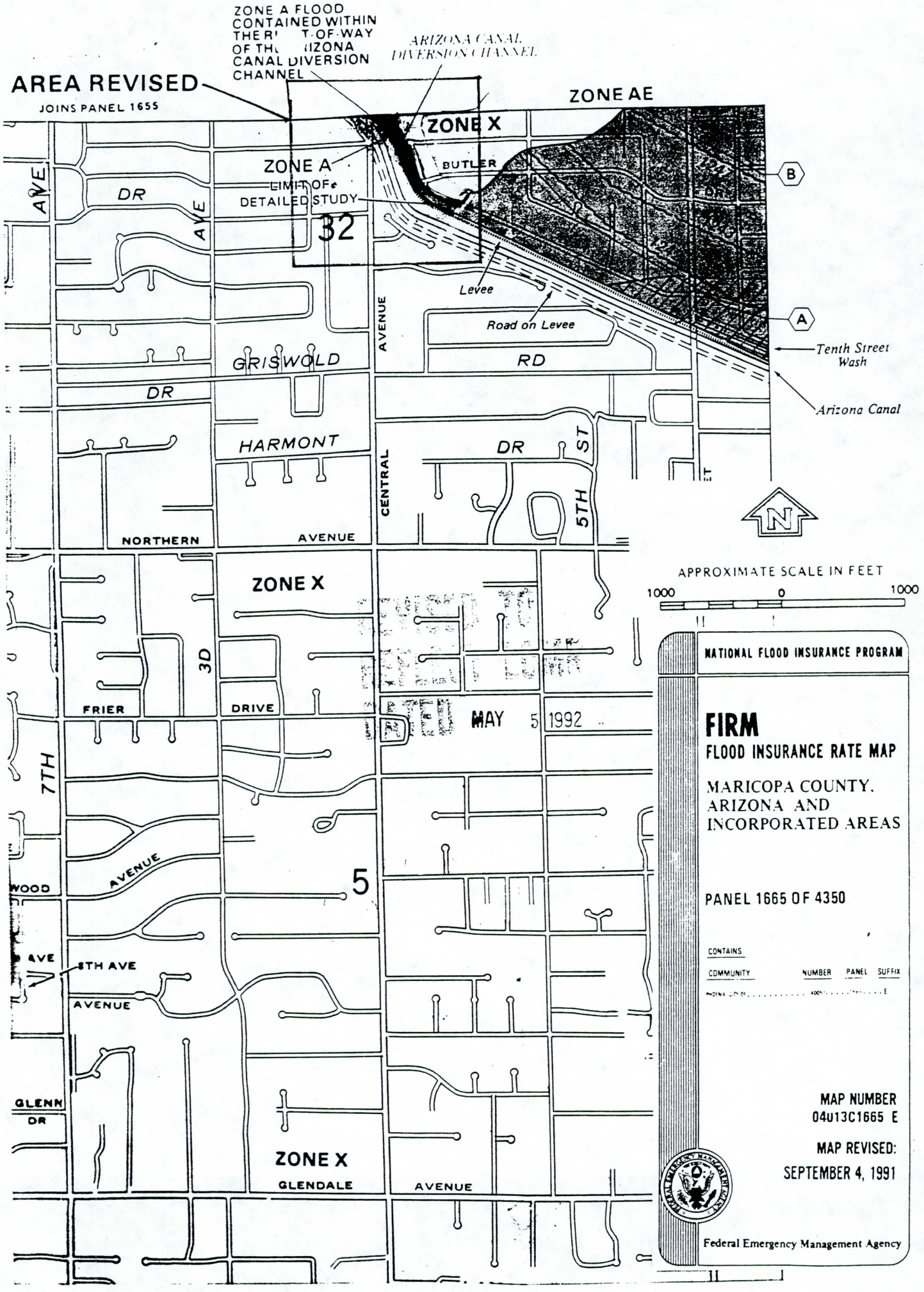
cc: The Honorable Betsey Bayless
Chairperson, Maricopa County
Board of Supervisors

Ms. Jan Opstein
Flood Control District
of Maricopa County

Mr. Paul E. Kienow, P.E.
Floodplain Management Engineer
City of Phoenix

Mr. Ron Nevitt
Floodplain Representative
Flood Control District of
Maricopa County


N
APPROXIMATE SCALE IN FEET
1000 0 1000
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS
PANEL 1655 OF 4350
CONTAINS
COMMUNITY NUMBER PANEL SUFFIX
PHOENIX CITY OF ..... 040051 ..... 1655 F
MAP NUMBER
04013C1655 F
MAP REVISED:
SEPTEMBER 4, 1991
Federal Emergency Management Agency
NORTH
North Mountai
MTN PARK
ZONE X
REVISED TO
MAY 5 1992
ZONE X
9TH DRIVE
7TH AVENUE
AVE
AV
29
ST
ST
2D
AVENUE
ROAD
TCHER
9TH AV
EVA STREET
MISSION LN
3RD DR
3D
DUNLAP AVENUE
ZONE A
CENTRAL
TOWNLEY AV
ZONE AE
D
C
1274
1268
ST
ARIZONA CANAL DIVERSION CHANNEL
LAWRENCE LANE
ALICE AVENUE
32
1ST ST
2ND ST
2ND WAY
AV
ALICE
4TH ST
6TH ST
6TH ST
6TH PLACE
33
RUTH AV
RUTH AVENUE
B
ZONE A FLOOD CONTAINED WITHIN THE RIGHT-OF-WAY OF THE ARIZONA CANAL DIVERSION CHANNEL
JOINS PANEL 1665
AREA REVISED
FLOODING EFFECTS FROM TENTH STREET WASH


ZONE A FLOOD CONTAINED WITHIN THE R T-OF-WAY OF TH IZONA CANAL DIVERSION CHANNEL
ARIZONA CANAL DIVERSION CHANNEL
AREA REVISED
JOINS PANEL 1655
ZONE AE
ZONE X
ZONE A
LIMIT OF DETAILED STUDY
32
BUTLER
DR
AVE
AVE
B
A
Levee
Road on Levee
Tenth Street Wash
Arizona Canal
AVENUE
GRISWOLD
RD
DR
HARMONT
DR
CENTRAL
ST
5TH
NORTHERN
AVENUE
ZONE X
APPROXIMATE SCALE IN FEET
1000
0
1000
N
3D
FRIER
DRIVE
MAY 5 1992
7TH
AVENUE
WOOD
5
AVE
8TH AVE
AVENUE
GLENN
DR
ZONE X
GLENDALE
AVENUE
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS
PANEL 1665 OF 4350
CONTAINS
COMMUNITY
NUMBER
PANEL
SUFFIX
MAP NUMBER
04013C1665 E
MAP REVISED:
SEPTEMBER 4, 1991
Federal Emergency Management Agency

Federal Emergency Management Agency

Washington, D.C. 20472

FLOOD CONTROL DISTRICT
RECEIVED
OCT 11 1988

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IA-RA-RS (102A)
Community: Maricopa County, Arizona and Incorporated Areas
Map Panel Number: 04013C1635D 04013C1665D
Effective Date: OCT 4 1988

The Honorable Terry Goddard
Mayor, City of Phoenix
Municipal Building
251 West Washington Street
Phoenix, Arizona 85003

Dear Mayor Goddard:

This is in response to a letter dated July 27, 1988, from Mr. D.E. Sagramoso, P.E., Flood Control District of Maricopa County, regarding the effective Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. In his letter, Mr. Sagramoso requested that we revise the effective FIRM for Maricopa County, Arizona and Incorporated Areas to reflect completion of the Arizona Canal Diversion Channel (ACDC) from 47th Avenue to 29th Avenue. In support of this request, the following data were submitted:

- Sheets 2, 4, and 5 of 30 of the final construction drawings, entitled "Arizona Canal Diversion Channel, 47th Drive to Cactus Road," prepared by the U.S. Army Corps of Engineers (COE), Los Angeles District, and dated September 10, 1986.

- Sheets 2, and 5 through 19 of 74 of the final construction drawings, entitled "Arizona Canal Diversion Channel, 29th Avenue to 47th Drive," prepared by the COE, Los Angeles District, and dated July 17, 1987.

- A letter of certification, dated August 19, 1988, from the COE, Los Angeles District, stating that the reach of the ACDC from 47th Avenue to 29th Avenue was built in conformance with the above-referenced construction drawings.

We have completed our review of the data submitted with regard to the data used to produce the effective FIRM for Maricopa County, Arizona and Incorporated Areas. The FIRM has been revised to modify the floodplain boundary delineations of a flood having a one-percent chance of occurrence in any given year (base flood) along the north side of the ACDC for the reach between 47th Avenue and 29th Avenue.

For this specified reach, the 100-year flood is contained within the ACDC. The Zone A floodplain boundaries for the above-referenced reach of the ACDC have been revised to coincide with the right-of-way limits for the ACDC as defined on the submitted final construction drawings. The areas outside the right-of-way limits on the north side of the reach of the ACDC have been redesignated as Zone B.

Revisions of the floodplain boundary delineations are shown on the enclosed annotated copy of FIRM Panels 04013C1635D and 04013C1655D. This Letter of Map Revision hereby amends the currently effective FIRM Panels 04013C1635D and 04013C1655D dated April 15, 1988.

A physical revision to the FIRM for Maricopa County, Arizona and Incorporated Areas is currently being processed by the Federal Emergency Management Agency (FEMA). The aforementioned revisions will be incorporated into the physical revision. Copies of the Revised Preliminary FIRM are scheduled to be sent to your community in November 1988.

These modifications have been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 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, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65.

As required by the legislation, a community must adopt and enforce floodplain management measures to ensure continued eligibility to participate in the National Flood Insurance Program (NFIP). Therefore, your community must enforce these regulations using, at a minimum, the base (100-year) flood elevations, zone designations, and floodways in the Special Flood Hazard Areas as shown on the FIRM and Flood Boundary and Floodway Map for your community, including the aforementioned floodplain boundary modifications.

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

The community number and suffix code listed above will be used for all flood insurance policies and renewals issued for your community on and after the effective date listed above.

The revised floodplain boundaries are effective as of the date of this letter. However, a review of the floodplain boundaries and any requests for changes should be made within 30 days. Any request for reconsideration must be based on scientific or technical data.

If there are any further questions regarding the new floodplain boundaries, please contact the Chief, Natural and Technological Hazards Division, FEMA, in San Francisco, California at (415) 923-7175, or Mr. William Judkins of my staff in Washington, D.C., at (202) 646-3458.

Sincerely,

John L. Matticks
Chief, Risk Studies Division
Federal Insurance Administration

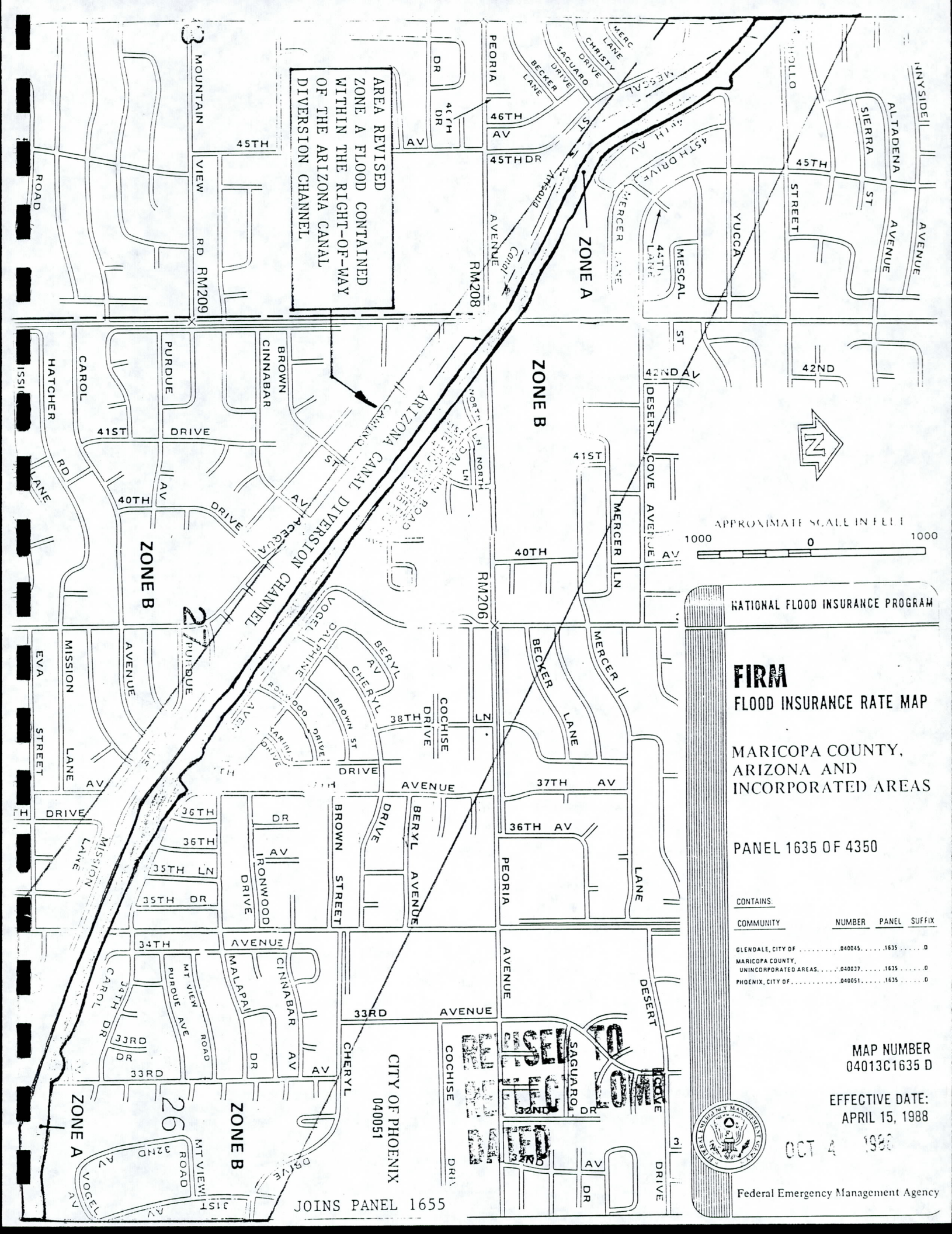
Enclosures

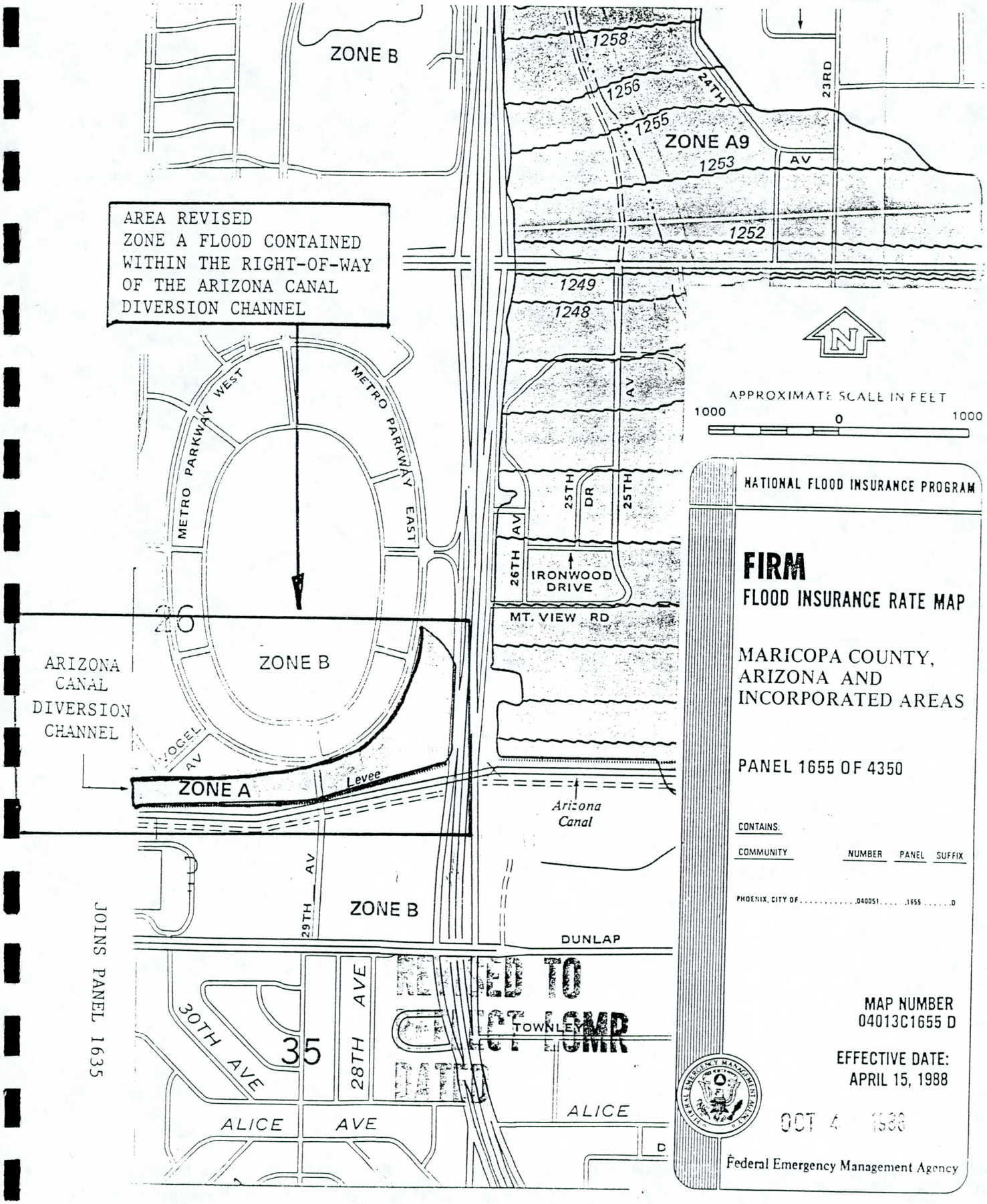
cc: Mr. Paul Kienow, P.E.
Floodplain Management Engineer

Mr. Ramon Miguez
City Engineer

Mr. D.E. Sagramoso, P.E.
Chief Engineer and General Manager
Flood Control District of
Maricopa County

Ms. Jan Farmer
Hydrologist
Flood Control District
of Maricopa County


AREA REVISED
ZONE A FLOOD CONTAINED
WITHIN THE RIGHT-OF-WAY
OF THE ARIZONA CANAL
DIVERSION CHANNEL
ZONE A
ZONE B
ZONE B
ZONE B
ZONE A
ARIZONA CANAL DIVERSION CHANNEL
RM208
RM209
RM206
MOUNTAIN VIEW ROAD
PEORIA AVENUE
46TH AV
45TH DR
45TH AV
45TH STREET
42ND AV
42ND
41ST DRIVE
40TH AV
40TH
41ST
38TH
37TH AV
36TH AV
36TH
35TH LN
35TH DR
34TH AVENUE
33RD AVENUE
33RD
32ND
31ST
MERCER LANE
BECKER LANE
DESERT COVE AVENUE
PEORIA LANE
BROWN STREET
BERYL AVENUE
IRONWOOD DRIVE
CINNABAR AV
MALAPAI DR
CHERYL
COCHISE DRIVE
MISSION LANE
HATCHER ROAD
CAROL DRIVE
PURDUE AVENUE
MT VIEW ROAD
VOGEL AV
SAGUARO DR
CITY OF PHOENIX
040051
JOINS PANEL 1655
APPROXIMATE SCALE IN FEET
1000 0 1000
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS
PANEL 1635 OF 4350
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
GLENDALE, CITY OF 040045 1635 D
MARICOPA COUNTY, UNINCORPORATED AREAS 040037 1635 D
PHOENIX, CITY OF 040051 1635 D
MAP NUMBER
04013C1635 D
EFFECTIVE DATE:
APRIL 15, 1988
OCT 4 1988
Federal Emergency Management Agency


ZONE B
1258
1256
1255
24TH
23RD
ZONE A9
1253
AV
1252
1249
1248
AREA REVISED
ZONE A FLOOD CONTAINED
WITHIN THE RIGHT-OF-WAY
OF THE ARIZONA CANAL
DIVERSION CHANNEL
N
APPROXIMATE SCALE IN FEET
1000
0
1000
METRO PARKWAY WEST
METRO PARKWAY EAST
AV
25TH
DR
25TH
26TH AV
IRONWOOD
DRIVE
MT. VIEW RD
ZONE B
ARIZONA
CANAL
DIVERSION
CHANNEL
VOGEL AV
ZONE A
Levee
Arizona
Canal
29TH AV
ZONE B
DUNLAP
30TH AVE
28TH AVE
TOWNLEY
ALICE
AVE
ALICE
JOINS PANEL 1635
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY,
ARIZONA AND
INCORPORATED AREAS
PANEL 1655 OF 4350
CONTAINS:
COMMUNITY
NUMBER
PANEL
SUFFIX
PHOENIX, CITY OF
040051
1655
D
MAP NUMBER
04013C1655 D
EFFECTIVE DATE:
APRIL 15, 1988
Federal Emergency Management Agency

Federal Emergency Management Agency
Washington, D.C. 20472

May 17, 1988

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IA-RA-RS (102A)
Community: Maricopa County, Arizona
and Incorporated Areas

The Honorable Terry Goddard
Mayor, City of Phoenix
Municipal Building
251 West Washington Street
Phoenix, Arizona 85003

Map Panel Number: 04013C1190D
04013C1630D
04013C1635D

Effective Date: May 17, 1988

Dear Mayor Goddard:

This is in response to a recent telephone conversation between Ms. Jan Farmer, Flood Control District of Maricopa County, and Mr. William Judkins of my staff regarding the effective Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. During this conversation, Ms. Farmer requested that we revise the effective FIRM for Maricopa County and Incorporated Areas to reflect the completion of the Arizona Canal Diversion Channel (ACDC) from Skunk Creek to 47th Avenue. In support of this request, Ms. Farmer had previously submitted:

- Sheets 2 of 74, and 15 through 19 of 74 of the final construction drawings, entitled "Arizona Canal Diversion Channel, 29th Avenue to 47th Drive", prepared by the U.S. Army Corps of Engineers (COE), Los Angeles District, and dated July 19, 1987.

- Sheets 2 and 4 through 8 of 30 of the final construction drawings, entitled "Arizona Canal Diversion Channel, 47th Drive to Cactus Road", prepared by the COE, Los Angeles District and dated September 10, 1986.

- Sheets 2, 6 through 19, 27, and 27A of 38 of the final construction drawings, entitled "Arizona Canal Diversion Channel, Cactus Road to Skunk Creek," prepared by the COE, Los Angeles District, and dated June 24, 1986

- A letter of certification, dated December 31, 1987, from the COE, Los Angeles District, stating that the reach of the ACDC from Skunk Creek to 47th Avenue was built in conformance with the above-referenced construction drawings

We have completed our review of the data submitted with regard to the data used to produce the effective FIRM for Maricopa County and Incorporated Areas. The FIRM has been revised to modify the floodplain boundary delineations of a flood having a one-percent chance of occurrence in any given year (base flood) along the north side of the ACDC for the reach between Skunk Creek and 47th

Avenue. For this specified reach, the 100-year flood is contained within the ACDC. The Zone A floodplain boundaries for the above-referenced reach of the ACDC have been revised to coincide with the right-of-way limits for the ACDC as defined on the submitted final construction drawings. The areas outside the right-of-way limits on the north side of the reach of the ACDC have been redesignated as Zone B.

Revisions of the floodplain boundary delineations are shown on the enclosed annotated copy of FIRM Panels 04013C1190D, 04013C1630D, and 04013C1635D. This Letter of Map Revision (LOMR) hereby amends currently effective FIRM Panels 04013C1190D, 04013C1630D, and 04013C1635D dated April 15, 1988.

A physical revision to the FIRM for Maricopa County, Arizona and Incorporated Areas is currently being processed by the Federal Emergency Management Agency (FEMA). The aforementioned revisions will be incorporated into this physical revision. Copies of the revised preliminary FIRM are scheduled to be sent to your community in the Fall of 1988.

These modifications have been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 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, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR, Part 65.

As required by the legislation, a community must adopt and enforce floodplain management measures to ensure continued eligibility to participate in the National Flood Insurance Program (NFIP). Therefore, your community must enforce these regulations using, at a minimum, the floodplain boundary modifications.

This response to your request is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all proposed floodplain developments, including this request, and for assuring that necessary permits required by Federal or state law have been received. State and community officials, based on knowledge of local conditions and in the interest of safety, 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 over the minimum NFIP requirements.

The community number and suffix code listed above will be used for all flood insurance policies and renewals issued for your community on and after the effective date listed above.

The revised floodplain boundaries are effective as of the date of this letter. However, a review of the floodplain boundaries and any requests for changes should be made within 30 days. Any request for reconsideration must be based on scientific or technical data.

If there are any further questions regarding the new floodplain boundaries, please contact the Chief, Natural and Technological Hazards Division, FEMA, in San Francisco, California, at (415) 923-7175, or Mr. William Judkins of my staff in Washington, D.C., at (202) 646-3458.

Sincerely,

John L. Matticks
Chief, Risk Studies Division
Federal Insurance Administration

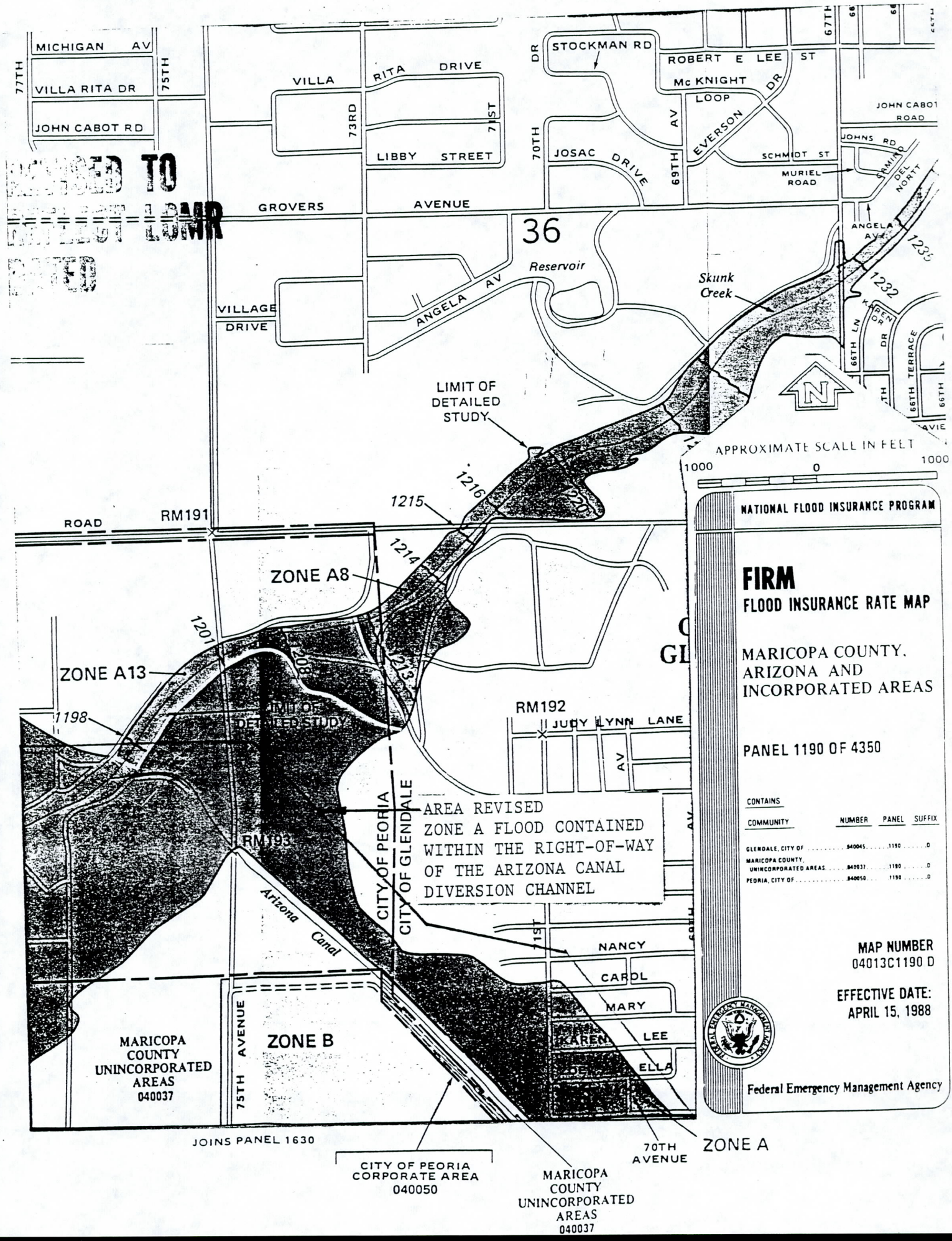
Enclosures

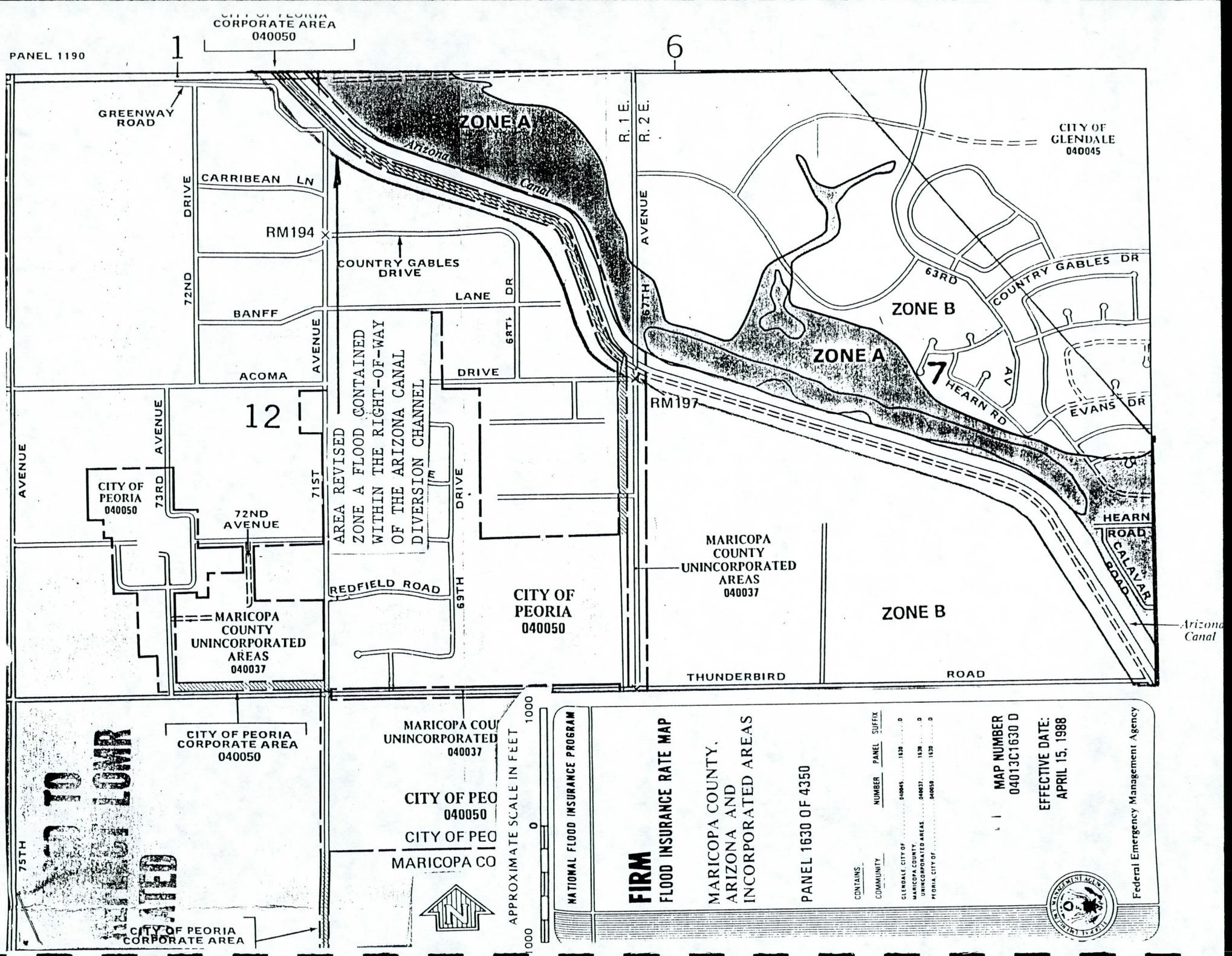
cc. Mr. Paul Kienow, P.E.
Floodplain Management Engineer

Mr. J.E. Attebery, P.E.
City of Phoenix

Mr. D.E. Sagramoso
Flood Control District of Maricopa County

Ms. Jan Farmer
Flood Control District of Maricopa County


MICHIGAN AV
VILLA RITA DR
JOHN CABOT RD
77TH
75TH
VILLA RITA DRIVE
73RD
71ST
LIBBY STREET
GROVERS AVENUE
VILLAGE DRIVE
ANGELA AV
36
Reservoir
Skunk Creek
STOCKMAN RD
ROBERT E LEE ST
Mc KNIGHT LOOP
EVERSON DR
JOSAC DRIVE
70TH
69TH AV
SCHMIDT ST
MURIEL ROAD
JOHNS RD
JOHN CABOT ROAD
ANGELA AV
1235
1232
66TH LN
66TH TERRACE
67TH
LIMIT OF DETAILED STUDY
1216
1220
1215
1214
1213
1208
1201
1198
RM191
ROAD
RM192
RM193
JUDY LYNN LANE
ZONE A8
ZONE A13
ZONE A
ZONE B
AREA REVISED
ZONE A FLOOD CONTAINED
WITHIN THE RIGHT-OF-WAY
OF THE ARIZONA CANAL
DIVERSION CHANNEL
CITY OF PEORIA
CITY OF GLENDALE
Arizona Canal
NANCY
CAROL
MARY
KAREN
LEE
ELLA
75TH AVENUE
70TH AVENUE
MARICOPA COUNTY UNINCORPORATED AREAS 040037
JOINS PANEL 1630
CITY OF PEORIA CORPORATE AREA 040050
MARICOPA COUNTY UNINCORPORATED AREAS 040037
APPROXIMATE SCALE IN FEET
1000 0 1000
N
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS
PANEL 1190 OF 4350
CONTAINS
COMMUNITY NUMBER PANEL SUFFIX
GLENDALE, CITY OF 040045 1190 D
MARICOPA COUNTY, UNINCORPORATED AREAS 040037 1190 D
PEORIA, CITY OF 040050 1190 D
MAP NUMBER
04013C1190 D
EFFECTIVE DATE:
APRIL 15, 1988
Federal Emergency Management Agency


PANEL 1190
1
CITY OF PEORIA
CORPORATE AREA
040050
6
GREENWAY ROAD
ZONE A
Arizona Canal
R. 1 E.
R. 2 E.
CITY OF GLENDALE
040045
CARRIBEAN LN
DRIVE
RM194
COUNTRY GABLES DRIVE
72ND AVENUE
BANFF LANE
ACOMA DRIVE
67TH AVENUE
63RD
COUNTRY GABLES DR
ZONE B
ZONE A
7
HEARN RD
EVANS DR
RM197
12
AVENUE
CITY OF PEORIA
040050
73RD AVENUE
72ND AVENUE
71ST DRIVE
AREA REVISED ZONE A FLOOD CONTAINED WITHIN THE RIGHT-OF-WAY OF THE ARIZONA CANAL DIVERSION CHANNEL
69TH DRIVE
REDFIELD ROAD
MARICOPA COUNTY UNINCORPORATED AREAS
040037
CITY OF PEORIA
040050
MARICOPA COUNTY UNINCORPORATED AREAS
040037
ZONE B
HEARN ROAD
CALAVAR ROAD
Arizona Canal
THUNDERBIRD ROAD
CITY OF PEORIA CORPORATE AREA
040050
MARICOPA COU UNINCORPORATED
040037
CITY OF PEO
040050
CITY OF PEO
MARICOPA CO
75TH
CITY OF PEORIA CORPORATE AREA
APPROXIMATE SCALE IN FEET
1000
0
1000
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS
PANEL 1630 OF 4350
CONTAINS
COMMUNITY NUMBER PANEL SUFFIX
GLENDALE, CITY OF ... 040045 ... 1630 ... D
MARICOPA COUNTY, UNINCORPORATED AREAS ... 040037 ... 1630 ... D
PEORIA, CITY OF ... 040050 ... 1630 ... D
MAP NUMBER
04013C1630 D
EFFECTIVE DATE:
APRIL 15, 1988
Federal Emergency Management Agency

JOINS PANEL 1195

CARIBBEAN LANE
PORT AU PRINCE LANE
COUNTRY GABLES AV
BANFF LANE
53RD AV
8
ACOMA ROAD
CROCUS DR
55TH AVENUE
REDFIELD ROAD
DAILEY ST
52ND AVENUE
DR

ZONE B

PORT AU PRINCE
COUNTRY GABLES
BANFF
9
ACOMA
MARICOPA COUNTY
UNINCORPORATED AREAS
040037
GELDING
45TH AV
47TH AVENUE
HEARN ROAD
REDFIELD ROAD
REDFIELD RD
DAILY ST
DAILEY STREET
CALAVAR STREET
BOCA RATON STREET
48TH AV
49TH AVENUE
45TH AV

COUNTRY GABLES DRIVE
60TH AV
7
59TH AVENUE
EVANS DR
RM199
HEARN RD
60TH AV
CALAVAR ROAD
RM201 THUNDERBIRD ROAD
RM203

ZONE A
CITY OF GLENDALE
040045
ZONE B
51ST AVENUE
18
17
Arizona Canal
SURREY AV
54TH AV
WOOD DR
AVENUE
53RD AV
DRIVE
SWEETWATER AV
52ND DR
DAHLIA DRIVE
ASTER DRIVE
WINDROSE DRIVE
CORRINE DR
515T DR
DRIVE
48TH AVENUE
DAHLIA DR
ASTER DRIVE
WINDROSE DRIVE
CORRINE DRIVE
50TH LANE
LARKSPUR DRIVE
COLUMBINE DRIVE
49TH DR
49TH AV
48TH
ZONE A
ZONE B
CITY OF GLENDALE
MARICOPA COUNTY
MARICOPA COUNTY
UNINCORPORATED AREAS
040037
RM202 CACTUS ROAD
RM204
59TH AVENUE
SHAW BUTTE DRIVE
POINSETTIA DRIVE
SUNNYSIDE DRIVE
58TH
CORTEZ STREET
57TH LANE
57TH
55TH
DESERT HILLS DR
POINSETTIA DR
SUNNYSIDE DRIVE
ALTADENA AVENUE
SIERRA STREET
52ND AV
52ND DR
ST
LANE
RM205
19
CHOLLA STREET
21
CHOLLO
45TH
47TH St.
JOINS PANEL 1630

AREA REVISED
ZONE A FLOOD CONTAINED
WITHIN THE RIGHT-OF-WAY
OF THE ARIZONA CANAL
DIVERSION CHANNEL

N

APPROXIMATE SCALE IN FEET
1000 0 100

CITY OF PHOENIX

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 1635 OF 4350

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
GLENDALE, CITY OF	040045	1635	0
MARICOPA COUNTY, UNINCORPORATED AREAS	040037	1635	0
PHOENIX, CITY OF	040051	1635	0

MAP NUMBER
04013C1635 D

EFFECTIVE DATE:
APRIL 15, 1988

Federal Emergency Management Agency

[illegible] LOWER
[illegible] MAY 17 1988

FEMA USE ONLY

FORM 3

HYDROLOGIC ANALYSIS FORM

Community Name: Maricopa County, City of Phoenix, Town of Paradise Valley

Flooding Source: ACDC Watershed (AZ Channel Diversion Canal)

Project Name/Identifier: ACDC Reach 4

Hydrologic Analysis in FIS

- [X] **Approximate study stream (Zone A)**
- [ ] **Detailed study stream (briefly explain methodology)** _____

Reason for New Hydrologic Analysis

- [ ] **No existing analysis**
- [ ] **Improved data (see data revision on page 3)**
- [ ] **Changed physical conditions of watershed (explain)** _____
- [ ] **Alternative methodology (justify why the revised model is better than model used in the effective FIS)** _____
- [ ] **Evaluation of proposed conditions (CLOMRs only) (explain)** _____
- [X] **Other** Existing hydrology used prepared by the Army Corps of Engineers. Effective FIRM date December 4, 1979

If a computer program/model was used in revising the hydrologic analysis, please provide a diskette with the input files for the 10-, 50-, 100- and 500-year recurrence intervals.
Not avaliable
Only the 100-year recurrence interval need be included for SFHAs designated as Zone A.

Approval of Analysis

- [X] **Approval of the hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e.,** Effective Firm date December 4, 1979 **)**
  Attach evidence of approval.
- [ ] **Approval of the hydrologic analysis is not required by any local, state or Federal Agency.**

Review of Results

Stream _____

Comparison of 100-year Discharges

Location:	FIS:	Revised:
_____	_____ cfs	_____ cfs
_____	_____ cfs	_____ cfs
_____	_____ cfs	_____ cfs
_____	_____ cfs	_____ cfs
_____	_____ cfs	_____ cfs

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

As is often the case with revision requests, only a portion of a stream may actually be revised or be affected by a revision. Therefore, transition to the unrevised portion is important to maintain the continuity of the study. NFIP regulations stipulate that such a transition must be assured. What is the transition from the proposed discharges to the effective discharges? Please explain how the transition was made (attach separate sheet if necessary).

_____
_____
_____
_____
_____
_____
_____
_____

Attach a completed Review of Results page for each flooding source.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS (i.e. no changed hydraulic conditions)? ☐ Yes ☐ No

If yes, does the 100-year water-surface elevation change by 1.0 foot or more? ☐ Yes ☐ No

FEMA does not normally revise NFIP maps solely due to insignificant flow changes where changes in 100-year water-surface elevation are less than 1.0 foot.

Historical Flooding Information

Is historical data available for the flooding source? ☐ Yes ☐ No

If yes, provide the following:

Location along flooding source: _____

Maximum peak discharge: _____ cfs

Second highest peak discharge: _____ cfs

Source of information: _____

Gage Record Information

Location of nearest gage to project site (along flooding source or similar watershed; specify)

_____

Gaging Station: _____

Drainage area at gage: _____ mi^2

Number of years of data: _____

Data Revision

Please use the following table to list all the data and/or parameters affected by this request and identify them as new data (New) or as revising existing data (Revised). (If necessary, attach a separate sheet.)

Data Parameter	New	Revised	Data Source
_____	☐	☐	_____
_____	☐	☐	_____
_____	☐	☐	_____
_____	☐	☐	_____
_____	☐	☐	_____

- Data source can be from a Federal, State, or local government agency, or from a private source. Some state and local governments may have less strict data requirements than Federal agencies, in which case the data may not be accepted by FEMA unless it is demonstrated that the data give a better estimate of the flood discharge.
- Attach documentation corroborating each data source (i.e., certified statement, report, bibliographical reference to a published document). In the case of a published document or a government report, providing copies of the cover and pertinent pages may be helpful.

Methodology for New Analysis

☐ Statistical Analysis of Gage Records (use Attachment A)

☐ Regional Regression Equations (use Attachment B)

☐ Precipitation/Runoff Model (use Attachment C)

☐ Other (specify; attach backup computations and supporting data) _____

_____

Attachment A: Statistical Analysis of Gage Records

Gaging Station: _____

Gage Location (latitude and longitude): _____

	FIS:	Revised:
1. Number of years of data		
Systematic		
Historical		
2. Homogeneous data	☐ Yes ☐ No	☐ Yes ☐ No
3. Data adjustments	☐ Yes ☐ No	☐ Yes ☐ No
4. Number of high outliers		
Low outliers		
Zero events		
5. Generalized skew		
6. Station skew		
7. Adopted skew		
8. Probability distribution used (justify if log-Pearson III was not used)		
9. Transfer equations to ungaged sites		☐ Yes ☐ No
If yes, specify method		
10. Expected probability*		☐ Yes ☐ No
11. Comparison of results with other analyses		☐ Yes ☐ No
If yes, describe comparison		

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

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

Attach analysis including plot of flood frequency curve.

Attachment B: Regional Regression Equations

1. Bibliographical Reference:

   _____
   _____
   _____

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

2. Gaged or ungaged stream: _____

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

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

   _____
   _____
   _____

		FIS:		Revised:	
5.	Urbanized conditions calculations	☐ Yes	☐ No	☐ Yes	☐ No
6.	Percent of watershed urbanization	_____		_____	
7.	Is the watershed controlled?	☐ Yes	☐ No	☐ Yes	☐ No
8.	Comparison with other analyses	☐ Yes	☐ No	☐ Yes	☐ No

If the answer to 5, 7, or 8 is yes, explain methodology in Comments.

If data is not available, indicate by N/A.

Comments

_____
_____
_____
_____

Attach computations and supporting maps.

Attachment C: Precipitation/Runoff Model

		FIS:	Revised:
1.	Method or model used: Version: Date:	_____ _____ _____	_____ _____ _____
2.	Source of rainfall depth:	_____	_____
3.	Source of rainfall distribution:	_____	_____
4.	Rainfall duration:	_____	_____
5.	Areal adjustment to precipitation (%):		_____
6.	Hydrograph development method:	_____	_____
7.	Loss rate method: Source of soils information: Source of land use information:	_____ _____	_____ _____ _____
8.	Channel routing method:	_____	_____
9.	Reservoir routing:	☐ Yes ☐ No	☐ Yes ☐ No
10.	Baseflow considerations: If yes, explain how baseflow was determined:	☐ Yes ☐ No	☐ Yes ☐ No
11.	Snowmelt considerations:	☐ Yes ☐ No	☐ Yes ☐ No
12.	Model calibration: If yes, explain how calibration was performed.	☐ Yes ☐ No	☐ Yes ☐ No
13.	Future land use conditions: If yes, explain why.		☐ Yes ☐ No

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

If data is not available, indicate by N/A.

Attach precipitation/runoff model, hydrologic model schematic, and supporting maps.

Attachment D: Confidence Limits Evaluation

Stream: _____

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

_____

Discharges for selected location:

Exceedance Probability		FIS		Revised	
10%	(10-year)	_____	cfs	_____	cfs
2%	(50-year)	_____	cfs	_____	cfs
1%	(100-year)	_____	cfs	_____	cfs
0.2%	(500-year)	_____	cfs	_____	cfs

1% (100-year) Flood Confidence Intervals

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

If the value of the 100-year frequency flood in the FIS is beyond the 50% confidence interval but within the 90% confidence interval, does the 100-year water-surface elevation change by 1.0 foot or more?

☐ Yes ☐ No

An example of confidence limits analysis can be found in Appendix 9 of Bulletin 17B.

Attach Confidence Limits Analysis.

SPLED-WH

12 April 1973

SUBJECT: Hydrology for Type 15 Flood Insurance Study, Phoenix, Arizona

Division Engineer, South Pacific
ATTN: SPDLD-R

1. The accompanying report presents discharge frequency curves at locations along Cave Creek, Indian Bend Wash and streams emanating from the Phoenix Mountains for use in Type 15 flood insurance study in Phoenix, Arizona.

2. Request that on-board review be conducted.

FOR THE DISTRICT ENGINEER:

1 Incl
as

CARTH A. FUQUAY
Chief, Engineering Division

FUQUAY

POTTER

HALL

EVELYN/vl
X4756

CF:
Major Worthington, w/incl
Phoenix Res Office
M&R File w/incl
DE Reading File w/o incl
ED w/o incl
Hydrology Sec w/incl
WRB w/incl

Incl 3

SPDED-H (12 Apr 73) 1st Ind
SUBJECT: Hydrology for Type 15 Flood Insurance Study, Phoenix, Arizona

DA, South Pacific Division, Corps of Engineers, 630 Sansome Street
Room 1216, San Francisco, California 94111 27 April 1973

TO: District Engineer, Los Angeles, ATTN: SPLED-WH

1. The Phoenix flood insurance frequency curves on Plates 1 through 24 and Plate 33 are approved for use in the insurance rate study. The Cave Creek Dam inflow frequency curve Plate 25 is approved.

2. It is understood that there is some question as to the stability of Cave Creek Dam, and further understood that the State of Arizona is undertaking detailed studies to settle this question. Until these studies are completed any results of hydrologic analyses for Cave Creek below Cave Creek Dam are inconclusive and are not to be used in the subject study.

FOR THE DIVISION ENGINEER:

for: JOHN W. GERHART
Chief, Engineering Division

1 Incl
wd 1 cy

HYDROLOGY REPORT FOR TYPE 15
FLOOD INSURANCE STUDY
PHOENIX, ARIZONA

1. General. Hydrologic studies as described in this report were made to determine discharge frequency curves on streams within the City of Phoenix for use in a Type 15 Flood Insurance Study. The locations of the drainage areas and concentration points are presented in Table 1 and shown on Plates 1, 2 and 3. The selected concentration points lie along Cave Creek, Indian Bend Wash and the small streams emanating from the Phoenix mountains.

2. Prior Hydrology. A detailed hydrologic investigation of the Phoenix area has been presented in the report entitled "Draft of Part I, Hydrologic Engineering Report, New River and Phoenix City Streams" dated 9 November 1972. Methodology used in this study is described in the above report, with the exception of a regionalized approach to flood frequency analysis which is presented herein.

3. Physiographic Characteristics. The City of Phoenix lies within Maricopa County in Central Arizona as shown on Plate 1. Cave Creek which flows from north to south through Phoenix, and the Salt River which flows east to west through the southern portion of Phoenix are the major water courses affecting the City of Phoenix. Indian Bend Wash has its source within the northwestern corner of corporate Phoenix and within 3 miles flows into Paradise Valley to the east of Phoenix. The Phoenix mountains which form the northern boundary of development of Phoenix pose another possible flood threat as runoff originating on the numerous small drainage basins collects behind the Arizona canal and causes breaks in the canal with subsequent damage downstream. None of the watercourses in the Phoenix area flows perennially. Even major rivers which flowed year around in their pristine state have been dried up by dams and diversions. Stream channels are distinct and well defined in the mountain ranges but upon reaching the valley transition, they become braided and poorly defined channels which carry most of large floodflows in their wide flat overbanks.

4. Cave Creek has its source in the New River mountains to the north of Phoenix where elevations rise to as high as 5000 feet. It then descends to the alluvial fan near the town of Cave Creek and flows south for 13 miles before encountering Cave Creek Dam. From Cave Creek Dam to the Arizona canal, Cave Creek continues to flow over a natural alluvial cone. A constriction of the channel near Cactus Road decreases the channel capacity to approximately 50,000 cfs and causes breakouts of larger flows over Black Canyon Highway. From Arizona Canal to the Salt River, Cave Creek flows through the highly urbanized floodway in the heart of Phoenix.

5. In general, the vegetation is sparse. Cacti grow throughout the area along with other desert shrubs on the fairly level areas at the lower elevations. A few stunted trees including Juniper, Paloverde, Mesquite,

Ironwood and Scrub Oak are among the shrubs. The vegetation tends to be thicker along and adjacent to stream courses. Perennial grasses form a negligible part of the vegetation but good covers of annual grasses occur after the winter rains. The natural vegetation is rapidly being replaced by suburban development including residential, commercial and industrial areas in the foothills and valleys.

6. The rock materials in the mountains vary widely. The materials include fine grained, course grained, and metamorphosed granites including gneiss and schist, sandstones, breccias and metamorphised sedimentary rocks and various lava rocks including the basalt, andesite, rhyolite, volcanic glass, and white tuff. The soils are typical of desert and semidesert regions, being mostly shallow, rocky and poorly developed. The soils in the mountains are residual. The valley area occupies a broad plain that has been built up from water-deposited, soil-forming materials and rock debris. These soils consist of various forms of clays and loams. The soils range from course materials in the upper parts to fine materials in the lower parts of the area.

7. Hydrometeorological Characteristics. The climate is typically desert in character with short mild winters and long hot summers. High diurnal temperature variations are characteristic. The prevailing winds are from the east and are usually light, although severe windstorms occur at rare intervals. The 90 year (1868 to 1957) mean anuual precipitation ranges from about 24 inches in the head waters to about 7.5 inches in the lower portion and averages about 14.5 inches. Precipitation is divided equally between summer and winter seasons. Three types of storm produce precipitation in the study area; general winter storms, general summer storms and local summer storms.

8. Runoff Characteristics. Little streamflow occurs except during and immediately following the heavy precipitation because climatic and drainage characteristics are not conducive to continuous runoff. Because of steep gradients, streamflow in the mountains increases rapidly in response to high intensity precipitation and causes debris laden flashfloods to debouch on the valley plains below. When floods reach the valley plain they spread out overland. The velocity and peak are reduced so that the debris is deposited and considerable amount of flow is lost to streambed percolation. The vegetation has a negligible effect on flood runoff except where perennial grasses impede overland flow in the upper reaches.

9. Existing structures affecting runoff. The Cave Creek Flood Control Dam (Completed in 1923), which is under the jurisdiction of the Salt River Valley Association, is about 18 miles north of downtown Phoenix. Cave Creek dam controls 175 square miles of drainage area with a reservoir storage capacity to the top of dam (elev. 1642) of approximately 12,400 ac-ft. The spillway, a natural saddle, is in the hills to the east of the dam and has a crest elevation of 1638 feet. The outlet works consist of three 4'x4' foot openings, two of which are kept covered. In a letter dated

7 February 1973 to Mr. Wesley E. Steiner, Executive Director of the Arizona Water Commission, the Los Angeles District stated that Cave Creek Dam is unsafe at a water surface elevation somewhat below the spillway crest. The letter also recommended additional evaluation of the condition of the dam as well as determination of remedial work to mitigate or obviate the potential hazards to human life and property. In that action to remove the possibility of a dam failure will probably be undertaken in the immediate future as part of the National Program for Safety of Dams, discharge-frequency curves developed along Cave Creek reflect present conditions without a dam failure.

10. Standard Project storm. The August 19, 1954 thunderstorm that was centered generally in the Queen Creek drainage area was determined to be the storm with the most critical precipitation factors that may reasonably be expected to occur over the central portion of Arizona. This storm was transposed from the Queen Creek basin to the Phoenix area on the basis of 10 year-6 hour precipitation.

11. Precipitation-runoff relationships. Reconstitutions of observed flood events in the Phoenix area provided the basis for the rainfall-runoff relationships used in this study. Runoff was computed using synthetic unit hydrographs developed from Phoenix Mountain and Phoenix Valley S-graphs in conjunction with the lag time determined for the subarea. Table 2 lists drainage basin characteristics used to compute subarea unit hydrographs.

12. Precipitation loss rates. A variable precipitation loss rate with an initial value of 0.58 inches/hr and decreasing as a function of accumulated loss was used to determine rainfall excess. Rainfall loss rate was decreased in direct proportion to percentage impervious cover.

13. Baseflow is considered negligible for the study area and allowance for snowmelt is inappropriate in this region for a storm occurring in the summer season.

14. Flood routing procedure. Flood routing through both natural and project channels was performed using the Muskingum method. Representative cross sections for each channel reach under natural conditions were determined from USGS topographic maps and field investigations. Manning's formula for normal flow was then used with an appropriate cross section to compute the average peak flow velocity for the reach. Hence flood wave travel time could be determined by dividing reach length by average peak flow velocity. The Muskingum K (storage coefficient) is synonymous with flood wave travel time. The Muskingum X coefficient is an index of wedge storage in the reach and its value ranges from 0 to 0.5. Values of Muskingum X used in this study ranged from 0.1 for reaches with wide cross sections and large amounts of channel storage to 0.40 for reaches with steep well defined channels.

15. Standard Project Flood. Standard project flood values as determined in this study are presented in Table 1.

16. Flood Frequency Regression Analysis. Some form of regionalization of flood frequency curves in the Phoenix area is necessary to determine discharge frequency curves for ungaged watersheds. A regional frequency analysis using 20 streamgages in the Phoenix-Tucson region as well as a study using 13 stream gages in the Phoenix Region were attempted but failed to yield usable results because of several factors: short stream gage records, the complications due to runoff from localized thunderstorm events and the lack of a long term streamgage in the immediate Phoenix valley area which correlated well with the short term gages. Also, a straight forward analytical approach to frequency curves provided unreasonably high results for the less frequent events because zero flows in several of the records caused extremely high standards deviations. Hence a straight forward regression analysis with each return frequency flood on gaged watersheds as a dependent variables and various hydrologic and meteorlogic parameters as independent variables was attempted.

17. Streamflow records for a total of 43 gages (see table 3 and 4) in South Central Arizona were complied. The drainage area sizes range from 0.13 to 417 square miles. Graphical frequency curves were drawn for each of these gages using the procedures outlined in Beard's "Statistical Methods in Hydrology." Zero flows were ranked along with the positive flows hence the entire period of record was utilized for each streamgage. The standard project flood computed using the local standard project storm and precipitation-runoff relationships outlined in previous paragraphs was plotted on each frequency curve between a 200 and 500 year return period. The 100-year, 50-year, 25-year, 10-year, 5-year, and 2-year peak discharges at each gage were then used as the dependent variables in the regression analysis.

18. The following independent parameters for each watershed were determined: drainage area in square miles, average basin elevation in feet, normal annual precipitation in inches, percentage mountain area in basin, basin response (drainage area divided by lag time) in square miles per hour, shape factor (drainage area divided by length squared), 5 year-6 hour rainfall in inches, 5 year-24 hour rainfall in inches, 50 year-6 hour rainfall in inches, 50 year-24 hour rainfall in inches, 10 year-6 hour rainfall in inches, 10 year-24 hour rainfall in inches, 25 year-6 hour rainfall in inches, 25 year-24 hour rainfall in inches, basin n-value, length of longest watercourse in miles, length from centroid of the area to the gage in miles, and lag time in hours. A logarithmic transformation of independent variables was made for all correlation runs.

19. The regression analysis was performed by using HEC computer Program 704-G9-L2020-Multiple Regression Package, which makes successive runs in which it eliminates the independent variable having the least significance based on the partial determination coefficients. After an initial run of

the multiple regression program, it was decided to reduce the number of independent variables to three: drainage area, basin slope, and 5 year-24 hour rainfall (see Tables 3 and 4). After the next run, watersheds were divided into two groups based on drainage area size in order to achieve better correlation results. The basins were grouped from zero to 15 square miles and from 15 to 417 square miles. The regression equations derived for the two drainage area groups and the determination coefficients for each equation are presented in Table 5. The unadjusted determination coefficients indicate the percentage of variation of the computed flood frequency results from that of the graphical curves. R-bar squares varied from 0.5807 for a 5 year return period flood to 0.6697 for 100 return period flood for drainage areas between 15 at 417 square miles. In a similar manner, R-bar square ranged from 0.4715 for 10 year flood to 0.7542 for a 100 year flood for drainage area sizes between 0 and 15 square miles. The reasonably good correlation demonstrated above was felt adequate for the determination of discharge frequency curves on ungaged watersheds in the Phoenix region.

20. Discharge frequency curves. All discharge frequency curves for drainage areas emanating in the Phoenix Mountains as well as the one discharge frequency curve on Indian Bend Wash were developed using the flood frequency regression analysis described in previous paragraphs in conjunction with a determination of standard project flood which was plotted between a 200 and 500 year return period. These discharge frequency curves are presented in Plates 4 thru 24.

21. The discharge frequency curves at successive concentration points on Cave Creek were developed as follows:

a. The frequency curve on Cave Creek on the upstream side of Cave Creek Dam (Plate 25) was determined by use of the regional regression analysis.

b. The frequency curve on Cave Creek on the downstream side of Cave Creek Dam (Plate 26) was determined by routing 2-year, 5-year, 10-year, 25-year, 50-year, 100-year, and standard project flood through the dam. The standard project flood hydrograph, upstream of the dam, was used as a pattern hydrograph with the flood hydrograph size determined by the ratio of each return period flood peak to the standard project flood discharge. The reservoir behind Cave Creek Dam was assumed empty at the beginning of each routing through the dam.

c. The frequency curve at Cave Creek at Arizona Canal (Plate 27) was based on the USGS stream gage record at the gage and accounts of historical floods from newspaper articles. Note the pronounced discontinuity in this frequency curve due to the influence of Cave Creek Dam with its fixed outlet.

d. Frequency curves between Cave Creek Dam and Arizona Canal (Plates 28, 29, and 30) were prorated between these two locations based on drainage area below the dam and SPF at each concentration point.

e. Frequency curves on Cave Creek at Grand Canal (Plate 31) and Cave Creek at the Salt River (Plate 32), result from flood flows emanating above Arizona Canal as well as runoff generated from the highly urbanized area below Arizona Canal. Frequency curves at these two locations were determined by considering the influence of the two different runoff regimes separately and combining the results for a composite frequency curve. The ratios of each return period flood to SPF for the Agua Fria Tributary No. 1 at Youngtown gage (Plate 33) was used as a guide for determining the shape of the frequency curve for urbanized areas.

TABLE 1

Concentration Point Locations and Standard Project Flood Discharges

Concentration Point	Location	Drainage Area (Sq. Mi.)	SPF (cfs)
1	Echo Canyon immediately north of Arizona Canal, just east of 37th Street	5.13	13400
2	Echo Canyon approximately 200 feet east of 40th Street between San Miguel and Saint Joseph	4.30	11800
3	Flynn Lane Wash at downstream side of the intersection of Flynn Lane and Lincoln Drive	0.63	2300
4	Flynn Lane Wash at Ocotillo Road, just north of Arizona Canal	0.98	3300
5	Myrtle Avenue Wash approximately 300 feet east of 16th Street, just north of Aurelius Avenue	0.87	2800
6	Dreamy Draw east at south end of 16th Street, just west of Dreamy Draw Drive	0.38	1400
7	Dreamy Draw at 16th Street, approximately 500 feet south of Northern Avenue	0.38	1500
8	Dreamy Draw at 12th Street, just north of Arizona Canal	0.66	2600
9	Northern Avenue Wash at 16th Street, approximately 200 feet north of Northern Avenue	0.61	2100
10	Northern Avenue Wash at intersection of Northern Avenue and Arizona Canal	0.95	2900

TABLE 1 (Cont'd)

Concentration Point	Location	Drainage Area (Sq. Mi.)	SPF (cfs)
11	10th Street Wash at 10th Street and Griswold Road	3.31	10100
12	10th Street Wash at Cheryl Drive, approximately 500 feet west of Cave Creek Road	1.21	3800
13	Moon Valley just upstream of confluence with Cave Creek near Sweetwater Avenue	6.52	17000
14	Moon Valley approximately 500 feet west of Southern Hills Road	4.17	13200
15	Moon Valley approximately 300 feet south of western tip of Southern Hills Road	1.07	3200
16	East Fork of Cave Creek just upstream of confluence with Cave Creek near Greenway Road	34.67	33000
17	Tributary on East Fork of Cave Creek, approximately 2300 feet west of 7th Street and about 600 feet south of Bell Road	0.67	2300
18	Tributary on East Fork of Cave Creek, approximately 500 feet west of 7th Street and 600 feet south of Bell Road	32.67	33000
19	Scatter Wash approximately 1500 feet east of Black Canyon Highway	1.25	3400
20	Indian Bend Wash at eastern Phoenix corporate boundary (33° 34' latitude 111° 58' longitude)	43.60	33300
21	Cave Creek tributary just upstream of Deer Valley Drive and about 700 feet east of Cave Creek	0.76	2600

TABLE 1 (Cont'd)

Concentration Point	Location	Drainage Area (Sq. Mi.)	SPF (cfs)
112U	Cave Creek at upstream face of Cave Creek Dam	174.44	86000
112D	Cave Creek at downstream face of Cave Creek Dam (one outlet in operation)	174.44	71000
113A	Cave Creek at Deer Valley Drive	194.56	68000
113B	Cave Creek at Utopia Road	215.00	63000
114	Cave Creek at Greenway Road	234.59	57000
115	Cave Creek just upstream of Arizona Canal	252.00	50000
116	Cave Creek at Grand Canal	264.41	49000
117	Cave Creek immediately upstream of confluence with the Salt River	310.56	59000

TABLE 2

Drainage Basin Characteristics

Subarea	Drainage Area (sq. mi.)	L (Miles)	LCA (Miles)	Slope (ft/mi)	N-Value	S-Graph	Percent Impervious Cover	Lag Time (hrs)	5R24 (inches)
1	5.13	3.15	1.67	470	0.035	Phoenix Mountain	25	0.49	1.90
2	4.30	2.77	1.48	515	0.035	"	25	0.44	1.90
3	0.63	1.40	0.74	835	0.035	"	10	0.24	1.90
4	0.98	1.97	1.02	735	0.035	"	10	0.31	1.90
5	0.87	2.12	1.10	740	0.035	"	10	0.33	1.90
6	0.38	1.21	0.64	460	0.035	"	20	0.24	1.90
7	0.38	1.12	0.63	304	0.035	"	5	0.25	1.90
8	0.66	1.87	0.98	203	0.030	Phoenix Valley	30	0.33	1.90
9	0.61	1.55	0.81	460	0.035	Phoenix Mountain	5	0.29	1.90
10	0.95	2.35	1.21	380	0.035	"	20	0.40	1.90
11	3.31	3.41	1.71	250	0.030	Phoenix Valley	45	0.49	1.90
12	1.21	1.67	0.84	420	0.035	Phoenix Mountain	15	0.30	1.90
13	6.52	4.37	2.20	220	0.030	Phoenix Valley	15	0.61	1.95
14	4.17	2.74	1.39	225	0.030	"	15	0.43	1.95
15	1.07	2.09	1.06	201	0.035	Phoenix Mountain	5	0.41	1.95
16	34.67	20.12	9.47	81	0.030	Phoenix Valley	5	2.30	2.20
17	0.67	1.48	0.65	27	0.030	"	5	0.38	2.00
18	32.67	18.53	8.67	84	0.030	"	5	2.14	2.20
19	1.25	3.41	1.82	71	0.030	"	5	0.64	2.10
20	43.60	19.60	9.10	89	0.030	Indian Bend Wash	10	2.20	2.30
21	0.76	1.87	0.82	43	0.030	Phoenix Valley	5	0.41	2.10

TABLE 2 (Cont'd)

Subarea	Drainage Area (sq. mi.)	L (Miles)	LCA (Miles)	Slope (ft/mi)	N-Value	S-Graph	Percent Impervious Cover	Lag Time (hrs)	5R24 (inches)
A	174.44	32.10	17.10	88.50	0.038	Phoenix Valley	5	4.28	2.75
B	20.12	18.10	7.20	116.70	0.030	"	5	1.85	
C	40.03	23.70	10.24	79.40	0.030	"	5	2.53	
D	9.79	7.10	3.96	80.30	0.032	"	11	1.19	
E	20.03	7.50	4.30	45.30	0.025	"	48	1.09	
F	46.15	12.50	5.90	75.60	0.024	"	50	1.30	

TABLE 3

Streamgages and Physical Parameters (D.A. = 0 to 15 Square Miles)

Observation Number	Streamgage Number	Station	Authority	Period of Record	Drainage Area (Sq. Mi.)	Slope (Ft/Mile)	5-Year 24-hour Rainfall (inches)
1	94792	Queen Creek Tributary at Apache Junction	USGS	1961-71	0.51	167	1.98
2	95012	Mesquite Creek near Mormon Flat Dam	USGS	1963-67	4.18	239	2.77
3	95100.7	West Fork Sycamore Creek ABV McFairland Canyon near Sunflower	USGS	1966-71	4.58	1437	3.74
4	95100.8	West Fork Sycamore Creek near Sunflower	USGS	1962-71	9.80	603	3.73
5	95101	East Fork Sycamore Creek near Sunflower	USGS	1962-71	4.49	1030	3.70
6	95101.8	Rock Creek near Sunflower	USGS	1963-71	15.00	340	2.80
7	95122	Salt River Trib. in South Mountain Park	USGS	1961-71	1.75	397	2.2
8	95127	Agua Fria River Trib. No. 2 near Rock Springs	USGS	1963-70	1.00	400	2.82
9	95137	Agua Fria River Trib. at Youngtown	USGS	1961-68	0.13	16	1.98
10	95138.2	Deadman Wash (at Black Canyon Highway) near New River	USGS	1960-71	11.10	319	2.48

TABLE 3 (Cont'd)

Observation Number	Streamgage Number	Station	Authority	Period of Record	Drainage Area (Sq. Mi.)	Slope (Ft/Mile)	5-Year 24-hour Rainfall (inches)
11	95158	Hartman Wash near Wickenburg	USGS	1964-71	5.57	125	2.23
12	95166	Ox Wash near Morristown	USGS	1963-71	6.31	150	2.40
13	95172	Centennial Wash Tributary near Salome	USGS	1963-71	3.58	288	2.18
14	95196	Rainbow Wash Tributary near Buckeye	USGS	1963-71	3.45	122	2.07
15	95201	Military Wash near Sentinel	USGS	1963-71	8.70	25	1.98
16	95202.3	Crater Range Wash near Ajo	USGS	1963-71	1.49	184	2.23
17	-	Safford W-V	ARS*	1939-71	1.13	130	2.00
18	-	Safford W-IV	ARS*	1939-71	1.19	54	2.00
19	-	Safford W-II	ARS*	1939-71	1.07	324	2.00
20	-	Safford W-I	ARS*	1939-71	0.81	80	2.00

* Note: (ARS) - Agricultural Research Service, U.S. Department of Agriculture.
Years in "Period of Record" are calendar years.

TABLE 4

Streamgages and Physical Parameters (D.A. = 15 to 417 Square Miles)

Observation Number	Streamgage Number	Station	Authority	Period of Record (water years)	Drainage Area (Sq. Mi.)	Slope (Ft/Mile)	5-Year 24-hour Rainfall (inches)
1	94988.7	Rye Creek near Gisela	USGS	1966-71	122	287	3.42
2	95101.5	Sycamore Creek near Sunflower	USGS	1962-70	53.4	368	3.70
3	95102	Sycamore Creek near Fort McDowell	USGS	1961-72	165	206	3.25
4	95121	Indian Bend near Scottsdale	USGS	1961-72	142	64	2.15
5	95123	Cave Creek near Cave Creek	USGS	1958-72	121	127	2.70
6	95137.8	New River near	USGS	1962-72	67.3	141	2.90
7	95138	New River at New River	USGS	1961-72	85.7	145	2.84
8	95138.35	New River (at Bell Road) near Peoria	USGS	1963-72	187	83	2.45
9	95138.6	Skunk Creek near Phoenix	USGS	1961-72	64.6	89	2.40
10	95138.9	New River (at Grand Avenue) at Peoria	USGS	1960-71	317	88	2.42
11	95139.1	New River near Glendale	USGS	1961-72	323	74	2.40

TABLE 4 (Cont'd)

Observation Number	Streamgage Number	Station	Authority	Period of Record (water years)	Drainage Area (Sq. Mi.)	Slope (Ft/Mile)	5-Year 24-hour Rainfall (inches)
12	95142	Waterman Wash near Buckeye	USGS	1964-71	403	84	2.25
13	95155	Hassayampa River near Wickenburg	USGS	1938, 1946-72	417	108	2.80
14	95168	Jack Rabbit Wash near Tonopah	USGS	1964-71	137	78	2.17
15	95172.8	Tiger Wash near Aguila	USGS	1963-71	85.2	47	2.17
16	95197.5	Bender Wash near Gila Bend	USGS	1963-71	68.8	43.4	2.26
17	95197.6	Sauceda Wash near Gila Bend	USGS	1963-71	126	62	2.23
18	94685	San Carlos River near Peridot	USGS	1916, 1930-71	320	127	2.70
19	94800	Santa Cruz River near Lochiel	USGS	1949-71	80.6	57	2.00
20	94815	Sonoita Creek near Patagonia	USGS	1930-71	209	300	2.58
21	94840	Sabino Creek near Tucson	USGS	1932-71	35.5	432	2.80
22	94831	Tanque Verde Creek near Tucson	USGS	1960-71	43.0	103	2.56
23	94850	Rincon Creek near Tucson	USGS	1953-71	44.8	638	2.70

TABLE 5

Regression Equations for Drainage Area Sizes 0 to 15 Square Miles

Return Period Years	C1	C5	C9	Constant	R squared	R bar squared
100	6580.04	0	20226.14	-3972.32	0.7871	0.7621
50	4539.83	0	13523.12	-2461.47	0.7919	0.7674
25	2987.84	0	7889.85	-1179.13	0.7447	0.7147
10	1541.98	0	2793.95	- 85.86	0.5547	0.5023
5	815.86	0	643.13	+ 283.51	0.3301	0.2513
2	-	-	-	-	0	0
			for drainage area sizes 15 to 417 square miles			
100	41750.34	-10966.70	214649.68	-107165.82	0.7148	0.6697
50	30366.44	-13048.91	185458.49	- 79977.25	0.7086	0.6626
25	20596.45	-10846.21	139951.40	- 55538.28	0.6680	0.6156
10	11674.26	- 5949.96	80139.74	- 32835.46	0.6123	0.5511
5	6779.87	- 2717.80	45087.47	- 20399.96	0.5757	0.5087
2	2641.09	30.45	12027.60	- 8540.39	0.4335	0.3440

Note: General regression equation is:

$Q = C1 (\log DA) + C5 (\log S) + C9 (\log 5R24) + Constant$

Where: DA = drainage area in square miles

5R24 = 5 year - 24 hour rainfall in inches

S = basin slope in ft/mile

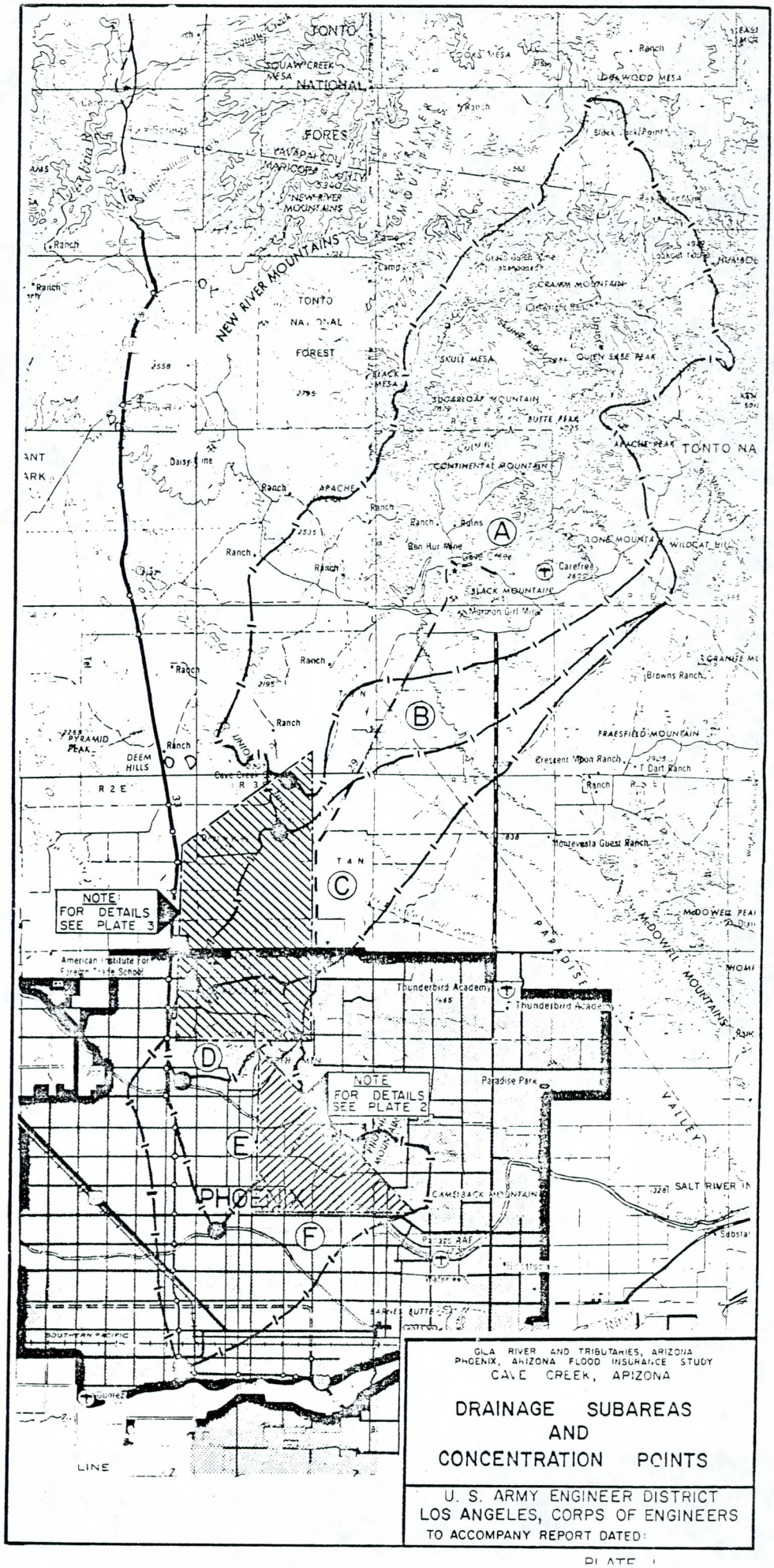
C1 = DA regression coefficient

C5 = S regression coefficient

C9 = 5R24 regression coefficient

Constant = regression constant

Q = return period peak discharge in cfs

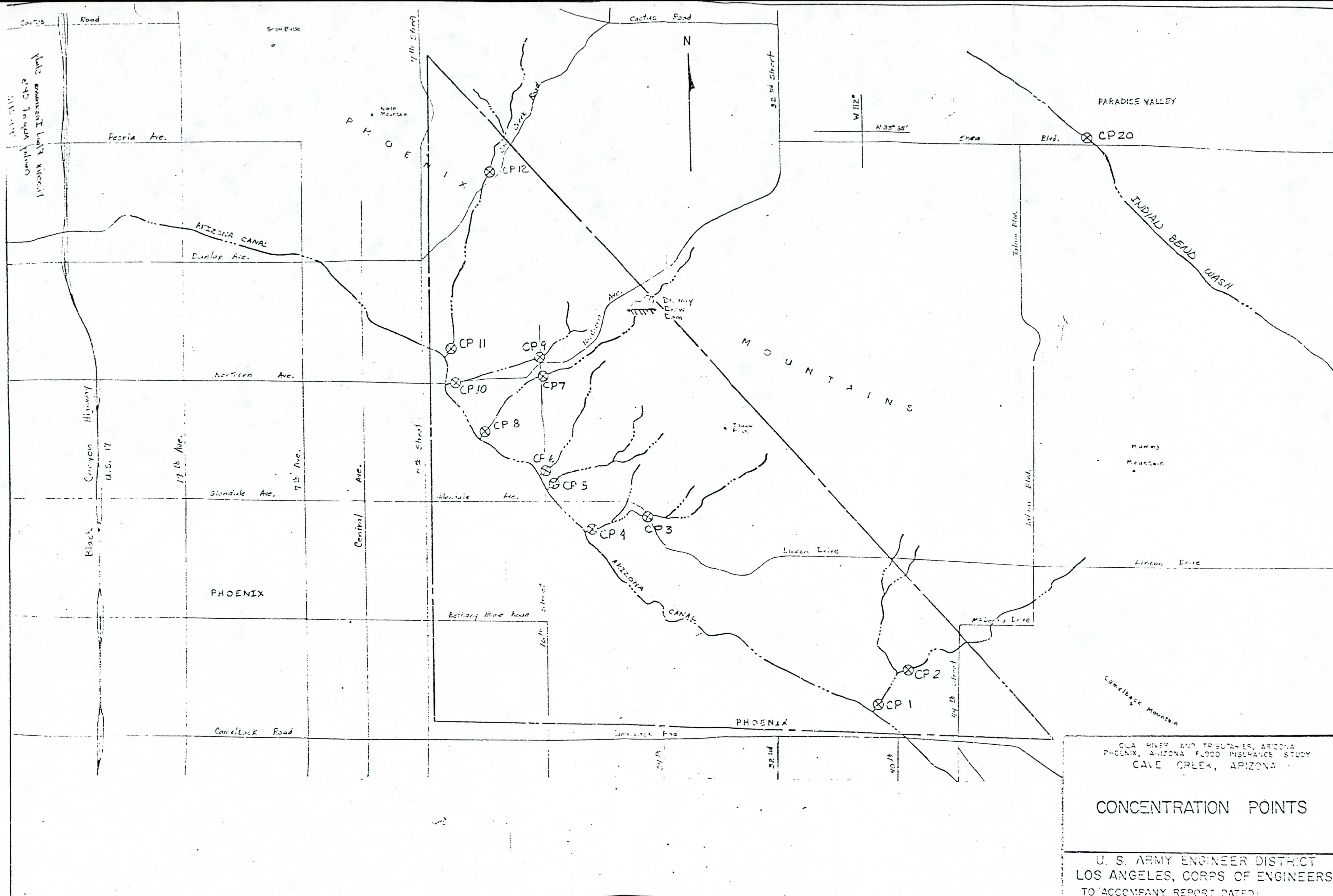


GILA RIVER AND TRIBUTARIES, ARIZONA
PHOENIX, ARIZONA FLOOD INSURANCE STUDY
CAVE CREEK, APIZONA

DRAINAGE SUBAREAS AND CONCENTRATION POINTS

U. S. ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED:

PLATE 1



GILA RIVER AND TRIBUTARIES, ARIZONA
PHOENIX, ARIZONA FLOOD INSURANCE STUDY
CAVE CREEK, ARIZONA

CONCENTRATION POINTS

U. S. ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED:

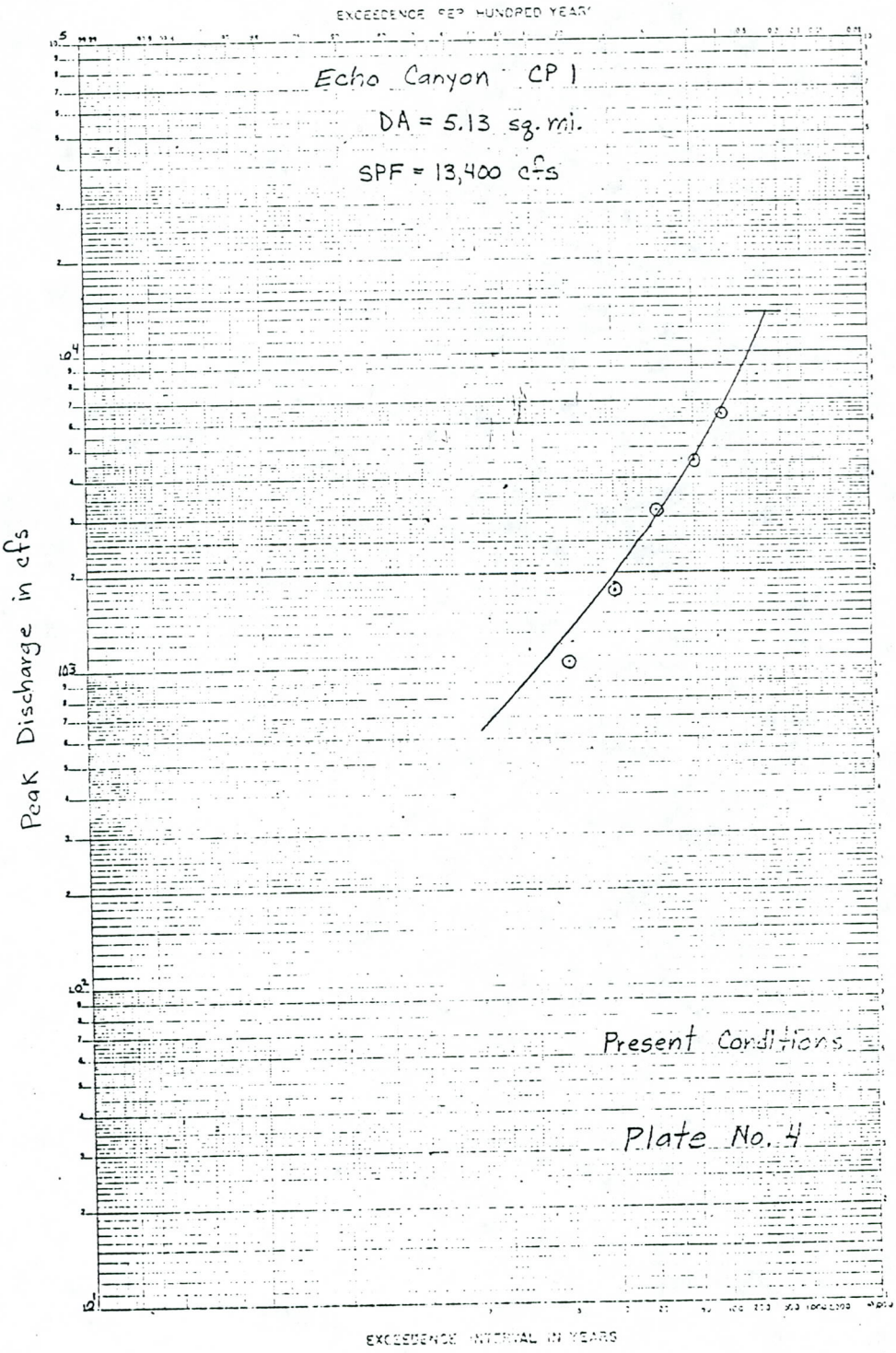
PLATE 2

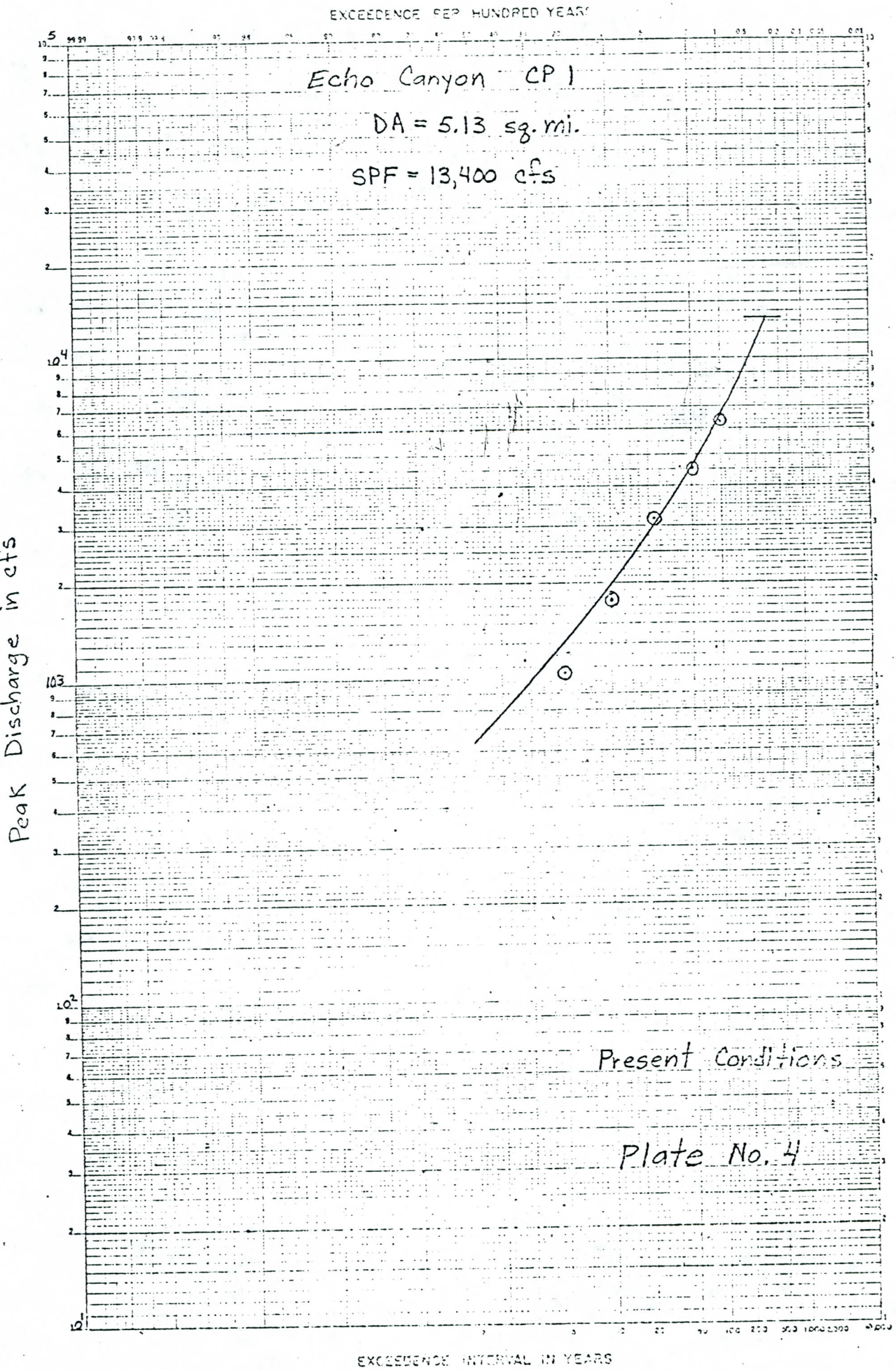
GILA RIVER AND TRIBUTARIES, ARIZONA
PHOENIX, ARIZONA FLOOD INSURANCE STUDY
CAVE CREEK, ARIZONA

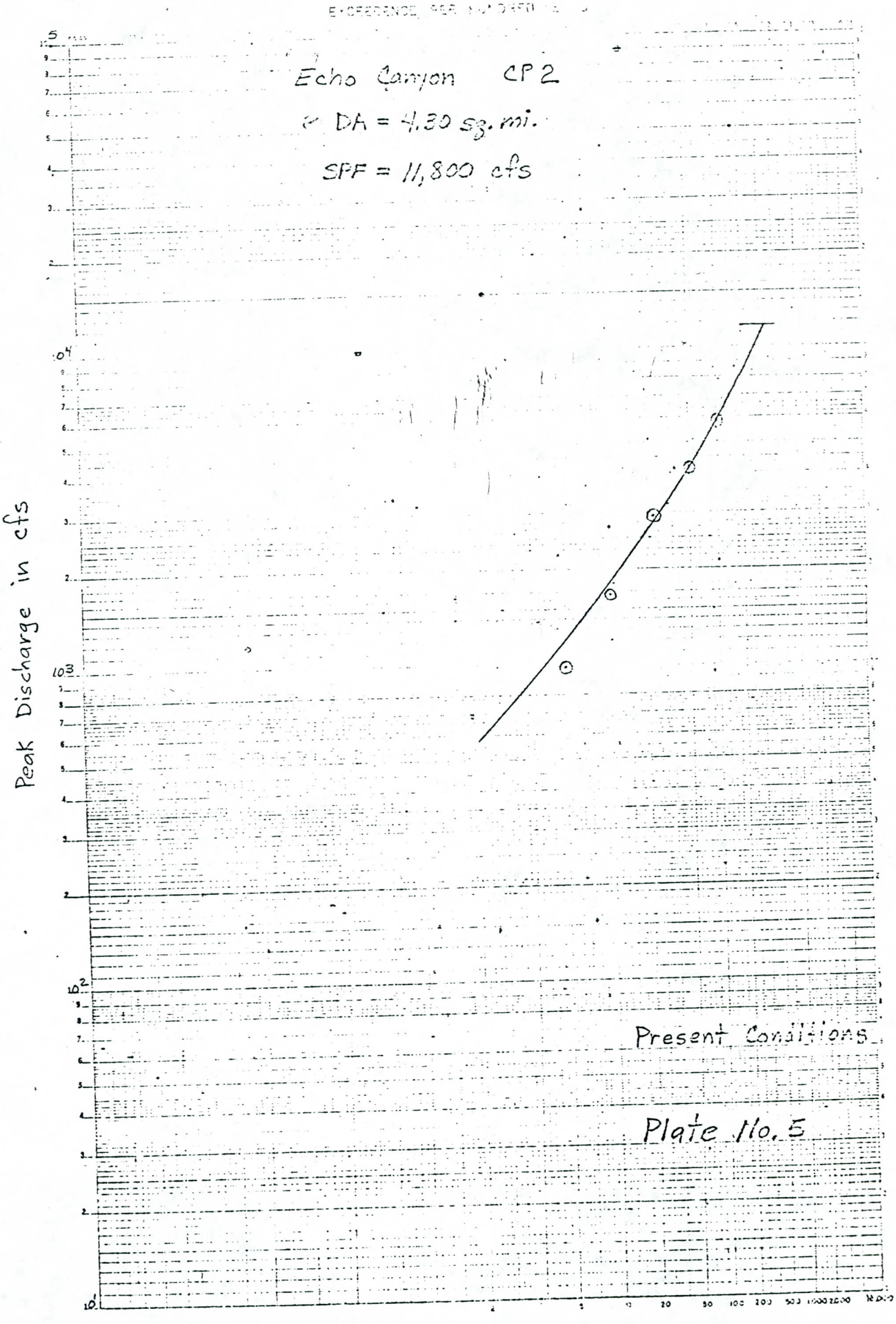
CONCENTRATION POINTS

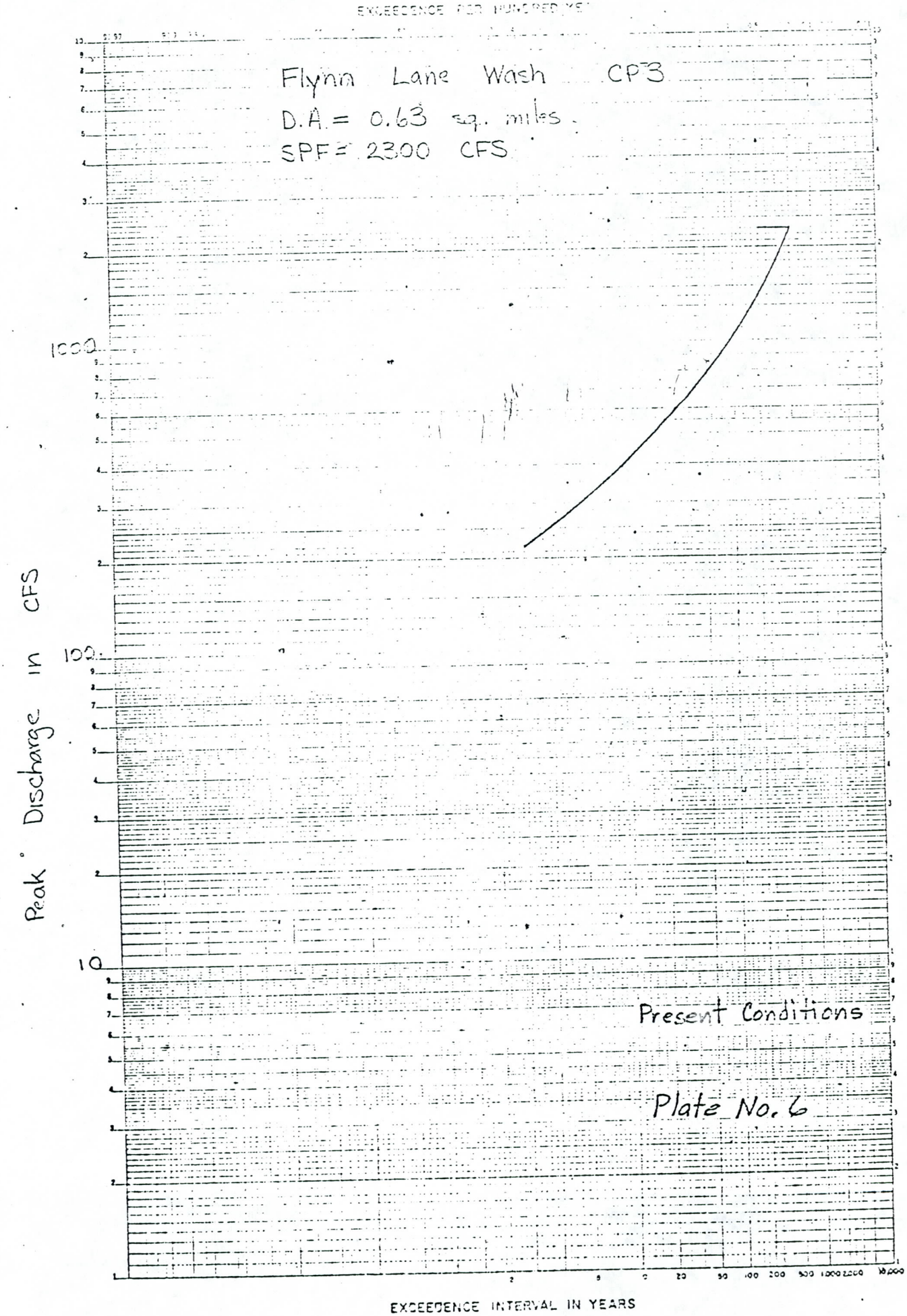
U. S. ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED:

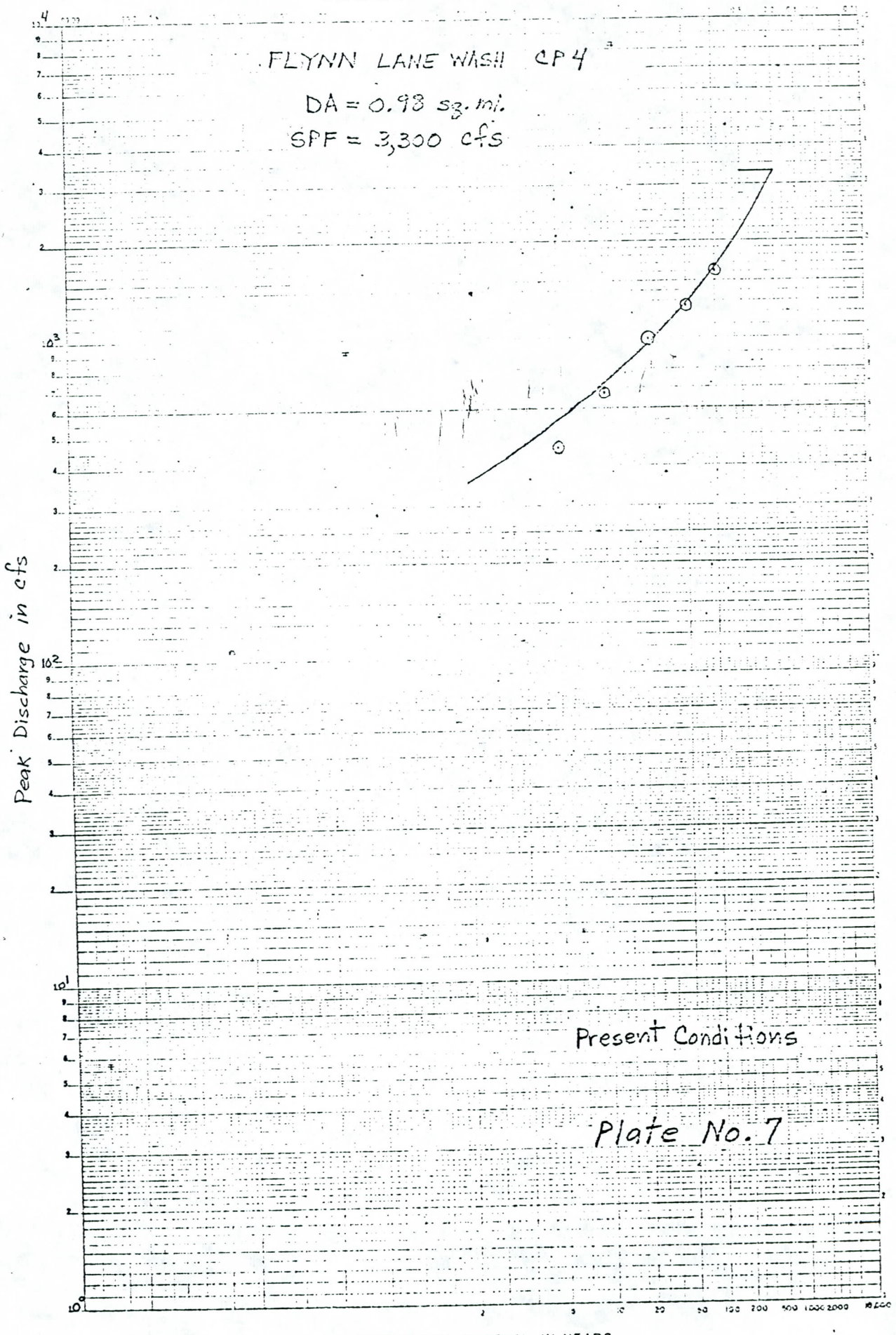
PLATE 3

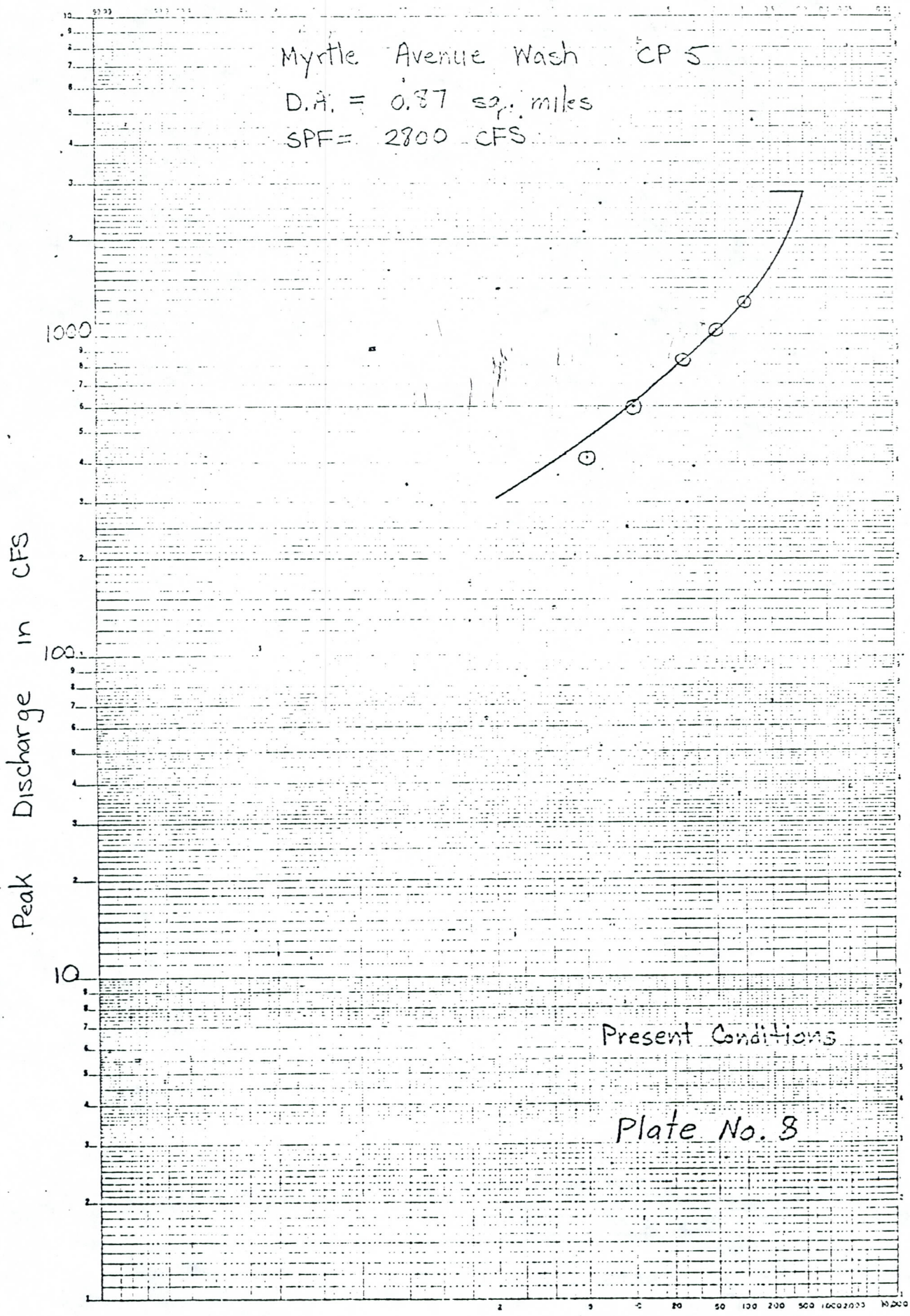

EXCEEDENCE PER HUNDRED YEARS
Echo Canyon CP 1
DA = 5.13 sq. mi.
SPF = 13,400 cfs
Peak Discharge in cfs
Present Conditions
Plate No. 4
EXCEEDENCE INTERVAL IN YEARS

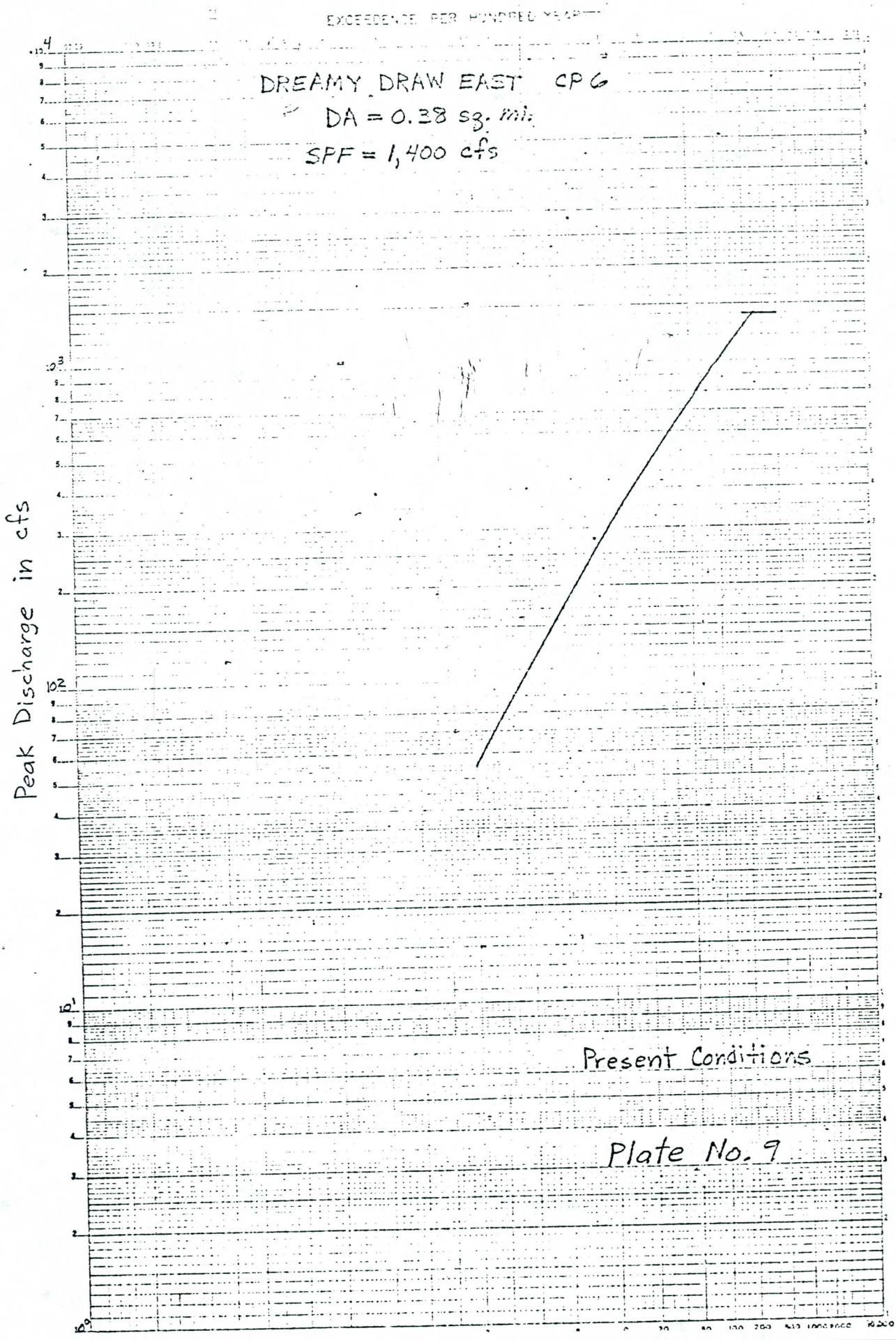

EXCEEDENCE PER HUNDRED YEARS
Echo Canyon CP 1
DA = 5.13 sq. mi.
SPF = 13,400 cfs
Peak Discharge in cfs
Present Conditions
Plate No. 4
EXCEEDENCE INTERVAL IN YEARS

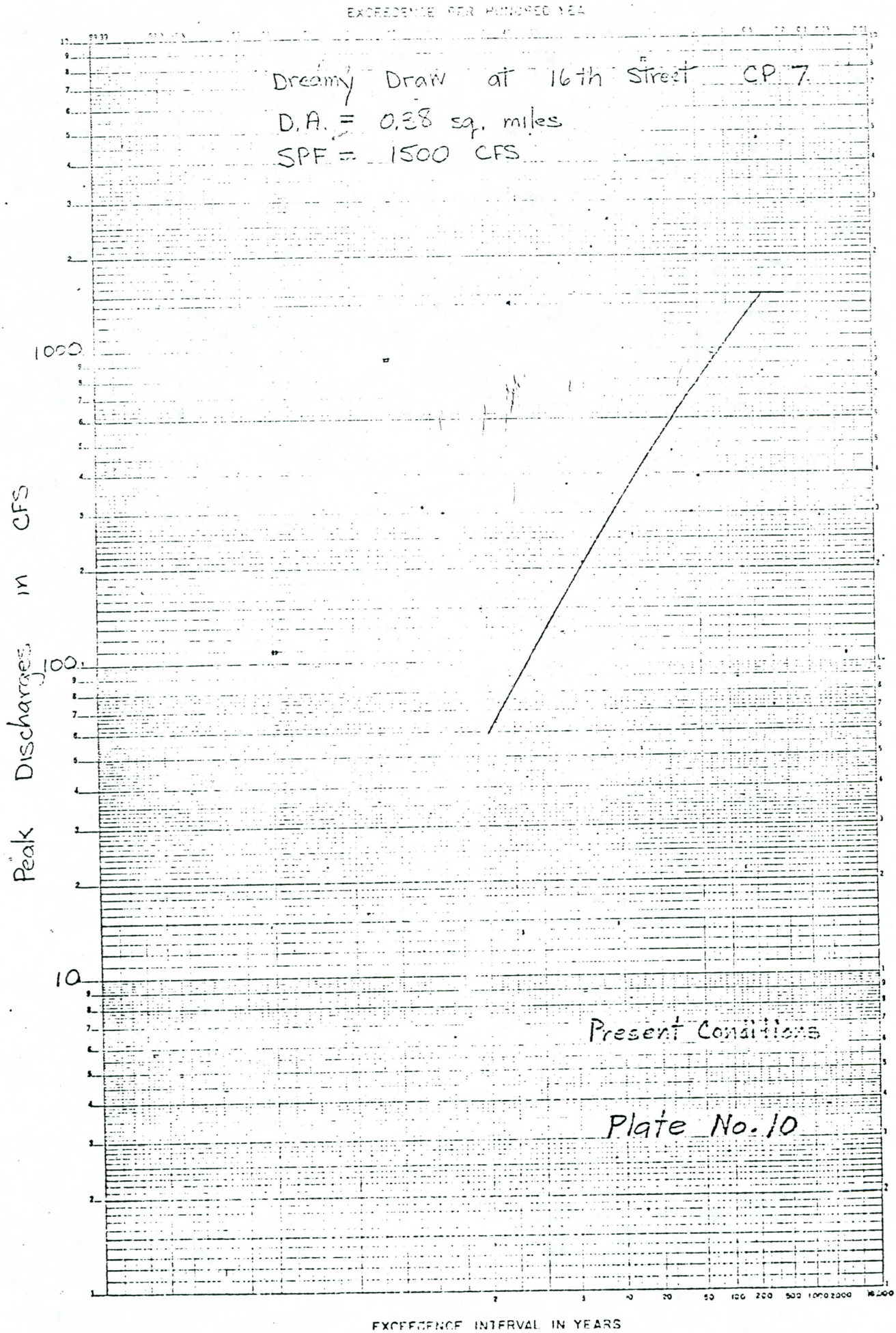

Echo Canyon CP 2
DA = 4.30 sq. mi.
SPF = 11,800 cfs
Peak Discharge in cfs
Present Conditions
Plate No. 5

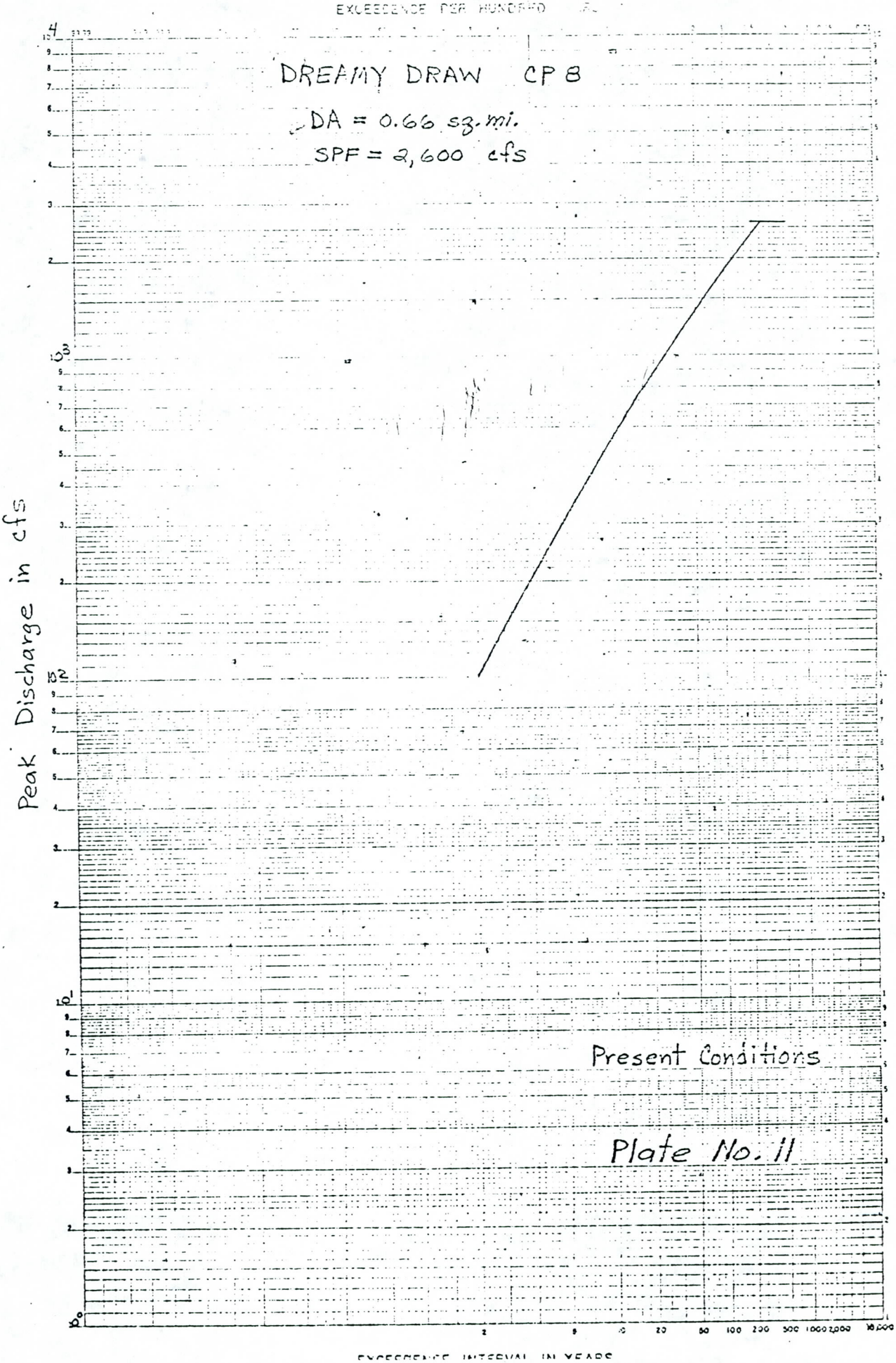

EXCEEDENCE PER HUNDRED YEAR
Flynn Lane Wash CP3
D.A. = 0.63 sq. miles
SPF = 2300 CFS
1000
100
10
Peak Discharge in CFS
Present Conditions
Plate No. 6
2
5
10
20
50
100
200
500
1000
2000
10,000
EXCEEDENCE INTERVAL IN YEARS

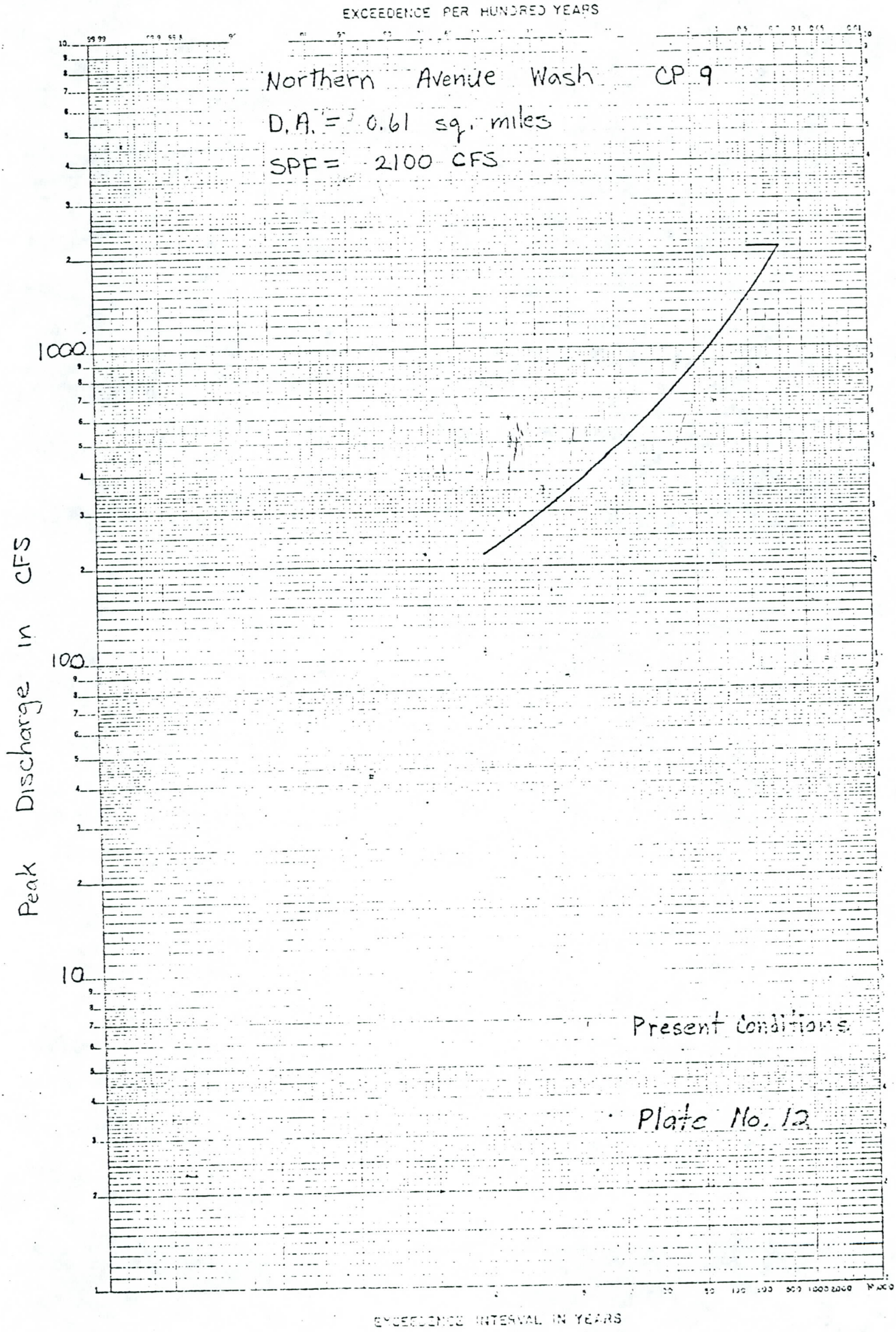

FLYNN LANE WASH CP 4
DA = 0.98 sq. mi.
SPF = 3,300 cfs
Peak Discharge in cfs
EXCEEDENCE INTERVAL IN YEARS
Present Conditions
Plate No. 7

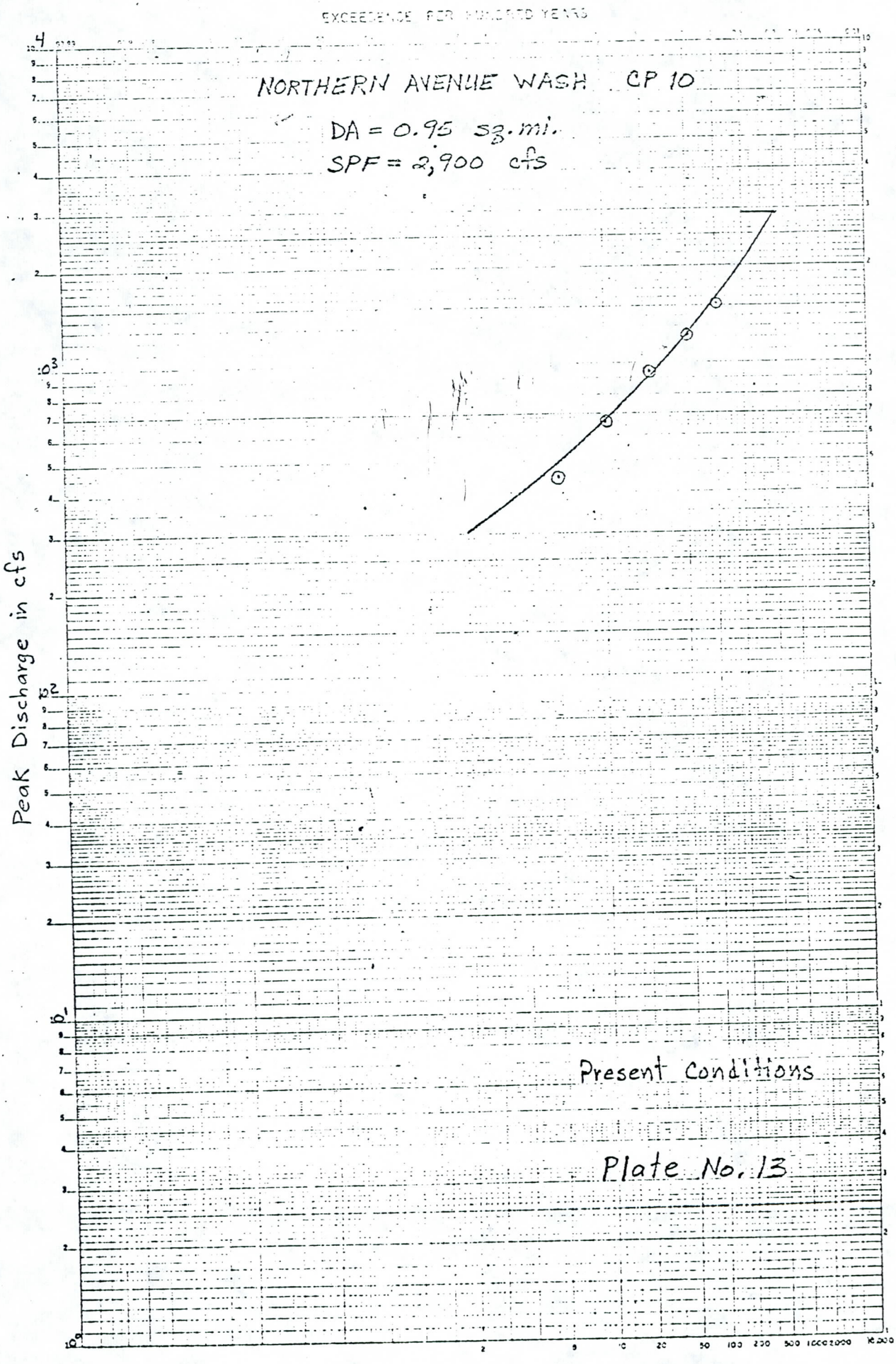

EXCEEDENCE PER HUNDRED YEAR
Myrtle Avenue Wash CP 5
D.A. = 0.87 sq. miles
SPF= 2800 CFS
Peak Discharge in CFS
1000
100
10
Present Conditions
Plate No. 8

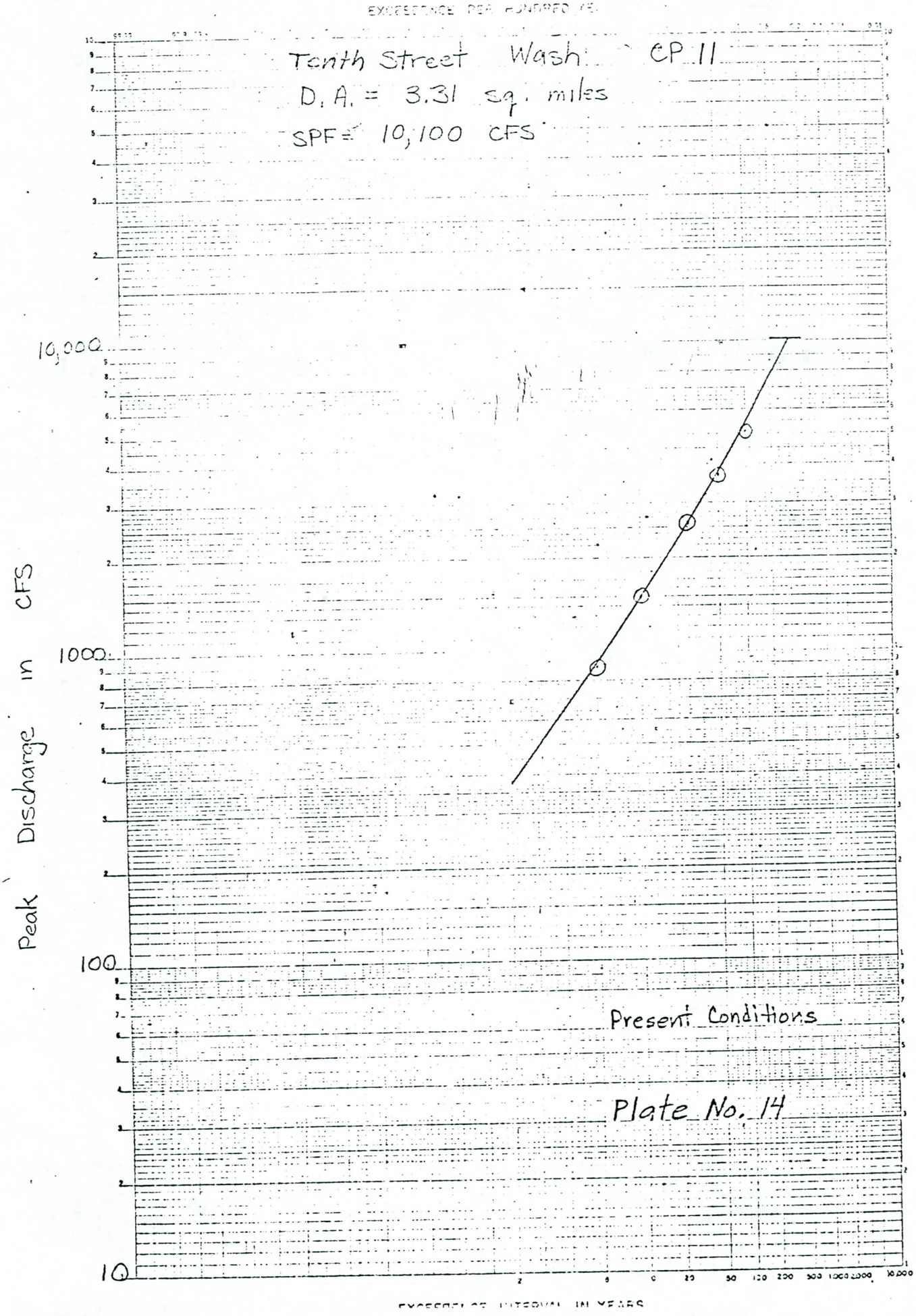

EXCEEDENCE PER HUNDRED YEAR
DREAMY DRAW EAST CP 6
DA = 0.38 sq. mi.
SPF = 1,400 cfs
Peak Discharge in cfs
Present Conditions
Plate No. 9

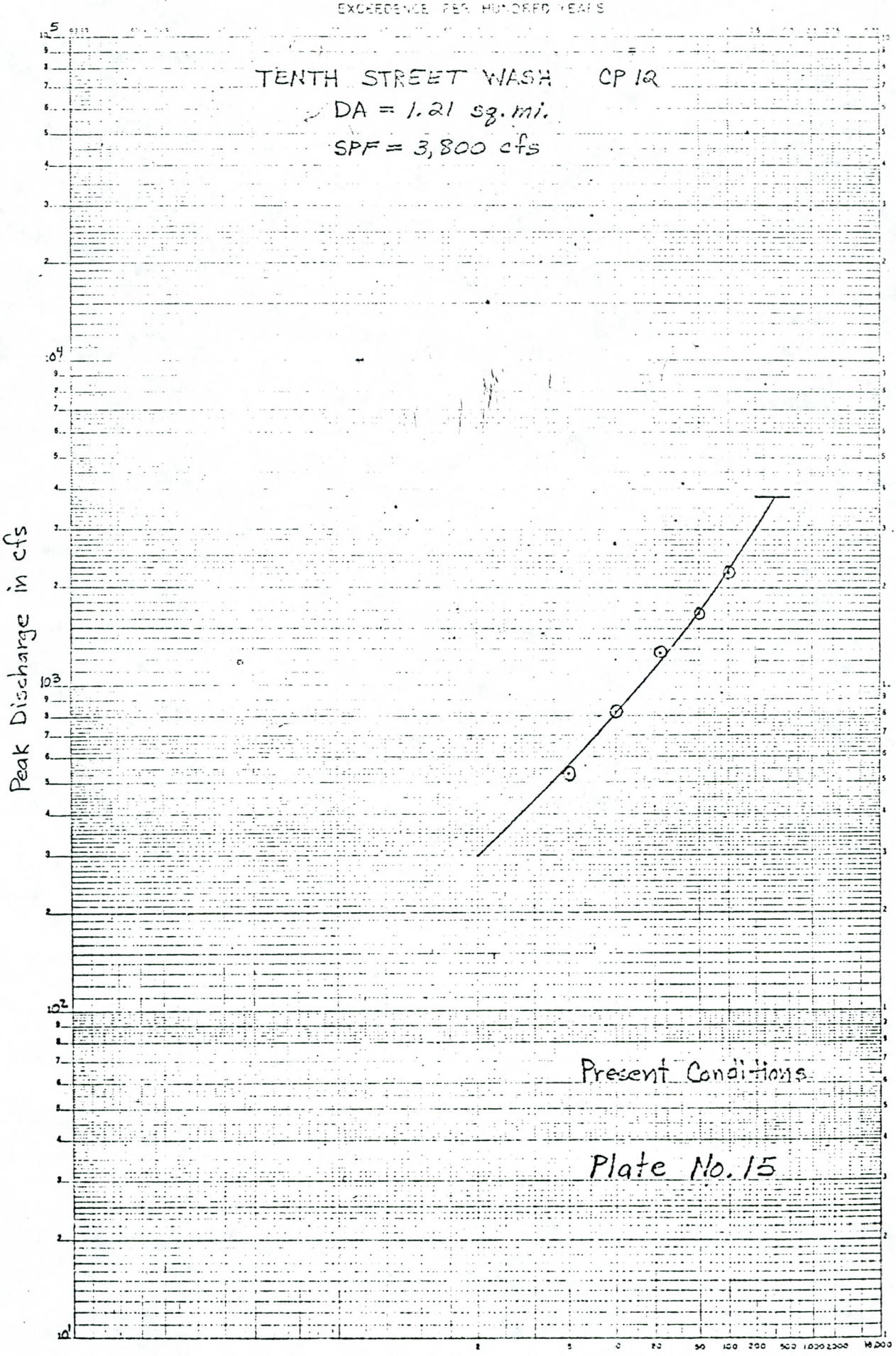

EXCEEDENCE PER HUNDRED YEA
Dreamy Draw at 16th Street CP 7.
D.A. = 0.38 sq. miles
SPF = 1500 CFS
1000
100
10
Peak Discharges in CFS
Present Conditions
Plate No. 10
2
5
10
20
50
100
200
500
1000
2000
10,000
EXCEEDENCE INTERVAL IN YEARS

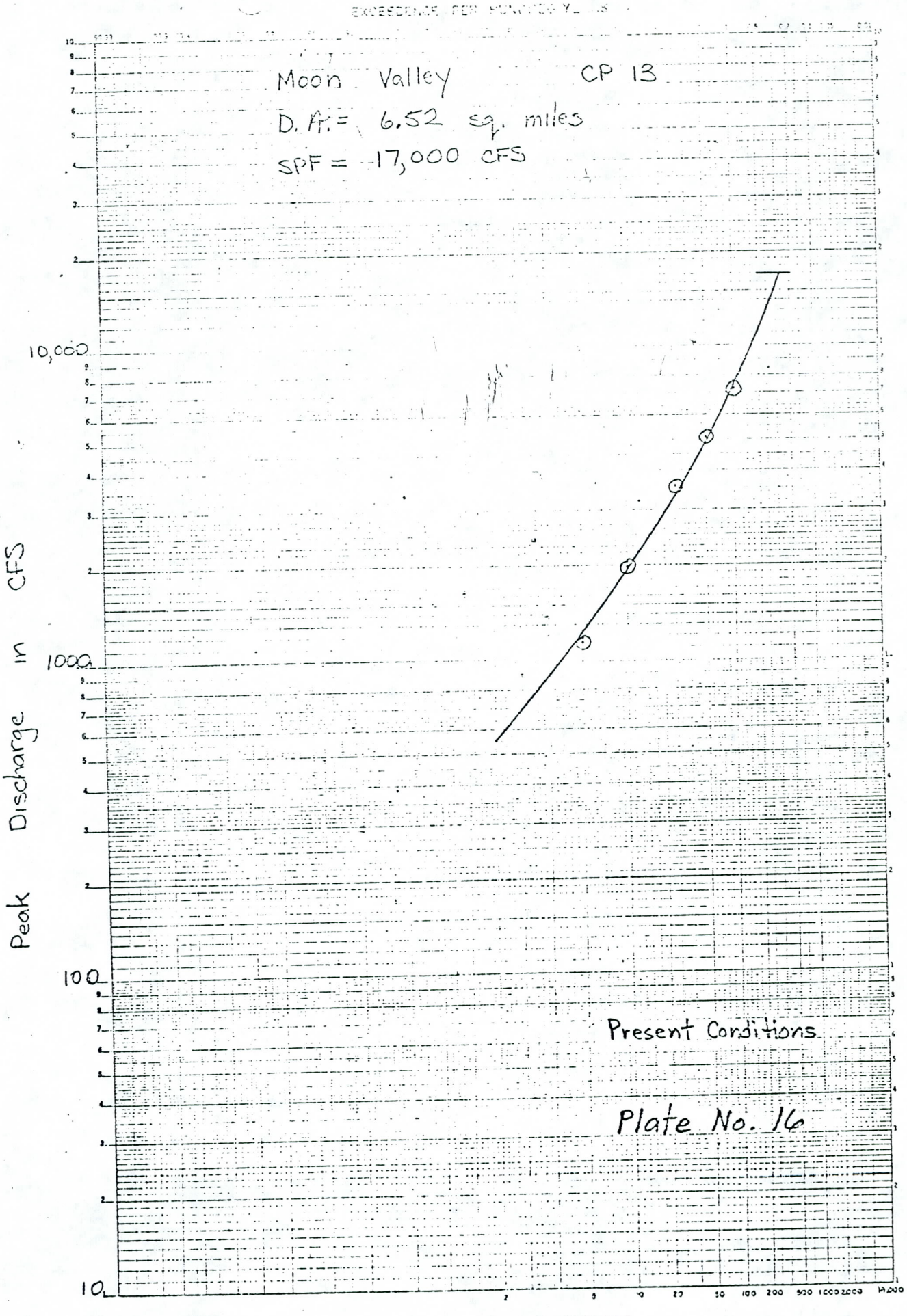

EXCEEDENCE PER HUNDRED
DREAMY DRAW CP 8
DA = 0.66 sq. mi.
SPF = 2,600 cfs
Peak Discharge in cfs
Present Conditions
Plate No. 11
EXCEEDENCE INTERVAL IN YEARS

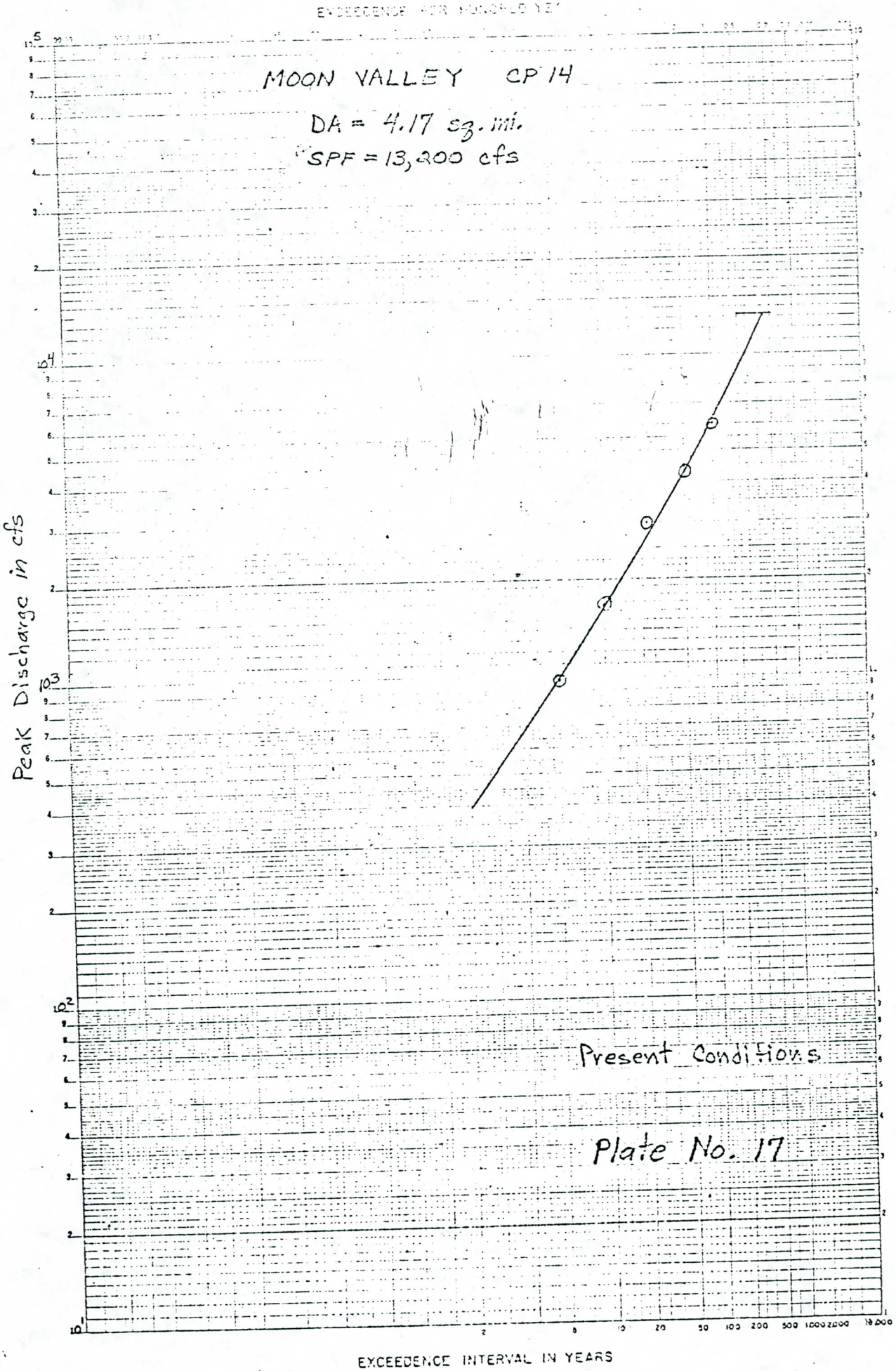

EXCEEDENCE PER HUNDRED YEARS
Northern Avenue Wash CP 9
D.A. = 0.61 sq. miles
SPF = 2100 CFS
1000
100
10
Peak Discharge in CFS
Present Conditions
Plate No. 12
EXCEEDENCE INTERVAL IN YEARS

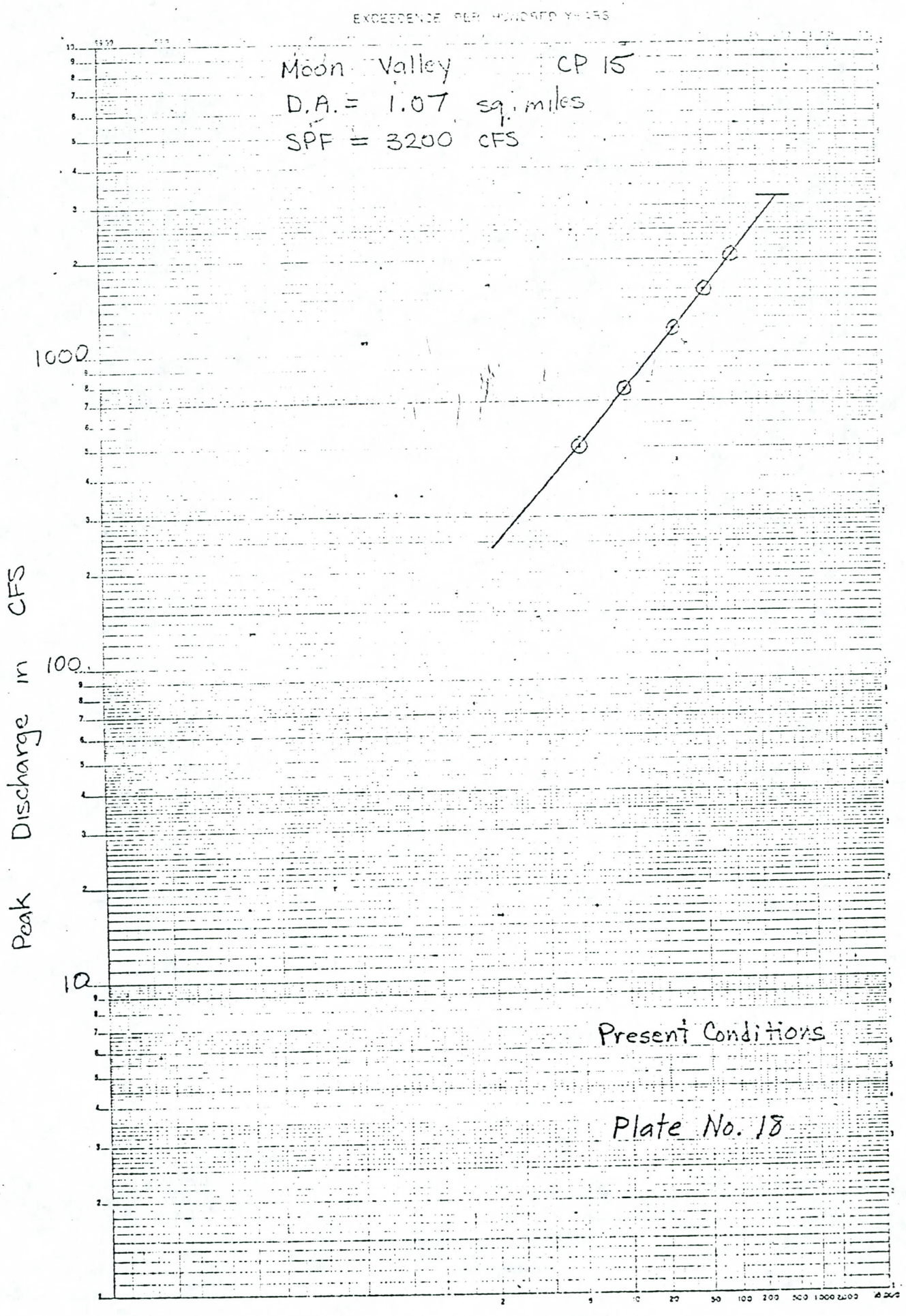

EXCEEDANCE PER HUNDRED YEARS
NORTHERN AVENUE WASH CP 10
DA = 0.95 sq. mi.
SPF = 2,900 cfs
Peak Discharge in cfs
Present Conditions
Plate No. 13

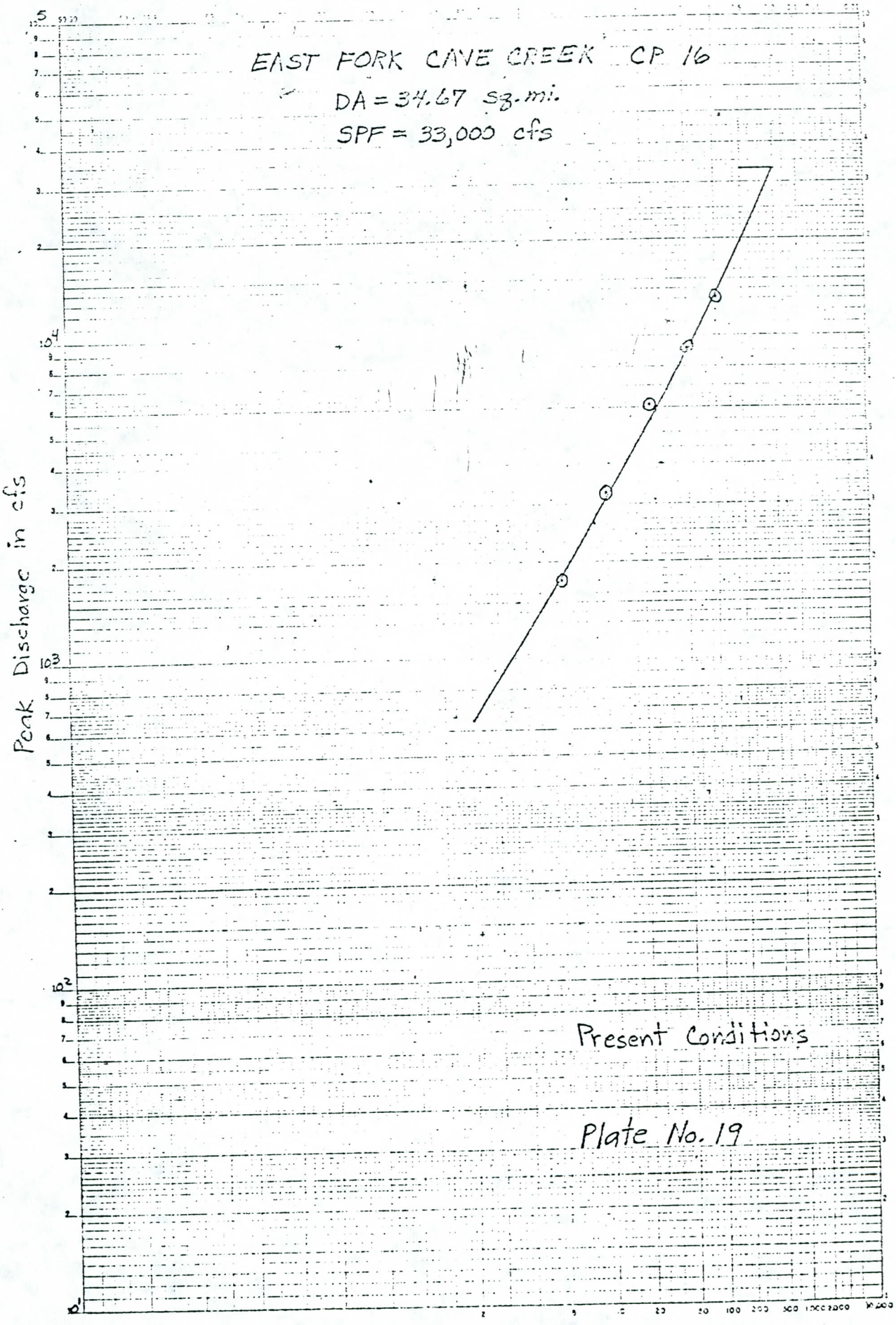

EXCEEDANCE PER HUNDRED YEARS
Tenth Street Wash CP 11
D. A. = 3.31 sq. miles
SPF = 10,100 CFS
10,000
1000
100
10
Peak Discharge in CFS
Present Conditions
Plate No. 14
2
5
10
20
50
100
200
500
1000
2000
10,000
EXCEEDANCE INTERVAL IN YEARS

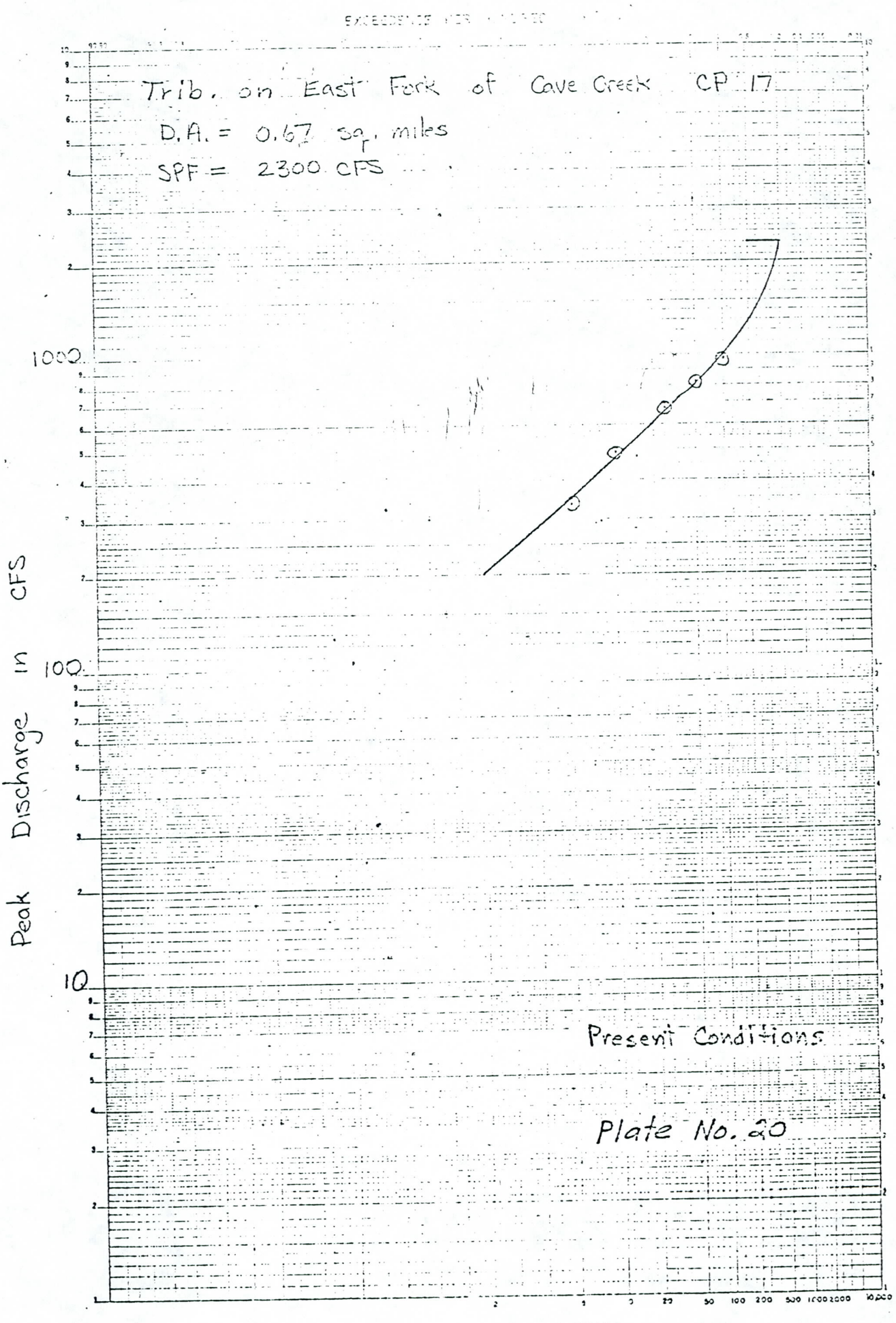

EXCEEDENCE PER HUNDRED YEARS
TENTH STREET WASH CP 12
DA = 1.21 sq. mi.
SPF = 3,800 cfs
Peak Discharge in cfs
Present Conditions
Plate No. 15

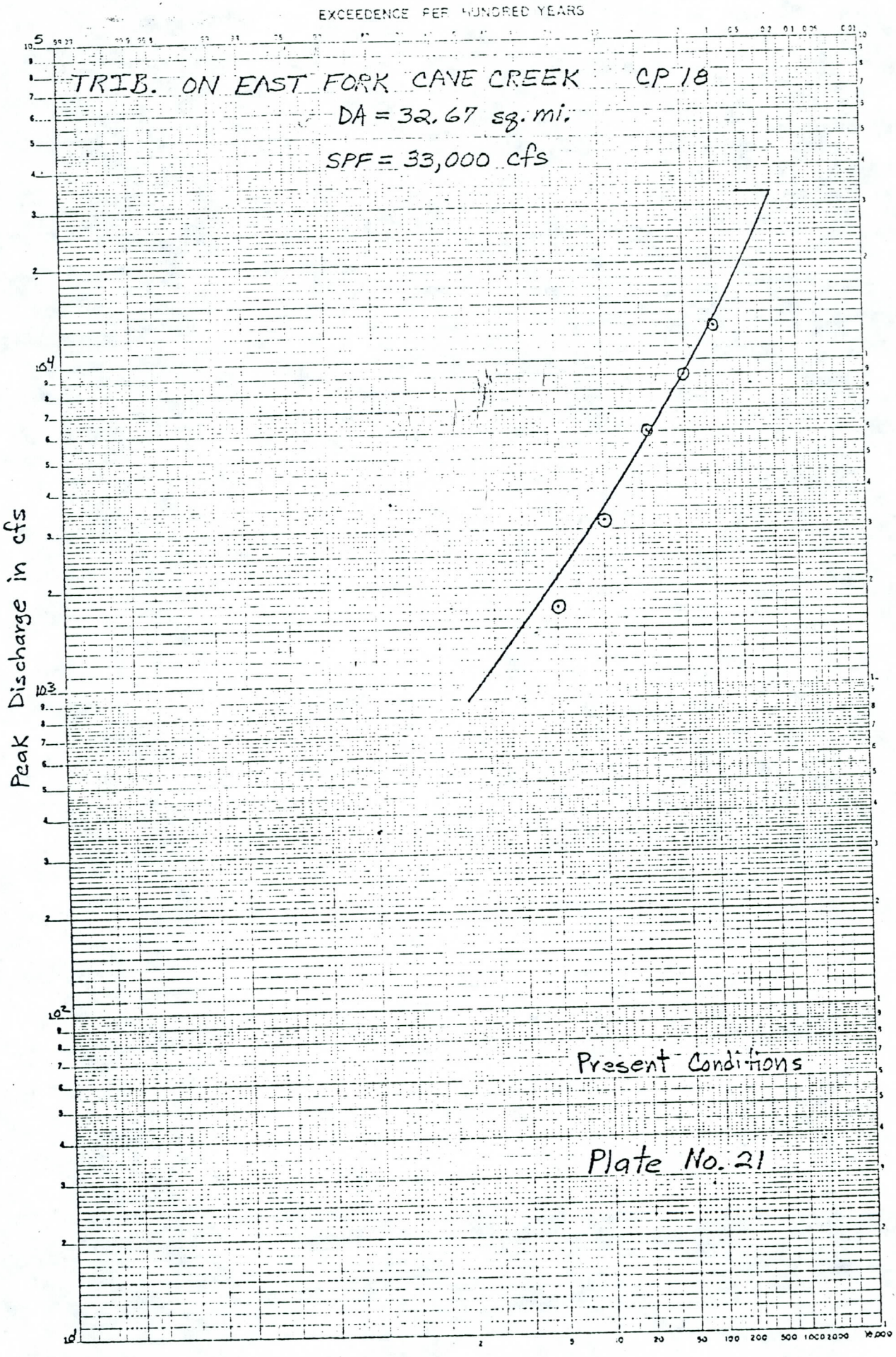

Moon Valley
CP 13
D. A. = 6.52 sq. miles
SPF = 17,000 CFS
Peak Discharge in CFS
10,000
1000
100
10
Present Conditions
Plate No. 16

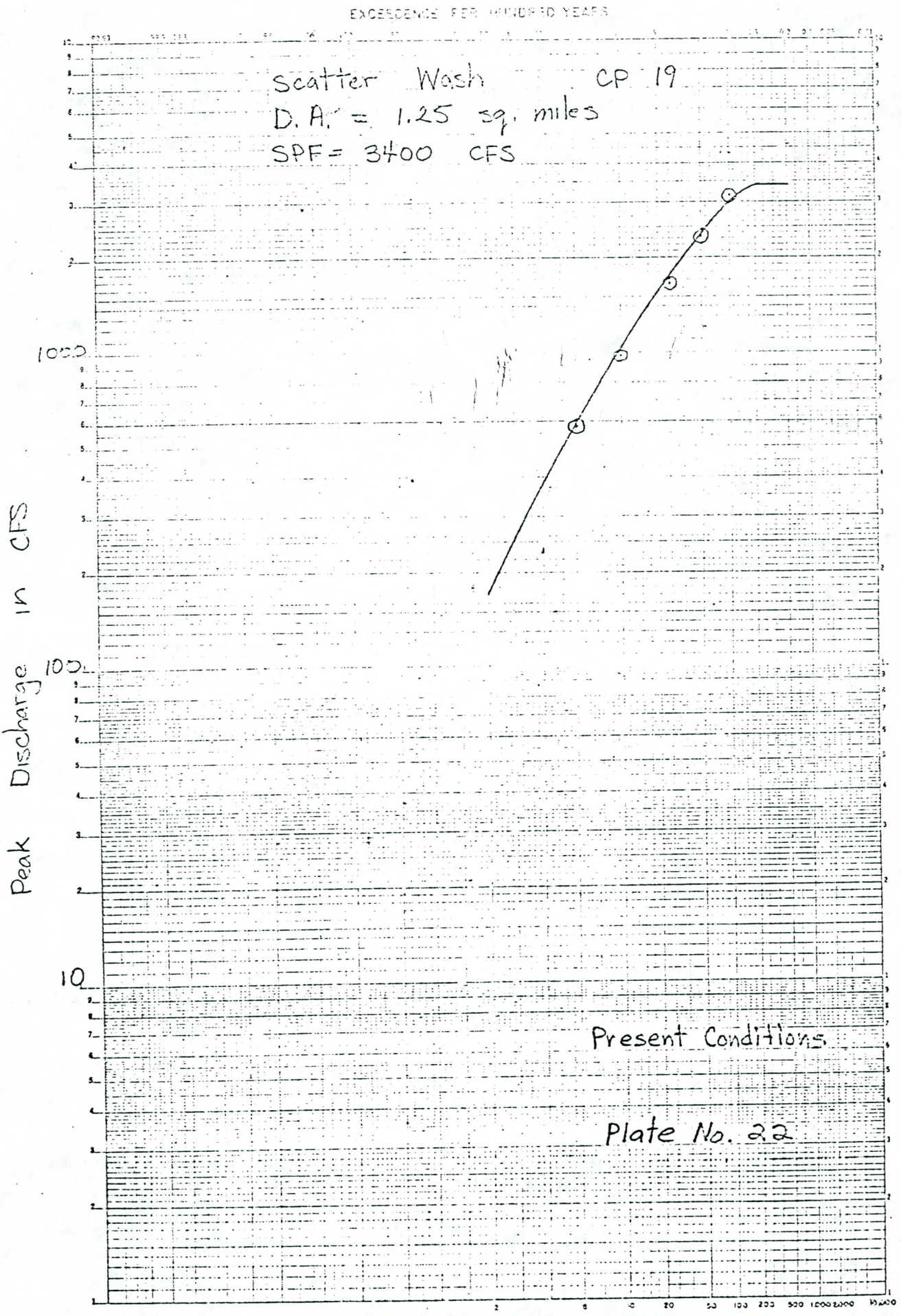

MOON VALLEY CP 14
DA = 4.17 sq. mi.
SPF = 13,200 cfs
Peak Discharge in cfs
EXCEEDENCE INTERVAL IN YEARS
Present Conditions
Plate No. 17

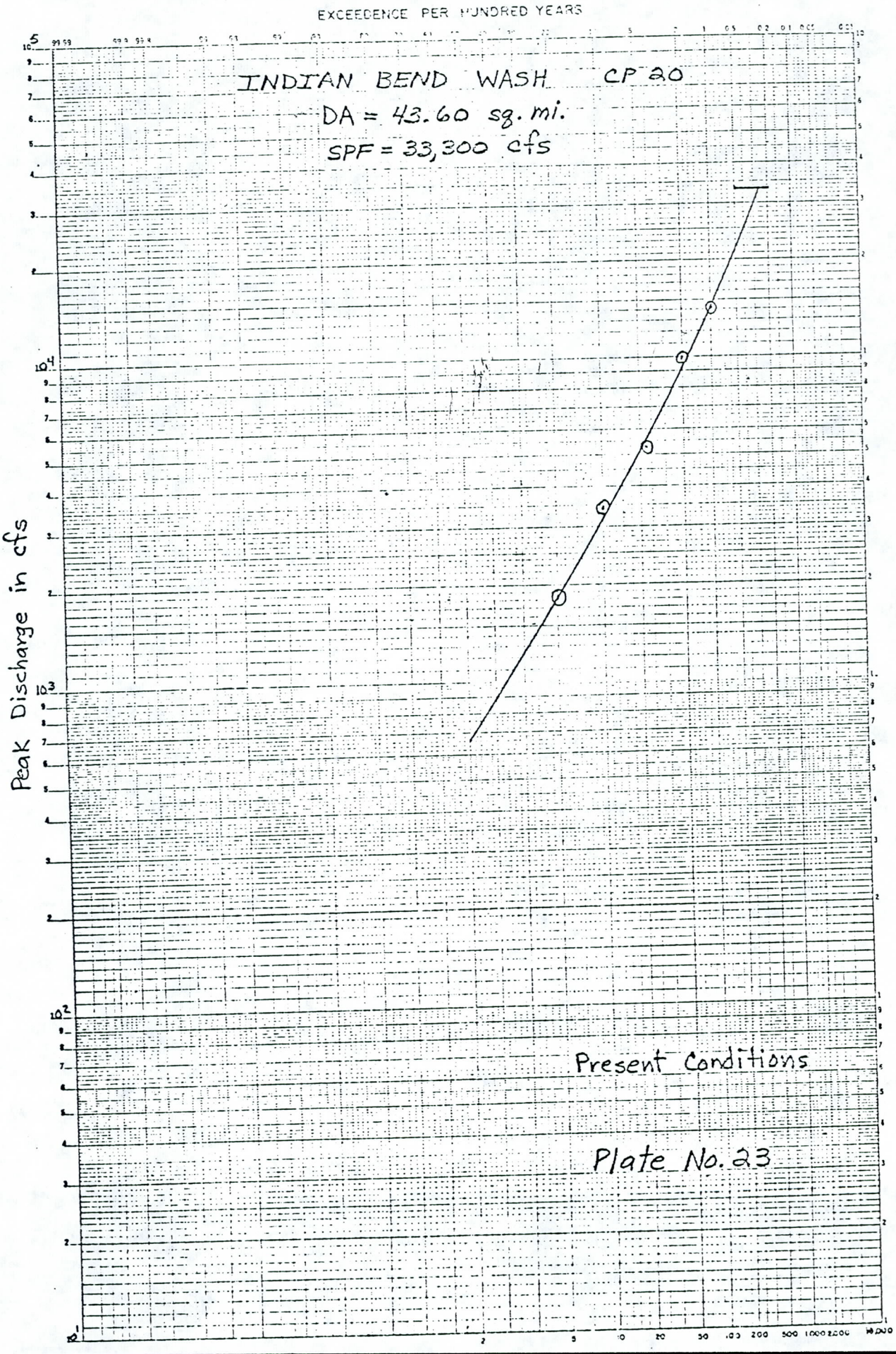

EXCEEDENCE PER HUNDRED YEARS
Moon Valley CP 15
D.A. = 1.07 sq. miles
SPF = 3200 CFS
1000
100
10
Peak Discharge in CFS
Present Conditions
Plate No. 18


EAST FORK CAVE CREEK CP 16
DA = 34.67 sq. mi.
SPF = 33,000 cfs
Peak Discharge in cfs
Present Conditions
Plate No. 19


Trib. on East Fork of Cave Creek CP 17
D.A. = 0.67 sq. miles
SPF = 2300 CFS
1000
100
10
Peak Discharge in CFS
Present Conditions
Plate No. 20
2
5
10
25
50
100
200
500
1000
2000
10,000
EXCEEDENCE INTERVAL IN YEARS


EXCEEDENCE PER HUNDRED YEARS
TRIB. ON EAST FORK CAVE CREEK CP 18
DA = 32.67 sq. mi.
SPF = 33,000 cfs
Peak Discharge in cfs
Present Conditions
Plate No. 21

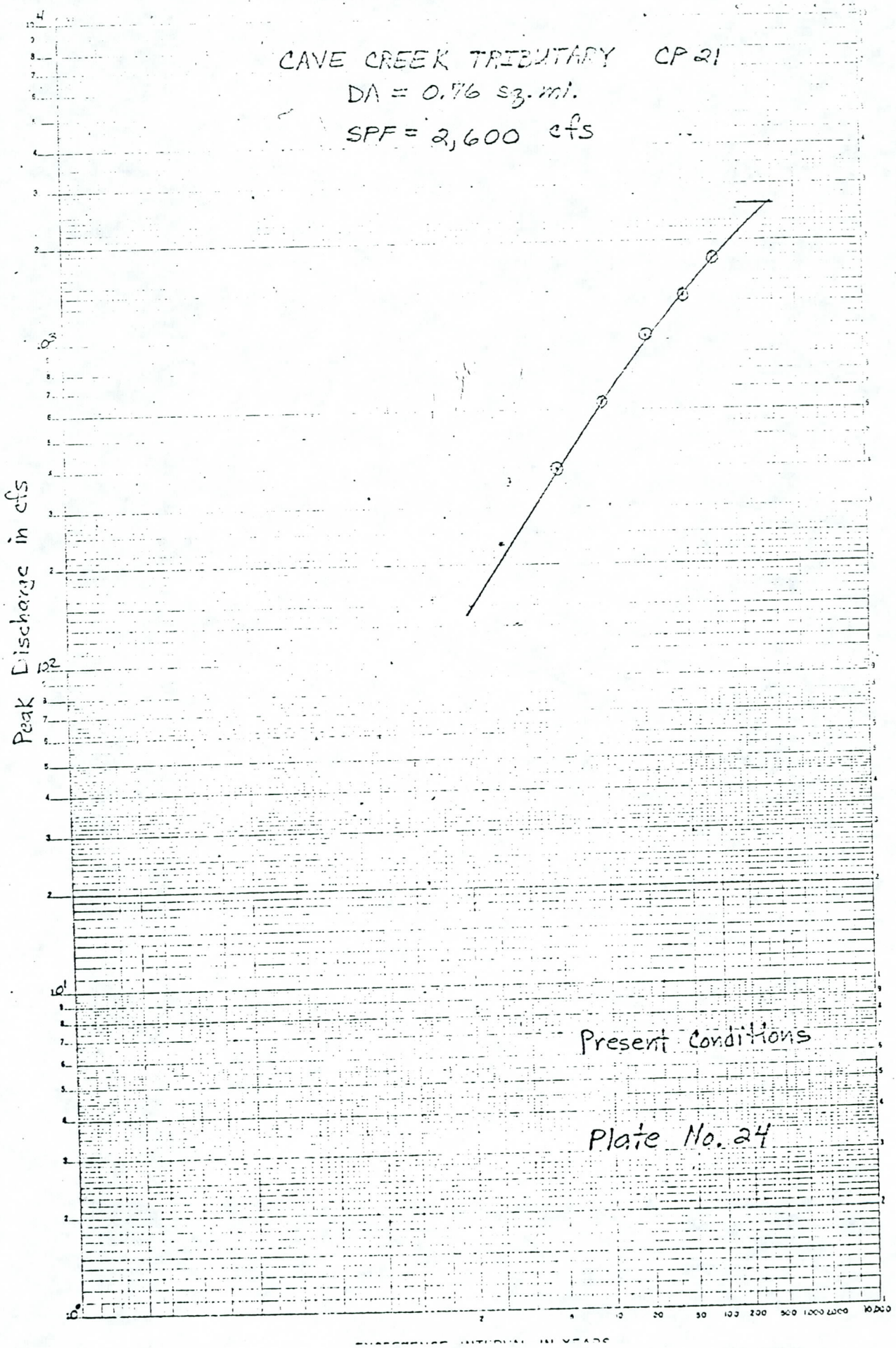

EXCEEDENCE PER HUNDRED YEARS
Scatter Wash CP 19
D. A. = 1.25 sq. miles
SPF = 3400 CFS
Peak Discharge in CFS
1000
100
10
Present Conditions
Plate No. 2.2

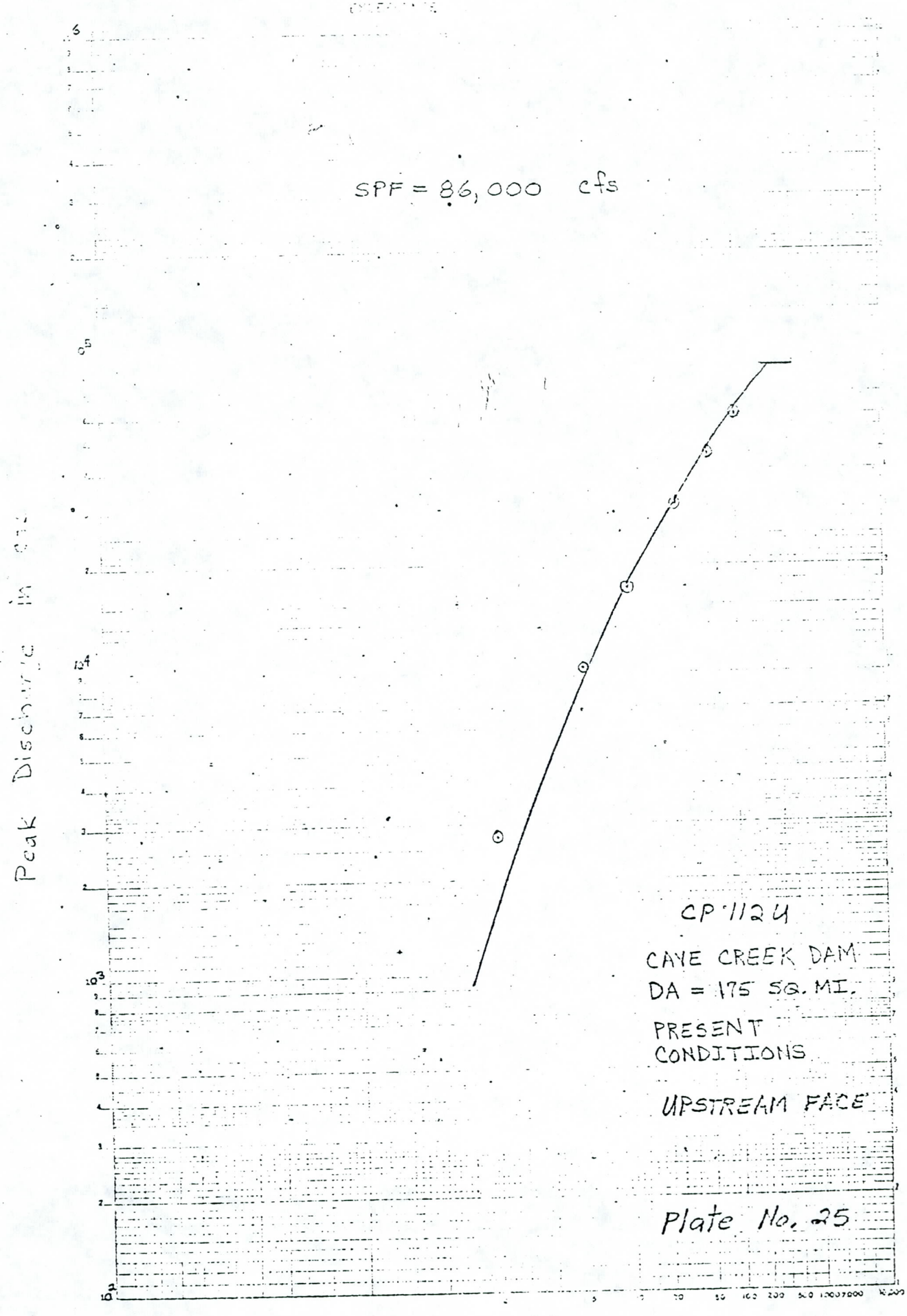

EXCEEDENCE PER HUNDRED YEARS
INDIAN BEND WASH CP 20
DA = 43.60 sq. mi.
SPF = 33,300 cfs
Peak Discharge in cfs
Present Conditions
Plate No. 23

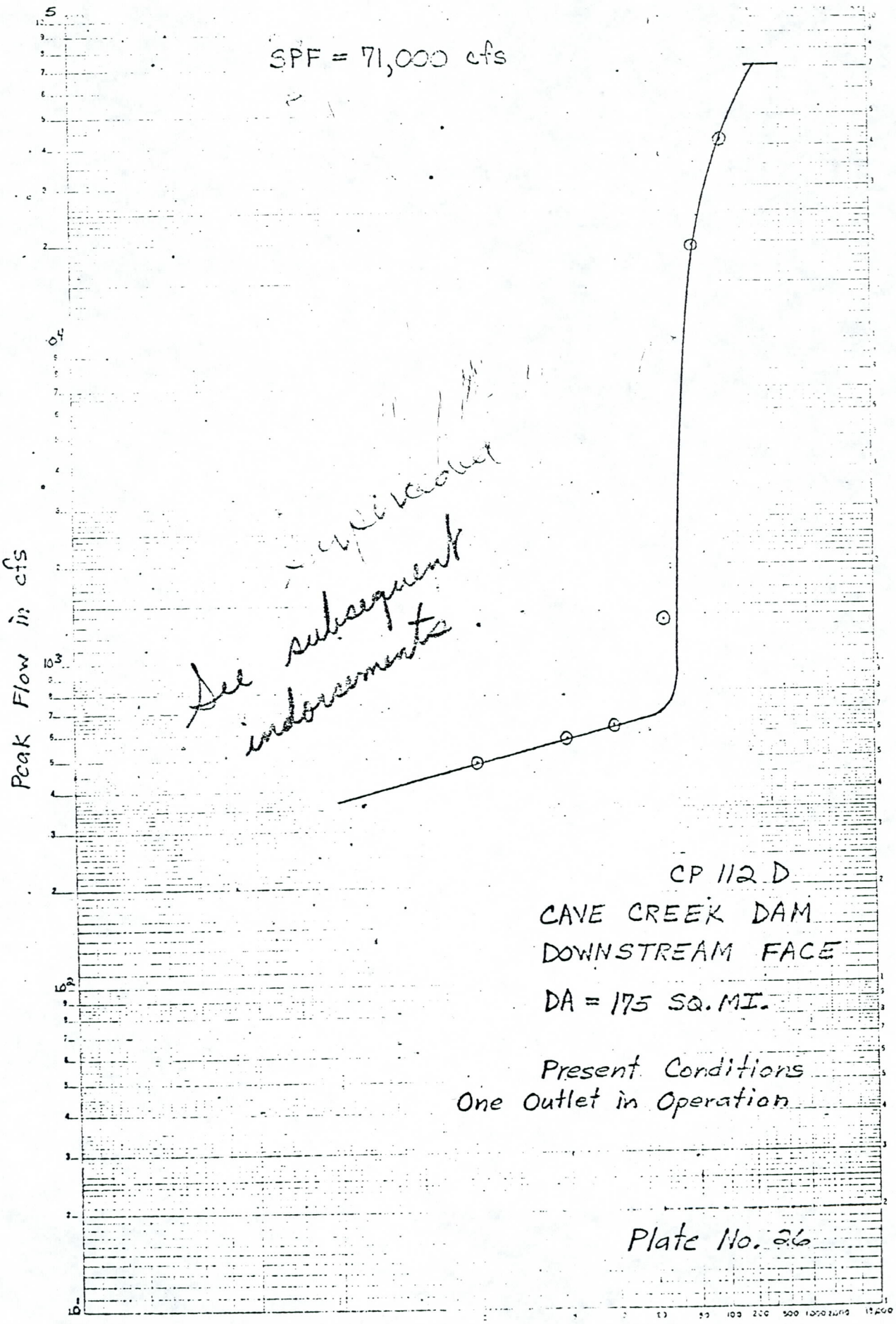
CAVE CREEK TRIBUTARY CP 21

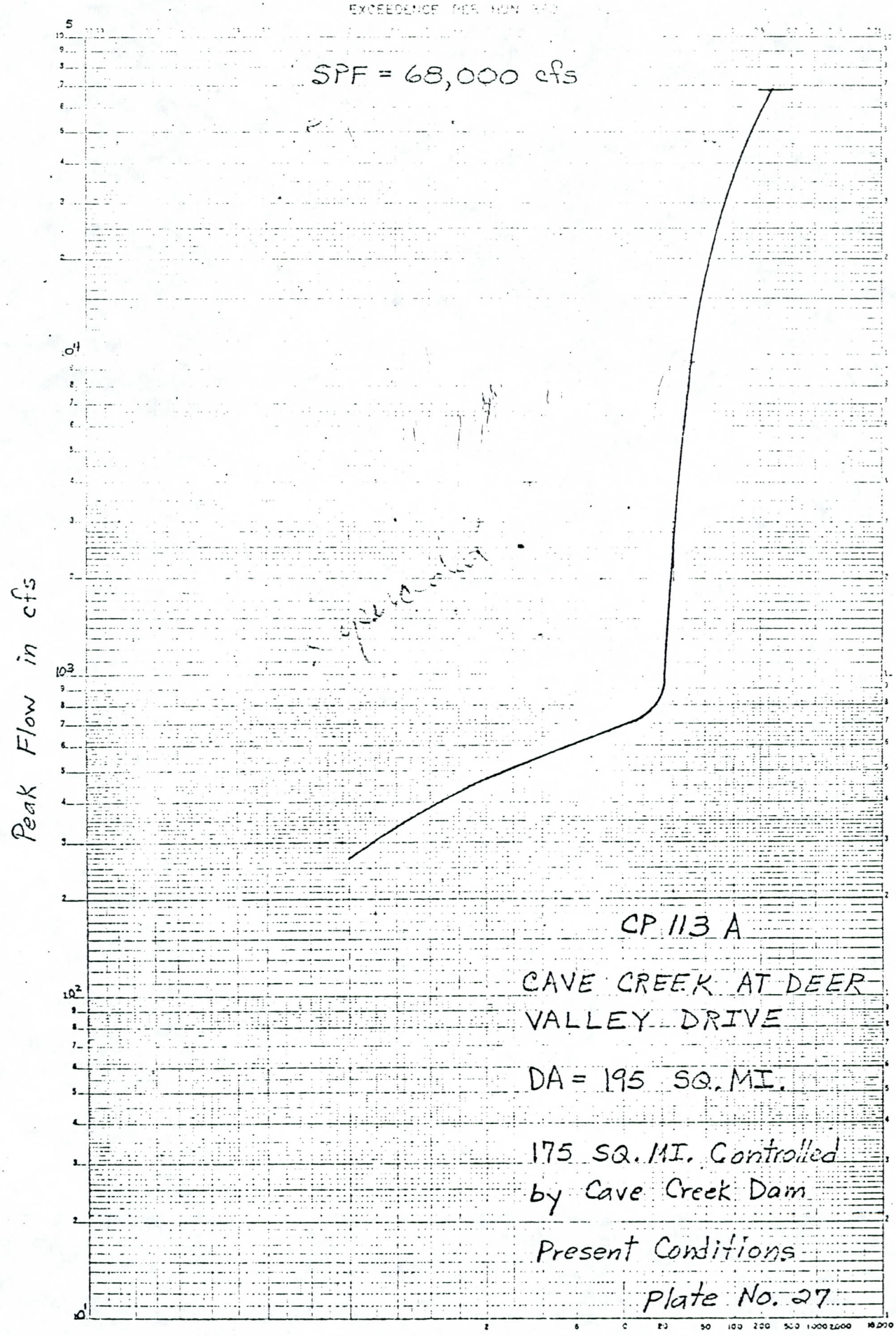
DA = 0.76 sq. mi.

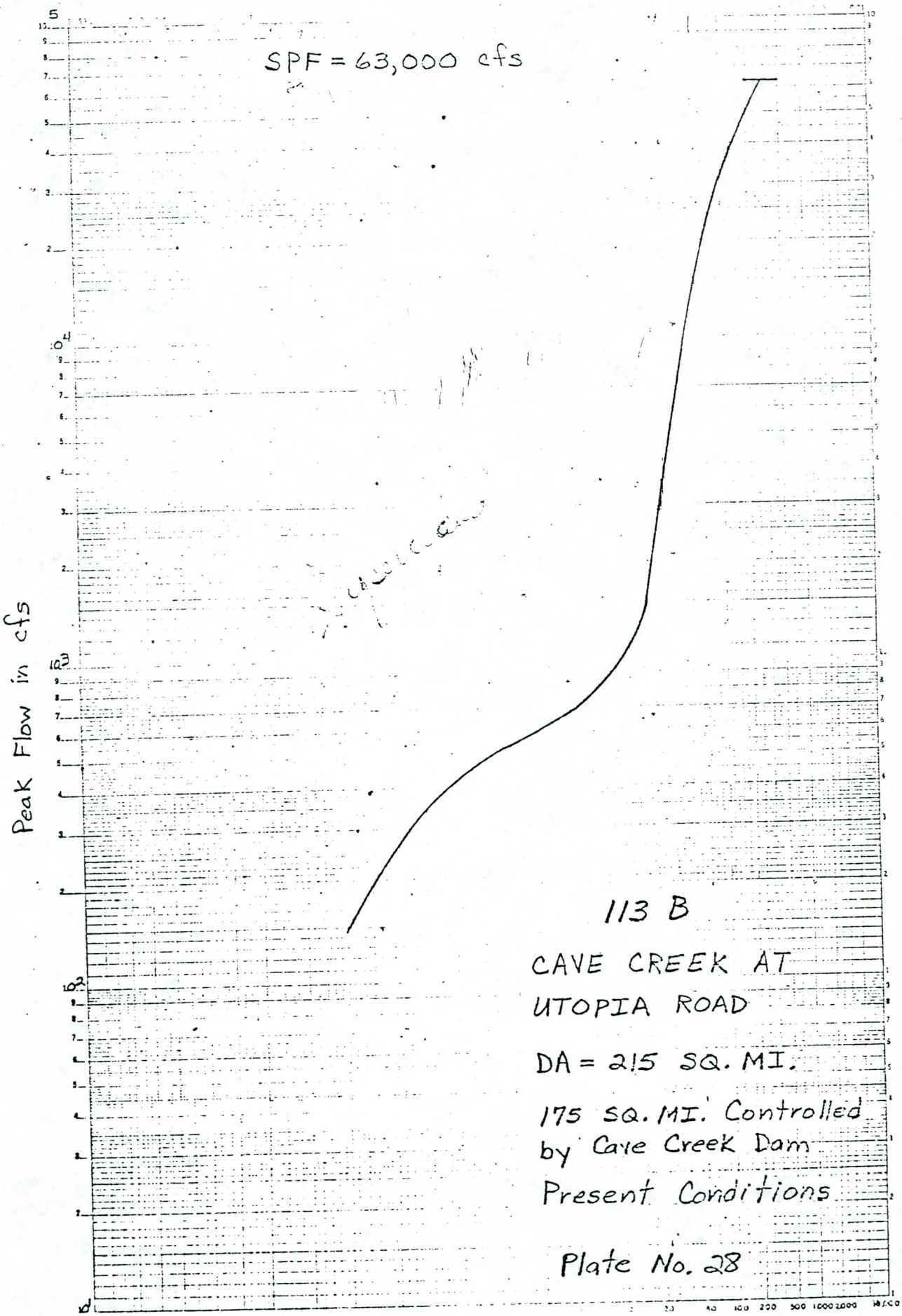
SPF = 2,600 cfs

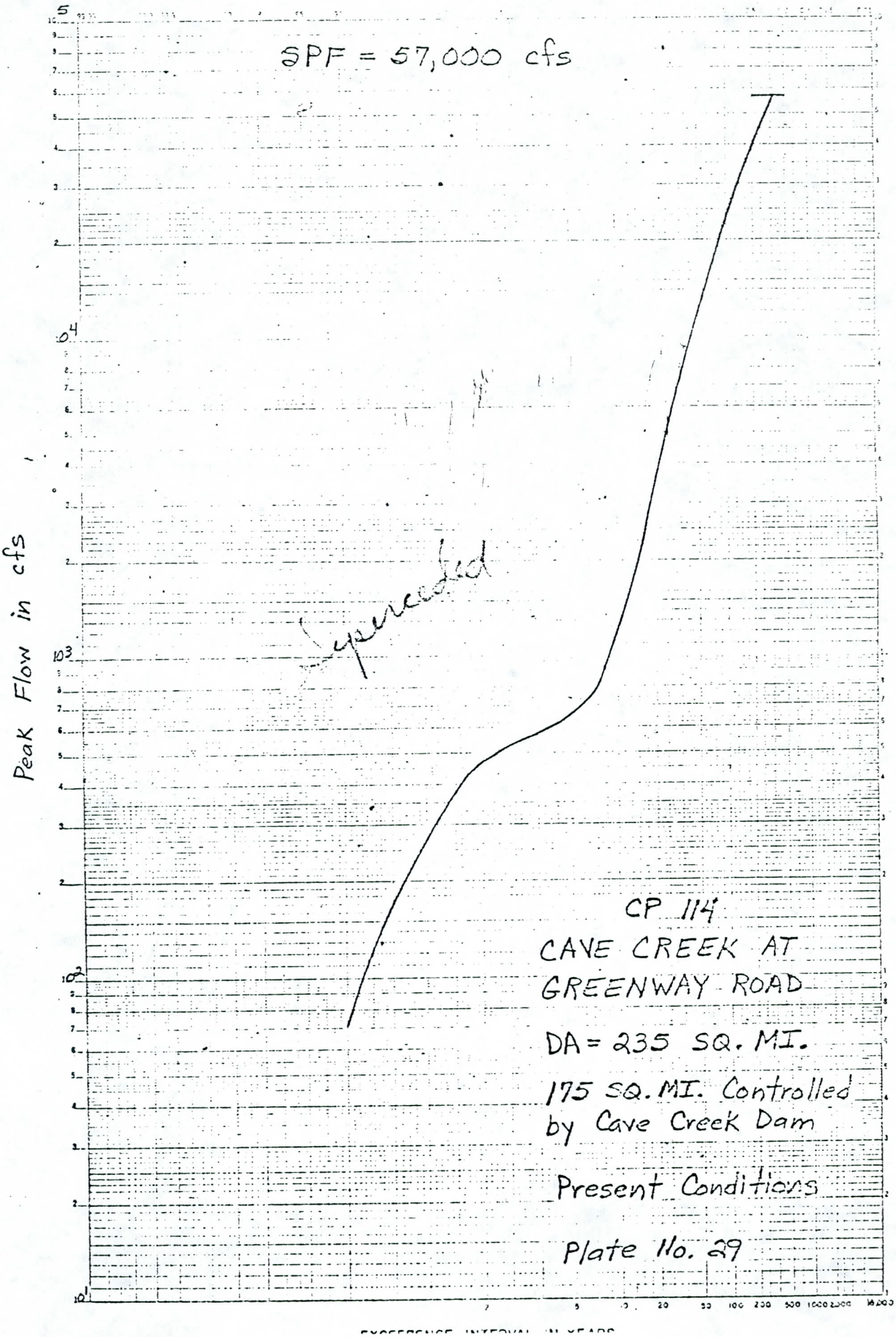


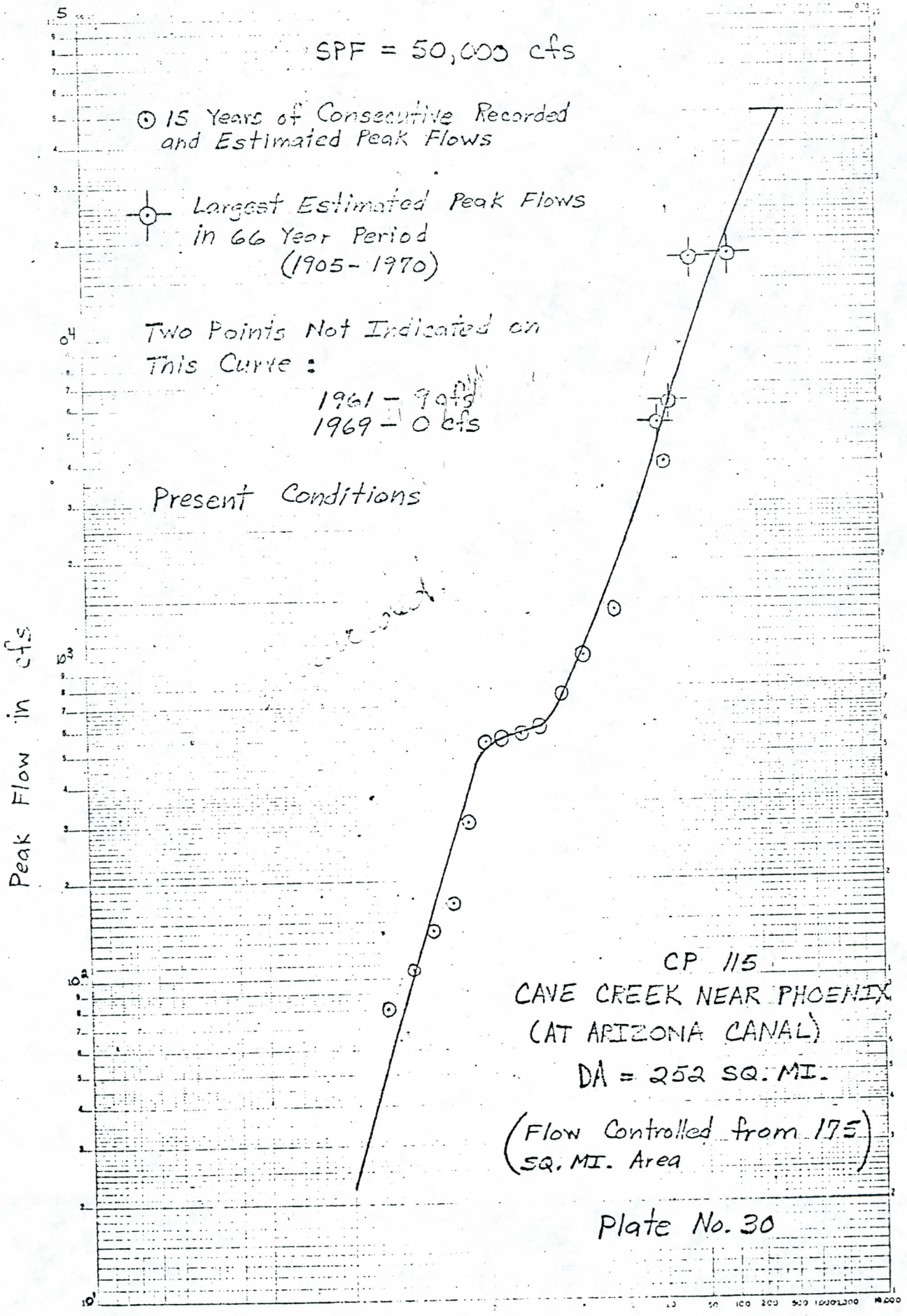

SPF = 86,000 cfs
Peak Discharge in cfs
CP 1124
CAYE CREEK DAM
DA = 175 SQ. MI.
PRESENT
CONDITIONS
UPSTREAM FACE
Plate No. 25
EXCEEDENCE INTERVAL IN YEARS

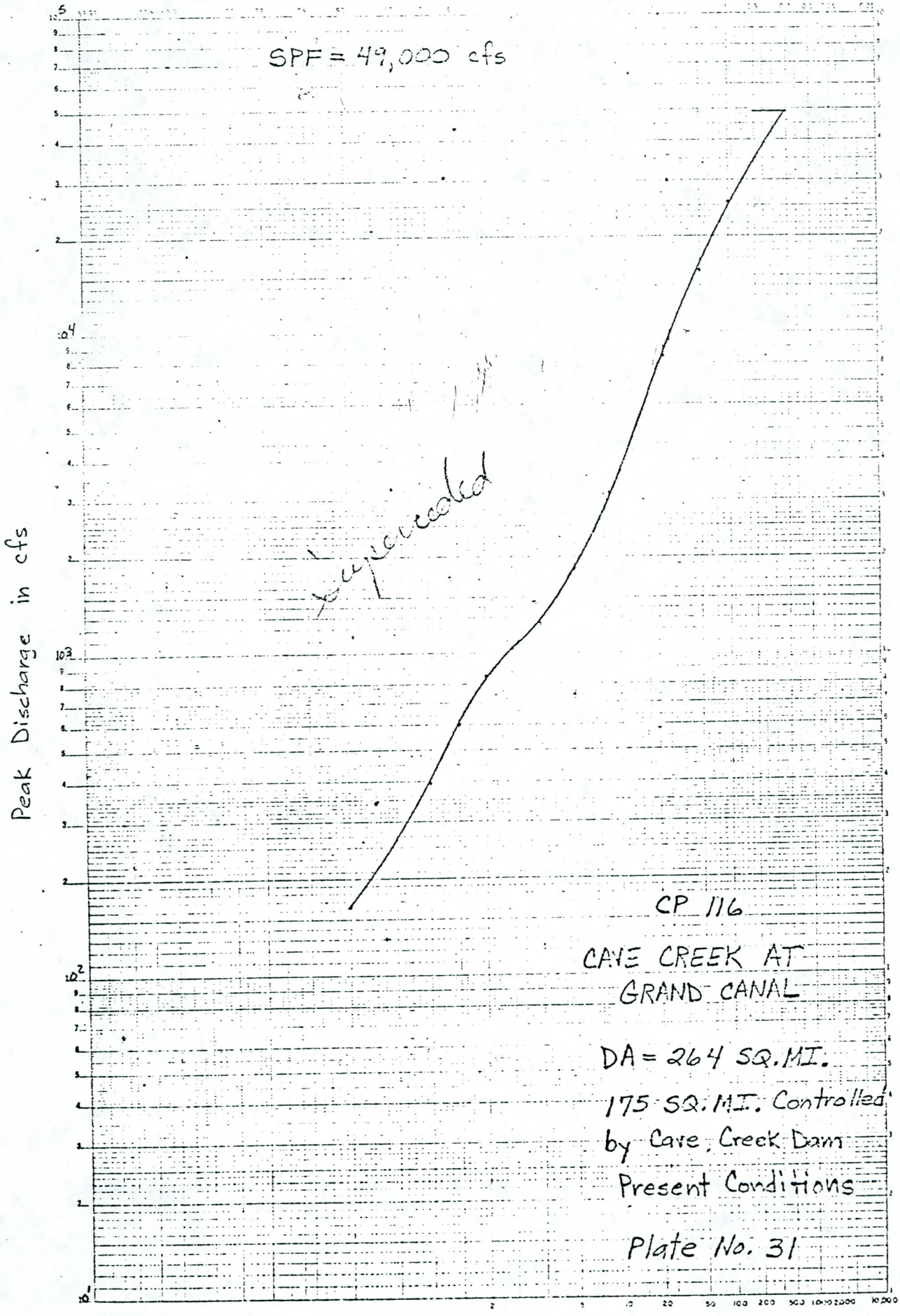

SPF = 71,000 cfs
Peak Flow in cfs
See subsequent inserts.
CP 112 D
CAVE CREEK DAM
DOWNSTREAM FACE
DA = 175 SQ. MI.
Present Conditions
One Outlet in Operation
Plate No. 26

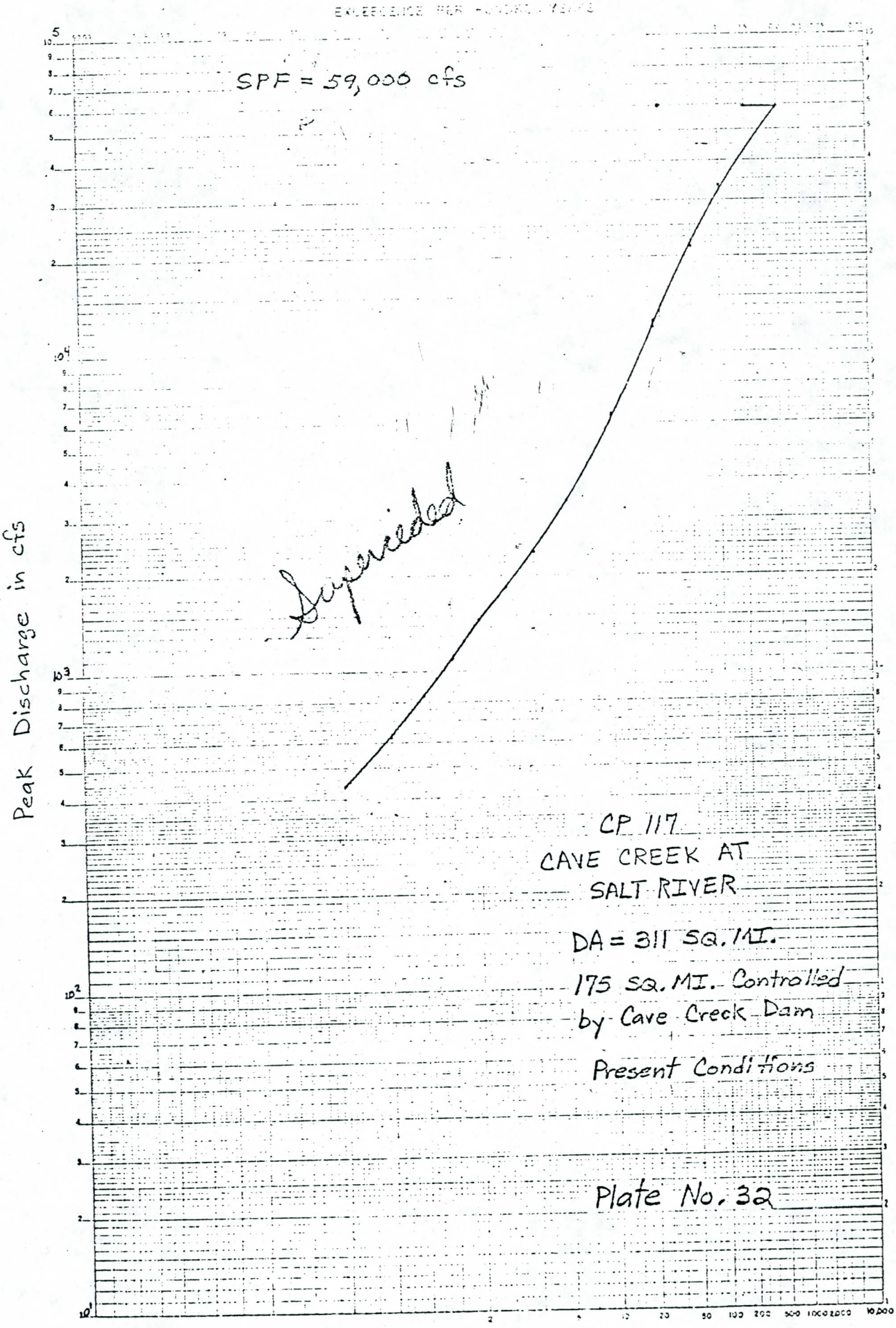

EXCEEDENCE PER NON
SPF = 68,000 cfs
Peak Flow in cfs
CP 113 A
CAVE CREEK AT DEER VALLEY DRIVE
DA = 195 SQ. MI.
175 SQ. MI. Controlled by Cave Creek Dam
Present Conditions
Plate No. 27
EXCEEDENCE INTERVAL IN YEARS

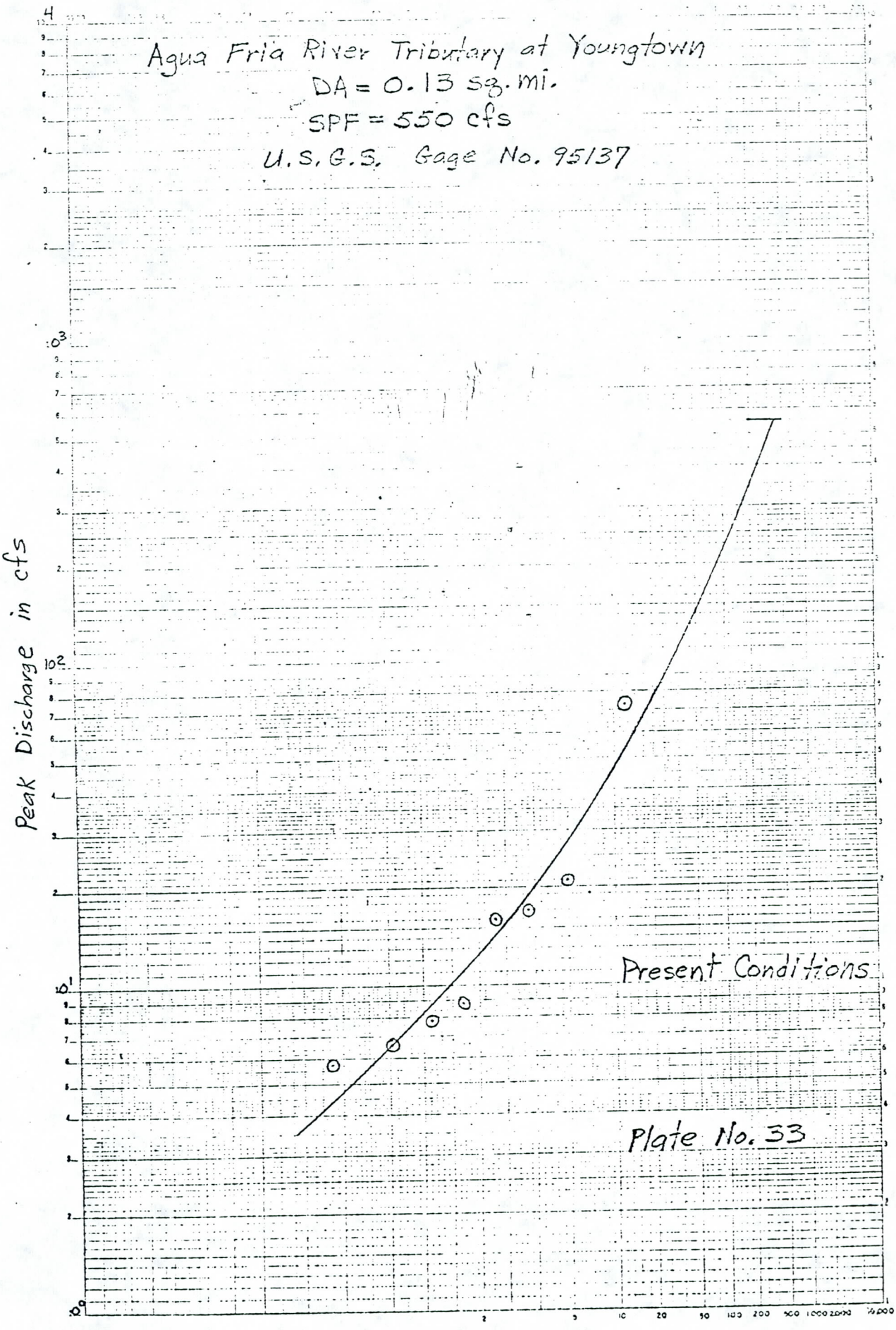

SPF = 63,000 cfs
Peak Flow in cfs
113 B
CAVE CREEK AT
UTOPIA ROAD
DA = 215 SQ. MI.
175 SQ. MI. Controlled
by Cave Creek Dam
Present Conditions
Plate No. 28


SPF = 57,000 cfs
Superseded
Peak Flow in cfs
CP 114
CAVE CREEK AT
GREENWAY ROAD
DA = 235 SQ. MI.
175 SQ. MI. Controlled
by Cave Creek Dam
Present Conditions
Plate No. 29


SPF = 50,000 cfs
⊙ 15 Years of Consecutive Recorded and Estimated Peak Flows
Largest Estimated Peak Flows in 66 Year Period (1905 - 1970)
Two Points Not Indicated on This Curve :
1961 - 9 cfs
1969 - 0 cfs
Present Conditions
Peak Flow in cfs
CP 115
CAVE CREEK NEAR PHOENIX
(AT ARIZONA CANAL)
DA = 252 SQ. MI.
(Flow Controlled from 175 SQ. MI. Area)
Plate No. 30


EXCEEDENCE PLR
SPF = 49,000 cfs
Peak Discharge in cfs
Exceeded
CP 116
CAVE CREEK AT
GRAND CANAL
DA = 264 SQ. MI.
175 SQ. MI. Controlled
by Cave Creek Dam
Present Conditions
Plate No. 31


EXCEEDENCE PER HUNDRED YEARS
SPF = 59,000 cfs
Superseded
Peak Discharge in cfs
CP 117
CAVE CREEK AT
SALT RIVER
DA = 311 SQ. MI.
175 SQ. MI. Controlled
by Cave Creek Dam
Present Conditions
Plate No. 32


EXCEEDENCE PER
Agua Fria River Tributary at Youngtown
DA = 0.13 sq. mi.
SPF = 550 cfs
U.S.G.S. Gage No. 95137
Peak Discharge in cfs
Present Conditions
Plate No. 33

CAVE CREEK
DISCHARGE FREQUENCY ANALYSIS

73-124

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

SPLED-WH

12 April 1973

SUBJECT: Hydrology for Type 15 Flood Insurance Study, Phoenix, Arizona

Division Engineer, South Pacific
ATTN: SPDED-H

1. The accompanying report presents discharge frequency curves at locations along Cave Creek, Indian Bend Wash and streams emanating from the Phoenix mountains for use in Type 15 flood insurance study in Phoenix, Arizona.

2. Request that on-board review be conducted.

FOR THE DISTRICT ENGINEER:

for GARTH A. FUQUAY
Chief, Engineering Division

1 Incl
as

SPDED-H (12 Apr 73) 1st Ind
SUBJECT: Hydrology for Type 15 Flood Insurance Study, Phoenix, Arizona

DA, South Pacific Division, Corps of Engineers, 630 Sansome Street
Room 1216, San Francisco, California 94111 27 April 1973

TO: District Engineer, Los Angeles, ATTN: SPLED-WH

1. The Phoenix flood insurance frequency curves on Plates 1 through 24 and Plate 33 are approved for use in the insurance rate study. The Cave Creek Dam inflow frequency curve Plate 25 is approved.

2. It is understood that there is some question as to the stability of Cave Creek Dam, and further understood that the State of Arizona is undertaking detailed studies to settle this question. Until these studies are completed any results of hydrologic analyses for Cave Creek below Cave Creek Dam are inconclusive and are not to be used in the subject study.

FOR THE DIVISION ENGINEER:

for: JOHN W. GERHART
Chief, Engineering Division

1 Incl
wd 1 cy

SPLED-WH (12 April 1973) 2nd Ind
SUBJECT: Hydrology for Type 15 Flood Insurance Study, Phoenix, Arizona

DA, Los Angeles District, Corps of Engineers
Los Angeles, California 90053 8 May 1973

TO: Division Engineer, South Pacific
ATTN: SPDED-H

1. A meeting of personnel representing the various disciplines within the District found that although overtopping of Cave Creek Dam would occur during a 100-year flood, that the duration of flow over the crest of the dam was not sufficient to cause failure of the dam. Hence, analysis of the influence of the failure of Cave Creek Dam on the discharge frequency curves along Cave Creek would only be necessary for a flood larger than the 100-year flood.

2. The State of Arizona plans no further investigations of the stability of Cave Creek Dam until funds become available in FY 75 under the National Program for the Safety of Dams.

3. Since establishment of flood insurance rates are based on the 100-year and lesser floods, approval is requested for the discharge frequency curves along Cave Creek downstream of Cave Creek Dam (Plates 26 thru 32 of the subject report) for use in flood insurance studies in Phoenix, Arizona.

FOR THE DISTRICT ENGINEER:

Garth A. Fuquay

GARTH A. FUQUAY
Chief, Engineering Division

1 Incl
nc

SPDED-H (12 Apr 73) 3d 1nd
SUBJECT: Hydrology for Type 15 Flood Insurance Study, Phoenix, Arizona

DA, South Pacific Division, Corps of Engineers, 630 Sansome Street, Room 1216, San Francisco, California 94111 15 May 1973

TO: District Engineer, Los Angeles, ATTN: SPLED-WH

1. In paragraph 3 of the 2d Indorsement you state that flood insurance rates are based on 100-year and lesser frequency floods. This statement is in conflict with criteria contained in Guidelines for Type 15 Flood Insurance Studies which were furnished you on 21 October 1971. Paragraph 16 of these guidelines states in part, that the 500-year event is to be used in establishing insurance rates.

2. In view of the above, it will be necessary for you to expand your analysis of the behavior of Cave Creek Dam to include the 500-year event and submit the conclusions of the analysis to this office for approval.

3. When submitting the above information, it is requested that you include the 50-, 100-, standard project, and 500-year inflow flood hydrographs for Cave Creek Dam. In addition, present a short, informal narrative discussion of the assumptions used in routing these floods into and through Cave Creek Dam and reservoir; the discussion should also include all assumptions relative to antecedent hydrometeorologic conditions.

FOR THE DIVISION ENGINEER:

John W. Gerhart

JOHN W. GERHART
Chief, Engineering Division

wd all incl

73-238

SPLED-WH (12 April 1973) 4th Ind
SUBJECT: Hydrology for Type 15 Flood Insurance Study, Phoenix, Arizona

DA, Los Angeles District, Corps of Engineers, P.O. Box 2711,
Los Angeles, California 90053 11 July 1973

TO: Division Engineer, South Pacific
ATTN: SPDED-H

1. Flood routings of the 25-year, 50-year, 100-year, and standard project floods through Cave Creek Dam under present conditions were transmitted to SPD in a letter dated 17 May 1973; subject, "Reservoir Routings Through Cave Creek Dam." Each inflow hydrograph to Cave Creek Dam was derived by taking the ratio of the n-year peak discharge from the inflow frequency curve to the SPF peak at the dam and multiplying by the SPF hydrograph. Assumptions concerning the derivation of the SPF and routings through Cave Creek Dam are given in the report accompanying subject letter.

2. Because the dam will be overtopped for large floodflows, the question of the stability of the dam has been considered by the Corps of Engineers and others; e.g., the Maricopa County Flood Control District. The State of Arizona will analyze Cave Creek Dam as part of the National Program for Dam Safety. The Corps of Engineers, in the design of Cave Buttes Dam, will determine whether the dam should be breached or removed, or whether the bypass spillway should be enlarged. Construction of the proposed Cave Buttes Dam, which should begin in October 1975, will result in the recommendation by the Corps of a revision of the flood insurance study for the Cave Creek area.

3. For the purposes of the flood insurance study, the dam was assumed to remain intact for the range of floods up to but not including the 500-year flood. In the case of the 500-year flood, the resistance of the dam foundation to an 8-hour overtopping is such that the dam would be rendered unsafe and failure was assumed to occur. Inclosure 1 shows the 500-year inflow hydrograph to the existing Cave Creek Dam and the outflow hydrograph after reservoir routing through the dam under present conditions.

4. Erosion of the foundation along the downstream edge of the dam would not be uniform, therefore sudden and complete failure of the dam (along its entire length) would not occur. A more reasonable failure mode would be that erosion of the foundation materials under four bays near the center of the dam would cause vertical displacement and shearing of this section away from the rest of the structure. This would leave a 4-bay breach in the structure (176 feet in width).

SPLED-WH (12 April 1973) 4th Ind
SUBJECT: Hydrology for Type 15 Flood Insurance Study, Phoenix, Arizona

5. The outflow hydrograph from the dam was determined in the following manner.

a. The peak outflow from the dam was calculated using the equation for a full depth-partial width breach found in "Military Hydrology Bulletin No. 9: Flow Through a Breached Dam," Corps of Engineers, 1957, Page 23.

b. The peak outflow from the dam was assumed to occur in one minute after the failure. The recession leg of the hydrograph was assumed to be a straight line and was adjusted so that the volume under the triangular hydrograph was equal to the storage in the reservoir at the time of failure.

c. Failure was assumed to occur after the dam had been overtopped for approximately 7.75 hours or one time period prior to the point at which flow over the dam ceased. At this point, storage behind the dam was 12470 acre-feet and the water surface was 52 feet above the bottom of the dam.

Inclosure 2 shows the outflow hydrograph from the breached dam.

6. Routing of the outflow hydrograph was accomplished using the Muskingum Routing Technique. The Muskingum "X" value was set at zero which approximates a reservoir type routing. The stream channel used in flood routing from Cave Creek Dam to the Arizona Canal was deepened and widened from the present condition cross sectional shape to account for the effects of the 8-hour overtopping of the 500-year flood preceeding the dam failure. From the Arizona canal to the Salt River the cross-sectional shape of Cave Creek was assumed to remain unchanged by flood flows which occurred prior to the passage of the dam failure flood hydrograph. The presence of large amounts of impervious cover in conjunction with the fact that no defined channel exists provided the basis for the assumption that no significant change in channel cross sectional shape occurs in this reach.

7. Request approval of the 500-year flood outflow from Cave Creek Dam assuming a dam failure and the frequency curves, inclosures 3-9, for the seven concentration points from Cave Creek Dam to the Salt River.

FOR THE DISTRICT ENGINEER:

A P Gilden

GARTH A. FUQUAY
for Chief Engineering Division

Added 9 Incl (trip)
as

SPDED-H (12 Apr 73) 5th Ind
SUBJECT: Hydrology for Type 15 Flood Insurance Study, Phoenix, Arizona

DA, South Pacific Division, Corps of Engineers, 630 Sansome Street, Room 1216, San Francisco, California 94111 30 July 1973

TO: District Engineer, Los Angeles

1. Concur with rationale and assumptions relative to the behavior of Cave Creek Dam under conditions of the 500-year flood event.

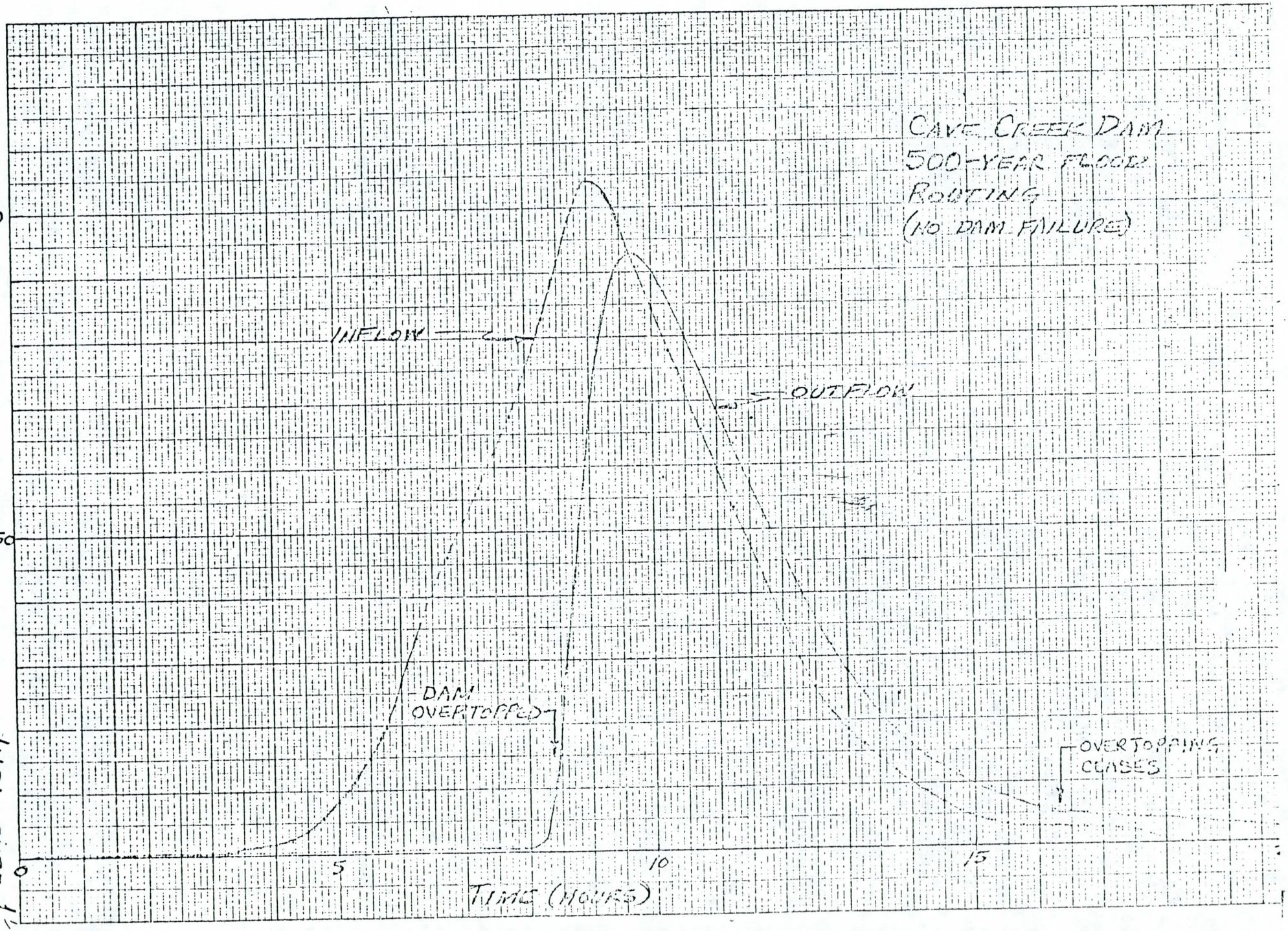
2. Discharge frequency curves shown on Inclosures 3 through 9 are approved for use in the subject flood insurance study.

FOR THE DIVISION ENGINEER:

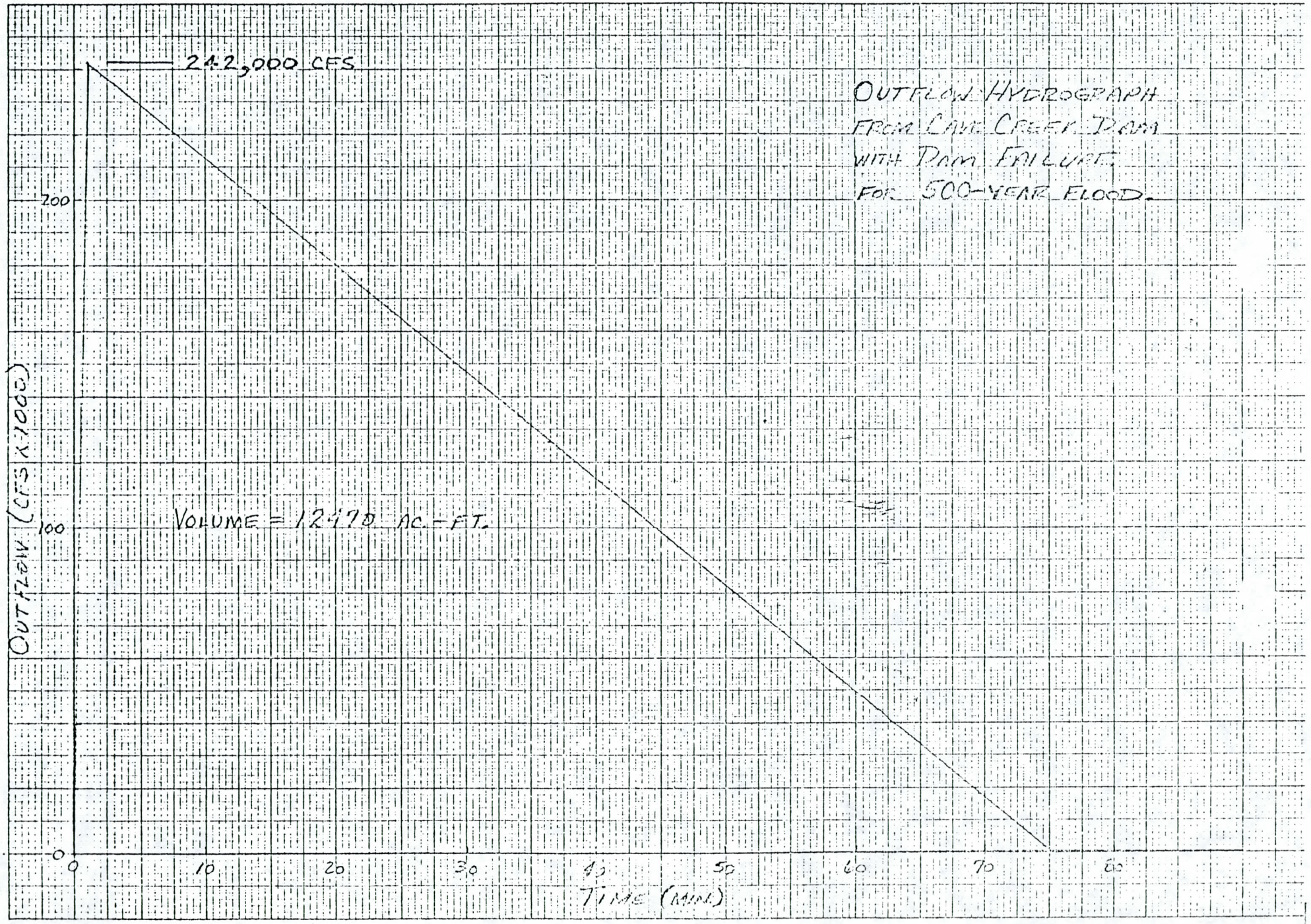
John W. Gerhart

JOHN W. GERHART
Chief, Engineering Division

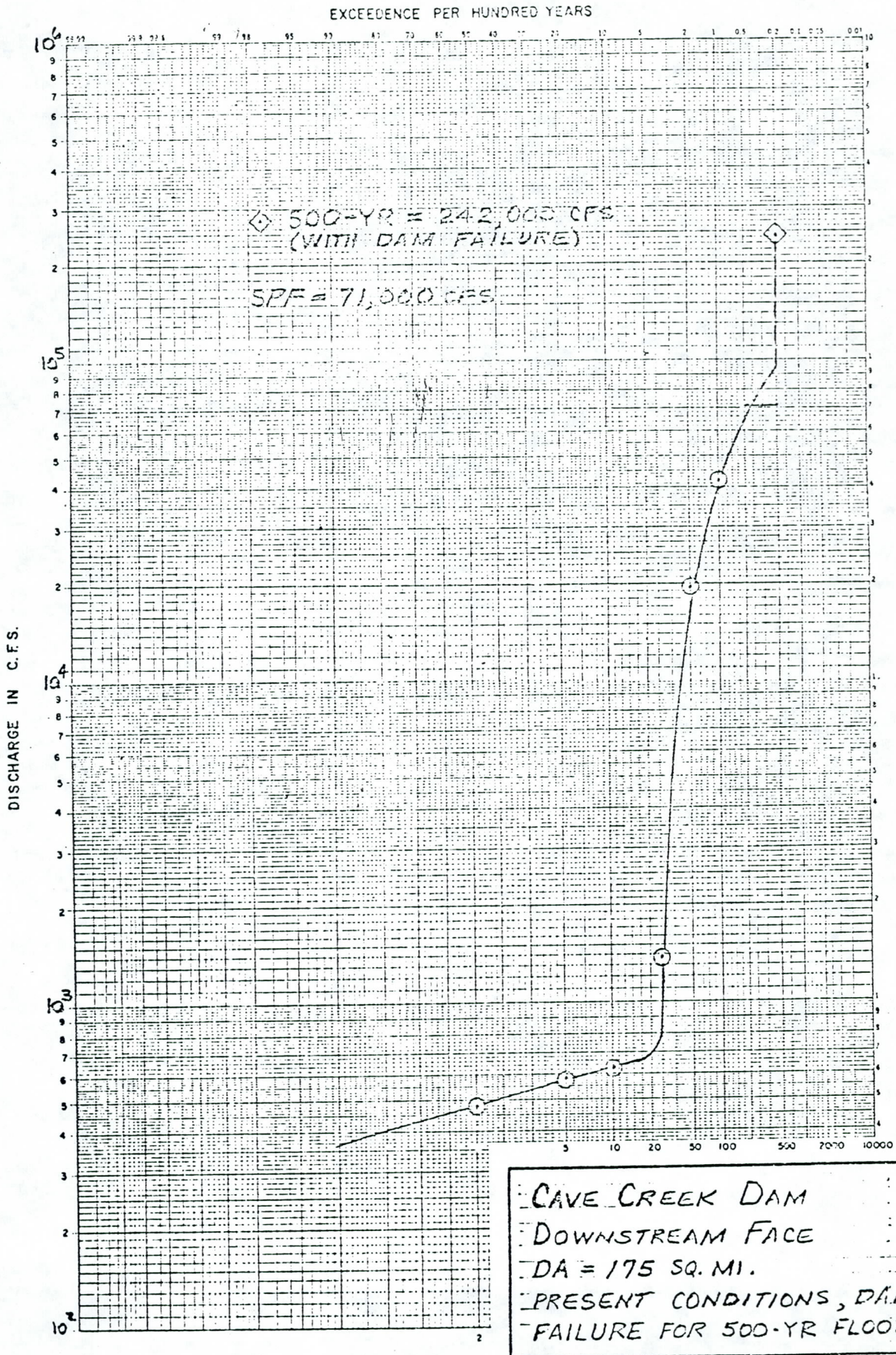
9 Incl
wd 1 cy ea


CAVE CREEK DAM
500-YEAR FLOOD
ROUTING
(NO DAM FAILURE)
INFLOW
OUTFLOW
DAM OVERTOPPED
OVERTOPPING CEASES
100
50
0
5
10
15
TIME (HOURS)

INCLOSURE 1

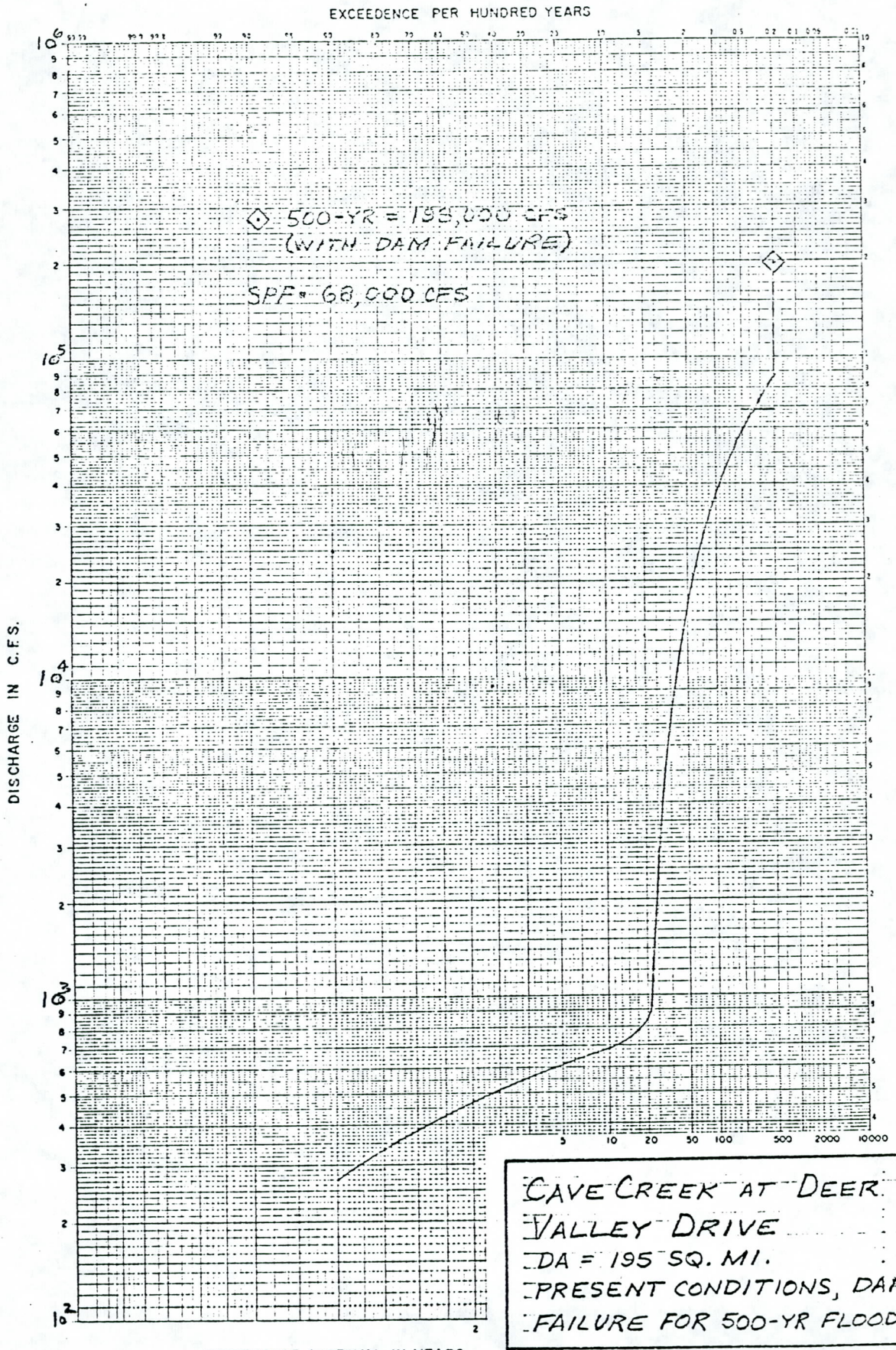

242,000 CFS
OUTFLOW HYDROGRAPH
FROM CAVE CREEK DAM
WITH DAM FAILURE
FOR 500-YEAR FLOOD.
VOLUME = 12470 AC.-FT.
200
100
0
0
10
20
30
40
50
60
70
80
OUTFLOW (CUBIC METERS/SEC)
TIME (MIN.)

INCLOSURE 2



CAVE CREEK DAM
DOWNSTREAM FACE
DA = 175 SQ. MI.
PRESENT CONDITIONS, DAM
FAILURE FOR 500-YR FLOOD

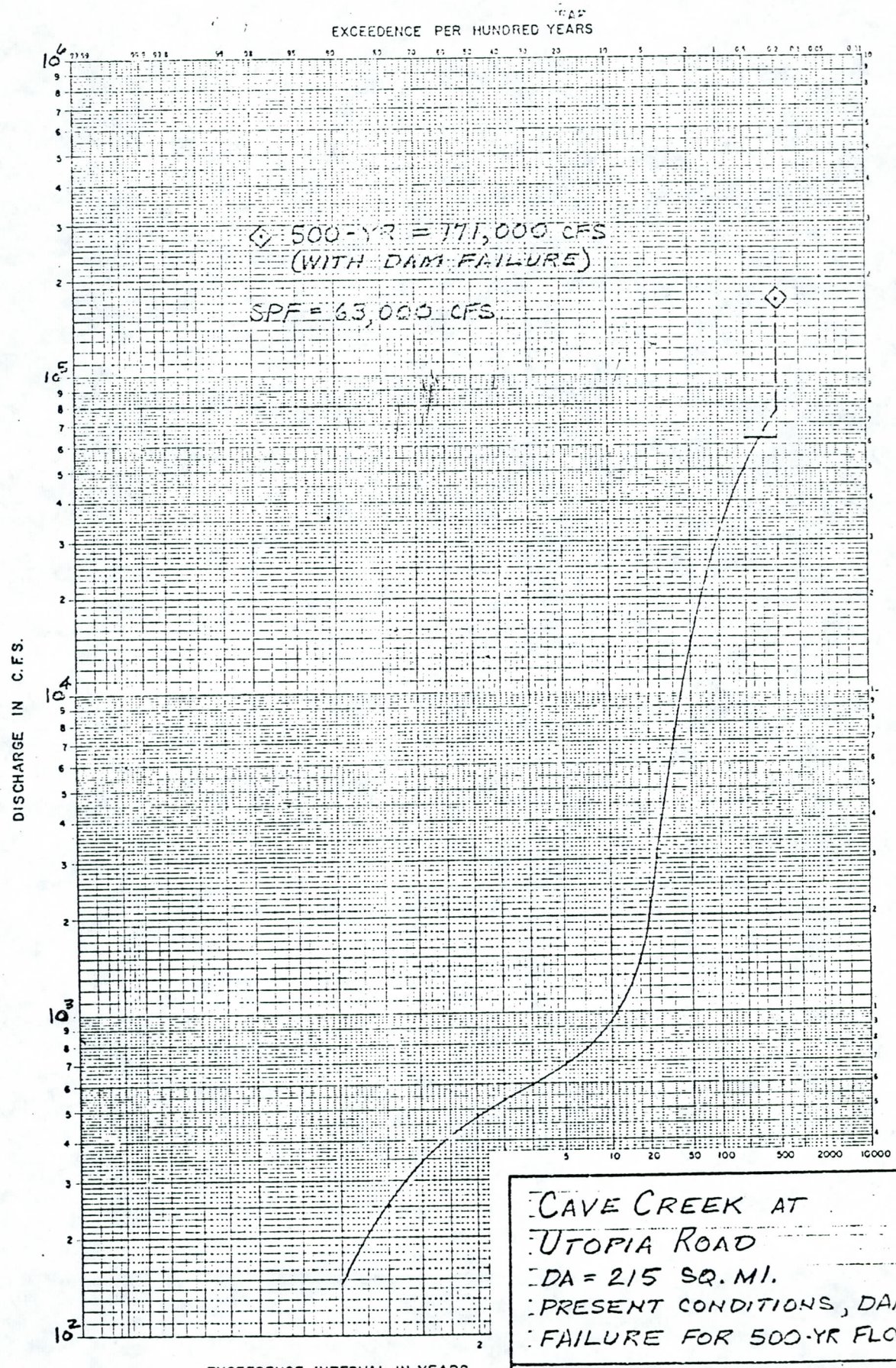
U. S. ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED INC P3



CAVE CREEK AT DEER VALLEY DRIVE
DA = 195 SQ. MI.
PRESENT CONDITIONS, DAM FAILURE FOR 500-YR FLOOD

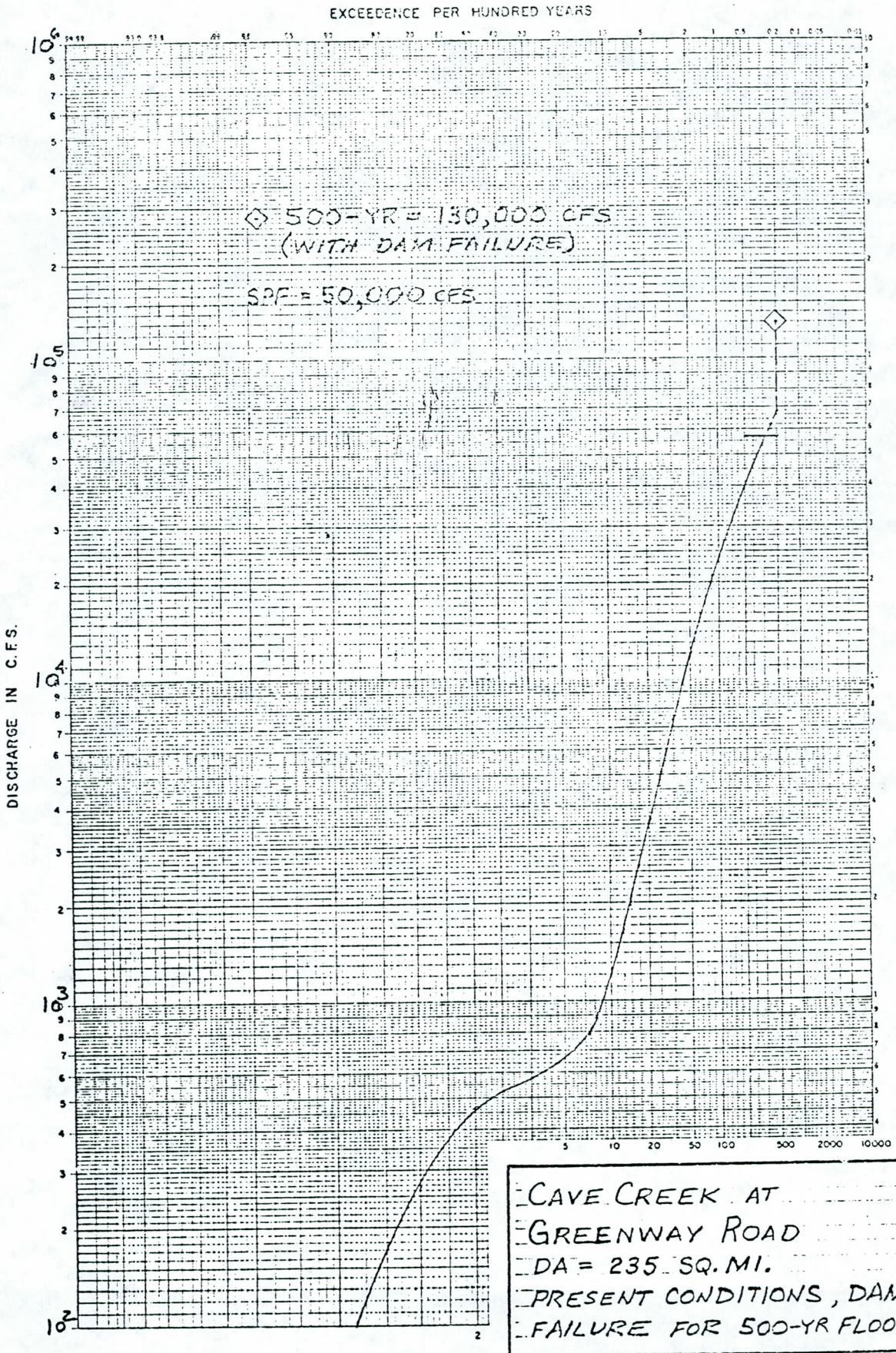
U. S. ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED:

INCLOSURE 4



CAVE CREEK AT
UTOPIA ROAD
DA = 215 SQ. MI.
PRESENT CONDITIONS, DAM
FAILURE FOR 500-YR FLOOD

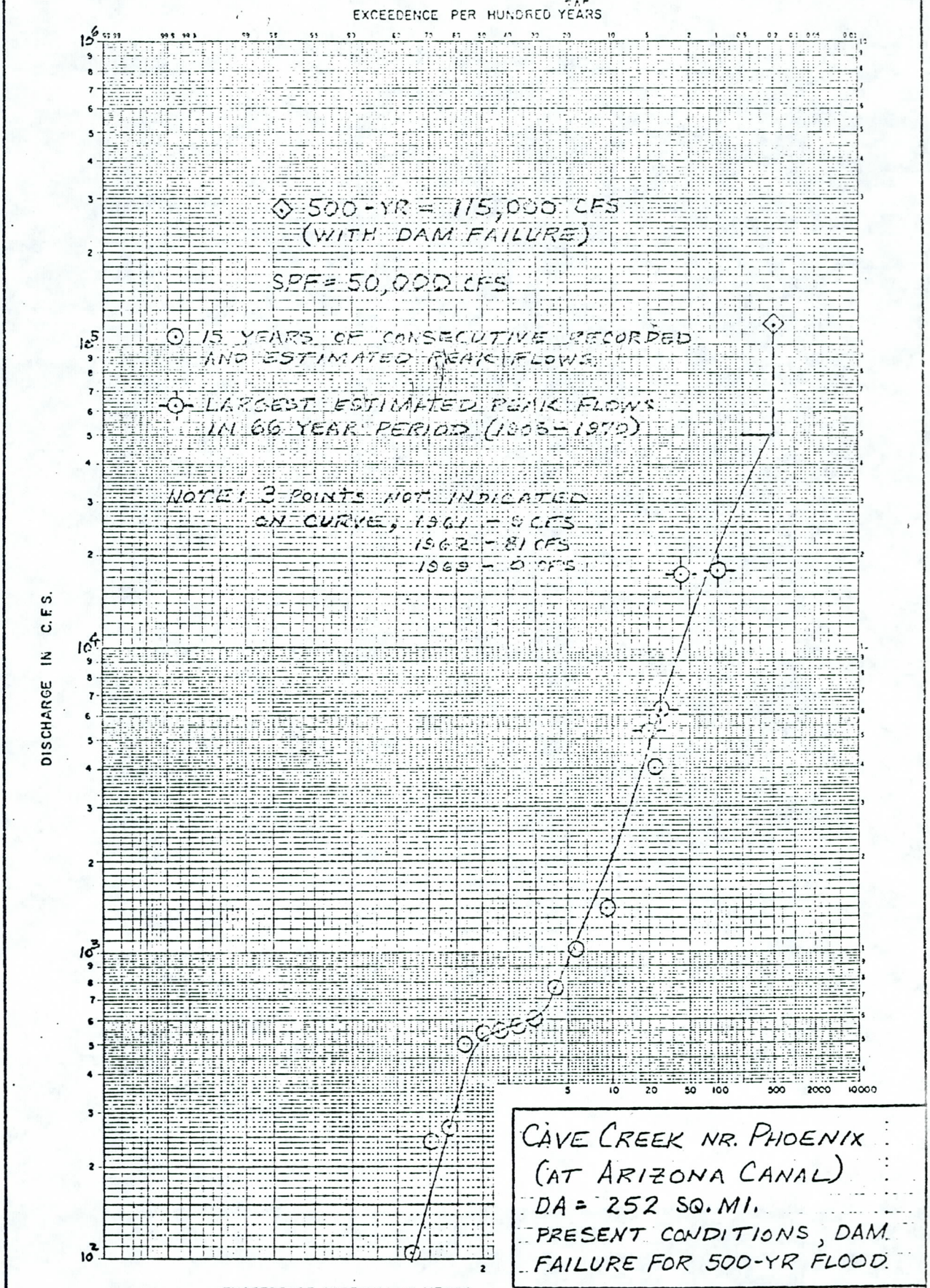
U. S. ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: INC #5



CAVE CREEK AT
GREENWAY ROAD
DA = 235 SQ. MI.
PRESENT CONDITIONS, DAM
FAILURE FOR 500-YR FLOOD.

U. S. ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED:

INCLOSURE 6



CAVE CREEK NR. PHOENIX
(AT ARIZONA CANAL)
DA = 252 SQ. MI.
PRESENT CONDITIONS, DAM FAILURE FOR 500-YR FLOOD

U. S. ARMY ENGINEER DISTRICT
LOS ANGELES, CORPS OF ENGINEERS
TO ACCOMPANY REPORT DATED: INC 7

FEMA USE ONLY

FORM 4

RIVERINE HYDRAULIC ANALYSIS FORM

Community Name: City of Phoenix, Town of Paradise Valley, Maricopa County

Flooding Source: ACDC Watershed

Project Name/Identifier: ACDC Reach 4

Reach to be Revised

Downstream limit 75th Ave./South of Bell Rd.

Upstream limit 40th St./North of Camelback Road

Effective FIS

☐ **Not studied**

☒ **Studied by approximate methods**

Downstream limit of study 17th Street & South of Glendale Ave

Upstream limit of study 40th Street & North of Camelback Road

☐ **Studied by detailed methods**

Downstream limit of study _____

Upstream limit of study _____

Floodway delineated

☐ **Downstream limit of floodway** _____

Upstream limit of floodway _____

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:** The AZ Canal Diversion Channel, or ACDC, is a 16.5 mile flood control channel that parallels the AZ Canal on the North side. The channel diverts stormwater that formerly flooded large areas of metropolita Phoenix. It now conveys these flows safely across the city to Skunk Creek.

☐ **Other. Explain:** _____

Models Submitted

Full input and output listings along with files on diskette (if available) for each of the models listed below and a 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). Only the Duplicate Effective and the Revised or Post-Project Conditions models must be submitted. See instructions for directions on when other models may be required. Only the 100-year flood profile is required for SFHAs with a Zone A designation.

☐ 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.

☐ 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.

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

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

☐ 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.

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

See document "ACDC Design Memorandum No. 3"

Model Parameters
(from model used to revise 100-year water surface elevations)

1. **Discharges:**

	Upstream Limit	Downstream Limit
10-year		
50-year		
100-year	6,700 cfs	29,000 cfs
500-year		

Attach diagram showing changes in 100-year discharge

NA

2. **Explain how the starting water surface elevations were determined** Army Corps Of Engineers used Mannings formula to determin starting water surface elevation.

	Starting Water Surface Elevation
10-year	
50-year	
100-year	
Floodway	
500-year	

Starting water surface elevation is controled by the water surface elevation in Skunk Creek. *Reach 4 SWSE continued from Reach 3.

3. **Give range of friction loss coefficients** 0.016 - 0.040

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

Location	FIS	Revised

Explain:

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.**

Field survey and construction plans

Model Parameters (Cont'd)

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

Reach lengths were placed every 200 feet. Overbank areas were not considered.

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
Within certain areas

c. **Critical depth?** ☒ Yes ☐ No
Within certain areas

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.
Areas that dissipate the energy grade to subcritical conditions

2. **What is the maximum head loss between cross-sections?** NA

3. **What is the distance between the cross-sections in 2 above?** 200 Feet

4. **What is the maximum distance between cross-sections?** 200 Feet

5. Floodway determination

a. **What is the maximum surcharge allowed by the community or State?** 1 **foot**

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

c. **What is the maximum velocity?** 26.3 **fps**

d. **What type of erosion protection is provided?** Lined Channel (concrete)

Explain: ACDC Reach 4 is landscaped with native & desert adapted trees, shrubs and ground cover to provide erosion control.

Results (Cont'd)

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:

_____

_____

_____

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

NA

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

NA

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.

_____

_____

_____

Please attach a completed comparison table entitled: Water Surface Elevation Check.

Revised FIRM/FBFM and Flood Profiles

NA

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** _____ **within** _____ **feet and upstream of the project at cross section** _____ **within** _____ **feet.**

B. **The revised floodway elevations tie into those computed by the effective FIS model, downstream of the project at cross section** _____ **within** _____ **feet and upstream of the project at cross section** _____ **within** _____ **feet.**

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.**

Proceed to Riverine/Coastal Mapping Form.

Water Surface Elevation Check

Community Name: _____

Flooding Source: _____

Project name/Identifier: _____

	Effective			Duplicate Effective			Corrected Effective			Existing/Pre-Project			Revised/Project		
SECNO	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL	FCWSEL	SURC.	NCWSEL	FCWSEL	SURC.	NCWSEL	FCWSEL	SURC.	NCWSEL	FCWSEL	SURC.

Comments:

1 - 100-year (natural) Water Surface Elevation

2 - Encroachment (floodway) Water Surface Elevation

3 - Surcharge Value

FEMA USE ONLY

FORM 5

RIVERINE/COASTAL MAPPING FORM

Community Name: Maricopa County, City of Phoenix, Town of Paradise Valley

Flooding Source: ADCD Watershed (AZ Channel Diversion Canal)

Project Name/Identifier: ACDC Reach 4

Mapping Changes

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

		Included		
A.	Revised 100- year floodplain boundaries (Zone A)	[x] Yes	[ ] No	[ ] N/A
B.	Revised 100- and 500-year floodplain boundaries	[ ] Yes	[x] No	[ ] N/A
C.	Revised 100-year floodway boundaries	[ ] Yes	[x] No	[ ] N/A
D.	Location and alignment of all cross sections used in the revised hydraulic model with stationing control indicated	[ ] Yes	[ ] No	[x] N/A
E.	Stream alignments, road and dam alignments	[ ] Yes	[ ] No	[x] N/A
F.	Current community boundaries	[ ] Yes	[ ] No	[x] 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	[x] N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	[ ] Yes	[ ] No	[x] N/A
I.	The requestor's property boundaries and community easements	[ ] Yes	[ ] No	[x] N/A
J.	The signed certification of a registered professional engineer	[x] Yes	[ ] No	[ ] N/A
K.	Location and description of reference marks	[x] Yes	[ ] No	[ ] N/A
L.	Vertical datum (example: NGVD 1929, NAVD 1988, etc.)	[ ] Yes	[ ] No	[x] N/A
M.	Coastal zone designations tie into adjacent areas not being revised	[ ] Yes	[ ] No	[x] N/A
N.	Location and alignment of all coastal transects used to revise the coastal analyses	[ ] Yes	[ ] No	[x] N/A

If any of the items above are marked no or N/A, please explain: Recent construction of the flood control structure. Some information was not considered in the Army Corps of Engineers design memorandum.

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.)? field survey - datum used was 1929 NAVD

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

   a. Effective FIS 1" = 1000' scale NA Contour interval

   b. Revision Request 1' = 1000' scale NA Contour interval

Note: Revised topographic information must be of equal or greater detail

Mapping Changes (Continued)

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.

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

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:

   ACDC is a collector canal for flood waters. All previous ponding behind the AZ Canal is contained within the right-of-way of the ACDC.

   _____

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

   If no, explain:

   NA

   _____

   _____

   _____

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.

Earth Fill Placement

1. Has fill been placed in the regulatory floodway? ☐ Yes ☒ No

   If yes, please attach completed Riverine Hydraulic Form.

2. Has fill been 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.

3. Has fill been 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.

FEMA USE ONLY

FORM 6

CHANNELIZATION FORM

Community Name: Town of Paradise Valley, City of Phoenix, Maricopa County
Flooding source: ACDC Watershed
Project Name/Identifier: ACDC Reach 4

Extent of Channelization

Downstream limit: Dreamy Draw Wash

Upstream limit: Cudia City Wash

Channel Description

1. **Describe the inlet to the channel** See back side of page 3 of 3.

2. **Briefly describe the shape of the channel (both cross sectional and planimetric configuration) and its lining (channel bottom and sides)** Reach 4 extneds approximately 4.2 miles west from Cudia City Wash. In this reach, the channel is rectangular with base widths ranging from 36 to 50 feet and wall height from 20.5 to 24.5 feet.

3. **Describe the outlet from the channel** Outlet at Skunk Creek previously approved.

4. **The channelization includes:**

- ☐ **Levees**
- ☒ **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**

**See ACDC - Design Memorandum No. 3.

Hydraulic Considerations

1. **What is the 100-year discharge?** inlet-6870 cfs outlet-35300 cfs _____ cfs

2. **Do the cross sections in the hydraulic model match the typical cross sections in the plans?** [X] Yes [ ] No

3. **Are the channel banks higher than the 100-year flood elevations everywhere?** [X] Yes [ ] No

4. **Are the channel banks higher than the 100-year flood energy grade lines everywhere?** [X] 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?** [X] Yes [ ] No

6. **What is the range of freeboard?** 3 - 3+ **feet**

7. **What is the range of the 100-year flood velocities?** 5.04 - 24.3 **ft/sec**

8. **What is the lining type? (both bottom and sides)** Concrete

   Explain how the channel lining prevents erosion and maintains channel stability (attach documentation) ACDC Reach 4 is landscaped with native & desert adapted trees, shrubs and ground cover to provide erosion control.

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

   - [X] **Subcritical flow**
   - [ ] **Critical flow**
   - [ ] **Supercritical flow**
   - [ ] **Energy grade line**

   Is 100-year flood profile based on the above type of flow? [X] Yes [ ] No

   If no, explain: _____

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

Inlet to channel	[X] Yes	[ ] No
Outlet of channel	[ ] Yes	[ ] No
At Drop Structures	[ ] Yes	[ ] No
At Transitions	[ ] Yes	[ ] No

Other location. Explain: Reach 4 only.

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: Controlled by energy dissipating areas.

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

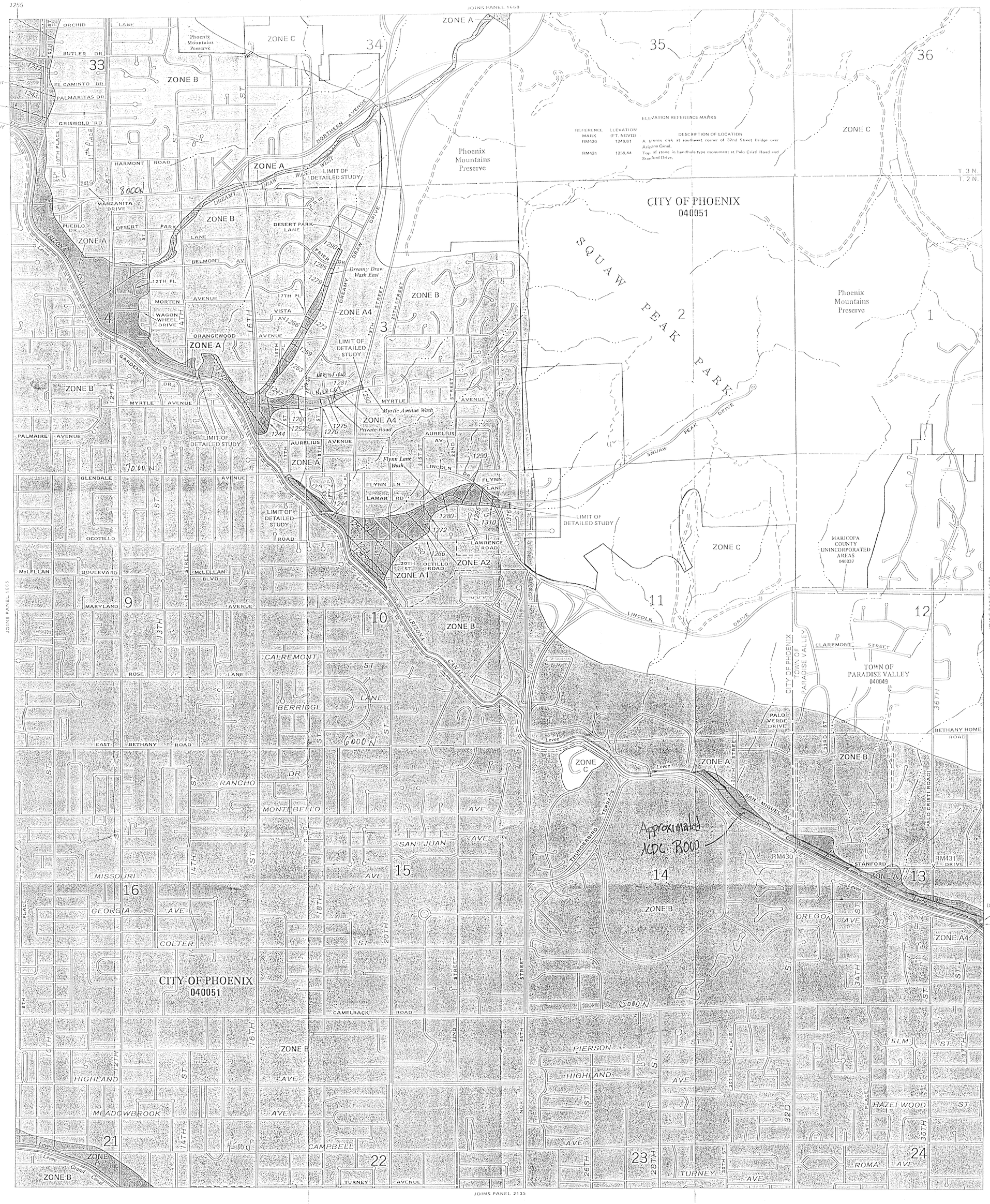
D. Will deposition or scour occur at or near the inlet? ☐ Yes ☐ No

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

Channel Description

1. Describe the inlet to the channel:

The inlet of the basin is 80 feet long and consist of 15-inch-thick grouted stone. It drops 8 feet to a 140-foot-long energy-dissipating area. The basin invert rises 3 feet and enters the first basin tier; this section is 360 feet long. A 25-foot-long, 4-foot-high, 15-inch-thick grouted stone drop inlet is connecting the first tier to the second. The second tier will be 390 feet long. A third drop 60 feet long and 11 feet high again of 15-inch-thick grouted stone, is connecting the second tier to the 910-foot-long third tier. Average depth for the three tiers is approximately 6 feet, 10 feet, and 21 feet for tiers 1, 2, 3 respectively. The basin will have multi-use playing fields and other recreational improvements. The concrete spillway is 600 feet long and transition from a 200-foot-wide rectangular section at spillway crest to a 36-foot-wide rectangular section at the entrance to the ACDC. The total basin and spillway area, including rights-of-ways is approximately 18 acres. The major maintenance access road is off of Stanford Drive at the upstream end of the basin. An alternative route, is from 40th Street along the Salt River Project (SRP) road to the basin at its confluence with the ACDC. Fenced boundaries extend along the spillway and along most of the basin sides.



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 2 NORTH, RANGE 3 EAST AND TOWNSHIP 3 NORTH, RANGE 3 EAST

KEY TO MAP

500-Year Flood Boundary
100-Year Flood Boundary
Zone Designations — ZONE B / ZONE B
100-Year Flood Boundary
500-Year Flood Boundary
Base Flood Elevation Line With Elevation In Feet** — 513
Base Flood Elevation in Feet Where Uniform Within Zone** — (EL 987)
Elevation Reference Mark — RM7×
Zone D Boundary
River Mile — •M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
AO	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas.

Certain areas not in the Special Flood Hazard Areas (zones A and V) may be protected by flood control structures.

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 5.4 of the Flood Insurance Study Report.

For adjoining map panels, see separately printed Map Index.

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

EFFECTIVE DATE (S) OF REVISION (S) TO THIS PANEL:
6815 N. 21st St. LOMA requested 4-27-92

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

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

APPROXIMATE SCALE IN FEET
1000 0 1000

1670

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 1670 OF 4350

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY, UNINCORPORATED AREAS	040037	1670	D
PARADISE VALLEY, TOWN OF	040049	1670	D
PHOENIX, CITY OF	040051	1670	D

MAP NUMBER
04013C1670 D

EFFECTIVE DATE:
APRIL 15, 1988

Federal Emergency Management Agency

CITY OF PHOENIX
040051

JOINS PANEL 1680

SUNSET ROAD

MOCKINGBIRD LANE

CABALLO DRIVE

Bernell Channel

ZONE A5
1320

ZONE B

ZONE C

ZONE A

ZONE B

LIMIT OF DETAILED STUDY

PROFILE BASE LINE

Indian Bend Wash

RM439

RM437

1315

Phoenix Mountains Preserve
CITY OF PHOENIX
040051

CITY OF PHOENIX
040051

MARICOPA COUNTY
UNINCORPORATED AREAS
040037

Phoenix Mountains Preserve
MARICOPA COUNTY
UNINCORPORATED AREAS
040037

ZONE C

T. 3 N.
T. 2 N.

DESERT JEWEL DRIVE

DESERT PARK PLACE

Phoenix Mountains Preserve
TOWN OF PARADISE VALLEY
040049

ROAD RUNNER RD

TOWN OF PARADISE VALLEY
040049

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 gap curb 2 feet north of northwest 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 hanho+type monument at intersection of 48th Street and Lincoln Drive.
RM436	1366.73	A bronze disk in hanpnole-type monument at Tatum Road and McDonald Drive.
RM437	1317.94	A ½-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 ½-inch rebar set east of Invergordon and the south boundary of golf course. Established by Planning Research Corporation.

MAVERICK RD

68TH STREET

INVERGORDON RD

NORTHERN AV

MOCKINGBIRD LANE

HUMMINGBIRD LANE

CHENEY DRIVE

IRONWOOD DR

CLEARWATER PARKWAY

SPARKLING LANE

MARICOPA COUNTY
UNINCORPORATED AREAS
040037

LAKESIDE LANE

COTTONTAIL RUN

ARROYO ROAD

DESERT FAIRWAYS DRIVE

MOUNTAIN RD

INDIAN BEND ROAD

HIGHLAND DRIVE

HILLSIDE DR

MUMMY

JOSHUA TREE

CACTUS WREN ROAD

TATUM BOULEVARD

LINCOLN DRIVE

RM435

ARROYO VERDE DR

KEIM DR

VALLEY VISTA

VALLEY VISTA LN

RM434

PALO VERDE DRIVE

RM436 McDONALD DRIVE

PALO VERDE DR

VALLEY VISTA WAY

CAMELBACK ROAD

MARION WAY

ARLINGTON ROAD

SAN MIGUEL AVENUE

SOLANO DRIVE

MONTEBELLO AV

RANCHO DR

Echo Canyon Wash

RM432

RM433

ZONE A

LIMIT OF DETAILED STUDY

ZONE A4

ZONE A9

ZONE B

ZONE C

ZONE A5

PASADENA AVENUE

AVENIDA DEL PUENTA

ARIZONA CANAL

Levee

ELM ST

HAZELWOOD ST

CAMPBELL AVE

PATRICIA JANE DR

CALLE TUERIA

CALLE REDONDA

LAFAYETTE BLVD

EXETER BLVD

LAUREL AVE

ARCADIA DR

DROMEDARY ROAD

ROCKRIDGE RD

WHITE GATES DR

ORANGE DR

PALOMINO ROAD

VALLE VISTA ROAD

SAGE DRIVE

CHOLLA LANE

VISTA DRIVE

WILKINSON ROAD

CHAPARRAL RD

JACKRABBIT ROAD

JEAN AV

ALTA HACIENDA DRIVE

JOHAKE RD

BUTLER DRIVE

CITY OF SCOTTSDALE

CITY OF PHOENIX

MARICOPA COUNTY
UNINCORPORATED AREAS
040037

TOWN OF PARADISE VALLEY

CITY OF PHOENIX
040051

CITY OF SCOTTSDALE
045012

JOINS PANEL 2155

JOINS PANEL 1670

JOINS PANEL 1695

KEY TO MAP

500-Year Flood Boundary	ZONE B
100-Year Flood Boundary	ZONE A1 / ZONE A5
Zone Designations	
100-Year Flood Boundary	ZONE B
500-Year Flood Boundary	
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 967)
Elevation Reference Mark	RM7×.
Zone D Boundary	
River Mile	•M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
AO	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas.

Certain areas not in the Special Flood Hazard Areas (zones A and V) may be protected by flood control structures.

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 revisions history prior to countywide mapping, see Section 5.4 of the Flood Insurance Study Report.

For adjoining map panels, see separately printed Map Index.

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

EFFECTIVE DATE (S) OF REVISION (S) TO THIS PANEL:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

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

APPROXIMATE SCALE IN FEET
1000 0 1000

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