

**Federal Emergency Management Agency**

**LETTER OF MAP REVISION**

**FLYNN LANE WASH**

**Prepared by**

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

**Submitted by**

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

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



Property of  
Flood Control District of MC Library

Please Return to  
**Federal Emergency Management Agency**

Phoenix, AZ 85009  
Washington, D.C. 20472

DEC 27 1996

CERTIFIED MAIL  
RETURN RECEIPT REQUESTED

The Honorable Skip Rimsza  
Mayor, City of Phoenix  
200 West Washington Street  
Phoenix, Arizona 85003-1611

IN REPLY REFER TO:  
Case No.: 96-09-1042P

Community: City of Phoenix, Arizona  
Community No.: 040051  
Panel Affected: 04013C1670 E  
Effective Date of  
This Revision: **DEC 19 1996**

REMARKS  
✓

102-I-A-C

Dear Mayor Rimsza:

This responds to a request that the Federal Emergency Management Agency (FEMA) revise the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for your community in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated August 9, 1996, Mr. Hasan Mushtaq, P.E., Project Manager, Engineering Division, Flood Control District of Maricopa County, requested that FEMA revise the FIRM and FIS report to show the effects of the construction of Ocotillo Road and Squaw Peak Parkway, the construction of spillways into the Arizona Canal Diversion Channel (ACDC), and updated topography along Flynn Lane Wash from the ACDC to approximately 2,800 feet upstream of the ACDC.

All data required to complete our review of this request were submitted with letters from Mr. Mushtaq. Because this Letter of Map Revision (LOMR) shows the effects of a publicly sponsored flood-control project that reduces flooding to existing development, fees were not assessed for the review.

We have completed our review of the submitted data and the flood data shown on the effective FIRM and FIS report. We have revised the FIRM and FIS report to modify the elevations and floodplain and floodway boundary delineations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along Flynn Lane Wash. As a result of the modifications, the base flood elevations (BFEs) for Flynn Lane Wash increased, the width of the Special Flood Hazard Area (SFHA), the area that would be inundated by the base flood, increased in some areas and decreased in other areas; and the width of the regulatory floodway increased in some areas and decreased in other areas. The modifications are shown on the enclosed annotated copy of FIRM Panel 04013C1670 E; Profile Panels 139P and 140P; and affected portions of the Floodway Data Table. This Letter of Map Revision (LOMR) hereby revises the above-referenced panel(s) of the effective FIRM dated September 30, 1995 and the affected portions of the FIS report dated September 30, 1995.

A LOMR was issued on August 7, 1996, for Echo Canyon Wash. Modifications resulting from this LOMR are shown on the enclosed Floodway Data Table.

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

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

Location	Existing BFE (feet)*	Modified BFE (feet)*
Approximately 50 feet upstream of the ACDC	1,242	1,244
Approximately 400 feet upstream of the ACDC	1,247	1,250
Approximately 1,900 feet upstream of the ACDC	1,274	1,275

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

Public notification of the proposed modified BFEs will be given in *The Arizona Republic* on or about January 24, 1997 and January 31, 1997. A copy of this notification is enclosed. In addition, a notice of changes will be published in the *Federal Register*. Within 90 days of the second publication in *The Arizona Republic*, a citizen may request that FEMA reconsider the determination made by this LOMR. Any request for reconsideration must be based on scientific or technical data. All interested parties are on notice that, until the 90-day period elapses, the determination to modify the BFEs presented in this LOMR may itself be modified.

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

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

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

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

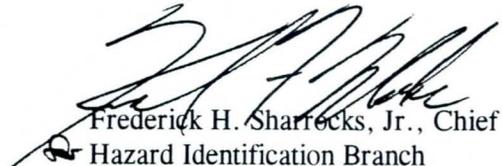
apply and the modifications described in this LOMR. Our records show that your community has met this requirement.

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

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

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

Sincerely,

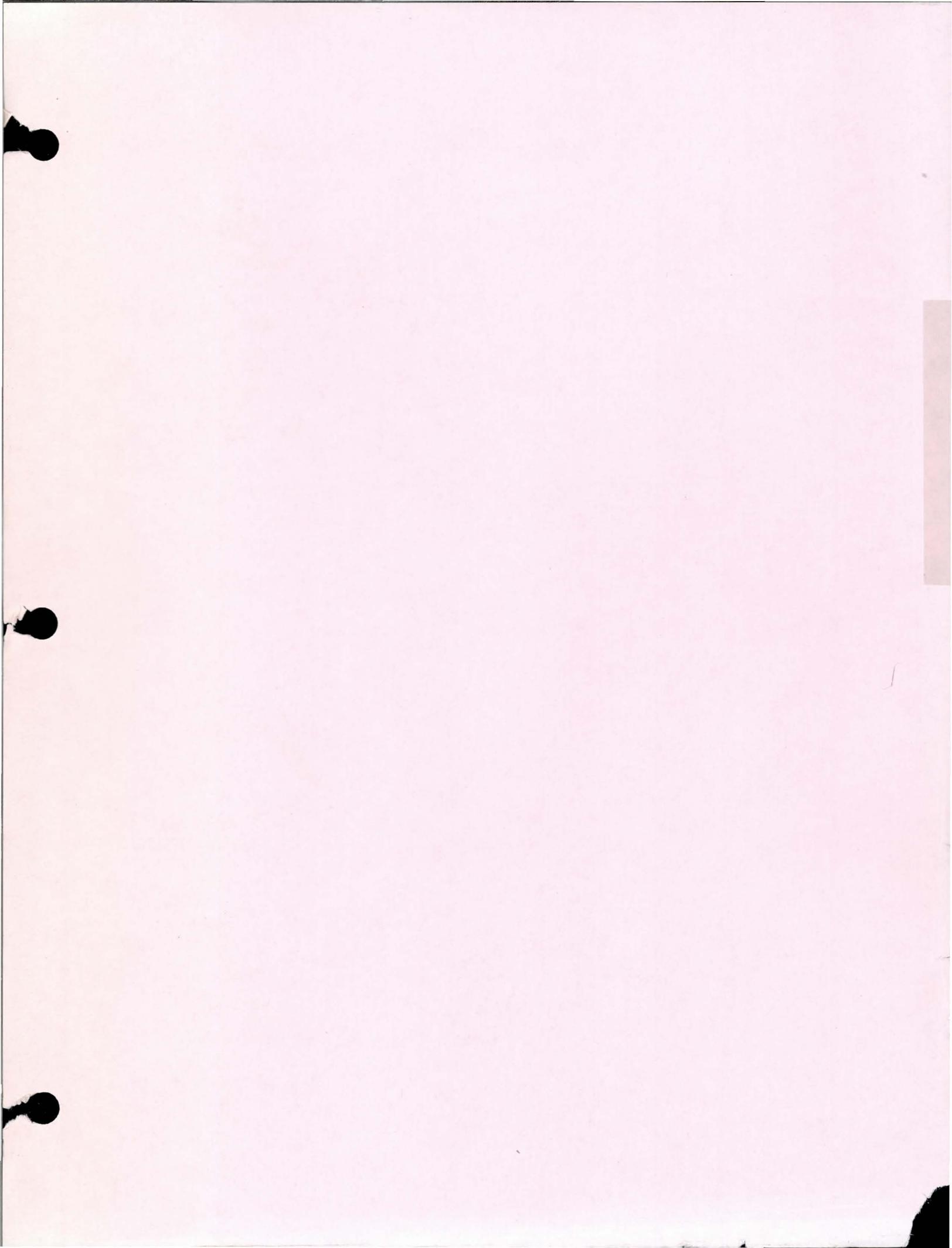


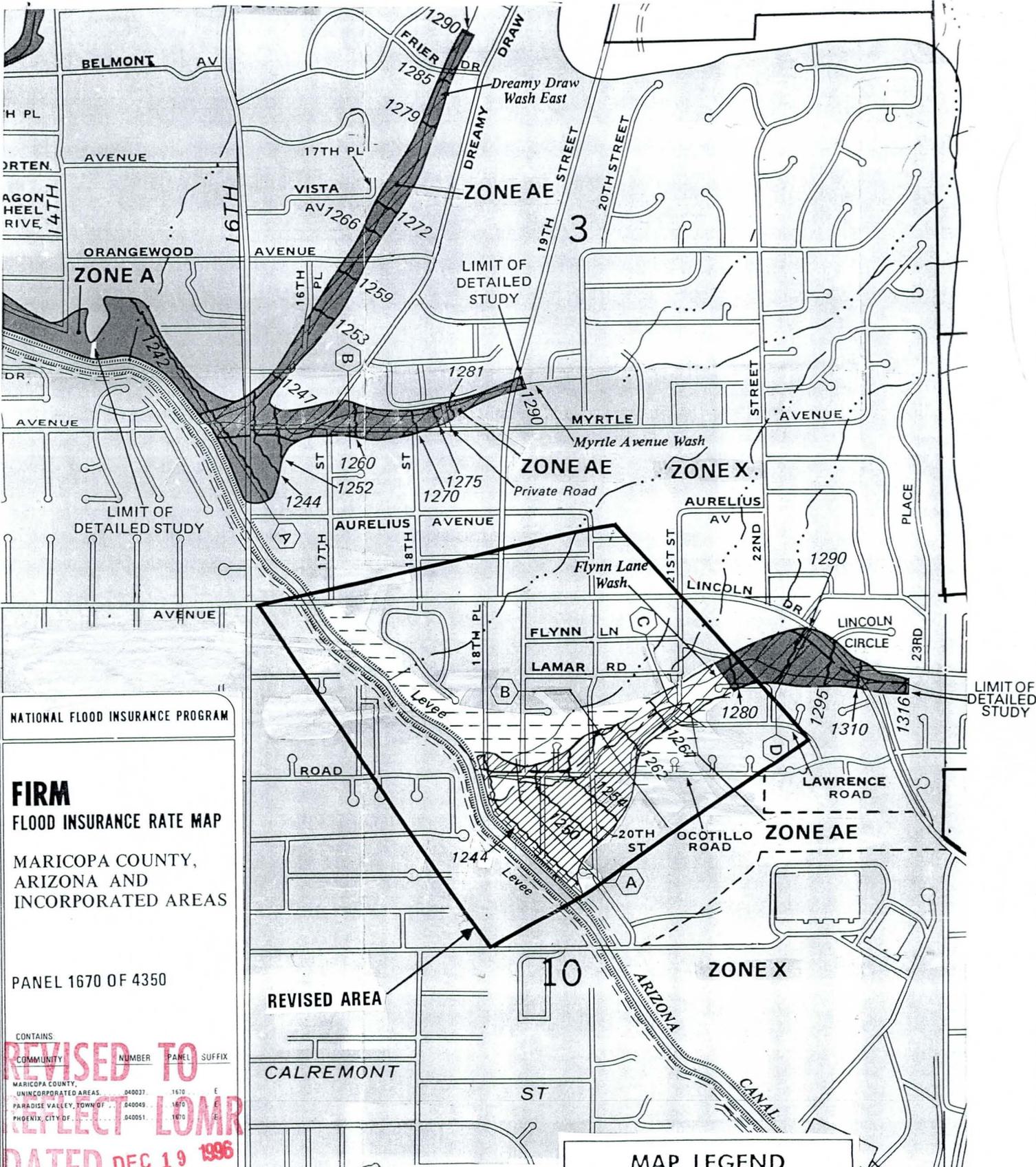
Frederick H. Sharrocks, Jr., Chief  
Hazard Identification Branch  
Mitigation Directorate

Enclosures

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

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





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 E  
PARADISE VALLEY, TOWN OF 040049 1670 E  
PHOENIX, CITY OF 040051 1670 E

**REVISED TO REFLECT LOMR DATED DEC 19 1996**

MAP NUMBER  
04013C1670 E

MAP REVISED:  
SEPTEMBER 30, 1995

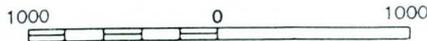


Federal Emergency Management Agency

**MAP LEGEND**

- Revised Floodway
- Revised 100-Year Floodplair
- ZONE X  
Areas subject to 100-year flooding with average depths less than one (1) foot.

APPROXIMATE SCALE IN FEET



FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WATER SURFACE ELEVATION (FEET NGVD)			
					REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Dreamy Draw Wash East								THESE DATA WERE REVISED BY LOMR DATED AUGUST 7, 1996
A	0.04	250 <sup>2</sup>	--3	--3	1,242.0	1,242.0	1,242.9	0.9
Echo Canyon Wash								
A	0.27	157	1,035	6.4	1,256.2	1,256.2	1,257.1	0.9
B	0.37	170	615	10.7	1,263.4	1,263.4	1,264.0	0.6
C	0.56 <sup>4</sup>	73	618	9.5	1,270.4	1,270.4	1,271.4	1.0
D	0.74 <sup>4</sup>	205	1,172	5.0	1,278.7	1,278.7	1,279.6	0.9
E	1.04	210	1,501	3.9	1,293.1	1,293.1	1,293.5	0.4
F	1.19	180	1,169	5.0	1,298.0	1,298.0	1,298.3	0.3
G	1.43	150	635	7.8	1,308.4	1,308.4	1,308.9	0.5
H	1.49	150	377	11.9	1,310.2	1,310.2	1,310.7	0.5
I	1.54	150	734	6.1	1,314.4	1,314.4	1,314.4	0.0
J	1.60	150	774	5.8	1,316.1	1,316.1	1,316.1	0.0
K	1.71	150	729	6.2	1,317.6	1,317.6	1,318.0	0.4
L	1.86	150	451	8.0	1,321.9	1,321.9	1,322.8	0.9
M	2.02	150	609	4.9	1,327.5	1,327.5	1,327.5	0.0
Flynn Lane Wash								
A	0.037	54	169	10.1	1,245.9	1,245.9	1,246.6	0.7
B	0.188	112	239	7.1	1,258.5	1,258.5	1,259.2	0.7
C	0.304	55	206	8.3	1,269.1	1,269.1	1,269.7	0.6
D	0.530	400	--3	--3	1,290.1	1,290.1	1,291.1	1.0

REVISED TO  
REFLECT LOMR  
DATED DEC 19 1996

REVISED DATA

<sup>1</sup>Miles Above Mouth

<sup>2</sup>Combined Floodway for Dreamy Draw Wash East and Myrtle Avenue Wash

<sup>3</sup>Data Not Available

<sup>4</sup>Station 0.740 previously shown as station 0.710; subsequent cross sections require addition of 0.030 miles

TABLE 5

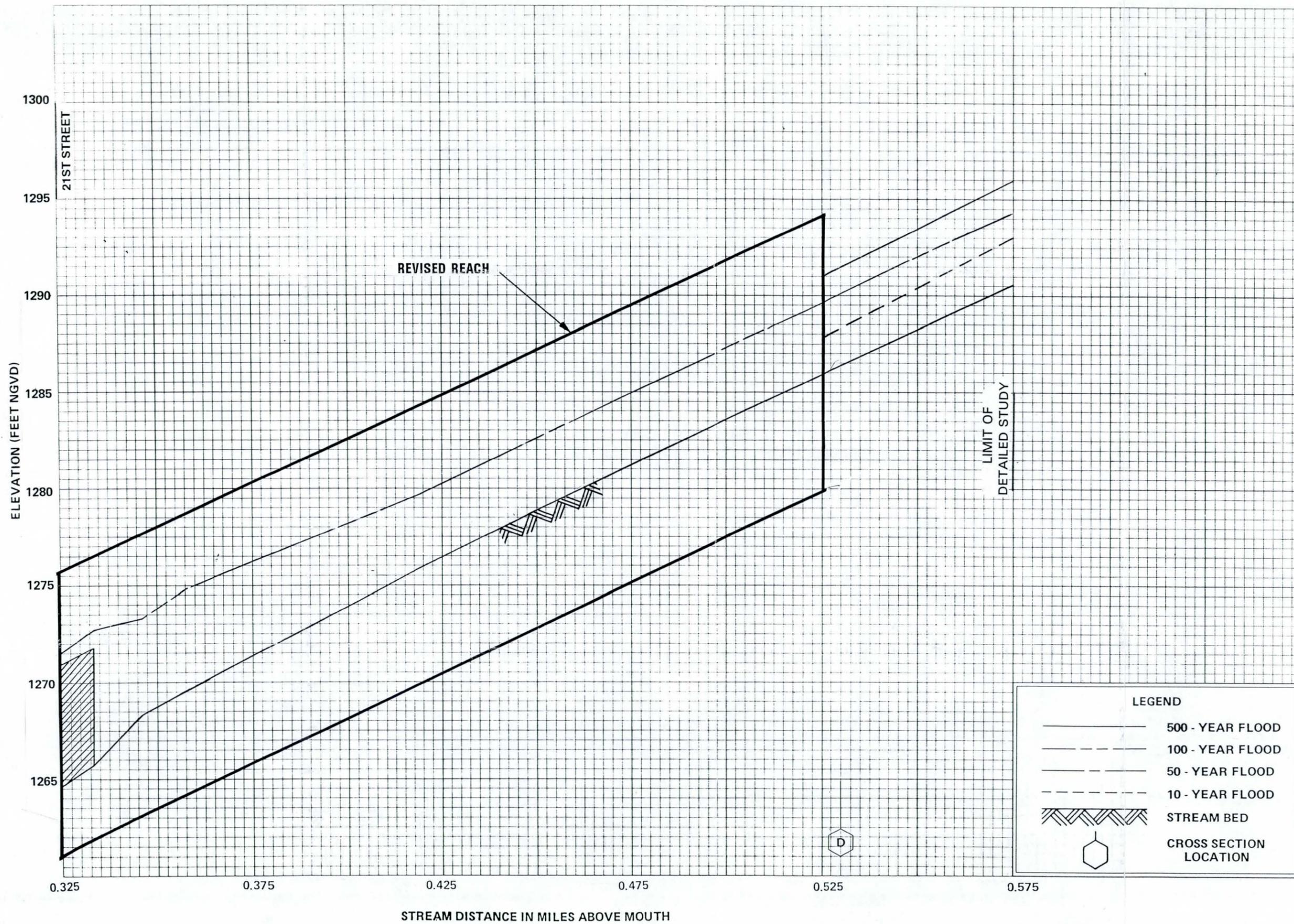
FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ  
AND INCORPORATED AREAS

FLOODWAY DATA

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





REVISED TO  
REFLECT LOMR  
DATED DEC 19 1986

**FLOOD PROFILES**  
FLYNN LANE WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY  
MARICOPA COUNTY, AZ  
AND INCORPORATED AREAS

079483

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

On September 30, 1995, the Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in the City of Phoenix, Arizona through issuance of a Flood Insurance Rate Map (FIRM). The Mitigation Directorate has determined that modification of the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) for certain locations in this community is appropriate. The modified base flood elevations (BFEs) revise the FIRM for the community.

The changes are being made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65.

A hydraulic analysis was performed to incorporate the construction of Ocotillo Road and Squaw Peak Parkway, the construction of spillways into the Arizona Canal Diversion Channel (ACDC), and updated topography and has resulted in a revised delineation of the regulatory floodway, an increase and decrease in SFHA, and higher BFEs for Flynn Lane Wash from the ACDC to approximately 2,800 feet upstream of ACDC. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source(s) cited above.

Location	Existing BFE (feet)*	Modified BFE (feet)*
Approximately 50 feet upstream of the ACDC	1,242	1,244
Approximately 400 feet upstream of the ACDC	1,247	1,250
Approximately 1,900 feet upstream of the ACDC	1,274	1,275

\*National Geodetic Vertical Datum, rounded to nearest whole foot

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

Upon the second publication of notice of these changes in this newspaper, any person has 90 days in which he or she can request, through the Chief Executive Officer of the community, that the Mitigation Directorate reconsider the determination. Any request for reconsideration must be based on knowledge of changed conditions or new scientific or technical data. All interested parties are on notice that until the 90-day period elapses, the Mitigation Directorate's determination to modify the BFEs may itself be changed.

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

The Honorable Skip Rimsza  
Mayor, City of Phoenix  
200 West Washington Street  
Phoenix, Arizona 85003-1611

## Introduction

David Evans and Associates was contracted by the Flood Control District of Maricopa County (FCDMC) to analyze a portion of Flynn Lane Wash and revise the Flood Insurance Rate Map (FIRM) as necessary. This new analysis has been performed due to the construction of the Arizona Canal Diversion Channel (ACDC) and the construction of Ocotillo Road as an inverted crown. The ACDC was built in 1994 by the US Corps of Engineers. It was designed to convey runoff that ponds upstream of the Arizona Canal, an irrigation distribution system in Phoenix.

## Area Studied

Detailed hydraulic analysis was performed along Ocotillo Road between 20th Street and the spillway into the ACDC which is located at the downstream portion of a previously studied reach of Flynn Lane Wash. The aerial topographic maps used in the design and construction of the ACDC were used to supplement the required ground information (GR cards) used in the revised HEC-2 model.

The inverted crown in Ocotillo Road resulted in a realignment of the floodway. Due to this, the revised analysis of the floodway is from approximately 20th Street to the spillway.

## Hydraulic Analysis

A duplicate effective model was prepared using the data available from the Federal Emergency Management Agency (FEMA). The data was provided to FCDMC on microfiche. A revised model was prepared using the current, more detailed topography which extends upstream to cross section 0.358. The data from the effective model was utilized from cross section 0.42 through 0.62.

The Manning roughness coefficients utilized in the new analysis are 0.013 for the concrete spillway, 0.016 for the roadway, 0.035 for the channel, and 0.09 to 0.12 for the overbanks. The roughness coefficients for the roadway and spillway were modified in the revised HEC-2.

## Boundary Conditions

The starting water surface elevations for the HEC-2 model were established based on a weir analysis of the ACDC spillways. Due to better topographic information, 24 cross sections were modeled in the new analysis as compared to the 12 in the duplicate effective model. Also, due to the new topographic data and the location and alignment of cross sections, comparing water surface elevations of cross sections with the same label call out may not be relevant. In addition, the configuration of the improvements (Ocotillo Road as an inverted crown), result in the revised model being extended an additional 150 feet as compared to the duplicate effective model.

## Results

A flood profile is included in the submittal package which shows that the revised profile ties in vertically with the duplicate effective profile at cross section 0.62 . The horizontal tie-in is at approximately cross section 0.32. The Zone A portion of the floodplain west of Squaw Peak Parkway has been extended east to the west side of the Squaw Peak Parkway. The limit of the revised analysis (study) is the intersection of the ACDC and Squaw Peak Parkway. This results in a north/south boundary line compared to the existing east/west boundary line. The floodplain west of Squaw Peak Parkway was not part of this study.

The revised floodplain widens when compared to the existing floodplain on the left overbank at cross sections .080, .100, and .116. Because the widening of the floodplain is within a park and no structures are impacted, the City of Phoenix has approved the widening.



**PUBLIC BURDEN DISCLOSURE NOTICE**

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

**1. OVERVIEW**

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

- Physical change
  - Existing
  - Proposed
- Improved methodology
- Improved data
- Floodway revision
- Other \_\_\_\_\_

Explain \_\_\_\_\_

2. Flooding Source: Flynn Lane Wash

3. Project Name/Identifier: Flynn Lane Wash

4. FEMA zone designations affected: AE

(example: A, AH, AO, A1-A30, A99, AE, V, V1-30, VE, B, C, D, X)

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

Community No.	Community Name	County	State	Map No.	Panel No.	Effective Date
EX: 480301	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
480287	Harris County	Harris	TX	48201C	0220G	09/28/90
040051	Phoenix, City	Maricopa	AZ	04013C	1670E	09/30/95

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

Types of Flooding

- Riverine
- Coastal
- Alluvial Fan
- Shallow Flooding (e.g. Zones AO and AH)
- Lakes

Affected by wind/wave action

- Yes
- No

Other (describe) \_\_\_\_\_

Structures

- Channelization
- Levee/Floodwall
- Bridge/Culvert
- Dam
- Coastal
- Fill
- Pump Station
- None
- Channel Relocation
- Excavation
- Other (describe) \_\_\_\_\_

Spillway into ACDC \_\_\_\_\_

Disciplines\*

- Water Resources
  - Hydrology
  - Hydraulics
  - Sediment Transport
  - Interior Drainage
- Structural
- Geotechnical
- Land Surveying
- Other (describe) \_\_\_\_\_

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

**2. FLOODWAY INFORMATION**

- 7. Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?  Yes  No
  - 8. Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?  Yes  No
- If yes, give reason: Street with inverted crown & spillway constructed

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

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

Yes  No

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

### 3. PROPOSED ENCROACHMENTS

10. With floodways:

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

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

11. Without floodways:

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

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

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

### 4. REVISION REQUESTOR ACKNOWLEDGMENT

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

### 5. COMMUNITY OFFICIAL ACKNOWLEDGMENT

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

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

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

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

### 6. OPERATION AND MAINTENANCE

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

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

A. Inspection of the flood control project will be conducted periodically by Flood Control District of Maricopa County entity

Maricopa County with a maximum interval of three months between inspections.

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

to ensure the integrity and degree of flood protection of the structure.

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

D. The community is willing to assume responsibility for  performing  overseeing compliance with the maintenance and operation plans of the Flynn Lane Wash Spillway  
(Name)

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

Attach operation and maintenance plans

#### 7. REQUESTED RESPONSE FROM FEMA

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

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

#### 8. FORMS INCLUDED

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

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

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

9. INITIAL REVIEW FEE

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

Initial fee amount: \$ \_\_\_\_\_

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

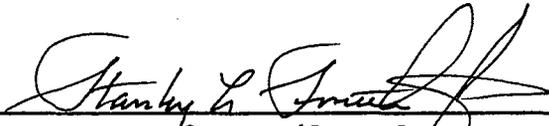
or

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

or

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

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

  
\_\_\_\_\_  
Signature of Revision Requester

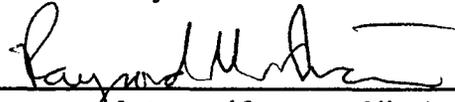
STANLEY L. SMITH JR., P.E.  
INTERIM CHIEF ENGINEER & GENERAL MANAGER  
\_\_\_\_\_  
Printed Name and Title of Revision Requester

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY  
\_\_\_\_\_  
Company Name

607 506 1501  
\_\_\_\_\_  
Telephone No.

AUG 7, 1996  
\_\_\_\_\_  
Date

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

  
\_\_\_\_\_  
Signature of Community Official

Floodplain Manager  
\_\_\_\_\_  
Printed Name and Title of Community Official

City of Phoenix  
\_\_\_\_\_  
Community Name

July 22, 1996  
\_\_\_\_\_  
Date

Does this request impact any other communities?  Yes  No

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

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



PUBLIC BURDEN DISCLOSURE NOTICE

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

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

Basis for above statement: (check all that apply)

- a.  Viewed all phases of actual construction.
  - b.  Compared plans and specifications with as-built survey information.
  - c.  Examined plans and specifications and compared with completed projects.
  - d.  Other Performed topographic survey as part of floodplain delineation process.
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: Teri S. Mintz  
(please print or type)

Title: Water Resource Engineer  
(please print or type)

Registration No. 30013 Expiration Date: 12-31-98

State Arizona

Type of License Civil Engineer

Teri S. Mintz  
Signature

4-17-96  
Date



Seal  
(Optional)

\*Specify Subdiscipline

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



**PUBLIC BURDEN DISCLOSURE NOTICE**

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Community Name: Maricopa County  
Flooding Source: Flynn Lane Wash  
*(One form for each flooding source)*  
Project Name/Identifier: Flynn Lane Wash Spillway

**1. REACH TO BE REVISED**

Downstream limit: 0.0  
Upstream limit: 0.62

**2. EFFECTIVE FIS**

- Not studied
- Studied by approximate methods  
Downstream limit of study \_\_\_\_\_  
Upstream limit of study \_\_\_\_\_
- Studied by detailed methods  
Downstream limit of study \_\_\_\_\_  
Upstream limit of study \_\_\_\_\_
- Floodway delineated  
Downstream limit of Floodway 0  
Upstream limit of Floodway .7

**3. HYDRAULIC ANALYSIS**

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

- Not studied in FIS
- Improved hydrologic data/analysis. Explain: \_\_\_\_\_  
\_\_\_\_\_
- Improved hydraulic analysis. Explain: \_\_\_\_\_  
\_\_\_\_\_
- Flood control structure. Explain: Construction of Arizona Canal Diversion Channel (ACDC) & spillway. Construction of street with inverted crown, since last study.
- Other. Explain: \_\_\_\_\_  
\_\_\_\_\_

3. RIVERINE HYDRAULIC ANALYSIS FORM  
Models Submitted

**For areas which have detailed flooding:**

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

**For areas which do not have detailed flooding:**

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

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

1. Duplicate Effective Model

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.

Natural	Floodway
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

2. Corrected Effective Model

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.

Natural	Floodway
<input type="checkbox"/>	<input type="checkbox"/>

3. Existing or Pre-Project Conditions Model

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

Natural	Floodway
<input type="checkbox"/>	<input type="checkbox"/>

4. Revised or Post-Project Conditions Model

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

Natural	Floodway
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

5. Other: Please attach a sheet describing all other models submitted.

Natural	Floodway
<input type="checkbox"/>	<input type="checkbox"/>

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

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

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



1. Discharges:	Upstream Limit	Downstream Limit
10-year .....	_____	_____
50-year .....	_____	_____
100-year .....	1100	1700
500-year .....	_____	_____

Attach diagram showing changes in 100-year discharge

2. Explain how the starting water surface elevations were determined Starting water surface elevations are determined based on weir calculations at spillway.

3. Give range of friction loss coefficients (*Manning's "N"*) Channel ..... .013 to .05  
 Overbanks ..... .013 to .12

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.

<u>Location</u>	<u>FIS</u>	<u>Revised</u>
<u>0 to 0.21</u>	<u>.05 to 0.12</u>	<u>.013 to .1</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

Explain: 'channel' composed of concrete spillway (.013), asphalt roadway (.016), Channel alignment has changed downstream of section 0.21.

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

Topographic maps and detailed field survey data

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

Yes  No If no, explain why not: \_\_\_\_\_

4. MODEL PARAMETERS (Cont'd)

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

Measured from survey drawing (channel and overbanks are well defined).

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

1. Do the results indicate:

- a. Water surface elevations higher than end points of cross sections?  Yes  No
- b. Supercritical depth?  Yes  No
- c. Critical depth?  Yes  No
- d. Other unique situations  Yes  No

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

- 2. What is the maximum change in energy gradient between cross-sections? 11.65  
Specify location .59 and .62  
210'
- 3. What is the distance between the cross-sections in 2 above? 550
- 4. What is the maximum distance between cross-sections? .42 and .53  
Specify location 0
- 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? 1 foot  
Specify location 0
  - c. What is the maximum velocity? 10.58 fps  
Specify location .347
  - d. Are there any negeative surcharge values at any cross-section?  Yes  No  
If yes, the floodway may need to be widened. If it is not widened, please explain and indicate the maximum negative surcharge.

Explain: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**WATER SURFACE ELEVATION CHECK**

COMMUNITY NAME Maricopa County	FLOODIND SOURCE Flynn Lane Wash	PROJECT NAME /IDENTIFIER Flynn Lane Wash
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SECNO	EFFECTIVE			DUPLICATE EFFECTIVE			CORRECTED EFFECTIVE			EXISTING/PRE-PROJECT			REVISED/PROJECT		
	NCWSEL <sup>1</sup>	FCWSEL <sup>2</sup>	SURC. <sup>3</sup>	NCWSEL <sup>1</sup>	FCWSEL <sup>2</sup>	SURC. <sup>3</sup>	NCWSEL <sup>1</sup>	FCWSEL <sup>2</sup>	SURC. <sup>3</sup>	NCWSEL <sup>1</sup>	FCWSEL <sup>2</sup>	SURC. <sup>3</sup>	NCWSEL <sup>1</sup>	FCWSEL <sup>2</sup>	SURC. <sup>3</sup>
0													1240.70	1241.70	1.00
.016													1244.99	1246.04	1.0
.037													1245.86	1246.61	0.75
.05				1244.40	1244.70	0.30									
.055													1247.48	1248.41	0.93
.08													1250.50	1251.55	1.0
.100													1251.60	1252.59	0.99
.116													1253.14	1253.72	0.58
.140				52.47	1254.04	1.57									
.158													1255.29	1255.72	0.43
.171													1256.29	1256.30	0.01
.188													1258.54	1259.25	0.71

COMMENTS:

1-100-year (natural) Water Surface Elevation

2-Encroachment (floodway) Water Surface Elevation

3-Surcharge Value

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

5. 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:

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

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

See attached

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

6. REVISED FIRM/FBFM AND FLOOD PROFILES

A. The revised water surface elevations tie into those computed by the effective FIS Model (10-, 50-, 100-, and 500-year), downstream of the project at cross-section \_\_\_\_\_ within \_\_\_\_\_ feet (vertical) and upstream of the project at cross section 0.62 within 0 feet (vertical).  
revision begins @ D/S end of study area

B. The revised floodway elevations tie into those computed by the effective FIS model, downstream of the project at cross section \_\_\_\_\_ within \_\_\_\_\_ feet (vertical) and upstream of the project at cross section 0.62 within 0.01 feet (vertical).  
revision begins @ D/S end of study area

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

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

Proceed to Riverine /Coastal Mapping Form

FEDERAL EMERGENCY MANAGEMENT AGENCY  
 WATER SURFACE ELEVATION CHECK

COMMUNITY NAME: Maricopa County  
 FLOOD/DRAINAGE SOURCE: Flynn Lane Wash  
 PROJECT NAME / IDENTIFIER: Flynn Lane Wash

SECNO	EFFECTIVE			DUPLICATE EFFECTIVE			CORRECTED EFFECTIVE			EXISTING/PRE-PROJECT			REVISED/PROJECT		
	NCWSEL <sup>1</sup>	FCWSEL <sup>2</sup>	SURC. <sup>3</sup>	NCWSEL <sup>1</sup>	FCWSEL <sup>2</sup>	SURC. <sup>3</sup>	NCWSEL <sup>1</sup>	FCWSEL <sup>2</sup>	SURC. <sup>3</sup>	NCWSEL <sup>1</sup>	FCWSEL <sup>2</sup>	SURC. <sup>3</sup>	NCWSEL <sup>1</sup>	FCWSEL <sup>2</sup>	SURC. <sup>3</sup>
.210				1259.32	1258.88	-0.44									
.217													1261.75	1262.25	0.50
.262													1265.96	1265.91	-0.04
.287													1267.70	1268.30	0.60
.300				1267.51	1268.79	1.28									
.304													1269.14	1269.79	0.64
.320				1269.84	1270.87	1.03							1270.97	1271.26	0.29
.33				1271.55	1272.58	1.03									
.333													1272.67	1272.74	0.07
.34				1272.48	1273.08	0.60									
.347													1273.35	1273.36	0.01
.358													1274.95	1274.96	0.01
.42				1279.19	1280.33	1.14							1279.83	1280.30	0.47

COMMENTS:

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





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Community Name: Maricopa County

Flooding Source: Flynn Lane Wash

Project Name/Identifier: Flynn Lane Wash Spillway

**1. MAPPING CHANGES**

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

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

If any of the items above are marked no or N/A, please explain: 500-yr floodplain not delineated, entirely within City of Phoenix, not in coastal zone

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.)? see attached

3. What is the scale and contour interval of the following workmaps?  
 a. Effective FIS 1" = 1000' scale 20' Contour interval  
 b. Revision Request 1" = 400' scale 2' Contour interval

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

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

1. MAPPING CHANGES (Cont'd)

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

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

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

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

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

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

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

If yes, explain:

The revised model shows the floodway is along the Ocotillo Road alignment, which has an inverted crown. The portion of Ocotillo Rd between 19th & 20th streets was not constructed at time of effective FIS (Dec '73).

Survey data, topography, & Hec-2 analysis reveals floodway is along Ocotillo alignment

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

N/A

If no, explain:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8. Manual or digital map submission:

Manual

Digital

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

2. EARTH FILL PLACEMENT

No fill placed

1. The fill is:  Existing  Proposed
2. Has fill been/will be placed in the regulatory floodway? .....  Yes  No  
If yes, please attach completed Riverine Hydraulic Analysis Form.
3. Has fill been/will be placed in floodway fringe (area between the floodway and 100-year floodplain boundaries)? .....  Yes  No

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

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

If yes, justify steeper slopes \_\_\_\_\_

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

If no, describe erosion protection provided \_\_\_\_\_

- C. Has all fill placed in revised 100-year floodplain been compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test Method or acceptable equivalent method?  Yes  No
- D. Can structures conceivably be constructed on the fill at any time in the future?  Yes  No

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

4. Has fill been/will be placed in a V-zone?  Yes  No
- If yes, is the fill protected from erosion by a flood control structure such as a revetment or seawall?  Yes  No

If yes, attach the coastal structures form.



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Community Name: Maricopa County

Flooding Source: Flynn Lane Wash

Project Name/Identifier: Flynn Lane Wash Spillway

**1. IDENTIFIER**

1. Name of roadway, railroad, etc.: 21st street

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): 333

3. This revision reflects (check one of the following):

- New bridge/culvert not modeled in the FIS
- Modified bridge/culvert previously modeled in the FIS
- New analysis of bridge/culvert previously modeled in the FIS

(Explain why new analysis was performed) More detailed survey information was obtained; special culvert routine is more accurate in describing culvert geometry given the detailed survey information

**2. BACKGROUND**

Provide the following information about the structure:

1. Dimension, material, and shape (e.g. two 10 x 5 feet reinforced concrete box culvert; three 30-foot span bridge with 2 rows of two 3-foot diameter circular piers; 40-foot wide ogee shape spillway) two 6-foot diameter Concrete Culverts

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

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

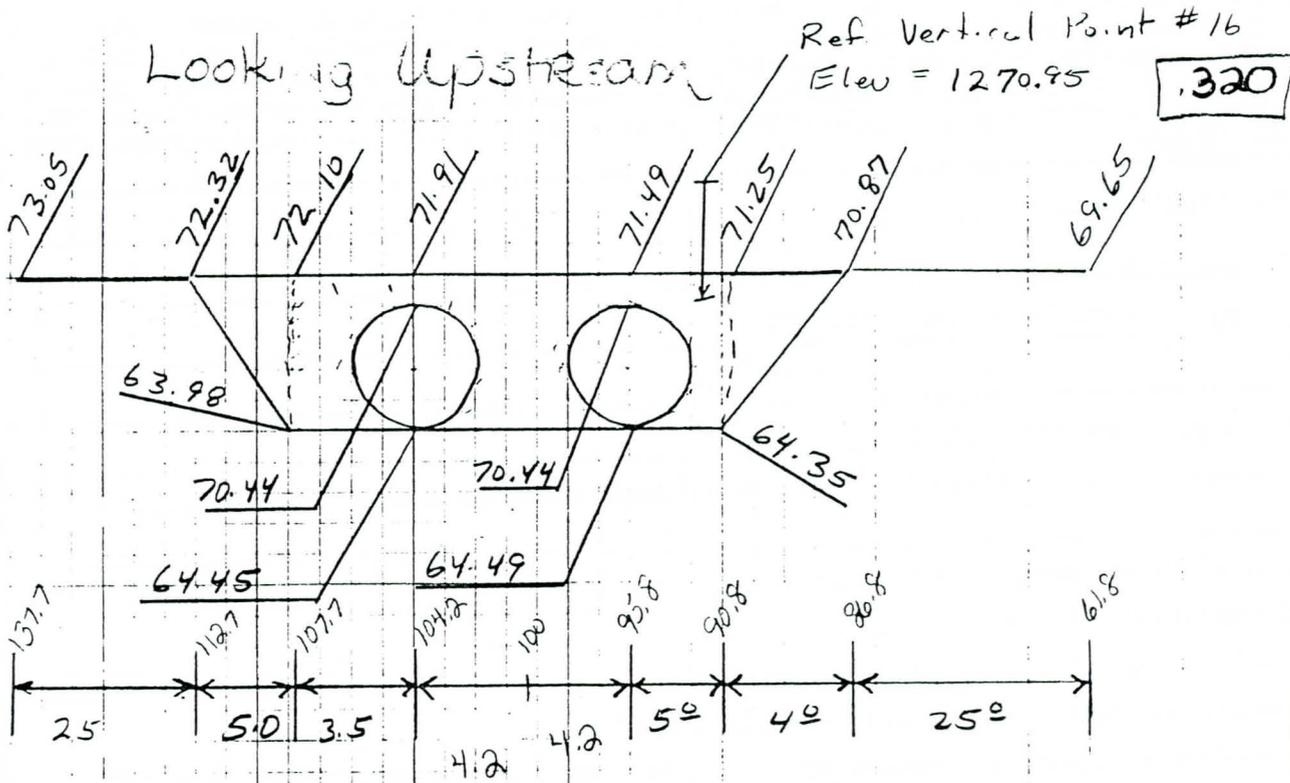
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). (Attach justification)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

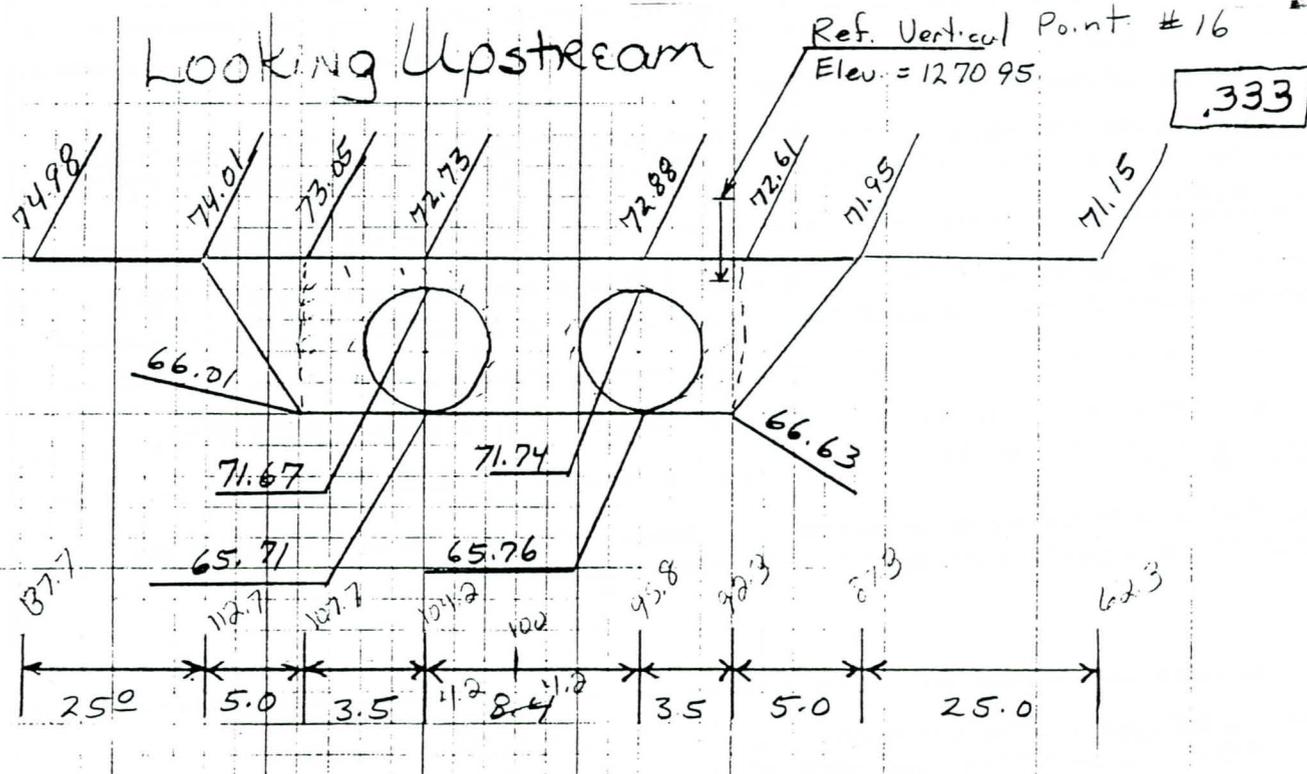
\* One form per new/revised bridge/culvert

3. ANALYSIS

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

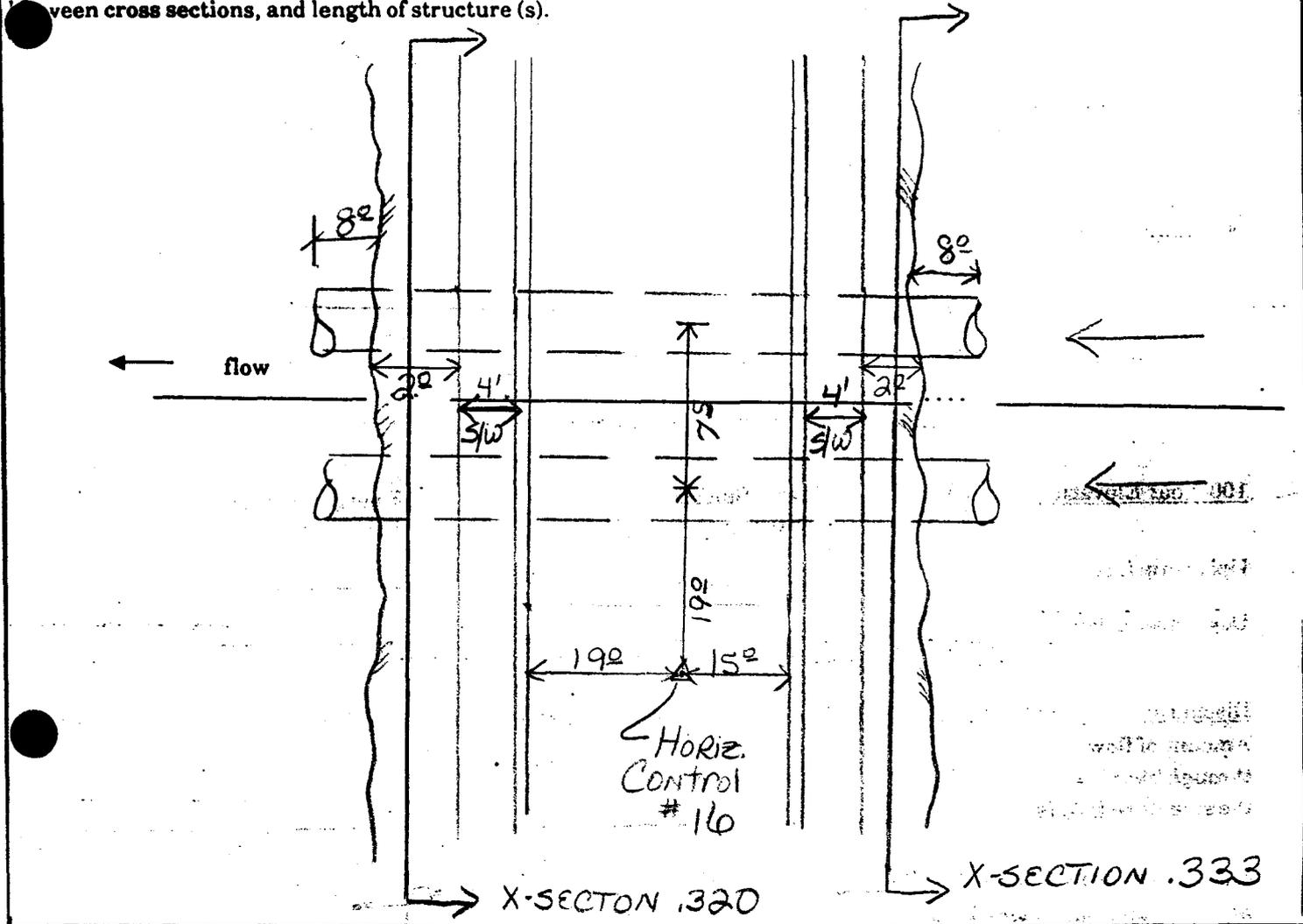


Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



3. ANALYSIS (Cont'd)

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



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

As-builts for culverts could not be obtained

Culvert length or bridge width (ft)	64'
Calculated culvert/bridge area (ft <sup>2</sup> ) by the hydraulic model, if applicable	56.5
Total culvert/bridge area (ft <sup>2</sup> )	56.5

3. ANALYSIS (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	<u>71.15</u>	<u>74.98</u>
Downstream face	<u>69.65</u>	<u>73.05</u>

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	<u>71.95</u>	<u>74.01</u>
Downstream face	<u>70.87</u>	<u>72.32</u>

100-Year Elevations

	Water Surface Elevations	Energy Gradient Elevations
Upstream face	<u>72.67</u>	<u>73.40</u>
Downstream face	<u>70.97</u>	<u>71.88</u>

<u>Discharge</u>	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure (s) (cfs)	<u>599</u>	<u>                    </u>	<u>930</u>	<u>1529</u>

The maximum depth of flow over the roadway/railroad (ft.) .....	<u>0.72</u>
Weir length (ft.) .....	<u>209</u>

<u>Top Widths</u>	Total Floodplain Width	Total Effective Flow Width	Floodway Width
Upstream face	<u>185.06</u>	<u>300'</u>	<u>54.60'</u>
Downstream face	<u>185.34</u>	<u>267.7'</u>	<u>50.27'</u>

3. ANALYSIS (Cont'd)

Loss Coefficients

Entrance loss coefficient	.5
Manning's "n" value assigned to the structure(s)	.013
Friction loss coefficient through structure (s)	N/A
Other loss coefficients (e.g., bend manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.6
Pier coefficient	N/A
Contraction loss coefficient	.6
Expansion loss coefficient	.8

4. SEDIMENT TRANSPORT CONSIDERATIONS

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

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

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

Explain method used to estimate the sediment transport and the depth of scour and/or deposition \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

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

\_\_\_\_\_

5. FLOODWAY ANALYSIS

Explain method of bridge encroachment

(floodway run) Ran HEC-2 using encroachment method #4. If surcharge was positive, method  
was used setting left & right encroachment stations at those specified in method #4.

5. FLOODWAY ANALYSIS (Cont'd)

Comments (*explain any unusual situations*):

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Attach analysis.

## Explanations

### Form 1, Section 3, Part 1B

The cross section locations for the revised and effective models do not line up until cross section 0.42. At cross section 0.42, the water surface elevation for the revised model is 0.64' higher than the duplicate effective model, 0.30' lower at cross section 0.53, 0.24' higher at cross section 0.58, and 0.02' lower at cross section 0.59. The 100 year water surface elevation balances out at cross section 0.62.

### Form 4, Section 5, Part 1a

The 100-year water surface elevation is higher than at the end points at cross section 0.62. This cross section is at the uppermost portion of the analysis and the improvements were made at the lower end of the run. The vertical extension warning is present in the duplicate effective model. The scope of work did not include surveying a half mile away from the improvements for the sole purpose of removing a vertical extension warning so far from the project location.

### Form 4, Section 5, Part 1b and 1c

Critical depth is assumed at several locations along the wash. A subcritical analysis was performed for Flynn Lane Wash which is a conservative approach to the revision of a floodplain boundary.

### Form 4, Section 5, Part 7

In the revised model, cross sections downstream of 0.42 are either more detailed or in different locations with respect to the duplicate effective model and should not be compared. Upstream of cross section 0.42, the water surface elevations increase and decrease compared to the duplicate effective model until finally balancing at cross section 0.62. No change to the floodplain was made upstream of cross section 0.42.

### Form 5, Section 1, Part 1K

Reference marker used was B.C.H.H. at 16th Street and Glendale Avenue.

### Form 5, Section 1, Part 1L

Vertical Datum was B.C.H.H. at 16th Street and Glendale Avenue, elevation 1229.69. Vertical Control is based on the National Geodetic Vertical Datum of 1929.

### Form 5, Section 1, Part 2

Field survey based on horizontal and vertical control as stated in Part 1K and 1L (above) on February of 1996 by David Evans and Associates, Inc.

### Form 7, Section 2, Part 3

The special culvert routine was not available for the duplicate effective model. The special culvert routine is more accurate in describing culvert geometry.

## Attachment to Form 2, Section 6

## OPERATIONAL INSPECTIONS SCHEDULE - 1996

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

**INSPECTION SCHEDULE FOR 1996  
FCDMC DAMS, FLOODWAYS AND DIVERSIONS**

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

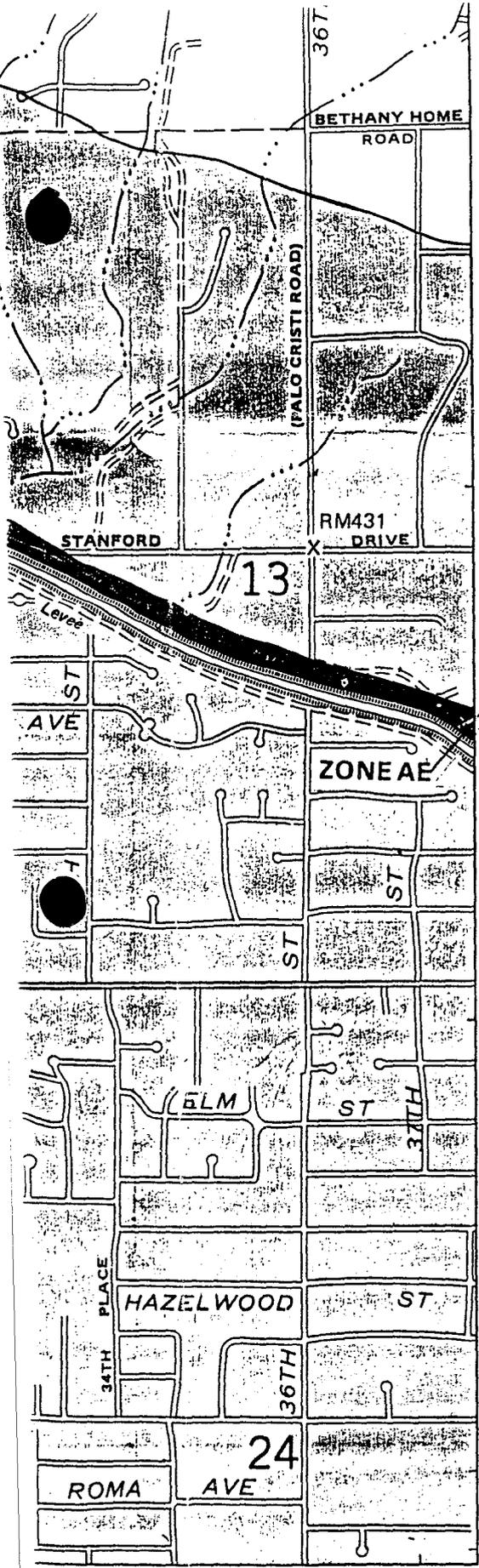
\*FCD C&O DIV. ONLY

\*\*FCD & ADWR ONLY





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



LIMIT OF DETAILED STUDY

1251

1670 E

**NATIONAL FLOOD INSURANCE PROGRAM**

**FIRM  
FLOOD INSURANCE RATE MAP**

MARICOPA COUNTY,  
ARIZONA AND  
INCORPORATED AREAS

PANEL 1670 OF 4350

CONTAINS:

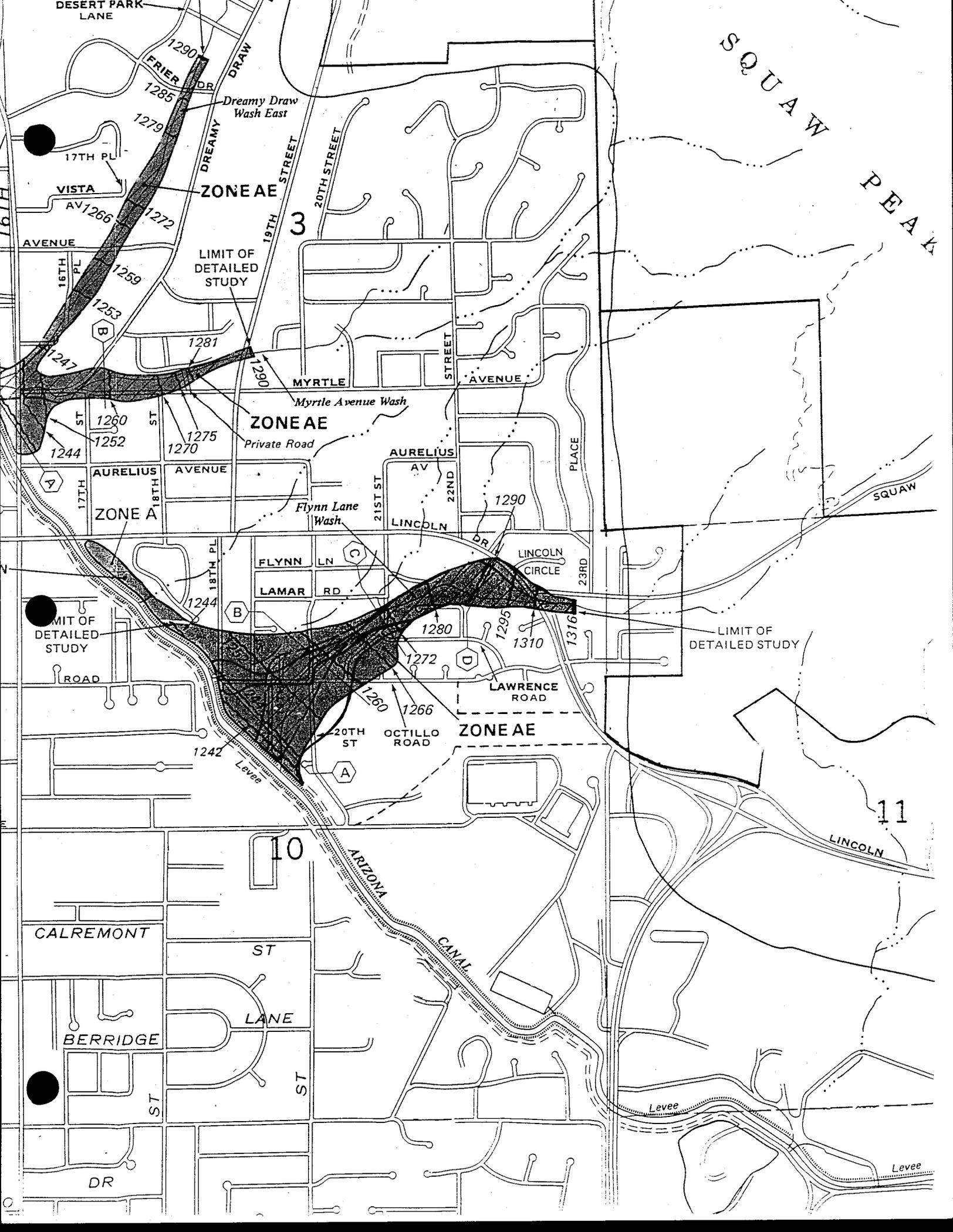
COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY, UNINCORPORATED AREAS	.040037	.1670	.E
PARADISE VALLEY, TOWN OF	.040049	.1670	.E
PHOENIX, CITY OF	.040051	.1670	.E

**MAP NUMBER  
04013C1670 E**

**MAP REVISED:  
SEPTEMBER 30, 1995**



Federal Emergency Management Agency



SQUAW PEAK

ZONE AE

LIMIT OF DETAILED STUDY

ZONE AE

ZONE A

LIMIT OF DETAILED STUDY

LIMIT OF DETAILED STUDY

ZONE AE

LIMIT OF DETAILED STUDY

11

CALREMONT

BERRIDGE

ST

LANE

ST

ST

DR

Levee

Levee

FRIER DR  
1290  
1285  
1279

Dreamy Draw Wash East

1272

1259

1281

1290

MYRTLE

Myrtle Avenue Wash

1260

1275

1270

Private Road

AURELIUS AV

1290

Flynn Lane Wash

LINCOLN DR

LINCOLN CIRCLE

FLYNN LN

LAMAR RD

1280

1295

1310

1316

LAWRENCE ROAD

20TH ST

OCTILLO ROAD

ZONE AE

1242

Levee

ARIZONA CANAL

CANAL

LINCOLN

AVENUE

VISTA AV 1266

17TH PL

16TH PL

16TH PL

1247

1244

1244

1244

ROAD

1242

CALREMONT

BERRIDGE

DR

ST

LANE

ST

ST

DR

Levee

Levee

FRIER DR  
1290  
1285  
1279

Dreamy Draw Wash East

ZONE AE

LIMIT OF DETAILED STUDY

ZONE AE

ZONE A

LIMIT OF DETAILED STUDY

LIMIT OF DETAILED STUDY

ZONE AE

LIMIT OF DETAILED STUDY

11

CALREMONT

BERRIDGE

ST

LANE

ST

ST

DR

Levee

Levee

FRIER DR  
1290  
1285  
1279

Dreamy Draw Wash East

ZONE AE

LIMIT OF DETAILED STUDY

ZONE AE

ZONE A

LIMIT OF DETAILED STUDY

LIMIT OF DETAILED STUDY

ZONE AE

LIMIT OF DETAILED STUDY

11

CALREMONT

BERRIDGE

ST

LANE

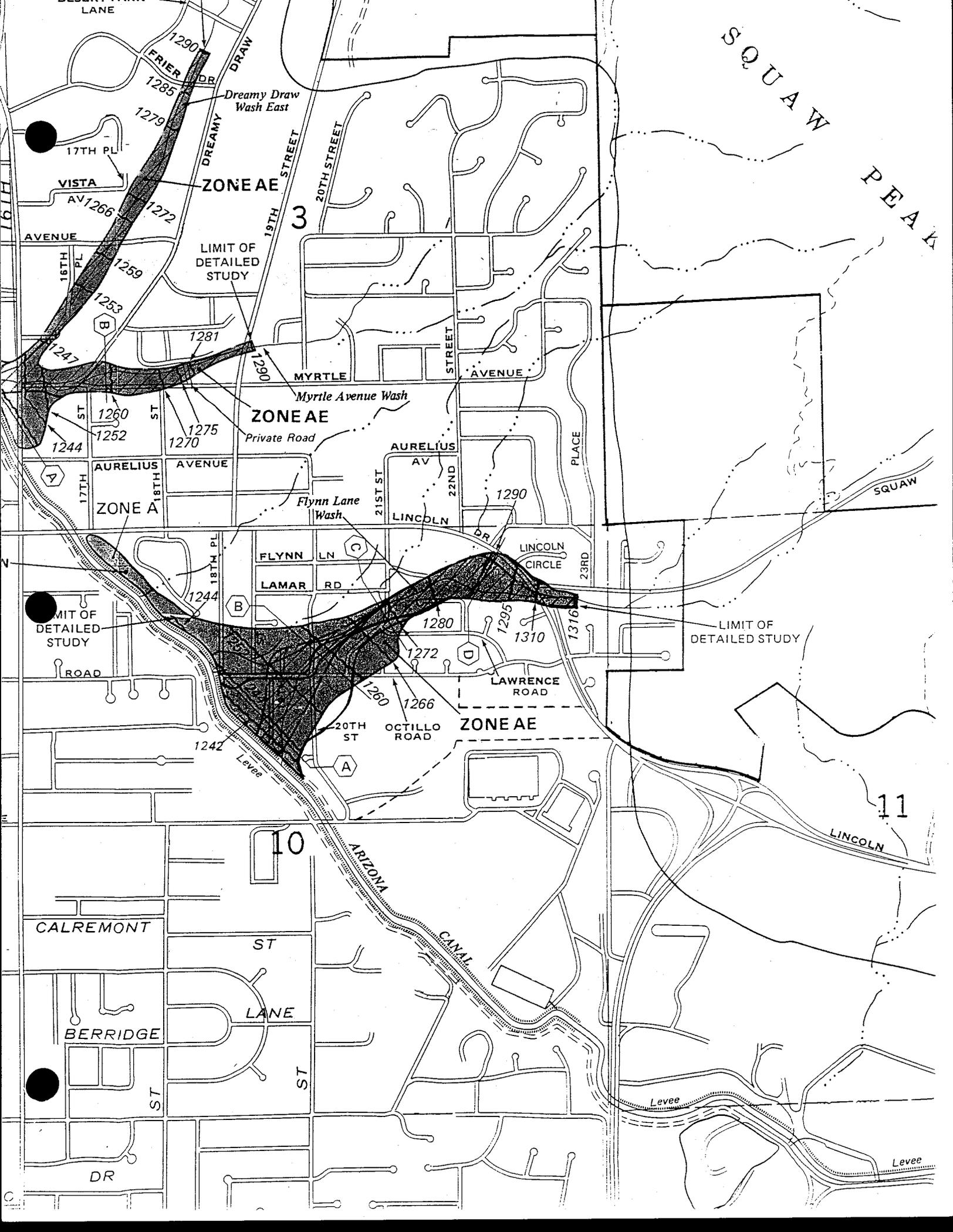
ST

ST

DR

Levee

Levee

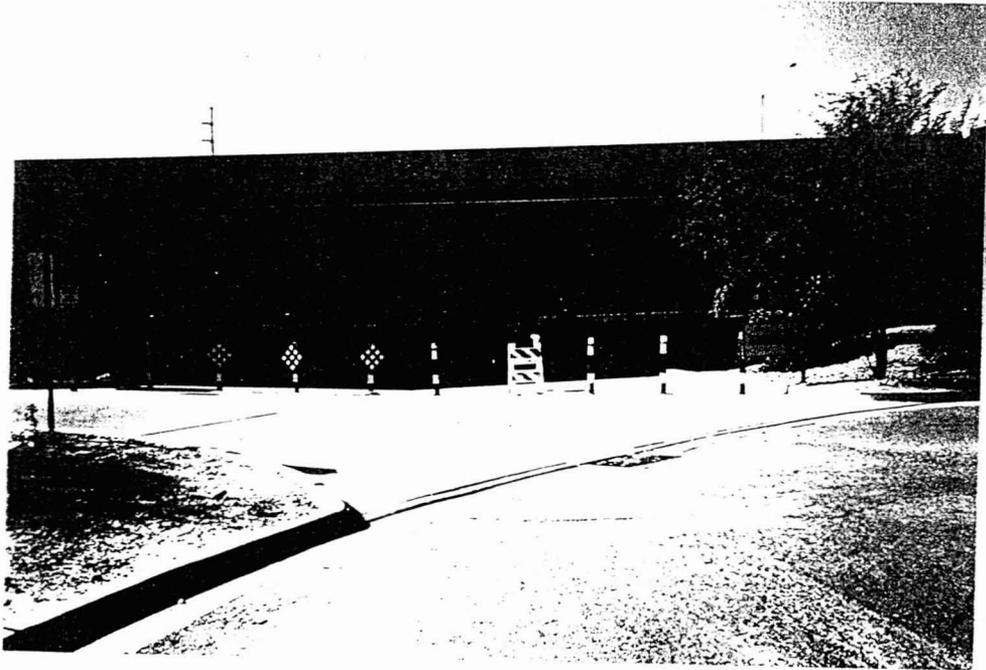


FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY		INCREASE
						(FEET NGVD)		
Dreamy Draw Wash East A	0.04	250 <sup>2</sup>	-- <sup>3</sup>	-- <sup>3</sup>	1,242.0	1,242.0	1,242.9	0.9
Echo Canyon Wash A	0.23	400	750	7.9	1,258.7	1,258.7	1,258.7	0.0
B	0.37	200	680	8.8	1,264.3	1,264.3	1,264.6	0.3
C	0.51	150	1,432	4.1	1,271.7	1,271.7	1,272.7	1.0
D	0.71	180	1,466	4.0	1,278.0	1,278.0	1,278.8	0.8
E	1.04	210	1,501	3.9	1,293.1	1,293.1	1,293.5	0.4
F	1.19	180	1,169	5.0	1,298.0	1,298.0	1,298.3	0.3
G	1.43	150	635	7.8	1,308.4	1,308.4	1,308.9	0.5
H	1.49	150	377	11.9	1,310.2	1,310.2	1,310.7	0.5
I	1.54	150	734	6.1	1,314.4	1,314.4	1,314.4	0.0
J	1.60	150	774	5.8	1,316.1	1,316.1	1,316.1	0.0
K	1.71	150	729	6.2	1,317.6	1,317.6	1,318.0	0.4
L	1.86	150	451	8.0	1,321.9	1,321.9	1,322.8	0.9
M	2.02	150	609	4.9	1,327.5	1,327.5	1,327.5	0.0
Flynn Lane Wash A	0.05	350	-- <sup>3</sup>	-- <sup>3</sup>	1,244.3	1,244.3	1,244.7	0.4
B	0.21	250	-- <sup>3</sup>	-- <sup>3</sup>	1,259.8	1,259.8	1,259.9	0.1
C	0.34	200	-- <sup>3</sup>	-- <sup>3</sup>	1,272.5	1,272.5	1,273.0	0.5
D	0.53	400	-- <sup>3</sup>	-- <sup>3</sup>	1,290.1	1,290.1	1,291.1	1.0

<sup>1</sup>Miles Above Mouth  
<sup>3</sup>Data Not Available

<sup>2</sup>Combined Floodway for Dreamy Draw Wash East and Myrtle Avenue Wash





SPILLWAY INTO ACDC



OCOTILLO ROAD  
(INVERTED CROWN)



FLYNN LANE WASH (TYPICAL)

Job No. MARI0011 Sht. 1 of 1  
 Calc. Peri M Chk. \_\_\_\_\_ B'chk. \_\_\_\_\_  
 Date 4-12-96 Date \_\_\_\_\_ Date \_\_\_\_\_

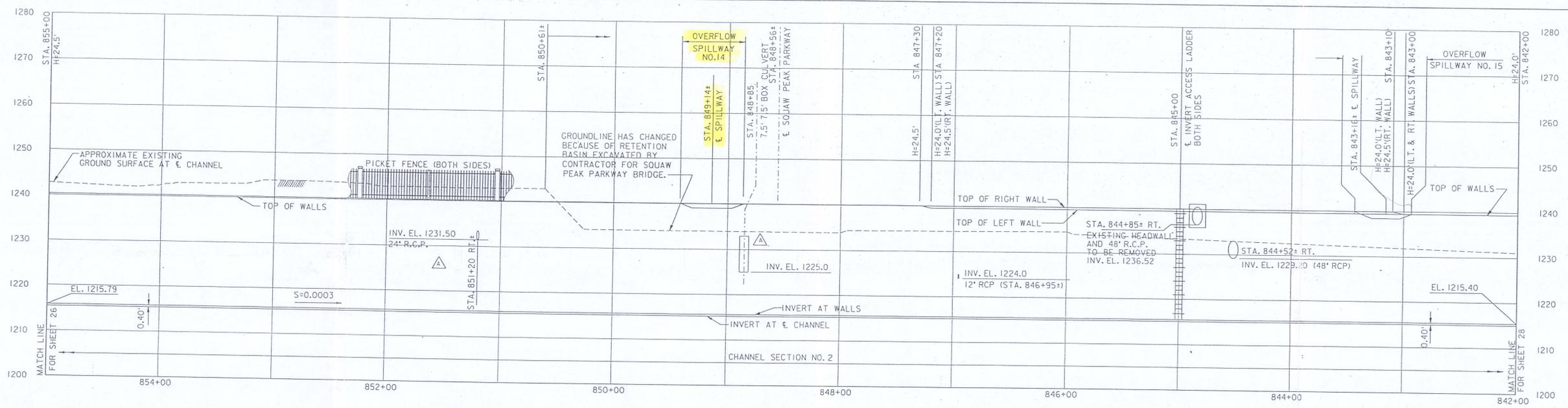
Project Weir Calculations for spillways into ACDC

Station from Construction Plans	Station used in Revised HEC-2 model		Elevation @ top of wall of ACDC	
848+86.5	1648.5		1240.11	} Portion within floodplain
848+96.5	1638.5	Spillway #1	1239.11	
849+31.5	1603.5		1239.11	
849+41.5	1593.5		1240.12	
856+07	928		1240.32	
856+17	918	Spillway #2	1239.33	
856+43	892		1239.33	
856+53	882		1240.34	
861+40	395		1240.48	
861+50	385		1239.49	
861+70	365		1239.49	
861+80	355		1240.49	
865+05	30		1240.59	
865+15	20		1239.59	
865+25	10		1239.59	
865+35	0		1240.60	

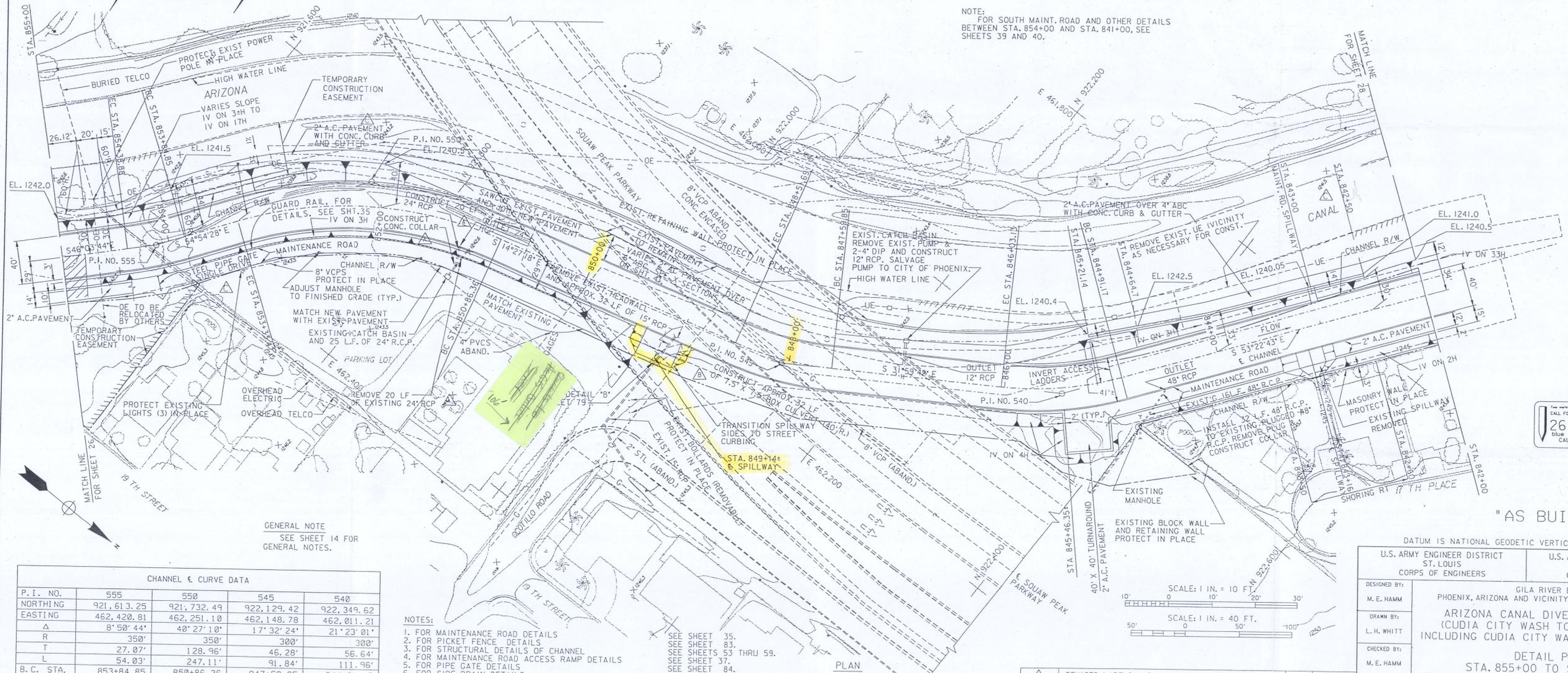
$$Q = C L H^{3/2} \quad (C = 3)$$

WS EL	Q Spillway #14	Q Spillway #13	Q total	Starting WS EL
1240.12	165	97	262	
1240.32	309	136	445	
1240.4	406	231	637	
1240.5	522	332	854	
1240.6	653	602	1255	
1240.7	795	843	1638	$Q_{100} = 1700 @ 1240.7$
1240.8	947	1116	2063	





NOTE:  
 FOR SOUTH MAINT. ROAD AND OTHER DETAILS  
 BETWEEN STA. 854+00 AND STA. 841+00, SEE  
 SHEETS 39 AND 40.



**CHANNEL & CURVE DATA**

P. I. NO.	555	550	545	540
NORTHING	921, 613.25	921, 732.49	922, 129.42	922, 349.62
EASTING	462, 420.81	462, 251.10	462, 148.78	462, 011.21
Δ	8° 50' 44"	40° 27' 10"	17° 32' 24"	21° 23' 01"
R	350'	350'	300'	300'
T	27.07'	128.96'	46.28'	56.64'
L	54.03'	247.11'	91.84'	111.96'
B. C. STA.	853+84.85	850+86.36	847+59.85	844+91.17
E. C. STA.	854+38.88	853+33.47	848+51.69	846+03.13

- NOTES:**
- FOR MAINTENANCE ROAD DETAILS
  - FOR PICKET FENCE DETAILS
  - FOR STRUCTURAL DETAILS OF CHANNEL
  - FOR MAINTENANCE ROAD ACCESS RAMP DETAILS
  - FOR PIPE GATE DETAILS
  - FOR SIDE DRAIN DETAILS
  - FOR OVERFLOW AND MAINT. RD. SPILLWAY DETAILS
  - FOR SCOUR GAGE DETAILS
  - FOR SOJAW PEAK PARKWAY BRIDGE PROFILE DETAILS
  - FOR MANHOLE ADJUSTMENT DETAILS

- SEE SHEET 35.  
 SEE SHEET 83.  
 SEE SHEETS 53 THRU 59.  
 SEE SHEET 37.  
 SEE SHEET 84.  
 SEE SHEETS 79 & 80.  
 SEE SHEETS 76 & 77.  
 SEE SHEET 45.  
 SEE SHEET 47.  
 SEE SHEET 87.

**REVISIONS**

SYMBOL	DESCRIPTIONS	DATE	APPROVAL
△	REVISED LABELS AND ADDED PIPE GATE	7/13/99	CEP
△	REVISED SIDE DRAIN	8-23-90	/S/C.W.F.
△	REVISED SIDE DRAIN	8-17-90	/S/C.J.D.

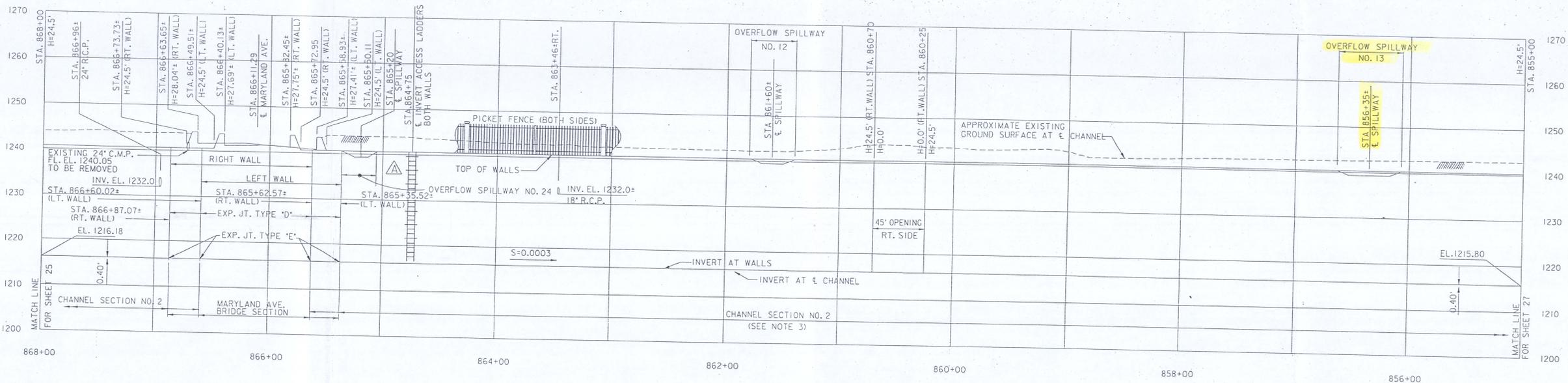
"AS BUILT"

DATUM IS NATIONAL GEODETIC VERTICAL DATUM OF 1929

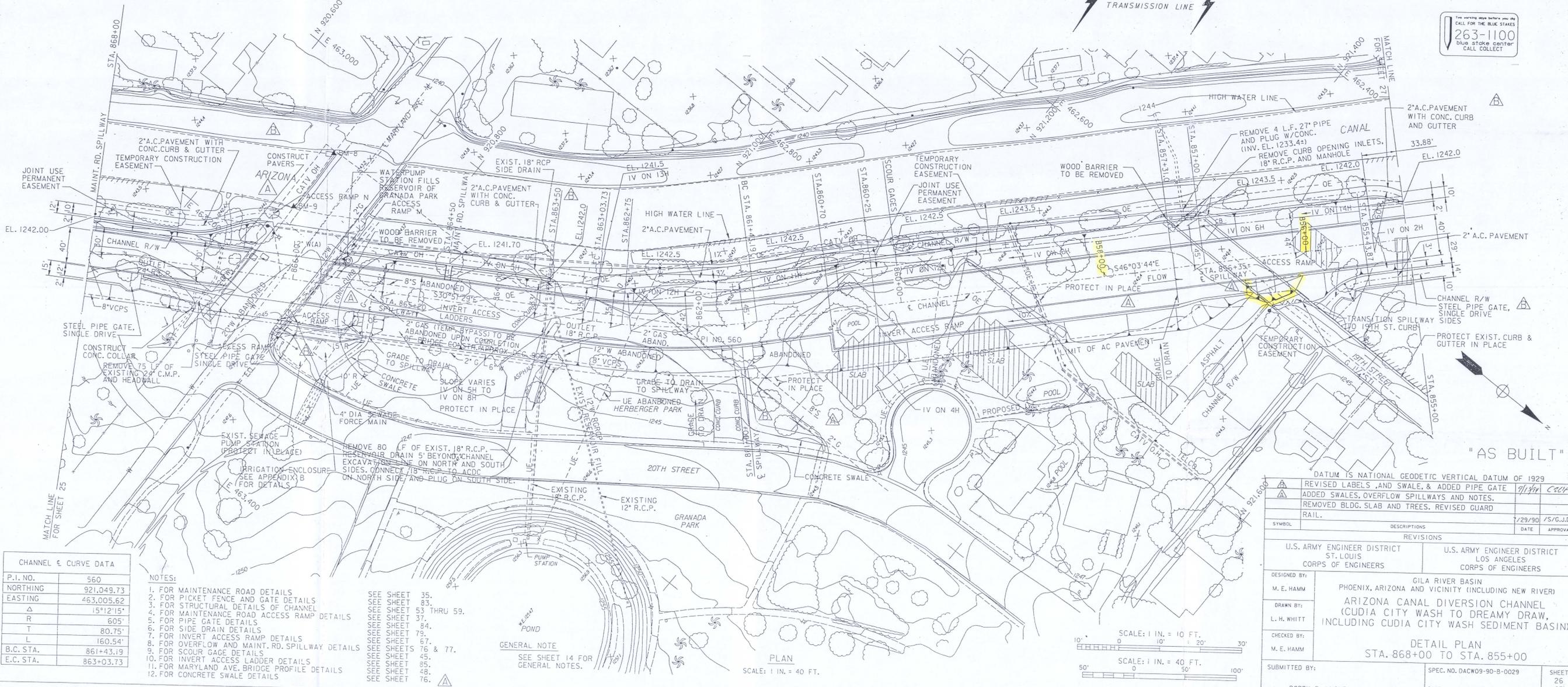
U.S. ARMY ENGINEER DISTRICT ST. LOUIS CORPS OF ENGINEERS	U.S. ARMY ENGINEER DISTRICT LOS ANGELES CORPS OF ENGINEERS
DESIGNED BY: M. E. HAMM	GILA RIVER BASIN PHOENIX, ARIZONA AND VICINITY (INCLUDING NEW RIVER)
DRAWN BY: L. H. WHITT	ARIZONA CANAL DIVERSION CHANNEL (CUDIA CITY WASH TO DREAMY DRAW, INCLUDING CUDIA CITY WASH SEDIMENT BASIN)
CHECKED BY: M. E. HAMM	DETAIL PLAN STA. 855+00 TO STA. 842+00
SUBMITTED BY: BOBBY R. HUGHEY CHIEF DESIGN BRANCH ST. LOUIS DISTRICT	SHEET 21 OF 90 SHEETS

263-1100  
Blue stake center  
CALL COLLECT

SCALE: 1 IN. = 10 FT.  
 SCALE: 1 IN. = 40 FT.



263-1100  
 BLUE STAKE CENTER  
 CALL COLLECT



CHANNEL & CURVE DATA	
P.I. NO.	560
NORTHING	921,049.73
EASTING	463,005.62
Δ	15°12'15"
R	605'
T	80.75'
L	160.54'
B.C. STA.	861+43.19
E.C. STA.	863+03.73

- NOTES:**
- FOR MAINTENANCE ROAD DETAILS SEE SHEET 35.
  - FOR PICKET FENCE AND GATE DETAILS SEE SHEET 83.
  - FOR STRUCTURAL DETAILS OF CHANNEL SEE SHEET 53 THRU 59.
  - FOR MAINTENANCE ROAD ACCESS RAMP DETAILS SEE SHEET 37.
  - FOR PIPE GATE DETAILS SEE SHEET 84.
  - FOR SIDE DRAIN DETAILS SEE SHEET 79.
  - FOR INVERT ACCESS RAMP DETAILS SEE SHEETS 67, 76 & 77.
  - FOR OVERFLOW AND MAINT. RD. SPILLWAY DETAILS SEE SHEET 45.
  - FOR SCOUR GAGE DETAILS SEE SHEET 85.
  - FOR INVERT ACCESS LADDER DETAILS SEE SHEET 48.
  - FOR MARYLAND AVE. BRIDGE PROFILE DETAILS SEE SHEET 76.
  - FOR CONCRETE SWALE DETAILS SEE SHEET 76.

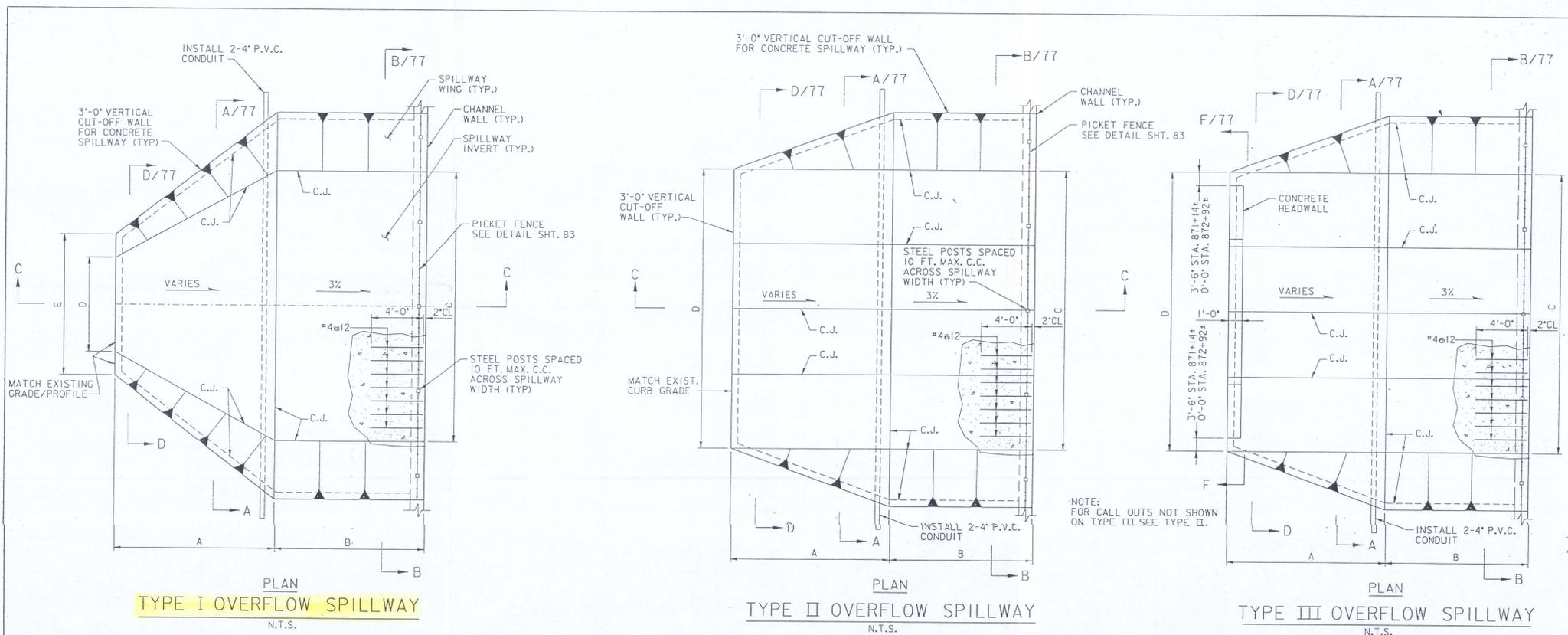
**GENERAL NOTE**  
 SEE SHEET 14 FOR GENERAL NOTES.

REVISIONS	
SYMBOL	DESCRIPTIONS
Δ	REVISED LABELS, AND SWALE, & ADDED PIPE GATE
+	ADDED SWALES, OVERFLOW SPILLWAYS AND NOTES.
○	REMOVED BLDG. SLAB AND TREES. REVISED GUARD RAIL.
DATE	APPROVAL
7/23/90	/S/G./J.D.

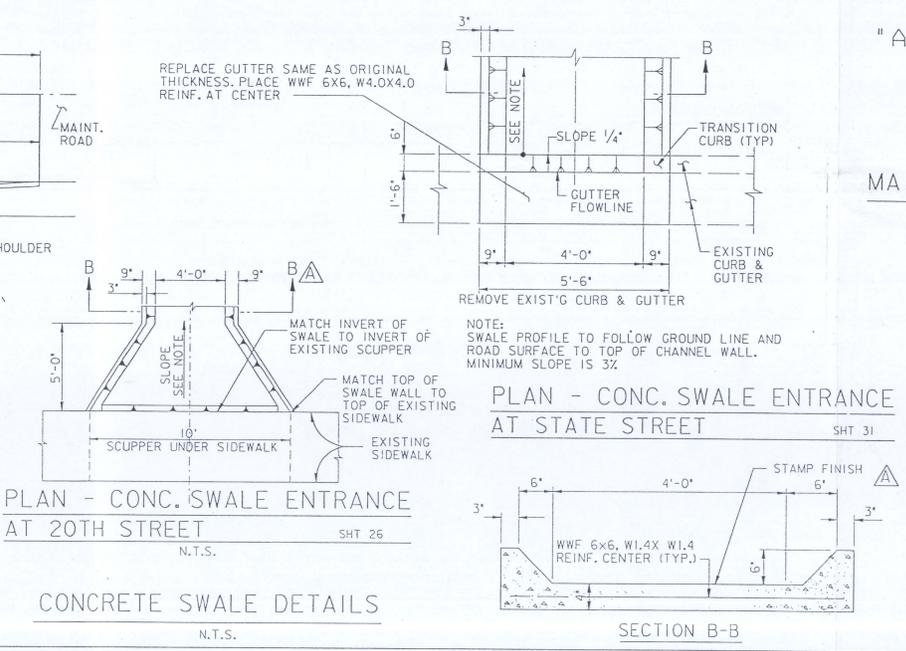
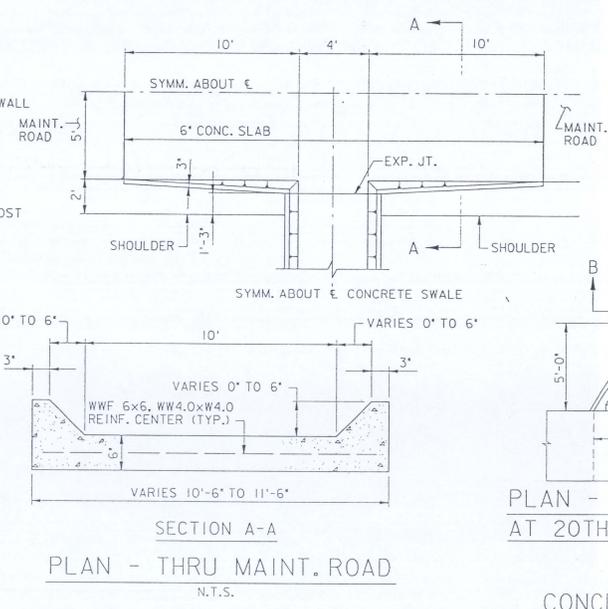
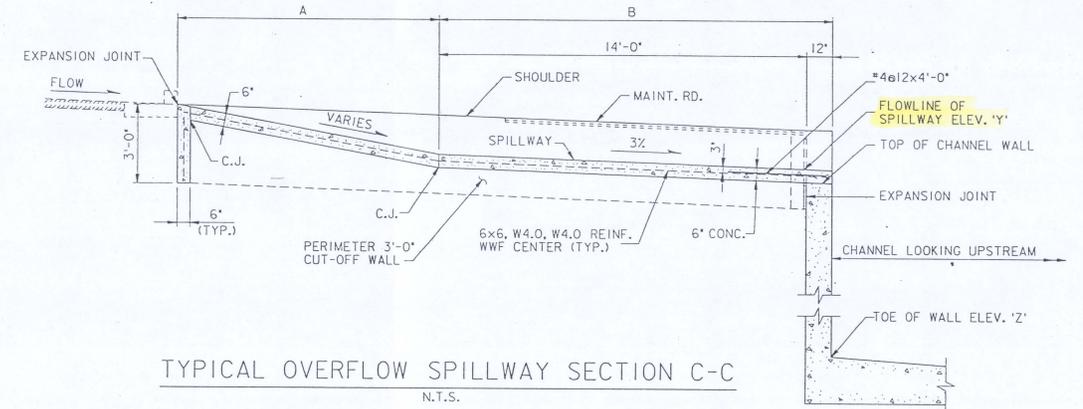
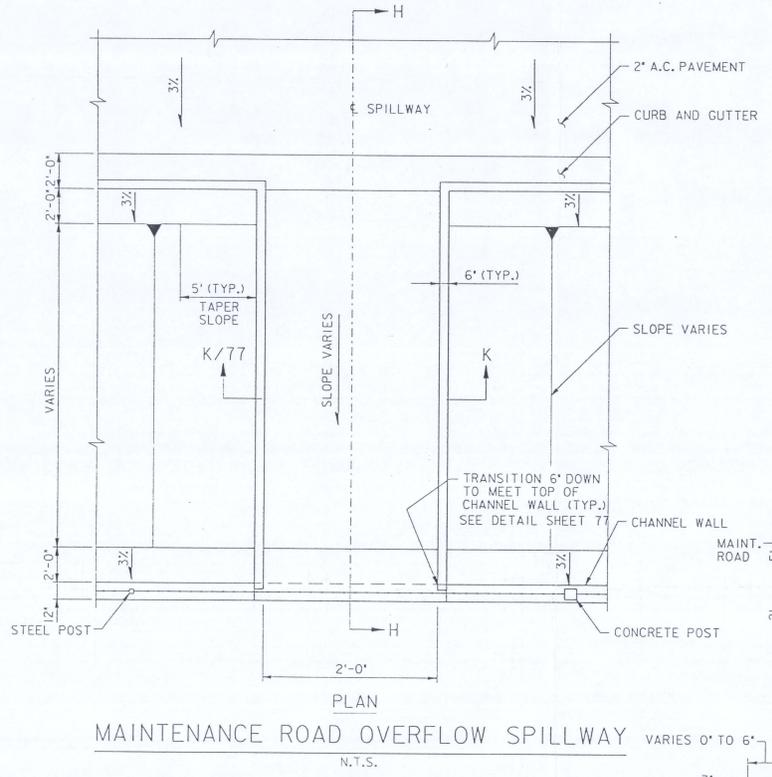
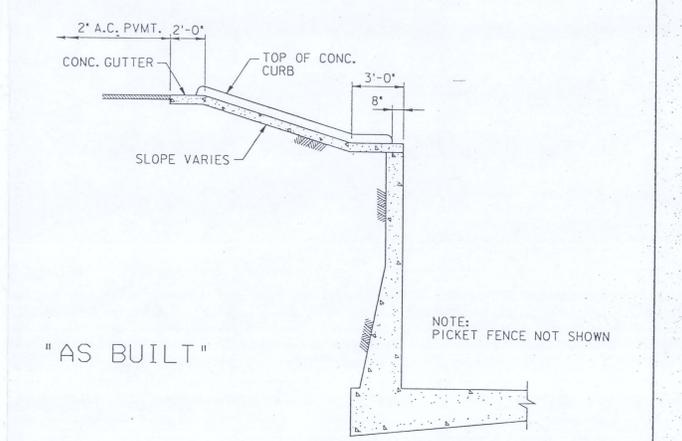
DESIGNED BY: M. E. HAMM	U.S. ARMY ENGINEER DISTRICT ST. LOUIS CORPS OF ENGINEERS	U.S. ARMY ENGINEER DISTRICT LOS ANGELES CORPS OF ENGINEERS
DRAWN BY: L. H. WHITT	GILA RIVER BASIN PHOENIX, ARIZONA AND VICINITY (INCLUDING NEW RIVER) ARIZONA CANAL DIVERSION CHANNEL (CUDIA CITY WASH TO DREAMY DRAW, INCLUDING CUDIA CITY WASH SEDIMENT BASIN)	
CHECKED BY: M. E. HAMM	DETAIL PLAN STA. 868+00 TO STA. 855+00	
SUBMITTED BY: BOBBY R. HUGHEY CHIEF DESIGN BRANCH ST. LOUIS DISTRICT	SPEC. NO. DACW09-90-8-0029	SHEET 26 OF 90 SHEETS

"AS BUILT"



OVERFLOW SPILLWAY TABULATION										
SPILLWAY No.	LOCATION SHT No.	E. STA.	TYPE	DIST. A	DIST. B	DIST. C	DIST. D	DIST. E	ELEV. Y	ELEV. Z
2	16	995+25±	II	7	15	20	20	-	1246.29	1225.79
3	17	983+13±	II	10	15	25	25	-	1244.82	1224.82
4	17	977+56±	II	10	15	35	35	-	1245.37	1224.37
5	20	945+32±	II	10	15	40	40	-	1242.80	1221.80
6	24	883+20±	II	15	10	70	53	-	1240.33	1216.83
7	25	878+48±	II	10	15	20	12	-	1239.99	1216.49
8	25	876+23±	II	10	15	20	20	-	1239.93	1216.43
9	25	872+92±	III	10	15	20	5	-	1239.83	1216.33
10	25	871+14±	III	10	15	20	16	-	1239.77	1216.27
11	25	868+60±	II	10	15	28	28	-	1239.70	1216.20
12	26	861+60±	I	10	15	20	4	-	1239.49	1215.99
13	26	856+35±	I	10	15	36	28	32	1239.33	1215.83
14	27	849+14±	I	10	15	35	35	37	1239.11	1215.61
15	27	843+16±	I	12	15	25	5	9	1238.43	1215.43
16	28	839+00±	I	5	15	25	3	14	1238.31	1215.31
17	28	835+25±	I	7	15	25	2	15	1238.20	1215.20
18	29	824+82±	I	10	15	20	4	8	1237.88	1214.88
19	29.30	814+00±	II	8-14	15	280	280	-	1236.06	1214.56
20	30	810+32±	II	6	15	20	20	-	1236.95	1214.45
21	30	807+25±	II	4	15	30	30	-	1236.36	1214.36
22	31	800+99±	I	10	15	88	36	40	1236.67	1214.17
23	31.32	791+94±	II	15	38	25	25	-	1235.00	1213.90
24	26	865+10±	I	10	15	10	4	-	1239.59	1216.09

- NOTES:
- FOR IRRIGATION SLEEVES UNDER SPILLWAYS SEE LANDSCAPE PLANS AND PROJECT SPECIFICATIONS.
  - THE CONTRACTION JOINT SPACING OF OVERFLOW SPILLWAY SHALL BE A UNIFORM MAXIMUM OF 10' CENTER-CENTER PARALLEL TO THE FLOWLINE, AND 20' MAXIMUM CENTER-CENTER PERPENDICULAR TO THE FLOWLINE.
  - FOR PURPOSE OF THIS SHEET ONLY C.J. MEANS CONTRACTION JOINT.
  - FOR GENERAL NOTES AND MISCELLANEOUS DETAILS --- SEE SHEET 45.



DATUM IS NATIONAL GEODETIC VERTICAL DATUM OF 1929

REVISIONS

SYMBOL	DESCRIPTIONS	DATE	APPROVAL
△	REVISED SPILLWAY, ADDED SPILLWAY, SWALE DETAIL, AND ADDED LABEL.	1/29/90	G.L.P.

DESIGNED BY: G. LEE  
 DRAWN BY: R.L. HOLT  
 CHECKED BY: G. LEE

U.S. ARMY ENGINEER DISTRICT ST. LOUIS CORPS OF ENGINEERS  
 U.S. ARMY ENGINEER DISTRICT LOS ANGELES CORPS OF ENGINEERS

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

ARIZONA CANAL DIVERSION CHANNEL  
 (CUDIA CITY WASH TO DREAMY DRAW, INCLUDING CUDIA CITY WASH SEDIMENT BASIN)

OVERFLOW SPILLWAY DETAILS

SUBMITTED BY: BOBBY R. HUCHEY  
 CHIEF DESIGN BRANCH ST. LOUIS DISTRICT

SPEC. NO. DACR09-90-B-0029  
 DISTRICT FILE NO. 252/915 REV'A

SHEET 76 OF 90 SHEETS





US Army Corps  
of Engineers  
Los Angeles District

## Gila River Basin

Phoenix, Arizona, and Vicinity  
(Including New River)

219



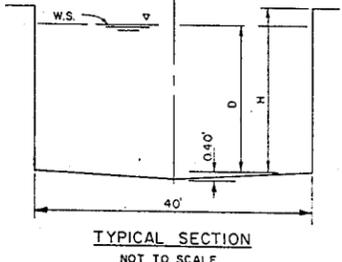
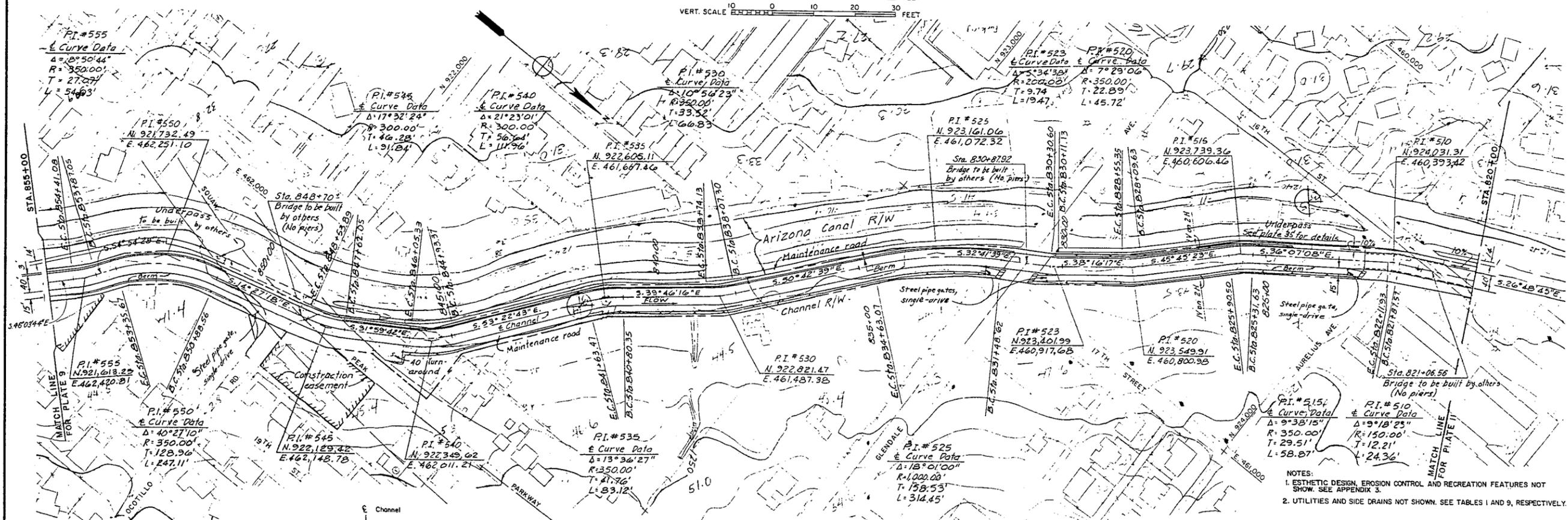
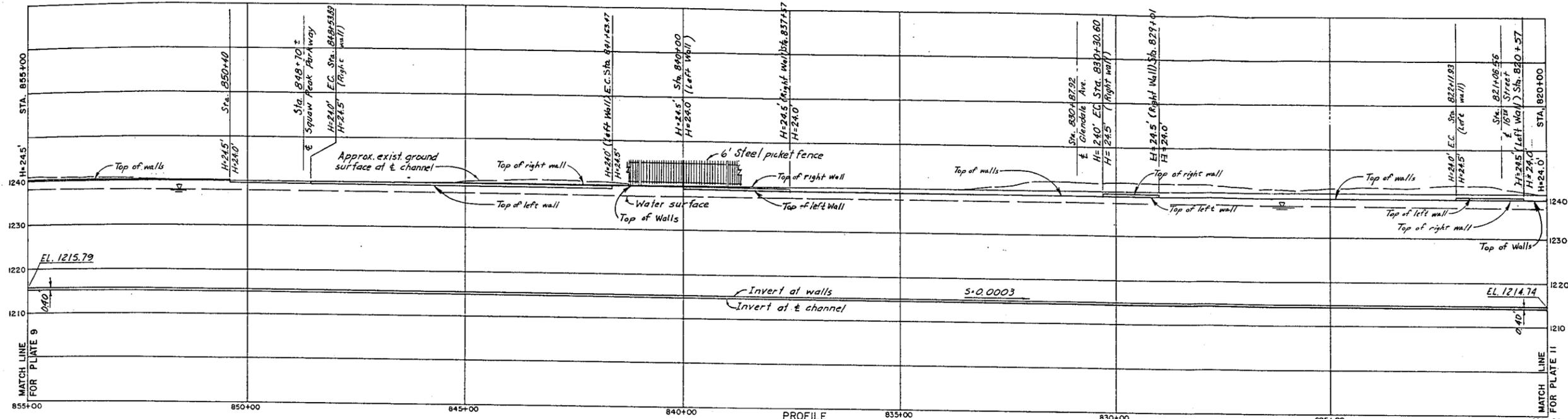
# Arizona Canal Diversion Channel

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

**FINAL**  
**April 1986**

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

# VALUE ENGINEERING PAYS



**HYDRAULIC ELEMENTS**

STATION TO STATION	SECTION	SLOPE	Q (cfs)	Dc (ft.)	K*0.07 ft.	K*0.02 ft.
				n	d'	Vel
855+00 854+15	RECT. b=40'	0.0003	8300	10.6	0.016	24.3
854+15 840+00	RECT. b=40'	0.0003	8700	11.0	0.015	24.0
840+00 821+07	RECT. b=40'	0.0003	8700	11.0	0.016	23.8
821+07 820+00	RECT. b=40'	0.0003	8700	11.0	0.016	23.7

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

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

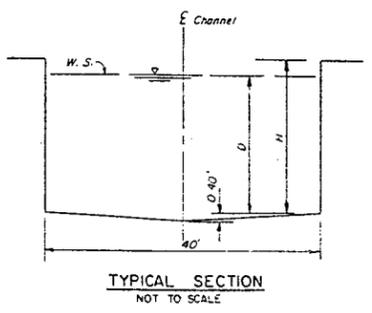
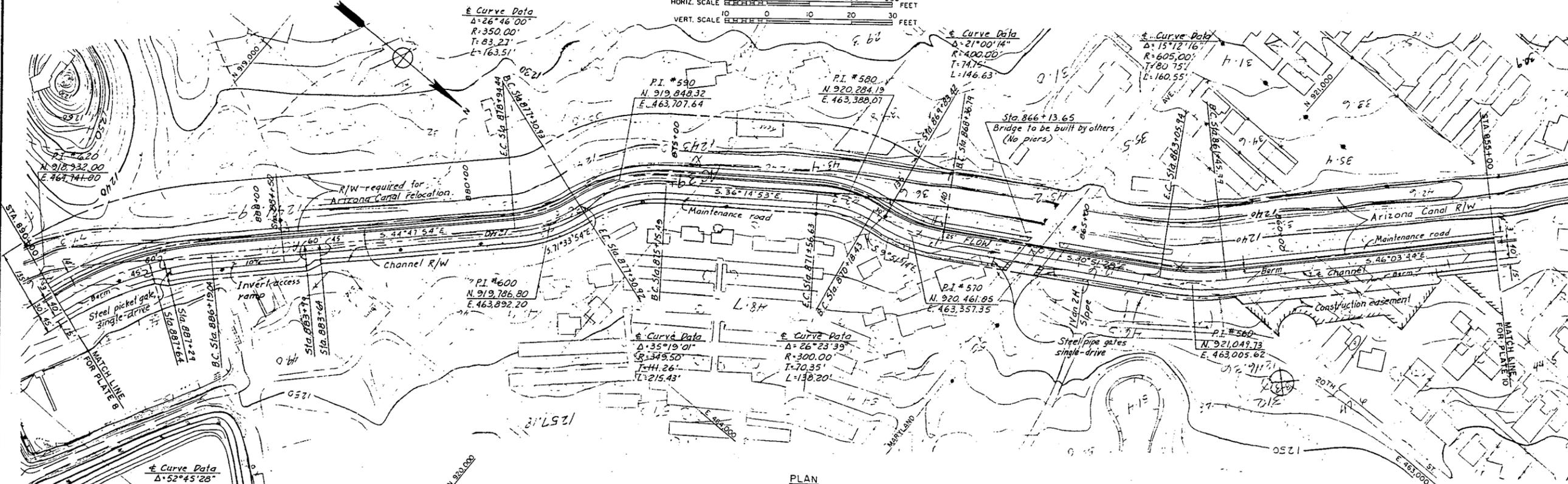
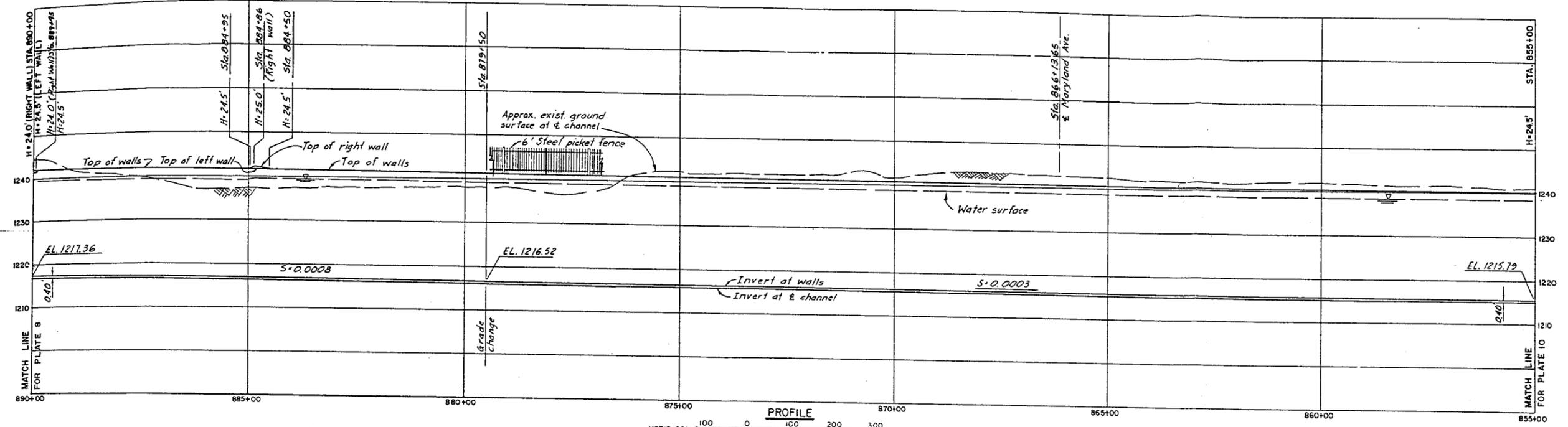
DATUM IS NATIONAL GEODETIC VERTICAL DATUM OF 1929  
GILA RIVER BASIN  
PHOENIX, ARIZONA AND VICINITY (INCLUDING NEW RIVER)  
ARIZONA CANAL DIVERSION CHANNEL

HYDRAULIC PLAN AND PROFILE  
STA. 855+00 TO STA. 820+00

U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT

# SAFETY PAYS

# VALUE ENGINEERING PAYS



**NOTES:**

- ESTHETIC DESIGN, EROSION CONTROL AND RECREATIONAL FEATURES NOT SHOWN, SEE APPENDIX 3.
- UTILITIES AND SIDE DRAINS NOT SHOWN, SEE TABLES 1 AND 9, RESPECTIVELY.

DATUM IS NATIONAL GEODETIC VERTICAL DATUM OF 1929

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

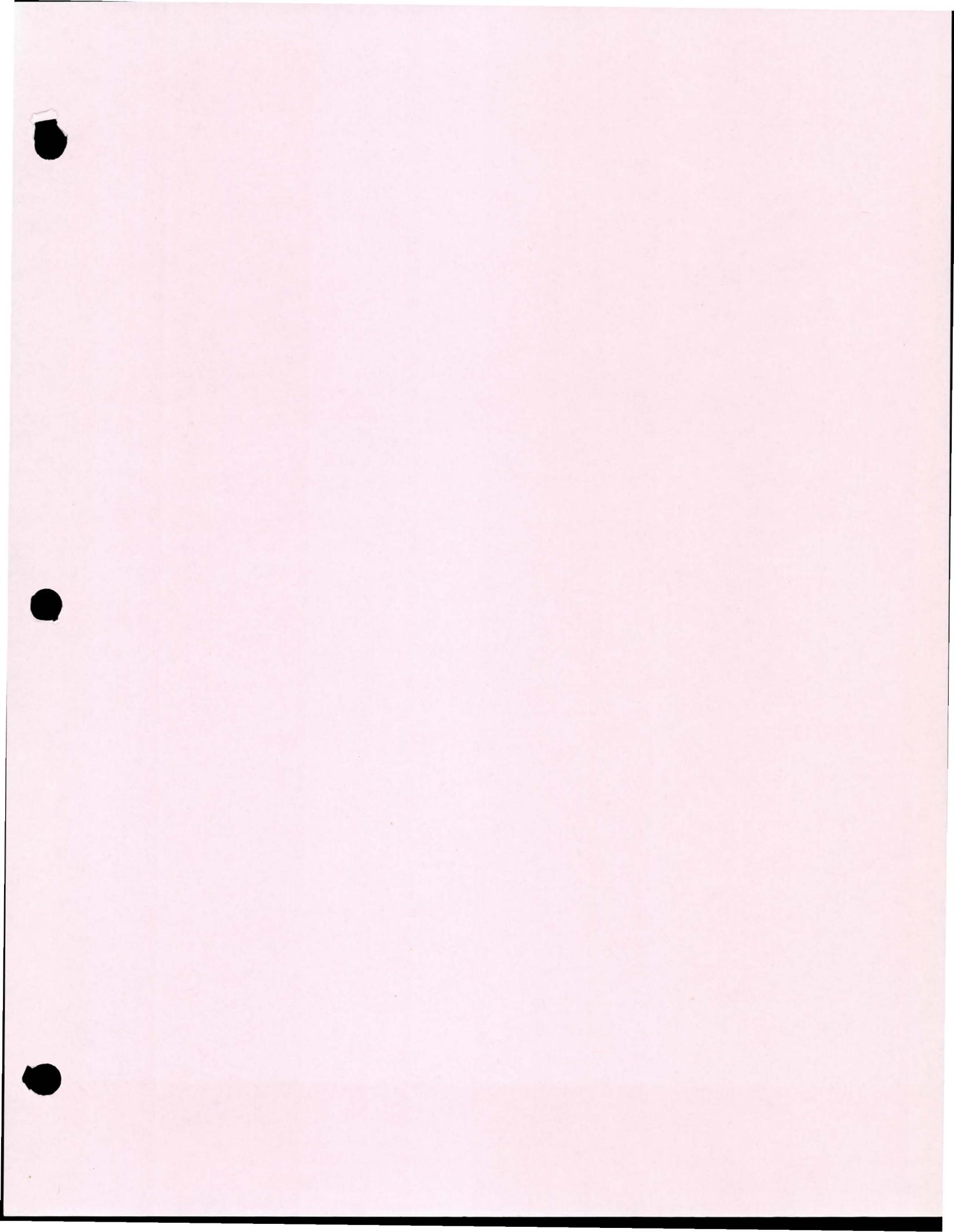
STATION TO STATION		SECTION	SLOPE	Q (cfs)	Dc (ft.)	K=0.007 ft.		K=0.02 ft.			
						n	σ <sup>2</sup>	Vel	n	σ <sup>2</sup>	Vel
890+00	879+50	RECT. b=40'	0.0008	8300	10.6	0.018	24.3	9.4	0.014	22.5	9.1
879+50	855+00	RECT. b=40'	0.0003	8300	10.6	0.016	24.3	8.4	0.014	22.7	9.0

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

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

**HYDRAULIC PLAN AND PROFILE**  
STA. 890+00 TO STA. 855+00

U.S. ARMY CORPS OF ENGINEERS  
LOS ANGELES DISTRICT





DEPARTMENT OF THE ARMY

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

FLOOD CONTROL DISTRICT RECEIVED	
SEP 26 1994	
CHENG	P & PM
DEP	HYDRO
ADMIN	LMGT
FINANCE	FILE
C & O	
ENGR	
REMARKS	

REPLY TO  
ATTENTION OF:

September 19, 1994

Office of the Chief  
Design Branch

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

NOTE:  
19 sheets NOT in  
full size set.

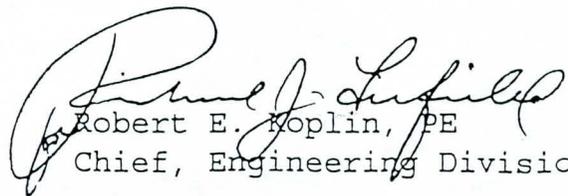
Dear Mr. Rerick:

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

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

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

Sincerely,

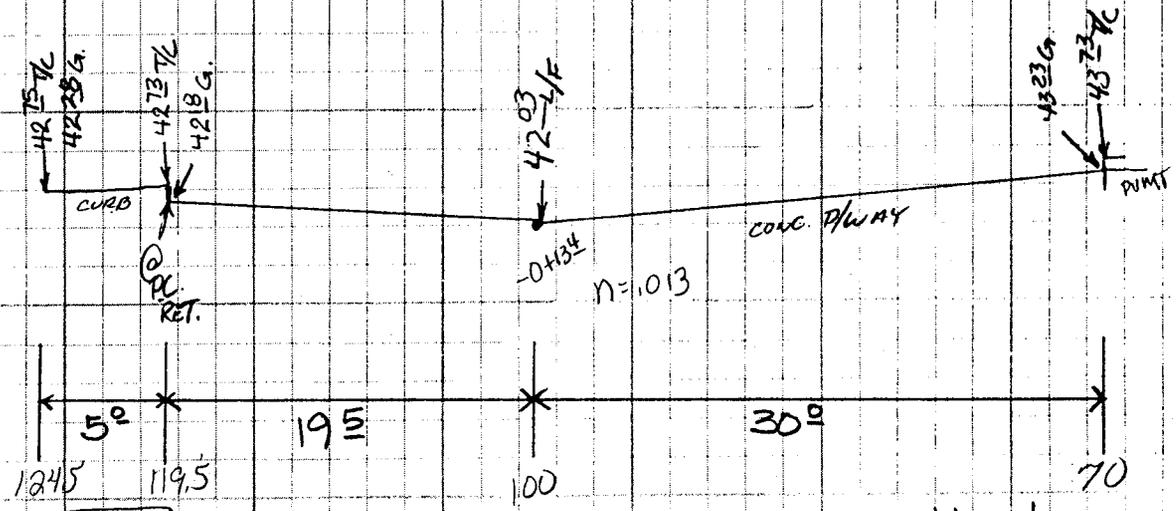
  
Robert E. Koplin, PE  
Chief, Engineering Division







HORIZ. PT. # 137



CROSS SECTION .01

FACING Upstream

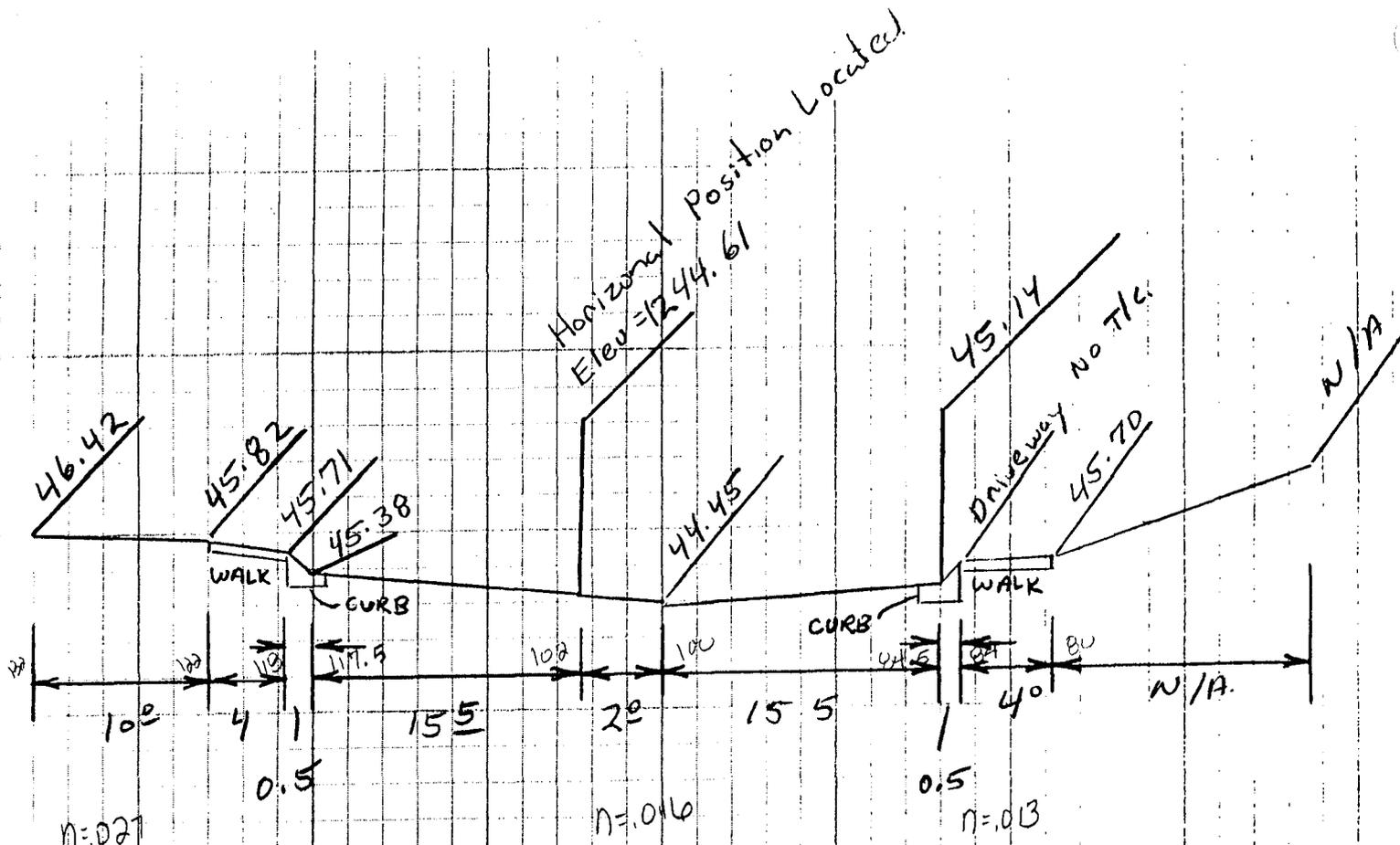










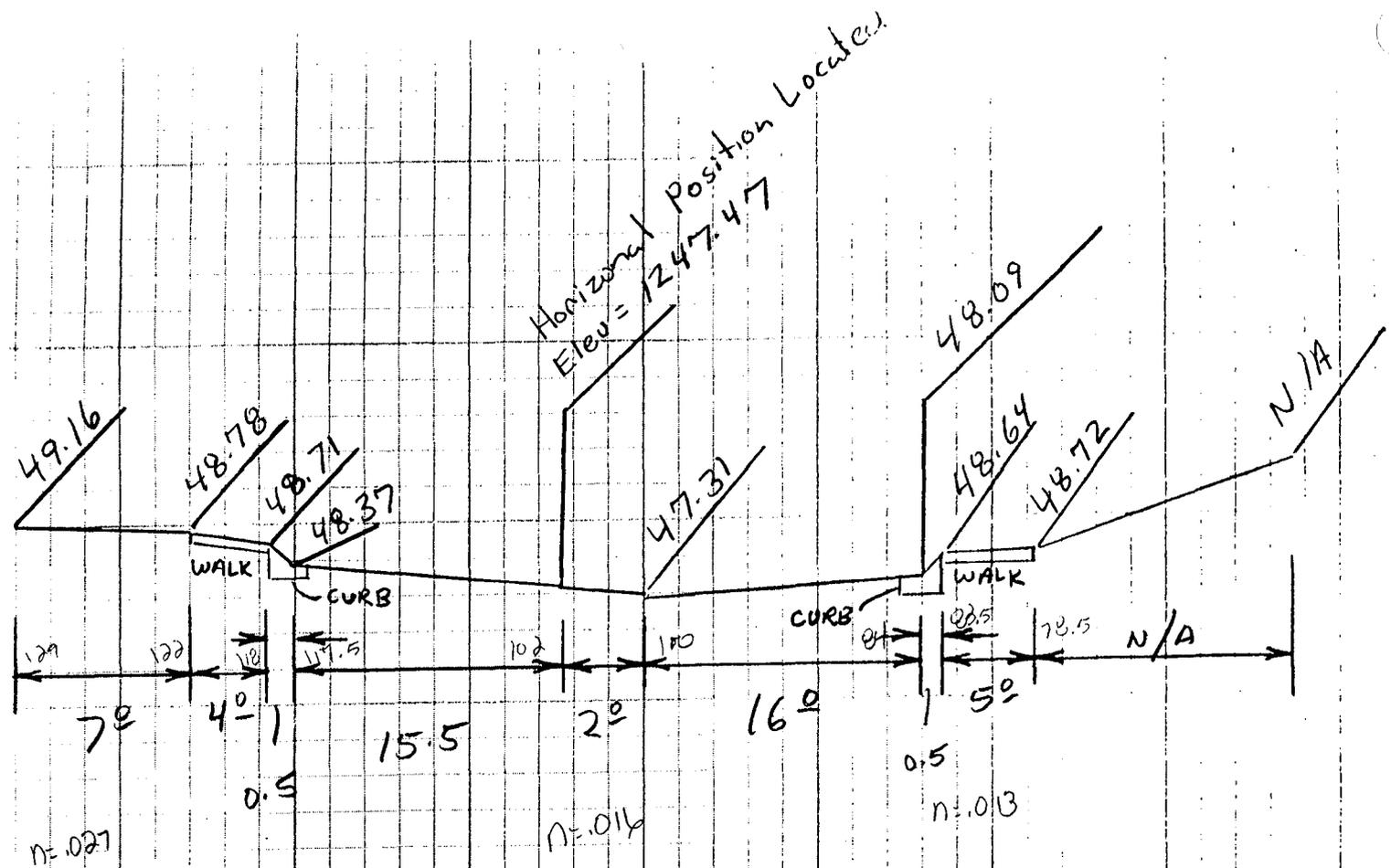


HORIZONTAL  
POINT  
NUMBER

# 3

X-Section Faces up stream  
CROSS SECTION 1055





HORIZONTAL  
POINT  
NUMBER  
# 4

X-Section Faces up stream  
CROSS SECTION 1080

1080

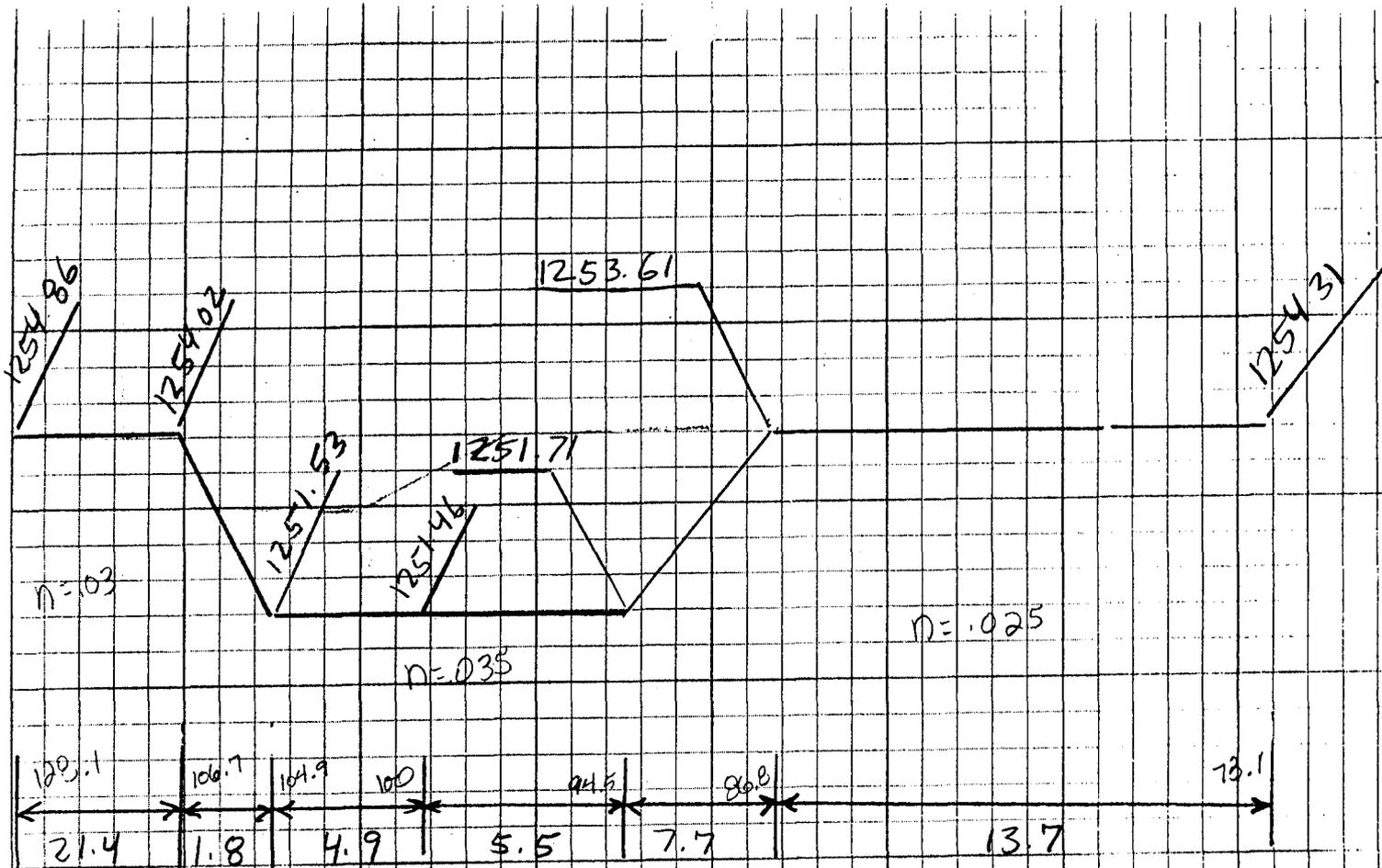












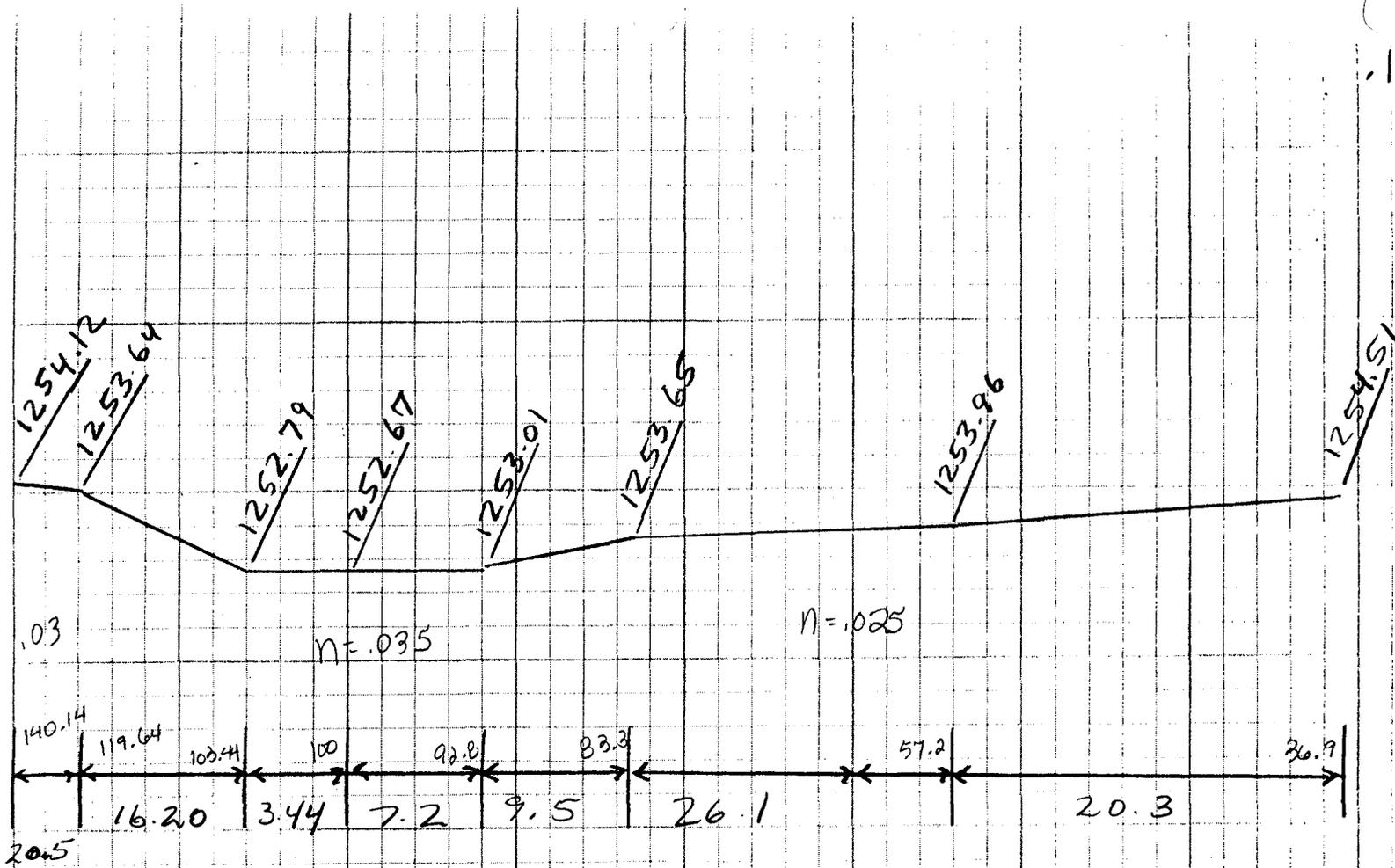
Horizontal Points

119 through 126

X-Section # 8

X-section Looking upstream  
CROSS SECTION 141





.158

HORIZONTAL POINTS

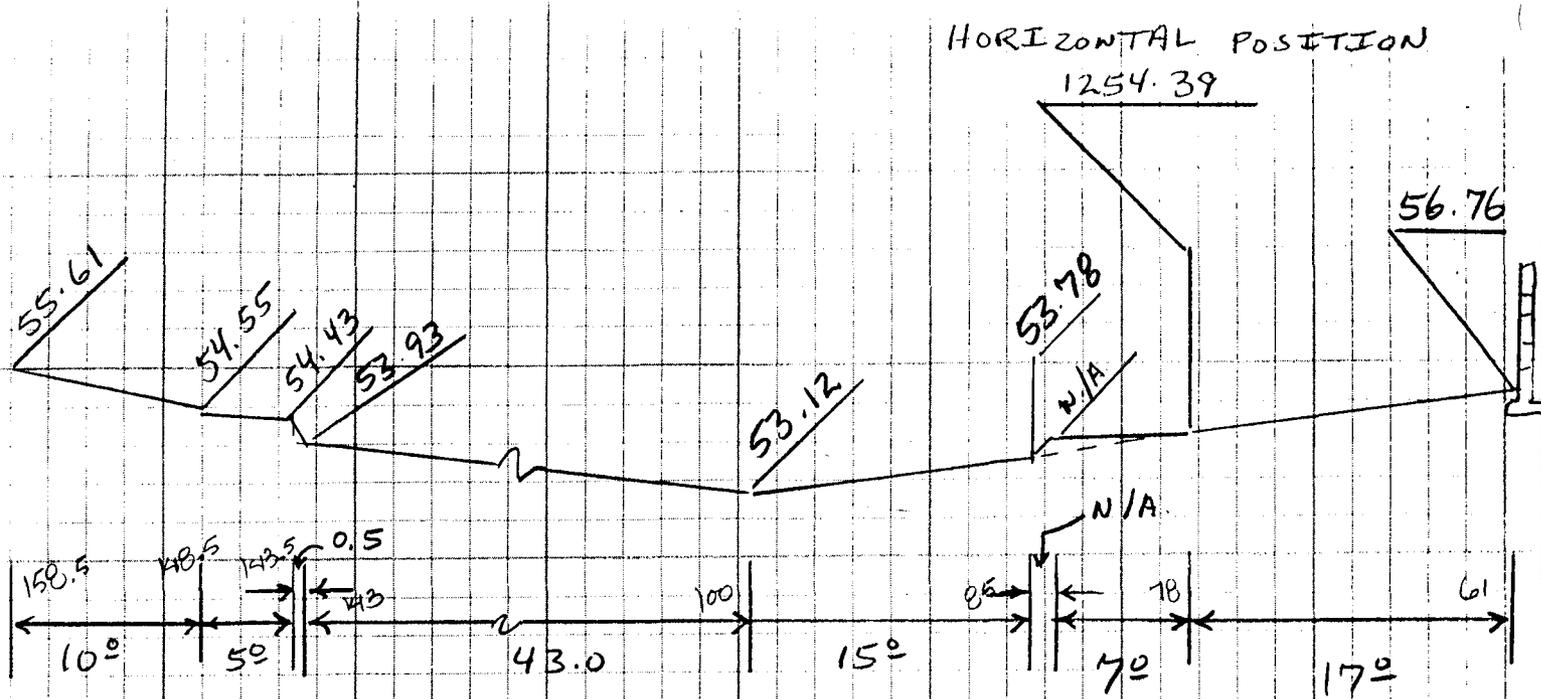
111 through 118

X-Section #9

X-SECTION LOOKING  
up stream.

CROSS SECTION .158

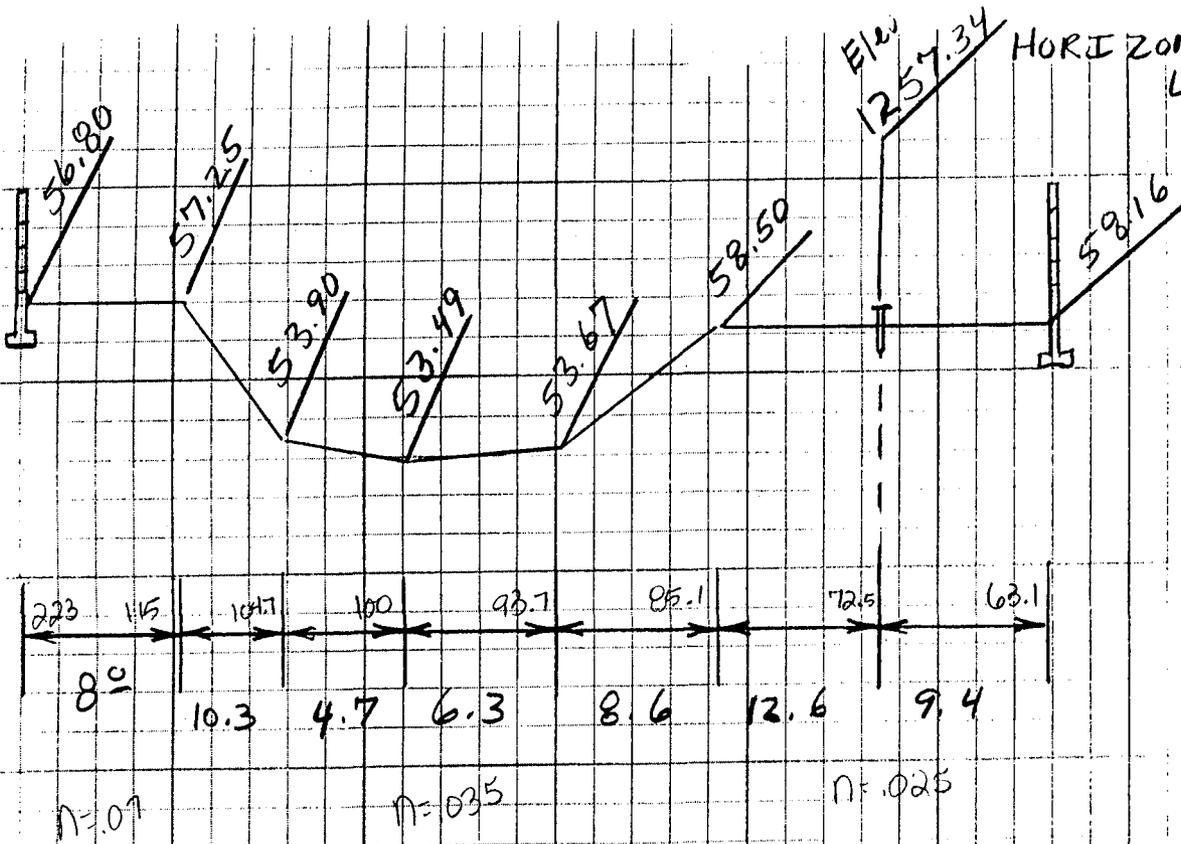




# 10

X Section Faces up-stream  
CROSS SECTION .171



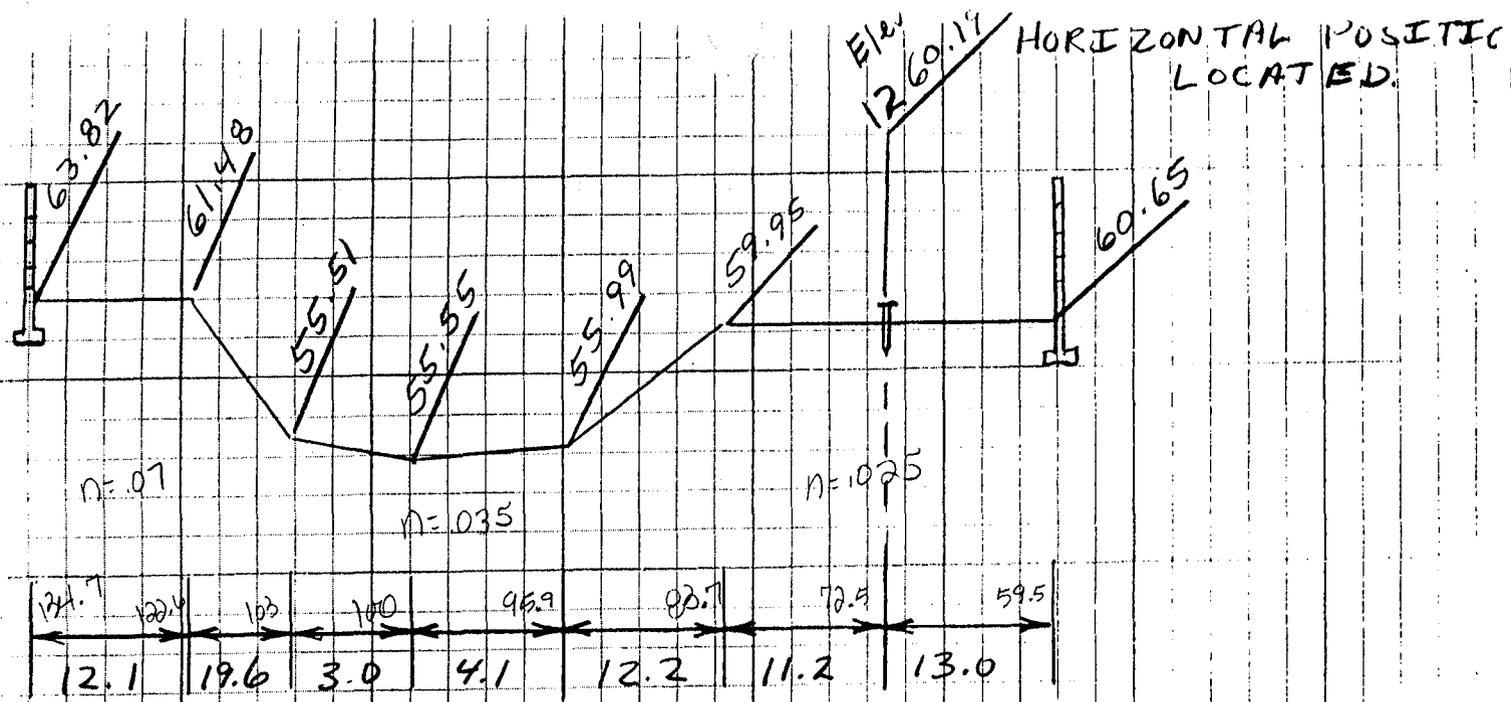


HORIZONTAL POINT NUMBER  
**11**

X-sections Face up-stream  
CROSS SECTION .188

.188





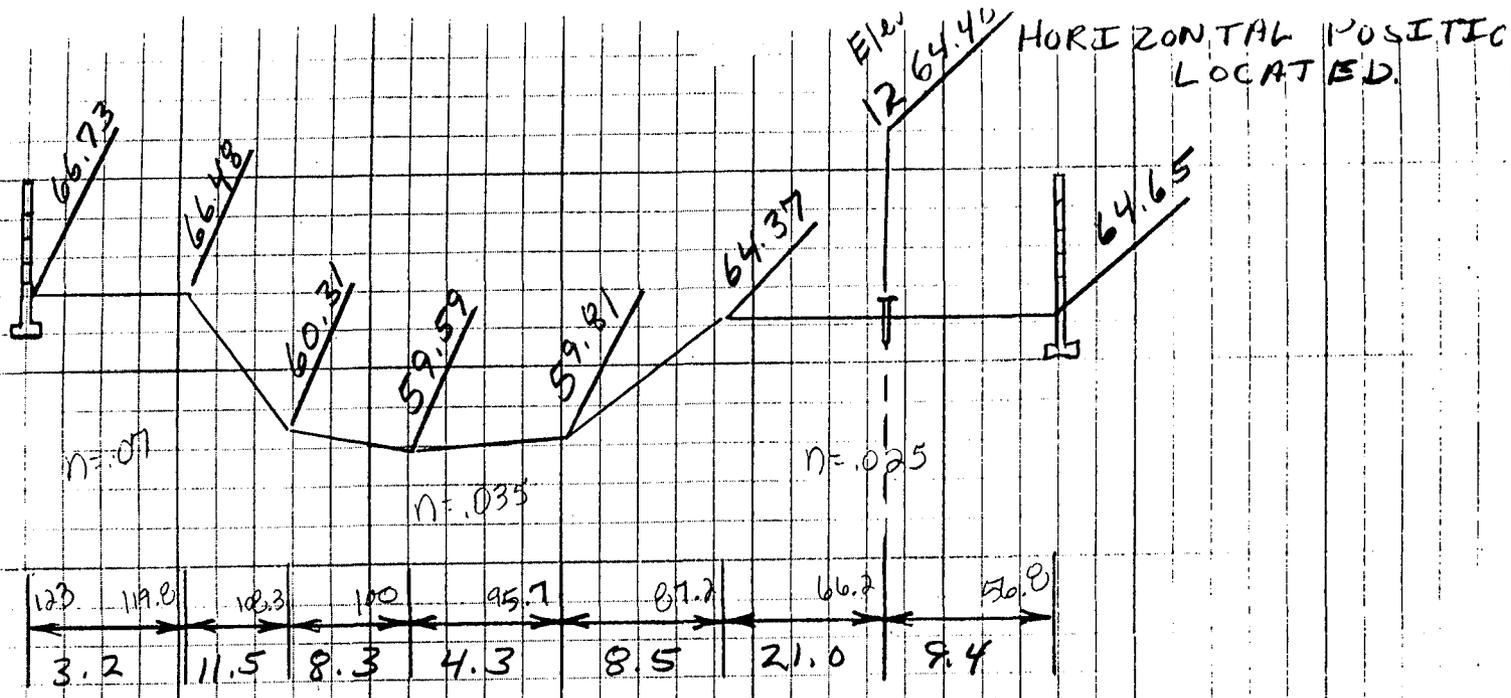
217

HORIZONTAL POINT NUMBER

12

X-Sections Face up-stream  
CROSS SECTION 217



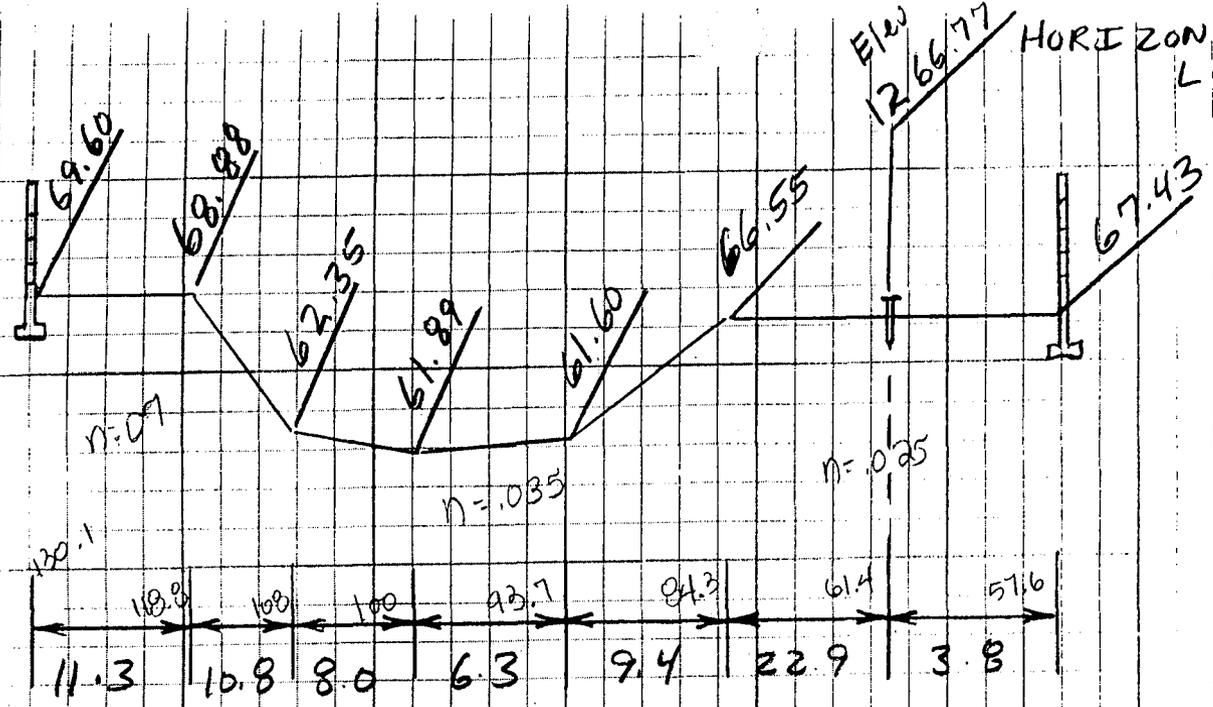


262

HORIZONTAL  
POINT  
NUMBER  
13

X-sections Face upstream  
CROSS SECTION 262





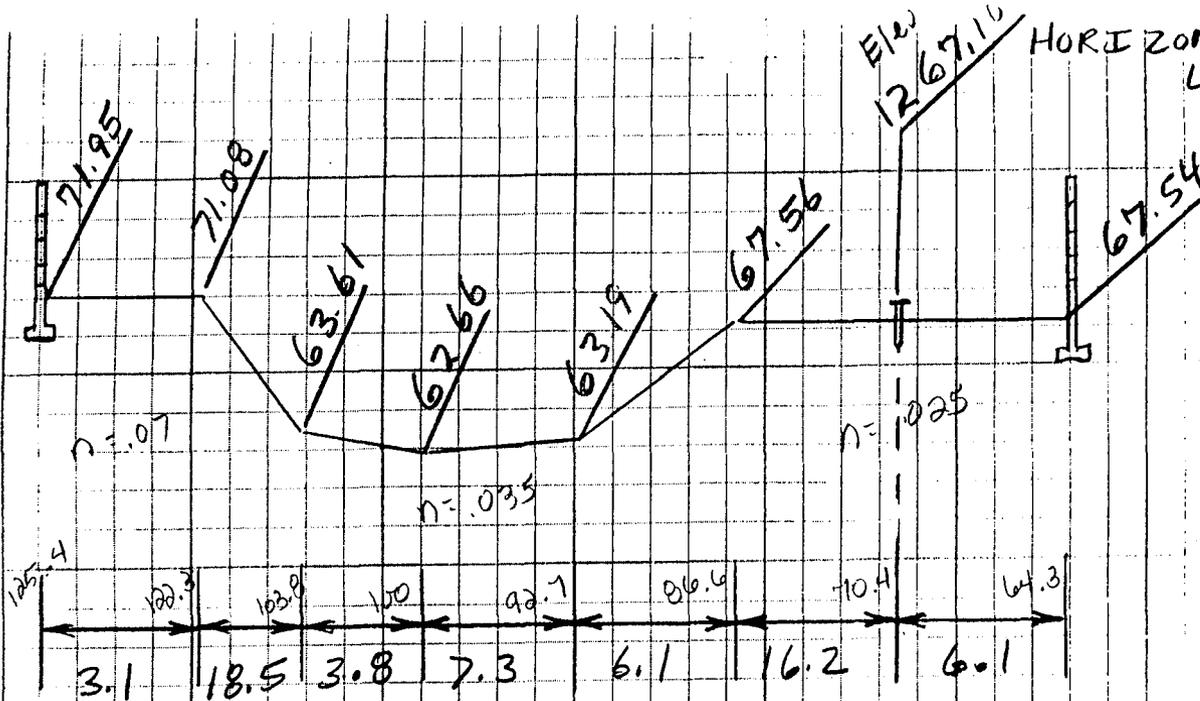
HORIZONTAL POINT NUMBER

**53 (14)**

X-sections Face up-stream  
 CROSS SECTION 287

287



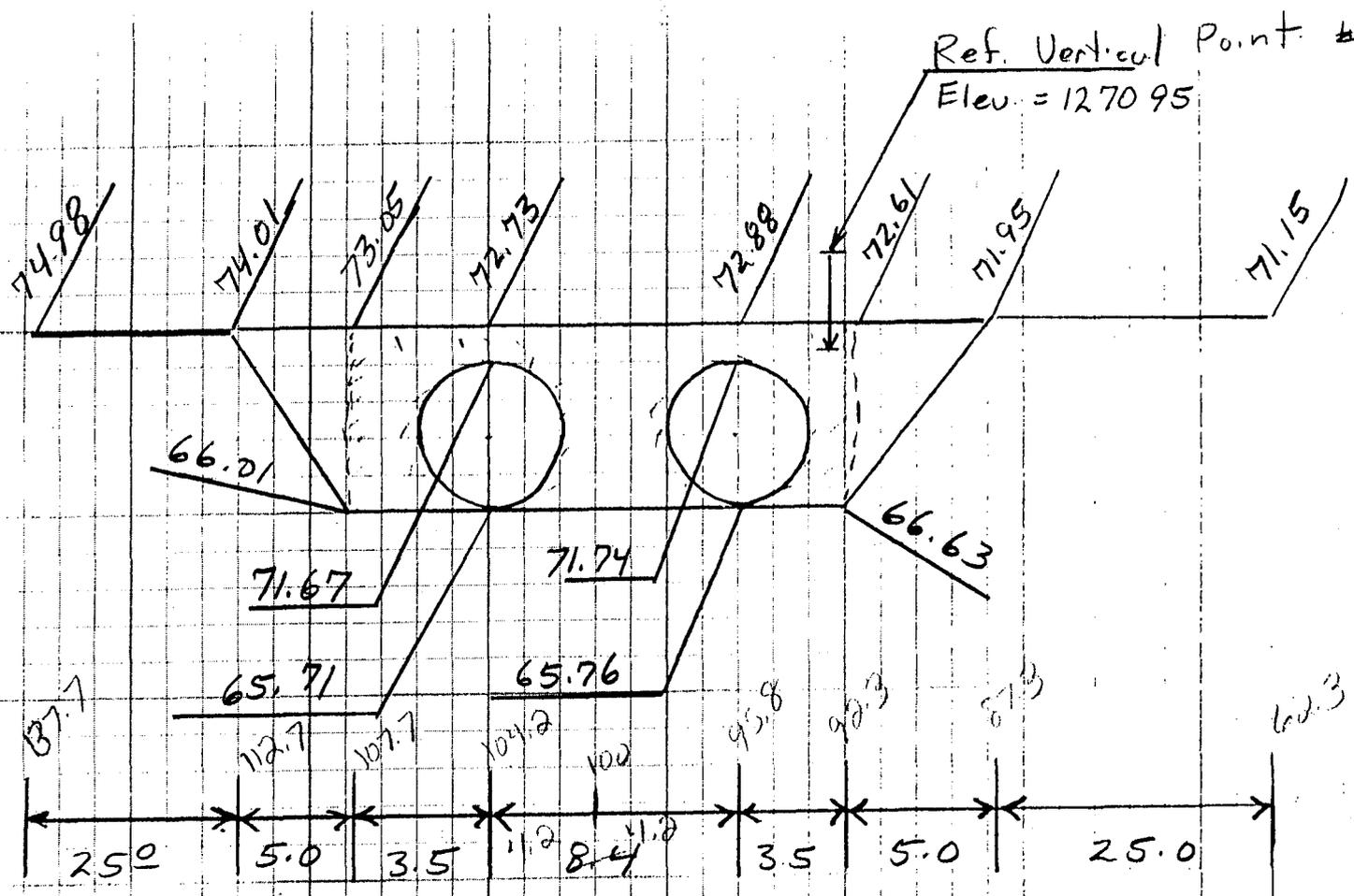


HORIZONTAL POINT NUMBER

15

X-sections Face up-stream  
CROSS SECTION 304





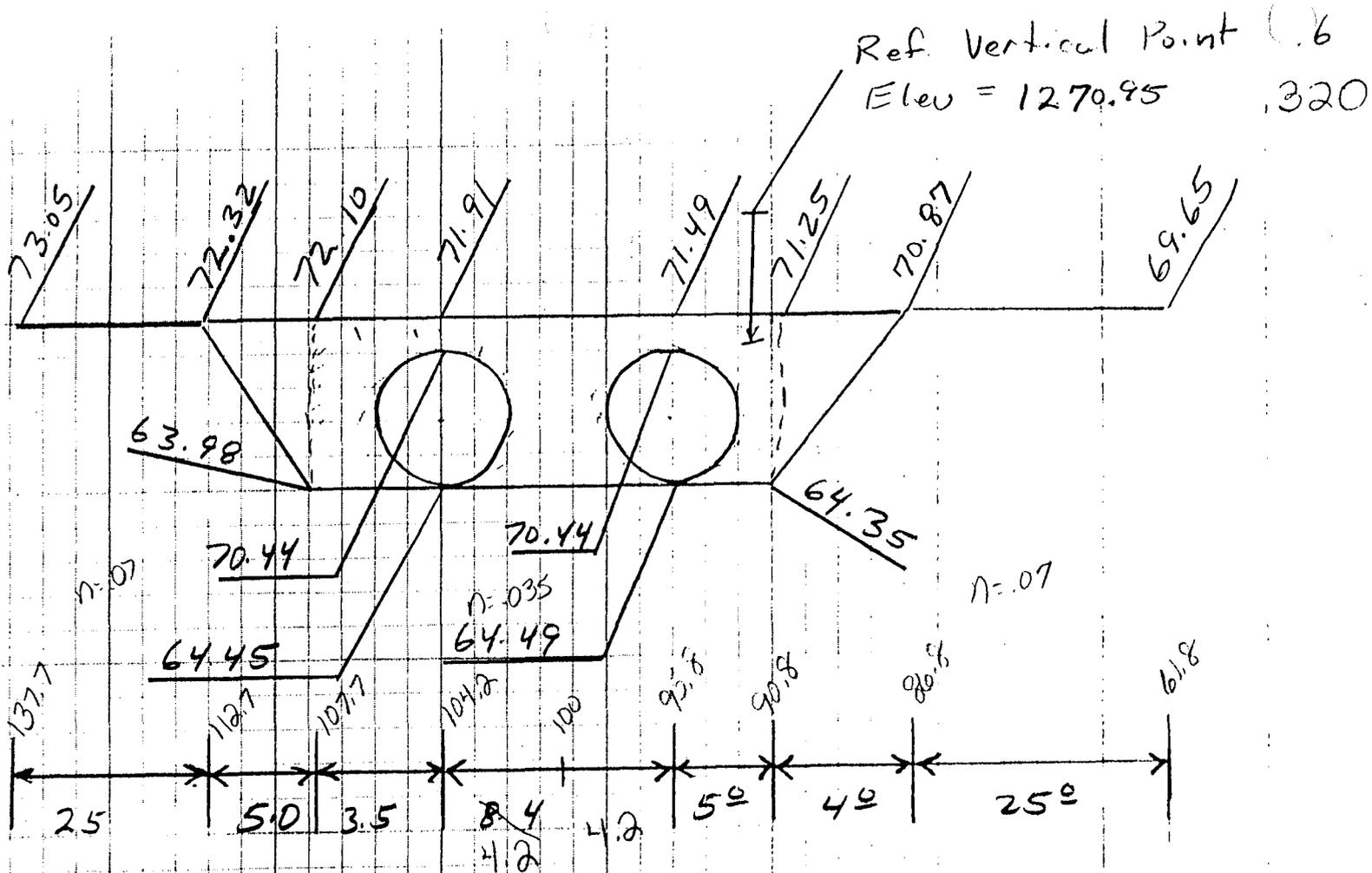
X-Section Looking up-stream.

X-Section

17 - 17

CROSS SECTION 333  
Upstream of culvert



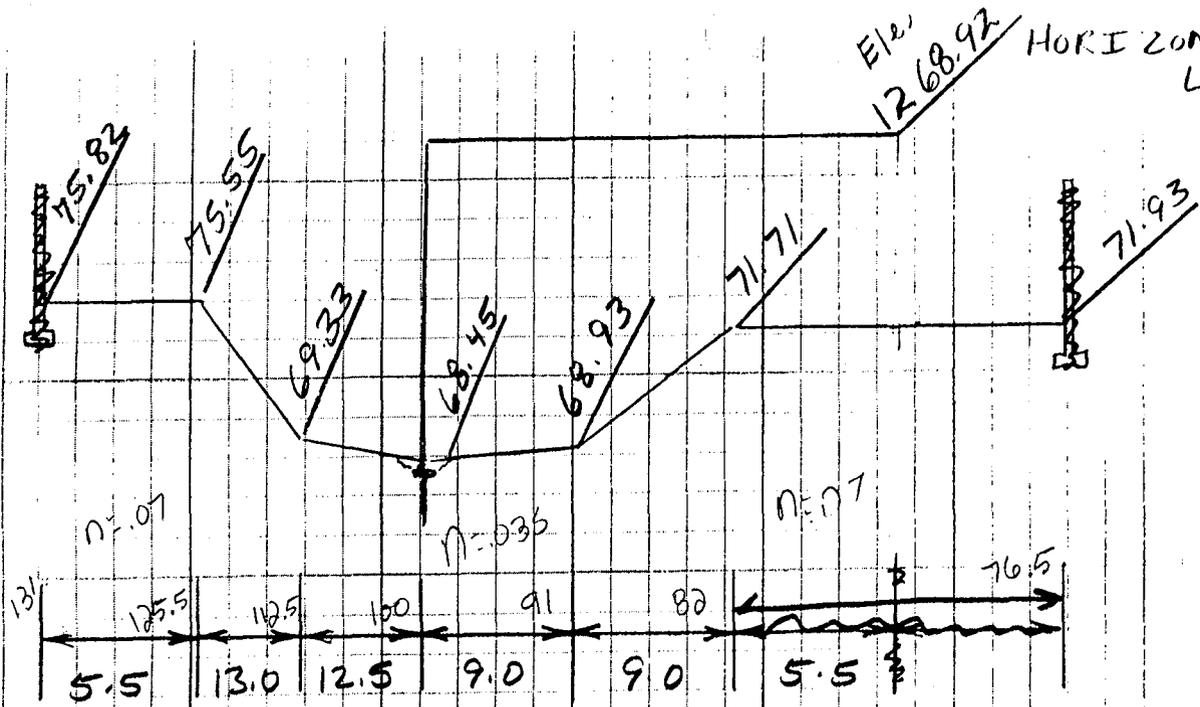


X Section Looking up-stream

X Section  
16-16

Cross Section 320  
Downstream of culvert





HORIZONTAL  
POINT  
NUMBER

18

X-sections Face up-stream  
CROSS SECTION 1317





## flynn lane topo for drainage study

Project: mari0011

Thu Dec 12 08:52:03 1996

## Current Coordinate Listing by Point Range

Point	Northing	Easting	Elevation	Description
129	8742.68	10350.77	1252.92	TOP
130	8748.82	10345.77	1251.82	TOE
131	8755.56	10340.97	1251.63	FLOW LINE
132	8761.28	10339.59	1252.14	TOE
133	8762.03	10338.17	1253.07	TOP
134	8763.62	10340.50	1253.56	TOP
135	8717.90	10281.50	1250.76	CECK SHOT
136	8746.53	9790.66	1242.29	CK
137	8748.90	9716.40	1242.03	CONC
138	8749.61	9724.80	1241.86	CONC
139	8749.72	9690.13	1241.61	CONC
140	8751.37	9667.30	1241.01	CONC
141	8751.45	9656.39	1241.03	CONC
142	8749.67	9645.86	1239.39	CONC
143	8747.10	9632.70	1238.93	CONC
144	8732.59	9667.72	1242.68	TC
145	8733.28	9667.58	1242.18	CONC
146	8768.84	9671.55	1241.94	CONC
147	8769.51	9671.69	1242.42	CONC
148	8746.53	9790.67	1242.29	CK

## flynn lane topo for drainage study

ject: mari0011

Thu Dec 12 08:51:20 1996

## Point statistics:

Starting point number: 1  
 Max point number used: 5009  
 Min point number used: 1  
 Current point number: 5010

## Current Coordinate Listing by Point Range

Point	Northing	Easting	Elevation	Description
1	8750.08	9729.74	1241.78	START
2	8742.88	9853.43	1242.94	SET PK
3	8737.71	9941.91	1244.61	set pk
4	8729.80	10077.37	1247.47	set pk
5	8723.35	10187.88	1249.18	set pk
6	8718.60	10269.17	1250.29	set pk
10	8856.48	10463.79	1254.39	START
11	8907.94	10531.48	1257.34	SET CPS
12	9021.09	10680.33	1260.19	SET CPS
13	9153.73	10854.81	1264.40	SET CPS
15	9247.83	11021.73	1267.19	SET HUB
16	9271.36	11111.71	1270.95	SET PK
18	9298.84	11216.84	1268.92	SET HUB
19	9311.47	11265.14	1269.95	SET HUB
32	8746.53	9790.65	1242.27	CNTL
51	10024.13	11369.33	1293.46	CPS IN PLANTER 2110
52	8717.88	10281.47	1250.73	CNTL
53	9230.65	10956.00	1266.77	SET NAIL
54	9328.83	11331.53	1269.81	SET NAIL
55	9526.10	11585.01	1274.65	SET H&T IN WASH
56	9508.38	11704.28	1282.40	SET CPS WITH PIN FL
57	9291.38	11973.41	1292.13	SET CPS IN ROAD
58	9219.69	12503.11	1310.45	SET CPS BK WLK S.SI
59	9699.81	12114.30	1297.03	SET H&T 22ND PL\LIN
101	8740.76	9889.84	1243.46	FD BCFL
110	8717.89	10281.48	1250.75	FD PK NAIL
111	8771.05	10404.20	1254.51	BW
112	8790.78	10408.86	1253.96	TOP
113	8816.63	10412.16	1253.65	BW
114	8826.09	10412.76	1253.01	BW
115	8833.26	10413.26	1252.67	BW FL
116	8836.69	10413.62	1252.79	BW TOE
117	8852.84	10414.90	1253.64	BW TOP
118	8873.32	10416.18	1254.12	BW
119	8758.84	10391.85	1254.31	NG
120	8769.56	10383.28	1253.61	TOP
121	8775.28	10378.09	1251.71	TOE
122	8779.58	10374.68	1251.46	FLOW LINE
123	8782.79	10370.98	1251.53	TOE
124	8783.16	10369.64	1252.90	TOP
125	8783.66	10369.37	1254.02	TOP
126	8800.38	10355.96	1254.86	NG
127	8731.44	10356.80	1253.08	TC
128	8735.55	10354.24	1253.11	BW

**PHOTOGRAMMETRIC SURVEY CERTIFICATION**  
I, Daniel L. Kaminski, of KAMINSKI-HUBBARD Engineering, Inc., Arizona Registered Land Surveyor #16559, Certify That The Survey Control Used To Complete Photogrammetric Maps For This Project Is Correct And Accurate Within Contract Specifications.



**Legend**

- Rev. 100 Yr. Floodway
- Rev. 100 Yr. Floodplain
- Existing Floodplain
- Cross Section Revised (0.53)
- Cross Section Effective Model (0.53)
- Existing Floodway



INDEX

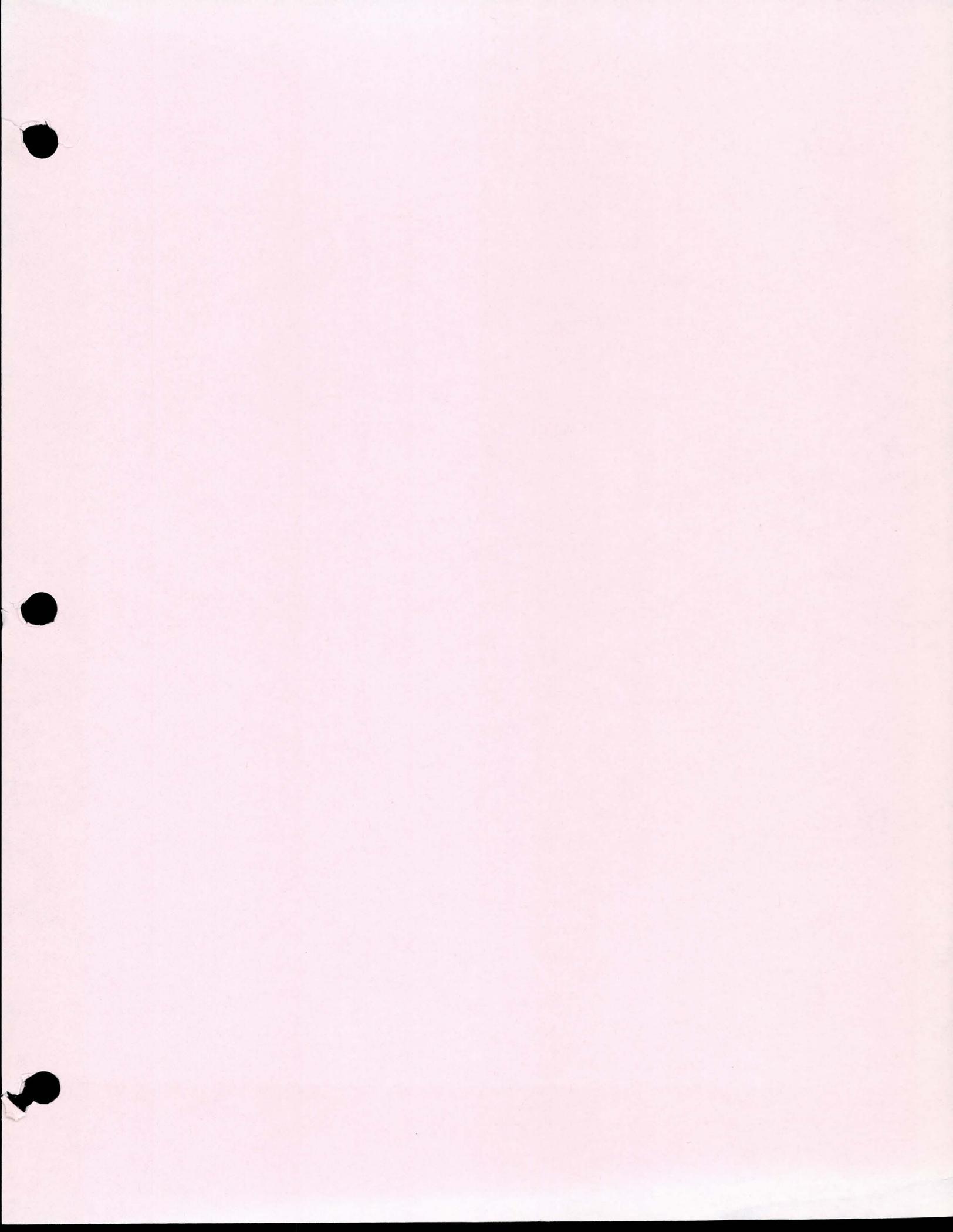
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14	13	18	17	16	15	14	13	18	17	THUNDERBOLT RD.
23	24	19	20	21	22	23	24	19	20	CACTUS RD.
26	25	30	29	28	27	26	25	30	29	SHEA BLVD.
35	36	31	32	33	34	35	36	31	32	DOUBLE TREE RANCH RD.
2	1	6	5	4	3	2	1	6	5	NORTHERN AVE.
11	12	7	8	9	10	11	12	7	8	INDIAN BEND RD.
14	13	18	17	16	15	14	13	18	17	MIC DONALD DR.
										CHAPARRAL RD.

DATE FLOWN : 11-15-1990



MARIOPOLI  
FLOOD CONTROL DISTRICT  
OF  
MARICOPA COUNTY  
ARIZONA CANAL DIVERSION CHANNEL  
AREA DRAINAGE MASTER STUDY  
PHASE 1

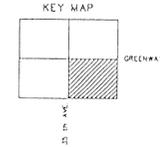
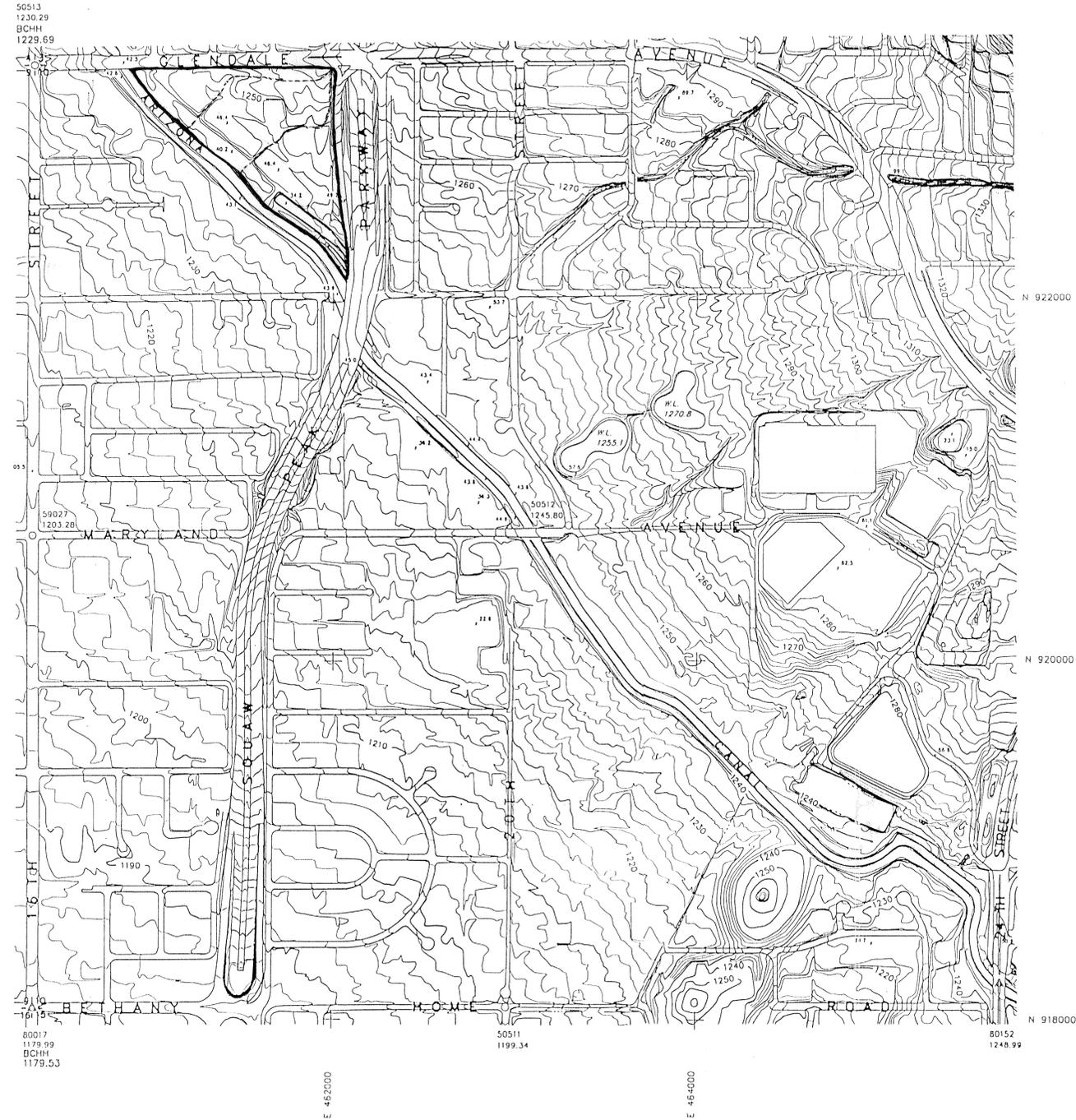
DRN:	DATE:	SCALE:	JOB NO.	SHEET
DES:	DATE:	1" = 400' HORIZ.	0146	75 of 111
CHD:	DATE:	1" = --- VERT.		





**KAMINSKI HUBBARD**  
**engineering, inc.**  
 SURVEYING • CIVIL • HYDROLOGY  
 4550 N. BLACK CANYON HWY., SUITE C  
 PHOENIX, ARIZONA 85017  
 (602) 242-5588

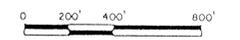
**PHOTOGRAMMETRIC SURVEY CERTIFICATION**  
 I, Daniel L. Kaminski, of KAMINSKI-HUBBARD Engineering, Inc., Arizona Registered Land Surveyor #16559, Certify That The Survey Control Used To Complete Photogrammetric Maps For This Project Is Correct And Accurate Within Contract Specifications.



INDEX

11	12	7	8	9	10	11	12	7	8	GREENWAY RD
14	13	18	17	16	15	14	13	18	17	THUNDERBOLT RD
23	24	19	20	21	22	23	24	19	20	CACTUS RD
26	25	30	29	28	27	26	25	30	29	SHEA BLVD.
35	36	31	32	33	34	35	36	31	32	DOUBLE TREE RANCH RD.
2	1	6	5	4	3	2	1	6	5	NORTHERN AVE.
11	12	7	8	9	10	11	12	7	8	HICKMAN BEND RD.
14	13	18	17	16	15	14	13	18	17	MC DONALD DR.
										CHAPARRIL RD.

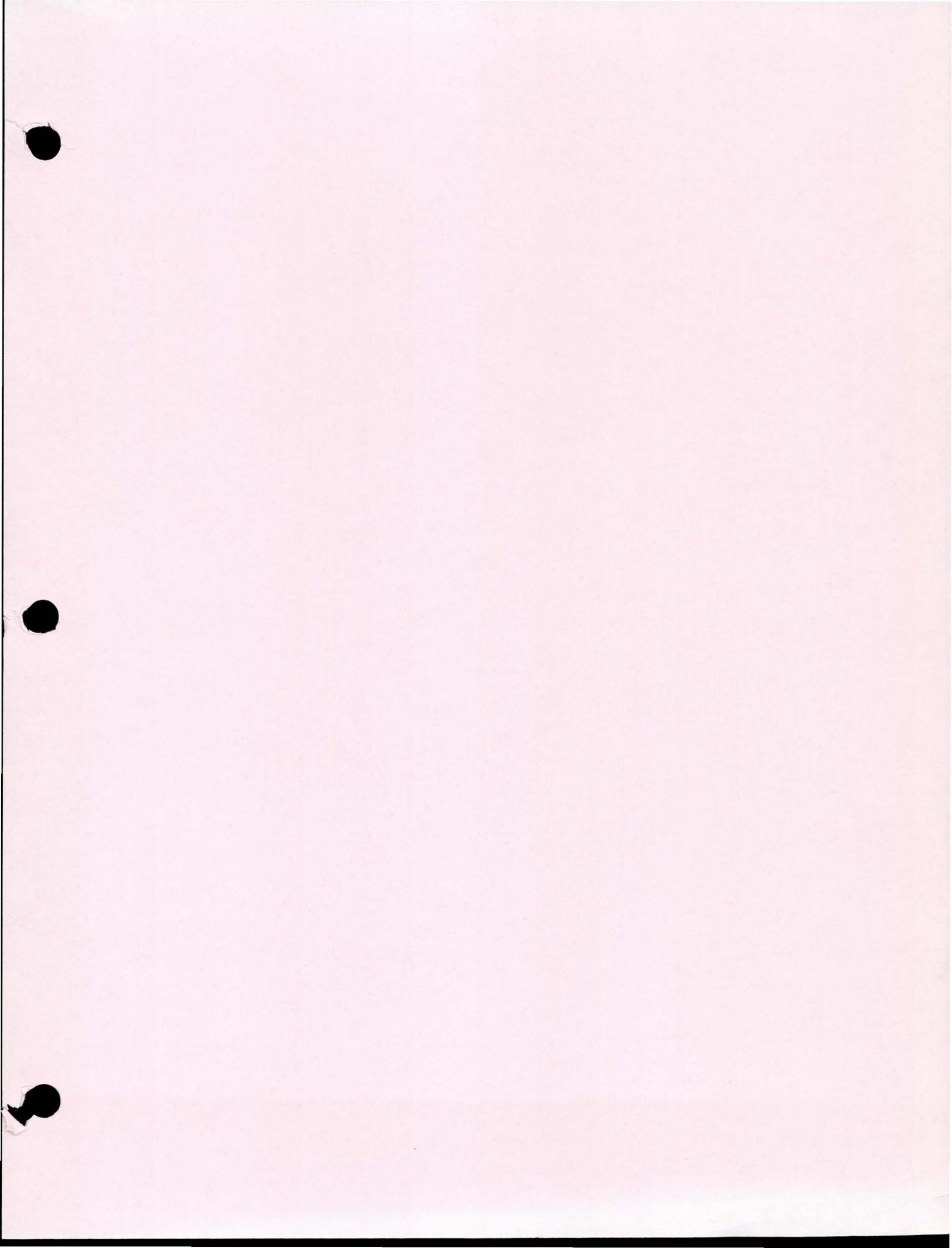
DATE FLOWN - 11-15-1990



FLOOD CONTROL DISTRICT  
 OF  
 MARICOPA COUNTY  
 ARIZONA CANAL DIVERSION CHANNEL  
 AREA DRAINAGE MASTER STUDY  
 PHASE 1

DRN: DATE:	SCALE:	JOB NO.	SHEET
DES: DATE:	1" = 400' HORIZ.	0146	75 of 111
CHD: DATE:	1" = --- VERT.		

KENNEDY AERIAL MAPPING, INC.



**DUPLICATE EFFECTIVE HEC-2 MODEL**

T1	FLYNN LANE WASH ARIZONA CANAL TO LINCOLN DR. FILE:MA11FIRM.HC2										T1	039
T2	STATIONING IS LEFT TO RIGHT LOOKING UPSTREAM										T2	040
T3	100 YEAR PROFILE RUN										T3	041
J1	-1	2	0	0	0	0	0	1244.4	0	0	J1	018
J2	1										J2	019
J3	1.0	34.00	27.00	28.00	31.00	32.00	33.00	0	0	0	0J3	020
NC	.1	.1	.1	.1	.3						NC	029
QT	2	1700	1700								QT	034
ET			10.4								ET	014
X1	0.05	13	1805	2118	0	0	0				X1	053
GR1245.0	500	1243.0	585	1244.0	700	1244.0	895	1243.0	1050GR		X1	015
GR1244.0	1209	1243.0	1390	1244.0	1700	1244.0	1805	1243.5	1930GR		X1	015
GR1244.0	2118	1244.0	2412	1246.0	2535				GR		X1	015
X1	0.14	14	1200	1240	460	600	500				X1	053
GR1254.0	500	1252.0	724	1251.0	924	1252.0	1040	1253.0	1124GR		X1	015
GR1252.0	1200	1251.7	1224	1252.0	1240	1252.5	1324	1252.0	1370GR		X1	015
GR1250.0	1470	1251.0	1500	1253.0	1724	1254.0	1850		GR		X1	015
NC	0.09	0.12	0.05						NC		X1	029
QT	2	1540	1540						QT		X1	034
X1	0.21	9	750	827	390	390	390		X1		X1	053
GR1260.0	500	1259.2	545	1260.0	578	1261.0	750	1256.0	760GR		X1	015
GR1256.0	800	1258	827	1259.0	922	1260.0	1300		GR		X1	015
X1	0.30	18	718	775	500	470	490		X1		X1	053
GR1274.0	500	1272.0	718	1264.0	750	1264.0	760	1267.0	775GR		X1	015
GR1267.2	822	1266.0	900	1265.7	902	1265.5	965	1266.0	990GR		X1	015
GR1268.0	1150	1268.0	1250	1266.0	1275	1265.5	1285	1265.5	1300GR		X1	015
GR1266.0	1310	1268.0	1335	1270.0	1490				GR		X1	015
NC	0.0	0.0	0.6	0.8					NC		X1	029
X1	0.32	16	635	696	105	90	83		X1		X1	053
GR1275.0	500	1274.0	590	1272.0	635	1267.25	654	1265.3	654.8GR		X1	015
GR1264.5	656.75	1265.3	658.7	1267.25	659.5	1267.25	662.5	1265.3	663.3GR		X1	015
GR1264.5	665.25	1265.3	667.2	1267.25	668	1270.0	696	1268.0	778GR		X1	015
GR1270.0	1138								GR		X1	015
SB	1.25	1.34	2.6	0	11.0	0	47.5	0	1265.8	1264.5SB	X1	036
X1	0.33	19	645	680	40	40	40	0	0	0	OX1	053
X2	0	0	1	0	0	0	0	0	0	0	OX2	054
BT	19	500	1275.0	1265.0	600	1274.0	1265.0	645	1273.0	1265.0BT	X1	005
BT	654	1273.0	1268.5	654.8	1273.0	1270.4	656.75	1272.5	1271.2	658.7BT	X1	005
BT1272.5	1270.4	659.5	1272.5	1268.5	662.5	1272.0	1268.5	663.3	1272.0BT		X1	005
BT1270.4	665.25	1272.0	1271.2	667.2	1272.0	1270.0	668	1272.0	1268.5BT		X1	005
BT	680	1271.0	1265.0	766	1270.0	1265.0	810	1269.0	1265.0	884BT	X1	005
BT1270.0	1265.0	990	1272.0	1265.0	1036	1273.0	1265.0			BT	X1	005
GR1275.0	500	1274.0	600	1273.0	645	1268.5	654	1266.5	654.8GR		X1	015
GR1265.8	656.75	1266.5	658.7	1268.5	659.5	1268.5	662.5	1266.5	663.3GR		X1	015
GR1265.8	665.25	1266.5	667.2	1268.5	668	1271.0	680	1270.0	766GR		X1	015
GR1269.0	810	1270.0	884	1272.0	990	1273.0	1036		GR		X1	015
X1	0.340	14	290	337	52	48	50		X1		X1	053
GR1280.0	0	1278.0	46	1277.0	195	1276.0	240	1274.0	290GR		X1	015
GR1267.0	314	1267.0	320	1271.6	337	1271.0	420	1271.5	550GR		X1	015
GR1271.0	567	1271.5	595	1272.0	608	1273.0	1036		GR		X1	015
NC	0	0	.1	.3					NC		X1	029
X1	0.42	10	200	260	420	450	440		X1		X1	053
GR1287.0	0	1284.0	143	1282.0	200	1276.0	220	1276.0	240GR		X1	015
GR1277.0	260	1278.0	362	1280.0	518	1282.0	685	1283.0	812GR		X1	015
QT	2	1100	1100						QT		X1	034
X1	0.53	13	327	400	525	600	550		X1		X1	053
GR1296.0	100	1295.0	218	1290.0	327	1286.4	353	1286.4	375GR		X1	015
GR1293.0	400	1293.5	424	1292.0	455	1294.0	490	1294.0	565GR		X1	015
GR1292.0	690	1291.0	728	1292.5	752				GR		X1	015
NC	0.12	0	0	0	0				NC		X1	029
X1	0.58	7	243	342	250	300	280		X1		X1	053
GR1300.0	0	1300.0	128	1301.0	168	1300.0	243	1291.0	260GR		X1	015
GR1291.0	288	1308.0	342						GR		X1	015
NC	0	0	.6	.8					NC		X1	029
X1	0.59	10	430	510	52	48	50		X1		X1	053
GR1303.0	200	1302.0	300	1300.0	430	1294.8	453	1292.8	453.8GR		X1	015
GR1292.0	455.8	1292.8	457.8	1294.8	458.5	1306.0	510	1307.0	564GR		X1	015
SB	0	1.69	2.80	0	5.5	0	23.7	0	1301.0	1292.0SB	X1	036
X1	0.62	11	470	545	210	210	210		X1		X1	053
X2	0	0	1	0	0	0	0		OX2		X1	054
BT	11	200	1310.0	1300.0	376	1312.0	1300.0	427	1313.0	1300.0BT	X1	005
BT	470	1312.0	1300.0	485	1312.0	1303.8	485.8	1312.0	1305.8	487.8BT	X1	005
BT1312.5	1306.5	489.8	1313.0	1305.8	490.5	1313.0	1303.8	545	1313.0BT		X1	005
BT1300.0	730	1314.0	1300.0						BT		X1	005
GR1310.0	200	1312.0	376	1313.0	427	1312.0	470	1303.8	485GR		X1	015
GR1301.8	485.8	1301.0	487.8	1301.8	489.8	1303.8	490.5	1313.0	545GR		X1	015
GR1314.0	730								GR		X1	015
X1	0.63	6	77	155	48	52	50		X1		X1	053
GR1314.5	28	1312.0	77	1302.0	96	1302.0	119	1314.0	155GR		X1	015
GR1315.0	730								GR		X1	015
NC	0	0	.1	.3					NC		X1	029
X1	0.70	6	540	608	320	330	320		X1		X1	053
GR1323.0	500	1323.8	540	1310.0	570	1311.0	575	1325.0	608GR		X1	015
GR1326.0	710								GR		X1	015
EJ									EJ		X1	012
T1	FLYNN LANE WASH 100 YEAR PROFILE WITH 1' ENCROACHMENT										T1	039
T3	100 YR W/ 1' ENCROACH										T3	041
J1	3										J1	018
J2	2							1244.7			J2	019
ER												004
ER												004
ER												004
ER												004
ER												004

1\*\*\*\*\*  
 \*\*\*\*\*  
 \* HEC-2 WATER SURFACE PROFILES \*  
 \* \* \* \* \*  
 \* Version 4.6.2; May 1991 \*  
 \* \* \* \* \*  
 \* RUN DATE 08AUG96 TIME 11:58:25 \*  
 \*\*\*\*\*  
 \*\*\*\*\*

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

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1 08AUG96 11:58:25 PAGE 1

THIS RUN EXECUTED 08AUG96 11:58:25

\*\*\*\*\*  
 HEC-2 WATER SURFACE PROFILES  
 Version 4.6.2; May 1991  
 \*\*\*\*\*

T1 FLYNN LANE WASH ARIZONA CANAL TO LINCOLN DR. FILE:M11FIRM.HC2  
 T2 STATIONING IS LEFT TO RIGHT LOOKING UPSTREAM  
 T3 100 YEAR PROFILE RUN

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	-1	2	0	0	0	0		0	1244.4	
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	1						-1			
J3	VARIABLE CODES FOR SUMMARY PRINTOUT									
	1.0	34.00	27.00	28.00	31.00	32.00	33.00	0	0	0
NC	.1	.1	.1	.1	.3					
QT	2	1700	1700							
ET			10.4							
X1	0.05	13	1805	2118	0	0	0			
GR	1245.0	500	1243.0	585	1244.0	700	1244.0	895	1243.0	1050
GR	1244.0	1209	1243.0	1390	1244.0	1700	1244.0	1805	1243.5	1930
GR	1244.0	2118	1244.0	2412	1246.0	2535				
X1	0.14	14	1200	1240	460	600	500			
GR	1254.0	500	1252.0	724	1251.0	924	1252.0	1040	1253.0	1124
GR	1252.0	1200	1251.7	1224	1252.0	1240	1252.5	1324	1252.0	1370
GR	1250.0	1470	1251.0	1500	1253.0	1724	1254.0	1850		
NC	0.09	0.12	0.05							
QT	2	1540	1540							
X1	0.21	9	750	827	390	390	390			
GR	1260.0	500	1259.2	545	1260.0	578	1261.0	750	1256.0	760
GR	1256.0	800	1258	827	1259.0	922	1260.0	1300		
X1	0.30	18	718	775	500	470	490			
GR	1274.0	500	1272.0	718	1264.0	750	1264.0	760	1267.0	775
GR	1267.2	822	1266.0	900	1265.7	902	1265.5	965	1266.0	990
GR	1268.0	1150	1268.0	1250	1266.0	1275	1265.5	1285	1265.5	1300
GR	1266.0	1310	1268.0	1335	1270.0	1490				

1 08AUG96 11:58:25 PAGE 2

NC	0.0	0.0	0.0	0.6	0.8					
X1	0.32	16	635	696	105	90	83			
GR	1275.0	500	1274.0	590	1272.0	635	1267.25	654	1265.3	654.8
GR	1264.5	656.75	1265.3	658.7	1267.25	659.5	1267.25	662.5	1265.3	663.3
GR	1264.5	665.25	1265.3	667.2	1267.25	668	1270.0	696	1268.0	778
GR	1270.0	1138								
SB	1.25	1.34	2.6	0	11.0	0	47.5	0	1265.8	1264.5
X1	0.33	19	645	680	40	40	40	0	0	0
X2	0	0	1	0	0	0	0	0	0	0
BT	19	500	1275.0	1265.0	600	1274.0	1265.0	645	1273.0	1265.0
BT	654	1273.0	1268.5	654.8	1273.0	1270.4	656.75	1272.5	1271.2	658.7
BT	1272.5	1270.4	659.5	1272.5	1268.5	662.5	1268.5	663.3	1272.0	1272.0
BT	1270.4	665.25	1272.0	1271.2	667.2	1272.0	1270.0	668	1272.0	1268.5
BT	680	1271.0	1265.0	766	1270.0	1265.0	810	1269.0	1265.0	884
BT	1270.0	1265.0	990	1272.0	1265.0	1036	1273.0	1265.0		
GR	1275.0	500	1274.0	600	1273.0	645	1268.5	654	1266.5	654.8
GR	1265.8	656.75	1266.5	658.7	1268.5	659.5	1268.5	662.5	1266.5	663.3
GR	1265.8	665.25	1266.5	667.2	1268.5	668	1271.0	680	1270.0	766
GR	1269.0	810	1270.0	884	1272.0	990	1273.0	1036		

X1	0.340	14	290	337	52	48	50						
GR	1280.0	0	1278.0	46	1277.0	195	1276.0	240	1274.0	290			
GR	1267.0	314	1267.0	320	1271.6	337	1271.0	420	1271.5	550			
GR	1271.0	567	1271.5	595	1272.0	608	1273.0	1036					
NC	0	0	0	.1	.3								
X1	0.42	10	200	260	420	450	440						
GR	1287.0	0	1284.0	143	1282.0	200	1276.0	220	1276.0	240			
GR	1277.0	260	1278.0	362	1280.0	518	1282.0	685	1283.0	812			
QT	2	1100	1100										
X1	0.53	13	327	400	525	600	550						
GR	1296.0	100	1295.0	218	1290.0	327	1286.4	353	1286.4	375			
GR	1293.0	400	1293.5	424	1292.0	455	1294.0	490	1294.0	565			
GR	1292.0	690	1291.0	728	1292.5	752							
NC	0.12	0	0	0	0								
X1	0.58	7	243	342	250	300	280						
GR	1300.0	0	1300.0	128	1301.0	168	1300.0	243	1291.0	260			
GR	1291.0	288	1308.0	342									
NC	0	0	0	.6	.8								
X1	0.59	10	430	510	52	48	50						
GR	1303.0	200	1302.0	300	1300.0	430	1294.8	453	1292.8	453.8			
GR	1292.0	455.8	1292.8	457.8	1294.8	458.5	1306.0	510	1307.0	564			
SB	0	1.69	2.80	0	5.5	0	23.7	0	1301.0	1292.0			
X1	0.62	11	470	545	210	210	210						
X2	0	0	1	0	0	0	0	0	0	0			
BT	11	200	1310.0	1300.0	376	1312.0	1300.0	427	1313.0	1300.0			
BT	470	1312.0	1300.0	485	1312.0	1303.8	485.8	1312.0	1305.8	487.8			
BT	1312.5	1306.5	489.8	1313.0	1305.8	490.5	1313.0	1303.8	545	1313.0			

PROFILE 1  
NATURAL

1 08AUG96 11:58:25 PAGE 3

BT	1300.0	730	1314.0	1300.0									
GR	1310.0	200	1312.0	376	1313.0	427	1312.0	470	1303.8	485			
GR	1301.8	485.8	1301.0	487.8	1301.8	489.8	1303.8	490.5	1313.0	545			
GR	1314.0	730											
X1	0.63	6	77	155	48	52	50						
GR	1314.5	28	1312.0	77	1302.0	96	1302.0	119	1314.0	155			
GR	1315.0	730											
NC	0	0	0	.1	.3								
X1	0.70	6	540	608	320	330	320						
GR	1323.0	500	1323.8	540	1310.0	570	1311.0	575	1325.0	608			
GR	1326.0	710											

1 08AUG96 11:58:25 PAGE 4

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

\*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV=	.100	CEHV=	.300										
*SECNO	.050												
	.050	1.40	1244.40	1243.92	1244.40	1244.43	.03	.00	.00	1244.00			
	1700.0	1359.1	238.5	102.4	989.7	203.5	122.5	.0	.0	1244.00			
	.00	1.37	1.17	.84	.100	.100	.100	.000	1243.00	525.50			
	.011055	0.	0.	0.	0	20	0	.00	1911.10	2436.60			

\*SECNO .140

3265 DIVIDED FLOW

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

	.140	2.47	1252.47	1252.06	.00	1252.56	.09	8.11	.02	1252.00			
	1700.0	733.4	42.3	924.3	335.1	24.7	354.5	11.6	16.2	1252.00			
	.06	2.19	1.71	2.61	.100	.100	.100	.000	1250.00	671.72			
	.025355	460.	500.	600.	5	14	0	.00	898.62	1664.28			

\*SECNO .210

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

	.210	3.32	1259.32	1259.05	.00	1260.01	.69	7.28	.18	1261.00			
	1540.0	.2	1431.1	108.7	.7	206.6	97.7	16.2	21.6	1258.00			
	.08	.30	6.93	1.11	.090	.050	.120	.000	1256.00	538.12			
	.013935	390.	390.	390.	3	11	0	.00	302.39	1043.82			

\*SECNO .300

3265 DIVIDED FLOW

1 08AUG96 11:58:25 PAGE 5

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

Q TIME SLOPE	QLOB VLOB XLOBL	QCH VCH XLCH	QROB VROB XLOBR	ALOB XNL ITRIAL	ACH XNCH IDC	AROB XNR ICONT	VOL WTN CORAR	TWA ELMIN TOPWID	R-BANK SSTA ENDST	ELEV
.300	3.51	1267.51	1267.30	.00	1267.87	.36	7.82	.03	1272.00	
1540.0	.0	634.7	905.3	.0	89.9	443.2	20.7	25.6	1267.00	
.11	.00	7.06	2.04	.000	.050	.120	.000	1264.00	735.96	
.019017	500.	490.	470.	4	5	0	.00	447.64	1328.88	

CCHV= .600 CEHV= .800  
 \*SECNO .320

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY

Q TIME SLOPE	QLOB VLOB XLOBL	QCH VCH XLCH	QROB VROB XLOBR	ALOB XNL ITRIAL	ACH XNCH IDC	AROB XNR ICONT	VOL WTN CORAR	TWA ELMIN TOPWID	R-BANK SSTA ENDST	ELEV
.320	5.34	1269.84	1269.84	.00	1270.33	.49	2.01	.11	1272.00	
1540.0	.0	798.2	741.8	.0	105.2	373.4	21.8	26.6	1270.00	
.11	.00	7.59	1.99	.000	.050	.120	.000	1264.50	643.65	
.028805	105.	83.	90.	0	8	0	.00	456.96	1108.89	

SPECIAL BRIDGE

SB	XK	XKOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
	1.25	1.34	2.60	.00	11.00	.00	47.50	.00	1265.80	1264.50

\*SECNO .330

6070, LOW FLOW BY NORMAL BRIDGE

EGPRS= 1291.709 EGLWC= 1271.631 ELLC= 1271.200 PCWSE= 1269.838 ELTRD= 1269.000

3370 NORMAL BRIDGE, NRD= 19 MIN ELTRD= 1269.00 MAX ELLC= 1271.20

Q TIME SLOPE	QLOB VLOB XLOBL	QCH VCH XLCH	QROB VROB XLOBR	ALOB XNL ITRIAL	ACH XNCH IDC	AROB XNR ICONT	VOL WTN CORAR	TWA ELMIN TOPWID	R-BANK SSTA ENDST	ELEV
.330	5.75	1271.55	1271.20	.00	1271.78	.23	1.30	.16	1273.00	
1540.0	.0	264.5	1275.5	.0	43.8	396.1	22.2	26.9	1271.00	
.12	.00	6.04	3.22	.000	.050	.120	.000	1265.80	647.90	
.036677	40.	40.	40.	3	9	0	-51.38	318.30	966.20	

\*SECNO .340

7185 MINIMUM SPECIFIC ENERGY

Q TIME SLOPE	QLOB VLOB XLOBL	QCH VCH XLCH	QROB VROB XLOBR	ALOB XNL ITRIAL	ACH XNCH IDC	AROB XNR ICONT	VOL WTN CORAR	TWA ELMIN TOPWID	R-BANK SSTA ENDST	ELEV
.340	5.48	1272.48	1272.48	.00	1273.03	.54	.98	.25	1274.00	
1540.0	.0	1004.8	535.2	.0	138.6	373.6	22.7	27.4	1271.60	
.12	.00	7.25	1.43	.000	.050	.120	.000	1267.00	295.20	
.012583	52.	50.	48.	0	10	0	.00	519.69	814.89	

1

08AUG96 11:58:25

PAGE 6

SECNO Q TIME SLOPE	DEPTH QLOB VLOB XLOBL	CWSEL QCH VCH XLCH	CRIWS QROB VROB XLOBR	WSELK ALOB XNL ITRIAL	EG ACH XNCH IDC	HV AROB XNR ICONT	HL VOL WTN CORAR	OLOSS TWA ELMIN TOPWID	L-BANK R-BANK SSTA ENDST	ELEV
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CCHV= .100 CEHV= .300  
 \*SECNO .420

.420	3.19	1279.19	1279.09	.00	1279.86	.67	6.79	.04	1282.00	
1540.0	.0	1053.9	486.1	.0	134.7	228.0	27.2	31.3	1277.00	
.14	.00	7.83	2.13	.000	.050	.120	.000	1276.00	209.36	
.019062	420.	440.	450.	2	11	0	.00	245.63	454.99	

\*SECNO .530

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

.530	3.53	1289.93	1289.65	.00	1290.81	.88	10.89	.06	1290.00	
1100.0	.0	1100.0	.0	.0	146.3	.0	30.6	33.4	1293.00	
.16	.00	7.52	.00	.000	.050	.000	.000	1286.40	327.50	
.020184	525.	550.	600.	3	5	0	.00	60.87	388.37	

\*SECNO .580

.580	3.84	1294.84	1294.26	.00	1295.73	.90	4.92	.01	1300.00	
1100.0	.0	1100.0	.0	.0	144.7	.0	31.5	33.7	1308.00	
.17	.00	7.60	.00	.000	.050	.000	.000	1291.00	252.75	
.015424	250.	280.	300.	3	11	0	.00	47.44	300.19	

CCHV= .600 CEHV= .800  
 \*SECNO .590

7185 MINIMUM SPECIFIC ENERGY

Q TIME SLOPE	QLOB VLOB XLOBL	QCH VCH XLCH	QROB VROB XLOBR	ALOB XNL ITRIAL	ACH XNCH IDC	AROB XNR ICONT	VOL WTN CORAR	TWA ELMIN TOPWID	R-BANK SSTA ENDST	ELEV
.590	7.07	1299.07	1299.07	.00	1300.45	1.38	1.06	.38	1300.00	
1100.0	.0	1100.0	.0	.0	116.8	.0	31.6	33.8	1306.00	
.17	.00	9.42	.00	.000	.050	.000	.000	1292.00	434.12	
.030716	52.	50.	48.	0	17	0	.00	44.01	478.13	

SPECIAL BRIDGE

SB	XK	XKOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
	.00	1.69	2.80	.00	5.50	.00	23.70	.00	1301.00	1292.00

\*SECNO .620

3265 DIVIDED FLOW



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2050 . . . . . IR WE LM
2100 . . . . . I RWEL M
2150 . . . . . I RWEL M
2200 . . . . . I WELM
2250 . . . . . I .WELM
2300 . . . . . I WE M
2350 . . . . . I WE M
2400 . . . . . I WERM
2450 . . . . . I WERM
2500 . . . . . I WE R
.53 2550 . . . . . I WE R
2600 . . . . . I CWELM R
2650 . . . . . I CWELM R
2700 . . . . . I CE L M R
2750 . . . . . I WE LM .R
2800 . . . . . I WE L . R
.58 2850 . . . . . I .CWE L . R
.59 2900 . . . . . I WE M R
2950 . C . . . . . I WE M R
3000 . C . . . . . I WE R
3050 . C . . . . . I WE R
.62 3100 . C . . . . . I M ER
.63 3150 . . . . . I C E .RM
3200 . . . . . I C EL R
3250 . . . . . I C WE LR
3300 . . . . . I C WE LR
3350 . . . . . I C WE LMR
3400 . . . . . I .CWE L R
3450 . . . . . I WE MLR
.70 3500 . . . . . I WE MLR

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PROFILE 2  
FLOODWAY

T1 FLYNN LANE WASH 100 YEAR PROFILE WITH 1' ENCROACHMENT  
T3 100 YR W/ 1' ENCROACH

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
									1244.7	
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE

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

\*PROF 2  
0

CCHV= .100 CEHV= .300  
\*SECNO .050  
2800 NAT Q1= 161.68 WSELK= 1244.40 ENC Q1= 161.68 WSEL= 1245.40 RATIO= .0000  
NAT Q1= 689. RATIOS LOB, CH, ROB= .7233 .1554 .1213 WSEL= 1245.40  
3470 ENCROACHMENT STATIONS= 1609.8 2118.0 TYPE= 4 TARGET= .765  
.050 1.70 1244.70 .00 1244.40 1244.93 .23 .00 .00 1244.00  
1700.0 517.6 1182.4 .0 149.7 297.3 .0 .0 .0 1244.00  
.00 3.46 3.98 .00 .100 .100 .000 .000 1243.00 1609.83  
.076915 0. 0. 0. 0 0 0 .00 508.17 2118.00

\*SECNO .140  
2800 NAT Q1= 106.76 WSELK= 1252.47 ENC Q1= 106.76 WSEL= 1253.47 RATIO= .0000  
NAT Q1= 380. RATIOS LOB, CH, ROB= .4789 .0348 .4863 WSEL= 1253.47  
3280 CROSS SECTION .14 EXTENDED .04 FEET

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 3.13

3470 ENCROACHMENT STATIONS= 977.2 1418.8 TYPE= 4 TARGET= .719  
.140 4.04 1254.04 .00 1252.47 1254.11 .06 9.16 .02 1252.00  
1700.0 760.7 195.2 744.1 392.1 87.7 356.6 7.5 5.5 1252.00  
.07 1.94 2.23 2.09 .100 .100 .100 .000 1250.00 977.23  
.007873 460. 500. 600. 7 0 0 .00 441.56 1418.79

\*SECNO .210  
2800 NAT Q1= 130.46 WSELK= 1259.32 ENC Q1= 198.48 WSEL= 1260.32 RATIO= -.5215  
NAT Q1= 272. RATIOS LOB, CH, ROB= .0289 .7303 .2408 WSEL= 1260.32

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY  
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= 750.0 827.0 TYPE= 4 TARGET= .270  
.210 2.88 1258.88 1258.88 1259.32 1260.09 1.21 5.12 .34 1261.00  
1540.0 .0 1540.0 .0 .0 174.1 .0 12.1 7.8 1258.00  
.08 .00 8.84 .00 .000 .050 .000 .000 1256.00 754.24  
.028484 390. 390. 390. 15 19 0 .00 72.76 827.00

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

\*SECNO .300  
 2800 NAT Q1= 111.67 WSELK= 1267.51 ENC Q1= 111.67 WSEL= 1268.51 RATIO= .0000  
 NAT Q1= 265. RATIOS LOB, CH, ROB= .0000 .3042 .6958 WSEL= 1268.51

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.45

3470 ENCROACHMENT STATIONS=	718.0	885.8	TYPE=	4	TARGET=	.579				
.300	4.79	1268.79	.00	1267.51	1269.43	1.63	9.27	.06	1272.00	
1540.0	.0	1073.0	467.0	.0	143.1	212.0	15.0	9.0	1267.00	
.10	.00	7.50	2.20	.000	.050	.120	.000	1264.00	730.84	
.013625	500.	490.	470.	4	0	0	.00	154.91	885.75	

CCHV= .600 CEHV= .800  
 \*SECNO .320  
 2800 NAT Q1= 90.74 WSELK= 1269.84 ENC Q1= 90.74 WSEL= 1270.84 RATIO= .0000  
 NAT Q1= 239. RATIOS LOB, CH, ROB= .0000 .3690 .6310 WSEL= 1270.84  
 3280 CROSS SECTION .32 EXTENDED .87 FEET

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY  
 3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=	635.0	716.4	TYPE=	4	TARGET=	.620				
.320	6.37	1270.87	1270.87	1269.84	1272.16	1.29	1.59	.53	1272.00	
1540.0	.0	1491.7	48.3	.0	160.9	22.7	15.5	9.3	1270.00	
.11	.00	9.27	2.12	.000	.050	.120	.000	1264.50	639.54	
.027794	105.	83.	90.	3	11	0	.00	76.87	716.41	

SPECIAL BRIDGE

SB	XK	XKOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
	1.25	1.34	2.60	.00	11.00	.00	47.50	.00	1265.80	1264.50

\*SECNO .330

1 08AUG96 11:58:25

PAGE 11

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

6070, LOW FLOW BY NORMAL BRIDGE

EGPRS= 1292.737 EGLWC= 1273.848 ELLC= 1271.200 PCWSE= 1270.865 ELTRD= 1269.000  
 2800 NAT Q1= 80.41 WSELK= 1271.55 ENC Q1= 80.41 WSEL= 1272.55 RATIO= .0000  
 NAT Q1= 175. RATIOS LOB, CH, ROB= .0000 .1019 .8981 WSEL= 1272.55  
 WATER EL=CHANGE FROM NATURAL PROFILES BRIDGE

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

3470 ENCROACHMENT STATIONS=	645.0	803.8	TYPE=	4	TARGET=	.540				
.330	6.78	1272.58	.00	1271.55	1273.01	.43	.67	.52	1273.00	
1540.0	.0	866.9	673.1	.0	129.3	292.8	15.8	9.4	1271.00	
.11	.00	6.71	2.30	.000	.050	.120	.000	1265.80	645.84	
.011114	40.	40.	40.	0	0	0	.00	158.00	803.84	

\*SECNO .340  
 2800 NAT Q1= 137.29 WSELK= 1272.48 ENC Q1= 137.29 WSEL= 1273.48 RATIO= .0000  
 NAT Q1= 310. RATIOS LOB, CH, ROB= .0000 .4321 .5679 WSEL= 1273.48  
 3280 CROSS SECTION .34 EXTENDED .09 FEET

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS=	290.0	346.7	TYPE=	4	TARGET=	.557				
.340	6.08	1273.08	.00	1272.48	1274.38	1.29	.68	.69	1274.00	
1540.0	.0	1511.5	28.5	.0	164.3	14.7	16.1	9.5	1271.60	
.11	.00	9.20	1.94	.000	.050	.120	.000	1267.00	293.14	
.017201	52.	50.	48.	2	0	0	.00	53.51	346.65	

CCHV= .100 CEHV= .300  
 \*SECNO .420  
 2800 NAT Q1= 111.54 WSELK= 1279.19 ENC Q1= 125.85 WSEL= 1280.19 RATIO= -.1283  
 NAT Q1= 217. RATIOS LOB, CH, ROB= .0000 .5798 .4202 WSEL= 1280.19

3470 ENCROACHMENT STATIONS=	200.0	260.0	TYPE=	4	TARGET=	.420				
.420	4.33	1280.33	.00	1279.19	1281.30	.98	6.90	.03	1282.00	
1540.0	.0	1540.0	.0	.0	194.2	.0	18.0	10.0	1277.00	
.13	.00	7.93	.00	.000	.050	.000	.000	1276.00	205.58	
.014335	420.	440.	450.	4	0	0	.00	54.42	260.00	

1 08AUG96 11:58:25

PAGE 12

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

\*SECNO .530  
 2800 NAT Q1= 77.43 WSELK= 1289.93 ENC Q1= 134.55 WSEL= 1290.93 RATIO= -.7378  
 NAT Q1= 135. RATIOS LOB, CH, ROB= .0069 .9931 .0000 WSEL= 1290.93

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .56

3470 ENCROACHMENT STATIONS= 327.0 400.0 TYPE= 4 TARGET= .007  
 .530 3.42 1289.82 1289.64 1289.93 1290.78 .97 9.48 .00 1290.00  
 1100.0 .0 1100.0 .0 .0 139.4 .0 20.1 10.7 1293.00  
 .15 .00 7.89 .00 .000 .050 .000 .000 1286.40 328.32  
 .023037 525. 550. 600. 11 15 0 .00 59.62 387.94

\*SECNO .580  
 2800 NAT Q1= 88.57 WSELK= 1294.84 ENC Q1= 135.23 WSEL= 1295.84 RATIO= -.5267  
 NAT Q1= 135. RATIOS LOB, CH, ROB= .0000 1.0000 .0000 WSEL= 1295.84

3470 ENCROACHMENT STATIONS= 243.0 342.0 TYPE= 4 TARGET= .000  
 .580 3.93 1294.93 .00 1294.84 1295.77 .84 4.98 .01 1300.00  
 1100.0 .0 1100.0 .0 .0 149.2 .0 21.0 11.1 1308.00  
 .16 .00 7.37 .00 .000 .050 .000 .000 1291.00 252.58  
 .014141 250. 280. 300. 4 0 0 .00 47.91 300.48

CCHV= .600 CEHV= .800

\*SECNO .590  
 2800 NAT Q1= 62.76 WSELK= 1299.07 ENC Q1= 99.96 WSEL= 1300.07 RATIO= -.5926  
 NAT Q1= 100. RATIOS LOB, CH, ROB= .0000 1.0000 .0000 WSEL= 1300.07

3301 HV CHANGED MORE THAN HVINS

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

3470 ENCROACHMENT STATIONS= 430.0 510.0 TYPE= 4 TARGET= .000  
 .590 7.06 1299.06 1299.06 1299.07 1300.45 1.39 1.01 .43 1300.00  
 1100.0 .0 1100.0 .0 .0 116.4 .0 21.2 11.1 1306.00  
 .16 .00 9.45 .00 .000 .050 .000 .000 1292.00 434.16  
 .031010 52. 50. 48. 20 17 0 .00 43.93 478.09

1 08AUG96 11:58:25

PAGE 13

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

SPECIAL BRIDGE

SB XK XKOR COFQ RDLEN BWC BWP BAREA SS ELCHU ELCHD  
 .00 1.69 2.80 .00 5.50 .00 23.70 .00 1301.00 1292.00

\*SECNO .620  
 2800 NAT Q1= 263.11 WSELK= 1311.95 ENC Q1= 324.85 WSEL= 1312.95 RATIO= -.2346  
 NAT Q1= 394. RATIOS LOB, CH, ROB= .1751 .8249 .0000 WSEL= 1312.95  
 WATER EL=CHANGE FROM NATURAL PROFILES BRIDGE  
 3280 CROSS SECTION .62 EXTENDED 1.94 FEET

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 3.88

3470 ENCROACHMENT STATIONS= 470.0 545.0 TYPE= 4 TARGET= .175  
 .620 10.94 1311.94 .00 1311.95 1312.13 .19 1.10 .72 1312.00  
 1100.0 .0 1100.0 .0 .0 312.9 .0 22.2 11.4 1313.00  
 .17 .00 3.52 .00 .000 .050 .000 .000 1301.00 470.10  
 .002063 210. 210. 210. 0 0 9 .00 68.63 538.74

\*SECNO .630  
 2800 NAT Q1= 490.29 WSELK= 1312.11 ENC Q1= 604.82 WSEL= 1313.11 RATIO= -.2336  
 NAT Q1= 606. RATIOS LOB, CH, ROB= .0017 .9983 .0000 WSEL= 1313.11

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

3470 ENCROACHMENT STATIONS= 77.0 155.0 TYPE= 4 TARGET= .002  
 .630 10.17 1312.17 .00 1312.11 1312.25 .08 .04 .07 1312.00  
 1100.0 .0 1100.0 .0 .0 487.1 .0 22.7 11.5 1314.00  
 .18 .00 2.26 .00 .000 .050 .000 .000 1302.00 77.00  
 .000492 48. 50. 52. 2 0 0 .00 72.50 149.50

CCHV= .100 CEHV= .300

\*SECNO .700  
 2800 NAT Q1= 66.07 WSELK= 1316.27 ENC Q1= 95.66 WSEL= 1317.27 RATIO= -.4479  
 NAT Q1= 96. RATIOS LOB, CH, ROB= .0000 1.0000 .0000 WSEL= 1317.27

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL

1 08AUG96 11:58:25

PAGE 14

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

3693 PROBABLE MINIMUM SPECIFIC ENERGY  
 3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=	540.0	608.0	TYPE=	4	TARGET=	.000			
.700	6.27	1316.27	1316.27	1316.27	1318.00	1.72	.49	.49	1323.80
1100.0	.0	1100.0	.0	.0	104.4	.0	24.9	11.9	1325.00
.19	.00	10.54	.00	.000	.050	.000	.000	1310.00	556.36
.027742	320.	320.	330.	20	14	0	.00	31.06	587.43

1  
 PROFILE FOR STREAM 100 YR W/ 1' ENCROACH

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

ELEVATION	1243.	1253.	1263.	1273.	1283.	1293.	1303.	1313.	1323.	1333.
SECNO	CUMDIS									
.05	0.	ILE	.	.	.	.	.	.	.	.
	50.	CILE	.	.	.	.	.	.	.	.
	100.	CI LE	.	.	.	.	.	.	.	.
	150.	C IL E	.	.	.	.	.	.	.	.
	200.	C ILWE	.	.	.	.	.	.	.	.
	250.	C ILWE	.	.	.	.	.	.	.	.
	300.	C I LE	.	.	.	.	.	.	.	.
	350.	C I LE	.	.	.	.	.	.	.	.
	400.	C I L E	.	.	.	.	.	.	.	.
	450.	C I L E	.	.	.	.	.	.	.	.
.14	500.	C I L E	.	.	.	.	.	.	.	.
	550.	C I L E	.	.	.	.	.	.	.	.
	600.	C I.LWE	.	.	.	.	.	.	.	.
	650.	C I.RLE	.	.	.	.	.	.	.	.
	700.	C I R E	.	.	.	.	.	.	.	.
	750.	C I RWE	.	.	.	.	.	.	.	.
	800.	C I RWE	.	.	.	.	.	.	.	.
	850.	C I RWEL	.	.	.	.	.	.	.	.
.21	900.	C I RWEL	.	.	.	.	.	.	.	.
	950.	C I RWEL	.	.	.	.	.	.	.	.
	1000.	C I RWEL	.	.	.	.	.	.	.	.
	1050.	C I RWEL	.	.	.	.	.	.	.	.
	1100.	C I RWEL	.	.	.	.	.	.	.	.
	1150.	C I RWEL	.	.	.	.	.	.	.	.
	1200.	C I.RWE L	.	.	.	.	.	.	.	.
	1250.	C I.R WE L	.	.	.	.	.	.	.	.
	1300.	C I R WE L	.	.	.	.	.	.	.	.
	1350.	C I R WE L	.	.	.	.	.	.	.	.
.30	1400.	C I R EM L	.	.	.	.	.	.	.	.
	1450.	C I RWEL	.	.	.	.	.	.	.	.
.32	1500.	C I RWEL	.	.	.	.	.	.	.	.
.33	1550.	C I R E	.	.	.	.	.	.	.	.
.34	1600.	C I RWE	.	.	.	.	.	.	.	.
	1650.	C I R WE	.	.	.	.	.	.	.	.
	1700.	C I R WE	.	.	.	.	.	.	.	.
	1750.	C I R WE	.	.	.	.	.	.	.	.
	1800.	C I R WE	.	.	.	.	.	.	.	.
	1850.	C I R WEL	.	.	.	.	.	.	.	.
	1900.	C I R WEM	.	.	.	.	.	.	.	.
	1950.	C I R WEM	.	.	.	.	.	.	.	.
.42	2000.	C IR WELM	.	.	.	.	.	.	.	.
	2050.	C IR WELM	.	.	.	.	.	.	.	.
	2100.	C I R WE M	.	.	.	.	.	.	.	.
	2150.	C I R WE M	.	.	.	.	.	.	.	.
	2200.	C I RWEM	.	.	.	.	.	.	.	.
	2250.	C I RWEM	.	.	.	.	.	.	.	.
	2300.	C I R E M	.	.	.	.	.	.	.	.
	2350.	C I WE M	.	.	.	.	.	.	.	.
	2400.	C I WERM	.	.	.	.	.	.	.	.
	2450.	C I WERM	.	.	.	.	.	.	.	.
	2500.	C I WE R	.	.	.	.	.	.	.	.
.53	2550.	C I WE R	.	.	.	.	.	.	.	.
	2600.	C I WE.M R	.	.	.	.	.	.	.	.
	2650.	C I WELM R	.	.	.	.	.	.	.	.
	2700.	C I E L M R	.	.	.	.	.	.	.	.
	2750.	C I WE LM R	.	.	.	.	.	.	.	.
	2800.	C I WE L R	.	.	.	.	.	.	.	.
.58	2850.	C I WE L R	.	.	.	.	.	.	.	.
.59	2900.	C I WE M R	.	.	.	.	.	.	.	.
	2950.	C I WE M R	.	.	.	.	.	.	.	.
	3000.	C I WE M R	.	.	.	.	.	.	.	.
	3050.	C I WE R	.	.	.	.	.	.	.	.
.62	3100.	C I WE R	.	.	.	.	.	.	.	.
.63	3150.	C I WE R	.	.	.	.	.	.	.	.
	3200.	C I WE R	.	.	.	.	.	.	.	.
	3250.	C I WE LR	.	.	.	.	.	.	.	.
	3300.	C I WE LR	.	.	.	.	.	.	.	.
	3350.	C I WE LMR	.	.	.	.	.	.	.	.
	3400.	C I WE L R	.	.	.	.	.	.	.	.
	3450.	C I WE MLR	.	.	.	.	.	.	.	.
.70	3500.	C I WE MLR	.	.	.	.	.	.	.	.

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 08AUG96 11:58:25

PAGE 15

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 HEC-2 WATER SURFACE PROFILES

THIS RUN EXECUTED 08AUG96 11:58:28

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

100 YEAR PROFILE RUN  
 SUMMARY PRINTOUT

	CWSEL	.01K	STENCL	STENCR	ELENCL	ELENCR	K*CHSL
	1244.400	161.68	.00	.00	.00	.00	.00
	1244.700	61.30	1609.83	2118.00	100000.00	100000.00	.00
*	1252.466	106.76	.00	.00	.00	.00	14.00
*	1254.041	191.59	977.23	1418.79	100000.00	100000.00	14.00
	1259.319	130.46	.00	.00	.00	.00	15.38
*	1258.878	91.25	750.00	827.00	100000.00	100000.00	15.38
	1267.512	111.67	.00	.00	.00	.00	16.33
*	1268.795	131.93	718.00	885.76	100000.00	100000.00	16.33
*	1269.838	90.74	.00	.00	.00	.00	6.02
*	1270.865	92.37	635.00	716.41	100000.00	100000.00	6.02
	1271.553	80.41	.00	.00	.00	.00	32.50
*	1272.580	146.08	645.00	803.84	100000.00	100000.00	32.50
*	1272.483	137.29	.00	.00	.00	.00	24.00
	1273.085	117.42	290.00	346.65	100000.00	100000.00	24.00
	1279.185	111.54	.00	.00	.00	.00	20.45
	1280.327	128.62	200.00	260.00	100000.00	100000.00	20.45
*	1289.931	77.43	.00	.00	.00	.00	18.91
*	1289.817	72.47	327.00	400.00	100000.00	100000.00	18.91
	1294.835	88.57	.00	.00	.00	.00	16.43
	1294.930	92.50	243.00	342.00	100000.00	100000.00	16.43
*	1299.069	62.76	.00	.00	.00	.00	20.00
*	1299.060	62.47	430.00	510.00	100000.00	100000.00	20.00

1 08AUG96 11:58:25

PAGE 16

	CWSEL	.01K	STENCL	STENCR	ELENCL	ELENCR	K*CHSL
*	1311.952	263.11	.00	.00	.00	.00	42.86
*	1311.943	242.16	470.00	545.00	100000.00	100000.00	42.86
*	1312.107	490.29	.00	.00	.00	.00	20.00
*	1312.167	496.14	77.00	155.00	100000.00	100000.00	20.00
*	1316.273	66.07	.00	.00	.00	.00	25.00
*	1316.272	66.04	540.00	608.00	100000.00	100000.00	25.00

1 08AUG96 11:58:25

PAGE 17

SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO= 1244.400 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE  
 WARNING SECNO= 1244.400 PROFILE= 2 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE  
 CAUTION SECNO= 1244.400 PROFILE= 2 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 1244.400 PROFILE= 2 MINIMUM SPECIFIC ENERGY  
 WARNING SECNO= 1244.400 PROFILE= 2 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE  
 CAUTION SECNO= 1244.400 PROFILE= 1 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 1244.400 PROFILE= 1 MINIMUM SPECIFIC ENERGY  
 CAUTION SECNO= 1244.400 PROFILE= 2 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 1244.400 PROFILE= 2 MINIMUM SPECIFIC ENERGY  
 WARNING SECNO= 1244.400 PROFILE= 2 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE  
 CAUTION SECNO= 1244.400 PROFILE= 1 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 1244.400 PROFILE= 1 MINIMUM SPECIFIC ENERGY  
 WARNING SECNO= 1244.400 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE  
 WARNING SECNO= 1244.400 PROFILE= 2 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE  
 CAUTION SECNO= 1244.400 PROFILE= 1 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 1244.400 PROFILE= 1 MINIMUM SPECIFIC ENERGY  
 CAUTION SECNO= 1244.400 PROFILE= 2 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 1244.400 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY  
 CAUTION SECNO= 1244.400 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL  
 WARNING SECNO= 1244.400 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE  
 WARNING SECNO= 1244.400 PROFILE= 2 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE  
 WARNING SECNO= 1244.400 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE  
 WARNING SECNO= 1244.400 PROFILE= 2 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE  
 CAUTION SECNO= 1244.400 PROFILE= 1 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 1244.400 PROFILE= 1 MINIMUM SPECIFIC ENERGY  
 CAUTION SECNO= 1244.400 PROFILE= 2 CRITICAL DEPTH ASSUMED  
 CAUTION SECNO= 1244.400 PROFILE= 2 PROBABLE MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 1244.400 PROFILE= 2 20 TRIALS ATTEMPTED TO BALANCE WSEL

**REVISED OR POST-DEVELOPED HEC-2 MODEL**



T1 FLYNN LANE WASH FLOODPLAIN DELINEATION FILE:MA11REV1.HC2

T2 STATIONING IS LEFT TO RIGHT, LOOKING DOWNSTREAM

T3 FLYNN LANE WASH REVISED OR POST-DEVELOPED MODEL 100 YR MODEL

J	-1	2	0	0	0	0			1240.7	
J2	1						-1			
J3	1.0	34.00	27.00	28.00	31.00	32.00	33.00	150	200	
QT	2	1700	1700							
ET			9.1					1515.14	1648.50	
NC	.013	.013	.013	.1	.3					
*	ENTRANCE INTO ARIZONA CANAL DIVERSION CHANNEL (ACDC)									
X1	0	10	1593.5	1648.5	0	0	0			
GR1240.4		400	1240.3	882	1239.3	892	1239.3	918	1240.3	928
GR1240.1		1593.5	1239.1	1603.5	1239.1	1638.5	1240.1	1648.5	1242	1680
ET			9.1						900	1149
NC	.1	.1	.016							
X1	.016	20	1080	1124	140	160	150			
GR	1245	120	1244	200	1243.5	300	1243.4	550	1244	700
GR1244.5		800	1244.5	1000	1244	1065	1243.65	1077	1243.46	1080
GR1243.9		1084	1242.82	1084.5	1242.12	1100	1242.27	1104.5	1243.05	1119.5
GR1243.5		1120	1244.77	1124	1244.84	1134	1246	1250	1250	1500
ET			9.1					2078.50	2132.50	
X1	.037	21	2078.5	2132.5	110	115	115			
GR	1246	1200	1244	1330	1245	1460	1244	1550	1245	1700
GR1245.5		1800	1245.5	1900	1245	2000	1244.5	2070	1244.1	2078.5
GR1244.0		2083.5	1243.5	2084	1242.8	2100	1242.9	2103	1243.5	2118
GR1243.8		2118.5	1243.9	2122.5	1244.4	2132.5	1246	2160	1248	2290
GR	1250	2400								
ET			9.1						1080.0	1132.0
*	19TH STREET & OCOTILLO									
X1	.055	21	1080	1132	125	95	95			
GR1247.5		320	1246	460	1246.5	580	1245.5	700	1246	720
GR	1246	820	1247	900	1246.5	970	1246.5	1050	1246	1080
GR1245.7		1080	1245.1	1084.5	1244.4	1100	1244.6	1102	1245.4	1117.5
GR1245.7		1118	1245.8	1122	1246.4	1132	1248	1140	1248	1200
GR	1250	1365								
ET			9.1					1035.24	1150	
X1	.080	22	1083.5	1118	200	137	130			
GR1250.5		470.0	1250.0	500.0	1248.0	600.0	1249.8	675.0	1250.0	750.0
GR1248.5		840.0	1249.0	900.0	1249.0	1050.0	1248.5	1075.0	1248.7	1078.5
GR1248.6		1083.5	1248.1	1084	1247.3	1100	1247.5	1102	1248.4	1117.5
GR1248.7		1118	1248.8	1122	1249.2	1129	1249.8	1140	1250.0	1148.5
GR1252.0		1360	1254.0	1450						
ET			9.1					1070.50	1150.00	
X1	.100	20	1070.5	1150	100	100	105			
GR	1252	500	1251	600	1250	680	1249	720	1250	770
GR	1252	850	1250	930	1250	1000	1252	1050	1251.6	1070.5
GR1250.4		1083.5	1249.8	1084	1249.0	1100	1249.1	1102	1250.0	1118
GR1250.3		1118.5	1250.4	1122.5	1251	1150	1252	1380	1254	1470
ET			9.1					1076.50	1130.30	
X1	.116	16	1076.5	1130.3	90	80	80			
GR	1254	600	1252	630	1251	750	1251	800	1252	870
GR1253.6		1000	1253	1050	1252.2	1076.5	1250.2	1081.5	1250.5	1082
GR1250.2		1100	1250.2	1115.8	1250.5	1120.3	1252.3	1130.3	1253	1200
GR	1254	1400								
ET			9.1					1006.75	1140.14	
NC	.1	.1	.035							
X1	.158	14	1000	1140.14	160	310	220			
GR1255.5		710	1254	820	1254	900	1256	1000	1254.5	1036.9
GR1253.9		1057.2	1253.65	1083.3	1253.01	1092.8	1252.6	1100	1252.8	1103.44

GR1253.6	1119.64	1254.12	1140.14	1256	1320	1258	1440		
* Dip crossing at 20th Street									
ET		9.1						1025.0	1198.0
NC	.016	.016	.016						
X1	.71	15	1061	1158.5	50	60	68		
GR1256.5	680	1255	760	1256	820	1257	940	1256	1000
GR1256.8	1061	1254.39	1078	1253.78	1085	1253.12	1100	1253.9	1143
GR1254.4	1143.5	1254.55	1148.5	1255.61	1158.5	1256	1200	1258	1300
ET		9.1						1033.1	1145.0
NC	.09	.12	.05						
X1	.188	15	1063.1	1115	140	25	90		
GR 1259	760	1258	790	1258	840	1260	860	1260	1000
GR1258.2	1063.1	1257.34	1072.5	1258.5	1085.1	1253.67	1093.7	1253.4	1100
GR1253.9	1104.7	1257.25	1115	1256.8	1223	1258	1300	1260	1390
ET		9.1						1030	1134
X1	.217	14	1059.5	1134.7	160	150	150		
GR 1264	750	1262	770	1262	900	1261.5	950	1262	990
GR1262.4	1020	1260.6	1059.5	1260.19	1072.5	1259.95	1083.7	1255.99	1095.9
GR1255.5	1100	1255.5	1103	1261.48	1122.6	1263.82	1134.7		
ET		9.1						1020.8	1153.72
X1	.262	17	1056.8	1123	220	260	240		
GR 1269	600	1268	760	1266	900	1264	920	1263.8	930
GR 1264	970	1264.8	1010	1264.6	1056.8	1264.4	1066.2	1264.3	1087.2
GR1259.8	1095.7	1259.59	1100	1260.3	1108.3	1266.4	1119.8	1266.7	1123
GR 1268	1140	1270	1190						
ET		9.1						1057.60	1118.29
X1	.287	14	1057.6	1130.1	120	130	130		
GR 1272	660	1270	750	1268	850	1266	900	1266	950
GR1267.5	980	1267.4	1057.6	1266.77	1061.4	1266.55	1084.3	1261.6	1093.7
GR 1268	1100	1262.4	1108	1268.88	1118.8	1269.60	1130.1		
ET		9.1						1064.30	1119.07
X1	.304	15	1064.3	1122.3	80	100	90		
GR 1272	760	1270	900	1268	920	1267.5	950	1268	970
GR 1269	1030	1268	1055	1267.5	1064.3	1267.1	1070.4	1267.56	1086.6
GR1263.1	1092.7	1262.6	1100	1263.6	1103.8	1271.08	1122.3	1271.95	1125.4
ET		9.1						1061.80	1112.39
NC			.6	.8					
QT	2	1540	1540						
X1	.320	11	1061.8	1137.7	50	90	85		
X3	10							1270.87	1272.32
GR 1272	870	1270	980	1270	1050	1269.6	1061.8	1270.8	1086.8
GR1264.3	1090.8	1264.49	1095.8	1264.45	1104.2	1264.0	1107.7	1272.3	1112.7
GR1273.0	1137.7								
ET		9.1						1057.30	1141.46
* 2-6' diameter culverts at 21st Street									
NC	.016	.016	.016						
SC 2.013	.5	2.6		6		64	1.3	1265.73	1264.47
X1	.333	12	1087.3	1112.7	64	64	64		
X2		2		1271.15					
X3	10							1271.95	1274.01
BT -12	900	1273		980	1272		1050	1271	
BT	1062.3	1271.15		1087.3	1271.95		1092.3	1272.61	
BT	1095.8	1272.88		1104.2	1272.73		1107.7	1273.05	
BT	1112.7	1274.01		1137.7	1275.0		1200	1276.0	
GR 1273	900	1272	980	1271	1050	1271.15	1062.3	1271.95	1087.3
GR 1273	1092.3	1265.76	1095.8	1265.71	1104.2	1266.01	1107.7	1274.01	1112.7
GR1275.0	1137.7	1276.0	1200						
ET		9.1						1072.00	1128.34
NC	.09	.12	.05						
X1	.347	10	1082	1125.5	50	70	75		

GR 1276	930	1276	1030	1274	1070	1271.9	1076.5	1271.7	1082
GR1268.9	1091	1268.45	1100	1269.33	1112.5	1275.6	1125.5	1275.8	1131
ET		9.1						1029.50	1173.85
NC			.1	.3					
X 0.58	12	1084.5	1123	60	50	60			
GR 1276	960	1274	1070	1273.7	1080.5	1273.3	1084.5	1269.7	1091
GR1269.6	1100	1269.95	1108	1269.9	1110	1275.4	1123	1275.7	1125
GR 1276	1190	1278	1240						
ET		10.4							
X1 0.42	10	200	260	330	330	330			
GR1287.0	0	1284.0	143	1282.0	200	1276.0	220	1276.0	240
GR1277.0	260	1278.0	362	1280.0	518	1282.0	685	1283.0	812
QT 2	1100	1100							
X1 0.53	13	327	400	525	600	550			
GR1296.0	100	1295.0	218	1290.0	327	1286.4	353	1286.4	375
GR1293.0	400	1293.5	424	1292.0	455	1294.0	490	1294.0	565
GR1292.0	690	1291.0	728	1292.5	752				
NC 0.12	0	0	0	0					
X1 0.58	7	243	342	250	300	280			
GR1300.0	0	1300.0	128	1301.0	168	1300.0	243	1291.0	260
GR1291.0	288	1308.0	342						
NC 0	0	0	.6	.8					
X1 0.59	10	430	510	52	48	50			
GR1303.0	200	1302.0	300	1300.0	430	1294.8	453	1292.8	453.8
GR1292.0	455.8	1292.8	457.8	1294.8	458.5	1306.0	510	1307.0	564
SB 0	1.69	2.80	0	5.5	0	23.7	0	1301.0	1292.0
X1 0.62	11	470	545	210	210	210			
X2 0	0	1	0	0	0	0	0	0	0
BT 11	200	1310.0	1300.0	376	1312.0	1300.0	427	1313.0	1300.0
E 470	1312.0	1300.0	485	1312.0	1303.8	485.8	1312.0	1305.8	487.8
BT1312.5	1306.5	489.8	1313.0	1305.8	490.5	1313.0	1303.8	545	1313.0
BT1300.0	730	1314.0	1300.0						
GR1310.0	200	1312.0	376	1313.0	427	1312.0	470	1303.8	485
GR1301.8	485.8	1301.0	487.8	1301.8	489.8	1303.8	490.5	1313.0	545
GR1314.0	730								

EJ

T1	FLYNN LANE WASH 100 YEAR PROFILE WITH 1' ENCROACHMENT								
T3	100 YR PROF W/ 1' ENCROA								
J1	3			0				1241.7	
J2	2								

ER

THIS RUN EXECUTED 29OCT96 9:57:26

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HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991

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T1 FLYNN LANE WASH FLOODPLAIN DELINEATION FILE:MA11REV1.HC2  
 T2 STATIONING IS LEFT TO RIGHT, LOOKING DOWNSTREAM  
 T3 FLYNN LANE WASH REVISED OR POST-DEVELOPED MODEL 100 YR MODEL

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	-1	2	0	0	0	0			1240.7	
J2	NPROF	IPLT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	1							-1		

J3 VARIABLE CODES FOR SUMMARY PRINTOUT

	.0	34.00	27.00	28.00	31.00	32.00	33.00	150	200		
QT	2	1700	1700								
ET			9.1							1515.14	1648.50
NC	.013	.013	.013	.1	.3						
ENTRANCE INTO ARIZONA CANAL DIVERSION CHANNEL (ACDC)											
X1	0	10	1593.5	1648.5	0	0	0				
GR	1240.4	400	1240.3	882	1239.3	892	1239.3	918	1240.3	928	
GR	1240.1	1593.5	1239.1	1603.5	1239.1	1638.5	1240.1	1648.5	1242	1680	
ET			9.1						900	1149	
NC	.1	.1	.016								
X1	.016	20	1080	1124	140	160	150				
GR	1245	120	1244	200	1243.5	300	1243.4	550	1244	700	
GR	1244.5	800	1244.5	1000	1244	1065	1243.65	1077	1243.46	1080	
GR	1243.9	1084	1242.82	1084.5	1242.12	1100	1242.27	1104.5	1243.05	1119.5	
GR	1243.5	1120	1244.77	1124	1244.84	1134	1246	1250	1250	1500	
ET			9.1						2078.50	2132.50	
X1	.037	21	2078.5	2132.5	110	115	115				
GR	1246	1200	1244	1330	1245	1460	1244	1550	1245	1700	
GR	1245.5	1800	1245.5	1900	1245	2000	1244.5	2070	1244.1	2078.5	
GR	1244.0	2083.5	1243.5	2084	1242.8	2100	1242.9	2103	1243.5	2118	
GR	1243.8	2118.5	1243.9	2122.5	1244.4	2132.5	1246	2160	1248	2290	
GR	1250	2400									

9.1  
 19TH STREET & Ocotillo

1080.0 1132.0

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

\*SECNO 0.262

3470 ENCROACHMENT STATIONS=	1020.8	1153.7	TYPE=	1	TARGET=	132.920			
0.262	6.32	1265.91	0.00	1265.96	1266.97	1.06	3.83	0.07	1264.60
1700.0	119.3	1580.7	0.0	44.9	185.6	0.0	8.2	3.6	1266.70
0.05	2.66	8.52	0.00	0.090	0.050	0.000	0.000	1259.59	1020.80
0.020138	220.	240.	260.	2	0	0	0.00	98.10	1118.90

\*SECNO 0.287

3470 ENCROACHMENT STATIONS=	1057.6	1118.3	TYPE=	1	TARGET=	60.690			
0.287	6.70	1268.30	0.00	1267.70	1269.40	1.10	2.42	0.01	1267.40
1700.0	0.0	1700.0	0.0	0.0	202.1	0.0	8.8	3.8	100000.00
0.05	0.00	8.41	0.00	0.000	0.050	0.000	0.000	1261.60	1057.60
0.017312	120.	130.	130.	2	0	0	0.00	60.23	1117.83

\*SECNO 0.304

3470 ENCROACHMENT STATIONS=	1064.3	1119.1	TYPE=	1	TARGET=	54.770			
0.304	7.19	1269.79	0.00	1269.14	1270.85	1.06	1.44	0.00	1267.50
1700.0	0.0	1700.0	0.0	0.0	205.7	0.0	9.2	3.9	100000.00
0.06	0.00	8.26	0.00	0.000	0.050	0.000	0.000	1262.60	1064.30
0.014925	80.	90.	100.	2	0	0	0.00	54.77	1119.07

CCHV= 0.600 CEHV= 0.800

\*SECNO 0.320

3470 ENCROACHMENT STATIONS=	1061.8	1112.4	TYPE=	1	TARGET=	50.590			
3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=					1270.87	ELREA=	1272.32		
0.320	7.26	1271.26	0.00	1270.97	1272.49	1.23	1.50	0.14	1269.60
1540.0	0.0	1540.0	0.0	0.0	173.0	0.0	9.6	4.0	100000.00
0.06	0.00	8.90	0.00	0.000	0.050	0.000	0.000	1264.00	1061.80
0.021716	50.	85.	90.	2	0	0	0.00	50.27	1112.07

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

SPECIAL CULVERT

SC	CUNO	CUNV	ENTLC	COFQ	RDLEN	RISE	SPAN	CULVLN	CHRT	SCL	ELCHU	ELCHD
	2	0.013	0.50	2.60	0.00	6.00	0.00	64.00	1	3	1265.73	1264.47

CHART 1 - CONCRETE PIPE CULVERT; NO BEVELED RING ENTRANCE  
 SCALE 3 - GROOVE END ENTRANCE, PIPE PROJECTING FROM FILL

5130, EGIC= 1293.32..MAY BE TOO LARGE IF INLET CONTROLS.  
 5135, EGOC= 1290.65 ..MAY BE TOO LARGE IF OUTLET CONTROLS.  
 \*SECNO 0.333

SPECIAL CULVERT INLET CONTROL + WEIR FLOW, EG = 1273.38  
 SPECIAL CULVERT

EGIC	EGOC	H4	QWEIR	QCULV	VCH	ACULV	ELTRD	WEIRLN
1293.32	1290.65	0.90	949.	600.	10.074	56.5	1271.15	209.

3685 20 TRIALS ATTEMPTED WSEL,CWSEL  
 3710 WSEL ASSUMED BASED ON MIN DIFF

3470 ENCROACHMENT STATIONS= 1057.3 1141.5 TYPE= 1 TARGET= 84.160

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1271.95 ELREA= 1274.01

0.333	7.03	1272.74	0.00	1272.67	1274.18	1.44	0.00	0.00	1271.95
1540.0	157.5	1382.5	0.0	37.7	137.2	0.0	9.9	4.1	1274.01
0.06	4.18	10.07	0.00	0.016	0.016	0.000	0.000	1265.71	1057.30
0.001602	64.	64.	64.	20	0	0	0.00	54.60	1111.90

\*SECNO 0.347

7185 MINIMUM SPECIFIC ENERGY  
 3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= 1072.0 1128.3 TYPE= 1 TARGET= 56.340

0.347	4.91	1273.36	1273.36	1273.36	1275.06	1.69	0.30	0.20	1271.70
1540.0	35.8	1504.2	0.0	11.9	142.5	0.0	10.1	4.2	1275.60
0.06	3.01	10.56	0.00	0.090	0.050	0.000	0.000	1268.45	1072.00
0.023378	50.	75.	70.	2	19	0	0.00	48.86	1120.86

0.100 CEHV= 0.300  
 0.358

7185 MINIMUM SPECIFIC ENERGY  
 3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= 1029.5 1173.8 TYPE= 1 TARGET= 144.350

X	.055	21	1080	1132	125	95	95			
GR	1247.5	320	1246	460	1246.5	580	1245.5	700	1246	720
GR	1246	820	1247	900	1246.5	970	1246.5	1050	1246	1080
GR	1245.7	1080	1245.1	1084.5	1244.4	1100	1244.6	1102	1245.4	1117.5
GR	1245.7	1118	1245.8	1122	1246.4	1132	1248	1140	1248	1200
GR	1250	1365								

ET			9.1						1035.24	1150
X1	.080	22	1083.5	1118	200	137	130			
GR	1250.5	470.0	1250.0	500.0	1248.0	600.0	1249.8	675.0	1250.0	750.0
GR	1248.5	840.0	1249.0	900.0	1249.0	1050.0	1248.5	1075.0	1248.7	1078.5
GR	1248.6	1083.5	1248.1	1084	1247.3	1100	1247.5	1102	1248.4	1117.5
GR	1248.7	1118	1248.8	1122	1249.2	1129	1249.8	1140	1250.0	1148.5
GR	1252.0	1360	1254.0	1450						

ET			9.1						1070.50	1150.00
X1	.100	20	1070.5	1150	100	100	105			
GR	1252	500	1251	600	1250	680	1249	720	1250	770
GR	1252	850	1250	930	1250	1000	1252	1050	1251.6	1070.5
GR	1250.4	1083.5	1249.8	1084	1249.0	1100	1249.1	1102	1250.0	1118
GR	1250.3	1118.5	1250.4	1122.5	1251	1150	1252	1380	1254	1470

ET			9.1						1076.50	1130.30
X1	.116	16	1076.5	1130.3	90	80	80			
GR	1254	600	1252	630	1251	750	1251	800	1252	870
GR	1253.6	1000	1253	1050	1252.2	1076.5	1250.2	1081.5	1250.5	1082
GR	1250.2	1100	1250.2	1115.8	1250.5	1120.3	1252.3	1130.3	1253	1200
GR	1254	1400								

ET			9.1						1006.75	1140.14
NC	.1	.1	.035							
X1	.158	14	1000	1140.14	160	310	220			
GR	1255.5	710	1254	820	1254	900	1256	1000	1254.5	1036.9
GR	1253.9	1057.2	1253.65	1083.3	1253.01	1092.8	1252.6	1100	1252.8	1103.44
GR	1253.6	1119.64	1254.12	1140.14	1256	1320	1258	1440		

Dip crossing at 20th Street

ET			9.1						1025.0	1198.0
NC	.016	.016	.016							
X1	.171	15	1061	1158.5	50	60	68			
GR	1256.5	680	1255	760	1256	820	1257	940	1256	1000
GR	1256.8	1061	1254.39	1078	1253.78	1085	1253.12	1100	1253.9	1143
GR	1254.4	1143.5	1254.55	1148.5	1255.61	1158.5	1256	1200	1258	1300

ET			9.1						1033.1	1145.0
NC	.09	.12	.05							
X1	.188	15	1063.1	1115	140	25	90			
GR	1259	760	1258	790	1258	840	1260	860	1260	1000
GR	1258.2	1063.1	1257.34	1072.5	1258.5	1085.1	1253.67	1093.7	1253.4	1100
GR	1253.9	1104.7	1257.25	1115	1256.8	1223	1258	1300	1260	1390



ET			9.1						1030	1134
X1	.217	14	1059.5	1134.7	160	150	150			
GR	1264	750	1262	770	1262	900	1261.5	950	1262	990
GR	1262.4	1020	1260.6	1059.5	1260.19	1072.5	1259.95	1083.7	1255.99	1095.9
GR	1255.5	1100	1255.5	1103	1261.48	1122.6	1263.82	1134.7		

ET			9.1						1020.8	1153.72
X1	.262	17	1056.8	1123	220	260	240			
GR	1269	600	1268	760	1266	900	1264	920	1263.8	930
GR	1264	970	1264.8	1010	1264.6	1056.8	1264.4	1066.2	1264.3	1087.2
GR	1259.8	1095.7	1259.59	1100	1260.3	1108.3	1266.4	1119.8	1266.7	1123
GR	1268	1140	1270	1190						

ET			9.1						1057.60	1118.29
X1	.287	14	1057.6	1130.1	120	130	130			
GR	1272	660	1270	750	1268	850	1266	900	1266	950
GR	1267.5	980	1267.4	1057.6	1266.77	1061.4	1266.55	1084.3	1261.6	1093.7
GR	1261.8	1100	1262.4	1108	1268.88	1118.8	1269.60	1130.1		

ET			9.1						1064.30	1119.07
X1	.304	15	1064.3	1122.3	80	100	90			
GR	1272	760	1270	900	1268	920	1267.5	950	1268	970
GR	1269	1030	1268	1055	1267.5	1064.3	1267.1	1070.4	1267.56	1086.6
GR	1263.1	1092.7	1262.6	1100	1263.6	1103.8	1271.08	1122.3	1271.95	1125.4

ET			9.1						1061.80	1112.39
NC				.6	.8					
QT	2	1540	1540							
X1	.320	11	1061.8	1137.7	50	90	85			
X3	10							1270.87	1272.32	
GR	1272	870	1270	980	1270	1050	1269.6	1061.8	1270.8	1086.8
GR	1264.3	1090.8	1264.49	1095.8	1264.45	1104.2	1264.0	1107.7	1272.3	1112.7
GR	1273.0	1137.7								

ET			9.1						1057.30	1141.46
2-6' diameter culverts at 21st Street										
NC	.016	.016	.016							
SC	2.013	.5	2.6		6		64	1.3	1265.73	1264.47
X1	.333	12	1087.3	1112.7	64	64	64			
X2			2		1271.15					
X3	10							1271.95	1274.01	
BT	-12	900	1273		980	1272		1050	1271	
BT		1062.3	1271.15		1087.3	1271.95		1092.3	1272.61	
BT		1095.8	1272.88		1104.2	1272.73		1107.7	1273.05	
BT		1112.7	1274.01		1137.7	1275.0		1200	1276.0	
GR	1273	900	1272	980	1271	1050	1271.15	1062.3	1271.95	1087.3
GR	1266.6	1092.3	1265.76	1095.8	1265.71	1104.2	1266.01	1107.7	1274.01	1112.7
GR	1275.0	1137.7	1276.0	1200						

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

\*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= 0.100 CEHV= 0.300

\*SECNO 0.000

3280 CROSS SECTION 0.00 EXTENDED 0.30 FEET

0.000	1.60	1240.70	1240.62	1240.70	1240.84	0.14	0.00	0.00	1240.10
1700.0	1327.8	367.2	5.0	555.8	78.0	3.0	0.0	0.0	1240.10
0.00	2.39	4.71	1.67	0.013	0.013	0.013	0.000	1239.10	400.00
0.001067	0.	0.	0.	0	8	0	0.00	1258.45	1658.45

NATURAL  
PROFILE 1

\*SECNO 0.016

7185 MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

0.016	2.87	1244.99	1244.99	0.00	1245.52	0.53	0.24	0.12	1243.46
1700.0	883.9	815.5	0.7	981.2	97.0	3.0	2.8	3.7	1244.77
0.01	0.90	8.41	0.22	0.100	0.016	0.100	0.000	1242.12	120.70
0.002956	140.	150.	160.	0	17	0	0.00	1028.42	1149.12

\*SECNO 0.037

7185 MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

0.037	3.06	1245.86	1245.86	0.00	1246.45	0.59	0.29	0.02	1244.10
1700.0	666.6	1022.8	10.6	863.4	128.6	18.3	5.4	6.2	1244.40
0.02	0.77	7.96	0.58	0.100	0.016	0.100	0.000	1242.80	1209.19
0.002327	110.	115.	115.	0	8	0	0.00	948.38	2157.57

\*SECNO 0.055

7185 MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

0.055	3.08	1247.48	1247.48	0.00	1248.07	0.59	0.27	0.00	1246.00
1700.0	736.4	962.1	1.5	856.3	117.9	2.9	8.2	8.7	1246.40
0.02	0.86	8.16	0.50	0.100	0.016	0.100	0.000	1244.40	321.69
0.002627	125.	95.	95.	0	5	0	0.00	815.72	1137.41

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

\*SECNO 0.080

7185 MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

0.080	3.20	1250.50	1250.50	0.00	1251.17	0.67	0.43	0.02	1248.60
1700.0	813.9	852.5	33.5	823.0	92.5	46.6	12.4	12.1	1248.70
0.03	0.99	9.22	0.72	0.100	0.016	0.100	0.000	1247.30	470.16
0.002681	200.	130.	137.	0	8	0	0.00	730.93	1201.09

\*SECNO 0.100

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

0.100	2.60	1251.60	1251.60	0.00	1252.23	0.63	0.38	0.00	1251.60
1700.0	733.8	946.3	20.0	541.1	112.1	41.3	14.4	13.7	1251.00
0.04	1.36	8.44	0.48	0.100	0.016	0.100	0.000	1249.00	540.06
0.005269	100.	105.	100.	0	14	0	0.00	685.22	1287.85

\*SECNO 0.116

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

0.116	2.94	1253.14	1253.14	0.00	1253.96	0.82	0.29	0.06	1252.20
1700.0	493.8	1190.3	15.9	495.4	137.6	35.9	15.7	15.0	1252.30
0.04	1.00	8.65	0.44	0.100	0.016	0.100	0.000	1250.20	612.93
0.002520	90.	80.	80.	0	8	0	0.00	538.52	1227.54

\*SECNO 0.158

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

0.158	2.69	1255.29	1255.29	0.00	1255.85	0.55	1.07	0.03	1256.00
1700.0	378.1	1234.6	87.3	206.9	178.5	66.0	18.2	17.3	1254.12
0.05	1.83	6.92	1.32	0.100	0.035	0.100	0.000	1252.60	725.08
0.016140	160.	220.	310.	0	11	0	0.00	474.76	1252.49

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

\*SECNO 0.171

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

0.171	3.16	1256.28	1256.28	0.00	1256.83	0.54	0.24	0.00	1256.80
1700.0	283.7	1368.6	47.7	101.2	211.9	21.8	18.7	17.8	1255.61
0.05	2.80	6.46	2.18	0.016	0.016	0.016	0.000	1253.12	691.57
0.001643	50.	68.	60.	0	8	0	0.00	350.48	1214.15

\*SECNO 0.188

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

0.188	5.14	1258.54	1258.54	0.00	1259.21	0.67	0.34	0.04	1258.20
1700.0	56.9	1008.0	635.1	35.1	121.4	258.7	19.4	18.5	1257.25
0.06	1.62	8.30	2.46	0.090	0.050	0.120	0.000	1253.40	773.70
0.026388	140.	90.	25.	0	14	0	0.00	345.14	1324.46

\*SECNO 0.217

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

0.217	6.25	1261.75	1261.63	0.00	1262.93	1.18	3.57	0.15	1260.60
1700.0	27.6	1672.4	0.0	20.1	190.0	0.0	20.4	19.4	1263.82
0.06	1.37	8.80	0.00	0.090	0.050	0.000	0.000	1255.50	925.01
0.021452	160.	150.	150.	3	14	0	0.00	134.71	1124.00

\*SECNO 0.262

3301 HV CHANGED MORE THAN HVINS

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

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.46

0.262	6.37	1265.96	1265.46	0.00	1266.37	0.41	3.36	0.08	1264.60
1700.0	560.3	1139.7	0.0	243.3	187.7	0.0	22.2	20.3	1266.70
0.07	2.30	6.07	0.00	0.090	0.050	0.000	0.000	1259.59	900.42
0.010088	220.	240.	260.	4	10	0	0.00	218.55	1118.97

\*SECNO 0.287

7185 MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

0.287	6.10	1267.70	1267.70	0.00	1268.42	0.72	1.68	0.09	1267.40
1700.0	418.5	1281.5	0.0	168.9	166.2	0.0	23.2	21.0	1269.60
0.08	2.48	7.71	0.00	0.090	0.050	0.000	0.000	1261.60	857.51
0.018074	120.	130.	130.	0	10	0	0.00	259.32	1116.83

\*SECNO 0.304

0.304	6.54	1269.14	1269.10	0.00	1269.99	0.85	1.54	0.04	1267.50
1700.0	314.7	1385.3	0.0	142.7	170.4	0.0	23.9	21.4	1271.08
0.08	2.21	8.13	0.00	0.090	0.050	0.000	0.000	1262.60	908.64
0.016925	80.	90.	100.	2	8	0	0.00	208.85	1117.49

CCHV= 0.600 CEHV= 0.800

\*SECNO 0.320

7185 MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1270.87 ELREA= 1272.32

0.320	6.97	1270.97	1270.97	0.00	1271.88	0.92	1.45	0.05	1269.60
1540.0	228.1	1311.9	0.0	107.1	158.5	0.0	24.3	21.7	1273.00
0.09	2.13	8.28	0.00	0.090	0.050	0.000	0.000	1264.00	926.83
0.020182	50.	85.	90.	0	8	0	0.00	185.06	1111.90

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

SPECIAL CULVERT

SC	CUNO	CUNV	ENTLC	COFQ	RDLEN	RISE	SPAN	CULVLN	CHRT	SCL	ELCHU	ELCHD
2		0.013	0.50	2.60	0.00	6.00	0.00	64.00	1	3	1265.73	1264.47

CHART 1 - CONCRETE PIPE CULVERT; NO BEVELED RING ENTRANCE  
 SCALE 3 - GROOVE END ENTRANCE, PIPE PROJECTING FROM FILL

5130, EGIC= 1293.32..MAY BE TOO LARGE IF INLET CONTROLS.  
 5135, EGOC= 1290.36 ..MAY BE TOO LARGE IF OUTLET CONTROLS.  
 \*SECNO 0.333

SPECIAL CULVERT INLET CONTROL + WEIR FLOW, EG = 1273.36  
 SPECIAL CULVERT

EGIC	EGOC	H4	QWEIR	QCULV	VCH	ACULV	ELTRD	WEIRLN
1293.32	1290.36	1.48	931.	599.	7.954	56.5	1271.15	209.

3685 20 TRIALS ATTEMPTED WSEL,CWSEL  
 3710 WSEL ASSUMED BASED ON MIN DIFF  
 3693 PROBABLE MINIMUM SPECIFIC ENERGY

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 1271.95 ELREA= 1274.01

0.333	6.96	1272.67	1272.60	0.00	1273.40	0.73	0.17	1.31	1271.95
1540.0	461.4	1078.6	0.0	147.2	135.6	0.0	24.7	21.9	1274.01
0.09	3.13	7.95	0.00	0.016	0.016	0.000	0.000	1265.71	926.52
0.001011	64.	64.	64.	20	5	0	0.00	185.34	1111.86

\*SECNO 0.347

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

0.347	4.91	1273.36	1273.36	0.00	1275.06	1.70	0.20	0.77	1271.70
1540.0	35.6	1504.4	0.0	11.8	142.2	0.0	25.1	22.1	1275.60
0.09	3.01	10.58	0.00	0.090	0.050	0.000	0.000	1268.45	1072.00
0.023521	50.	75.	70.	0	19	0	0.00	48.85	1120.85

CEHV= 0.100 CEHV= 0.300  
 0.358

7185 MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

0.358	5.35	1274.95	1274.95	0.00	1276.33	1.37	1.21	0.03	1273.30
1540.0	76.4	1463.6	0.0	42.4	151.8	0.0	25.3	22.2	1275.40

$V = \frac{1.486}{R^{2/3}} S^{1/2}$

0.09	1.80	9.64	0.00	0.090	0.050	0.000	0.000	1269.60	1017.56
0.017413	60.	60.	50.	0	8	0	0.00	104.38	1121.94

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

\*SECNO 0.420

3301 HV CHANGED MORE THAN HVINS

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

0.420	3.83	1279.83	1279.09	0.00	1280.15	0.32	3.72	0.11	1282.00
1540.0	0.0	947.2	592.8	0.0	167.5	367.6	28.1	23.7	1277.00
0.12	0.00	5.66	1.61	0.000	0.050	0.120	0.000	1276.00	207.24
0.007874	330.	330.	330.	4	11	0	0.00	297.27	504.52

\*SECNO 0.530

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY  
3720 CRITICAL DEPTH ASSUMED

0.530	3.23	1289.63	1289.63	0.00	1290.77	1.14	6.86	0.24	1290.00
1100.0	0.0	1100.0	0.0	0.0	128.6	0.0	32.5	26.1	1293.00
0.13	0.00	8.55	0.00	0.000	0.050	0.000	0.000	1286.40	329.66
0.028793	525.	550.	600.	0	15	0	0.00	57.58	387.24

\*SECNO 0.580

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.53

0.580	4.08	1295.08	1294.27	0.00	1295.85	0.77	5.04	0.04	1300.00
1100.0	0.0	1100.0	0.0	0.0	156.5	0.0	33.4	26.4	1308.00
0.14	0.00	7.03	0.00	0.000	0.050	0.000	0.000	1291.00	252.29
0.012326	250.	280.	300.	4	5	0	0.00	48.67	300.96

CCHV= 0.600 CEHV= 0.800

\*SECNO 0.590

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY  
3720 CRITICAL DEPTH ASSUMED

0.590	7.05	1299.05	1299.05	0.00	1300.45	1.40	0.93	0.50	1300.00
1100.0	0.0	1100.0	0.0	0.0	116.1	0.0	33.6	26.5	1306.00
0.15	0.00	9.48	0.00	0.000	0.050	0.000	0.000	1292.00	434.19
0.031235	52.	50.	48.	0	17	0	0.00	43.86	478.05

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

SPECIAL BRIDGE

SB	XK	XKOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
	0.00	1.69	2.80	0.00	5.50	0.00	23.70	0.00	1301.00	1292.00

\*SECNO 0.620

3265 DIVIDED FLOW

3280 CROSS SECTION 0.62 EXTENDED 1.95 FEET

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 4.23

PRESSURE AND WEIR FLOW, Weir Submergence Based on TRAPEZOIDAL Shape

EGPRS	EGLWC	H3	QWEIR	QPR	BAREA	TRAPEZOID AREA	ELLC	ELTRD	WEIRLN
1355.58	1309.77	0.00	572.	529.	24.	30.	1306.50	1310.00	202.
0.620	10.95	1311.95	0.00	0.00	1312.10	0.15	11.65	0.00	1312.00
1100.0	84.8	1015.2	0.0	167.7	313.6	0.0	35.0	27.2	1313.00
0.17	0.51	3.24	0.00	0.120	0.050	0.000	0.000	1301.00	200.00
0.001748	210.	210.	210.	2	0	9	0.00	240.48	538.79







3360. C . . . . . . I .ME R . . . .  
0.62 3380. C . . . . . . I .M ER . . . .

T3 FLYNN LANE WASH 100 YEAR PROFILE WITH 1' ENCROACHMENT  
T3 100 YR PROF W/ 1' ENCROA

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		3			0				1241.7	
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE

2

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

\*PROF 2

CCHV= 0.100 CEHV= 0.300  
 \*SECNO 0.000

3470 ENCROACHMENT STATIONS=	1515.1	1648.5	TYPE=	1	TARGET=	133.360			
0.000	2.60	1241.70	0.00	1240.70	1242.41	0.71	0.00	0.00	1240.10
1700.0	707.0	993.0	0.0	124.5	133.0	0.0	0.0	0.0	100000.00
0.00	5.68	7.47	0.00	0.013	0.013	0.000	0.000	1239.10	1515.14
0.001369	0.	0.	0.	0	0	0	0.00	133.36	1648.50

\*SECNO 0.016  
 3685 20 TRIALS ATTEMPTED WSEL,CWSEL  
 3693 PROBABLE MINIMUM SPECIFIC ENERGY  
 3720 CRITICAL DEPTH ASSUMED

ENCROACHMENT STATIONS=	900.0	1149.0	TYPE=	1	TARGET=	249.000			
0.016	3.92	1246.04	1246.04	1244.99	1247.19	1.15	0.26	0.13	1243.46
1700.0	307.7	1369.8	22.5	304.5	143.2	29.2	1.2	0.6	1244.77
0.01	1.01	9.57	0.77	0.100	0.016	0.100	0.000	1242.12	900.00
0.002277	140.	150.	160.	20	14	0	0.00	249.00	1149.00

\*SECNO 0.037  
 3685 20 TRIALS ATTEMPTED WSEL,CWSEL  
 3693 PROBABLE MINIMUM SPECIFIC ENERGY  
 3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=	2078.5	2132.5	TYPE=	1	TARGET=	54.000			
0.037	3.81	1246.61	1246.61	1245.86	1248.18	1.57	0.29	0.13	1244.10
1700.0	0.0	1700.0	0.0	0.0	169.0	0.0	2.1	1.0	100000.00
0.01	0.00	10.06	0.00	0.000	0.016	0.000	0.000	1242.80	2078.50
0.002887	110.	115.	115.	20	8	0	0.00	54.00	2132.50

\*SECNO 0.055  
 3685 20 TRIALS ATTEMPTED WSEL,CWSEL  
 3693 PROBABLE MINIMUM SPECIFIC ENERGY  
 3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=	1080.0	1132.0	TYPE=	1	TARGET=	52.000			
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PROFILE 2  
FLOODWAY

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST
0.055	4.01	1248.41	1248.41	1247.48	1250.04	1.63	0.28	0.02	1246.00
1700.0	0.0	1700.0	0.0	0.0	166.2	0.0	2.4	1.1	100000.00
0.01	0.00	10.23	0.00	0.000	0.016	0.000	0.000	1244.40	1080.00
0.002907	125.	95.	95.	20	8	0	0.00	52.00	1132.00

\*SECNO 0.080

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

3470 ENCROACHMENT STATIONS=	1035.2	1150.0	TYPE=	1	TARGET=	114.760			
0.080	4.25	1251.55	1251.55	1250.50	1253.16	1.61	0.36	0.00	1248.60
1700.0	187.6	1428.4	84.0	132.2	128.6	67.8	3.3	1.4	1248.70
0.01	1.42	11.10	1.24	0.100	0.016	0.100	0.000	1247.30	1035.24
0.002505	200.	130.	137.	20	8	0	0.00	114.76	1150.00

\*SECNO 0.100

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

3470 ENCROACHMENT STATIONS=	1070.5	1150.0	TYPE=	1	TARGET=	79.500			
0.100	3.59	1252.59	1252.59	1251.60	1253.82	1.23	0.29	0.04	1251.60
1700.0	0.0	1700.0	0.0	0.0	190.9	0.0	3.9	1.7	100000.00
0.02	0.00	8.90	0.00	0.000	0.016	0.000	0.000	1249.00	1070.50
0.003005	100.	105.	100.	20	15	0	0.00	79.50	1150.00

\*SECNO 0.116

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

3470 ENCROACHMENT STATIONS=	1076.5	1130.3	TYPE=	1	TARGET=	53.800			
0.116	3.52	1253.72	1253.72	1253.14	1255.29	1.58	0.23	0.10	1252.20
1700.0	0.0	1700.0	0.0	0.0	168.7	0.0	4.2	1.8	100000.00
0.02	0.00	10.08	0.00	0.000	0.016	0.000	0.000	1250.20	1076.50
0.002793	90.	80.	80.	20	8	0	0.00	53.80	1130.30

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

\*SECNO 0.158

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 0.44

3470 ENCROACHMENT STATIONS=	1006.8	1140.1	TYPE=	1	TARGET=	133.390			
0.158	3.12	1255.72	1255.67	1255.29	1256.55	0.82	1.18	0.08	100000.00
1700.0	0.0	1700.0	0.0	0.0	233.8	0.0	5.2	2.3	100000.00
0.03	0.00	7.27	0.00	0.000	0.035	0.000	0.000	1252.60	1006.75
0.014115	160.	220.	310.	14	15	0	0.00	133.39	1140.14

\*SECNO 0.171

3685 20 TRIALS ATTEMPTED WSEL,CWSEL

3693 PROBABLE MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=	1025.0	1198.0	TYPE=	1	TARGET=	173.000			
0.171	3.18	1256.30	1256.30	1256.28	1257.19	0.90	0.32	0.02	1256.80
1700.0	0.0	1644.4	55.6	0.0	213.2	19.8	5.6	2.5	1255.61
0.03	0.00	7.71	2.81	0.000	0.016	0.016	0.000	1253.12	1064.55
0.002329	50.	68.	60.	20	5	0	0.00	133.45	1198.00

\*SECNO 0.188

3685 20 TRIALS ATTEMPTED WSEL,CWSEL

3693 PROBABLE MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=	1033.1	1145.0	TYPE=	1	TARGET=	111.900			
0.188	5.85	1259.25	1259.25	1258.54	1260.46	1.21	0.46	0.09	1258.20
1700.0	34.4	1483.0	182.6	18.7	158.1	61.9	6.0	2.7	1257.25
0.03	1.84	9.38	2.95	0.090	0.050	0.120	0.000	1253.40	1033.10
0.023679	140.	90.	25.	20	14	0	0.00	111.90	1145.00

\*SECNO 0.217

3470 ENCROACHMENT STATIONS=	1030.0	1134.0	TYPE=	1	TARGET=	104.000			
0.217	6.75	1262.25	0.00	1261.75	1263.08	0.83	2.58	0.04	1260.60
1700.0	52.1	1647.9	0.0	28.5	222.1	0.0	6.9	3.0	100000.00
0.04	1.83	7.42	0.00	0.090	0.050	0.000	0.000	1255.50	1030.00
13030	160.	150.	150.	2	0	0	0.00	96.52	1126.52

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST
0.358	5.36	1274.96	1274.96	1274.95	1276.32	1.36	1.20	0.03	1273.30
1540.0	79.3	1460.7	0.0	41.2	151.9	0.0	10.4	4.3	1275.40
0.06	1.92	9.61	0.00	0.090	0.050	0.000	0.000	1269.60	1029.50
0.017316	60.	60.	50.	2	8	0	0.00	92.45	1121.95

\*SECNO 0.420

2800 NAT Q1= 173.55 WSELK= 1279.83 ENC Q1= 173.55 WSEL= 1280.83 RATIO= 0.0000  
 NAT Q1= 312. RATIOS LOB, CH, ROB= 0.0000 0.5243 0.4757 WSEL= 1280.83

3301 HV CHANGED MORE THAN HVINS

3470 ENCROACHMENT STATIONS= 200.0 269.3 TYPE= 4 TARGET= 0.444

0.420	4.30	1280.30	0.00	1279.83	1281.16	0.86	4.79	0.05	1282.00
1540.0	0.0	1465.0	75.0	0.0	192.5	30.3	12.0	4.9	1277.00
0.08	0.00	7.61	2.48	0.000	0.050	0.120	0.000	1276.00	205.68
0.012323	330.	330.	330.	4	0	0	0.00	63.63	269.32

\*SECNO 0.530

2800 NAT Q1= 64.83 WSELK= 1289.63 ENC Q1= 115.91 WSEL= 1290.63 RATIO= -0.7880  
 NAT Q1= 116. RATIOS LOB, CH, ROB= 0.0029 0.9971 0.0000 WSEL= 1290.63

7185 MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= 327.0 400.0 TYPE= 4 TARGET= 0.003

0.530	3.24	1289.64	1289.64	1289.63	1290.77	1.13	9.26	0.08	1290.00
1100.0	0.0	1100.0	0.0	0.0	128.8	0.0	14.2	5.6	1293.00
0.09	0.00	8.54	0.00	0.000	0.050	0.000	0.000	1286.40	329.63
0.028668	525.	550.	600.	8	15	0	0.00	57.62	387.26

\*SECNO 0.580

2800 NAT Q1= 99.08 WSELK= 1295.08 ENC Q1= 148.29 WSEL= 1296.08 RATIO= -0.4967  
 NAT Q1= 148. RATIOS LOB, CH, ROB= 0.0000 1.0000 0.0000 WSEL= 1296.08

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.52

3470 ENCROACHMENT STATIONS= 243.0 342.0 TYPE= 4 TARGET= 0.000

0.580	4.08	1295.08	0.00	1295.08	1295.85	0.77	5.04	0.04	1300.00
1100.0	0.0	1100.0	0.0	0.0	156.3	0.0	15.1	6.0	1308.00
0.10	0.00	7.04	0.00	0.000	0.050	0.000	0.000	1291.00	252.30
0.012354	250.	280.	300.	4	0	0	0.00	48.66	300.96

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

CCHV= 0.600 CEHV= 0.800

\*SECNO 0.590

2800 NAT Q1= 62.24 WSELK= 1299.05 ENC Q1= 99.16 WSEL= 1300.05 RATIO= -0.5932  
 NAT Q1= 99. RATIOS LOB, CH, ROB= 0.0000 1.0000 0.0000 WSEL= 1300.05

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL

3693 PROBABLE MINIMUM SPECIFIC ENERGY

3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=	430.0	510.0	TYPE=	4	TARGET=	0.000			
0.590	7.05	1299.05	1299.05	1299.05	1300.45	1.39	0.93	0.50	1300.00
1100.0	0.0	1100.0	0.0	0.0	116.1	0.0	15.3	6.0	1306.00
0.11	0.00	9.48	0.00	0.000	0.050	0.000	0.000	1292.00	434.19
0.031212	52.	50.	48.	20	17	0	0.00	43.87	478.06

AL BRIDGE

SB	XK	XKOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
	0.00	1.69	2.80	0.00	5.50	0.00	23.70	0.00	1301.00	1292.00

\*SECNO 0.620

2800 NAT Q1= 263.10 WSELK= 1311.95 ENC Q1= 324.81 WSEL= 1312.95 RATIO= -0.2346  
 NAT Q1= 394. RATIOS LOB, CH, ROB= 0.1750 0.8250 0.0000 WSEL= 1312.95

WATER EL=CHANGE FROM NATURAL PROFILES BRIDGE

3280 CROSS SECTION 0.62 EXTENDED 1.95 FEET

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 3.90

3470 ENCROACHMENT STATIONS=	470.0	545.0	TYPE=	4	TARGET=	0.175			
0.620	10.95	1311.95	0.00	1311.95	1312.14	0.19	1.09	0.72	1312.00
1100.0	0.0	1100.0	0.0	0.0	313.6	0.0	16.3	6.3	1313.00
0.12	0.00	3.51	0.00	0.000	0.050	0.000	0.000	1301.00	470.09
0.002051	210.	210.	210.	0	0	9	0.00	68.71	538.80







3360. C  
0.62 3380. C

. . . . . . I .ME R . . . .  
. . . . . . I .M ER . . . .

THIS RUN EXECUTED 29OCT96 9:57:29

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HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991

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

FLYNN LANE WASH

SUMMARY PRINTOUT

	CWSEL	.01K	STENCL	STENCR	ELENCL	ELENCR	K*CHSL
	1240.700	520.36	0.00	0.00	0.00	0.00	0.00
	1241.700	459.49	1515.14	1648.50	100000.00	100000.00	0.00
*	1244.991	312.68	0.00	0.00	0.00	0.00	20.13
*	1246.041	356.30	900.00	1149.00	100000.00	100000.00	20.13
*	1245.859	352.43	0.00	0.00	0.00	0.00	5.91
*	1246.607	316.41	2078.50	2132.50	100000.00	100000.00	5.91
*	1247.482	331.66	0.00	0.00	0.00	0.00	16.84
*	1248.411	315.29	1080.00	1132.00	100000.00	100000.00	16.84
*	1250.497	328.32	0.00	0.00	0.00	0.00	22.31
*	1251.545	339.65	1035.24	1150.00	100000.00	100000.00	22.31
*	1251.599	234.19	0.00	0.00	0.00	0.00	16.19
*	1252.591	310.13	1070.50	1150.00	100000.00	100000.00	16.19
*	1253.138	338.68	0.00	0.00	0.00	0.00	15.00
*	1253.716	321.65	1076.50	1130.30	100000.00	100000.00	15.00
*	1255.294	133.81	0.00	0.00	0.00	0.00	10.91
*	1255.725	143.09	1006.75	1140.14	100000.00	100000.00	10.91
*	1256.283	419.40	0.00	0.00	0.00	0.00	7.65
*	1256.296	352.26	1025.00	1198.00	100000.00	100000.00	7.65
*	1258.543	104.65	0.00	0.00	0.00	0.00	3.11
*	1259.250	110.48	1033.10	1145.00	100000.00	100000.00	3.11
	1261.750	116.07	0.00	0.00	0.00	0.00	14.00
	262.246	148.93	1030.00	1134.00	100000.00	100000.00	14.00

	CWSEL	.01K	STENCL	STENCR	ELENCL	ELENCR	K*CHSL
*	1265.959	169.26	0.00	0.00	0.00	0.00	17.04
	1265.915	119.79	1020.80	1153.72	100000.00	100000.00	17.04
*	1267.699	126.45	0.00	0.00	0.00	0.00	15.46
	1268.302	129.20	1057.60	1118.29	100000.00	100000.00	15.46
	1269.144	130.67	0.00	0.00	0.00	0.00	11.11
	1269.788	139.15	1064.30	1119.07	100000.00	100000.00	11.11
*	1270.967	108.40	0.00	0.00	0.00	0.00	16.47
	1271.257	104.50	1061.80	1112.39	100000.00	100000.00	16.47
*	1272.668	484.22	0.00	0.00	0.00	0.00	26.72
*	1272.735	384.77	1057.30	1141.46	100000.00	100000.00	26.72
*	1273.355	100.41	0.00	0.00	0.00	0.00	36.53
*	1273.362	100.72	1072.00	1128.34	100000.00	100000.00	36.53
*	1274.953	116.70	0.00	0.00	0.00	0.00	19.17
*	1274.956	117.03	1029.50	1173.85	100000.00	100000.00	19.17
*	1279.827	173.55	0.00	0.00	0.00	0.00	19.39
	1280.297	138.73	200.00	269.32	100000.00	100000.00	19.39
	1289.632	64.83	0.00	0.00	0.00	0.00	18.91
*	1289.635	64.97	327.00	400.00	100000.00	100000.00	18.91
*	1295.082	99.08	0.00	0.00	0.00	0.00	16.43
*	1295.078	98.97	243.00	342.00	100000.00	100000.00	16.43
*	1299.052	62.24	0.00	0.00	0.00	0.00	20.00
*	1299.053	62.26	430.00	510.00	100000.00	100000.00	20.00
*	1311.952	263.10	0.00	0.00	0.00	0.00	42.86
*	1311.953	242.87	470.00	545.00	100000.00	100000.00	42.86

## LANE WASH

## SUMMARY PRINTOUT TABLE 150

SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
0.000	0.00	0.00	0.00	1239.10	1700.00	1240.70	1240.62	1240.84	10.67	4.71	636.75	520.36
0.000	0.00	0.00	0.00	1239.10	1700.00	1241.70	0.00	1242.41	13.69	7.47	257.45	459.49
* 0.016	150.00	0.00	0.00	1242.12	1700.00	1244.99	1244.99	1245.52	29.56	8.41	1081.22	312.68
* 0.016	150.00	0.00	0.00	1242.12	1700.00	1246.04	1246.04	1247.19	22.77	9.57	476.95	356.30
* 0.037	115.00	0.00	0.00	1242.80	1700.00	1245.86	1245.86	1246.45	23.27	7.96	1010.27	352.43
* 0.037	115.00	0.00	0.00	1242.80	1700.00	1246.61	1246.61	1248.18	28.87	10.06	169.00	316.41
* 0.055	95.00	0.00	0.00	1244.40	1700.00	1247.48	1247.48	1248.07	26.27	8.16	977.07	331.66
* 0.055	95.00	0.00	0.00	1244.40	1700.00	1248.41	1248.41	1250.04	29.07	10.23	166.17	315.29
* 0.080	130.00	0.00	0.00	1247.30	1700.00	1250.50	1250.50	1251.17	26.81	9.22	962.08	328.32
* 0.080	130.00	0.00	0.00	1247.30	1700.00	1251.55	1251.55	1253.16	25.05	11.10	328.66	339.65
* 0.100	105.00	0.00	0.00	1249.00	1700.00	1251.60	1251.60	1252.23	52.69	8.44	694.49	234.19
* 0.100	105.00	0.00	0.00	1249.00	1700.00	1252.59	1252.59	1253.82	30.05	8.90	190.93	310.13
0.116	80.00	0.00	0.00	1250.20	1700.00	1253.14	1253.14	1253.96	25.20	8.65	668.86	338.68
0.116	80.00	0.00	0.00	1250.20	1700.00	1253.72	1253.72	1255.29	27.93	10.08	168.72	321.65
* 0.158	220.00	0.00	0.00	1252.60	1700.00	1255.29	1255.29	1255.85	161.40	6.92	451.28	133.81
* 0.158	220.00	0.00	0.00	1252.60	1700.00	1255.72	1255.67	1256.55	141.15	7.27	233.80	143.09
* 0.171	68.00	0.00	0.00	1253.12	1700.00	1256.28	1256.28	1256.83	16.43	6.46	334.90	419.40
* 0.171	68.00	0.00	0.00	1253.12	1700.00	1256.30	1256.30	1257.19	23.29	7.71	232.93	352.26
* 0.188	90.00	0.00	0.00	1253.40	1700.00	1258.54	1258.54	1259.21	263.88	8.30	415.22	104.65
* 0.188	90.00	0.00	0.00	1253.40	1700.00	1259.25	1259.25	1260.46	236.79	9.38	238.66	110.48
0.217	150.00	0.00	0.00	1255.50	1700.00	1261.75	1261.63	1262.93	214.52	8.80	210.12	116.07
0.217	150.00	0.00	0.00	1255.50	1700.00	1262.25	0.00	1263.08	130.30	7.42	250.55	148.93
* 0.262	240.00	0.00	0.00	1259.59	1700.00	1265.96	1265.46	1266.37	100.88	6.07	431.07	169.26
0.262	240.00	0.00	0.00	1259.59	1700.00	1265.91	0.00	1266.97	201.38	8.52	230.46	119.79
* 0.287	130.00	0.00	0.00	1261.60	1700.00	1267.70	1267.70	1268.42	180.74	7.71	335.12	126.45
0.287	130.00	0.00	0.00	1261.60	1700.00	1268.30	0.00	1269.40	173.12	8.41	202.11	129.20
0.304	90.00	0.00	0.00	1262.60	1700.00	1269.14	1269.10	1269.99	169.25	8.13	313.10	130.67
0.304	90.00	0.00	0.00	1262.60	1700.00	1269.79	0.00	1270.85	149.25	8.26	205.69	139.15
* 0.320	85.00	0.00	0.00	1264.00	1540.00	1270.97	1270.97	1271.88	201.82	8.28	265.61	108.40
0.320	85.00	0.00	0.00	1264.00	1540.00	1271.26	0.00	1272.49	217.16	8.90	173.02	104.50
0.333	64.00	1271.15	0.00	1265.71	1540.00	1272.67	1272.60	1273.40	10.11	7.95	282.83	484.22
* 0.333	64.00	1271.15	0.00	1265.71	1540.00	1272.74	0.00	1274.18	16.02	10.07	174.95	384.77

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
*	0.347	75.00	0.00	0.00	1268.45	1540.00	1273.36	1273.36	1275.06	235.21	10.58	154.06	100.41
*	0.347	75.00	0.00	0.00	1268.45	1540.00	1273.36	1273.36	1275.06	233.78	10.56	154.40	100.72
*	0.358	60.00	0.00	0.00	1269.60	1540.00	1274.95	1274.95	1276.33	174.13	9.64	194.23	116.70
*	0.358	60.00	0.00	0.00	1269.60	1540.00	1274.96	1274.96	1276.32	173.16	9.61	193.14	117.03
*	0.420	330.00	0.00	0.00	1276.00	1540.00	1279.83	1279.09	1280.15	78.74	5.66	535.07	173.55
	0.420	330.00	0.00	0.00	1276.00	1540.00	1280.30	0.00	1281.16	123.23	7.61	222.81	138.73
*	0.530	550.00	0.00	0.00	1286.40	1100.00	1289.63	1289.63	1290.77	287.93	8.55	128.61	64.83
*	0.530	550.00	0.00	0.00	1286.40	1100.00	1289.64	1289.64	1290.77	286.68	8.54	128.81	64.97
*	0.580	280.00	0.00	0.00	1291.00	1100.00	1295.08	1294.27	1295.85	123.26	7.03	156.47	99.08
*	0.580	280.00	0.00	0.00	1291.00	1100.00	1295.08	0.00	1295.85	123.54	7.04	156.34	98.97
*	0.590	50.00	0.00	0.00	1292.00	1100.00	1299.05	1299.05	1300.45	312.35	9.48	116.05	62.24
*	0.590	50.00	0.00	0.00	1292.00	1100.00	1299.05	1299.05	1300.45	312.12	9.48	116.08	62.26
*	0.620	210.00	1310.00	1306.50	1301.00	1100.00	1311.95	0.00	1312.10	17.48	3.24	481.21	263.10
*	0.620	210.00	999999.00	0.00	1301.00	1100.00	1311.95	0.00	1312.14	20.51	3.51	313.60	242.87

## LANE WASH

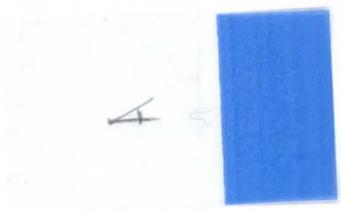
## SUMMARY PRINTOUT TABLE 150

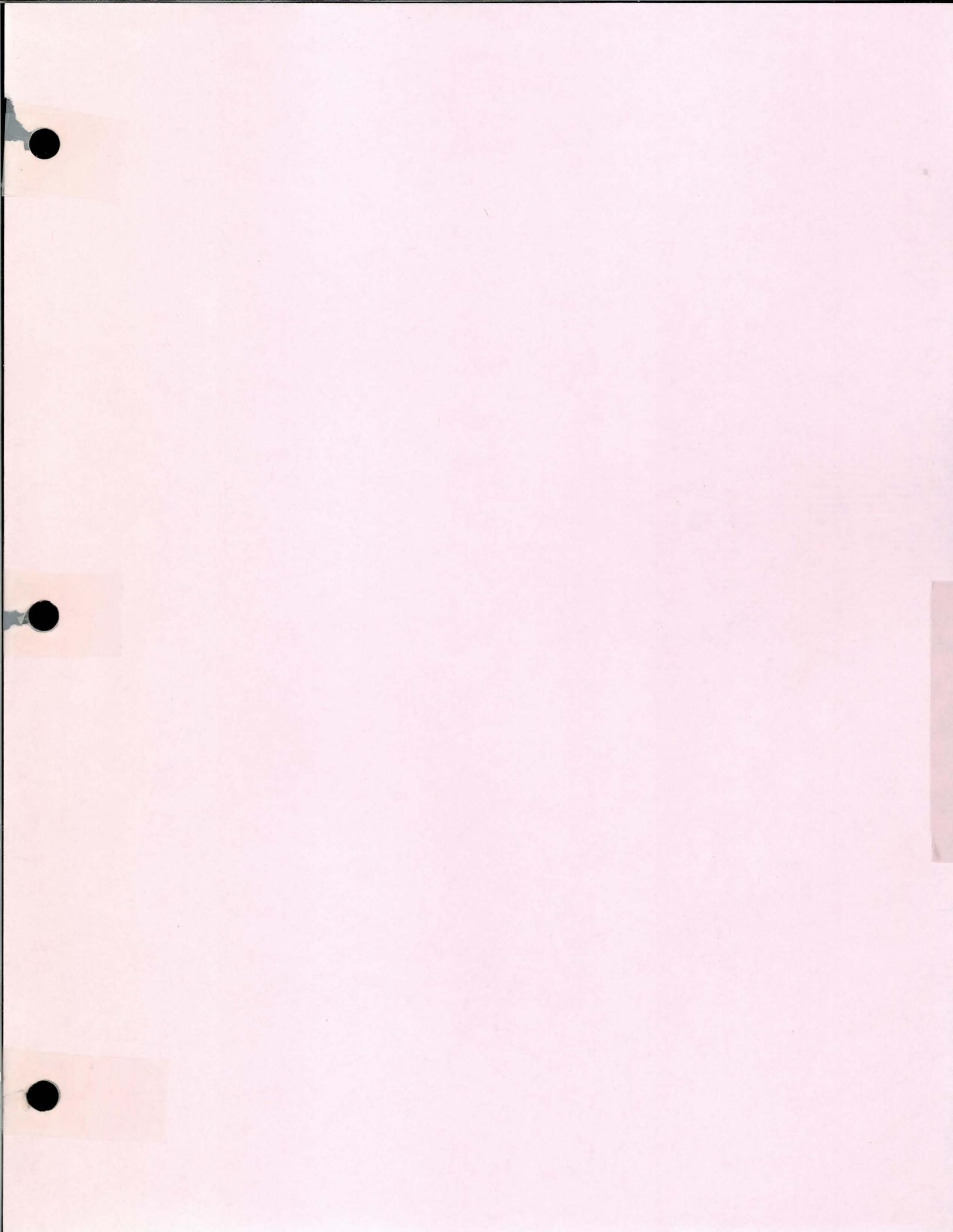
SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH	
0.000	1700.00	1240.70	0.00	0.00	0.00	1258.45	0.00	
0.000	1700.00	1241.70	1.00	0.00	1.00	133.36	0.00	
*	0.016	1700.00	1244.99	0.00	4.29	0.00	1028.42	150.00
*	0.016	1700.00	1246.04	1.05	4.34	1.05	249.00	150.00
*	0.037	1700.00	1245.86	0.00	0.87	0.00	948.38	115.00
*	0.037	1700.00	1246.61	0.75	0.57	0.75	54.00	115.00
*	0.055	1700.00	1247.48	0.00	1.62	0.00	815.72	95.00
*	0.055	1700.00	1248.41	0.93	1.80	0.93	52.00	95.00
*	0.080	1700.00	1250.50	0.00	3.02	0.00	730.93	130.00
*	0.080	1700.00	1251.55	1.05	3.13	1.05	114.76	130.00
*	0.100	1700.00	1251.60	0.00	1.10	0.00	685.22	105.00
*	0.100	1700.00	1252.59	0.99	1.05	0.99	79.50	105.00
	0.116	1700.00	1253.14	0.00	1.54	0.00	538.52	80.00
	0.116	1700.00	1253.72	0.58	1.12	0.58	53.80	80.00
*	0.158	1700.00	1255.29	0.00	2.16	0.00	474.76	220.00
*	0.158	1700.00	1255.72	0.43	2.01	0.43	133.39	220.00
*	0.171	1700.00	1256.28	0.00	0.99	0.00	350.48	68.00
*	0.171	1700.00	1256.30	0.01	0.57	0.01	133.45	68.00
*	0.188	1700.00	1258.54	0.00	2.26	0.00	345.14	90.00
*	0.188	1700.00	1259.25	0.71	2.95	0.71	111.90	90.00
	0.217	1700.00	1261.75	0.00	3.21	0.00	134.71	150.00
	0.217	1700.00	1262.25	0.50	3.00	0.50	96.52	150.00
*	0.262	1700.00	1265.96	0.00	4.21	0.00	218.55	240.00
	0.262	1700.00	1265.91	-0.04	3.67	-0.04	98.10	240.00
*	0.287	1700.00	1267.70	0.00	1.74	0.00	259.32	130.00
	0.287	1700.00	1268.30	0.60	2.39	0.60	60.23	130.00
	0.304	1700.00	1269.14	0.00	1.44	0.00	208.85	90.00
	0.304	1700.00	1269.79	0.64	1.49	0.64	54.77	90.00
*	0.320	1540.00	1270.97	0.00	1.82	0.00	185.06	85.00
	0.320	1540.00	1271.26	0.29	1.47	0.29	50.27	85.00
*	0.333	1540.00	1272.67	0.00	1.70	0.00	185.34	64.00
*	0.333	1540.00	1272.74	0.07	1.48	0.07	54.60	64.00

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
*	0.347	1540.00	1273.36	0.00	0.69	0.00	48.85	75.00
*	0.347	1540.00	1273.36	0.01	0.63	0.01	48.86	75.00
*	0.358	1540.00	1274.95	0.00	1.60	0.00	104.38	60.00
*	0.358	1540.00	1274.96	0.00	1.59	0.00	92.45	60.00
*	0.420	1540.00	1279.83	0.00	4.87	0.00	297.27	330.00
	0.420	1540.00	1280.30	0.47	5.34	0.47	63.63	330.00
*	0.530	1100.00	1289.63	0.00	9.80	0.00	57.58	550.00
*	0.530	1100.00	1289.64	0.00	9.34	0.00	57.62	550.00
*	0.580	1100.00	1295.08	0.00	5.45	0.00	48.67	280.00
*	0.580	1100.00	1295.08	0.00	5.44	0.00	48.66	280.00
*	0.590	1100.00	1299.05	0.00	3.97	0.00	43.86	50.00
*	0.590	1100.00	1299.05	0.00	3.97	0.00	43.87	50.00
*	0.620	1100.00	1311.95	0.00	12.90	0.00	240.48	210.00
*	0.620	1100.00	1311.95	0.00	12.90	0.00	68.71	210.00

FLOODWAY DATA, FLYNN LANE WASH  
 PROFILE NO. 2

STATION	FLOODWAY			WATER SURFACE ELEVATION		
	WIDTH	SECTION AREA	MEAN VELOCITY	WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE
0.000	133.	257.	6.6	1241.7	1240.7	1.0
0.016	249.	477.	3.6	1246.0	1245.0	1.0
0.037	54.	169.	10.1	1246.6	1245.9	0.7
0.055	52.	166.	10.2	1248.4	1247.5	0.9
0.080	115.	329.	5.2	1251.5	1250.5	1.0
0.100	79.	191.	8.9	1252.6	1251.6	1.0
0.116	54.	169.	10.1	1253.7	1253.1	0.6
0.158	133.	234.	7.3	1255.7	1255.3	0.4
0.171	133.	233.	7.3	1256.3	1256.3	0.0
0.188	112.	239.	7.1	1259.2	1258.5	0.7
0.217	97.	251.	6.8	1262.2	1261.7	0.5
0.262	98.	230.	7.4	1266.0	1266.0	0.0
0.287	60.	202.	8.4	1268.3	1267.7	0.6
0.304	55.	206.	8.3	1269.7	1269.1	0.6
0.320	50.	173.	8.9	1271.3	1271.0	0.3
0.333	55.	175.	8.8	1272.8	1272.7	0.1
0.347	49.	154.	10.0	1273.4	1273.4	0.0
0.358	92.	193.	8.0	1275.0	1275.0	0.0
0.420	64.	223.	6.9	1280.3	1279.8	0.5
0.530	58.	129.	8.5	1289.6	1289.6	0.0
0.580	49.	156.	7.0	1295.1	1295.1	0.0
0.590	44.	116.	9.5	1299.1	1299.1	0.0
0.620	69.	314.	3.5	1312.0	1312.0	0.0

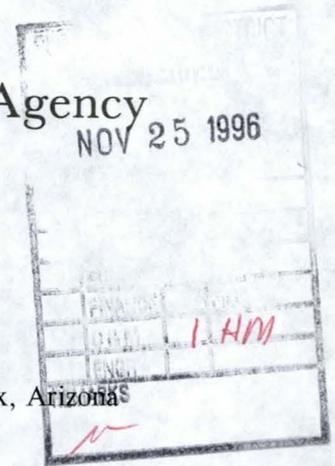






# Federal Emergency Management Agency

Washington, D.C. 20472



November 20, 1996

Mr. Hasan Mushtaq, P.E.  
Project Manager  
Engineering Division  
Flood Control District of Maricopa County  
2801 West Durango Street  
Phoenix, Arizona 85009

IN REPLY REFER TO:  
Case No.: 96-09-1042P  
Community: City of Phoenix, Arizona  
Community No.: 040051

316-AD/ACK.FEX

Dear Mr. Mushtaq:

This acknowledges receipt of additional data in support of and authorization to proceed with our review of your request for a Letter of Map Revision for the above-referenced community. Our review of the data submitted indicates we have the minimum data needed to continue our evaluation. If we need additional data to complete our evaluation, or if we encounter delays, we will notify you in writing within 30 days of the date of this letter.

If you write to us about your request, please include the case number shown above in your letter. If you have any questions about the status of your request, please call our Technical Evaluation Contractor, Michael Baker Jr., Inc. The Revisions Coordinator for your state, Mr. Massoud Rezakhani, may be reached at (703) 317-6239.

Sincerely,

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



# FLOOD CONTROL DISTRICT

of  
**Maricopa County**

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

BOARD OF DIRECTORS  
Betsey Bayless  
Ed King  
Tom Rawles  
Don Stapley  
Mary Rose Garrido Wilcox

**NOV 6 - 1996**

Michael Baker Jr., Inc.  
3601 Eisenhower Avenue, Suite 600  
Alexandria, Virginia 22304

**REFERENCE :**

Case No. : 96-09-1042P  
Community : City of Phoenix, Arizona  
Community No. : 040051

Attn : Mr. Massoud Rezakhani

Re : LOMR request for Flynn Lane Wash  
FCD Contract No. FCD 94-51  
FIRM Map Panel 1670 E (9-30-1995)

Dear Mr. Rezakhani :

This responds to your request dated October 18, 1996, to revise the HEC-2 modeling in order to eliminate the cross section extended messages. The original request was for a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. Pertinent information about that request is listed below :

Identifier :	Flynn Lane Wash
Flooding Source :	Flynn Lane Wash
FIRM Panel Affected :	04013C1670 E (9-30-1995)

Discussion on Cross-Section extended messages

This starting cross-section, at 0.00, is located inside the spillway, that releases water in the Arizona Canal Diversion Channel (ACDC). The GR points, at this cross-section, are based upon field survey information only. Therefore, nothing could be done to eliminate the cross-section extended message at this location.

Cross-section 0.01 was removed and a cross-section at 0.037 river miles was added. The required GR information was used from the available topographic mapping (1"=400' scale), which was supplemented by field survey information as necessary. The cross-section extended message was eliminated.

The GR information at cross-sections 0.80 and 0.158 were redone based upon topographic information, supplemented by field survey information as necessary, from a smaller scale mapping. This eliminated the cross-section extended messages at these locations.

The proposed changes in the floodplain and the floodway boundaries discontinue just upstream of cross-section 0.358. Also, cross-sections 0.42 through 0.62 remain the same as in the duplicate effective model. Therefore, no efforts were made to eliminate the cross-section extended message at cross-section 0.62.

Based on the above mentioned revisions, a revised hydraulic model was prepared. Following is a list of revised items that are included in this package.

ITEM

1. Revised pages 3,4,5, & 6 of 6 of MT-2 Form 4.
2. Revised pages 3 & 4 of 6 of MT-2 Form 7.
3. Explanation sheet.
4. Updated flood profile for Flynn Lane Wash.
5. Updated 1"=2000' scale map.
6. Detailed Survey information at cross-section 0.016.
7. Hardcopy input/output of revised HEC-2 model.
8. Updated 1"=2000' scale map for Appendix A.
9. Revised floodplain and floodway delineated at a scale of 1"=400'.
10. One 3-1/2" diskette with revised HEC-2 model and Word document.

Should additional information be required, please contact either Ms. Teri Mintz, P.E., Water Resources Engineer, David Evans and Associates, Inc., at (602)-956-9850 or Mr. Hasan Mushtaq, P.E., Project Manager, Engineering Division, Flood Control District of Maricopa County at (602)-506-1501.

Sincerely,



Hasan Mushtaq, P.E.  
Engineering Division

Enclosures

- Copy to :
- Terri Miller, State Coordinator, NFIP  
Arizona Department of Water Resources  
500 North 3rd Street, Phoenix, Arizona 85004
  - Ray Acuna, P.E., Floodplain Manager  
City of Phoenix  
200 West Washington Street, Phoenix, Arizona 85003
  - Teri Mintz, P.E., Water Resources Engineer  
David Evans & Associates, Inc.  
2929 East Camelback Road, Suite 240, Phoenix, Arizona 85016

Coord :  
Info :



HM PAC EAR  
HM RGN



DAVID EVANS AND ASSOCIATES, INC.

T R A N S M I T T A L

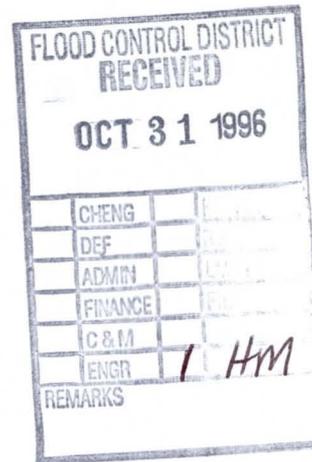
TO: Hasan Mushtaq, P.E.  
Flood Control District of Maricopa County  
2801 W. Durango Street  
Phoenix, AZ 85009

DATE: October 30, 1996

FROM: Teri Mintz

PROJECT: Flynn Lane Wash

PROJ. #: MARI0011



2929 East Camelback Road  
Suite 240  
Phoenix, Arizona 85016  
Tel: 602.956.9850  
Fax: 602.956.9853

ITEM	COPIES	DATE	DESCRIPTION
1	2		Form 4, Page 3 , 4, 5 & 6 of 6
2	2		Form 7, Page 3 & 4 of 6
3	2		Explanations page
4	2		Updated Flood Profile
5	2		Updated 1" = 2000' FIRM
6	2		Detailed Survey information for cross section .016
7	2		Revised HEC-2 model showing additional cross section
8	2		Updated 1" = 2000' FIRM for Appendix A
9	2		Revised 1'=400' map delineating floodplain
10	1		Computer Disk with HEC-2 and Word Documents

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

COMMENTS:

I could not eliminate the vertical extension warnings at cross section 0.01 so I tried adding another cross section approximately half way between cross section .037 and the spillway. This removed the warning in this area. The floodway had to be revised in the vicinity (a parking area). Let me know if there are any problems with my changes. Otherwise, submit the extra set of copies to FEMA for their approval.



# Federal Emergency Management Agency

Washington, D.C. 20472

OCT 18 1996

Mr. Hasan Mushtaq, P.E.  
Project Manager  
Engineering Division  
Flood Control District of Maricopa County  
2801 West Durango Street  
Phoenix, Arizona 85009

IN REPLY REFER TO:  
Case No.: 96-09-1042P  
Community: City of Phoenix, Arizona  
Community No.: 040051

316-AD

Dear Mr. Mushtaq:

This is in reference to your letter dated September 13, 1996, regarding your August 9, 1996, request for a Letter of Map Revision for the above-referenced community.

In our letter dated September 20, 1996, we indicated additional data might be required to complete our review of the request. The data required to complete our review, which must be submitted within 90 days of the date of this letter, are listed on the enclosed summary.

If we do not receive the required data within 90 days, we will suspend our processing of your request pending our receipt of the required data.

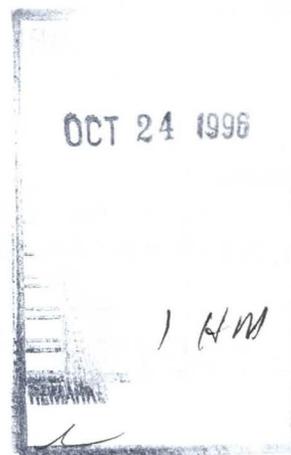
If you have any questions regarding this matter, please contact Mr. John Magnotti of our staff in Washington, DC, either by telephone at (202) 646-3932 or by facsimile at (202) 646-4596.

Sincerely,

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

Enclosure

cc: Ms. Teri Mintz, P.E.  
Water Resources Engineer  
David Evans & Associates, Inc.



Summary of Additional Data Required to Support a  
Letter of Map Revision

Case No.: 96-09-1042P

Date: OCT 18 1996

Requester: Mr. Hasan Mushtaq, P.E.

Community No.: 040051

Community: City of Phoenix, Arizona

The issues listed below must be addressed before we can continue the review of your request.

1. The output of the submitted HEC-2 hydraulic computer model for Flynn Lane Wash contains "cross section extended" messages at many cross sections. The model has extended the cross sections up to a maximum of 1.95 feet. Please revise the HEC-2 model to include ground elevations for the entire width of the floodplain of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood). The delineation of the floodplain shown on the submitted topographic map entitled "Flood Control District of Maricopa County, Arizona Canal Diversion Channel Area Drainage Master Study, Phase 1," Sheet 75 of 111, prepared by Kaminski Hubbard Engineering, Inc., dated July 11, 1994, should be revised to agree with the widths of the floodplain shown on the output of the revised HEC-2 model.
2. Based on our review of the previously mentioned topographic map, it appears that in some of the areas where the cross sections are extended, the floodwater may breakout and follow a different flow path. An assessment must be made to determine whether the breakout flooding would result in average flow depths of at least 1 foot. If the breakout flooding would result in average flow depths of at least 1 foot, the flooding source must be studied. If the breakout flooding would result in average flow depths of less than 1 foot, the area of flooding may be designated Zone X (shaded). An analysis must be performed to determine the average depth of this breakout flooding, and the extent of the flooding must be mapped based on this analysis.

Please send the required data directly to our Technical Evaluation Contractor at the following address:

Michael Baker Jr., Inc.  
3601 Eisenhower Avenue, Suite 600  
Alexandria, Virginia 22304

Attention: Mr. Massoud Rezakhani  
(703) 317-6239

For identification purposes, you must include the case number referenced above on all correspondence.



# FLOOD CONTROL DISTRICT

of

## Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009

Telephone (602) 506-1501

Fax (602) 506-4601

TT (602) 506-5859

BOARD OF DIRECTORS  
Betsey Bayless  
Ed King  
Tom Rawles  
Don Stapley  
Mary Rose Garrido Wilcox

**OCT 03 1996**

Jit S. Pegany, P.E., R.L.S.  
Engineering Alliance, Inc.  
727 East Bethany Home Road, Suit C-100  
Phoenix, Arizona 85014

Re: Flynn Lane Wash  
FIRM Map Panel 1670 E (9-30-1995)

Dear Mr. Pegany :

This responds to your request dated October 2, 1996, requesting information on the above mentioned Flynn Lane Wash. Please find following itemized information provided to you.

### ITEM

1. 11' X 17" sheet of Flood Profile plot for the Flynn Lane Wash.
2. 8-1/2" X 11 sheet of revised floodplain/floodway boundaries.
3. Hardcopy input/output of the duplicate effective HEC-2, and revised HEC-2 models.
4. Copies of necessary FEMA forms to be submitted.
5. 24" X 36" copy of work map of the project area.
6. 3-1/2" diskette with input/output files of duplicate effective HEC-2 model, revised HEC-2 models.
7. 24" X 36" mylar of sheet 75 of 111 from the ACDC Area Drainage Master Study : Phase I.

Please note that, as of today, the Application for the Letter of Map Revision is being reviewed by the Federal Emergency Management Agency. Prior to approval of the original application, there may be requests for minor changes in the hydraulic model, which may or may not affect the floodplain/floodway boundaries in the Flynn Lane Wash.

Should you need additional information, please feel free to contact me at (602)-506-1501.

Sincerely,

Hasan Mushtaq, P.E.  
Engineering Division

Copy to : Ray Acuña, P.E., Floodplain Manager  
City of Phoenix, Fifth Floor  
200 West Washington Street, Phoenix, Arizona 85003

COORD :   

INFO : HM.



# Federal Emergency Management Agency

Washington, D.C. 20472

September 20, 1996

Mr. Hasan Mushtaq, P.E.  
Project Manager  
Engineering Division  
Flood Control District of Maricopa County  
2801 West Durango Street  
Phoenix, Arizona 85009

IN REPLY REFER TO:  
Case No.: 96-09-1042P  
Community: City of Phoenix, Arizona  
Community No.: 040051

316-ACK.FEX

Dear Mr. Mushtaq:

This is in response to your letter dated September 13, 1996, concerning an August 9, 1996, request for a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. Pertinent information about the request is listed below.

Flooding Source: Flynn Lane Wash

FIRM Panel Affected: 04013C1670 E

As you may know, the Federal Emergency Management Agency (FEMA) has implemented a procedure to recover costs associated with reviewing and processing requests for modifications to published flood information and maps. However, because your request is intended to show the effects of a publicly sponsored flood-control project that reduces flooding to existing development, no fees will be assessed for our review.

We have completed an inventory of the items that you submitted. We have received all of the data we require to begin a detailed technical review of your request. If additional data are required, we will inform you within 30 days of the date of this letter.

Please direct all questions concerning your request to our Technical Evaluation Contractor at the following address:

Michael Baker Jr., Inc.  
3601 Eisenhower Avenue, Suite 600  
Alexandria, Virginia 22304

Attention: Mr. Massoud Rezakhani  
(703) 317-6239

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

FLOOD CONTROL DISTRICT RECEIVED	
SEP 23 1996	
CHENG	P & PM
DEF	REG
ADMIN	LMGT
FINANCE	FILE
C & M	1 Hm
ENGR	
REMARKS	

2

If you have any questions concerning FEMA policy, or the National Flood Insurance Program in general, please contact Mr. John Magnotti of our staff in Washington, DC, either by telephone at (202) 646-3932 or by facsimile at (202) 646-4596.

Sincerely,

A handwritten signature in cursive script that reads "Michael Buckley".

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

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



# FLOOD CONTROL DISTRICT

of

## Maricopa County

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

BOARD OF DIRECTORS  
Betsey Bayless  
Ed King  
Tom Rawles  
Don Stapley  
Mary Rose Garrido Wilcox

OCT 15 1996

SEP 16 1996

Michael Baker Jr., Inc.  
3601 Eisenhower Avenue, Suite 600  
Alexandria, Virginia 22304

REFERENCE :

Case No. : 96-09-1042P  
Community : City of Phoenix, Arizona  
Community No. : 040051

Attn : Mr. Massoud Rezakhani

Re : LOMR request for Flynn Lane Wash  
FCD Contract No. FCD 94-51  
FIRM Map Panel 1670 E (9-30-1995)

Dear Mr. Rezakhani :

This responds to your request dated August 15, 1996, for a copy of a public notice distributed by the community stating its intent to revise the floodway or a statement by the community that it has notified all affected property owners. The original request was for a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. Pertinent information about that request is listed below :

Identifier : Flynn Lane Wash  
Flooding Source : Flynn Lane Wash  
FIRM Panel Affected : 04013C1670 E (9-30-1995)

Please find attached a copy of the public notice distributed by the community stating its intent to revise the floodplain/floodway. A copy of the letter requesting this information is also attached herewith.

Should additional information be required, please contact either Ms. Teri Mintz, P.E., Water Resources Engineer, David Evans and Associates, Inc., at (602)-956-9850 or Hasan Mushtaq, P.E., Project Manager, Engineering Division, Flood Control District of Maricopa County at (602)-506-1501.

Sincerely,

Hasan Mushtaq, P.E.  
Engineering Division



Enclosures

Copy to : Terri Miller, State Coordinator, NFIP  
Arizona Department of Water Resources  
500 North 3rd Street, Phoenix, Arizona 85004

Ray Acuna, P.E., Floodplain Manager  
City of Phoenix  
200 West Washington Street, Phoenix, Arizona 85003

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

Coord :  
Info :

*HM PAC EAR*  
~~HM~~ *RGN*

*file*

*HM*

FLOOD CONTROL DISTRICT RECEIVED	
SEP 12 1996	
CHENG	P & PM
DEP	HYDRO
ADMIN	LMGT
FINANCE	FILE
C & D	
ENGR	
REMARKS	

# ARIZONA BUSINESS GAZETTE

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

**ANNOUNCEMENT OF FLOOD HAZARD STUDY**  
 The City of Phoenix, under authority of the National Flood Insurance Act of 1968 (P.L. 90-448), as amended, and the Flood Disaster Protection Act of 1973 (P.L. 93-234), is authorizing a re-study of the Flynn Lane Wash Area, east of the Arizona Canal Diversion Channel (ACDC). The re-study is being funded by the Flood Control District of Maricopa County and performed by David Evans and Associates, Inc.  
 The purpose of this re-study is to re-delineate the floodplain/floodway, considering the effects of the Spillway at the ACDC and the construction of the Ocotillo Road improvements. These flood elevations will be used by the City of Phoenix to carry out floodplain management responsibilities and by the Federal Emergency Management Agency (FEMA) to determine flood insurance rates under the National Flood Insurance Program (NFIP).  
 This announcement is intended to notify the community of revisions to the floodplain/floodway boundaries of the Flynn Lane Wash. Any interested person, who may have any relevant facts and technical data concerning local flood hazards, is requested to provide such information to the City of Phoenix. These should be directed to Mr. Raymond U. Acuna, P.E., Floodplain Manager, 200 West Washington Street, 5th Floor, Phoenix, Arizona 85003; telephone (602) 262-4960; fax (602) 262-7322.  
 Published September 5, 1996

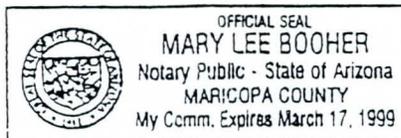
STATE OF ARIZONA }  
 COUNTY OF MARICOPA } SS.

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

9/ 5/1996

*T. Bianco*  
 \_\_\_\_\_

Sworn to before me this  
 5th day of  
 September A.D. 1996



*Mary Lee Booher*  
 \_\_\_\_\_  
 Notary Public

FLOOD CONTROL DISTRICT RECEIVED	
SEP 12 1996	
CHENG	P & PM
DEP	HYDRO
ADMIN	LMGT
FINANCE	FILE
C & O	
ENGR	
REMARKS	

# ARIZONA BUSINESS GAZETTE

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

STATE OF ARIZONA }  
 COUNTY OF MARICOPA } SS.

**ANNOUNCEMENT OF FLOOD HAZARD STUDY**

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The purpose of this re-study is to re-delineate the floodplain/floodway, considering the effects of the Spillway at the ACDC and the construction of the Ocotillo Road improvements. These flood elevations will be used by the City of Phoenix to carry out floodplain management responsibilities and by the Federal Emergency Management Agency (FEMA) to determine flood insurance rates under the National Flood Insurance Program (NFIP).

This announcement is intended to notify the community of revisions to the floodplain/floodway boundaries of the Flynn Lane Wash. Any interested person, who may have any relevant facts and technical data concerning local flood hazards, is requested to provide such information to the City of Phoenix. These should be directed to Mr. Raymond U. Acuna, P.E., Floodplain Manager, 200 West Washington Street, 5th Floor, Phoenix, Arizona 85003, telephone (602) 262-4960, fax (602) 262-7322.

Published: September 5, 1996

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

9/ 5/1996

*T. Bianco*

Sworn to before me this  
 5th day of  
 September A.D. 1996



*Mary Lee Booher*  
 Notary Public

August 20, 1996

Raymond Acuna, P.E.  
Floodplain Manager,  
City of Phoenix  
200 West Washington Street  
Phoenix, Arizona 85004

Re : LOMR request for Flynn Lane Wash  
FCD Contract No. FCD 94-51  
FIRM Map Panel 1670 E (9-30-1995)

LOMR request for Myrtle Avenue Wash and  
Dreamy Draw Wash East  
FCD Contract No. FCD 94-51  
FIRM Map Panel 1670 E (9-30-1995)

Dear Mr. Acuna :

Please find attached letter from Mr. Michael K. Buckley, P.E., Chief, Hazard Identification Branch, Mitigation Directorate, Federal Emergency Management Agency. This letter, dated August 15, 1996, is a response to a submittal, by the Flood Control District of Maricopa County, for a Letter of Map Revision (LOMR) on Flynn Lane Wash, dated August 9, 1996. The Federal Emergency Management Agency requested additional information as described in the attached letter. As per our conversation on the morning of August 20, 1996, a notarized copy of the public notice distributed by the community, will be forwarded to the FCD at your convenience. The intent of this public notice is to notify the property owners of the intended revision of the flood plains/flood ways.

The Flood Control District of Maricopa County, has undertaken another Letter of Map Revision project on the Myrtle Avenue Wash and the Dreamy Draw Wash East. A public notice for this project will be required by FEMA before the LOMR is approved. Therefore, it is suggested that the public notice for the Myrtle Avenue Wash and Dreamy Draw Wash East project is also advertised in advance.

Should you have further questions, please feel free to contact me at 506-1501.

Sincerely,



Hasan Mushtaq, P.E.  
Engineering Division

Coord :  
Info :





2

If you have any questions concerning FEMA policy, or the NFIP in general, please contact Mr. John Magnotti of our staff in Washington, DC, either by telephone at (202) 646-3932 or by facsimile at (202) 646-4596.

Sincerely,

A handwritten signature in cursive script that reads "Michael Buckley". The signature is written in dark ink and is positioned above the typed name.

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

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



# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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

## COVER SHEET

TO: RAY ACUNA, P.E.

Company CITY OF PHOENIX 9-1-602-262-7322  
or Department: \_\_\_\_\_ Fax # \_\_\_\_\_

FROM: HASAN MUSHTAQ

Number of pages being sent including Cover Sheet: 3 (THREE).

Comments: \_\_\_\_\_

RAY,  
LOOKS LIKE WE HAVE SUBMITTED ALL THE TECHNICAL  
INFORMATION TO FEMA ON FLYNN LANE WASH. HOWEVER, THEY NEED  
A STATEMENT FROM THE COMMUNITY OFFICIAL THAT ALL THE  
AFFECTED PROPERTY OWNERS HAVE BEEN NOTIFIED.  
TO  
THEREFORE, I WOULD LIKE REQUEST THAT YOU SEND  
US (FCD) A LETTER FROM THE COP, ~~REPEAT~~ SAYING THAT ALL  
THE AFFECTED PROPERTY OWNERS HAVE BEEN NOTIFIED. PLEASE  
CALL ME (506-4528) OR PEDRO (506-4697). THNX  
*ShunBog*



# Federal Emergency Management Agency

Washington, D.C. 20472

FLOOD CONTROL DISTRICT RECEIVED	
AUG 19 1996	
SEARCHED	INDEXED
SERIALIZED	FILED
REMARKS	

August 15, 1996

Mr. Hasan Mushtaq, P.E.  
Project Manager  
Engineering Division  
Maricopa County Flood Control District  
2801 West Durango Street  
Phoenix, Arizona 85009

IN REPLY REFER TO:  
Case No.: 96-09-1042P  
Community: City of Phoenix, Arizona  
Community No.: 040051

316-ACK.FEX

Dear Mr. Mushtaq:

This responds to your request dated August 9, 1996, for a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. Pertinent information about the request is listed below.

Flooding Source: Flynn Lane Wash

FIRM Panel Affected: 04013C1670 E

As you may know, the Federal Emergency Management Agency (FEMA) has implemented a procedure to recover costs associated with reviewing and processing requests for modifications to published flood information and maps. However, because your request is intended to show the effects of a publicly sponsored flood-control project that reduces flooding to existing development, no fees will be assessed for our review.

We have completed an inventory of the items that you submitted. In accordance with Paragraph 65.7(b)(1) of the National Flood Insurance Program (NFIP) regulations, please submit a copy of a public notice distributed by the community stating its intent to revise the floodway or a statement by the community that it has notified all affected property owners. We must receive the public notice or statement before we can begin a detailed review of your request.

If the required item is not submitted within 90 days of the date of this letter, we will treat any subsequent request as an original submittal, and it will be subject to all submittal procedures.

Please direct the required item and questions concerning your request to our Technical Evaluation Contractor at the following address:

Michael Baker Jr., Inc.  
3601 Eisenhower Avenue, Suite 600  
Alexandria, Virginia 22304

Attention: Mr. Massoud Rezakhani  
(703) 317-6239

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

If you have any questions concerning FEMA policy, or the NFIP in general, please contact Mr. John Magnotti of our staff in Washington, DC, either by telephone at (202) 646-3932 or by facsimile at (202) 646-4596.

Sincerely,



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

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

\*\*\*\*\*  
\*\*\* ACTIVITY REPORT \*\*\*  
\*\*\*\*\*

TRANSMISSION OK

TX/RX NO.	0675
CONNECTION TEL	916022627322
CONNECTION ID	
START TIME	08/20 08:32
USAGE TIME	01'06
PAGES	3
RESULT	OK

# TRANSMITTAL

Date 8-13-96 File MARI0011  
 To Hasan Mushtaq Project Flynn Lane Wash  
Flood Control District of MC  
2801<sup>W</sup> Duwango St Subject LOMR Package  
Phoenix, AZ 85009



Item	Copies	Date	Description
1			LOMR submittal Package

Remarks I've made all the necessary copies showing any changes. Say, I noticed the "PE" after your name - Congratulations! You deserve it; well done. Talk to you again on the MYRTLE AVE. project.

- As you requested
- For your approval
- Return requested
- For your information
- For your review
- \_\_\_\_\_

From Teri Mintz

DAVID EVANS AND ASSOCIATES, INC.  
 A PROFESSIONAL SERVICES CONSULTING FIRM  
 IN OREGON, WASHINGTON, CALIFORNIA AND ARIZONA  
 2929 E. CAMELBACK ROAD, SUITE 240  
 PHOENIX, ARIZONA 85016-3446  
 (602) 956-9850 FAX (602) 956-9853

**FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY**

2801 West Durango Street  
Phoenix, Arizona 85009

(602) 506-1501

**LETTER OF TRANSMITTAL**

TO

DAVID EVANS & ASSOC.

2929 E. CAMELBACK RD.

SUITE 240, PHX, AZ 85016

DATE	8/9/96	JOB NO	
ATTENTION	TERI MINTZ		
RE	FLYNN LANE WASH		

WE ARE SENDING YOU  Attached  Under separate cover via \_\_\_\_\_ the following items:

- Shop drawings       Prints       Plans       Samples       Specifications  
 Copy of letter       Change order       \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
1	8/9/96	1	COMPLETE PACKAGE OF FLYNN LANE WASH COMR.

THESE ARE TRANSMITTED as checked below:

- For approval       Approved as submitted       Resubmit \_\_\_\_\_ copies for approval  
 For your use       Approved as noted       Submit \_\_\_\_\_ copies for distribution  
 As requested       Returned for corrections       Return \_\_\_\_\_ corrected prints  
 For review and comment       \_\_\_\_\_  
 FOR BIDS DUE \_\_\_\_\_ 19 \_\_\_\_\_  PRINTS RETURNED AFTER LOAN TO US

REMARKS \_\_\_\_\_

PLEASE RETURN THE PACKAGE AT YOUR EARLIEST CONVENIENCE.

THANKS.

*[Signature]*

COPY TO \_\_\_\_\_

PAC

SIGNED: \_\_\_\_\_

*[Signature]*



# FLOOD CONTROL DISTRICT

of

## Maricopa County

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Telephone (602) 506-1501

Fax (602) 506-4601

TT (602) 506-5859

### BOARD OF DIRECTORS

Betsy Bayless

Ed King

Tom Rawles

Don Stapley

Mary Rose Garrido Wilcox

Michael K. Buckley, P.E., Chief  
Hazard Identification Branch  
Mitigation Directorate  
Federal Emergency Management Agency  
Washington, D.C. 20472

Attn : Mr. John Magnotti

Re : LOMR request for Flynn Lane Wash  
FCD Contract No. FCD 94-51  
FIRM Map Panel 1670 E (9-30-1995)

Dear Mr. Buckley :

This is a request for a Letter of Map Revision (LOMR) for Flynn Lane Wash. This request is for a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. Pertinent information about the request is listed below :

Identifier :	Flynn Lane Wash
Flooding Source :	Flynn Lane Wash
FIRM Panel Affected :	04013C1670 E (9-30-1995)

Flynn Lane wash flows south-westerly through the City of Phoenix and discharges into the Arizona Canal Diversion Channel (ACDC). Flynn Lane Wash is currently delineated as AE zones. The above referenced study contract was undertaken by David Evans and Associates, Inc., on behalf of the Flood Control District of Maricopa County. The following information is submitted in support of the LOMR request :

1. FEMA application form.
2. Certificate by Registered Professional Engineer form.
3. A complete set of LOMR application forms.
4. Revised profile plot showing the match point locations.
5. Revised Floodplain/floodway boundary annotated on the FIRM panel 1670 E (1"=1000').
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7. As-built plans for the spillways at the ACDC by the US Army Corps of Engineers (sheets 26, 27, and

76 of 90).

8. Hydraulic plan and profile for the spillways at the ACDC by the US Army Corps of Engineers (plates 9 and 10).
9. A copy of the letter, stating that the As-built plans were prepared by the Corps of Engineers.
10. A set of survey notes.
11. Flood insurance study work maps including previous approximate delineation of Flynn Lane Wash.
12. Available topographic mapping (1"=400') of Flynn Lane Wash and vicinity (sheet 75 of 111).
13. Aerial photograph of the project area and vicinity (1"=1200').
14. Hardcopy input/output of the duplicate effective model and the revised model.
15. One 3-1/2" diskette with the duplicate effective model and the revised model.

Following items are also discussed in relation to the LOMR application.

#### ITEM

1. The southern boundary of the floodplain at cross-sections 0.08, 0.10, and 0.116, extends beyond the existing floodplain boundary. However, the extension of the floodplain boundary is fully contained within the City of Phoenix Park area. Ray Acuna, P.E., Floodplain Manager, City of Phoenix, was contacted regarding the City's position on this situation. Correspondence with the city official indicates that the City of Phoenix does not object to an extension of the revised floodplain boundary within the City Park area. Copies of these correspondence are shown in Appendix A.
2. The As-built plans for the different reaches of the ACDC were prepared by the US Army Corps of Engineers. As such, the As-built plans (sheets 26, 27 and 76 of 90), submitted with this application package, are not certified by registered professional engineer. A copy of the letter, stating that these As-built plans were prepared by the US army Corps of Engineers, is included in this submittal.
3. The As-built plans for the two 6'-0" concrete culverts at cross-section 0.333 were not available. These culverts were already accounted for in the duplicate effective model. However, the bridge/culvert was field measured for elevation verification. A bridge/culvert form is also completed and attached with this application.
4. It is proposed that the existing Zone A delineation behind the Arizona Canal, between 17th Street and 18th Street, be completely eliminated. This Zone A ponding (Appendix B) is shown to be contained within the right-of-way of the Arizona Canal Diversion Channel (ACDC). The major source for this ponding is an unnamed wash flowing from the north-easterly direction. However, due to the construction of the Squaw Peak Parkway (Appendix C), the wash has been discontinued permanently. Appendix D shows the drainage tracts, designed and developed within the Villa Valencia development, to convey floodwater from the entire upper watershed. As of now, after the Squaw Peak Parkway construction, the remaining drainage area bounded by Glendale Avenue, Squaw Peak Parkway, and the ACDC, contributes much less floodwater than the original unnamed wash. Since the wash, and the upper watershed, have been discontinued by the Squaw Peak Parkway, the drainage tracts have more than the required capacity, to convey flows, from the remaining drainage area into the ACDC.

An application of the Rational Method shows that the 100-yr. peak discharge is only approximately 84.0 cfs. A hydraulic analysis, using Manning's Equation, of the channel which conveys flows into

the ACDC, shows that it has a capacity of approximately 230.0 cfs. Therefore, it is concluded that the channel capacity (230.0 cfs.) exceeds the 100-yr. peak discharge of 84.0 cfs. generated by the remaining drainage area. The discharge analysis and the hydraulic analysis are shown in Appendix E. Finally, Appendix F is a compilation of several photographs of the drainage tracts within the Villa Valencia development.

Since the study indicates that several residential properties within the current AE Zone will be removed from the redelineated floodplain, and also the Zone A delineation behind the Arizona Canal, between 17th Street and 18th Street, can be completely eliminated, we request that an actual Letter of Map Revision with revised area map be issued.

Should additional information be required, please contact either Ms. Teri Mintz, P.E., Water Resources Engineer, David Evans and Associates, Inc., at (602)-956-9850 or Hasan Mushtaq, P.E., Project Manager, Engineering Division, Flood Control District of Maricopa County at (602)-506-1501.

Sincerely,



Hasan Mushtaq, P.E.  
Engineering Division

Enclosures

Copy to : Terri Miller, State Coordinator, NFIP  
Arizona Department of Water Resources  
500 North 3rd Street, Phoenix, Arizona 85004

Ray Acuna, P.E., Floodplain Manager  
City of Phoenix  
200 West Washington Street, Phoenix, Arizona 85004

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

Coord :



Info :

HM RGN



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AUG 08 1996

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Federal Emergency Management Agency  
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Teri Mintz, P.E., Water Resources Engineer  
David Evans & Associates, Inc.  
2929 East Camelback Road, Suite 240, Phoenix, Arizona 85016

Coord :

Info :

# CONVERSATION RECORD

DATE: 7-18-96 TIME: 9 AM

BY: Teri Mintz

INDIVIDUAL CONTACTED: Hasan

PROJECT NO: MARI 011

COMPANY/ AGENCY: MCFCO

PROJECT NAME: Flynn Lane

ADDRESS: \_\_\_\_\_

PHONE: ( ) \_\_\_\_\_

FAX: ( ) \_\_\_\_\_

TELEPHONE CALL  MEETING  MEMORANDUM TO FILE  OTHER: \_\_\_\_\_

SUBJECT OF CONTACT: Comments on Flynn Lane

DCN

Add explanation for vert boundary vs Horiz bound. for ZONE A West of 51.

& Widen Floodplain @ X-section .116 & explain OK w/ David

Widen floodway d/s of Culvert Xing by changing TET station to smooth out floodway bound. - Get 2 new copies of FRM

Add comment in explanation again for Floodway alignment, Survey, topo,  $\Rightarrow$  West

Adjust not on Form 5, Pg 2 #6  
Remove design to convey flow to ADC  
Reference to photo, topo, survey, HEC-2

Add explanation re- NO as-builts but Reference field topo.

Adjust X-section data to Remove bulge after call w/ Ray

ACTION REQUIRED: \_\_\_\_\_

COPY TO: \_\_\_\_\_

July 9, 1996

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

**SUBJECT: Flynn Lane Wash Floodplain Delineation, Response to comments**

Dear Hasan:

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FEMA Forms:

- (1) Suggested corrections in the "introduction".  
*Corrections made.*
- (2) Corrections on MT-2 Form 1, page 1 of 4.  
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*Corrections made.*
- (4) Corrections on the "Explanation" page.  
*Corrections made.*

Duplicate Effective Model:

- (5) Please explain the reason to modify the J3 record in the HEC-2 input.  
*Duplicate Effective model now reflects Effective model J3 record.*
- (6) Also explain the modification on the fields 4 & 5 of the X2 records at X1 0.33 and X1 0.62.  
*Duplicate Effective model now reflects Effective model X2 record.*
- (7) Some changes are required in the input file based on the information from the microfiche received from FEMA.  
*Changes were made.*
- (8) The floodway table lists incorrect information.  
*Due to changes made to the J3 record (J3 record in Duplicate Effective model is the same as Effective model), no floodway table is produced.*

Revised Model:

- (9) Several cross-sections have the "cross sections extended" messages. These messages need to be eliminated.

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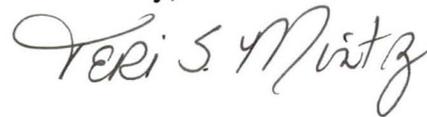
s:\adm\mari0011\ma11ltr2.doc

*It was not possible to eliminate the warnings unless the floodplain is widened beyond the existing boundaries. However, the four remaining extensions are less than 0.5'.*

- (10) The floodway width at X1 0.141 seems incorrect; please verify.  
*The width anomaly could not be eliminated based on the cross section. Because the cross section is only 90' from cross section 0.158, cross section 0.041 was eliminated. The resulting floodway width was consistent upstream and downstream.*
- (11) X1 0.32 shows a greater floodway width than the floodplain.  
*With the use of encroachment method #1, this type of occurrence was eliminated.*
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*Method 1 was utilized in the final analysis.*
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*All surcharge values are within range except one which is -0.08'. Due to the cross sectional data, this could not be eliminated without widening the floodway to an unrealistic width. The value of -0.08' was retained due to the low value.*

Let me know if there are any other comments on this second submittal.

Sincerely,



Teri S. Mintz, P.E.

July 9, 1996

Hasan Mushtaq  
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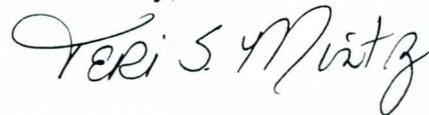
s:\adm\mari0011\ma11ltr2.doc

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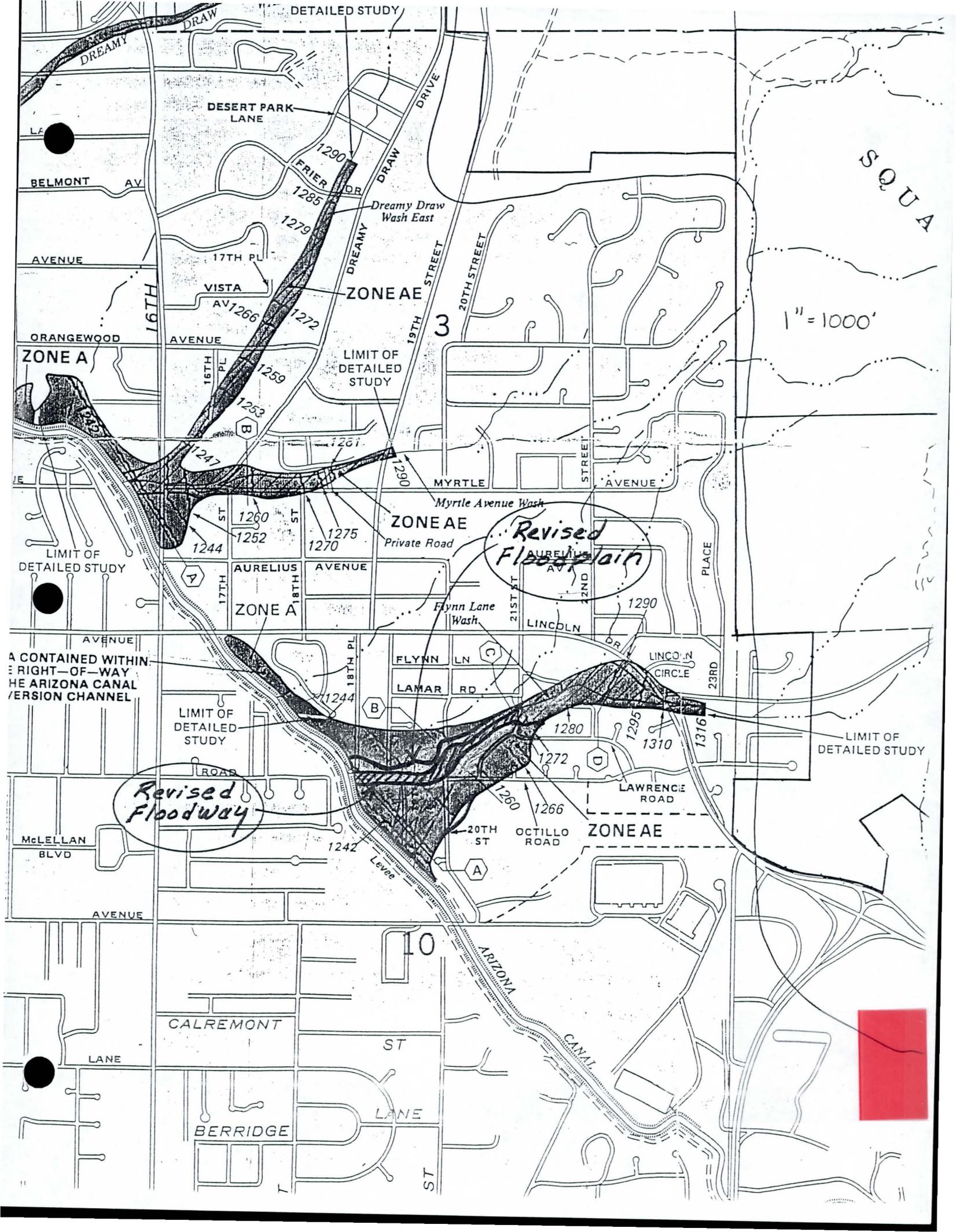
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Sincerely,



Teri S. Mintz, P.E.



DETAILED STUDY

DREAMY DRAW

DESERT PARK LANE

1290

1285

1279

1272

1259

1253

1247

1260

1252

1275

1270

1244

1242

1244

1280

1272

1295

1310

1316

1266

1260

1242

1242

1" = 1000'

Revised Floodplain

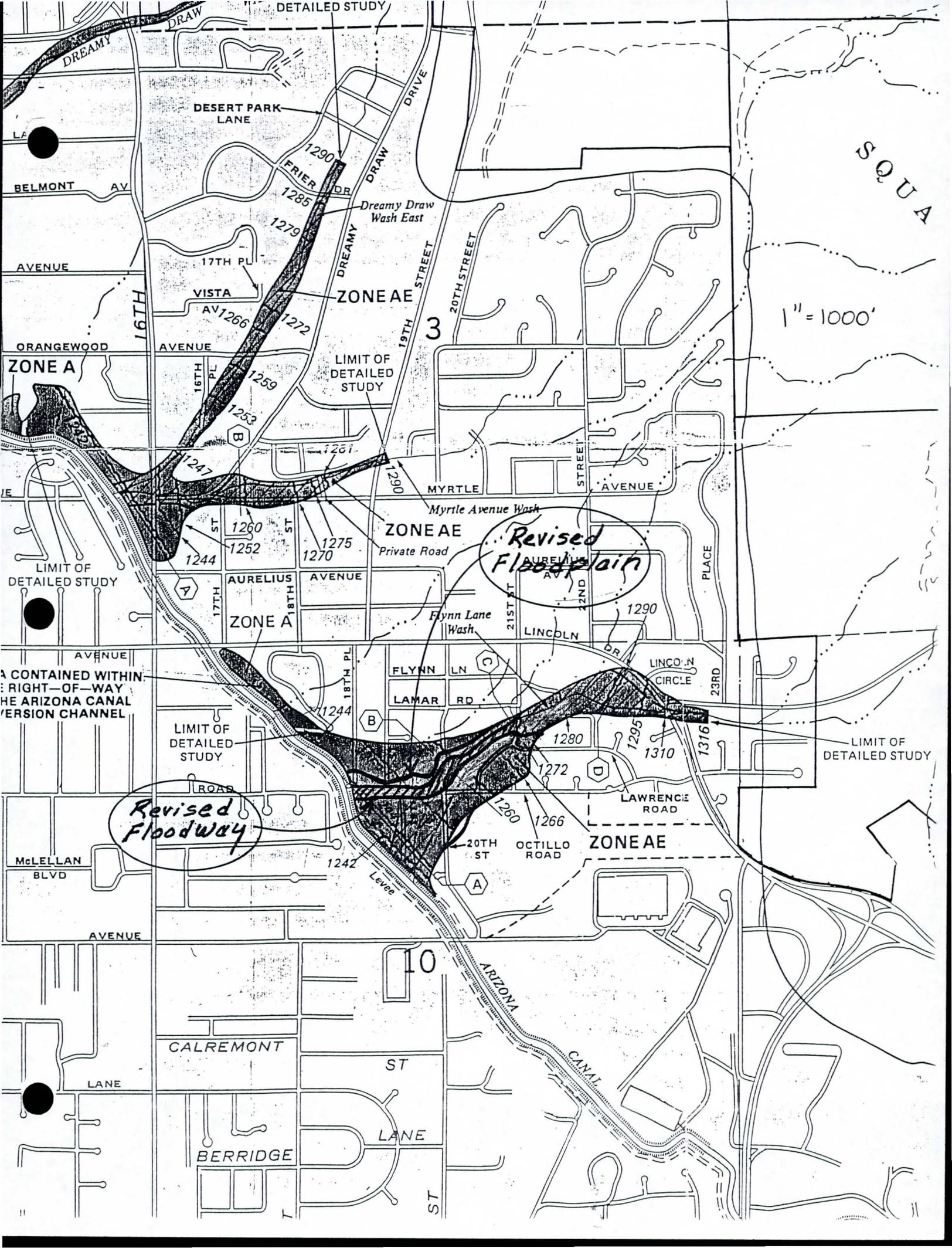
Revised Floodway

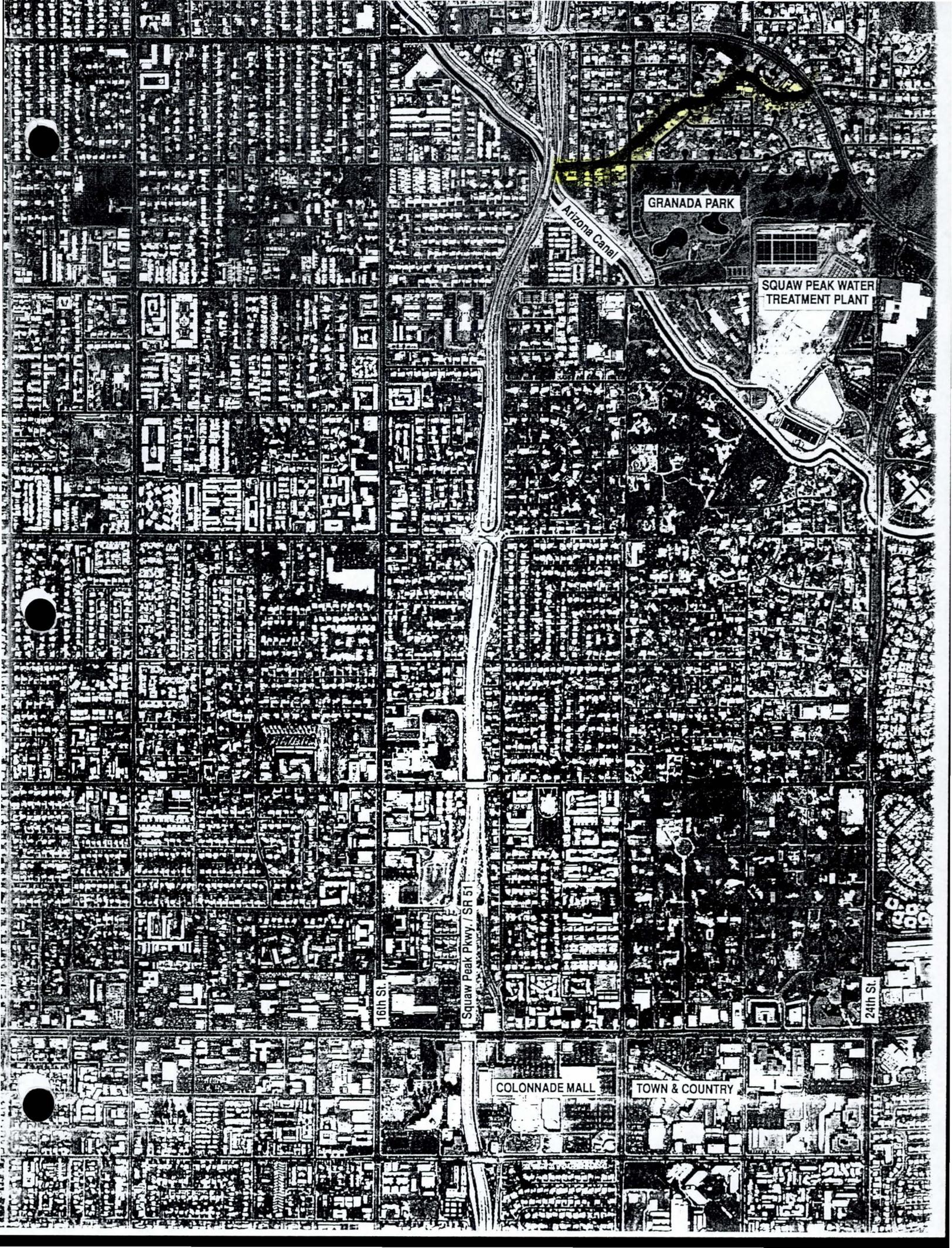
CONTAINED WITHIN THE RIGHT-OF-WAY OF THE ARIZONA CANAL VERSION CHANNEL

LIMIT OF DETAILED STUDY

LIMIT OF DETAILED STUDY







Arizona Canal

GRANADA PARK

SQUAW PEAK WATER  
TREATMENT PLANT

16th St.

Squaw Peak Pkwy. / SR 51

24th St.

COLONNADE MALL

TOWN & COUNTRY

Teri Mintz, P.E.  
David Evans and Associates, Inc.  
2929 East Camelback Road  
Suite # 240  
Phoenix, Arizona 85016-3446

**SUBJECT : Flynn Lane Wash Floodplain Delineation : FEMA Submittal, FCD 94-51.**

Dear Ms. Mintz :

Following is a list of review comments on the above mentioned project. It is suggested that these comments be addressed prior to final submission.

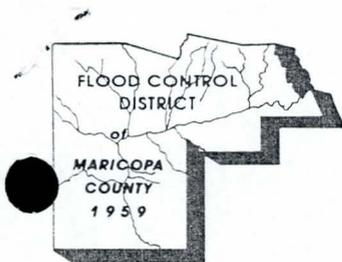
- ✓ (1) The ponding behind the Arizona Canal, to the west of the Squa Peak Parkway, ~~cannot be eliminated. The higher of the two canal banks needs to be extended horizontally, to delineate a Zone A floodplain boundary.~~
- ✓ (2) The floodplain boundary at the north-west corner of 20th Street and Ocotillo Road needs to be revised and/or explanation for the delineation.
- ✓ (3) The transition of the floodway boundary before and after the culvert across 20th Street need to be addressed.

# FLOOD CONTROL DISTRICT of Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009  
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Please do not hesitate to contact me at 506-1501 for further information.

Sincerely,



Hasan Mushtaq  
Engineering Division

Coord :

Info :



PAC HM  
HM

# TRANSMITTAL

Date 5/8/96 File MAR10011  
 To Hasan Project Flynn Lane  
MCFCO  
 Subject LOMR



Item	Copies	Date	Description
1	1		Copy of LOMR applications (with both sides)

Remarks \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

- As you requested
- For your information
- For your approval
- For your review
- Return requested

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**FLOOD CONTROL DISTRICT  
RECEIVED**

**MAY 10 1996**

CHENG	P&M
DEF	REG
ADMIN	LMGT
FINANCE	FILE
C&M	1 HM
ENGR	

REMARKS \_\_\_\_\_

# TRANSMITTAL

Date 4-17-96 File MARI0011  
 To Flood Control Dist of MC Project Flynn Lane Wash  
2801 W. Durango St  
Phoenix, AZ 85009 Subject LOMR submittal  
ATTN: Hasan



Item	Copies	Date	Description
1	1		LOMR Submittal Package w/ Diskette
2	1		Explanation of procedures (Cover Letter)
3	1		Survey Notes

### Issues to Resolve:

Form 1, Part 3, Item 10-1B WSEL's do change  
 Can same operation/maintenance plans be used as w/ Echo Canyon?  
 Signatures req'd on Form 1, pg 4  
 Form 4 pg 4 of 6 - max. surcharge allowed by community  
 Do you have a 'cleaner' copy of FIRM panel than I have? Also a lighter copy of  
 Map to show Revised floodplain.  
 Probably need to include as-built dwgs, sheets 26, 27,  
 Let me know when you want to meet 4/16  
 to Review comments.

- As you requested  
 For your information

- For your approval  
 For your review

- Return requested

From Teri Mintz

DAVID EVANS AND ASSOCIATES, INC.  
 A PROFESSIONAL SERVICES CONSULTING FIRM  
 IN OREGON, WASHINGTON, CALIFORNIA AND ARIZONA  
 2929 E. CAMELBACK ROAD, SUITE 240  
 PHOENIX, ARIZONA 85016-3446  
 (602) 956-9850 FAX (602) 956-9853

FLOOD CONTROL DISTRICT RECEIVED	
APR 17 1996	
CHENG	P & FM
DEF	REG
ADMIN	LMST
FINANCE	FILE
C & D	
ENGR	
REMARKS	

**FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY**

2801 West Durango Street  
Phoenix, Arizona 85009

(602) 506-1501

**LETTER OF TRANSMITTAL**

TO

DAVID EVANS & ASSOCIATES  
2929 E. CAMELBACK RD.  
# 240  
PHOENIX, AZ 85016

DATE	4/12/96	JOB NO.
ATTENTION	TERRY MINTZ	
RE:	FLYNN LANE WASH.	

WE ARE SENDING YOU  Attached  Under separate cover via \_\_\_\_\_ the following items:

- Shop drawings       Prints       Plans       Samples       Specifications  
 Copy of letter       Change order       AS BUILT

COPIES	DATE	NO.	DESCRIPTION
1	4/12/96	6	"AS BUILT" PLANS FOR <del>CONCRETE</del> ACDC FROM MARYLAND TO OCCOTILLO RD.

THESE ARE TRANSMITTED as checked below:

- For approval       Approved as submitted       Resubmit \_\_\_\_\_ copies for approval  
 For your use       Approved as noted       Submit \_\_\_\_\_ copies for distribution  
 As requested       Returned for corrections       Return \_\_\_\_\_ corrected prints  
 For review and comment       \_\_\_\_\_  
 FOR BIDS DUE \_\_\_\_\_ 19 \_\_\_\_\_       PRINTS RETURNED AFTER LOAN TO US

REMARKS \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

COPY TO PAC.

SIGNED: [Signature]

Flood Control District of Maricopa County

Interoffice Memorandum

Subject : Flynn Lane Wash LOMR.

To : AMMotamedi

From : HMushtaq

Date : April 8, 1996

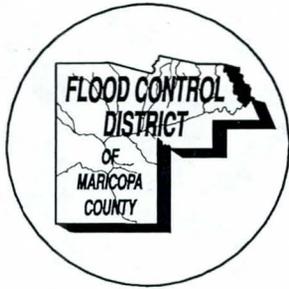
Cc : EARaleigh  
PACalza

This memorandum documents the conversation I had with Mr. Henry Thome (840-4748) this morning regarding the Flynn Lane Wash LOMR application.

Start time	January 25, 1996.
Finish time	March 25, 1996
Internal review	April 25, 1996
FEMA review	June 25, 1996
Approximate approval	End of July.

In an earlier conversation (December 1995) with Mr. Thome, I had explained the same schedule to him regarding the Flynn Lane Wash LOMR application. At the time, the district was preparing to start the Echo Canyon Wash LOMR study.

Please do not hesitate to contact me for further information at X 4528.



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY  
HYDROLOGY BRANCH  
Request for information

# HYDROLOGY

Date: 4,8,96 Initials: AMM  
Name: Henry Thome Agency/Company: \_\_\_\_\_  
Tele: 840-4748 Fax: \_\_\_\_\_

Request:

Henry Thome (C)  
What is the status of the Flynn Lane Wash.  
He has been very upset as to why it took so long  
for this restudy to start, and why is it taking  
so long to complete.

Referred to: PAC / HM Due date: \_\_\_\_\_

Response:

Hasan, will you please give him the status,  
I told him someone

Date of response:

Time spent on preparing the response (closest 1/2 hour):

File:

Reference files:

# TRANSMITTAL

Date 4/4/96 File 5 MARI0011  
 To Hasam Project Flynn Lane Wash  
FCDMC  
2801 W. Durango St Subject Revised Floodplain  
Phoenix, AZ 85009



Item	Copies	Date	Description
1	1		Topo showing cross section locations
2	1		Disk w/ effec. & Revised models

Remarks Let me know how you want to continue with this.

FLOOD CONTROL DISTRICT RECEIVED	
APR 04 1996	
CHENG	P & FM
DEF	REG
ADMIN	IMGT
FINANCE	FILE
C & M	
ENGR	
REMARKS	

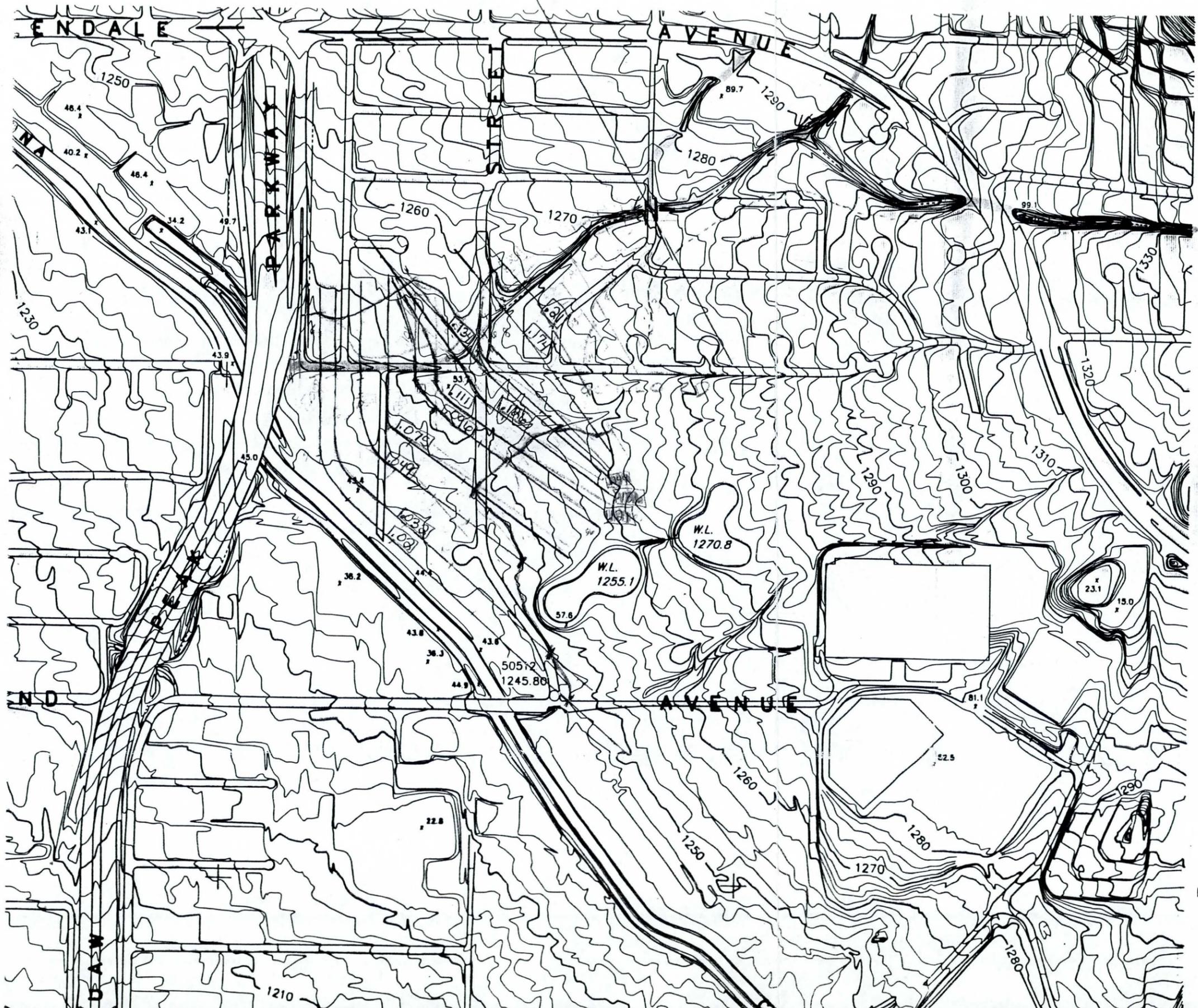
- As you requested
- For your information
- For your approval
- For your review
- Return requested

From Jeri Mintz

DAVID EVANS AND ASSOCIATES, INC.  
 A PROFESSIONAL SERVICES CONSULTING FIRM  
 IN OREGON, WASHINGTON, CALIFORNIA AND ARIZONA  
 2929 E. CAMELBACK ROAD, SUITE 240  
 PHOENIX, ARIZONA 85016-3446  
 (602) 956-9850 FAX (602) 956-9853

**PHOTOGRAMMETRIC SURVEY**

I, Daniel L. Kaminski, of KAMINSKI-HUBBARD  
 Arizona Registered Land Surveyor #16559  
 Control Used To Complete Photogrammetric  
 Correct And Accurate Within Contract Specifications

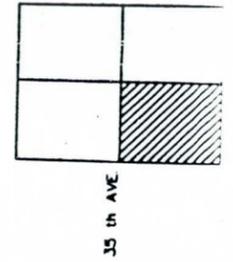


	FIRM	REV	DIF
.21	59.77	60.21	+44
.30	67.31	67.35	+04
.32	70.07	70.08	+01
.33	71.39	71.39	0
.34	72.54	72.54	0

N 922000

N 920000

KEY MAP



INDEX

11	12	7	8	9	10	11	1
14	13	18	17	16	15	14	1
27	24	19	20	21	22	23	2

FAX TRANSMITTAL

DATE: 4-3-96 TIME: 11:50

TO: Hasan

OF: FCDMC

FROM: Teri Mintz

SUBJECT: I've run the HEC-2 models

and the resulting floodplain is  
shown on the attached drawing.

The reason why I'm showing you this  
now is to make sure you're aware  
of what area will be removed &  
what area should be added to the  
~~old~~ floodplain. Let me know your

TOTAL NUMBER OF PAGES SENT INCLUDING COVER SHEET thoughts.  
2

JOB/PROPOSAL NO. MAR10011

FAX NUMBER TRANSMITTED TO: ( ) 506-4601

If all pages were not received, please call (602) 956-9850.

ORIGINAL to follow by: \_\_\_\_\_ U.S. Mail

\_\_\_\_\_ Overnight Messenger

\_\_\_\_\_ Messenger Service

\_\_\_\_\_ Other

DAVID EVANS AND ASSOCIATES, INC.  
A PROFESSIONAL SERVICES CONSULTING FIRM  
OFFICES IN OREGON, WASHINGTON, CALIFORNIA AND ARIZONA  
2929 E. CAMELBACK ROAD, SUITE 240  
PHOENIX, ARIZONA 85016-3446  
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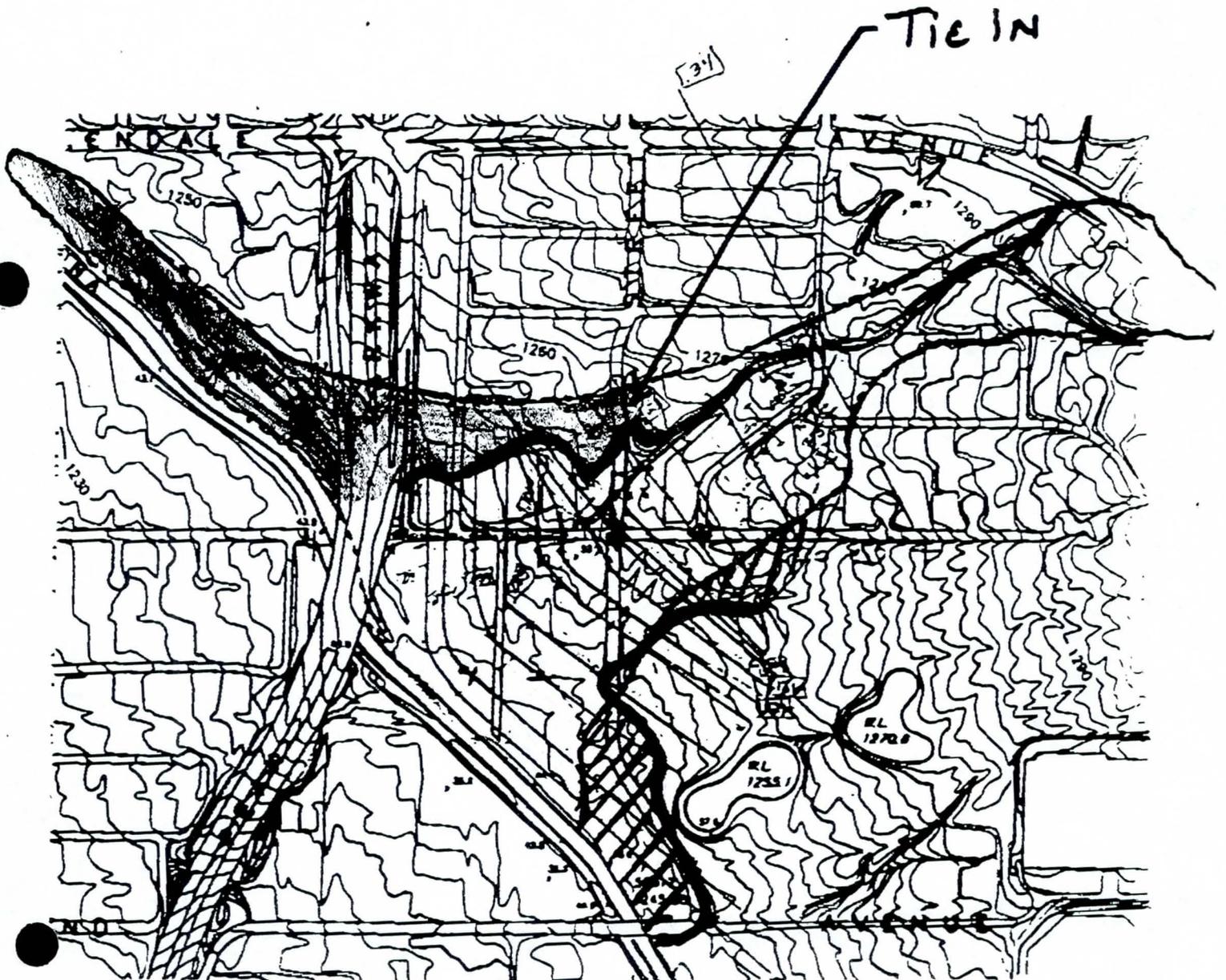


— Existing floodplain boundary

● — Revised " "

▨ Area removed from floodplain

▩ Area added to floodplain





# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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

## COVER SHEET

TO: TERI S. MINTZ

Company or Department: DAVID EVANS & ASSOCIATES Fax # 916029529853

FROM: HASAN MUSHTAQ

Number of pages being sent including Cover Sheet: 4 ~~(FOUR)~~ (FOUR)

Comments: \_\_\_\_\_

\_\_\_\_\_

CALL ME IF YOU HAVE ANY QUESTIONS @  
506-1501

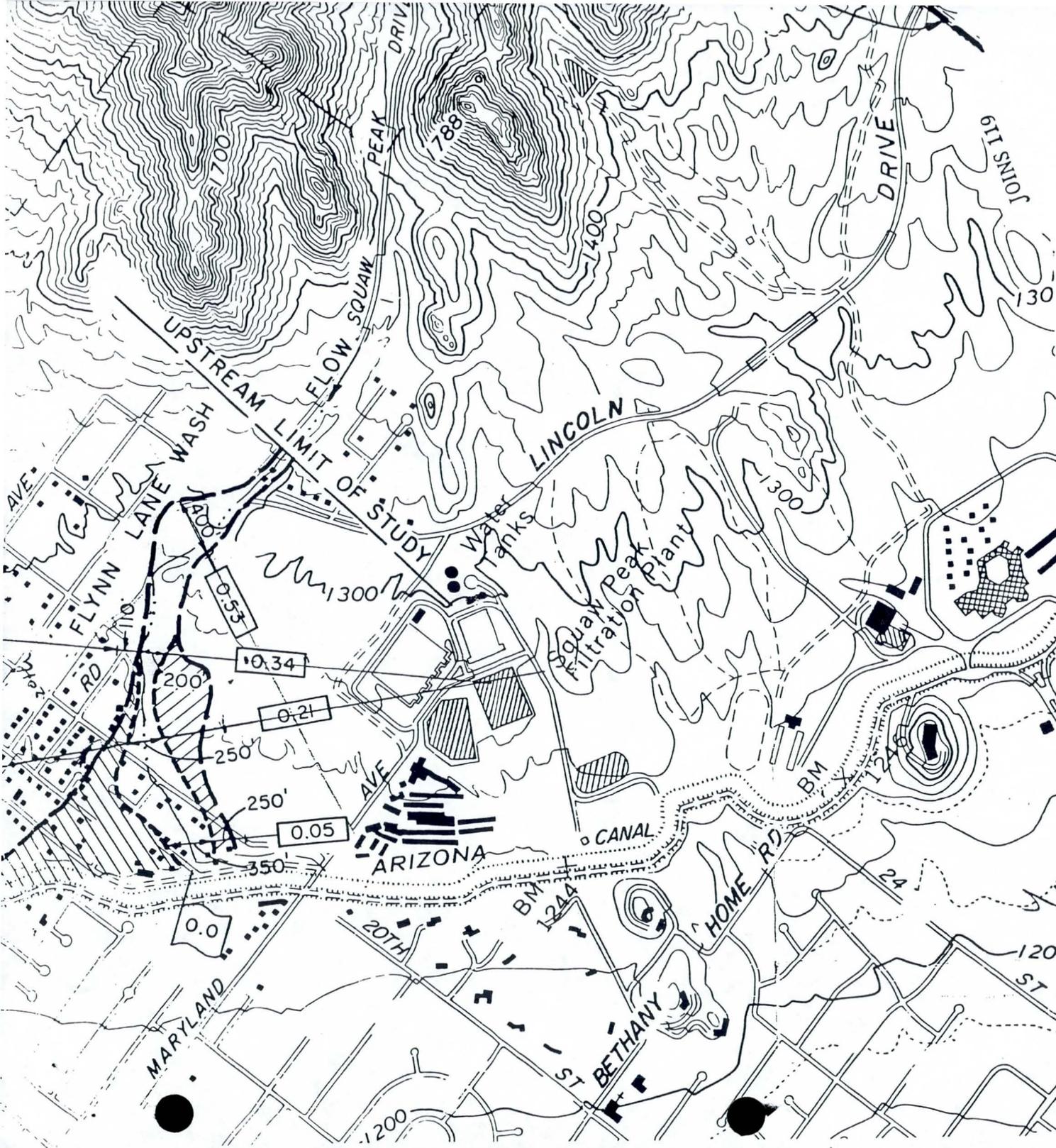
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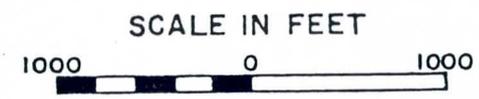
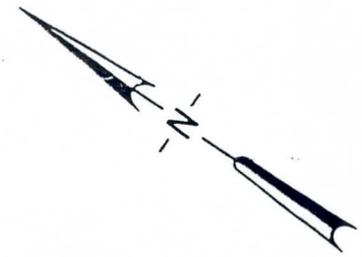
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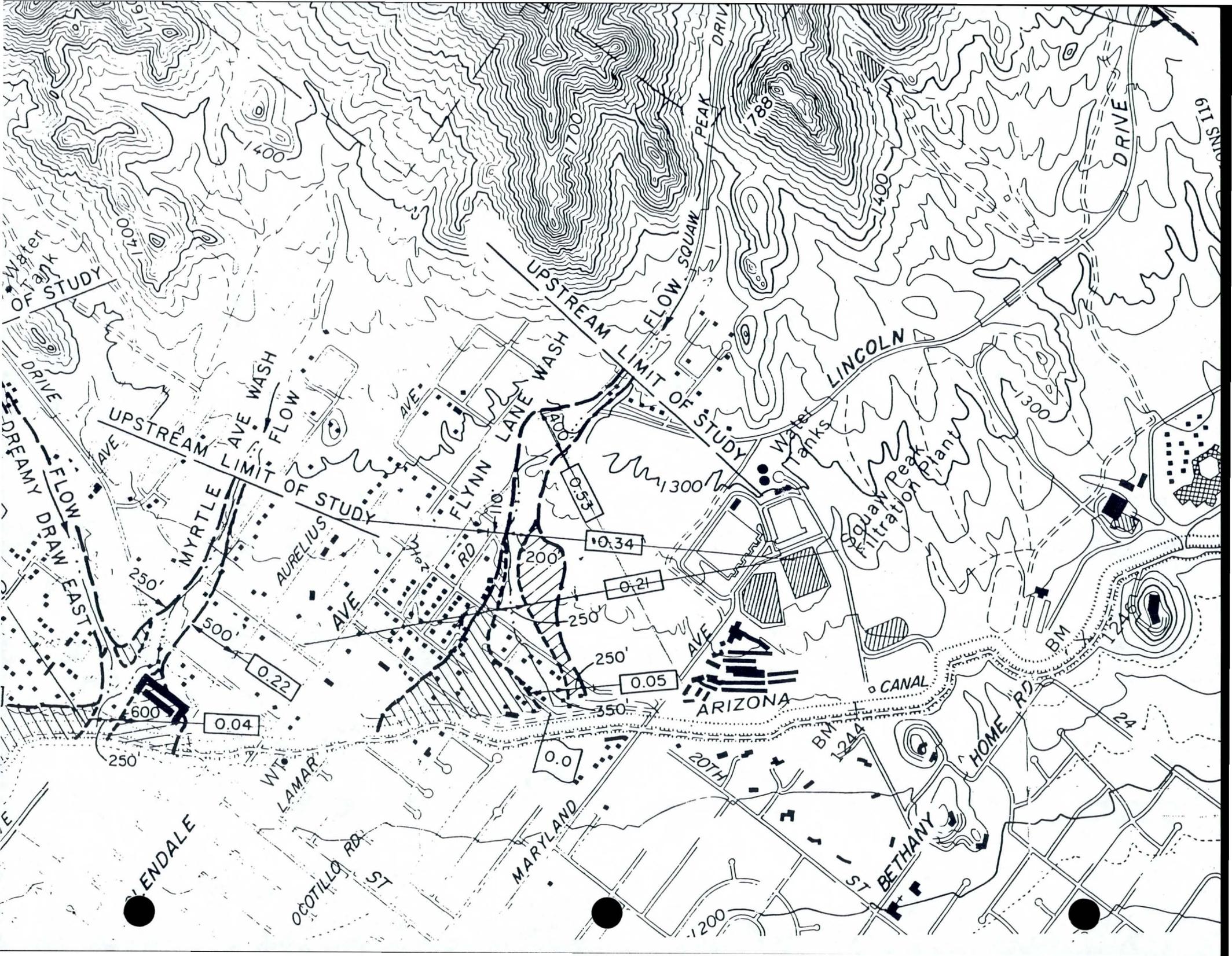
-  CROSS SECTION NUMBER AND RIVER MILE.
-  RIVER MILE.
-  2840 GROUND ELEVATION IN FEET ABOVE MEAN SEA LEVEL.

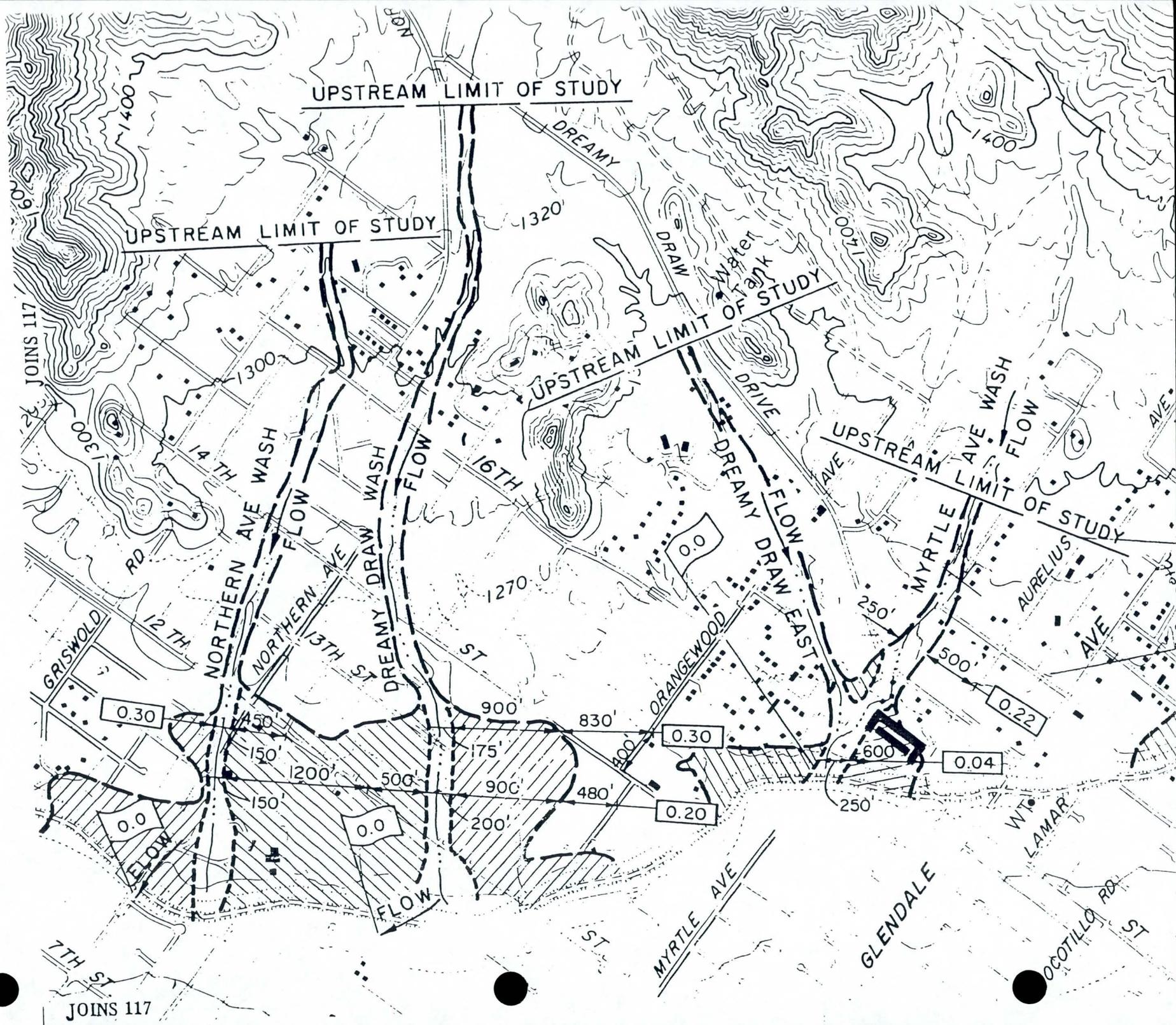


DEPARTMENT OF THE ARMY  
 LOS ANGELES DISTRICT, CORPS OF ENGINEERS  
 LOS ANGELES, CALIFORNIA  
 FLOOD INSURANCE STUDY  
 PHOENIX, ARIZONA

PRELIMINARY FLOODWAY  
 NORTHERN AVE., DREAMY DRAW  
 DREAMY DRAW EAST, MYRTLE AVE.  
 AND FLYNN LANE WASHES  
 PREPARED FOR  
 FEDERAL INSURANCE ADMINISTRATION

DECEMBER





\*\*\*\*\*  
\*\*\* ACTIVITY REPORT \*\*\*  
\*\*\*\*\*

TRANSMISSION OK

TX/RX NO.	3502
CONNECTION TEL	916029569853
CONNECTION ID	
START TIME	02/05 13:22
USAGE TIME	02'50
PAGES	4
RESULT	OK



# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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

## COVER SHEET

TO:

TERRY MINTZ

Company

DAVID EVANS & ASSOCIATES

916029569853

or Department:

Fax #

FROM:

HASAN MUSHTAQ

Number of pages being sent including Cover Sheet:

4 (FOUR).

Comments:

PLEASE CALL ME @ 506-1501, IF  
YOU HAVE ANY QUESTIONS.

THANKS

*Hasan Mushtaq*

FEB 8, 1996

SCOPE OF WORK  
(DRAFT 3-14-90)

A.C.D.C. AREA DRAINAGE MASTER STUDY  
PHASE I (MAPPING AND HYDROLOGY)

The Engineer shall make the necessary surveys and studies, and shall prepare a report setting forth the Hydrology for present and future conditions in the Arizona Canal Diversion Channel (ACDC) drainage area. The study area covers a portion of the Flood Control District Watersheds Nos. 21, 23, and 24. This area is roughly bounded on the South by the Arizona Canal, Skunk Creek, and New River; on the west by the Agua Fria River watershed; on the north by the New River Dam, Adobe Dam, and Cave Buttes Dam watersheds; and on the east by the Indian Bend Wash watershed .

See attached map.

The purpose of this study is to perform the mapping as listed below and produce a working hydrologic model for present and future conditions for this watershed. The study products will include:

- I. Background Materials
- II. Mapping
- III. Hydrology
- IV. Supporting Documentation
- V. Project Coordination and Study Management

The work shall include the following tasks:

I. **Background Materials:**

Assemble and review pertinent maps, studies, land use plans, and private master plans, including existing Flood Control District studies within the area. Included in this data search will be the drainage studies for the Flood Control District of Maricopa County 1963 Comprehensive Plan; the East Fork Cave Creek ADMS; FCD Flood Insurance Studies (FIS) for Cave Creek and Skunk Creek; U.S. Army Corps of Engineers Design Memorandums for the ACDC, New River Dam, Adobe Dam, Cave Buttes Dam, and Dreamy Draw Dam; and ADOT studies for Interstate 17, the Outer Loop, etc.

II. **Mapping:**

A. Procedures for General Mapping:

1. Prepare topographic mapping to a 2-foot contour interval, with spot elevations and/or 1-foot contours on all section line and mid-section line roads. This would be for the approximately 160 square mile area as outlined on the attached map.

2. Ground Control:

- a. The Consultant shall provide all survey control.
- b. The Consultant shall systematically set panel points and establish horizontal and vertical control throughout the areas to be mapped for use in compilation by the aerial survey contractor. Where readily available, surveys will tie into the State Plane Coordinate System. Field control shall be sufficient to readily allow for compilation of maps by the aerial survey contractor at the desired map scale and contour interval and will be based on the National Geodetic Vertical Datum (NGVD).
- c. The horizontal and vertical control points shall be located and marked by the Contractor. The controls for the area mapping shall be in sufficient numbers and shall be in locations which will be compatible with the accuracy of the mapping requirements. The controls shall be of at least third order accuracy. Section corners, quarter corners, and mid-section points shall be used for control points wherever possible.

B. Map Standards:

1. Digital design, contour and planimetric data developed for this project shall be delivered in AutoCAD DXF ASCII format, as specified in Autodesk, Inc., publication TD106-009 (May 7, 1986). Layer names and graphics attributes shall be fully documented by the Consultant. The delivered DXF files shall be compatible with the requirements, and subject to the limitations, of the ESRI DXFARC software translator as detailed in the January 1989 release of the "ARC/INFO Users Guide". All DXF file deliveries shall be in ASCII format on industry-standard 1/2" magnetic tape, 2400-foot reels, written in a generic unlabelled COPY format, with specified record-lengths and block sizes, OR

Digital design, contour and planimetric data developed for this project shall be delivered in Intergraph ISIF ASCII format, as specified in Intergraph publication DIX4110 (May 12, 1985). Layer names and graphics attributes shall be fully documented by the Consultant. The delivered ISIF files should be compatible with the requirements, and subject to the limitations, of the ESRI SIF2ARC software translator as detailed in the January 1989 release of the "ARC/INFO Users Guide". All ISIF file deliveries shall be in ASCII format on industry-standard 1/2" magnetic tape, 2400-foot reels, written in a generic unlabelled COPY format, with specified record-lengths and block sizes.

2. The Consultant shall provide permanent non-erasable topographic mylar sheets 24" X 36" with a scale of 1-inch equal to 400 feet, and a contour interval of 2 feet for all mapping with the exception of section line roads, which will have a contour interval of 1 foot. A cover sheet will be provided with the project title, date of topographic mapping, and a location map showing geographic range covered by each specific mapping sheet. Each manuscript shall include a minimum of a north arrow, scale, section corners and quarter corners, current and proposed streets and highway names,

State Plane Coordinate System, major drainage features, city limits, cross section lines, channel station center line, index map, description and elevation of control points and ERMs, and reference marks used in ground control. The mapping will have an accuracy such that ninety percent (90%) of all contours shall be within one-half contour of the true elevations and the remaining ten percent (10%) of the contours shall not be in error by more than one contour interval.

3. Sketch maps no larger than 11" x 17" for the study area must be included in the narrative report.
4. The Presentation Maps shall be on U.S.G.S. 7.5 minute Quadrangle Maps and include:
  - a. The study area: all current and proposed streets, major arterials and freeways, section lines, major drainage features, presently delineated floodplains areas, and city limits. This map shall serve as a base map.
  - b. Maps showing the existing drainage patterns, the subwatersheds, and indicating the flows at major intersections and concentration points.
  - c. Maps showing the future drainage patterns, if different from existing.
5. Hydrologic Work Maps should be at a scale of 1 inch = 1200 feet and shall include: reproducible transparent overlay maps of existing drainage patterns, subwatersheds; major flow paths; and general topographic maps.

\*\*\*\*\*  
\*\*\* ACTIVITY REPORT \*\*\*  
\*\*\*\*\*

TRANSMISSION OK

TX/RX NO.	3672
CONNECTION TEL	916029569853
CONNECTION ID	
START TIME	02/08 09:39
USAGE TIME	02'34
PAGES	4
RESULT	OK



FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY  
2801 West Durango Street  
Phoenix, Arizona 85009  
(602) 506-1501

NOTICE TO PROCEED

TO: Mr. Roger E. Baele, P.E.  
David Evans and Associates, Inc.  
2929 E. Camelback Road, Suite 240  
Phoenix, Arizona 85016

DATE: January 25, 1996

PROJECT: Assignment No. 6  
TITLE: Flynn Lane Wash Floodplain Delineation Study  
FCD CONTRACT NUMBER: 94-51  
FCD ACTIVITY NUMBER: 991-690-6926-6903

Your Not-to-Exceed cost estimate of \$9,351.00 for Assignment No. 6: Flynn Lane Wash Floodplain Delineation Study has been received and accepted for this project. You are hereby authorized to commence with the consulting work for the above referenced project as originally described in the Scope of Services dated October 12, 1995, and Fee Schedule dated January 23, 1996 (copies attached) as discussed with Pedro A. Calza of the District.

If at any time during the project you anticipate an increase above the original cost estimate shown here, you must provide the Flood Control District of Maricopa County with a detailed written explanation for your request for additional funds. The request will be reviewed and must be approved by authorized Flood Control District personnel before any additional payment amount is made.

I have enclosed a Certificate of Performance (C.O.P.) for this assignment. All deliverables should be directed to me for verification. When you have completed all the duties related to this assignment, the completed C.O.P. shall be returned with your invoice to Lovetta Henry.

Please contact me immediately if you have any questions or comments regarding the above information. Thank you for your cooperation and assistance in providing survey services for this project.

SIGNED: Richard P. Harris  
Richard P. Harris, P.E.

coord: MA *mat*

cc: lh

STANDARD TASK ORDER FORM  
TASK ORDER NO. 3  
CONTRACT FCD 94-51

Re: General Surveying and Engineering Services between the  
Flood Control District of Maricopa County (CLIENT) and  
David Evans and Associates, Inc. (DEA) dated March 13, 1995.

Execution of this Task Order by CLIENT and DEA will serve as authorization for DEA to carry out and complete the services as set forth below in accordance with the referenced Agreement between CLIENT and DEA.

1. Scope of Services:

See enclosed Exhibit "Scope of Services" for Flynn Lane Wash at AC/DC Floodplain Delineation Study.

2. Time Schedule for Performance of Services:

The FEMA submittal package will be ready for submittal 60 days after notice to proceed, excluding Client review time.

3. Fees for Services:

Not to Exceed \$9,351.00 per fee schedule in the Contract for Consulting Services. See enclosed Exhibit A for break-down of fee per task and resource.

4. Additional Provisions:

In preparation of this Task Order, the following items were considered:

- A) Client is the Owner of the property or Agent for same.
- B) Client is to provide the best available Topographic Surveys to DEA.
- C) Client has requested and received from FEMA, all available existing data for the Flynn Lane Wash FEMA floodplain and has made that information available to DEA.
- D) Client is to provide As-Built data for the AC/DC improvements to DEA.

**SCOPE OF SERVICES  
FLYNN LANE WASH AT AC/DC  
FLOODPLAIN DELINEATION STUDY**

**Phoenix, Arizona  
DEA Proposal No. 95-198  
October 12, 1995**

**ENGINEERING SERVICES**



**A) Supplemental Topographic Survey**

The new HEC2 models will be developed based on topographic mapping of the AC/DC Area Drainage Master Study. However, additional topography will be needed for Octillo Road between the AC/DC on the west and 20th Street on the east. Octillo Road is currently constructed with an inverted crown roadway section which intercepts the flow from Flynn Lane Wash at about 20th Street and conveys it to the west. The survey for this 700 foot length of road will include cross sectioning at 100 foot intervals which provides elevations at the right-of-way, curb, and roadway center line. The supplement topographic survey will also provide field measurements for the concrete spillway inlet to the AC/AC.

**B) N-Value Confirmation/Field Trip**

DEA will conduct a "field trip" to determine the appropriate Manning "n" value to be used in the preparation of the HEC2 model. The "field trip" will be documented with photographs and field notes.

**C) HEC2 Model Development**

DEA will prepare a HEC2 model using existing As-Built data and topographic information provided by the Client and existing FEMA data. The model will begin at the spillway entrance to the AC/DC and extend to Glendale Road. Using the 100-year event peak flow value from the current FEMA floodplain model, a new model will be prepared based on the new topographic data and AC/DC improvements.

**D) Deliverables**

DEA will prepare the floodplain work maps, technical analysis, design report, FEMA LOMR application forms, and submittal package to FEMA. These

Scope of Services  
Flynn Lane Wash at AC/DC  
Floodplain Delineation Study

October 12, 1995  
DEA Proposal No. 95-198  
Page 2

deliverables will be submitted to the Client for their review and comment. It is assumed the Client will submit the final package to FEMA. It is understood that the Client will act as the FEMA coordinator for this project, responsible for all communications with FEMA with regards to this project.

DEA

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

I, Roger E. Baele, P.E., hereby certify to the Flood Control District of Maricopa County (FCDMC) that all lawful claims for labor, rental of equipment, material used, and any other claims by David Evans and Associates, Inc. or its subcontractors in connection with the specific assignment described below and as authorized by the terms of the FCDMC contract 94-51 have been paid.

David Evans and Associates, Inc. understands that with receipt of payment for previously invoiced amounts plus any retained funds, that this is a settlement of all claims of every nature and kind against the FCDMC arising out of the performance of the FCDMC's specific assignment through FCDMC Contract 94-51 for Assignment No. 6: Flynn Lane Wash Floodplain Delineation relating to the material, equipment, and work covered in and required by the contract.

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

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

Signed the \_\_\_\_\_ day of \_\_\_\_\_, 1995.

\_\_\_\_\_  
Signature

Title: \_\_\_\_\_

SUBSCRIBED AND SWORN TO before me this \_\_\_\_\_ day of \_\_\_\_\_, 199\_\_.

\_\_\_\_\_  
Notary Public

My Commission Expires:

ACCT INFO: 991-690-6926-6903

**EXHIBIT 'A'**  
**FEE SCHEDULE**  
**FLYNN LANE WASH AT AC/DC**  
**FEMA FLOODPLAIN DELINEATION STUDY**  
 DEA Proposal No. 95-198  
 January 23, 1996

TASK	PROJECT MANAGER	PROJECT SURVEYOR	2-MAN CREW	PROJECT ENGINEER	TECHNICIAN	DRAFTER	TASK TOTAL
Supplemental Topographic Survey	\$80	\$600	\$1,275				\$1,955
<i>Hours</i>	<i>1.00</i>	<i>10.00</i>	<i>17.00</i>				<i>28.00</i>
N-Value Confirmation/Field Trip	\$80			\$480			\$560
<i>Hours</i>	<i>1.00</i>			<i>8.00</i>			<i>9.00</i>
HEC2 Model Development	\$80			\$2,400	\$398		\$2,876
<i>Hours</i>	<i>1.00</i>			<i>40.00</i>	<i>12.00</i>		<i>53.00</i>
Deliverables	\$80			\$1,440	\$660	\$1,280	\$3,460
<i>Hours</i>	<i>1.00</i>			<i>24.00</i>	<i>20.00</i>	<i>32.00</i>	<i>77.00</i>
<b>COLUMN TOTALS</b>	<b>\$320</b>	<b>\$600</b>	<b>\$1,275</b>	<b>\$4,320</b>	<b>\$1,056</b>	<b>\$1,280</b>	<b>\$8,851</b>
<i>Hours</i>	<i>4.00</i>	<i>10.00</i>	<i>17.00</i>	<i>72.00</i>	<i>32.00</i>	<i>32.00</i>	<i>167.00</i>
Allowance for Blueprinting, Xeroxing, and other incidental cost - Not to Exceed Fee (based on DEA cost plus 15% markup)							\$500
<b>TOTAL FEE FOR PROJECT - Not to Exceed Fee</b>							<b>\$9,351</b>

The above fees do not include agency review fee costs which are the responsibility of the Client to provide.

**EXHIBIT 'A'**  
**FEE SCHEDULE**  
**FLYNN LANE WASH AT AC/DC**  
**FEMA FLOODPLAIN DELINEATION STUDY**  
 DEA Proposal No. 95-198  
 January 23, 1996

TASK	PROJECT MANAGER	PROJECT SURVEYOR	2-MAN CREW	PROJECT ENGINEER	TECHNICIAN	DRAFTER	TASK TOTAL
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HEC2 Model Development	\$80			\$2,400	\$398		\$2,876
<i>Hours</i>	<i>1.00</i>			<i>40.00</i>	<i>12.00</i>		<i>63.00</i>
Deliverables	\$80			\$1,440	\$660	\$1,280	\$3,460
<i>Hours</i>	<i>1.00</i>			<i>24.00</i>	<i>20.00</i>	<i>32.00</i>	<i>77.00</i>
<b>COLUMN TOTALS</b>	<b>\$320</b>	<b>\$600</b>	<b>\$1,275</b>	<b>\$4,320</b>	<b>\$1,056</b>	<b>\$1,280</b>	<b>\$8,851</b>
<i>Hours</i>	<i>4.00</i>	<i>10.00</i>	<i>17.00</i>	<i>72.00</i>	<i>32.00</i>	<i>32.00</i>	<i>167.00</i>
Allowance for Blueprinting, Xeroxing, and other incidental cost - Not to Exceed Fee (based on DEA cost plus 15% markup)							\$500
<b>TOTAL FEE FOR PROJECT - Not to Exceed Fee</b>							<b>\$9,351</b>

The above fees do not include agency review fee costs which are the responsibility of the Client to provide.

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

I, Roger E. Baele, P.E., hereby certify to the Flood Control District of Maricopa County (FCDMC) that all lawful claims for labor, rental of equipment, material used, and any other claims by David Evans and Associates, Inc. or its subcontractors in connection with the specific assignment described below and as authorized by the terms of the FCDMC contract 94-51 have been paid.

David Evans and Associates, Inc. understands that with receipt of payment for previously invoiced amounts plus any retained funds, that this is a settlement of all claims of every nature and kind against the FCDMC arising out of the performance of the FCDMC's specific assignment through FCDMC Contract 94-51 for Assignment No. 6: Flynn Lane Wash Floodplain Delineation relating to the material, equipment, and work covered in and required by the contract.

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

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

Signed the \_\_\_\_\_ day of \_\_\_\_\_, 1995.

\_\_\_\_\_

Signature

Title: \_\_\_\_\_

SUBSCRIBED AND SWORN TO before me this \_\_\_\_\_ day of \_\_\_\_\_, 199\_\_.

\_\_\_\_\_

Notary Public

My Commission Expires:

ACCT INFO: 991-690-6926-6903

STANDARD TASK ORDER FORM  
TASK ORDER NO. 3  
CONTRACT FCD 94-51

Re: General Surveying and Engineering Services between the  
Flood Control District of Maricopa County (CLIENT) and  
David Evans and Associates, Inc. (DEA) dated March 13, 1995.

Execution of this Task Order by CLIENT and DEA will serve as authorization for DEA to carry out and complete the services as set forth below in accordance with the referenced Agreement between CLIENT and DEA.

1. Scope of Services:  
See enclosed Exhibit "Scope of Services" for Flynn Lane Wash at AC/DC Floodplain Delineation Study.
2. Time Schedule for Performance of Services:  
The FEMA submittal package will be ready for submittal 60 days after notice to proceed, excluding Client review time.
3. Fees for Services:  
Not to Exceed \$9,351.00 per fee schedule in the Contract for Consulting Services. See enclosed Exhibit A for break-down of fee per task and resource.
4. Additional Provisions:  
In preparation of this Task Order, the following items were considered:
  - A) Client is the Owner of the property or Agent for same.
  - B) Client is to provide the best available Topographic Surveys to DEA.
  - C) Client has requested and received from FEMA, all available existing data for the Flynn Lane Wash FEMA floodplain and has made that information available to DEA.
  - D) Client is to provide As-Built data for the AC/DC improvements to DEA.

**SCOPE OF SERVICES  
FLYNN LANE WASH AT AC/DC  
FLOODPLAIN DELINEATION STUDY**

Phoenix, Arizona  
DEA Proposal No. 95-198  
October 12, 1995

**ENGINEERING SERVICES**



**A) Supplemental Topographic Survey**

The new HEC2 models will be developed based on topographic mapping of the AC/DC Area Drainage Master Study. However, additional topography will be needed for Octillo Road between the AC/DC on the west and 20th Street on the east. Octillo Road is currently constructed with an inverted crown roadway section which intercepts the flow from Flynn Lane Wash at about 20th Street and conveys it to the west. The survey for this 700 foot length of road will include cross sectioning at 100 foot intervals which provides elevations at the right-of-way, curb, and roadway center line. The supplement topographic survey will also provide field measurements for the concrete spillway inlet to the AC/AC.

**B) N-Value Confirmation/Field Trip**

DEA will conduct a "field trip" to determine the appropriate Manning "n" value to be used in the preparation of the HEC2 model. The "field trip" will be documented with photographs and field notes.

**C) HEC2 Model Development**

DEA will prepare a HEC2 model using existing As-Built data and topographic information provided by the Client and existing FEMA data. The model will begin at the spillway entrance to the AC/DC and extend to Glendale Road. Using the 100-year event peak flow value from the current FEMA floodplain model, a new model will be prepared based on the new topographic data and AC/DC improvements.

**D) Deliverables**

DEA will prepare the floodplain work maps, technical analysis, design report, FEMA LOMR application forms, and submittal package to FEMA. These

Scope of Services  
Flynn Lane Wash at AC/DC  
Floodplain Delineation Study

October 12, 1995  
DEA Proposal No. 95-198  
Page 2

deliverables will be submitted to the Client for their review and comment. It is assumed the Client will submit the final package to FEMA. It is understood that the Client will act as the FEMA coordinator for this project, responsible for all communications with FEMA with regards to this project.



**EXHIBIT 'A'**  
**FEE SCHEDULE**  
**FLYNN LANE WASH AT AC/DC**  
**FEMA FLOODPLAIN DELINEATION STUDY**  
 DEA Proposal No. 95-198  
 January 23, 1996

TASK	PROJECT MANAGER	PROJECT SURVEYOR	2-MAN CREW	PROJECT ENGINEER	TECHNICIAN	DRAFTER	TASK TOTAL
Supplemental Topographic Survey	\$80	\$600	\$1,275				\$1,955
<i>Hours</i>	<i>1.00</i>	<i>10.00</i>	<i>17.00</i>				<i>28.00</i>
N-Value Confirmation/Field Trip	\$80			\$480			\$560
<i>Hours</i>	<i>1.00</i>			<i>8.00</i>			<i>9.00</i>
HEC2 Model Development	\$80			\$2,400	\$396		\$2,876
<i>Hours</i>	<i>1.00</i>			<i>40.00</i>	<i>12.00</i>		<i>53.00</i>
Deliverables	\$80			\$1,440	\$660	\$1,280	\$3,460
<i>Hours</i>	<i>1.00</i>			<i>24.00</i>	<i>20.00</i>	<i>32.00</i>	<i>77.00</i>
<b>COLUMN TOTALS</b>	<b>\$320</b>	<b>\$600</b>	<b>\$1,275</b>	<b>\$4,320</b>	<b>\$1,056</b>	<b>\$1,280</b>	<b>\$8,851</b>
<i>Hours</i>	<i>4.00</i>	<i>10.00</i>	<i>17.00</i>	<i>72.00</i>	<i>32.00</i>	<i>32.00</i>	<i>167.00</i>
Allowance for Blueprinting, Xeroxing, and other incidental cost - Not to Exceed Fee (based on DEA cost plus 15% markup)							\$500
<b>TOTAL FEE FOR PROJECT - Not to Exceed Fee</b>							<b>\$9,351</b>

The above fees do not include agency review fee costs which are the responsibility of the Client to provide.

STANDARD TASK ORDER FORM  
TASK ORDER NO. 3  
CONTRACT FCD 94-51

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**SCOPE OF SERVICES  
FLYNN LANE WASH AT AC/DC  
FLOODPLAIN DELINEATION STUDY**

**Phoenix, Arizona**  
DEA Proposal No. 95-198  
October 12, 1995

**ENGINEERING SERVICES**



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Scope of Services  
Flynn Lane Wash at AC/DC  
Floodplain Delineation Study

October 12, 1995  
DEA Proposal No. 95-198  
Page 2

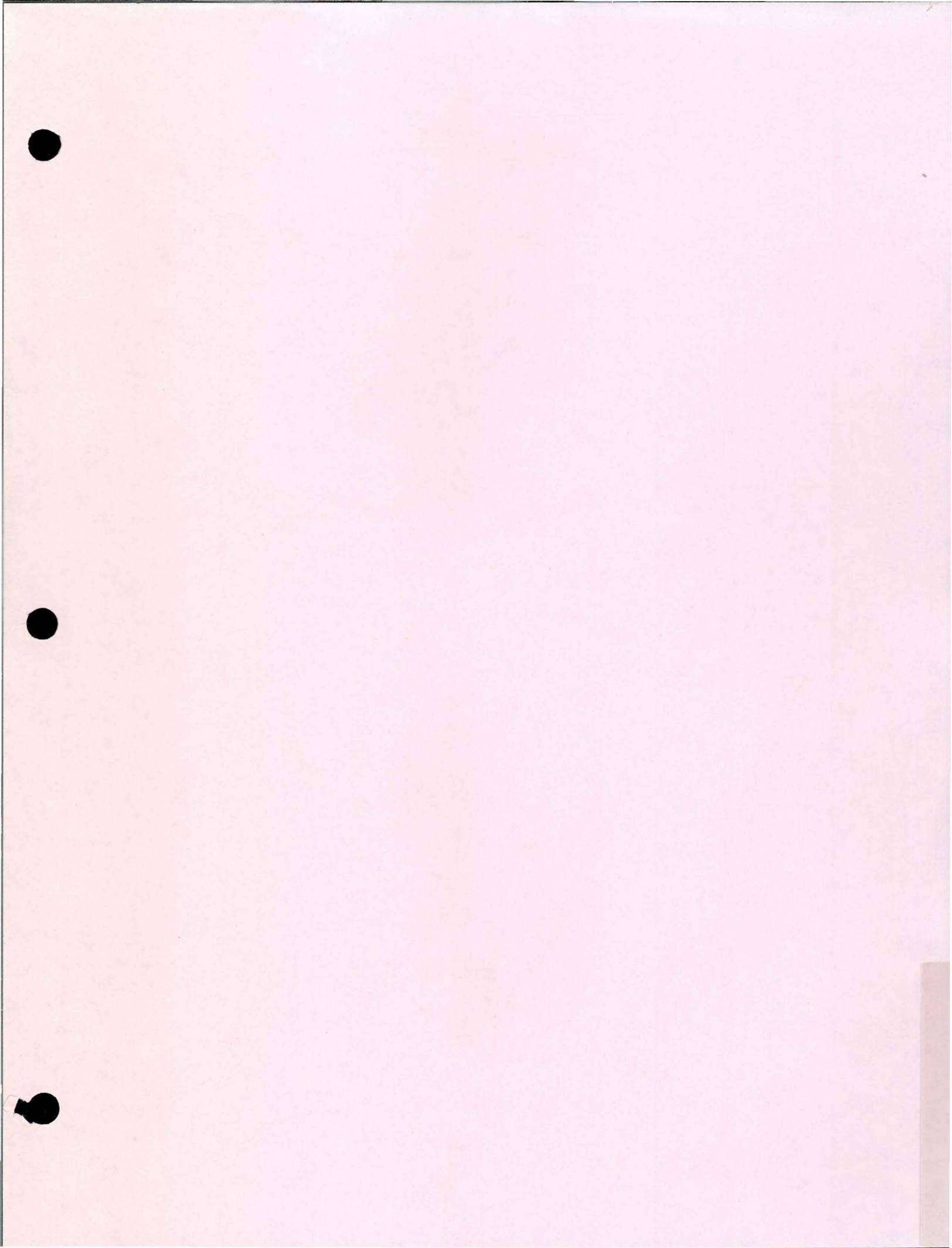
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**EXHIBIT 'A'**  
**FEE SCHEDULE**  
**FLYNN LANE WASH AT AC/DC**  
**FEMA FLOODPLAIN DELINEATION STUDY**  
DEA Proposal No. 95-198  
January 23, 1996

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Jit S. Pegany, P.E., R.L.S.  
Engineering Alliance, Inc.  
727 East Bethany Home Road, Suit C-100  
Phoenix, Arizona 85014

Re : Flynn Lane Wash  
FIRM Map Panel 1670 E (9-30-1995)

Dear Mr. Pegany :

This responds to your request dated October 2, 1996, requesting information on the above mentioned Flynn Lane Wash. Please find following itemized information provided to you.

ITEM

1. 11' X 17" sheet of Flood Profile plot for the Flynn Lane Wash.
2. 8-1/2" X 11 sheet of revised floodplain/floodway boundaries.
3. Hardcopy input/output of the duplicate effective HEC-2, and revised HEC-2 models.
4. Copies of necessary FEMA forms to be submitted.
5. 24" X 36" copy of work map of the project area.
6. 3-1/2" diskette with input/output files of duplicate effective HEC-2 model, revised HEC-2 models.
7. 24" X 36" mylar of sheet 75 of 111 from the ACDC Area Drainage Master Study : Phase I.

Please note that, as of today, the Application for the Letter of Map Revision is being reviewed by the Federal Emergency Management Agency. Prior to approval of the original application, there may be requests for minor changes in the hydraulic model, which may or may not affect the floodplain/floodway boundaries in the Flynn Lane Wash.

Should you need additional information, please feel free to contact me at (602)-506-1501.

Sincerely,

Hasan Mushtaq, P.E.  
Engineering Division

Copy to :

Ray Acuña, P.E., Floodplain Manager  
City of Phoenix, Fifth Floor  
200 West Washington Street, Phoenix, Arizona 85003

Following are suggestions for a possible Letter of Map Revision (LOMR) to Federal Emergency Management Agency (FEMA).

- (1) Revise approved HEC-2, with additional surveyed cross-sections.
- (2) Delineate revised floodway boundary based upon new cross sections.
- (3) Submit the following forms :
  - (a) Revision Requestor and Community Official Form (MT-2 FORM 1)
  - (b) Certification by Registered Professional Engineer and/or Land Surveyor Form (MT-2 FORM 2).
  - (c) Riverine Hydraulic Analysis Form (MT-2 FORM 4).

FACSIMILE TRANSMITTAL



ENGINEERING ALLIANCE, INC.  
727 E. BETHANY HOME RD., C-100  
PHOENIX, AZ 85014  
FAX (602) 248-4219

From: Jit Pegany  
Time: 2:30 Date: 10-2-96

Attn: N. Mushtaq, P.E.

Firm: FCDMC

Phone:

Fax#: 506-4601

Subject:

Message:

Number of pages transmitted (including this sheet):

If you had any problems with this transmission, please call  
@ (602) 248-4203.

TRANSPORTATION • LAND DEVELOPMENT • WATER/WASTEWATER  
STRUCTURES • LAND SURVEYING • CONSTRUCTION MANAGEMENT



ENGINEERING ALLIANCE, INC.  
CONSULTING ENGINEERS  
727 EAST BETHANY HOME ROAD, SUITE C-100  
PHOENIX, ARIZONA 85014 (602) 248-4203 FAX (602) 248-4319

JIT S. PEGANY, P.E., R.L.S.  
ROBERT J. MEYERS, JR., E.I.T.

HOWARD G. PRATT  
BEN VAN HORN

RICHARD F. BARTHOLOMEW, P.E.  
DR. SHAN SUNDARAM, P.E.

October 2, 1996

Flood Control District  
Maricopa County  
2801 W. Durango  
Phoenix, Arizona 85009

Attention: Mr. Hasan Mushtaq, P.E.  
Hydrologist

Reference: Flynn Lane Wash

Dear Hasan:

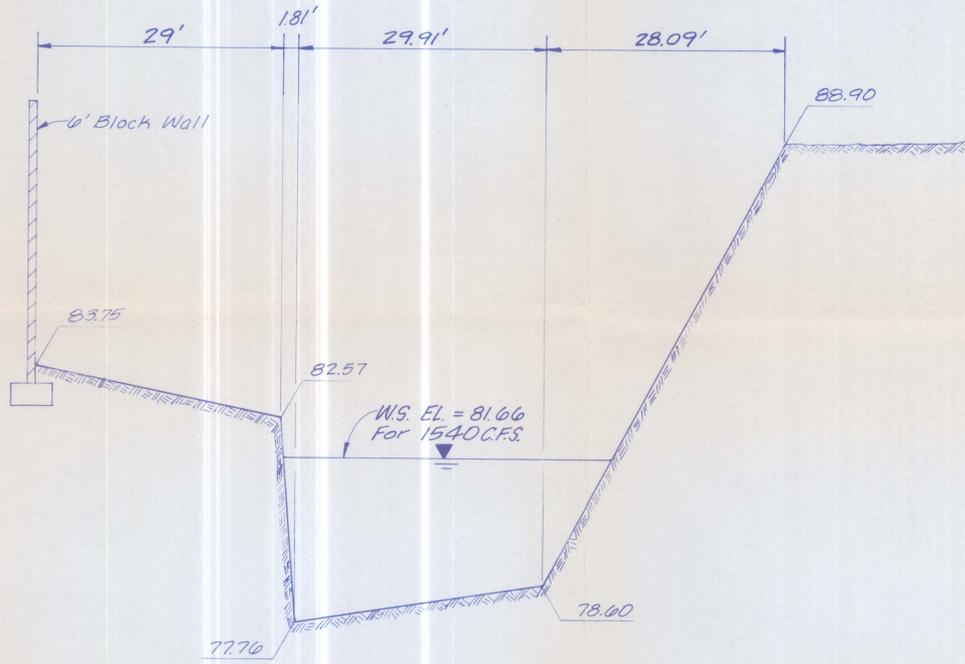
We are studying the limits of the flood plain of Flynn Lane Wash from 21st Street to Lincoln Drive.

Please furnish us the existing study data that is available for our use in this study.

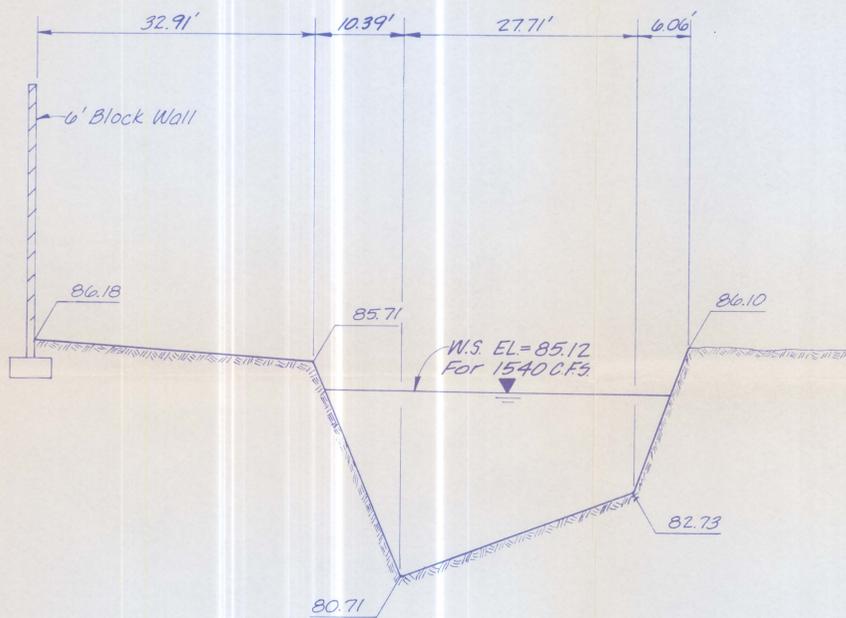
Thank you for your cooperation.

Very Truly Yours,

Jit S. Pegany, P.E., R.L.S.  
Engineering Alliance, Inc.

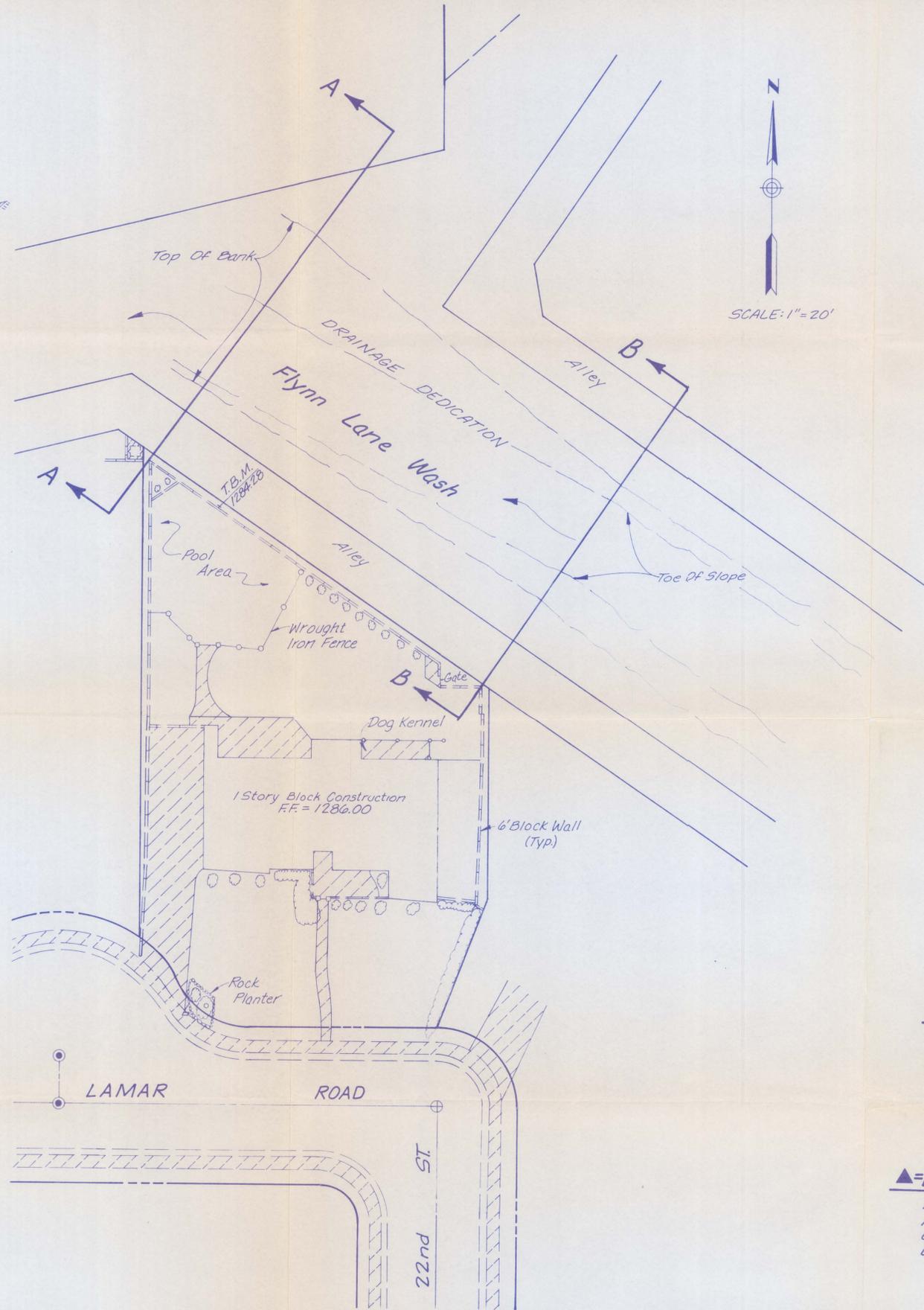


**SECTION A-A**



**SECTION B-B**

SCALE: 1" = 10' HORIZ.  
2" VERT.



**NOTE:**

1540 C.F.S. - 100 Year Flood  
Cross Section C, Panel 1670  
Of 4350.

**▲=BENCH MARK**

From C.O.P. B.C. On E. Service Rd. At Lincoln Dr.  
And Octillo Rd. 212' West Of 23rd Place And  
65' East Of Center Line Of Lincoln Dr.  
Elev. = 1316.95

<b>WHITLOW RESIDENCE</b> 2144 EAST LAMAR ROAD		<b>EA</b> ENGINEERING ALLIANCE, INC. CONSULTING ENGINEERS 727 EAST BETHANY HOME ROAD, SUITE C-100 PHOENIX, ARIZONA 85014 (602) 248-4203 FAX (602) 248-4219	10/1
Date	9-16-96		
Designed	R.J.B.		
Checked	J.S.P.		
		JIT S. PEGANY, P.E., R.L.S. ROBERT J. MEYERS, JR., E.I.T.	HOWARD G. PRATT BEN VAN HORN

ORDINANCE NO S 11092

195493

AN ORDINANCE OF THE COUNCIL OF THE CITY OF PHOENIX ACCEPTING DEEDS AND EASEMENT FOR STREET, ALLEY AND DRAINAGE PURPOSES, ORDERING THE DOCUMENTS RECORDED AND DEDICATING TO PUBLIC USE THE PROPERTIES DESCRIBED THEREIN.

ORDINANCE (GO)

WHEREAS, the real estate hereinafter described has been conveyed to the City of Phoenix by deeds and easement from the parties and on the dates hereinafter listed, and

WHEREAS, it is to the advantage of said City of Phoenix to accept said-described properties for street, alley and drainage purposes.

NOW THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF PHOENIX, THAT the following described deeds and easement to the City of Phoenix be and are hereby accepted by the City of Phoenix, subject to the conditions, if any, contained therein, ordered recorded in the Maricopa County records, and the properties therein described are hereby dedicated to public use for street, alley and drainage purposes:

Deeds for street purposes.  
Lupine Avenue E/O 25th Place.  
30-33

From: Gary S. Moore  
Date: January 4, 1979

From: John K. Hoffner  
Date: April 2, 1979



Description

The North 25 feet of the West half of Lot 10, CACTUS MANOR, according to the plat of record in the office of the County Recorder of Maricopa County, Arizona, in Book 76 of Maps at page 17.

-----

Deed for street purposes.  
Arlington Road and 45th Street.  
20-38

From: D. G. Bell  
Date: May 11, 1979

Description

The South 5 feet and the East 5 feet of Lot 16 in VALHALLA-AMENDED, according to the plat of record in the office of the County Recorder of Maricopa County, Arizona, in Book 27 of Maps at page 46 thereof, said East 5 feet being measured radially to the East line of said Lot 16;

TOGETHER WITH that part of said Lot 16 bounded on the South by the North line of the South 5 feet of said Lot 16 and on the East by the West line of the East 5 feet of said Lot 16 and on the Northwest by the arc of a circular curve which is concave to the Northwest, has a radius of 25 feet and is tangent to said North line and to said West line.

-----

Deed for street purposes.  
Adobe Drive at 19th Avenue.  
43-24

From: Curtis G. Jones  
Date: April 19, 1979

Description

The South 33 feet of Lot 8 in the Southeast quarter of Section 13, Township 4 North, Range 2 East, G&SRB&M.

-----

Deed for alley purposes.  
S/O Grant Street E/O 2nd  
Street.  
9-28

From: PHOENIX LINEN AND TOWEL SUPPLY, an  
Arizona Corporation  
Date: May 16, 1977

Legal Description - continued

Description

That part of Lot 11, Block 26, AMENDED PLAT OF LINVILLE ADDITION, according to the plat of record in the office of the County Recorder of Maricopa County, Arizona, in Book 2 of Maps at page 30, and that part of abandoned 2nd Street, lying within the parcel of land described as follows:

BEGINNING at the Southeast corner of said Lot 11; thence West along the South line of said Lot 11 and the Westerly prolongation thereof to a line which is parallel with and 22.73 feet Westerly of the West line of said Lot 11; thence North along said parallel line to the Westerly prolongation of the North line of the South 20 feet of said Lot 11; thence East along said North line and prolongation to a point 46 feet West of the East line of said Lot 11 as measured along said North line; thence Easterly to the Northwest corner of the East 6 feet of the South 26 feet of said Lot 11; thence East along the North line of said South 26 feet to the East line of said Lot 11; thence South along said East line to the point of beginning.

-----

Easement for drainage purposes.  
Cactus Wren Drive W/O 20th  
Street.  
23-31

From: Paul Klusman  
Date: May 10, 1979

Description

That part of Lot 3, Block 2, SQUAW PEAK MANOR, according to the plat of record in the office of the County Recorder of Maricopa County, Arizona, in Book 39 of Maps at page 3, lying 5 feet on each side of the following described line;

BEGINNING at a point on the North line of said Lot 3 which is 70 feet East of the Northwest corner thereof;

thence Southwesterly to a point in the West line of said Lot 3 which is 90 feet South of said Northwest corner.

It is the intent herein that this easement shall extend from the North line of said Lot 3 to the West line thereof.

-----

PASSED by the Council of the City of Phoenix this 29 day of  
MAY, 1979.



Margaret T. Hauck  
MAYOR

JUN 1 - 1979 - 10 00

ATTEST:

[Signature] City Clerk

STATE OF ARIZONA }  
County of Maricopa } ss

I hereby certify that the within instrument was filed and recorded at request of PHOENIX, CITY OF

APPROVED AS TO FORM:

[Signature] City Attorney

REVIEWED BY:

[Signature] City Manager

in Decret 13670 650 657  
on page

Witness my hand and official seal this 1st day of June, 1979.

[Signature]

County Recorder  
By [Signature]  
Deputy Recorder

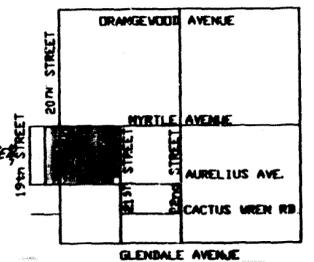
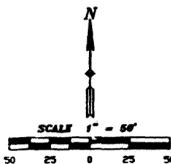
S 11002

# LINCOLN VISTAS

AN AVERAGE LOT SUBDIVISION

SITUATED IN THE SE/4 OF THE SW/4, & SW/4 OF SECTION 3,  
SECTION 3, TOWNSHIP 2 NORTH, RANGE 3 EAST  
GILA AND SALT RIVER BASE AND MERIDIAN  
MARICOPA COUNTY, ARIZONA

CENTER OF SECTION 3,  
T. 2 N., R. 3 E.  
FND. BRASS CAP IN H.H.



VICINITY MAP

CURVE DATA

Curve Number	Delta	Radius	Arc Length	Tangent Length
C1	91°33'03"	12.00'	19.17'	12.33'
C2	78°22'31"	12.00'	18.51'	11.67'
C3	49°11'23"	25.00'	21.03'	11.18'
C4	27°22'46"	50.00'	24.15'	12.34'
C5	18°31'43"	100.00'	16.67'	10.00'
C6	7°51'43"	250.00'	30.77'	17.58'
C7	97°49'17"	12.00'	20.47'	13.74'
C8	7°07'33"	600.25'	75.78'	37.94'
C9	30°09'08"	12.00'	18.57'	12.00'
C10	9°46'58"	559.26'	95.49'	47.86'
C11	88°32'48"	12.00'	18.61'	11.77'
C12	4°27'46"	673.41'	52.61'	26.32'
C13	4°13'43"	673.41'	51.03'	25.55'
C14	2°07'09"	338.26'	20.69'	10.34'
C15	7°39'49"	339.26'	74.89'	37.46'
C16	69°09'08"	58.88'	52.36'	28.87'
C17	13°15'18"	58.88'	13.12'	10.25'
C18	40°16'33"	38.00'	35.15'	18.33'
C19	3°26'59"	623.41'	59.49'	29.77'
C20	3°23'32"	623.41'	36.48'	18.25'
C21	34°17'28"	50.00'	47.38'	25.64'
C22	83°53'55"	50.00'	73.22'	44.94'
C23	44°42'55"	50.00'	42.65'	24.29'
C24	43°28'59"	50.00'	37.94'	19.94'
C25	9°46'58"	584.26'	99.76'	50.00'
C26	0°47'31"	650.41'	99.80'	50.00'
C27	21°01'11"	12.00'	12.44'	2.72'
C28	70°A	12.00'	14.77'	4.71'

DEDICATION

State of Arizona )  
County of Maricopa ) ss.  
KNOW ALL MEN BY THESE PRESENTS:  
That SHERMAN O. COLTIAS, as successor Trustee of the  
THE HESS FAMILY REVOCABLE TRUST DATED MARCH 2, 1988, as owners, have  
subdivided under the name LINCOLN VISTAS,  
AN AVERAGE LOT SUBDIVISION, a portion of the  
SW/4 OF SE/4, AND SE/4 OF SW/4 of Section 3,  
T. 2 N., R. 3 E., G. & S. R. B. & M.,  
Maricopa County, Arizona, as shown and plotted hereon and  
herby publishes this plat as and for the plat of said Lincoln  
Vistas and hereby declares that said plat sets forth the  
location and gives the dimensions of the lots, streets and easements  
constituting same and that each lot and street shall be  
known by the number or name given to each respectively on  
said plat, and that SHERMAN O. COLTIAS,  
as trustee, of the Hess Family Revocable Trust, as owners, hereby dedicate  
to the public for use as such the streets and easements  
as shown on said plat and included in the above described premises.

IN WITNESS WHEREOF: SHERMAN O. COLTIAS  
as trustee, of the Hess Family Revocable Trust, owners, have hereunto  
caused this name to be signed this 14 day of April, 1995.  
By: *Sherman O. Coltias*  
for SHERMAN O. COLTIAS as trustee of the HESS FAMILY REVOCABLE TRUST

BOOK 396 PAGE 13  
OFFICIAL RECORDS OF  
MARICOPA COUNTY RECORDER  
HELEN PURCELL  
95-0247136  
05/02/95 04:17

APPROVALS  
BY: *[Signature]* 4-14-95  
FOR: DEVELOPMENT SERVICES DEPT. DATE  
THIS PLAT WAS APPROVED BY THE COUNCIL OF THE  
CITY OF PHOENIX, ARIZONA, THIS 14 DAY OF April, 1995  
ATTESTED BY: *[Signature]*  
ACTING CITY CLERK

NOTE:  
ADDITIONAL INDIVIDUAL LOT REQUIREMENTS  
(ie. SETBACKS, EASEMENTS) MAY BE LOCATED  
ON APPROVED SUBDIVISION SETBACK EXHIBIT.

ACKNOWLEDGEMENT

State of Arizona )  
County of Maricopa ) ss.  
This instrument is acknowledged before me this 14 day of  
April, 1995, by  
SHERMAN O. COLTIAS OF THE HESS FAMILY REVOCABLE TRUST, as trustee.

IN WITNESS WHEREOF: I hereunto set my hand and official seal.  
My commission expires: 9-22-95  
Notary Public

CERTIFICATION

This is to certify that the survey and subdivision of the premises  
described and plotted hereon was made under my direction during the  
month of Dec, 1994; that the survey is complete as shown,  
that the monuments shown actually exist or will be set as shown,  
that their positions are correctly shown, and that said monuments  
are sufficient to enable the survey to be retraced.

*[Signature]*  
Registered Land Surveyor (118087) Date 4-14-95

- NOTES:
- All utilities and single phase electric lines will be installed underground.
  - Structures and landscaping within a triangle measuring 33' x 33' along the property lines will be maintained at a maximum height of 5'.
  - No structure of any kind shall be constructed on, over or placed within the easements except paving for any parking except grass. It is further understood that the City of Phoenix shall not be required to replace any obstruction or planting that must be removed during the course of maintenance, construction, or reconstruction of city utilities.
  - This subdivision is located within the City of Phoenix water service area and has been designated as having an assured water supply.
  - A minimum 20' setback will be provided from back of sidewalk to face of garage door.
  - All easements are subordinate to Drainage Easements.
  - "Homeowners" will be responsible for maintaining the Drainage Easements.

NOTES:  
1. NO STRUCTURE OF ANY KIND BE CONSTRUCTED OR ANY VEGETATION BE PLANTED NEAR OR ALLOWED TO GROW WITHIN THE DRAINAGE EASEMENT OR AREA WHICH WOULD IMPEDING THE FLOW OF WATER OVER, UNDER OR THROUGH THE EASEMENT OR AREA. THE CITY OF PHOENIX MAY, IF IT SO DESIRES, CONSTRUCT AND/OR MAINTAIN DRAINAGE FACILITIES ON OR UNDER THE LAND IN THE EASEMENTS OR AREAS.

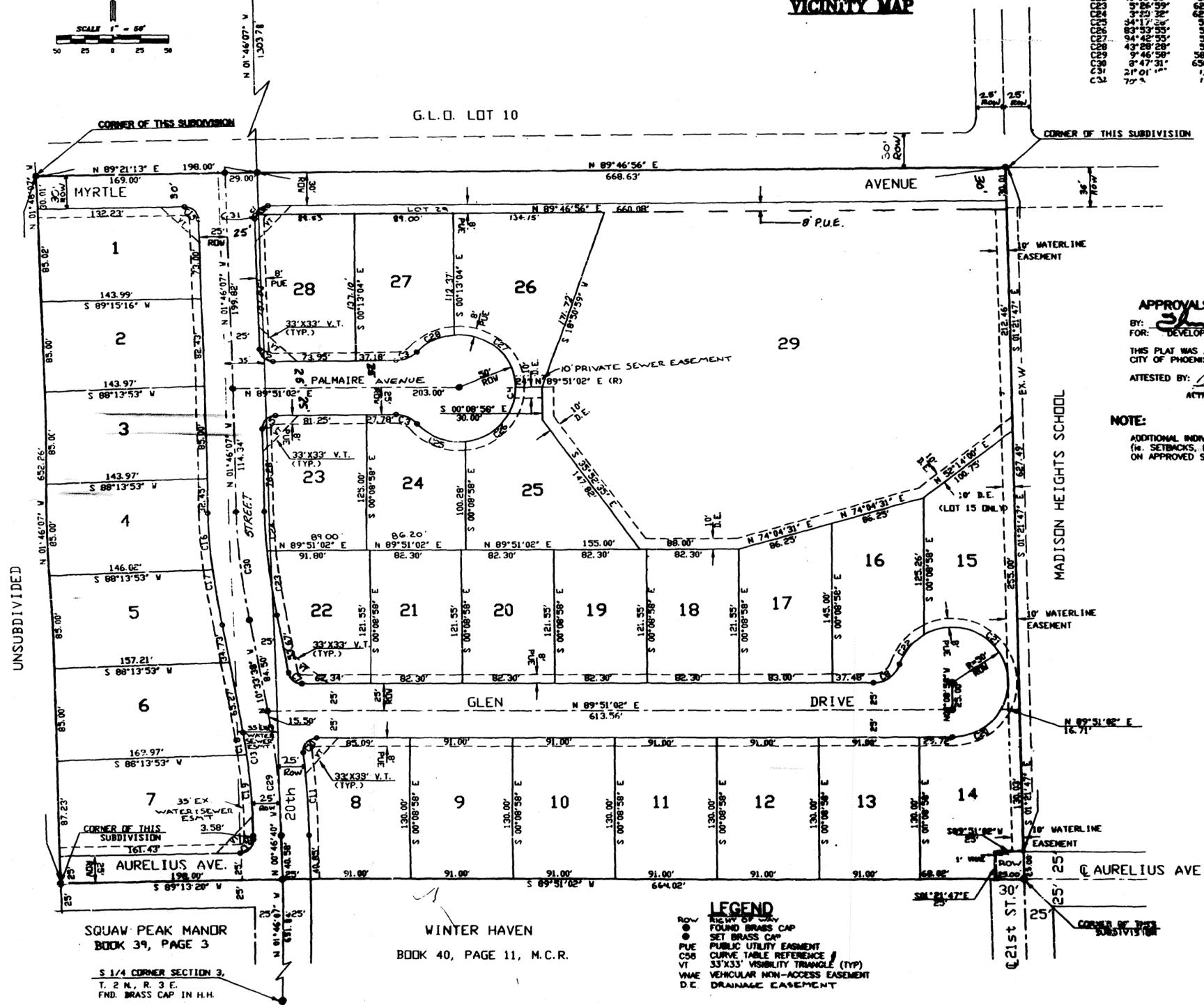
PROJECT NO. S94086  
ENG. NO. (D.I.S.) FN44256  
O.S. NO. 23-31, 23-32  
ZONING MAP: 1-9  
ZONING: RI-10  
ABANDONMENT: V-940-87-4

**ALLEN CONSULTING ENGINEERS, INC.**  
206 WEST 3RD PLAZA  
MESA, ARIZONA 85210  
PHONE (602) 844-1111

**CLASSIC STELLAR HOMES**  
FINAL PLAT  
LINCOLN VISTAS

DEVELOPER  
CLASSIC STELLAR HOMES  
14820 N. CAVE CREEK, SUITE 16  
PHOENIX, ARIZONA 85032  
802-971-9888

396-13



LEGEND  
 ● FND. BRASS CAP  
 ○ SET BRASS CAP  
 PUE PUBLIC UTILITY EASEMENT  
 C&B CURVE TABLE REFERENCE  
 VT 33'X33' VISIBILITY TRIANGLE (TYP.)  
 VAE VEHICULAR NON-ACCESS EASEMENT  
 D.E. DRAINAGE EASEMENT

SQUAW PEAK MANOR  
BOOK 39, PAGE 3  
S 1/4 CORNER SECTION 3,  
T. 2 N., R. 3 E.  
FND. BRASS CAP IN H.H.

WINTER HAVEN  
BOOK 40, PAGE 11, M.C.R.

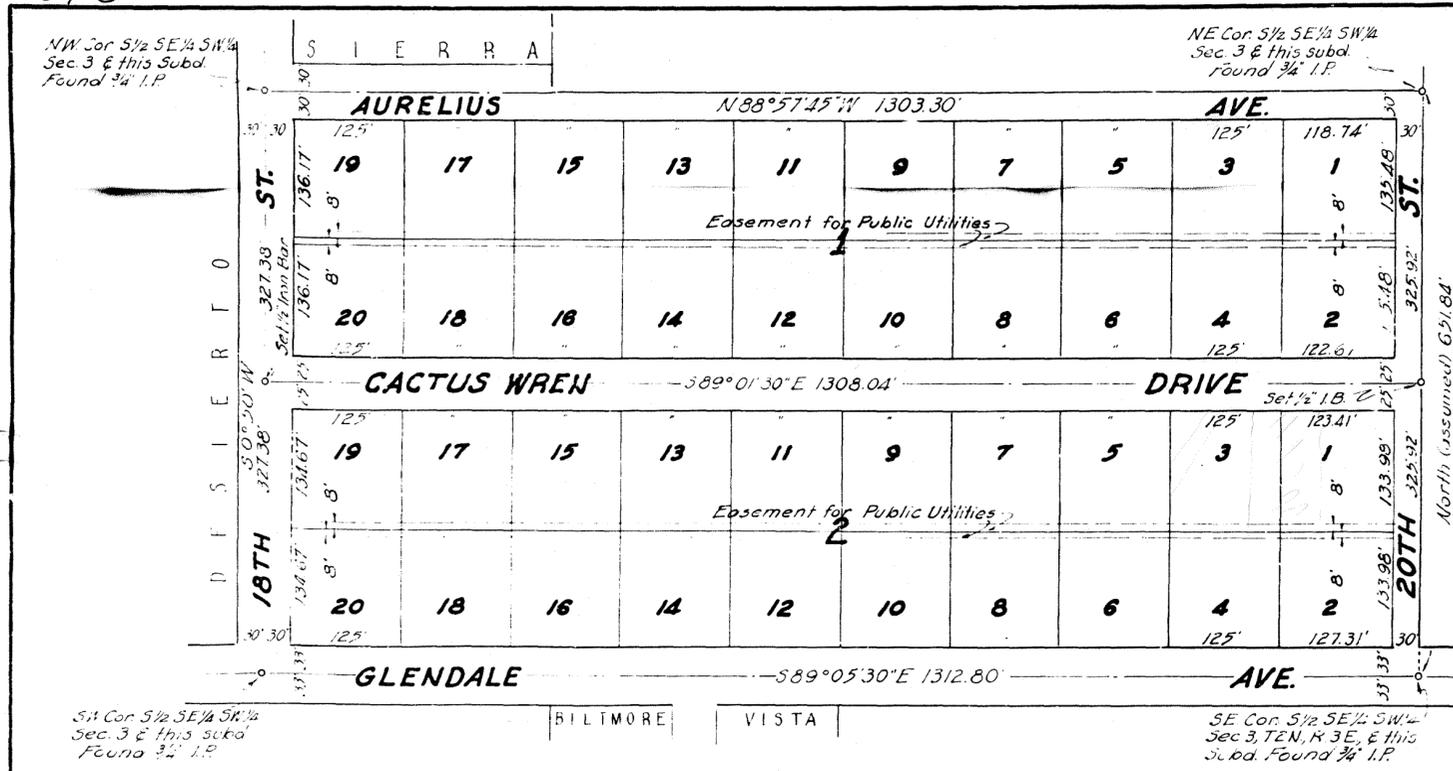
UNSUBDIVIDED

MADISON HEIGHTS SCHOOL



39-3

39-3



Scale 1"=100'

14 14 2 2

Indexed	Filed	Compared
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

STATE OF ARIZONA  
 COUNTY OF MARICOPA  
 I hereby certify that the within instrument was duly recorded at the office of the Recorder of Deeds on this 23rd day of June 1947.  
 JUN 23 1947  
 Recorder of Deeds  
 W. J. Taylor  
 Recorder

**SQUAW PEAK MANOR**  
 A Subdivision of the S 1/2, SE 1/4, SW 1/4, Sec. 3, T.2N, R.3E, G. & S.R. B. & M.  
 MARICOPA COUNTY ARIZONA.

DEDICATION

State of Arizona  
 County of Maricopa ss  
 KNOW ALL MEN BY THESE PRESENTS: That the Phoenix Title and Trust Company, an Arizona corporation, as Trustee, this 23<sup>rd</sup> day of June 1947, has subdivided under the name of SQUAW PEAK MANOR the South one-half of the South-east one-quarter of the South-west one-quarter of Section Three Township Two North Range Three East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. And hereby declares that the accompanying plat sets forth the location and gives the dimensions of the lots, blocks, and streets constituting said SQUAW PEAK MANOR and that the lots and blocks shall be known by the number and the streets by the name given each respectively on said plat, and that the streets shown thereon are hereby dedicated to the public for its use and benefit; and the easements shown thereon are for the use of public utilities.

IN WITNESS WHEREOF: The Phoenix Title and Trust Company, as Trustee, has hereunto caused its corporate name to be signed and its corporate seal to be affixed, and the same to be attested by the signatures of its duly authorized officers this day and year first above written.  
 PHOENIX TITLE AND TRUST COMPANY, TRUSTEE  
 Attest: Charles S. Voigt Assistant Secretary  
 By: L. J. Taylor Vice-President

On this 23<sup>rd</sup> day of June 1947, before me, Virginia Quackenbush, the undersigned officer, personally appeared L. J. Taylor who acknowledged himself to be the Vice-President, and Charles S. Voigt, who acknowledged himself to be the Assistant Secretary, of the Phoenix Title and Trust Company, a corporation, and acknowledged that they, as such Vice-President and Assistant Secretary, respectively, being authorized so to do, executed the foregoing instrument for the purpose therein contained by signing the name of the corporation, as Trustee, by themselves, as Vice-President and Assistant Secretary, respectively.

IN WITNESS WHEREOF I have hereunto set my hand and official seal.  
 My Commission Expires November 2, 1950  
 Virginia Quackenbush  
 Notary Public

Thereby certify that the survey and plat of this subdivision were made under my direction during May 1947.  
Harold W. Thomas  
 Registered Engineer



**SQUAW PEAK MANOR**  
 TOST AND GARDNER ENGINEERS  
 508 HEARD BLDG. PHOENIX, ARIZONA.  
 MAY 1947  
 BOX 39 MAR 3

39-3



City of Phoenix

51175

Engineering & Architectural Services  
Official City Receipt

STREET TRANS - FLD PLN 03243  
Ordered by: Donna

03243 WK 07/25/1996 0049DT

Subdivision Plat MICROFILM

DT 90123

QTY	Price	Amount
1	3.00	3.00
T O T A L		3.00

We NOW accept most major CREDIT CARDS !  
Office Hours: Monday - Friday 8 a.m. to 5 p.m.

262-4935

PLAT OF DEDICATION FOR  
**VILLA VALENCIA**  
A PLANNED AREA DEVELOPMENT

A PLAT OF A PORTION OF THE NORTHWEST 1/4 OF SECTION 10, T.2 N., R.3 E., G. & S. R. B. & M., MARICOPA COUNTY, ARIZONA

192-37  
County Recorder

JOB NO. 770110

CLOUSE ENGINEERING INC.  
ENGINEERS SURVEYORS  
PHOENIX ARIZONA

DEDICATION

KNOW ALL MEN BY THESE PRESENTS: That Minnesota Title Company, an Arizona Corporation, as Trustee, has divided under the name of Villa Valencia, a Planned Area Development, a portion of the Northwest 1/4 Section 10, T.2 N., R.3 E., G. & S. R. B. & M., Maricopa County, Arizona as shown platted hereon and hereby publishes this plat as and for the plat of said Villa Valencia, A Planned Area Development, and hereby declares that said plat sets forth the location and gives the dimensions of the lots, tracts, private accessway, and streets constituting same and that each lot, tract, private accessway, and street shall be known by the number, letter or name given each respectively on said plat, and hereby dedicates to the public for use as such the street (known as Glendale Avenue) as shown on said plat and included in the above described premises. Easements are dedicated for the purposes shown. Tracts "A" thru "J" are not to be construed to be dedicated for the use of the General Public but are declared for the use and enjoyment of the Homeowners in Villa Valencia as more fully set forth in the Declaration of covenants, conditions and restrictions. Tract "A" is hereby declared as a private accessway and dedicated as an easement for public utilities, refuse collection and emergency and service type vehicles, as shown hereon. An easement is hereby dedicated to the City of Phoenix for maintenance of the street paving, curbs and gutters and grants to the City of Phoenix the right to allow and prohibit and otherwise control the location and construction of all utility & drainage installation located within, on or under private accessways within the above described premises as shown platted hereon.

The flood control channel is hereby dedicated to the City of Phoenix in fee title. Drainage ways and drainage easements are hereby granted to the Homeowners Association over the lots & tracts as designated and shown on said plat, and shall be the responsibility of the Homeowners Association for maintenance. Tracts "F" thru "J" are to be known as common areas and are set aside for drainage ways.

IN WITNESS WHEREOF: Minnesota Title Company, an Arizona Corporation, as Trustee, has hereunto caused its corporate name to be signed and its corporate seal to be affixed and the same to be attested by the signature of its Trust Officer, thereunto duly authorized.

MINNESOTA TITLE COMPANY TRUSTEE

BY: [Signature]  
TRUST OFFICER

NOTES:

┌ Indicates a corner of this development. Set 1/2" rebar unless noted otherwise.

All utility & single phase electric lines are to be installed underground.

—|— Indicates an easement for public utilities unless noted otherwise.

No structure of any kind be constructed or placed within or over the public utility easements, except wood, wire or removable section-type fencing and/or paving nor any planting except grass. It shall be further understood that the City of Phoenix shall not be required to replace any obstructions or planting that must be removed during the course of maintenance, construction or reconstruction.

A homeowners association, including all property owners in the development will be formed and have responsibility for maintaining all common areas, to be noted as tracts, landscaped areas, and drainage facilities, in accordance with approved plans.

All utilities located on or under: refuse collection easements, easements to maintain street and alley paving, curbs, gutters, and private accessways, shall be installed and maintained in accordance with the City of Phoenix standards and permit requirements.

No structure of any kind to be constructed or any vegetation to be planted nor be allowed to grow within the drainage areas which would impede the flow of storm, flood, or other waters to pass over, under, or through the areas. The City of Phoenix may, if it so desires, construct and/or maintain drainage facilities on or under the land in the drainage areas.

ACKNOWLEDGEMENT

STATE OF ARIZONA  
COUNTY OF MARICOPA, SS.  
On this 15 day of August, 1977  
before me, the undersigned officer, personally appeared [Signature], who acknowledged himself to be Trust Officer of Minnesota Title Company, an Arizona Corporation, as Trustee and acknowledged that he, as such officer, being authorized so to do, executed the foregoing instrument for the purpose therein contained.

IN WITNESS WHEREOF, I hereunto set my hand and official seal. My commission expires [Date]

[Signature]  
NOTARY PUBLIC

APPROVAL

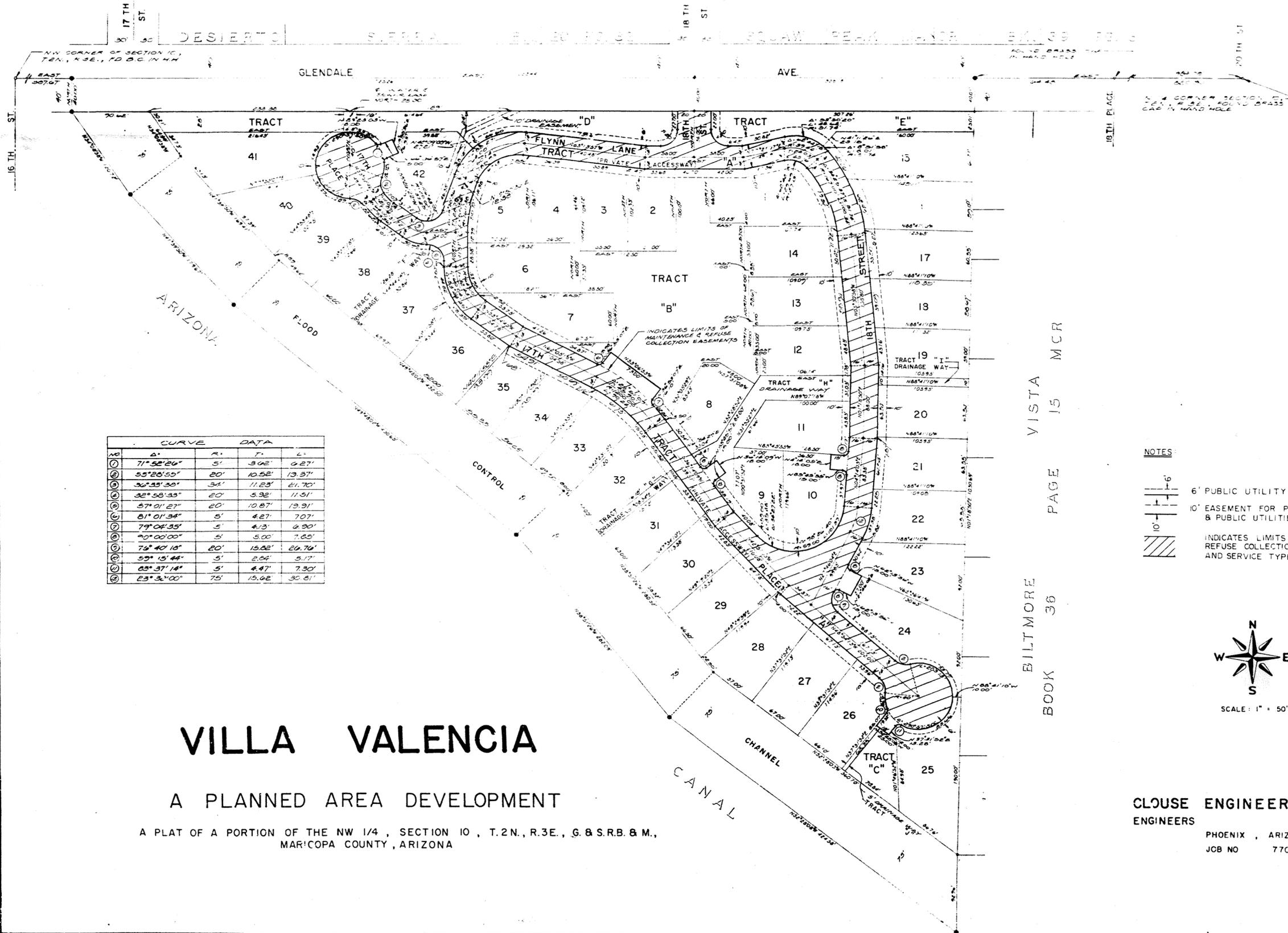
Approved by the Council of the City of Phoenix, Arizona, this the 5 day of Sept, 1977.

BY Margaret T. Hauer ATTEST [Signature]  
MAYOR CITY CLERK

CERTIFICATE

This is to certify that the survey and development of the premises described and platted hereon were made under my direction during the month of May, 1977, and that the plat is correct and accurate, and that the monuments described in it have been located as described.

[Signature]  
REGISTERED CIVIL ENGINEER



NO.	ANGLE	R.	T.	L.
1	71° 52' 26"	5'	3.02'	0.27'
2	55° 25' 59"	20'	10.52'	13.37'
3	36° 35' 30"	34'	11.23'	21.70'
4	32° 58' 35"	20'	3.92'	11.51'
5	57° 01' 27"	20'	10.87'	13.91'
6	61° 01' 34"	5'	4.27'	7.07'
7	79° 04' 35"	5'	4.13'	6.90'
8	90° 00' 00"	5'	5.00'	7.65'
9	74° 40' 18"	20'	15.02'	20.74'
10	59° 15' 44"	5'	2.04'	3.17'
11	65° 37' 18"	5'	4.47'	7.30'
12	23° 34' 00"	75'	15.62'	30.81'

# VILLA VALENCIA

## A PLANNED AREA DEVELOPMENT

A PLAT OF A PORTION OF THE NW 1/4, SECTION 10, T.2N., R.3E., G. & S.R.B. & M., MARICOPA COUNTY, ARIZONA

BILTMORE BOOK 36 PAGE 15 VISTA MCR

- NOTES:
- 6' PUBLIC UTILITY EASEMENT
  - 10' EASEMENT FOR PRIVATE ACCESSWAY & PUBLIC UTILITIES
  - INDICATES LIMITS OF MAINTENANCE, REFUSE COLLECTION, AND EMERGENCY AND SERVICE TYPE VEHICLES.



**CLOUSE ENGINEERING, INC.**  
 ENGINEERS SURVEYORS  
 PHOENIX, ARIZONA  
 JOB NO 770110



# AMENDED BERRYHILL MANOR: 164-27 A CONDOMINIUM MAP

A CONDOMINIUM MAP OF THE EAST 274 FEET OF LOT 38, STATE PLAT NO. 12, AMENDED, A SUBDIVISION RECORDED IN THE MARICOPA COUNTY RECORDER'S OFFICE, IN BOOK 69 OF MAPS, PAGE 58, EXCEPT THE SOUTH 105 FEET THEREOF.

**BASIS OF BEARINGS:**  
THE BEARING  $N87^{\circ}59'10"E$  OF THE CENTER-LINE OF 5TH ST. AS SHOWN ON STATE PLAT 12, AMENDED, AS RECORDED IN BOOK 69, PAGE 58, M.C.R., WAS TAKEN AS THE BASIS OF BEARINGS FOR THIS MAP.

- NOTES:**
- 1.  $\triangle$  INDICATES BUILDING NUMBERS.
  - 2.  $\textcircled{1}$  INDICATES PARCEL NUMBERS  $\textcircled{4}$  INDICATES UNIT NUMBERS.
  - 3. THIS MAP SHOWS BUILDING LOCATIONS ON RESPECTIVE PARCELS.
  - 4. DIMENSIONS SHOWN HEREON ARE TO FINISHED INSIDE WALLS.
  - 5. P - INDICATES PATIO SPACE
  - 6. S - INDICATES STORAGE SPACE
  - 7. C - INDICATES CARPORT SPACE
  - 8. P.S. - INDICATES PARKING SPACE
  - 9. U.R. - INDICATES UTILITY ROOM

**LEGAL DESCRIPTIONS:**

- PARCEL NO. 1:** THE EAST 274 FEET, EXCEPT THE WEST 209.25 FT. OF LOT 38, STATE PLAT NO. 12, AMENDED, EXCEPT THE SOUTH 105 FEET THEREOF.
- PARCEL NO. 2:** THE WEST 209.25 FT, EXCEPT THE WEST 199.50 FT. OF THE EAST 274 FEET OF LOT 38, STATE PLAT NO. 12, AMENDED, EXCEPT THE SOUTH 105 FEET THEREOF.
- PARCEL NO. 3:** THE WEST 199.50 FT, EXCEPT THE WEST 191.15 FEET OF THE EAST 274 FEET OF LOT 38, STATE PLAT NO. 12, AMENDED, EXCEPT THE SOUTH 105 FEET THEREOF.
- PARCEL NO. 4:** THE WEST 191.15 FT. OF THE EAST 274 FEET OF LOT 38, STATE PLAT NO. 12, AMENDED, EXCEPT THE SOUTH 105 FEET THEREOF.

**BENCHMARK:** TOP OF BRASS CAP @ E INTERSECTION OF 5TH ST. & PRIEST DR./ELEV. 1146.72

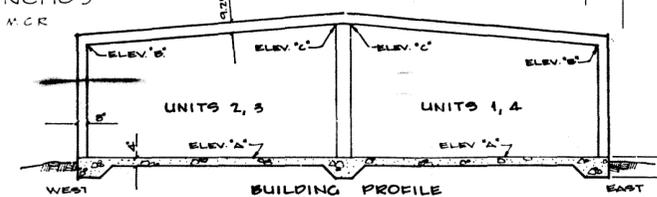
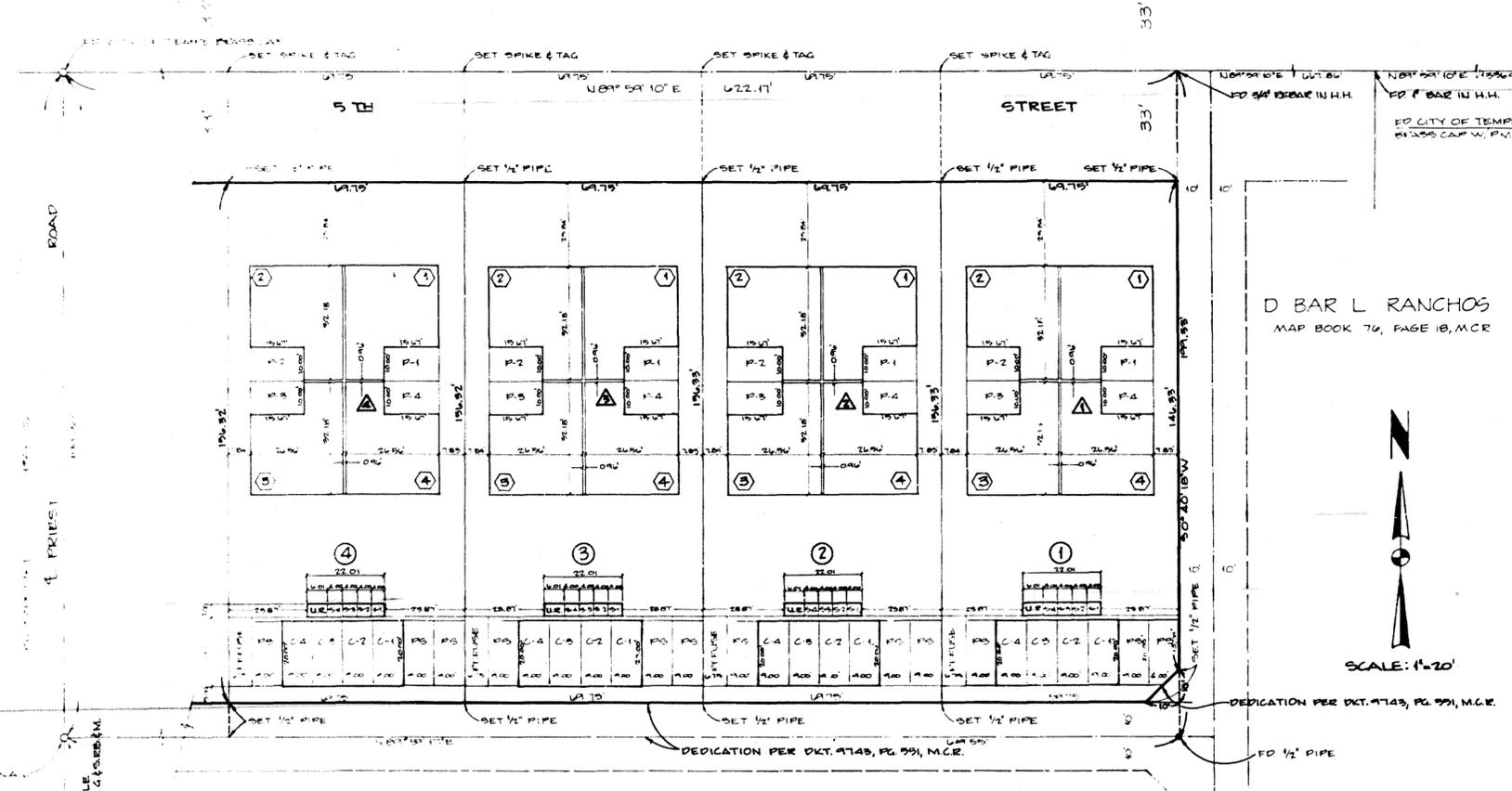
**ENGINEER'S CERTIFICATE:**

I, WILLIAM J. NORMAN, HEREBY CERTIFY THAT I AM A REGISTERED CIVIL ENGINEER IN THE STATE OF ARIZONA, THAT THIS MAP, CONSISTING OF ONE (1) SHEET, CORRECTLY REPRESENTS A SURVEY MADE UNDER MY SUPERVISION DURING THE MONTH OF AUGUST, 1972.



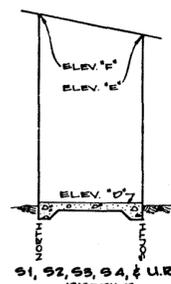
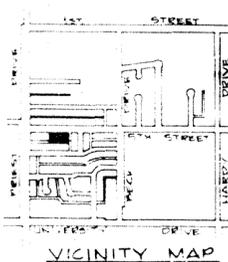
AMENDED: William J. Norman  
WILLIAM J. NORMAN - P.E. 5306  
21 Feb 73  
DATE

William J. Norman  
Civil Engineer  
10 W. 7th Street  
Tempe, Arizona 85281  
480-219-8888



000 PROFILE ELEVATION SCHEDULE 000									
PARCEL NO.	UNIT NO.	ELEV. A.	ELEV. B.	ELEV. C.	ELEV. D.	ELEV. E.	ELEV. F.	ELEV. G.	ELEV. H.
1	1	1149.02	1157.02	1158.02	1148.02	1155.73	1155.89	1148.30	1156.30
1	2	1149.02	1157.02	1158.02	1148.02	1155.73	1155.89	1148.30	1156.30
1	3	1149.02	1157.02	1158.02	1148.02	1155.73	1155.89	1148.30	1156.30
1	4	1149.02	1157.02	1158.02	1148.02	1155.73	1155.89	1148.30	1156.30
2	1	1148.88	1156.88	1157.88	1148.26	1155.59	1155.75	1148.16	1156.16
2	2	1148.88	1156.88	1157.88	1148.26	1155.59	1155.75	1148.16	1156.16
2	3	1148.88	1156.88	1157.88	1148.26	1155.59	1155.75	1148.16	1156.16
2	4	1148.88	1156.88	1157.88	1148.26	1155.59	1155.75	1148.16	1156.16
3	1	1148.76	1156.76	1157.76	1148.12	1155.45	1155.61	1148.02	1156.02
3	2	1148.76	1156.76	1157.76	1148.12	1155.45	1155.61	1148.02	1156.02
3	3	1148.76	1156.76	1157.76	1148.12	1155.45	1155.61	1148.02	1156.02
3	4	1148.76	1156.76	1157.76	1148.12	1155.45	1155.61	1148.02	1156.02
4	1	1148.62	1156.62	1157.62	1147.98	1155.31	1155.47	1147.88	1155.88
4	2	1148.62	1156.62	1157.62	1147.98	1155.31	1155.47	1147.88	1155.88
4	3	1148.62	1156.62	1157.62	1147.98	1155.31	1155.47	1147.88	1155.88
4	4	1148.62	1156.62	1157.62	1147.98	1155.31	1155.47	1147.88	1155.88

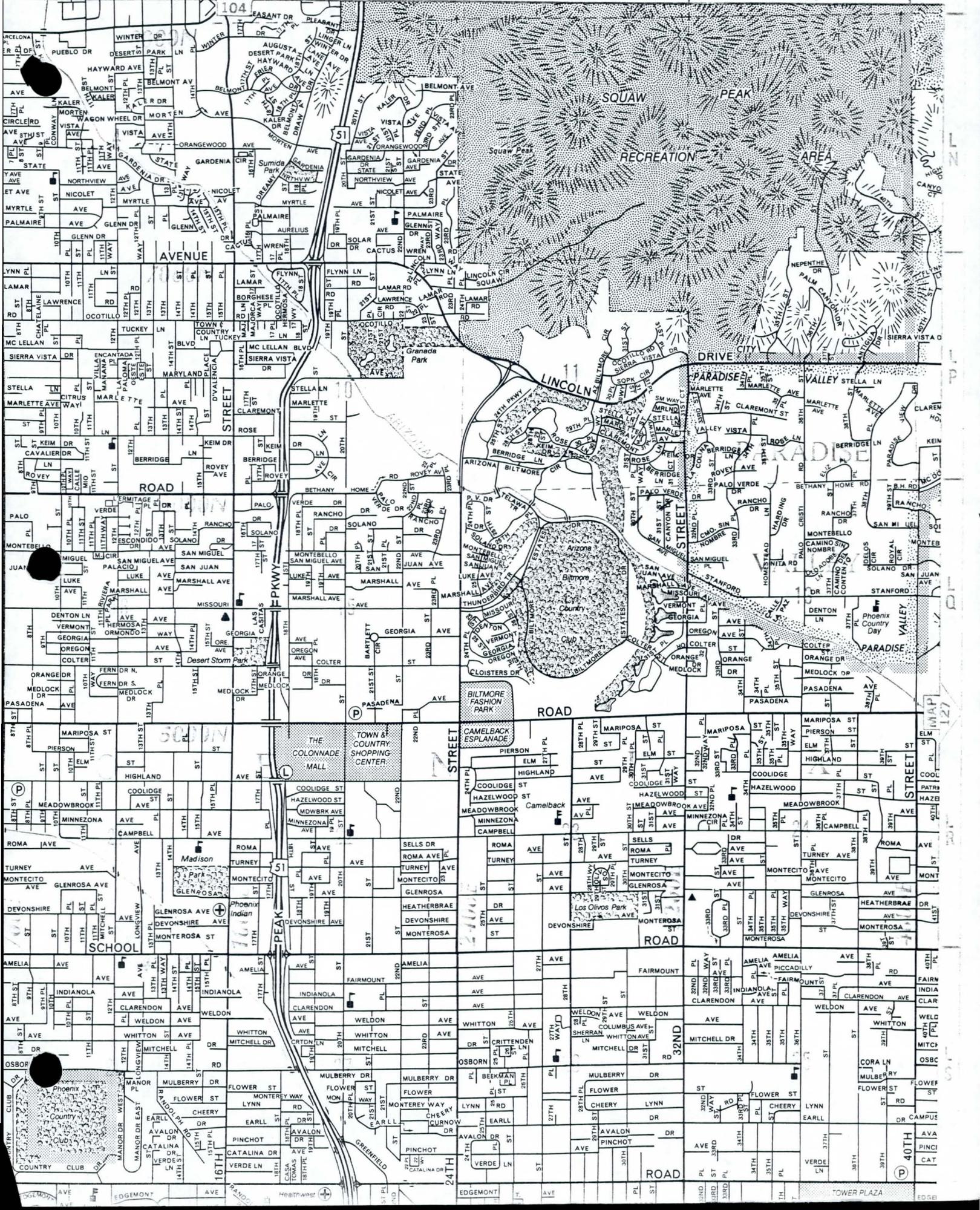
NOTE: ELEVATIONS G & H ARE LOWER AND UPPER LIMITS OF CARPORT SPACE.

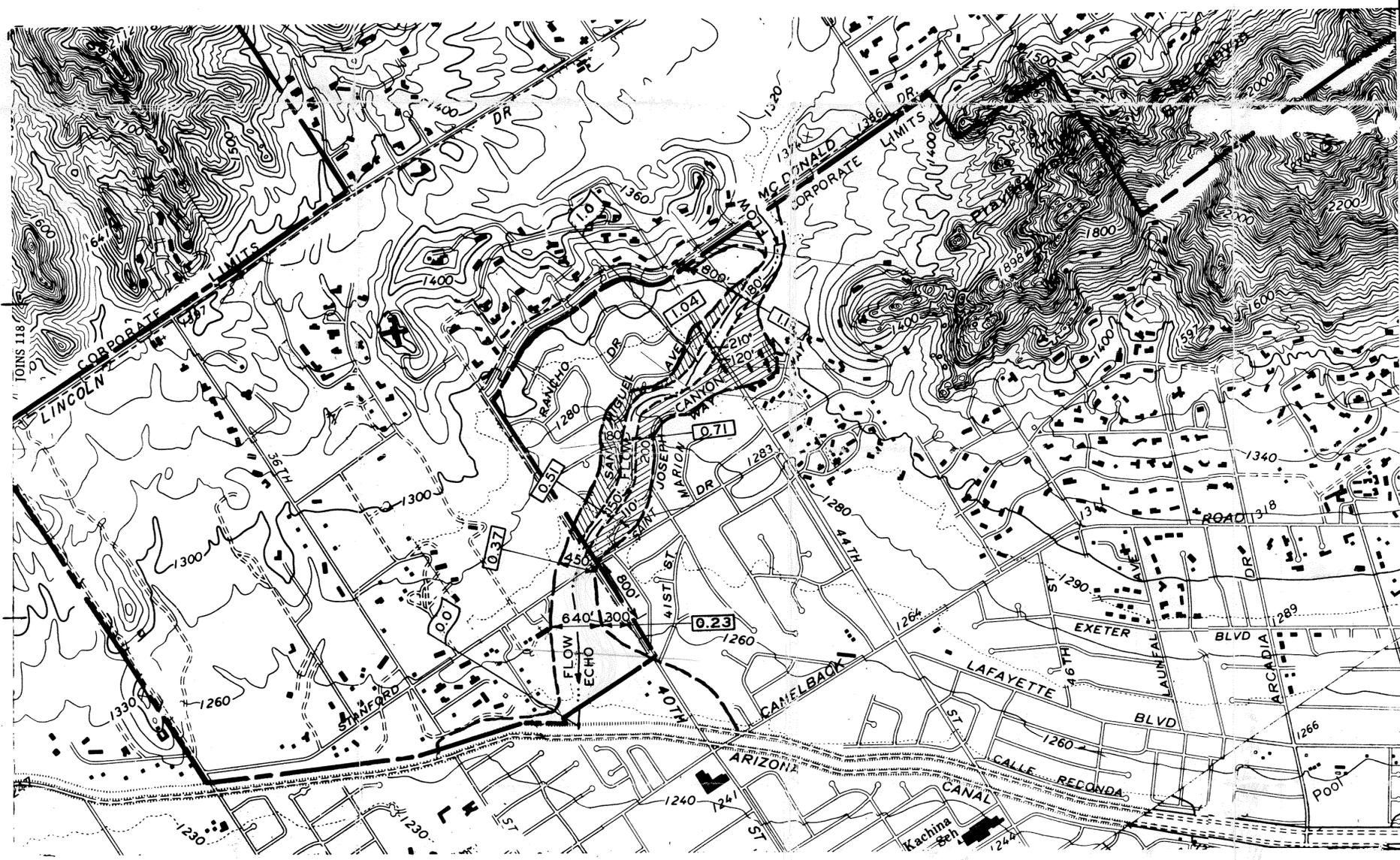




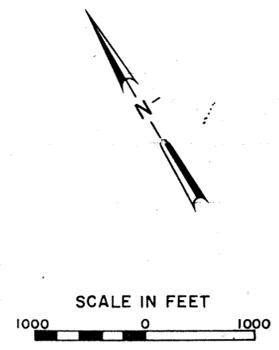


MAP 104

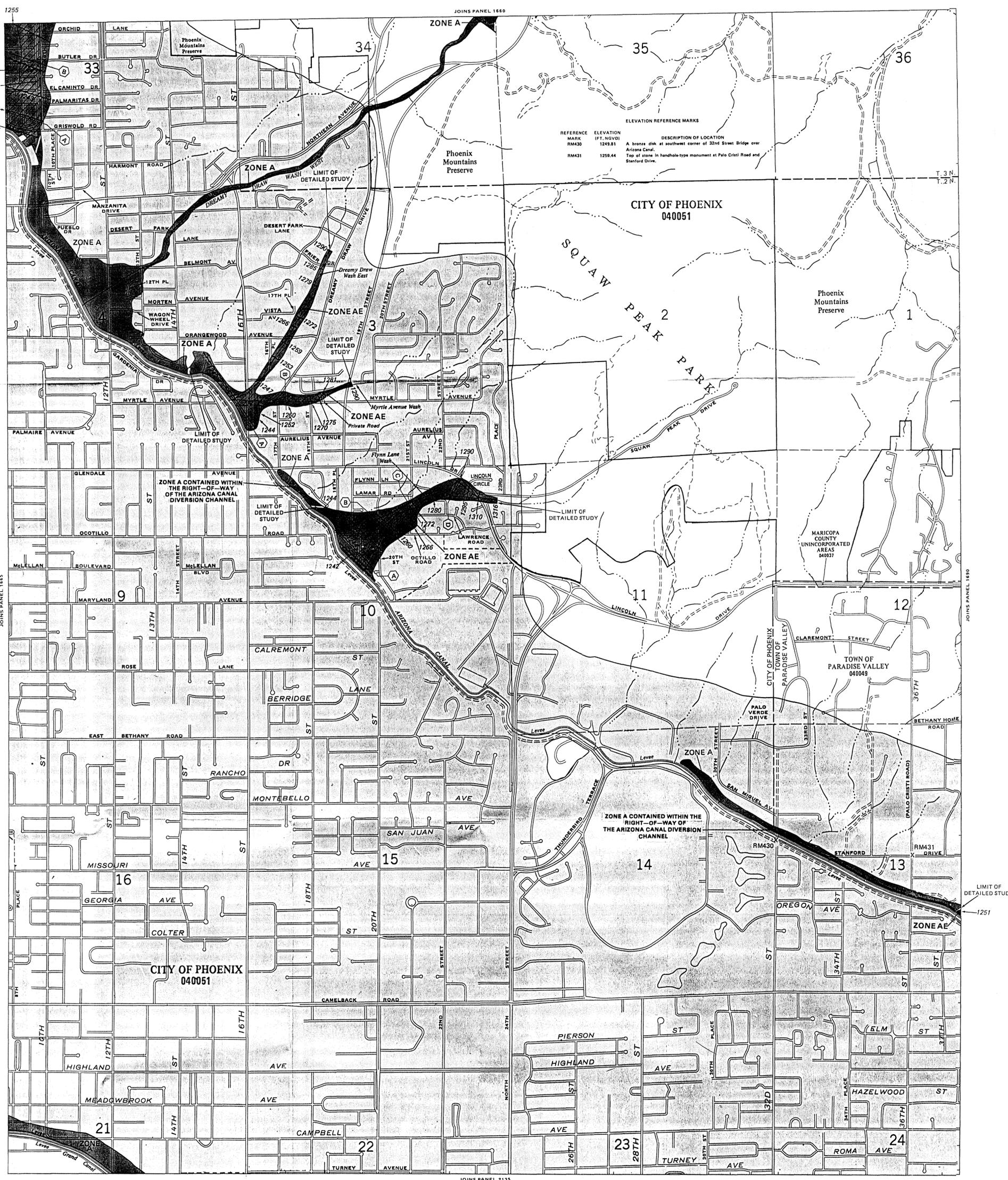




- LEGEND**
- OVERFLOW LIMITS
  - FLOODWAY FRINGE
  - PRELIMINARY FLOODWAY
  - FLOODWAY FRINGE
  - CROSS SECTION NUMBER AND RIVER MILE.
  - RIVER MILE.
  - GROUND ELEVATION IN FEET ABOVE MEAN SEA LEVEL.



DEPARTMENT OF THE ARMY  
 LOS ANGELES DISTRICT, CORPS OF ENGINEERS  
 LOS ANGELES, CALIFORNIA  
 FLOOD INSURANCE STUDY  
 PHOENIX, ARIZONA  
 PRELIMINARY FLOODWAY  
 ECHO CANYON  
 PREPARED FOR  
 FEDERAL INSURANCE ADMINISTRATION  
 SEPTEMBER 1973



### LEGEND

**SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD**

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

**FLOODWAY AREAS IN ZONE AE**

**OTHER FLOOD AREAS**

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

**OTHER AREAS**

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

**Other Symbols:**

- Flood Boundary
- Floodway Boundary
- Zone D Boundary
- Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.
- Base Flood Elevation Line; Elevation in Feet\*
- Cross Section Line
- Base Flood Elevation in Feet Where Uniform Within Zone\*
- Elevation Reference Mark

\*Referenced to the National Geodetic Vertical Datum of 1929

### NOTES

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

Areas of special flood hazard (100-year flood) include Zones A, A1-30, AE, AH, AO, A99, V, V1-30 AND VE.

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

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

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Coastal base flood elevations apply only landward of the shoreline.

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

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

For adjoining map panels see separately printed Map Index.

**MAP REPOSITORY**  
Refer to Repository Listing on Index Map

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

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

Map revised SEPTEMBER 30, 1995 to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to change zone designations, to add and update roads and road names, to reflect updated topographic information, to incorporate previously issued letters of map revision, and to incorporate previously issued letters of map amendment.

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

APPROXIMATE SCALE IN FEET  
1000 0 1000

1670 F

**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, .....	040051	1670		E
PARADISE VALLEY, TOWN OF .....	040049	1670		E
PHOENIX, CITY OF .....	040051	1670		E

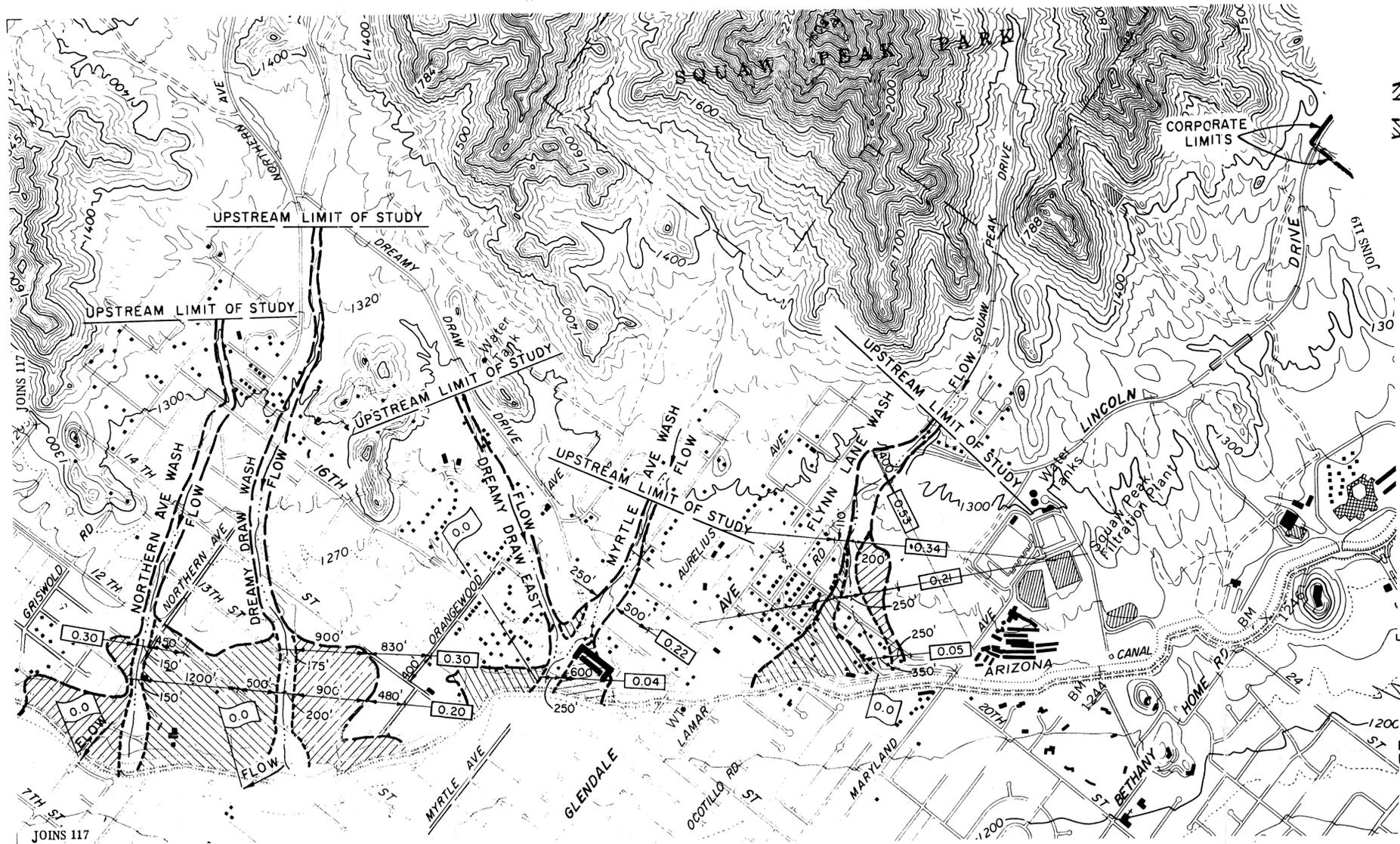
**MAP NUMBER**  
04013C1670 E

**MAP REVISED:**  
SEPTEMBER 30, 1995

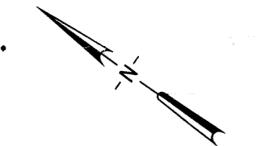
Federal Emergency Management Agency

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

FLOOD CONTROL DISTRICT  
 PREPARED  
 SEP 06 1995

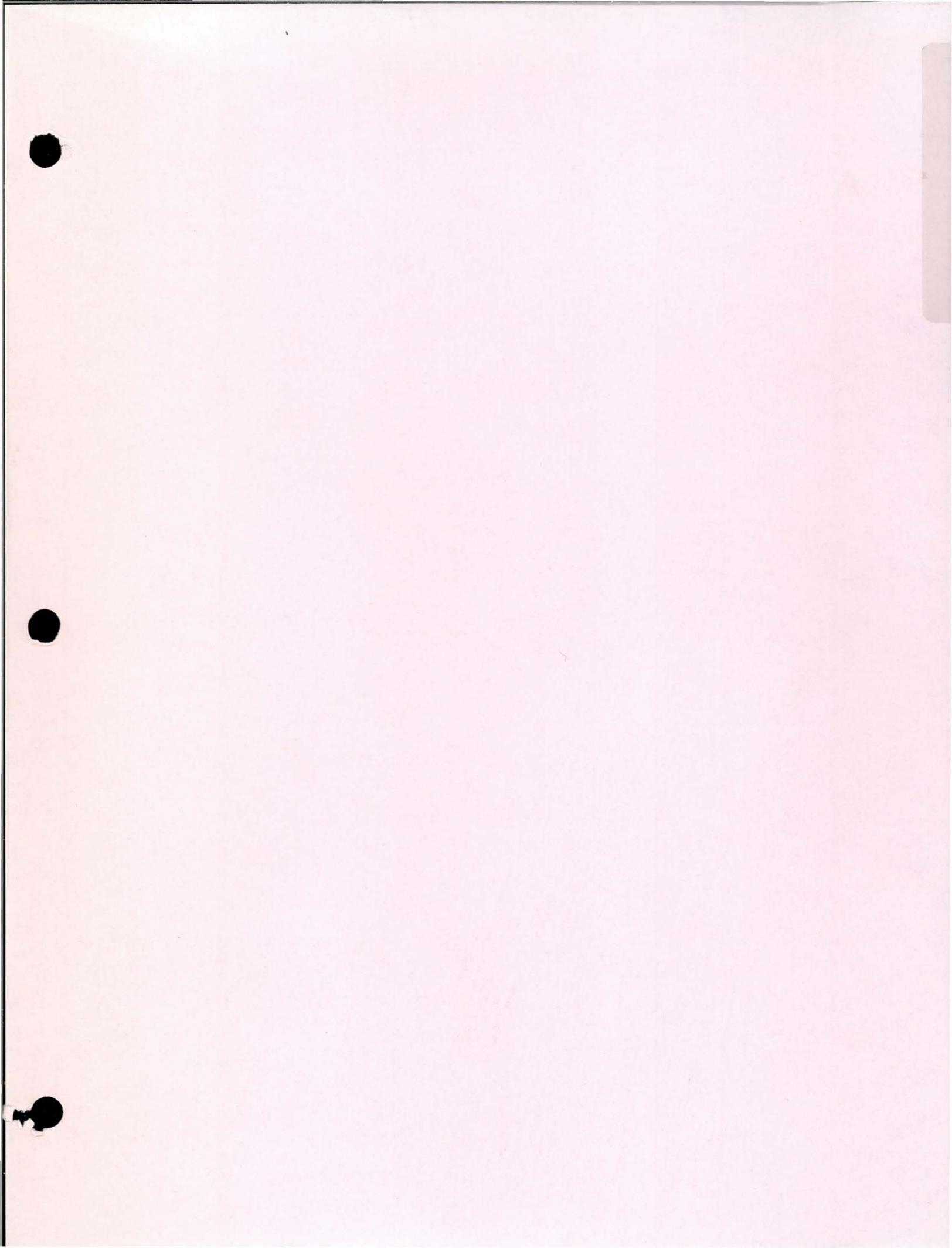


- LEGEND**
- OVERFLOW LIMITS
  - FLOODWAY FRINGE
  - PRELIMINARY FLOODWAY
  - FLOODWAY FRINGE
  - CROSS SECTION NUMBER AND RIVER MILE.
  - RIVER MILE.
  - GROUND ELEVATION IN FEET ABOVE MEAN SEA LEVEL.



SCALE IN FEET  
 1000 0 1000

DEPARTMENT OF THE ARMY  
 LOS ANGELES DISTRICT, CORPS OF ENGINEERS  
 LOS ANGELES, CALIFORNIA  
 FLOOD INSURANCE STUDY  
 PHOENIX, ARIZONA  
 PRELIMINARY FLOODWAY  
 NORTHERN AVE., DREAMY DRAW  
 DREAMY DRAW EAST, MYRTLE AVE.  
 AND FLYNN LANE WASHES  
 PREPARED FOR  
 FEDERAL INSURANCE ADMINISTRATION  
 DECEMBER 1973





# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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

## COVER SHEET

TO: Raymond Acuna, P.E., Floodplain Manager

Company

or Department: City of Phoenix

Fax # 9 1 602 495 3670 <sup>2016</sup>

FROM: Hasan Mushtaq, P.E.

Number of pages being sent including Cover Sheet: 3 (three)

Comments: \_\_\_\_\_

Dear Ray,

As a part of the FEMA submittal package, we <sup>need</sup> a correspondence from the city on the subject matter of extending the floodplain boundary within the City of Phoenix park area. The intention of the letter is to show FEMA that the City of Phoenix does not object to an increase of the floodplain boundary within the park area. A prompt response would be much appreciated. Please feel free to call me at 506-1501 if you have further questions.

Thank you

Hasan Mushtaq



# FLOOD CONTROL DISTRICT of Maricopa County

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

---

BOARD OF DIRECTORS  
Betsey Bayless  
Ed King  
Tom Rawles  
Don Stapley  
Mary Rose Garrido Wilcox

August 1, 1996

Raymond Acuna, P.E.  
Floodplain Manager,  
City of Phoenix  
200 West Washington Street  
Phoenix, Arizona 85004

Re : LOMR request for Flynn Lane Wash  
FCD Contract No. FCD 94-51  
FIRM Map Panel 1670 E (9-30-1995)

Dear Mr. Acuna :

This is regarding a request for a Letter of Map Revision (LOMR) for Flynn Lane Wash, being prepared to be submitted to the Federal Emergency Management Agency (FEMA). This request is for a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. Pertinent information about the request is listed below :

Identifier :	Flynn Lane Wash
Flooding Source :	Flynn Lane Wash
FIRM Panel Affected :	04013C1670 E (9-30-1995)

Please find attached a copy of the proposed revision of the FIRM, based on the hydraulic analysis using HEC-2 modeling. The hydraulic analysis shows that the southern floodplain boundary at cross-sections 0.08, 0.10, and 0.116, needs to be extended beyond the existing floodplain boundary. However, this extension of the floodplain boundary is fully contained within the City of Phoenix park area (please refer to attached map).

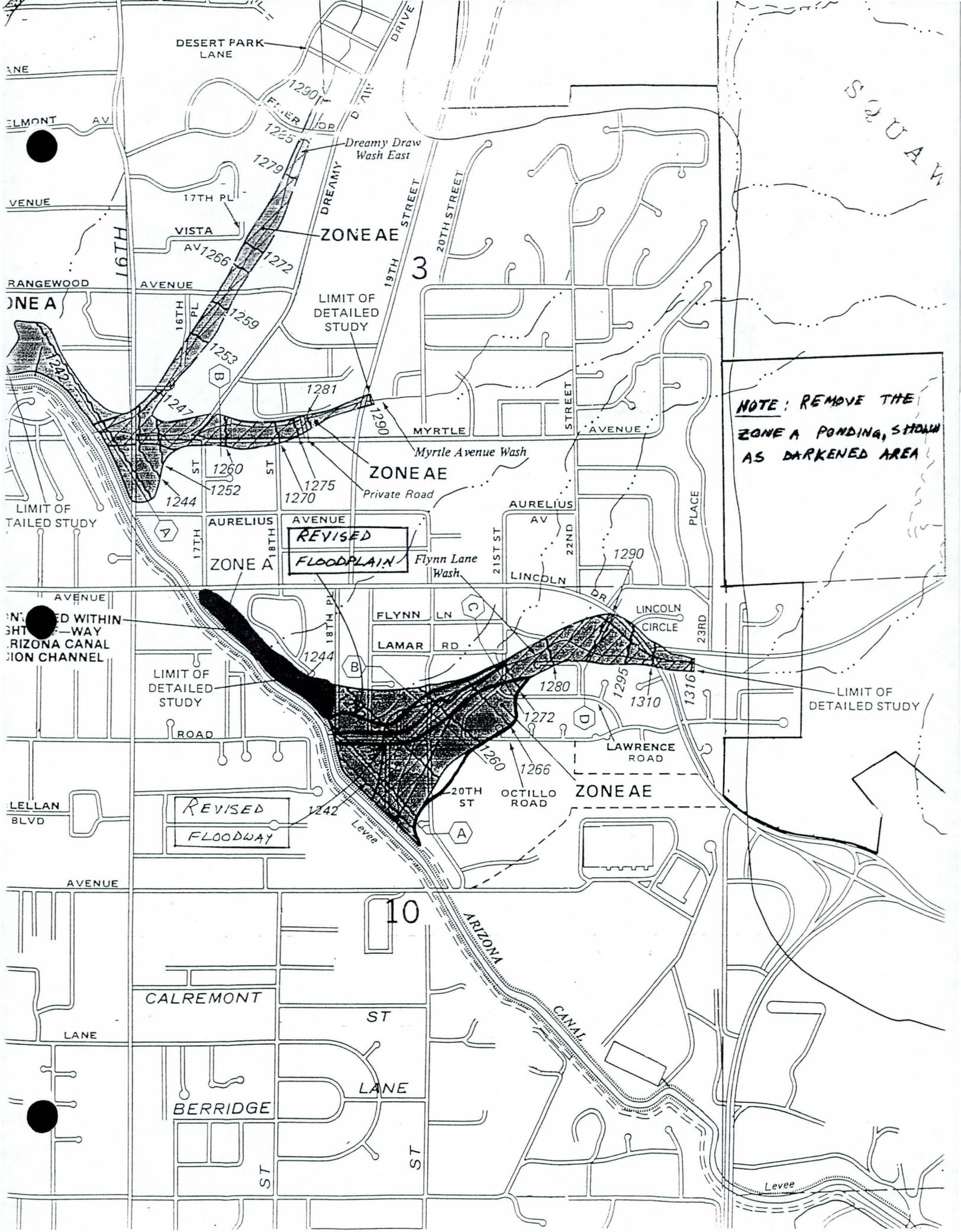
It is the intention of this letter to find out about the City's position regarding the extension of the floodplain boundary within the park area. A response regarding the subject matter would be much appreciated.

Should you have further questions, please feel free to contact me at 506-1501.

Sincerely,

Hasan Mushtaq, P.E.







# FLOOD CONTROL DISTRICT

of  
**Maricopa County**

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

---

BOARD OF DIRECTORS  
Betsey Bayless  
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Raymond Acuna, P.E.  
Floodplain Manager,  
City of Phoenix  
200 West Washington Street  
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It is the intention of this letter to find out about the City's position regarding the extension of the floodplain boundary within the park area. A response regarding the subject matter would be much appreciated.

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Sincerely,

Hasan Mushtaq, P.E.

Coord :  
Info :

HM  
HM

\*\*\*\*\*  
\*\*\* ACTIVITY REPORT \*\*\*  
\*\*\*\*\*

TRANSMISSION OK

TX/RX NO.	0008
CONNECTION TEL	916024952016
CONNECTION ID	
START TIME	08/01 15:03
USAGE TIME	01'09
PAGES	3
RESULT	OK

**CITY OF PHOENIX  
STREET TRANSPORTATION DEPARTMENT  
FLOODPLAIN MANAGEMENT  
200 WEST WASHINGTON STREET  
PHOENIX, ARIZONA 85003-1611  
PHONE: (602) 262-4960 FAX: (602) 262-7322**

Date: 8/2/96

To Whom: Hasan Mushtaq

Company: FCD MC

Fax Number: 506-4601

Sender: Ray Lecuna

Telephone: 262-4026

Number of Pages (including cover): 2

Description/Comments:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**City of Phoenix**  
STREET TRANSPORTATION DEPARTMENT

Winner of the  
Carl Bertelsmann  
Prize



August 2, 1996

Mr. Hasan Mushtaq, P.E.  
Flood Control District of Maricopa County  
2801 West Durango Street  
Phoenix, Arizona 85009

Dear Hasan:

Thank you for the work you have done in preparing a Letter of Map Revision (LOMR) for Flynn Lane Wash. These new floodplain boundaries reflect the latest information and improvements in this area. I recognize and appreciate the effort taken to reduce the floodplain. I understand that in a small area within a City park the new floodplain will extend outward beyond the limits of the old floodplain. This is a result of the hydraulic analysis. I support the submittal of this data to the Federal Emergency Management Agency (FEMA) for review.

Upon approval by FEMA we will be notifying effected residents. We would be glad to develop a joint City/County letter informing them of the good news. Please let me know if you have any suggestions.

Very truly yours,

James H. Matteson, P.E.  
Street Transportation Director

Raymond U. Acuña, P.E.  
Floodplain Manager

JHM/RUA/aff/960802a

c: Mr. Blakley



**City of Phoenix**  
STREET TRANSPORTATION DEPARTMENT

Winner of the  
Carl Bertelsmann  
Prize



August 2, 1996

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Flood Control District of Maricopa County  
2801 West Durango Street  
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Street Transportation Director

Raymond U. Acuña, P.E.  
Floodplain Manager

JHM/RUA/aff/960802a

c: Mr. Blakley

FLOOD CONTROL DISTRICT RECEIVED	
AUG 05 1996	
CHENG	
DEF	
ADAMS	
CHEN	
LEE	
PHILLIPS	
	1 H/M



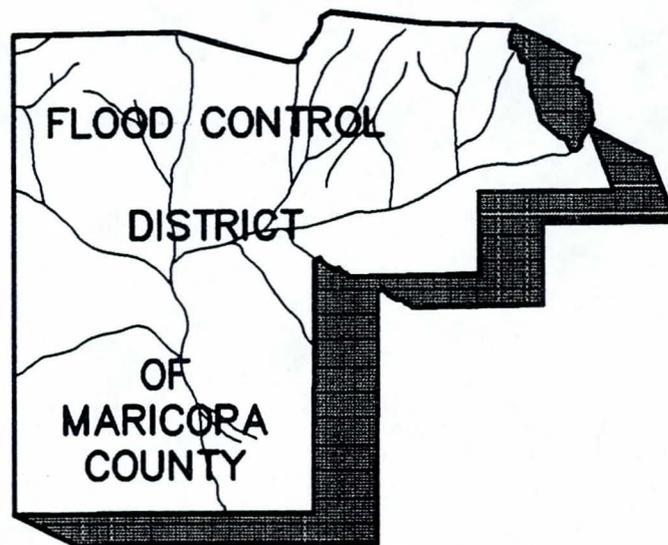


# CUDIA CITY WASH TO 10TH STREET WASH WATERSHED

VOLUME 1.8

ARIZONA CANAL DIVERSION CHANNEL  
AREA DRAINAGE MASTER STUDY

ACDC/ADMS PHASE 1



HYDROLOGY REPORT

NOVEMBER 1994

**KAMINSKI  
HUBBARD  
engineering, inc.**

SURVEYING \* CIVIL \* HYDROLOGY

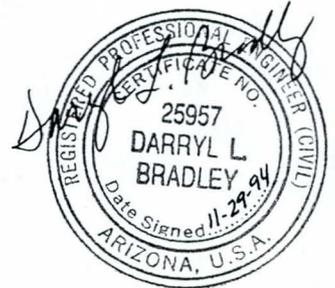
CUDIA CITY WASH TO  
10TH STREET WASH WATERSHED

Volume 1.8

Arizona Canal Diversion Channel  
Area Drainage Master Study  
ACDC/ADMS Phase I

HYDROLOGY REPORT

November, 1994



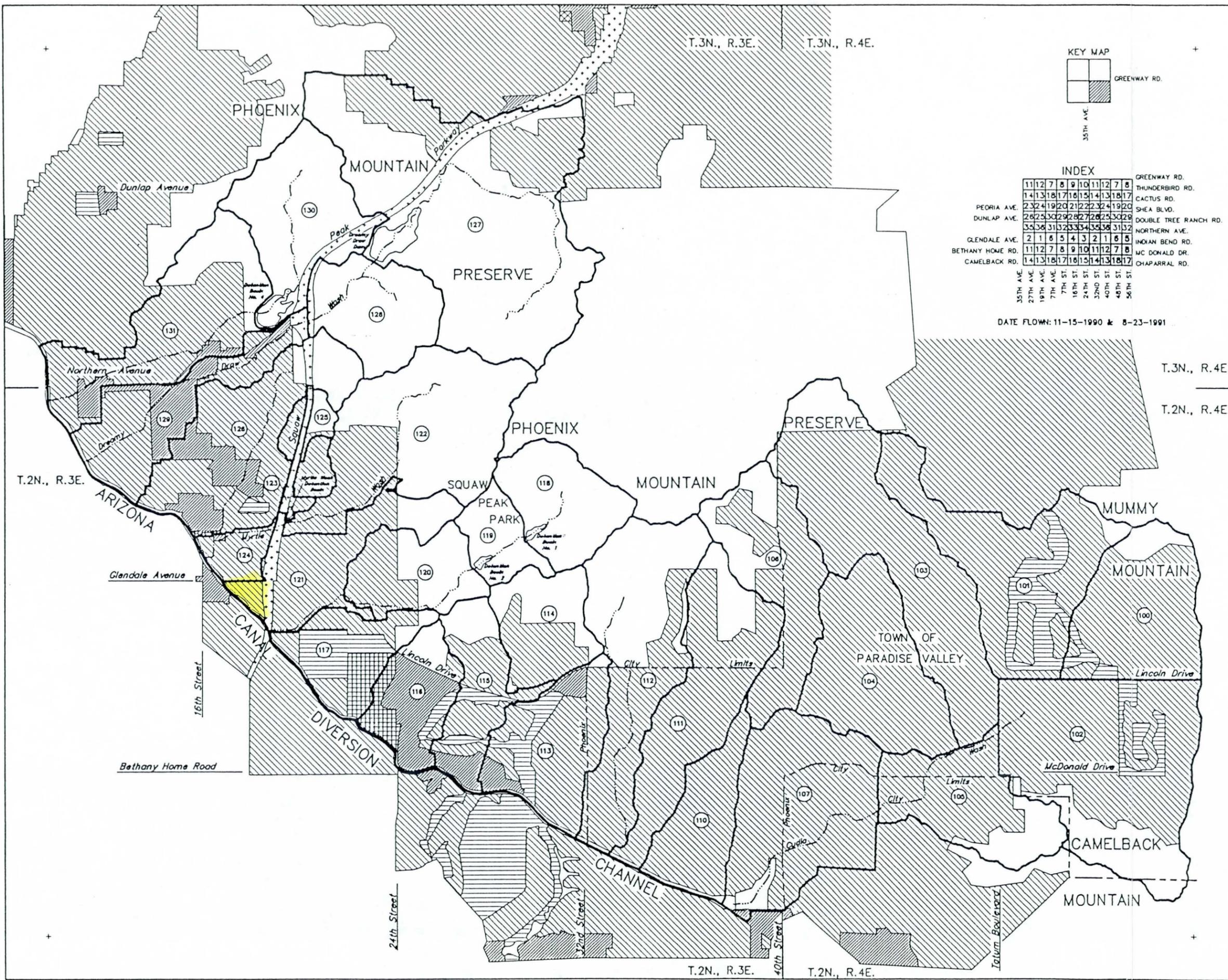
Prepared For:

Flood Control District Of Maricopa County  
2801 West Durango Street  
Phoenix, Arizona 85009  
(60) 506-1501

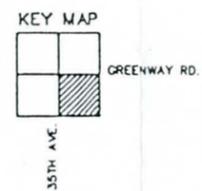


Prepared By:

Kaminski-Hubbard Engineering, Inc.  
4550 North Black Canyon Highway, Suite C  
Phoenix, Arizona 85017  
(602) 242-5588



T.3N., R.3E. T.3N., R.4E.



INDEX

GREENWAY RD.	11	12	7	8	9	10	11	12	7	8
THUNDERBIRD RD.	14	13	18	17	16	15	14	13	18	17
CACTUS RD.	23	24	19	20	21	22	23	24	19	20
SHEA BLVD.	26	25	30	29	28	27	26	25	30	29
DOUBLE TREE RANCH RD.	35	36	31	32	33	34	35	36	31	32
NORTHERN AVE.	2	1	6	5	4	3	2	1	6	5
INDIAN BEND RD.	11	12	7	8	9	10	11	12	7	8
MC DONALD DR.	14	13	18	17	16	15	14	13	18	17
CHAPARRAL RD.	14	13	18	17	16	15	14	13	18	17
35TH AVE.	14	13	18	17	16	15	14	13	18	17
27TH AVE.	14	13	18	17	16	15	14	13	18	17
19TH AVE.	14	13	18	17	16	15	14	13	18	17
7TH AVE.	14	13	18	17	16	15	14	13	18	17
16TH ST.	14	13	18	17	16	15	14	13	18	17
24TH ST.	14	13	18	17	16	15	14	13	18	17
32ND ST.	14	13	18	17	16	15	14	13	18	17
40TH ST.	14	13	18	17	16	15	14	13	18	17
48TH ST.	14	13	18	17	16	15	14	13	18	17
56TH ST.	14	13	18	17	16	15	14	13	18	17

DATE FLOWN: 11-15-1990 & 8-23-1991

T.3N., R.4E.  
T.2N., R.4E.

T.2N., R.3E.

T.2N., R.3E. T.2N., R.4E.

# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## ACDC/ADMS PHASE 1 CUDIA CITY WASH TO 10TH STREET WASH HYDROLOGY STUDY

### LEGEND

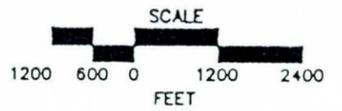
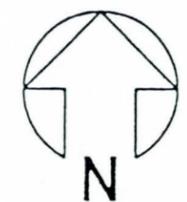
- Drainage Basin Boundary
- Phoenix City Limits Boundary
- Residential Land Use
- Commercial Land Use
- Golf Course/Park
- Utility Land Use
- Industrial Land Use
- Right-of-Way
- Vacant Land Use
- Drainage Sub-Basin Number

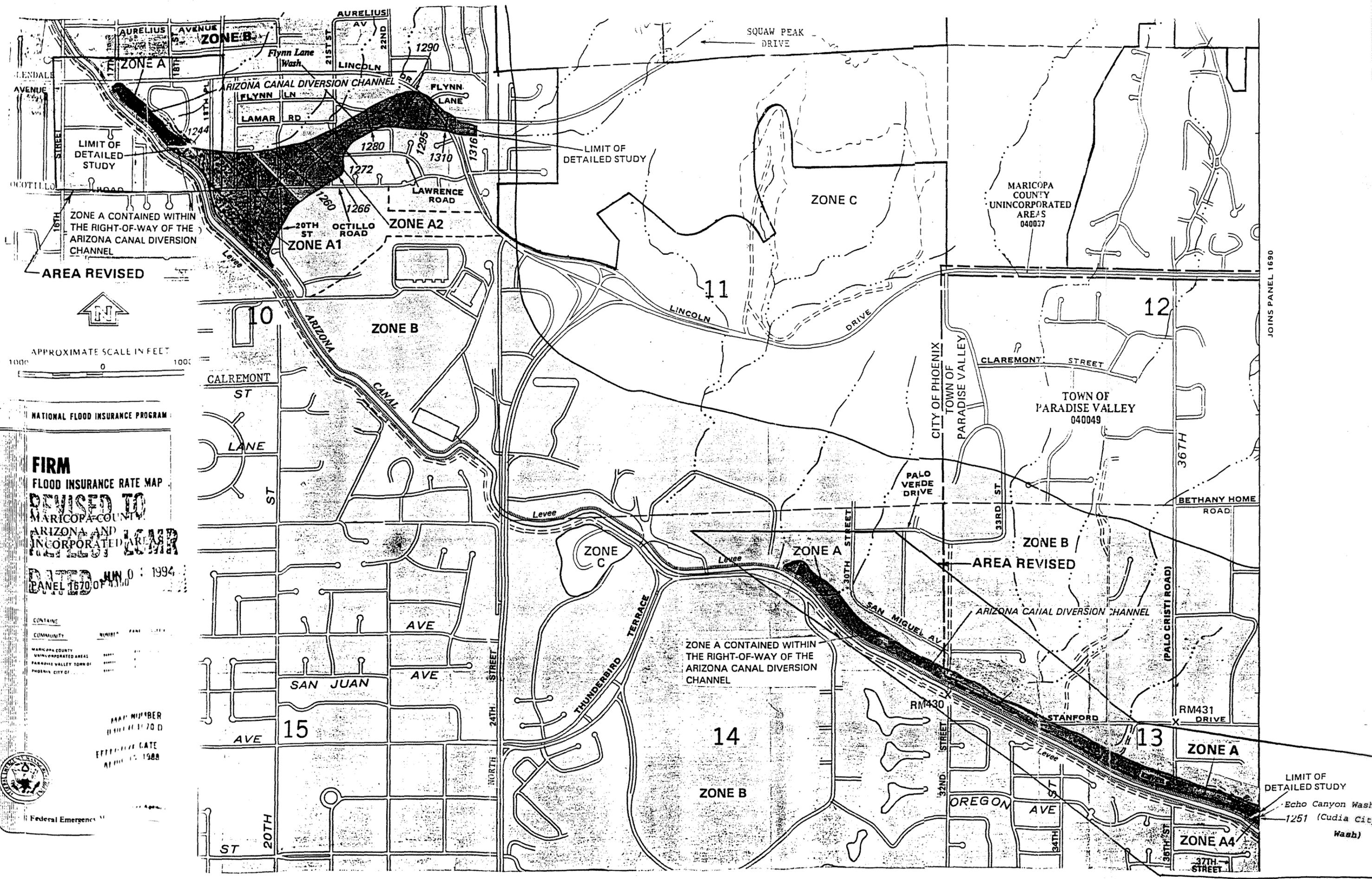
### LAND USE MAP FUTURE CONDITIONS

PLATE 6

**KAMINSKI HUBBARD**  
engineering, inc.

SURVEYING • CIVIL • HYDROLOGY  
4550 N. BLACK CANYON HWY., SUITE C  
PHOENIX, ARIZONA 85017  
(602) 242-5588





NATIONAL FLOOD INSURANCE PROGRAM

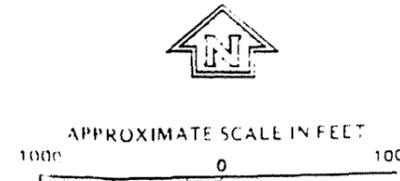
**FIRM**  
FLOOD INSURANCE RATE MAP  
**REVISED TO**  
MARICOPA COUNTY  
ARIZONA AND  
INCORPORATED AREAS  
DATED **JUN 0 1994**  
PANEL 1670 OF 1100

CONTAINING	NUMBER	PANEL	DATE
MARICOPA COUNTY	1670	1100	1994
UNINCORPORATED AREAS	1671	1100	1994
PARADISE VALLEY TOWN OF	1672	1100	1994
PHOENIX CITY OF	1673	1100	1994

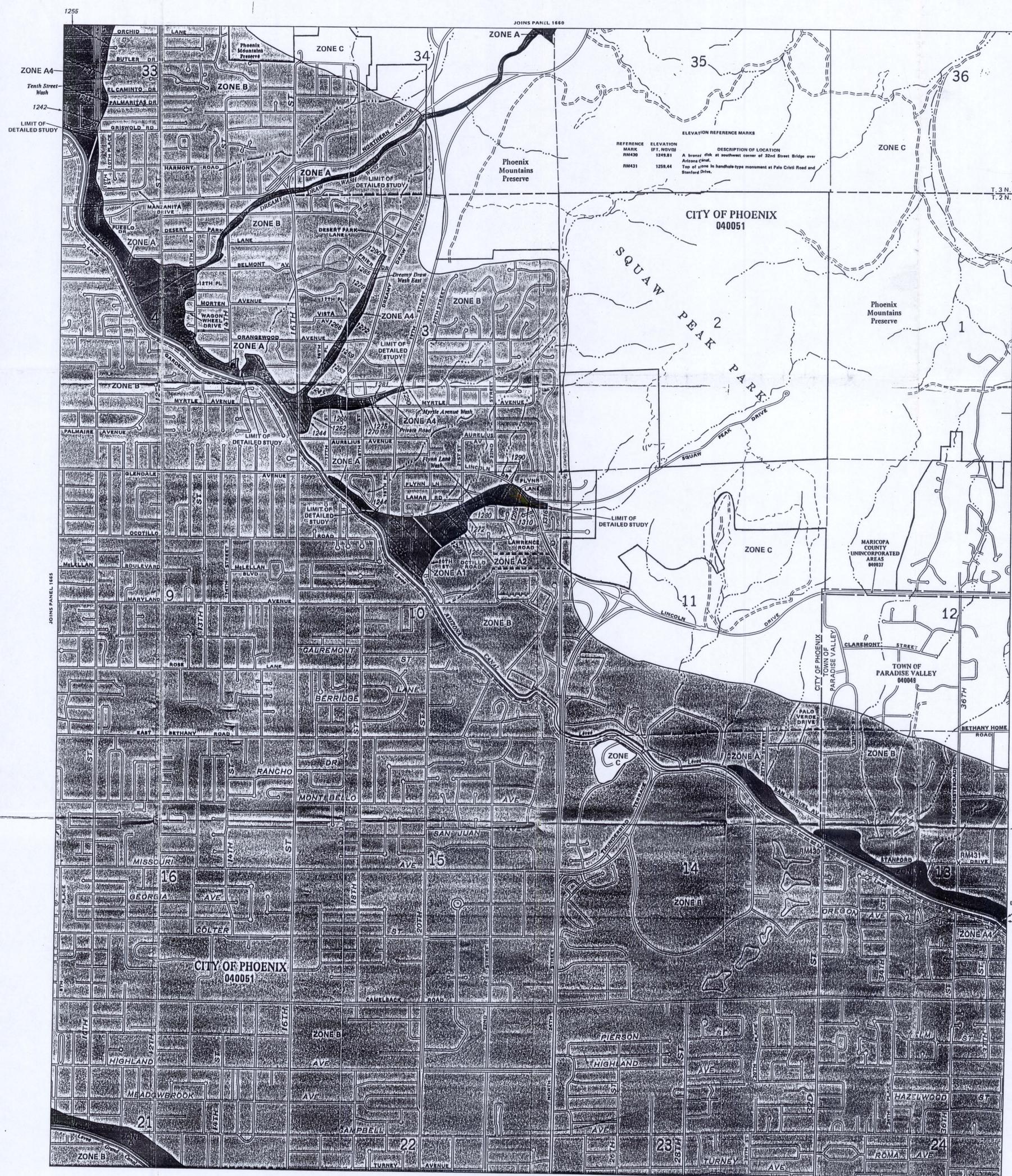
MAP NUMBER  
1670 OF 1100

EFFECTIVE DATE  
MAY 15 1988

Federal Emergency



JOINS PANEL 1690



**KEY TO MAP**

500-Year Flood Boundary  
 100-Year Flood Boundary  
 Zone Designations

100-Year Flood Boundary  
 500-Year Flood Boundary

Base Flood Elevation Line  
 With Elevation in Feet\*\*

Base Flood Elevation in Feet  
 Where Uniform Within Zone\*\*

Elevation Reference Mark

Zone D Boundary

River Mile

\*\*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.
A0	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.

See 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:**

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

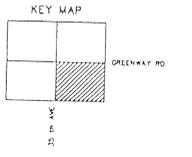
NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 2 NORTH, RANGE 3 EAST AND TOWNSHIP 3 NORTH, RANGE 3 EAST



**KAMINSKI HUBBARD**  
**engineering, inc.**  
 SURVEYING • CIVIL • HYDROLOGY  
 4550 N. BLACK CANYON HWY., SUITE C  
 PHOENIX, ARIZONA 85017  
 (602) 242-5388

**PHOTOGRAMMETRIC SURVEY CERTIFICATION**

I, Daniel L. Kaminski, of KAMINSKI-HUBBARD Engineering, Inc., Arizona Registered Land Surveyor #16559, Certify That The Survey Control Used To Complete Photogrammetric Maps For This Project is Correct And Accurate Within Contract Specifications.



INDEX

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23	24	19	20	21	22	23	24	19	20	CACTUS RD
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11	12	7	8	9	10	11	12	7	8	HICKHURST RD
14	13	18	17	16	15	14	13	18	17	MC DONALD DR
										CHAPARRAL RD

DATE FLOWN : 11-16-1990



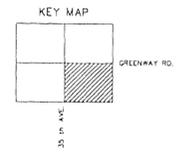
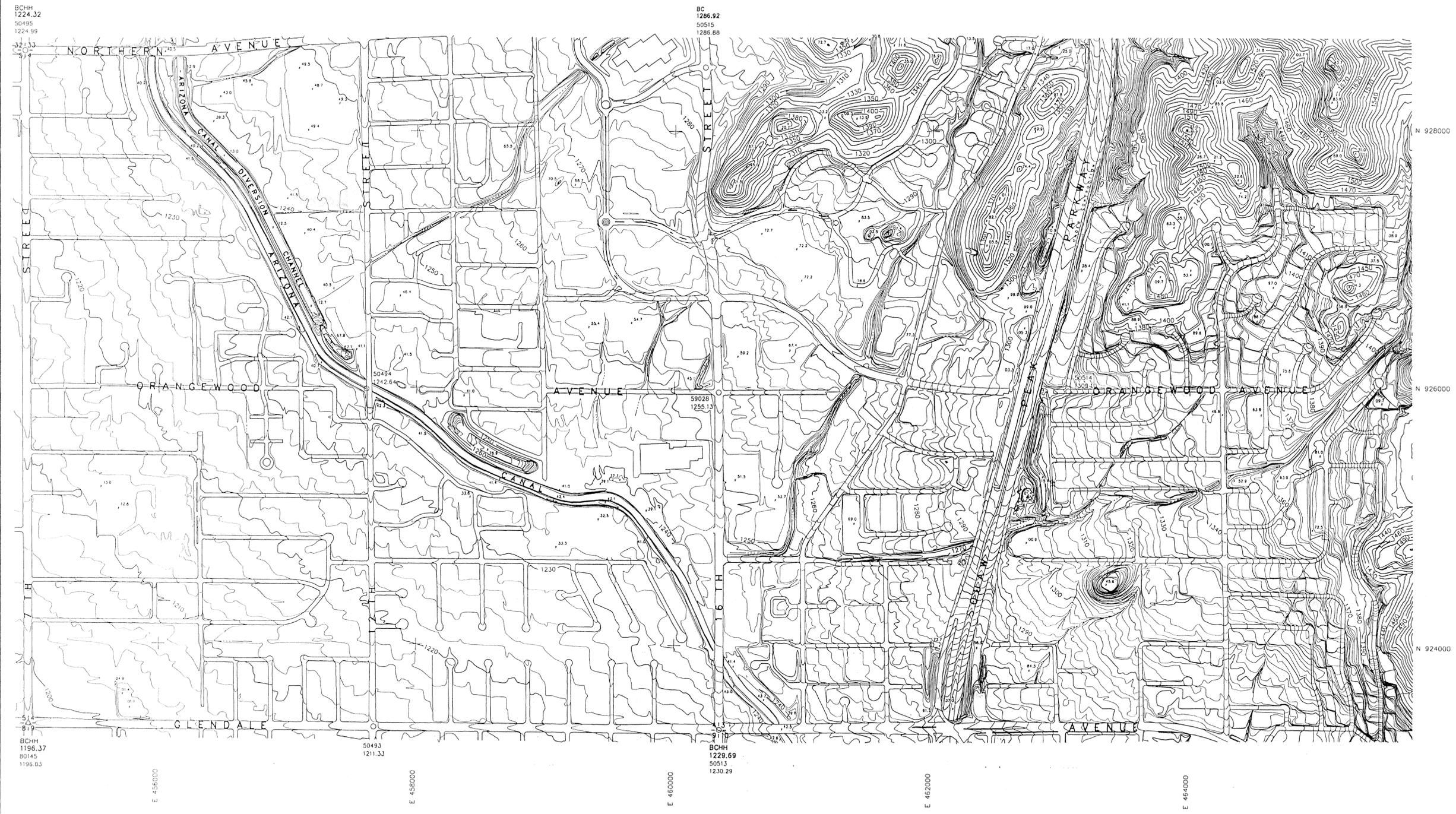
FLOOD CONTROL DISTRICT  
 OF  
 MARICOPA COUNTY  
 ARIZONA CANAL DIVERSION CHANNEL  
 AREA DRAINAGE MASTER STUDY  
 PHASE 1

DRN: DATE:	SCALE:	JOB NO.	SHEET
DES: DATE:	1" = 400' HORIZ.	0146	75 of 111
CHD: DATE:	1" = --- VERT.		

KENNEY AERIAL MAPPING 1999

SEC. 10. T. 2 N. R. 3 E.

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14	13	18	17	16	15	14	13	18	17

GREENWAY RD.  
THUNDERBIRD RD.  
CACTUS RD.  
SHEA BLVD.  
DOUBLE TREE RANCH RD.  
NORTHERN AVE.  
HIDAY BEND RD.  
MC DONALD DR.  
CHAPARRAL RD.

30th AVE  
29th AVE  
19th AVE  
7th AVE  
7th ST  
8th ST  
9th ST  
10th ST  
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23rd ST  
24th ST  
25th ST  
26th ST  
27th ST  
28th ST  
29th ST  
30th ST

DATE FLOWN : 11 - 15 - 1990



FLOOD CONTROL DISTRICT  
OF  
MARICOPA COUNTY  
ARIZONA CANAL DIVERSION CHANNEL  
AREA DRAINAGE MASTER STUDY  
PHASE 1

DRN:	DATE:	SCALE:	JOB NO.	SHEET
DES:	DATE:	1" = 400' HORIZ.	0146	76 of 111
CHD:	DATE:	1" = --- VERT.		



PLAT OF DEDICATION FOR  
VILLA VALENCIA  
A PLANNED AREA DEVELOPMENT

A PLAT OF A PORTION OF THE NORTHWEST 1/4 OF SECTION 10, T.2 N., R.3 E., G. & S. R. B. & M., MARICOPA COUNTY, ARIZONA

RECORDED  
192-37  
MAY 19 1977  
COUNTY RECORDER

JOB NO. 770110

CLOUSE ENGINEERING INC.  
ENGINEERS SURVEYORS  
PHOENIX ARIZONA

DEDICATION

KNOW ALL MEN BY THESE PRESENTS: That Minnesota Title Company, an Arizona Corporation, as Trustee, has divided under the name of Villa Valencia, a Planned Area Development, a portion of the Northwest 1/4 Section 10, T.2 N., R.3 E., G. & S. R. B. & M., Maricopa County, Arizona as shown platted hereon and hereby publishes this plat as and for the plat of said Villa Valencia, a Planned Area Development, and hereby declares that said plat sets forth the location and gives the dimensions of the lots, tracts, private accessway, and streets constituting same and that each lot, tract, private accessway, and street shall be known by the number, letter or name given each respectively on said plat, and hereby dedicates to the public for use as such the street, (known as Glendale Avenue) as shown on said plat and included in the above described premises. Easements are acceded for the purposes shown, Tracts A, thru J are not to be construed to be dedicated for the use of the General Public but are declared for the use and enjoyment of the Homeowners in Villa Valencia as more fully set forth in the Declaration of covenants, conditions and restrictions. Tract A is hereby declared as a private accessway and dedicated as an easement for public utilities, refuse collection and emergency and service type vehicles, as shown hereon. An easement is hereby dedicated to the City of Phoenix for maintenance of the street paving, curbs and gutters and granite to the City of Phoenix. The right to allow, prohibit and otherwise control the location and construction of all utility & drainage installation located within, on or under private accessways within the above described premises as shown platted hereon.

The flood control channel is hereby dedicated to the City of Phoenix in fee title. Drainage ways and drainage easements are hereby granted to the Homeowners Association over the lots & tracts as designated and shown on said plat, and shall be the responsibility of the Homeowners Association for maintenance. Tracts "F" thru "J" are to be known as common areas and are set aside for drainage ways.

IN WITNESS WHEREOF: Minnesota Title Company, an Arizona Corporation, as Trustee, has hereunto caused its corporate name to be signed and its corporate seal to be affixed and the same to be attested by the signature of its Trust Officer, thereunto duly authorized.

MINNESOTA TITLE COMPANY TRUSTEE

BY: [Signature]  
TRUST OFFICER

NOTES:

┌ Indicates a corner of this development. Set 1/2" rebar unless noted otherwise.

All utility & single phase electric lines are to be installed underground.

┌ Indicates an easement for public utilities unless noted otherwise

No structure of any kind be constructed or placed within or over the public utility easements, except wood, wire or removable section-type fencing and/or paving nor any planting except grass. It shall be further understood that the City of Phoenix shall not be required to replace any obstructions or planting that must be removed during the course of maintenance, construction or reconstruction.

A homeowners association, including all property owners in the development will be formed and have responsibility for maintaining all common areas, to be noted as tracts, landscaped areas, and drainage facilities, in accordance with approved plans.

All utilities located on or under: refuse collection easements, easements to maintain street and alley paving, curbs, gutters, and private accessways, shall be installed and maintained in accordance with the City of Phoenix standards and permit requirements.

No structure of any kind to be constructed or any vegetation to be planted nor be allowed to grow within the drainage areas which would impede the flow of storm, flood, or other waters to pass over, under, or through the areas. The City of Phoenix may, if it so desires, construct and/or maintain drainage facilities on or under the land in the drainage areas.

ACKNOWLEDGEMENT

STATE OF ARIZONA  
COUNTY OF MARICOPA, ss.  
On this 19th day of Sept, 1977  
before me, the undersigned officer, personally appeared [Signature], who acknowledged himself to be Trust Officer of Minnesota Title Company, an Arizona Corporation, as Trustee and acknowledged that he, as such officer, being authorized so to do, executed the foregoing instrument for the purpose therein contained.

IN WITNESS WHEREOF I hereunto set my hand and official seal. My commission expires [Date]

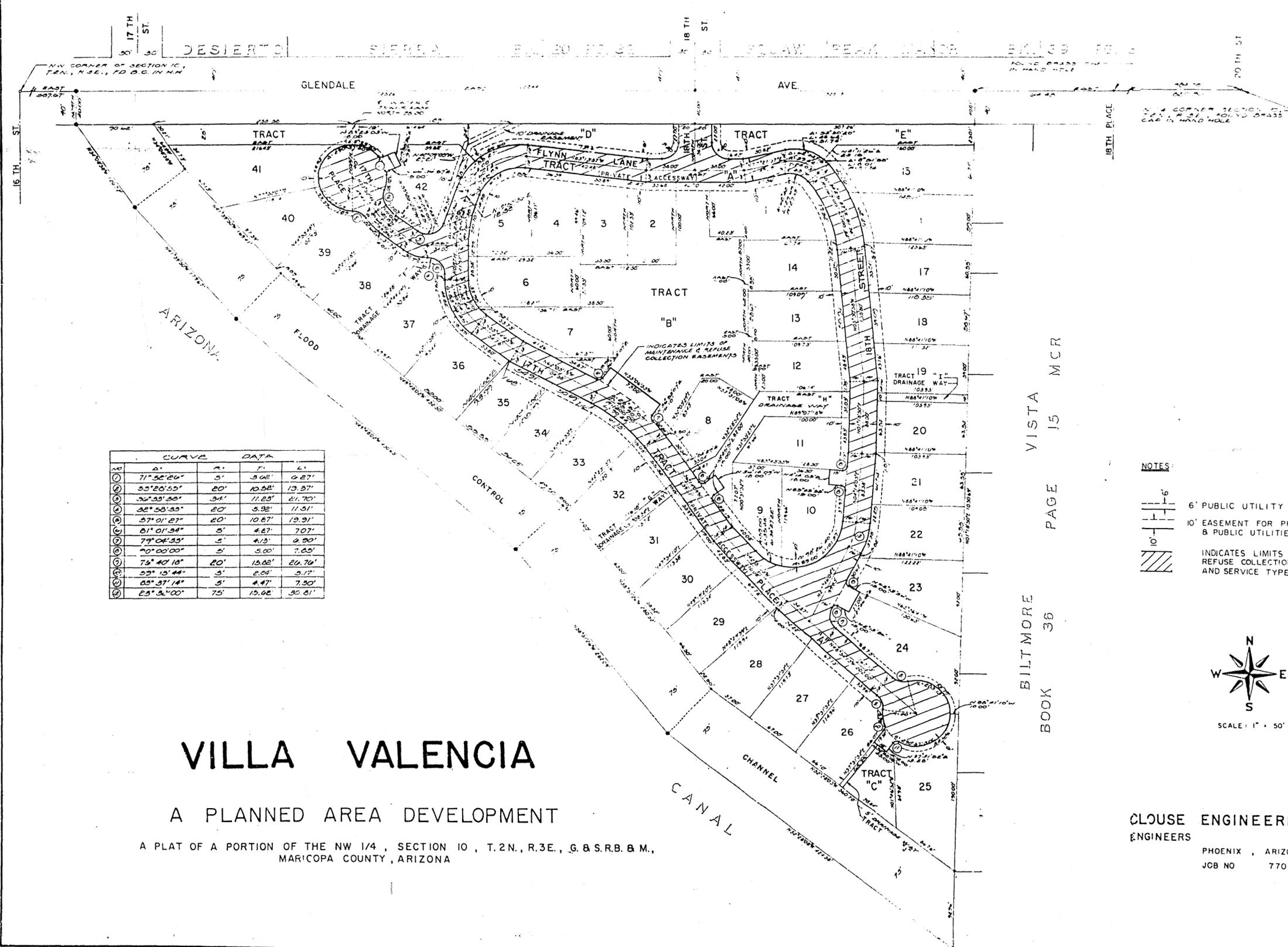
[Signature]  
NOTARY PUBLIC

APPROVAL  
Approved by the Council of the City of Phoenix, Arizona, this the 5th day of Sept, 1977.

BY: Margaret T. Havel ATTEST [Signature]  
MAROR CITY CLERK

CERTIFICATE  
This is to certify that the survey and development of the premises described and platted hereon were made under my direction during the month of May, 1977, and that the plat is correct and accurate, and that the monuments described in it have been located as described.

[Signature]  
REGISTERED CIVIL ENGINEER



CURVE DATA			
NO	A	R	L
1	71°52'26"	5'	9.02'
2	55°26'55"	20'	10.52'
3	50°35'30"	34'	11.25'
4	32°58'33"	20'	5.32'
5	57°01'27"	20'	10.27'
6	61°01'34"	5'	4.47'
7	79°04'33"	5'	4.13'
8	70°02'00"	5'	5.00'
9	75°40'18"	20'	15.02'
10	55°15'44"	5'	2.04'
11	65°37'14"	5'	4.47'
12	23°34'00"	75'	15.02'

# VILLA VALENCIA

A PLANNED AREA DEVELOPMENT  
 A PLAT OF A PORTION OF THE NW 1/4, SECTION 10, T.2N., R.3E., G. & S.R.B. & M.,  
 MARICOPA COUNTY, ARIZONA

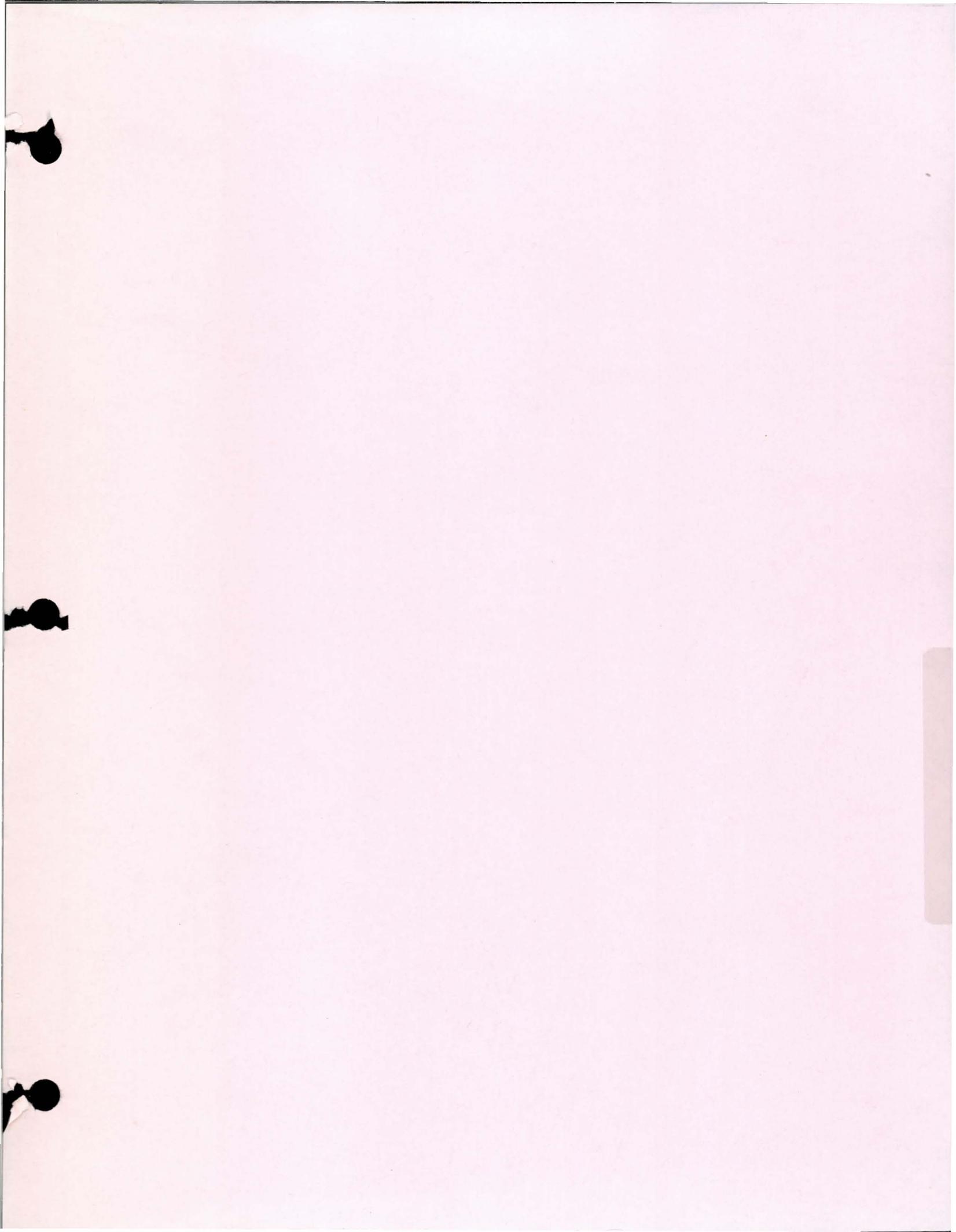
BILTMORE BOOK 36 PAGE 15 VISTA MCR

- NOTES:
- 6' PUBLIC UTILITY EASEMENT
  - 10' EASEMENT FOR PRIVATE ACCESSWAY & PUBLIC UTILITIES
  - INDICATES LIMITS OF MAINTENANCE, REFUSE COLLECTION, AND EMERGENCY AND SERVICE TYPE VEHICLES.



CLOUSE ENGINEERING, INC.  
 ENGINEERS SURVEYORS  
 PHOENIX, ARIZONA  
 JOB NO. 770110

192-37  
 SHEET 2 OF 2





# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT FLYNN LANE WASH LDMR PAGE 1 OF 6  
 DETAIL DISCHARGE CALCULATION COMPUTED HM DATE 3/5/96  
RATIONAL METHOD CHECKED BY AA DATE 8/6/96

## (1) Flow Path calculation

The longest flow path was measured using a map wheel on the attached work map. Following table lists the procedure followed to estimate the average length of the longest flow path.

No.	Reading	Factor	Length (ft)	Length (mi)
1	9.5	100	950.0	0.179
2	9.4	100	940.0	0.178
3	9.6	100	960.0	0.181
4	9.5	100	950.0	0.179
5	9.6	100	960.0	0.181
<b>Average</b>			<b>952.0</b>	<b>0.180</b>

## (2) Drainage Area Calculation

The drainage are was measured using a planimeter on the attached work map. Following table lists the procedure followed to estimate an average drainage area.

No.	Reading (acre)
1	14.80
2	15.01
3	14.69
4	14.74
5	15.15
<b>Average</b>	<b>14.91</b>



# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT FLYNN LANE WASH LOMR PAGE 2 OF 6  
DETAIL DISCHARGE CALCULATION COMPUTED LM DATE 3/5/96  
RATIONAL METHOD CHECKED BY AA DATE 8/6/96

### (3) Other parameters

The following parameters were estimated from the attached work map and the Drainage Design Manual for Maricopa County, Hydrology, Vol. I (Ref. 1).

(A)	Highest elevation on the watercourse	=	1260.0 ft. (work map)
(B)	Lowest elevation on the watercourse	=	1240.0 ft. (work map)
(C)	10-yr. runoff coefficient, C	=	0.50 (Table 3.2, Ref. 1)
(D)	10-yr. 6-hr. rainfall (default)	=	2.07"
(E)	Watershed resistance factor, $K_b$	=	0.3267

$$K_b = m \log (A) + b$$

From Table 3.1, Ref. 1,

m	=	-0.00625
b	=	0.04, and
A	=	14.91 acres

$$\begin{aligned} \text{Therefore, } K_b &= -0.00625 \times \log (14.91) + 0.04 \\ &= \mathbf{0.03267} \end{aligned}$$

### (4) Application of Rational Method

The above mentioned estimated parameters were used in the "Rational Method" program as specified in Ref. 1. According to the output, the 100-yr. runoff from the drainage area is approximately,

$$Q_{100} = 84.0 \text{ cfs. (please see attached output)}$$



# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT FLYNN LANE WASH LOMR PAGE 3 OF 6  
DETAIL DISCHARGE CALCULATION COMPUTED HM DATE 8/5/96  
RATIONAL METHOD CHECKED BY AA DATE 8/6/96

## Flood Control District of Maricopa County Hydrologic Design Manual Rational Method

Wtrcrse. Length = 952 (feet)                      Kb = .0330  
Top Elev. = 1260 (feet)                            P(10,6) = 2.07 (inches)  
Bottom Elev. = 1240 (feet)                        Area = 14.91 (acres)  
Slope = .0210 (feet/feet)                         C(10) = .5

Hydrological Summary Table

PARAMETER	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Q (cfs):	25	34	41	56	70	84
C :	0.500	0.500	0.500	0.550	0.600	0.625
Tc (min):	7.2	6.4	6.0	5.5	5.2	5.0
i (in/hr):	3.4	4.6	5.4	6.8	7.8	9.0



# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT FLYNN LANE WASH LOMR PAGE 4 OF 6  
DETAIL CHANNEL CAPACITY COMPUTED HM DATE 8/5/96  
MANNING'S EQUATION CHECKED BY AA DATE 8/6/96

(1) Description of the Channel flowing into ACDC (photograph No. 4)

The channel flows in the south-westerly direction and built with shotcrete. It is approximately 115 ft. long (from Appendix D). The channel seems to have good surface condition.

(2) Parameter estimation

Based on the field trip and the photographs taken, the following parameters were estimated.

Bottom Width, B = 5.0 ft.  
Side Slope, Z (H : V) = 0.50  
Depth of flow, D = 4.0 ft.  
Manning's n value = 0.019 (for shotcrete, from Table 5.11, Ref. 2)  
Channel slope, S = 0.004348 '1' (0.5/115 = 0.004348 '1')

(3) Application of Manning's Equation

Manning's Equation was applied to solve for the capacity of the channel.

$$Q = (1.49/n) A R^{2/3} S^{1/2}$$
$$= 230.0 \text{ cfs.} \geq Q_{100} = 84.0 \text{ cfs.} \quad (\text{please see attached output})$$

Therefore, it is concluded that the channel capacity is more than sufficient to carry the 100-yr. discharge of 84.0 cfs. Generated by the drainage area.

# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



PROJECT FLYNN LANE WASH LOMR PAGE 5 OF 6  
DETAIL CHANNEL CAPACITY COMPUTED HM DATE 8/5/96  
MANNING'S EQUATION CHECKED BY AA DATE 8/6/96

## INPUT VALUES:

N= .01900  
S= .004348 (FT/FT)  
Z= .50:1  
B= 5.0 (FT)  
D= 4.00 (FT)

## RESULTS:

Q= 229.8 (CFS)  
A= 28.0 (SQ FT)  
V= 8.21 (FT/SEC)  
W.S. WIDTH= 9.0 (FT)  
CRITICAL DEPTH= 3.56 (FT)  
CRITICAL SLOPE= .006478 (FT/FT)  
PRINT OUTPUT AT PRINTER X (Y/N OR BY)?

CRITICAL VELOCITY= 9.53 (FT/SEC)  
FROUDE NUMBER= .820  
SPECIFIC ENERGY, E= 5.05 (FT)  
WETTED PERIMETER= 13.94 (FT)  
HYDRAULIC RADIUS= 2.01 (FT)



# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT FLYNN LANE WASH LOMR PAGE 6 OF 6  
DETAIL CHANNEL CAPACITY COMPUTED HM DATE 9/5/96  
MANNING'S EQUATION CHECKED BY AA DATE 8/6/96

## References

1. Maricopa County Flood Control District, January 1995, Drainage Design Manual for Maricopa County, Hydrology, Volume I.
2. Maricopa County Flood Control District, September 1992, Drainage Design Manual for Maricopa County, Hydraulics, Volume II.

# 3

## Rational Method

### 3.1 General

The Rational Method was originally developed to estimate runoff from small areas and its use should be generally limited to those conditions. For the purposes of this manual, its use should be limited to areas of up to 160 acres. In such cases, the peak discharge and the volume of runoff from rainfall events up to and including the 100-year, 2-hour duration storm falling within the boundaries of the proposed development are to be retained. If the development involves channel routing, the procedures given in Chapters 4 through 6 should be used, since the peak generated by the Rational Method cannot be directly routed.

### 3.2 Rational Equation

The Rational Equation relates rainfall intensity, a runoff coefficient and the watershed size to the generated peak discharge. The following shows this relationship:

$$Q = CiA \quad (3.1)$$

where

- Q = the peak discharge (cfs) from a given area.
- C = a coefficient relating the runoff to rainfall.
- i = average rainfall intensity (inches/hour), lasting for a T<sub>c</sub>.
- T<sub>c</sub> = the time of concentration (hours).
- A = drainage area (acres).

The Rational Equation is based on the concept that the application of a steady, uniform rainfall intensity will produce a peak discharge at such a time when all points of the watershed are contributing to the outflow at the point of design. Such a condition is met when the elapsed time is equal to the time of concentration, T<sub>c</sub>, which is defined to be the floodwave travel time from the most remote part of the

## Rational Equation

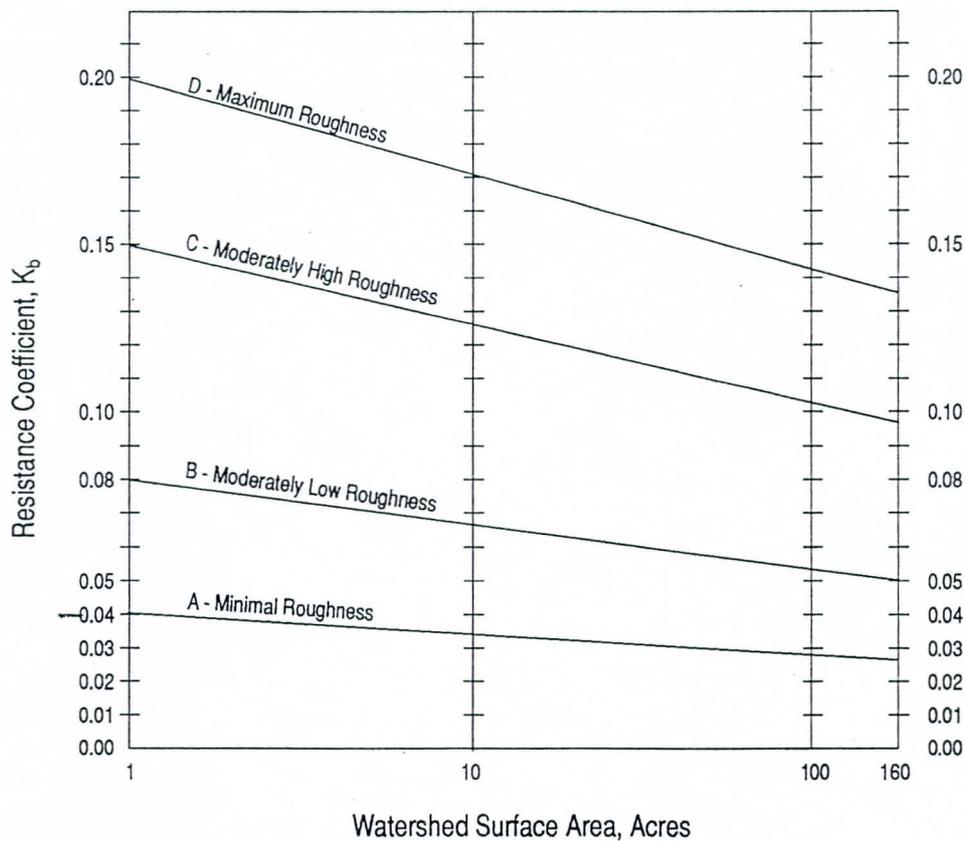
watershed to the point of design. The time of concentration should be computed by applying the following equation developed by Papadakis and Kazan (1987):

$$T_c = 11.4 L^{0.5} K_b^{0.52} S^{-0.31} i^{-0.38} \quad (3.2)$$

where

- $T_c$  = time of concentration in hours
- $L$  = length of the longest flow path in miles
- $K_b$  = watershed resistance coefficient (see Figure 3.1, or Table 3.1)
- $S$  = watercourse slope in feet/mile
- $i$  = rainfall intensity in inches/hour\*

\*It should be noted that  $i$  is the "rainfall excess intensity" as originally developed. However, when used in the Rational Equation, rainfall intensity and rainfall excess intensity provide similar values because of the hydrologic characteristics of small, urban watersheds which result in minimal rainfall loss. This is because of the extent of imperviousness associated with urban watersheds and the fact that the time of concentration is usually very short.



**Figure 3.1**  
**Resistance Coefficient  $K_b$  as a Function of Watershed Size**

**Table 3.1**  
**Equation for Estimating  $K_b$  in the  $T_c$  Equation**

$K_b = m \log A + b$ Where A is drainage area, in acres				
Type	Description	Typical Applications	Equation Parameters	
			m	b
A	Minimal roughness: Relatively smooth and/or well graded and uniform land surfaces. Surface runoff is sheet flow.	Commercial/ industrial areas Residential area Parks and golf courses	-0.00625	0.04
B	Moderately low roughness: Land surfaces have irregularly spaced roughness elements that protrude from the surface but the overall character of the surface is relatively uniform. Surface runoff is predominately sheet flow around the roughness elements.	Agricultural fields Pastures Desert rangelands Undeveloped urban lands	-0.01375	0.08
C	Moderately high roughness: Land surfaces that have significant large- to medium-sized roughness elements and/or poorly graded land surfaces that cause the flow to be diverted around the roughness elements. Surface runoff is sheet flow for short distances draining into meandering drainage paths.	Hillslopes Brushy alluvial fans Hilly rangeland Disturbed land, mining, etc. Forests with underbrush	-0.025	0.15
D	Maximum roughness: Rough land surfaces with torturous flow paths. Surface runoff is concentrated in numerous short flow paths that are often oblique to the main flow direction.	Mountains Some wetlands	-0.030	0.20

### 3.3 Assumptions

Application of the Rational Equation requires consideration of the following:

1. The peak discharge rate corresponding to a given intensity would occur only if the rainfall duration is at least equal to the time of concentration.
2. The calculated runoff is directly proportional to the rainfall intensity.
3. The frequency of occurrence for the peak discharge is the same as the frequency for the rainfall producing that event.
4. The runoff coefficient increases as storm frequency decreases.

### 3.4 Limitations

Application of the Rational Method is appropriate for watersheds less than 160 acres in size. This is based on the assumption that the rainfall intensity is to be uniformly distributed over the drainage area at a uniform rate lasting for the duration of the storm. The Maricopa County Unit Hydrograph Procedure described in Chapter 5 may also be used for areas less than 160 acres where hydrograph routing is desired, or, in cases where the Rational Method assumptions do not apply.

### 3.5 Application

The Rational Method can be used to calculate the generated peak discharge and runoff volume from drainage areas less than 160 acres.

#### 3.5.1 Peak Discharge Calculation

1. Determine the area within the development boundaries.
2. Select the runoff coefficient, *C* from Table 3.2
3. Calculate time of concentration (see Example 4). This is to be done by an iterative process. Select a duration from the I-D-F curves, Figure 3.2. This value should not be longer than two hours and normally it will be less than an hour. Determine the maximum rainfall intensity indicated on the I-D-F curve for a frequency that includes the 100-year. The intensity value of the corresponding *T<sub>c</sub>* in the above is for the Phoenix Metro area. Use *i<sub>p</sub>* in the following equation for estimating *i* for other areas:

$$i = i_p \frac{(P_{10}^6)}{2.07} \tag{3.3}$$

where

- i* = the desired intensity for a given duration and frequency.
- i<sub>p</sub>* = the intensity for the Phoenix Metro area.
- $\underline{P}_{10}^6$  = the 10-year, 6-hour precipitation depth at the point of interest.  
(Can be read from Figure 2.4.)

4. Use the adjusted intensity in Equation 3.2 to calculate time of concentration. Repeat this process until the selected and computed *T<sub>c</sub>* values are reasonably close. For more details see Example 1.
5. Determine peak discharge (*Q*) by using the above value of *i* in Equation 3.1.
6. As an alternative to the above procedure, the computer program RATIONAL.EXE may be used to calculate peak discharges.

**Table 3.2**  
**C Coefficients for Use with the Rational Method**

Land Use	Return Period			
	2-10 Year	25 Year	50 Year	100 Year
Streets and Roads				
Paved Roads	0.75 – 0.85	0.83 – 0.94	0.90 – 0.95	0.94 – 0.95
Gravel Roadways & Shoulders	0.60 – 0.70	0.66 – 0.77	0.72 – 0.84	0.75 – 0.88
Industrial Areas				
Heavy	0.70 – 0.80	0.77 – 0.88	0.84 – 0.95	0.88 – 0.95
Light	0.60 – 0.70	0.66 – 0.77	0.72 – 0.84	0.75 – 0.88
Business Areas				
Downtown	0.75 – 0.85	0.83 – 0.94	0.90 – 0.95	0.94 – 0.95
Neighborhood	0.55 – 0.65	0.61 – 0.72	0.66 – 0.78	0.69 – 0.81
Residential Areas				
Lawns – Flat	0.10 – 0.25	0.11 – 0.28	0.12 – 0.30	0.13 – 0.31
– Steep	0.25 – 0.40	0.28 – 0.44	0.30 – 0.48	0.31 – 0.50
Suburban	0.30 – 0.40	0.33 – 0.44	0.36 – 0.48	0.38 – 0.50
Single Family	0.45 – 0.55	0.50 – 0.61	0.54 – 0.66	0.56 – 0.69
Multi-Unit	0.50 – 0.60	0.55 – 0.66	0.60 – 0.72	0.63 – 0.75
Apartments	0.60 – 0.70	0.66 – 0.77	0.72 – 0.84	0.75 – 0.88
Parks/Cemetaries	0.10 – 0.25	0.11 – 0.28	0.12 – 0.30	0.13 – 0.31
Playgrounds	0.40 – 0.50	0.44 – 0.55	0.48 – 0.60	0.50 – 0.63
Agricultural Areas	0.10 – 0.20	0.11 – 0.22	0.12 – 0.24	0.13 – 0.25
Bare Ground	0.20 – 0.30	0.22 – 0.33	0.24 – 0.36	0.25 – 0.38
Undeveloped Desert	0.30 – 0.40	0.33 – 0.44	0.36 – 0.48	0.38 – 0.50
Mountain Terrain (Slopes > 10%)	0.60 – 0.80	0.66 – 0.88	0.72 – 0.95	0.75 – 0.95

**Note:** Values of C for 25, 50 and 100 Year were derived using frequency adjustment factors of 1.10, 1.20, and 1.25, respectively, with an upper limit of 0.95 for C for the 2-10 Year values.

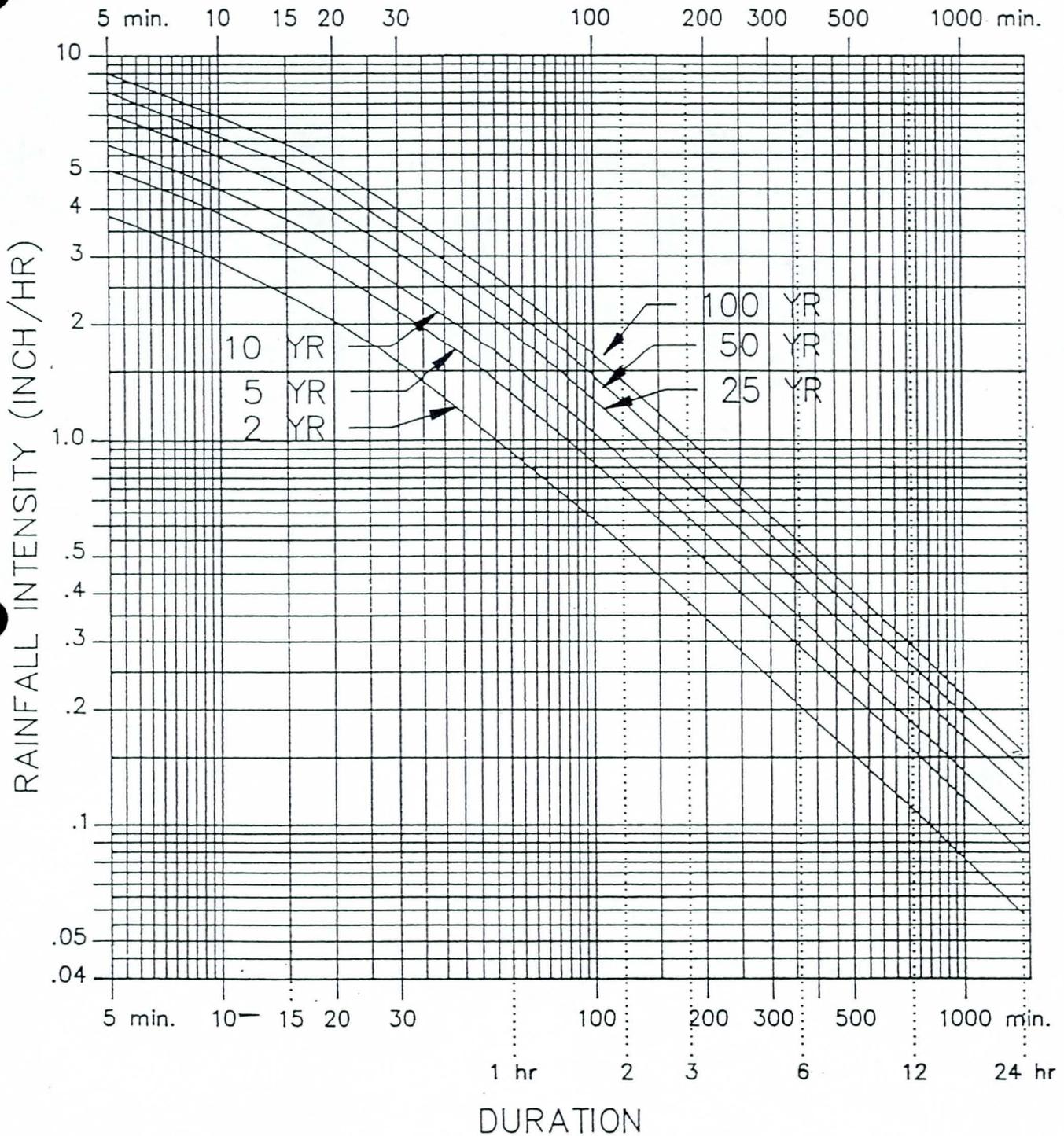


Figure 3.2  
Rainfall Intensity-Duration-Frequency Relation  
(Phoenix Metro Area)

### 3.5.2 Volume Calculations

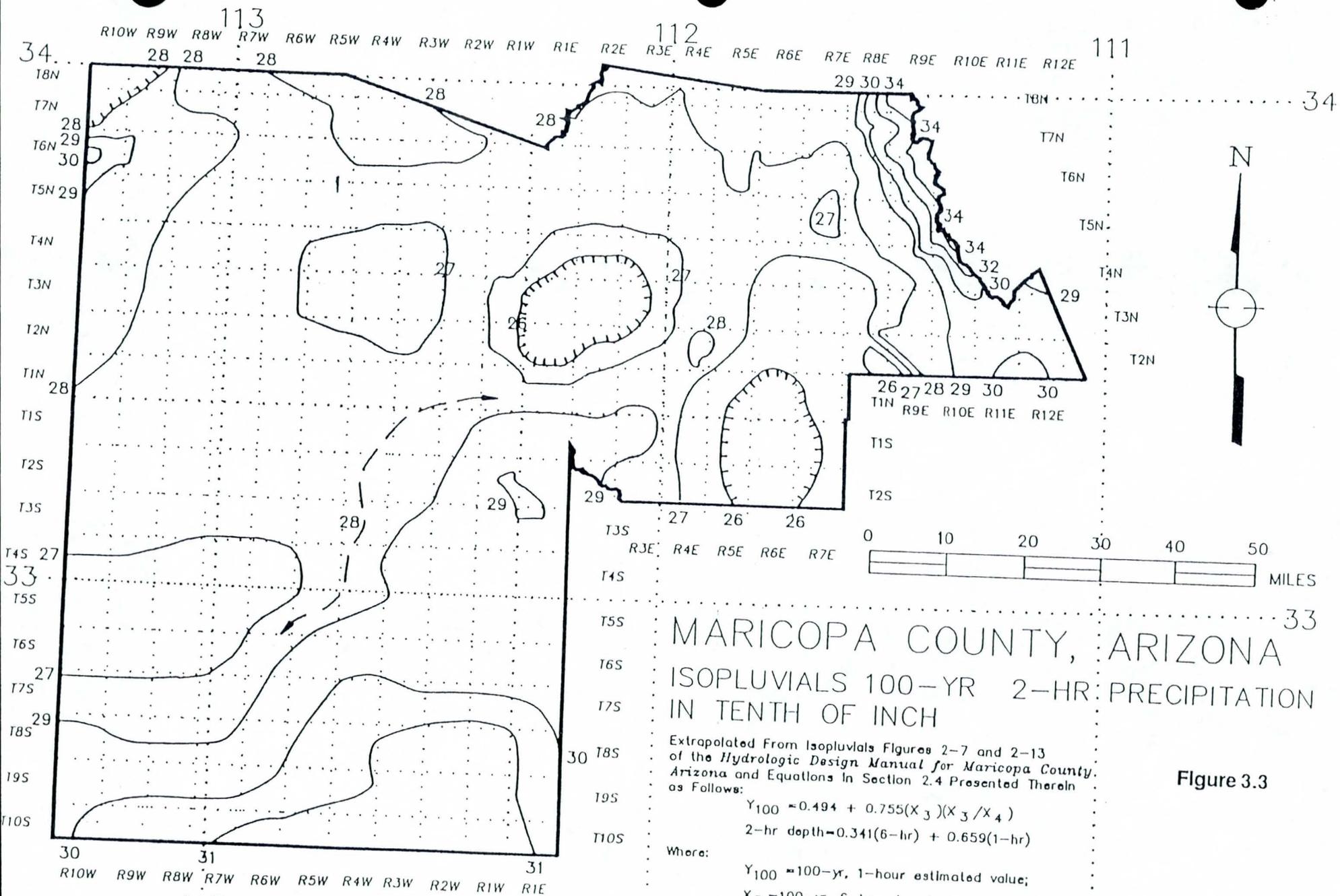
Volume calculation should be done by applying the following equation:

$$V = C \left( \frac{P}{12} \right) A \quad (3.4)$$

where

- V = Calculated volume in acre-feet
- C = Runoff coefficient from Table 3.2
- P = Rainfall depth in inches
- A = Drainage area in acres

In the case of volume calculations for retention/detention design, P equals the 100-year, 2-hour depth, in inches, from Section 2.2 or Figure 3.3.



MARICOPA COUNTY, ARIZONA  
 ISOPLUVIALS 100-YR 2-HR PRECIPITATION  
 IN TENTH OF INCH

Extrapolated From Isopluvials Figures 2-7 and 2-13  
 of the Hydrologic Design Manual for Maricopa County,  
 Arizona and Equations in Section 2.4 Presented Therein  
 as Follows:

$$Y_{100} = 0.494 + 0.755(X_3)(X_3/X_4)$$

$$2\text{-hr depth} = 0.341(6\text{-hr}) + 0.659(1\text{-hr})$$

Where:

$Y_{100}$  = 100-yr, 1-hour estimated value;

$X_3$  = 100-yr, 6-hr value from precipitation-  
 frequency maps;

$X_4$  = 100-yr, 24-hr value from precipitation-  
 frequency maps;

6-hr = isopluvial values from figure 2.7;

1-hr =  $Y_{100}$  value as computed above.

Figure 3.3

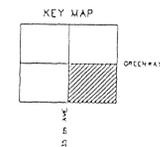
Table 5.11  
Manning's Roughness Coefficients\*

Channel Material	Roughness Coefficient (n)		
	Minimum	Normal	Maximum
Corrugated metal	0.021	0.025	0.030
Concrete			
Trowel finish	0.011	0.013	0.015
Float finish	0.013	0.015	0.016
Unfinished	0.014	0.017	0.020
Shotcrete, good section	0.016	0.019	0.023
Shotcrete, wavy section	0.018	0.022	0.025
Asphalt (use maximum value when cars are present)	0.013	0.016	0.020
Soil Cement	0.018	0.020	0.025
Constructed channels with earth or sand bottom and sides of:			
Clean earth; straight	0.018	0.022	0.025
Earth with grass and weeds	0.020	0.025	0.030
Earth with trees and shrubs	0.024	0.032	0.040
Shotcrete	0.018	0.022	0.025
Soil Cement	0.022	0.025	0.028
Concrete	0.017	0.020	0.024
Dry rubble or riprap	0.023	0.032	0.036
Natural channels with sand bottom and sides of:			
Trees and shrubs	0.025	0.035	0.045
Rock	0.024	0.032	0.040
Natural channel with rock bottom	0.040	0.060	0.090
Overbank Floodplains			
Desert brush, normal density	0.040	0.060	0.080
Dense vegetation	0.070	0.100	0.160

\* From: Simons, Li and Associates 1988. Adapted from Chow (1959) and Aldridge and Garret (1973).

**PHOTOGRAMMETRIC SURVEY CERTIFICATION**

I, Daniel L. Kaminski, of KAMINSKI-HUBBARD Engineering, Inc., Arizona Registered Land Surveyor #16559, Certify That The Survey Control Used To Complete Photogrammetric Maps For This Project is Correct And Accurate Within Control Specifications.



INDEX

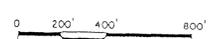
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26	25	30	29	28	27	26	25	30	29
35	36	31	32	33	34	35	36	31	32
2	1	6	5	4	3	2	1	6	5
11	12	7	8	9	10	11	12	7	8
14	13	18	17	16	15	14	13	18	17

PEORIA AVE.  
DUTY AVE.  
GREENDALE AVE.  
BENTLEY HOME RD.  
CAROLINA RD.

GREENWAY RD.  
HUNTERBROOK RD.  
CADIZ RD.  
SHEA BLVD.  
DOUBLE TREE RANCH RD.  
NORTHEAN AVE.  
MOHAWK BEND RD.  
MC DONALD DR.  
CHAPARRAL RD.

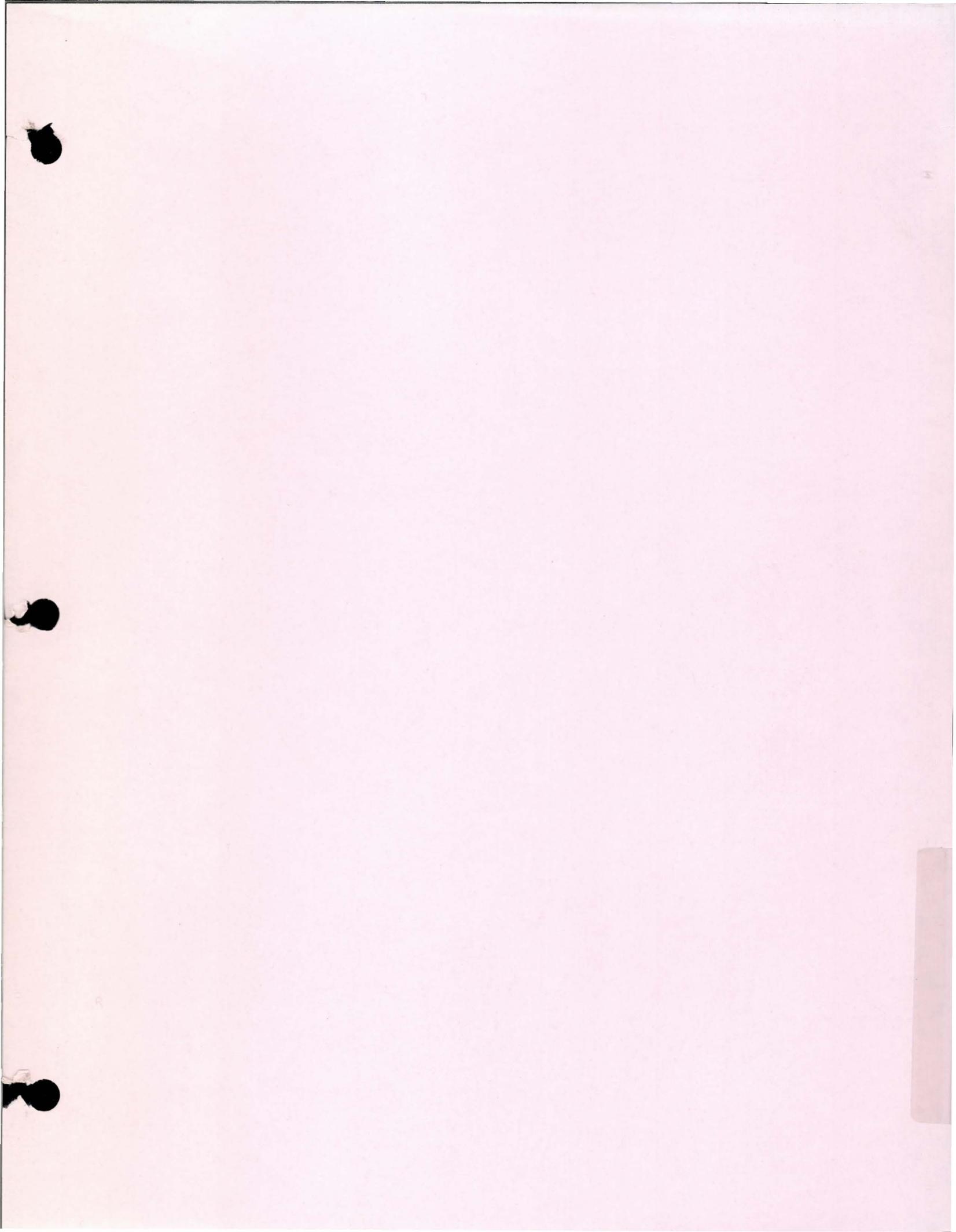
35th St  
37th St  
39th St  
41st St  
43rd St  
45th St  
47th St  
49th St  
51st St  
53rd St

DATE FLOOD: 11-10-1990



FLOOD CONTROL DISTRICT  
OF  
MARICOPA COUNTY  
ARIZONA CANAL DIVERSION CHANNEL  
AREA DRAINAGE MASTER STUDY  
PHASE 1

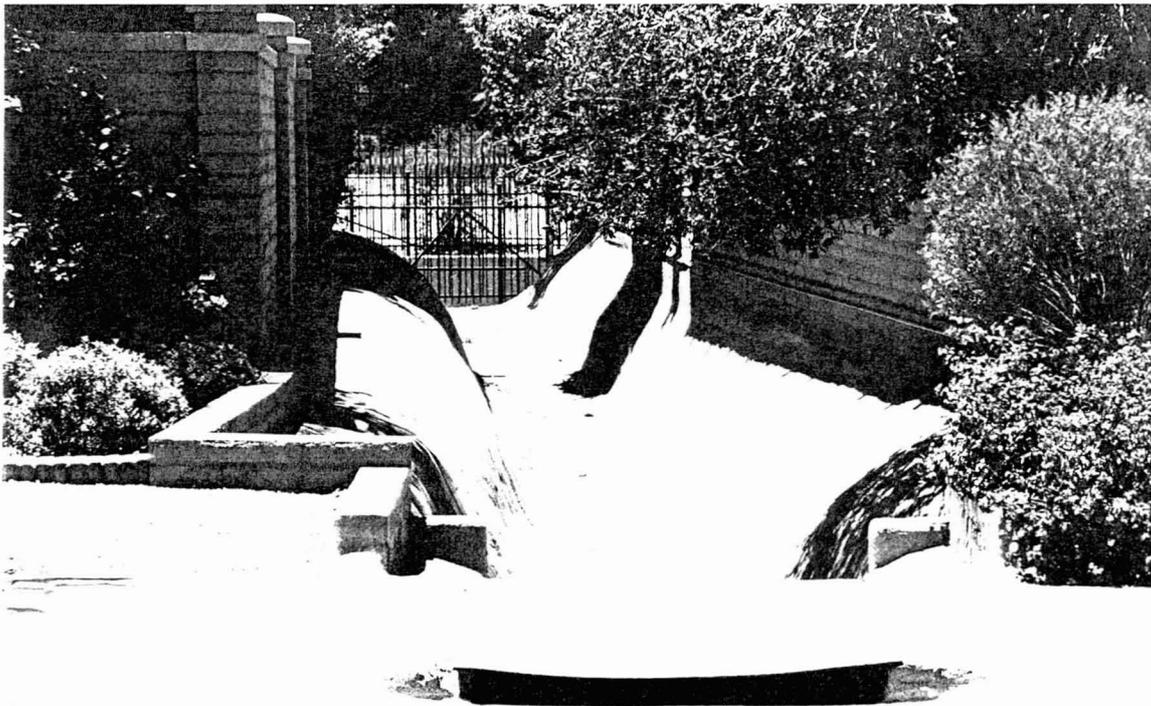
DRN:	DATE:	SCALE:	JOB NO.	SHEET
DES:	DATE:	1" = 400' HORIZ.	0146	75 of 111
CHD:	DATE:	1" = 400' VERT.		



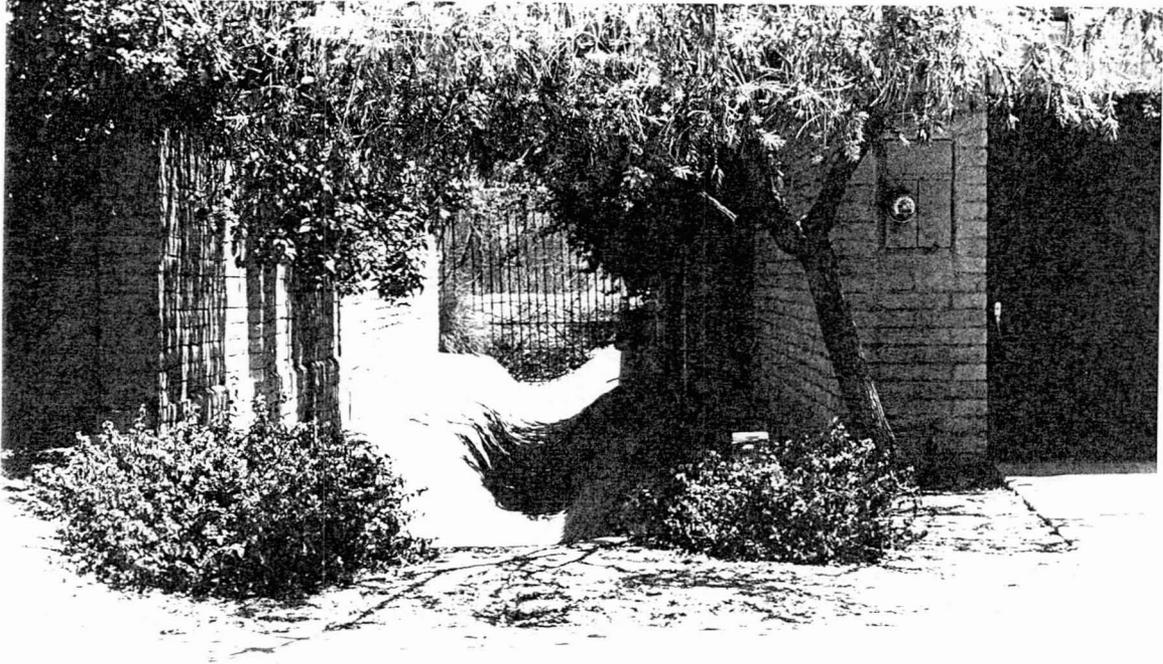




Photograph 3: Looking north-east toward drainage tract H.



Photograph 4: Looking south-east toward drainage tract G (toward ACDC).



Photograph 1: Looking east toward drainage tract I.



Photograph 2: Looking west toward drainage tract H.





Photo No. 1 : Looking east toward drainage tract I.



Photo No. 2 : Looking west toward the inlet of the culvert at 18th Street.



Photo No. 3 : Looking west toward drainage tract H.



Photo No. 4 : Looking east toward the outlet of the culvert at 18th Street.



Photo No. 5 : Looking north-east toward drainage tract H.



Photo No. 6 : Looking south-west toward the inlet of the culvert at 17th Tract Place.



Photo No. 7 : Looking south-west toward Drainage Tract G (toward ACDC).



Photo No. 8 : Looking north-east toward the outlet of the culvert at 17th Tract Place.



Photograph 1: Looking east toward drainage tract I.

Photograph 2: Looking west toward drainage tract H.

Photograph 3: Looking north-east toward drainage tract H.

Photograph 4: Looking south-east toward drainage tract G (toward ACDC).

Photo No. 1 : Looking east toward drainage tract I.



Photo No. 2 : Looking west toward the inlet of the culvert at 18th Street.

Photo No. 3 : Looking west toward drainage tract H.



Photo No. 4 : Looking east toward the outlet of the culvert at 18th Street.

Photo No. 5 : Looking north-east toward drainage tract H.



Photo No. 6 : Looking south-west toward the inlet of the culvert at 17th Tract Place.

Photo No. 7 : Looking south-west toward Drainage Tract G (toward ACDC).



Photo No. 8 : Looking north-east toward the outlet of the culvert at 17th Tract Place.