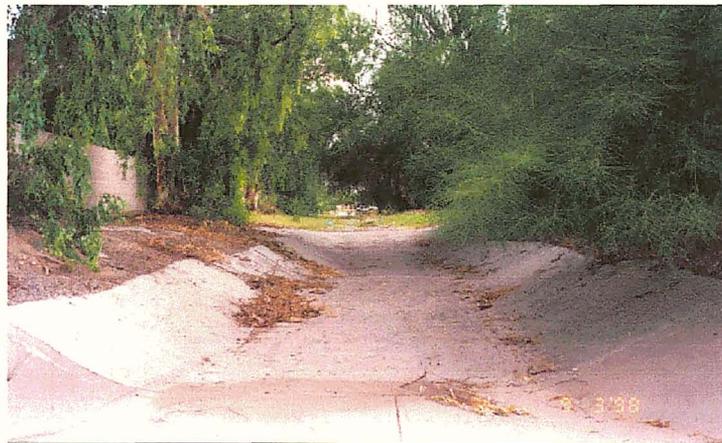


**DREAMY DRAW WASH WEST AT ACDC
LOMR PACKAGE FOR ZONE AE FLOODPLAIN WITHOUT
FLOODWAY**

FCD Contract No. 1999C048 - Assignment # 3

TECHNICAL DATA NOTEBOOK



Prepared for:

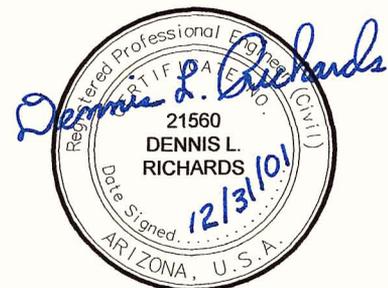
Flood Control District of Maricopa County

Prepared by:



WEST Consultants, Inc

December 27, 2000





Federal Emergency Management Agency

Washington, D.C. 20472

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Skip Rimsza
Mayor, City of Phoenix
200 West Washington Street,
11th Floor
Phoenix, AZ 85003-1611

IN REPLY REFER TO:
Case No.: 01-09-285P

Community: City of Phoenix, AZ
Community No.: 040051
Panel Affected: 04013C1670 F
Effective Date of **OCT 15 2001**
This Revision:

102-I-A-C

FLOOD CONTROL DISTRICT RECEIVED	
OCT 18 '01	
CH & GM	FINANCE
PI	LANDS
ADMIN	C & M
REG	P & PM
FILE	FILE
MWD	

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 Maricopa County, Arizona and Incorporated Areas (the effective FIRM and FIS report for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated January 2, 2001, Mr. Michael Duncan, P.E., Project Manager, Engineering Division, Flood Control District of Maricopa County, requested that FEMA revise the FIRM and FIS report to show the effects of a revised hydraulic analysis and more detailed topographic information for Dreamy Draw Wash West that reflects the presence of the Arizona Canal Diversion Channel (ACDC).

All data required to complete our review of this request were submitted with letters from Mr. Duncan. Because this Letter of Map Revision (LOMR) is based on flood hazard information meant to improve upon that shown on the flood map or within the flood study, and does not partially or wholly incorporate manmade modifications within the Special Flood Hazard Area (SFHA), fees were not assessed for the review. The SFHA is the area that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood).

We have completed our review of the submitted data and the flood data shown on the effective FIRM. We have revised the FIRM and FIS report to modify the floodplain boundary delineations and zone designations of the base flood along Dreamy Draw Wash West. As a result of the modifications, Base Flood Elevations (BFEs) were established, and the width of the SFHA decreased along the northeast side of the ACDC from the Myrtle Avenue alignment to the Griswold Road alignment and along Dreamy Draw Wash West from the confluence with the ACDC to approximately 300 feet northeast of the intersection of 13th Street and Belmont Avenue. The SFHA previously designated Zone A, with no BFEs determined, was redesignated Zone AE, with BFEs determined. The modifications are shown on the enclosed annotated copy of FIRM Panel 04013C1670 F and affected portions of the Summary of Discharges Table. In addition, Profile Panel 1165P was added to the FIS report. This LOMR hereby revises the above-referenced panel of the effective FIRM and the affected portions of the FIS report, both dated July 19, 2001.

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

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

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

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

Sincerely,



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

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

Enclosures

cc: Mr. Ray Dovalina, P.E.
Floodplain Manager
Street Transportation Department
City of Phoenix

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

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

MORE LIKE	Location	Existing BFE (feet)*	Modified BFE (feet)*
	→ 20'	None	1,237
	Approximately 230 feet upstream of the ACDC	None	1,257
	Approximately 1,440 feet upstream of the ACDC ↳ 1530' (MD)	None	1,257

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

Public notification of the proposed modified BFEs will be given in the *Arizona Republic* on or about November 8 and November 15, 2001. A copy of this notification is enclosed. In addition, a notice of changes will be published in the *Federal Register*. Within 90 days of the second publication in the *Arizona Republic*, any interested party may request that FEMA reconsider the determination made by this LOMR. Any request for reconsideration must be based on scientific or technical data. All interested parties are on notice that, until the 90-day period elapses, the determination to modify the BFEs made by this LOMR may itself be modified.

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

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

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

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

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

On July 19, 2001, the Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in the City of Phoenix, Maricopa County, Arizona, through issuance of a Flood Insurance Rate Map (FIRM). The Federal Insurance and Mitigation Administration has determined that modification of the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) for certain locations in 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 more detailed topographic information for Dreamy Draw Wash West that reflects the presence of the Arizona Canal Diversion Channel. This has resulted in a decrease in SFHA width and establishment of BFEs for Dreamy Draw Wash West along the northeast side of the Arizona Canal Diversion Channel from the Myrtle Avenue alignment to the Griswold Road alignment and from the confluence with the Arizona Canal Diversion Channel to approximately 300 feet northeast of the intersection of 13th Street and Belmont Avenue. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source(s) cited above.

MORE UKG	Location	Existing BFE (feet)*	Modified BFE (feet)*
→ 20'	Approximately 230 feet upstream of Arizona Canal Diversion Channel	None	1,237
→ 1530'	Approximately 1440 feet upstream of Arizona Canal Diversion Channel	None	1,257

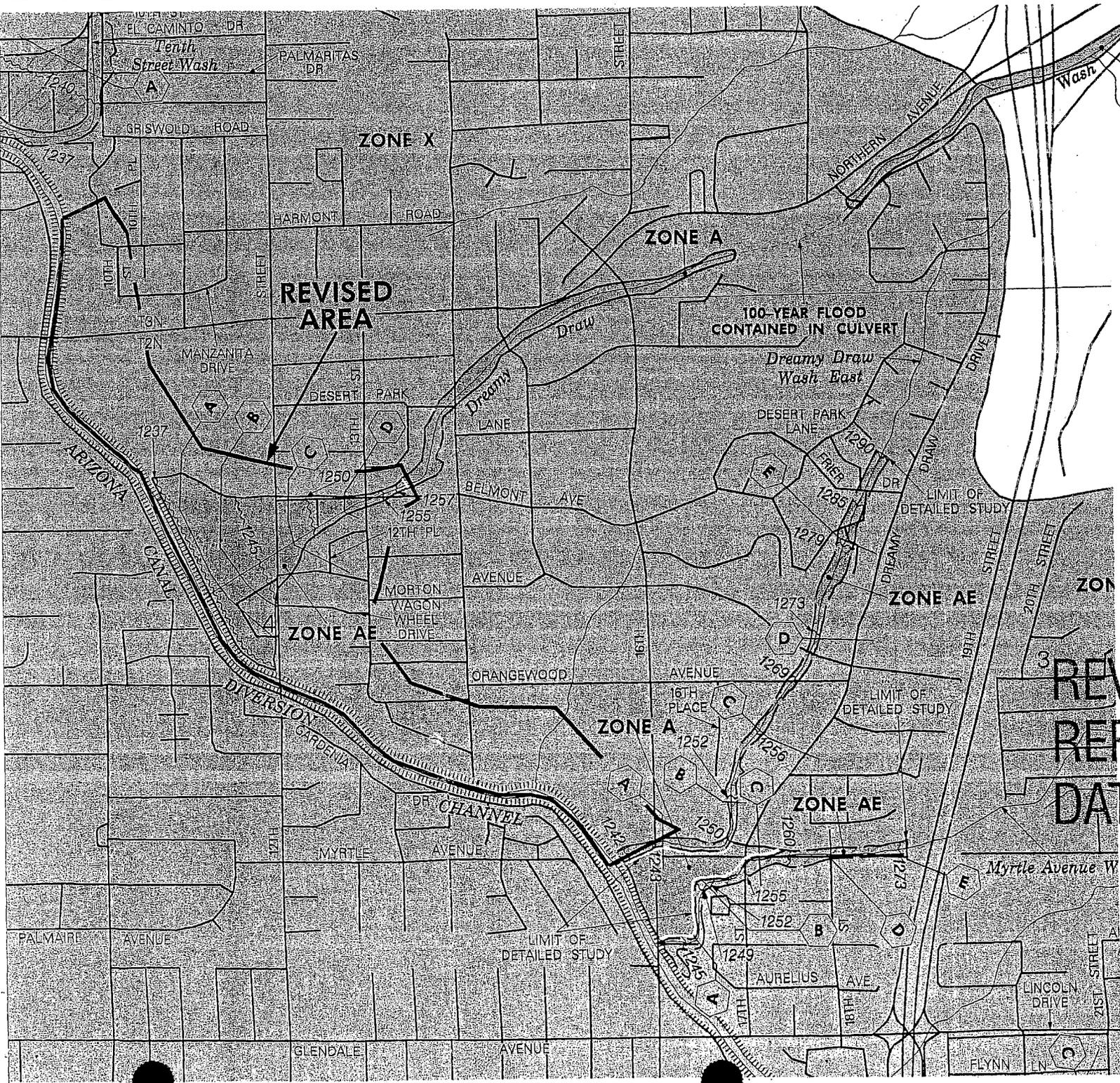
*National Geodetic Vertical Datum, rounded to nearest whole foot

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

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

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

The Honorable Skip Rimsza
Mayor, City of Phoenix
200 West Washington Street, 11th Floor
Phoenix, AZ 85003-1611



APPROXIMATE SCALE IN FEET
 1000 0 100

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
 FLOOD INSURANCE RATE MAP
 MARICOPA COUNTY,
 ARIZONA AND
 INCORPORATED AREAS

PANEL 1670 OF 4350
 (SEE MAP NUMBER FOR PANELS NOT PRINTED)

**REVISED TO
 REFLECT LOMR
 DATED OCT 15 2001**

CONTAINS:
 COMMUNITY NUMBER PANEL SUFFIX
 PARADISE VALLEY 82000 1670
 PHOENIX CITY OF 040001 1670

MAP NUMBER
 04013C1670 F

MAP REVISED:
 JULY 19, 2001



Federal Emergency Management Agency

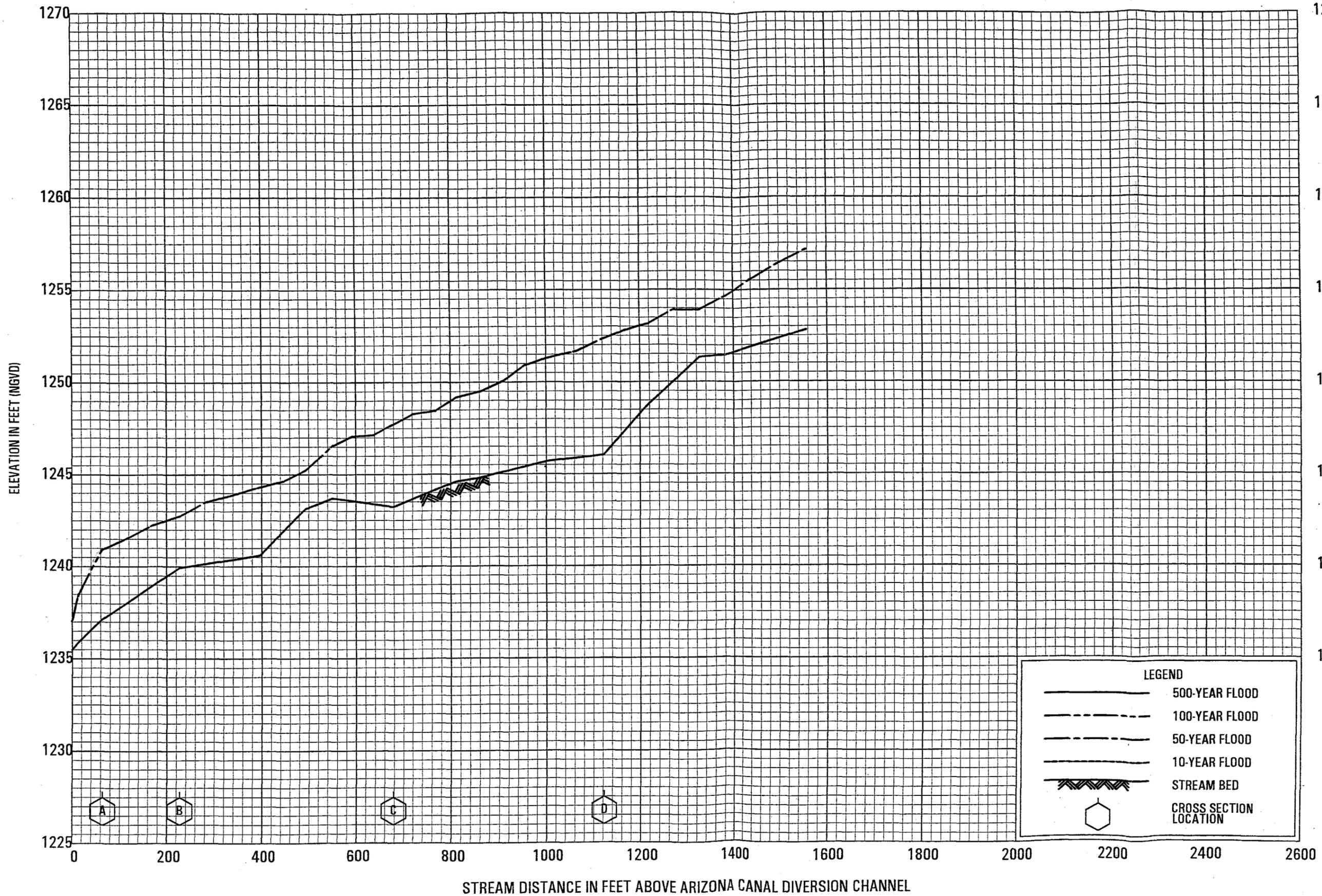
Table 3. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (Cubic Feet per Second)			
		10-Year	50-Year	100-Year	500-Year
Southern Pacific Railroad					
At Apache Road	2.6	220	450	650	--- ¹
At Miller Road	2.0	50	210	410	--- ¹
At Ray Road	4.7	110	270	360	--- ¹
At Railroad Spur	2.2	120	280	320	--- ¹
1.0 mile north of Guadalupe Road	143.9	200	2,270	4,090	--- ¹
0.25 mile north of Western Canal	131.8	130	2,100	3,950	--- ¹
At Airport Entrance	2.2	120	280	320	--- ¹
Southern Pacific Railroad Spur					
At Ray Road	2.5	--- ¹	--- ¹	790	--- ¹
Southern Pacific Railroad Ditch					
At 115th Avenue	14.52	--- ¹	--- ¹	440 ²	--- ¹
At 107th Avenue	13.55	--- ¹	--- ¹	930 ²	--- ¹
At 99th Avenue	12.12	--- ¹	--- ¹	850 ²	--- ¹
At 91st Avenue	10.24	--- ¹	--- ¹	760 ²	--- ¹
At 83rd Avenue	9.68	--- ¹	--- ¹	980 ²	--- ¹
At 69th Avenue	7.24	--- ¹	--- ¹	1,020 ²	--- ¹
At 67th Avenue	2.46	--- ¹	--- ¹	1,280 ²	--- ¹
Roosevelt Irrigation District Canal					
At 51st Avenue	4.65	--- ¹	--- ¹	1,755 ²	--- ¹
East of 59th Avenue	0.50	--- ¹	--- ¹	650 ²	--- ¹
At 83rd Avenue	9.54	--- ¹	--- ¹	160 ²	--- ¹
At Van Buren Street, West of 83rd Avenue	0.76	--- ¹	--- ¹	429 ²	--- ¹
Apache Creek (Apache Junction Alluvial Fan)					
At U.S. Highway 80 and 108th Street	2.64	433	831	1,021	--- ¹
Dreamy Draw Wash East					
At Mouth	0.38	--- ¹	--- ¹	1,530	--- ¹
500 feet upstream of 16th Street	--- ¹	300	750	1,000	1,700
Dreamy Draw Wash West					
Approximately					
260 feet Upstream of 13 Street					
Wash-North Branch	--- ³	--- ³	--- ³	1000	--- ³
Flynn Lane Wash					
At Flynn Lane and Lincoln Drive	0.63	400	800	1,100	2,300
At Ocotillo Road	0.98	700	1,300	1,700	3,300
Granite Reef Wash					
Pima Road	6.2	470	770	644	1,431
McDowell Road	7.2	580	950	1,240	2,660
Van Buren Street	7.5	720	1,158	1,417	3,150

REVISED DATA

REVISED TO
REFLECT LOMR
DATED OCT 15 2001

¹Not Computed²Decreases Due to Diversions along Southern Pacific Railroad³Not Available



FEDERAL EMERGENCY MANAGEMENT AGENCY
 MARICOPA COUNTY, AZ
 AND INCORPORATED AREAS
 REVISIED TO
 REFLECT LOMR
 FLOOD PROFILES
 DREAMY WASH WEST

DATED OCT 15 2001

1165P



NATIONAL FLOOD INSURANCE PROGRAM

FEMA MAP COORDINATION CONTRACTOR

FLOOD CONTROL DISTRICT	
RECEIVED	
JUL 23 '01	
CH & GM	FINANCE
PIO	LANDS
ADMIN	C & U
REG	P & PM
<input checked="" type="checkbox"/> ENG	FILE
CONTRACTS	
ROUTED	MWD

July 19, 2001

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

IN REPLY REFER TO:
Case No.: 01-09-285P
Community: City of Phoenix, AZ
Community No. 040051

316-AD/ACK

Dear Mr. Duncan:

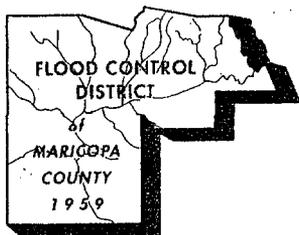
This acknowledges receipt of additional data in support of your request for a Letter of Map Revision for the above-referenced community. Our review of the submitted data indicates we have the minimum data needed to continue our evaluation. If we need additional data to complete our evaluation, or if delays are encountered, we will notify you in writing within 60 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 general questions about your request, Federal Emergency Management Agency (FEMA) policy, or the National Flood Insurance Program, please call the FEMA Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627). If you have specific questions concerning your request, please call the Revisions Coordinator for your State, Pernille Buch-Pedersen, who may be reached at (703) 317-6224.

Sincerely,

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

cc: The Honorable Skip Rimsza
Mayor, City of Phoenix



FLOOD CONTROL DISTRICT

of

Maricopa County

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

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

July 9, 2001

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

SUPPLEMENTAL INFORMATION FOR CASE NO. 01-09-258P⁸⁵

Community: City of Phoenix, Arizona
Community No.: 040051

Flooding Source: Dreamy Draw Wash West
Map No.: 04013C
FIRM Panel Affected: 1670E

Dear Ms. Buch-Pedersen:

In response to your letter of April 20, 2001, I have enclosed a revised work map and a letter from the study consultant that addresses the three comments of your letter. If you have any questions, please contact me at (602) 506-4732, or mwd@mail.maricopa.gov.

Sincerely,

Michael Duncan, P.E.
Engineering Division

Enclosures

Copies to: Floodplain Manager
City of Phoenix
200 W. Washington Street, 5th Floor
Phoenix, Arizona 85003-1611

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

WEST



July 3, 2001

Technical Services Division
Michael Baker Jr., Inc.
3501 Eisenhower Avenue, Suite 600
Alexandria, Virginia
22304-6426

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

858.487.9378
858.487.9448 Fax

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

425.646.8806
425.646.0570 Fax

Arizona
2151 East Broadway Road
Suite 116
Tempe, AZ 85282-1705

480.345.2155
480.345.2156 Fax

www.westconsultants.com

Hydraulics

Hydrology

Sedimentation

Water Quality

Erosion Control

Environmental Services

Dear Sir or Madam:

This document is prepared in response to the comments by Mr. Monther S. Madanat in a letter dated April 20, 2001 regarding the TDN submittal of "Dreamy Draw Wash West at ACDC: LOMR Package for Zone AE Floodplain without Floodway." The reference FEMA Case Number is 01-09-285P, and the Community Number is 040051.

Comment #1 – *Graphical tie-in to effective floodplain boundary*

The floodplain mapping has been altered at the upstream end of the mapping – cross sections 13 and 14 – to match the existing effective floodplain boundary.

Comment #2 – *Discrepancies between topography and BFE at several cross sections*

The discrepancies between topographical and base flood elevation lines are due to the adjustment of model output prior to mapping. See section 5.9.1 – Hydraulic Analysis Results – in the existing TDN for an explanation of these adjustments. As a result of these adjustments, the mapped extent of the floodplain does not agree numerically with the base flood elevations calculated by the hydraulic model. Adjusting the results in this manner does, however, result in a more reasonable and more conservative mapping of the floodplain.

Comment #3 – *Top width discrepancies between HEC-RAS model and work map*

As with Comment #2, the discrepancies between model top widths and those plotted on the work map result from the adjustments described in section 5.9.1 of the TDN text. For cross sections 0.5 through 3, the left edge of the floodplain was drawn south along the outside edge of 12th Street. For cross sections 4 through 7 (actually 8, as well), the floodplain was mapped along the north edge of Belmont Avenue for reasons described in Comment #2. Due to these manipulations of the floodplain

WEST



boundaries, the top widths computed by HEC-RAS do not concur with those plotted on the work map.

Sincerely,

Dennis L. Richards
Dennis Richards, P.E.
Vice President

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

858.487.9378
858.487.9448 Fax

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

425.646.8806
425.646.0570 Fax

Arizona
2151 East Broadway Road
Suite 116
Tempe, AZ 85282-1705

480.345.2155
480.345.2156 Fax

www.westconsultants.com

Hydraulics

Hydrology

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Environmental Services



NATIONAL FLOOD INSURANCE PROGRAM

FEMA MAP COORDINATION CONTRACTOR

APR 20 2001

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

IN REPLY REFER TO:
 Case No.: 01-09-285P
 Community: City of Phoenix, AZ
 Community No.: 040051

316-AD

FLOOD CONTROL DISTRICT RECEIVED	
APR 20 2001	
IC&GW	FINANCE
IPIO	LANDS
ADMIN	O & M
REG	P & PM
LENG	FILE
CONTRACTS	
ROUTING	

Dear Mr. Duncan:

This is in regard to your January 2, 2001, request that the Federal Emergency Management Agency (FEMA) issue a Letter of Map Revision (LOMR) for the above-referenced community.

In a previous letter, you were informed that additional data might be required to complete our review of the request. The submitted topographic work map entitled "Flood Delineation Study of Dreamy Draw Wash West," contained in the submitted Technical Data Notebook entitled "Dreamy Draw Wash West at ACDC: LOMR Package for Zone AE Floodplain without FloodWay," prepared by West Consultants, Inc., dated December 27, 2000, does not provide all the data required to complete our detailed review of this request. The following is a list of the data that must be submitted within 90 days of the date of this letter:

1. The proposed floodplain boundary delineations do not graphically tie into the effective floodplain boundary delineations at the upstream end of the revised reach. Please submit a topographic work map that includes a graphical tie-in between the revised and effective floodplain boundary delineations.
2. A review of the submitted work map revealed discrepancies between the ground-surface elevation and the elevation of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) in several areas. The first such area is at the intersection of Cross Section 4 with Belmont Avenue where the Base Flood Elevation (BFE) contour line of 1,245.19 feet crosses the ground-surface contour line of 1,248 feet. A second area is north of Wagon Wheel Drive and west of 13th Street where the BFE contour line of 1,242.71 feet at Cross Section 2 crosses the ground-surface contour line of 1,244 feet. Please submit a topographic work map that matches the BFEs obtained from the HEC-RAS hydraulic model with the plotted water-surface elevations on the work map, or provide an explanation for these discrepancies.
3. The base floodplain topwidths shown on the revised proposed conditions hydraulic analysis from Cross Section 0.5 to Cross Section 7 do not match the corresponding approximate base floodplain topwidths shown on the above-referenced topographic work map. Please provide an explanation for these discrepancies, or make the appropriate changes.

Please send the required data directly to us at the address shown at the bottom of this page. For identification purposes, please include the case number referenced above on all correspondence.

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

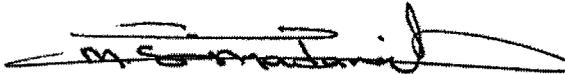
Michael Baker Jr., Inc., under contract with the FEDERAL EMERGENCY MANAGEMENT AGENCY, is a Map Coordination Contractor for the National Flood Insurance Program

If we do not receive the required data within 90 days, we will suspend our processing of your request. Any data submitted after 90 days will be treated as an original submittal and will be subject to all submittal/payment procedures, including the flat review and processing fee for requests of this type established by the current fee schedule. A copy of the notice summarizing the current fee schedule, which was published in the *Federal Register*, is enclosed for your information.

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

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

Sincerely,



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

Enclosure

cc: Mr. Ray Dovalina, P.E.
Floodplain Manager
Street Transportation Department
City of Phoenix

Ms. Terri Miller
Program Coordinator
Arizona Division of Emergency
Management

Mr. Dennis Richards
West Consultants, Inc.

FLOOD CONTROL DISTRICT	
RECEIVED	
APR 25 '01	
10/1 & 3/1	FINANCE
IPD	LANDS
ADMM	Q & M
REG	P & M
ENG	FILE
CONTRACTS	
JIMS	



Federal Emergency Management Agency

Washington, D.C. 20472

FEE SCHEDULE FOR PROCESSING REQUESTS FOR MAP CHANGES

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

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

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

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

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

Fee Schedule for Requests for CLOMRs

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

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



NATIONAL FLOOD INSURANCE PROGRAM

FEMA MAP COORDINATION CONTRACTOR

February 5, 2001

FLOOD CONTROL DISTRICT RECEIVED	
FEB 08 '01	
CH & SV	FINANCE
PD	LANDS
ADMIN	IO & M
REG	P & PM
ENG	FILE
CONTRACTS	
ROUTING	

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

IN REPLY REFER TO:
 Case No.: 01-09-285P
 Community: City of Phoenix, AZ
 Community No.: 040051

316-ACK.FEX

Dear Mr. Duncan:

This responds to your request dated January 2, 2001, that the Federal Emergency Management Agency (FEMA) issue a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. Pertinent information about the request is listed below.

Identifier: Dreamy Draw Wash West

Flooding Source: Dreamy Draw Wash *West*

FIRM Panel(s) Affected: 04013C1670 E

As you may know, FEMA has implemented a procedure to recover costs associated with reviewing and processing requests for modifications to published flood information and maps. However, because your request is based on flood hazard information meant to improve upon that shown on the flood map or within the flood study, and does not partially or wholly incorporate manmade modifications within the Special Flood Hazard Area, no fees will be assessed for our review.

We have completed an inventory of the items you submitted. We have received the required data to begin a detailed technical review of your request. If additional data are required, we will inform you within 60 days of the date of this letter.

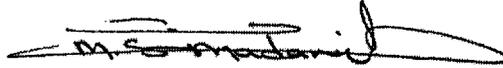
Please direct questions concerning your request to us at the address shown at the bottom of this page. For identification purposes, please include the case number referenced above on all correspondence.

If you have general questions about your request, FEMA policy, or the National Flood Insurance Program, please call the FEMA Map Assistance Center, toll free, at 1-877-FEMA MAP

4-6-01 ←

(1-877-336-2627). If you have specific questions concerning your request, please call the Revisions Coordinator for your State, Pernille Buch-Pedersen, who may be reached at (703) 317-6224.

Sincerely,



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

cc: Mr. Ray Dovalina, P.E.
Floodplain Manager
City of Phoenix

Ms. Terri Miller
Program Coordinator
Arizona Division of Emergency Management

Mr. Dennis Richards
WEST Consultants, Inc.

Need Information on Flood Hazard Maps?

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



Homeowners will find:

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



Insurance Agents and Bankers will find:

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



Engineers and Surveyors will find:

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



Floodplain Managers and Community Officials will find:

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

All Four Constituent groups will find:

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



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

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



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



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

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

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

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

Typical flood hazard map questions we answer:



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



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



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

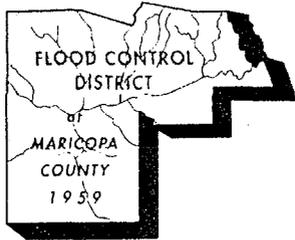
Community Officials: "How do I request a physical revision to a flood map?"

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

Other important National Flood Insurance Program toll-free numbers:

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





FLOOD CONTROL DISTRICT
of
Maricopa County

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

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

January 2, 2001

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

Community: City of Phoenix, Arizona
Community No.: 040051

Flooding Sources: Dreamy Draw Wash West
FIRM Panel Affected: 04013C1670 E

Dear Ms. Buch-Pedersen:

I have enclosed a re-study of Dreamy Draw Wash West. This re-study reflects the physical change due to the Arizona Canal Diversion Channel (roll of as-built plans enclosed), and involves a change from a Zone A to a Zone AE without floodway. The Technical Support Data Notebook includes a digital copy of the work map. Please review and process a Letter of Map Revision for the re-studied portion of this wash.

If you have any questions, please contact me at (602) 506-4732.

Sincerely,

Michael Duncan, P.E.
Engineering Division

Enclosures

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

Ray Dovalina, P.E., Floodplain Manager
City of Phoenix
200 W. Washington Street, 5th Floor
Phoenix, Arizona 85003-1611

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

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

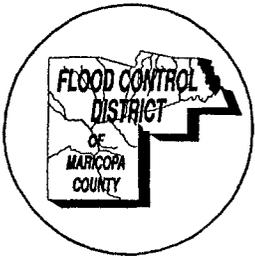
Coord:



JMT



EAR



FLOOD CONTROL DISTRICT of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009-6399
(602) 506-1501
FAX: (602) 506-4601
TT: (602) 506-5897

LETTER OF TRANSMITTAL

TO: Pernille Buch-Pedersen
Baker Civil
3601 Eisenhower Avenue, Suite 600
Alexandria, VA 22304

6 Feb 01

SUBJECT: LOMR Appl. for Dreamy Draw Wash West -- Hydrology References

WE ARE SENDING YOU THE FOLLOWING ITEMS: Enclosed Under separate cover

Shop Drawings Prints Legal Description Samples Reports
 Specification Change Order Copy of Letter Plans Other

COPIES	DATE	NO.	DESCRIPTION
1		all 14 pages	Design Memo. No. 1, Feature Design for Dreamy Draw Dam, July 1979
1		4 pages	Gila River Basin, New River and Phoenix City Streams, Arizona, Design Memo. No. 2, 1982
1		13 pages	Arizona Canal Diversion Channel 40th Street to Cactus Road, Design Memo. No. 12, April 1986
1		6 pages	Cudia City Wash to 10th Street Wash, Vol. 1.8, Az. Canal Diversion Channel, Hydrology Report, Nov. 1994

THESE ARE TRANSMITTED:

- For approval Approved as submitted
 For your use Approved as noted
 As requested Returned for corrections
 Resubmit copies for approval For review and comments
 Submit copies for distribution Return corrected prints
 FOR ESTIMATE DUE: Borrowed prints being returned

Remarks: In response to your call of 2-5-01, these same items were faxed to you on 2-5-01. Here are copies for your use.

SIGNED: Mike Duncan
Michael Duncan phone 602-506-4732 email mwd@mail.maricopa.gov

FAX COVER SHEET

TO: fax 703-960-9125

FROM: Mike Duncan phone 602-506-4732
Floodplain Delineation Branch fax 602-506-7346

PERNILLE BUCH-PEDERSEN
Baker Civil

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

38 sheets including cover

Date: 2-5-01

Project / Subject: LOMR Application for Dreamy Draw Wash West at ACDC

HYDROLOGY REFERENCE MATERIAL

I herewith send excerpts of the hydrology references (nos. 6-9 of Appendix A of the TSDN). I am sending all of no. 6, and selected pages from the other 3 references.

The locations of the discharge summaries are as follows:

Ref.#6 Corps Memo No. 1, 1979 p. 3
Ref.#7 Corps Memo No. 2, 1982 p. 31
Ref.#8 Corps Memo No. 12, 1986 p. 35
Ref.#9 ACDC ADMS, Vol. 1.8, 1994 p.2

I will also send copies of the excerpts by mail. If you have any questions, please call me at 602-506-4732, or

email me at mwd@mail.maricopa.gov

GILA RIVER BASIN
NEW RIVER
AND PHOENIX CITY STREAMS
ARIZONA

DESIGN MEMORANDUM NO. 1
FEATURE DESIGN
FOR
DREAMY DRAW DAM

SUPPLEMENTAL REPORT

FLOODWAY DELINEATION
FOR
DREAMY DRAW
(DREAMY DRAW TO THE ARIZONA CANAL)

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT,

JULY 1979

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1	Delineation of Flood Boundaries and Floodway
2	Profile

Dreamy Draw

(Dreamy Draw Dam to Arizona Canal)

I - INTRODUCTION

General

1.01 The New River and Phoenix City Streams, Arizona, flood control project (also known as the Phoenix, Arizona and Vicinity, including New River, flood control project) was authorized by the Flood Control Act of 1965. The recommended plan, (as formulated in the report "New River and Phoenix City Streams, Arizona, Design Memorandum No. 3, General Design Memorandum, Phase I, Plan Formulation", dated March 1976) includes the construction of four dams (Dreamy Draw, Cave Buttes, Adobe and New River Dams) and 19.2 miles of channelization (Arizona Canal diversion channel, Cave Creek channel from Peoria Avenue to the Arizona Canal, and Skunk Creek in the vicinity of the Black Canyon Highway); and flowage easement acquisition downstream from the confluence of the proposed Arizona Canal diversion channel with Skunk Creek, the New River and the Agua Fria River. Each of the four dams has an ungated outlet which would discharge into their natural channels. The duration of flow varies with the volume of runoff at each of the dams and can last up to several days. The local governments are presently managing the flood plains by restricting or controlling development within the floodway fringes under authority of and in accordance with local flood plain management regulations. To assure the long term capability to operate the dams as designed, the Federal Government is requiring that local interests, under the agreement of local cooperation, manage and maintain the downstream flood plains for the life of the project basically in accordance with 1978 applicable regulations.

1.02 Detailed design for Dreamy Draw Dam was initiated in 1969, prior to initiation of the Phase I studies, based on the authorized plan of improvement. The results of these design studies are contained in the report "New River and Phoenix City Streams, Arizona, Design Memorandum No. 1, Feature Design for Dreamy Draw Dam," dated January 1972. The dam was constructed in 1973 near the Dreamy Draw headwaters - just south of Northern Avenue and about 1 mile east of 16th Street. The main embankment was constructed as a compacted earthfill structure with a maximum height of about 50 feet above the natural streambed. The outlet works consist of a 3 foot diameter ungated conduit located in the main embankment. It has a capacity of about 220 cfs when the water surface is at the spillway crest.

1.03 The purpose of this supplement to the Dreamy Draw Dam design memorandum is to delineate the 100-year flood plain, the floodway, and the floodway fringes for Dreamy Draw from Dreamy Draw Dam to the Arizona Canal (see plate 1). In addition, the standard project flood (SPF) overflow is delineated for the same reach.

Description of Area

1.04 This supplement considers the reach of Dreamy Draw extending from Dreamy Draw Dam downstream to the Arizona Canal in Maricopa County, Arizona (See vicinity map on plate 1). Dreamy Draw Dam controls the runoff from a 1.3 square mile drainage basin; its ungated outlet discharges directly into the Dreamy Draw streambed.

1.05 The Dreamy Draw basin is located approximately 2 miles north of the center of Phoenix and lies at the base of the Phoenix Mountains. Dreamy Draw is a well defined, deep channel as it flows out from the Phoenix Mountains onto an alluvial plain, where it diminishes in definition as braided streams. Only the main streambed remains, as the others have been obliterated by urbanization. Presently only the smaller flows are intercepted by the Arizona Canal. The total drainage area between Dreamy Draw Dam and the Arizona Canal is 1.56 square miles. Of this drainage area, approximately 0.65 square mile contributes direct runoff to Dreamy Draw.

1.06 About 900 feet downstream from Dreamy Draw Drive, Dreamy Draw is a well defined channel with left and right banks about 8 and 10 feet high, respectively, and an average bottom width of about 30 feet (pl. 1). Generally, the channel bottom is alluvial sandy gravel, and lined with cobblestones. The side slopes are covered with brush and small trees.

1.07 The draw downstream from 13th Street is a shallow, natural channel (pl. 1) which has a gravelly bottom and grassy banks. Intermittent residential fences are set back a few feet from the top of the slopes on either side of the channel. The draw from 12th Street to the Arizona Canal is heavily urbanized with apartment complexes (pl. 1) with 5-foot masonry block walls or wood fences bordering each side of the draw.

1.08 Three bridges cross Dreamy Draw; they are 19th Street, Dreamy Draw Drive and 16th Street (see plate 1). The bridges at 19th Street and Dreamy Draw Drive are double multi-plate pipe arch culverts which are also used as equestrian underpasses. The 16th Street bridge is double 10 by 10-foot reinforced concrete box structure.

Scope of Studies

GENERAL

1.09 The work performed in developing this study and its information content was generally governed by the criteria set forth in the "Flood Insurance Guidelines and Specifications" published by the Federal Insurance Administration (FIA), U.S. Department of Housing and Urban Development in February, 1977.

PRIOR REPORTS

1.10 A limited overflow area was delineated for Dreamy Draw (without Dreamy Draw Dam) and published in Design Memorandum No. 1 for Dreamy Draw dated January 1972.

SURVEYS

1.11 Topographic manuscripts used for the study area were compiled by the U.S. Army Corps of Engineers, and are entitled "Dreamy Draw." The aerial survey was flown in July 1977; mapping was done at a scale of 1"=100' with a contour interval of 2 feet.

HYDROLOGIC STUDIES

1.12 The contributing drainage basin was subdivided for accurate representation and the designated storm was centered downstream from Dreamy Draw Dam.

1.13 A storm which occurred over the Queen Creek drainage basin in August 1954 was the most severe storm that could be considered reasonably characteristic of the region. This storm was transposed to the study area, using 10-year, 6-hour rainfall statistics and was used as the Standard Project Storm. The contributing outflow from the Dreamy Draw Dam during this storm would be approximately 220 cfs (SPF). The study area was divided into appropriate subareas and the SPF components from the Standard Project Storm were computed for each subarea under future conditions consideration.

1.14 Using the basic temporal and spatial characteristics of the Queen Creek storm, 100-year rainfall statistics were used to develop a 100-year storm. This storm was centered below Dreamy Draw Dam so as to produce the corresponding 100-year peak discharge on Dreamy Draw. Outflow from the dam corresponding to 100-year peak discharge would be approximately 140 cfs. One-hundred-year peak discharges were computed for each subarea. The resulting discharges are tabulated in table 1.

Table 1

Dreamy Draw Peak Discharge With Project

Effective Drainage Area 0.65 sq. mi

Concentration Point Location	100-Year Flood (cfs)	SPF (cfs)
Immediately downstream of Dreamy Draw Dam	140	220
Approximately 1200 ft. downstream of Dreamy Draw Dam	400	950
Just upstream of confluence with Arizona Canal	1,000	2,100

HYDRAULIC ANALYSIS

1.15 In the hydraulic analyses for Dreamy Draw, estimates of the elevations of the 100-year flood and the SPF were developed. Water surface profiles of the 100-year flood and SPF were computed using the U.S. Army Corps of Engineers HEC-2 backwater computer program. Cross sections for the backwater analysis were taken from topographic maps at intervals of approximately 500 feet in open areas, 200 feet in the urban areas, and at closer intervals above and below bridges.

1.16 Channel roughness factors (Mannings' "n") values were based on field inspection. The "n" values ranged from 0.035 to 0.045 for the channel and the overbanks.

1.17 The Dreamy Draw physical features described in paragraph 1.05 creates two distinct flow regimes and consequently, two distinct flood characteristic zones with 14th Street as the dividing line. The 100-year and SPF flow are confined by the banks from Dreamy Draw Dam to 14th Street. Downstream of 14th Street, on the alluvial cone, Dreamy Draw floodflows are intercepted by the Arizona Canal flood overflow near 13th Street. The canal acts as a dike with a storage capacity of about 27 acre-feet when controlled by the top of the higher south canal bank. However, Dreamy Draw floodflows would fill the relatively small storage capacity well before the peak runoff reached the canal. Consequently, the starting water surface elevation was assumed to be 1 foot higher than the south bank of the canal.

1.18 The 100-year flood would break out at the 13th Street dip-crossing and would inundate an irregular area on the east side of the draw and flood the west side over to Belmont Avenue (plate 1). The SPF would break out just above 13th Street and spread eastward over the entire area while Hayward Avenue would represent the west overflow limit. The extent of the inundated area, as shown on plate 1, is dependent on the Arizona Canal flood stage as noted in paragraph 1.17. However, the conditions illustrated on plate 1 are representative of probable conditions based on historical observations. When the Arizona Canal diversion channel is completed in the next 10 years, there will be a reduction in the flood prone areas downstream of 13th Street because the backwater influence of the Arizona Canal would be minimized.

1.19 Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the 100-year and SPF recurrence interval. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles, plate 2.

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II - FLOOD PLAIN MANAGEMENT APPLICATION

General

2.01 This supplement is intended to be used by local governments such that they may adopt sound flood plain management programs. Included in this supplement are flood boundary maps (plate 1). Discharges used in delineating floodways and floodway fringes are either the release from Dreamy Draw Dam during occurrence of the Standard Project Storm centered above Dreamy Draw Dam or the runoff from a 100-year frequency storm centered below the dam, whichever would be greater. Discharges reflect the impact of future development in the drainage basin; this precludes the need to revise the discharge rate periodically.

Flood Boundaries

2.02 In order to conform to a national standard without regional discrimination, the 100-year flood (adopted by the FIA as the base flood) is used for purposes of flood plain management. The SPF delineation is an indication of additional areas of flood risk along Dreamy Draw. The boundaries of the 100-year flood and the SPF have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1"=100' with a contour interval of 2 feet. In cases where the 100-year flood and the SPF boundaries are close together, only the 100-year flood boundary has been shown.

2.03 Small areas within the flood boundaries may lie above the flood elevation, and therefore, not be subject to flooding. Such areas are not shown due to limitations of the map scale.

Floodways

2.04 Encroachments on flood plains, such as artificial fill and structures, would reduce the flood-carrying capacity of Dreamy Draw and increase flood heights, thus increasing the flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. The concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment in order that the 100-year flood be carried without substantial increases in flood heights. As minimum standards, U.S. Army Corps of Engineers limits such increases in flood heights to 1 foot, provided that hazardous velocities are not produced. This floodwater surface rise constraint is in agreement with Maricopa County 1977 Flood Plain Regulations for Unincorporated Areas (section 3.11).

2.05 The floodway proposed for this study was determined on the basis of equal conveyance reduction from each side of the flood plain. The results of this analysis are tabulated in table 2 at selected cross sections for Dreamy Draw.

Table 2
DREAMY DRAW FLOODWAY DATA

Flood Source Cross Section (River Mile)	Width (ft.)	Section Area (ft. ²)	Mean Velocity (fps)	Water Surface Elevation		Diff. (ft.)
				With Floodway Fringe (MSL)	Without Floodway Fringe (MSL)	
0.00	Arizona Canal South Bank	-	-	1242.6	1242.6	0
0.01	Arizona Canal North Bank	-	-	1242.6	1242.6	0
0.02	48.0	127.0	7.8	1242.6	1242.6	0
0.05	48.0	140.0	7.0	1242.6	1242.6	0
0.14	42.3	108.0	9.3	1247.3	1246.3	1.0
0.19	48.0	101.0	8.0	1250.4	1249.4	1.0
0.24	35.0	106.0	9.3	1252.5	1252.3	0.2
0.27	57.0	177.0	5.6	1254.4	1253.6	0.8
0.31	34.8	102.0	9.8	1256.3	1256.3	0
0.36	59.0	199.0	5.0	1259.8	1259.6	0.2
0.40	52.0	140.0	7.1	1261.1	1260.6	0.5
0.43	81.4	163.0	6.1	1263.5	1263.5	0
0.44	72.5	180.0	5.5	1263.9	1263.9	0
0.45	47.0	162.0	6.0	1264.0	1264.0	0
0.50	63.0	179.0	5.4	1265.5	1265.3	0.2
0.564	59.6	135.0	6.9	1268.5	1268.5	0
0.600	42.0	116.0	7.9	1271.1	1271.0	0.1
0.680	47.5	131.0	6.7	1277.0	1277.0	0
0.734	56.4	123.0	6.9	1279.7	1279.7	0
0.737	21.0	90.0	9.4	1282.3	1282.3	0
0.739	21.0	122.0	6.9	1283.7	1283.7	0
0.741	42.4	146.0	5.8	1284.2	1284.2	0
0.800	38.1	92.0	8.9	1284.7	1284.7	0
0.890	51.0	154.0	5.0	1290.4	1290.4	0
1.000	44.1	89.0	8.1	1295.3	1295.3	0
1.100	25.4	70.0	9.6	1305.1	1305.1	0
1.200	43.5	80.0	7.8	1319.2	1319.2	0
1.300	54.0	82.0	7.1	1328.6	1328.6	0
1.360	64.9	114.0	4.8	1332.0	1332.0	0
1.370	33.0	138.0	3.9	1332.2	1332.2	0
1.380	44.8	169.0	3.3	1332.3	1332.3	0
1.400	26.8	61.0	8.7	1334.5	1334.5	0
1.500	63.3	115.0	4.2	1342.2	1342.2	0
1.600	39.4	101.0	4.3	1345.3	1345.3	0
1.700	74.8	70.0	5.6	1351.1	1351.1	0
1.720	37.7	92.0	4.4	1355.1	1355.1	0
1.730	38.3	103.0	3.2	1355.4	1355.4	0
1.800	27.1	45.0	7.4	1357.0	1357.0	0
1.900	20.6	47.0	4.6	1365.0	1365.0	0

2.06 As shown on the map entitled "Delineation of Flood Boundary and Floodway" (plate 1), the floodway boundaries were determined at discrete cross sections and the boundaries were interpolated between cross section. In cases where the 100-year flood and floodway boundaries are close together, only the floodway boundary has been shown.

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III - RECREATION

3.01 No structural recreation facilities are presently planned along Dreamy Draw between Dreamy Draw Dam and the Arizona Canal.

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IV - BRIDGES

4.01 Floodway and floodway fringe delineation reflect only existing bridges at 19th Street, Dreamy Draw Drive, and 16th Street. There are no new bridges proposed for the study reach.

V - OPERATION AND MAINTENANCE

5.01 The floodway and floodway fringe delineations contained in this supplemental report must be adopted by the Flood Control District of Maricopa County. Subsequent to this action, the Flood Control District is responsible for the management and maintenance of the floodway and floodway fringes, in accordance with established flood plain management criteria, to assure the unobstructed passage of floodwaters of 100-year storms. Maintenance includes the removal of excessive plant growth and sediment deposits that would obstruct flows and appreciably increase flood plain widths.

5.02 Sediment ranges normally are established to assess the stability of a streambed in maintaining the flow conveyance capacity. The location would be in a reach that normally would experience minimum scour, but could experience aggradation which could increase the local water surface profile.

5.03 A critical review of the hydraulic calculations for Dreamy Draw along with a field inspection determined that the above criteria for sediment ranges could not be met in the Dreamy Draw reach studied. Upstream from 14th Street (river mile of 0.45) the 100-year flood flow is at or near critical depth such that scour of the soft-bottom streambed would occur. Downstream from 14th Street (river mile 0.43) the 100-year floodflow is subcritical, but in a high density urbanized area. Fences and structures border the streambed (ref. para. 1.07) and would affect the containment and overflow on an individual basis. In addition dip-crossings at 12th and 13th Streets would permit breakout southerly to the Arizona Canal in an unpredictable manner; it would be dependent on the extent of the Arizona Canal north overbank flooding (not part of this study). Thus a sediment range downstream of 14th Street would be an unreliable measurement of the Dreamy Draw flow conveyance change because of the potential flood activity of the Arizona Canal which may or may not be in phase with Dreamy Draw peak flows.

VI - COST ESTIMATES

6.01 The floodway and floodway fringe delineation with their respective water surface profiles and the SPF overflow area were computed for Dreamy Draw between Dreamy Draw Dam and the Arizona Canal using July 1977 topography. No major new development or changes in topography are anticipated prior to completion of the final delineations; however, the delineations will be reviewed and updated as necessary prior to publishing the data as an appendix to the Dreamy Draw Dam O&M Manual. The cost estimate presented in table 3 includes the cost of preparing this supplement and the O and M manual appendix.

Table 3
Detailed First Cost Estimate - Dreamy Draw
(Dreamy Draw Dam to Arizona Canal)

(Oct 1978 price levels)

Acct. No.	Description	Sub Total	Amount Total
30.	Engineering and Design		
	Topography	7,500	
	Delineation of floodway and floodway fringes	<u>29,500</u>	
	Total, E&D		37,000
31.	Supervision and Administration		7,000
51.	O&M Manual		<u>6,000</u>
	Total		\$50,000

VII - CONCLUSIONS

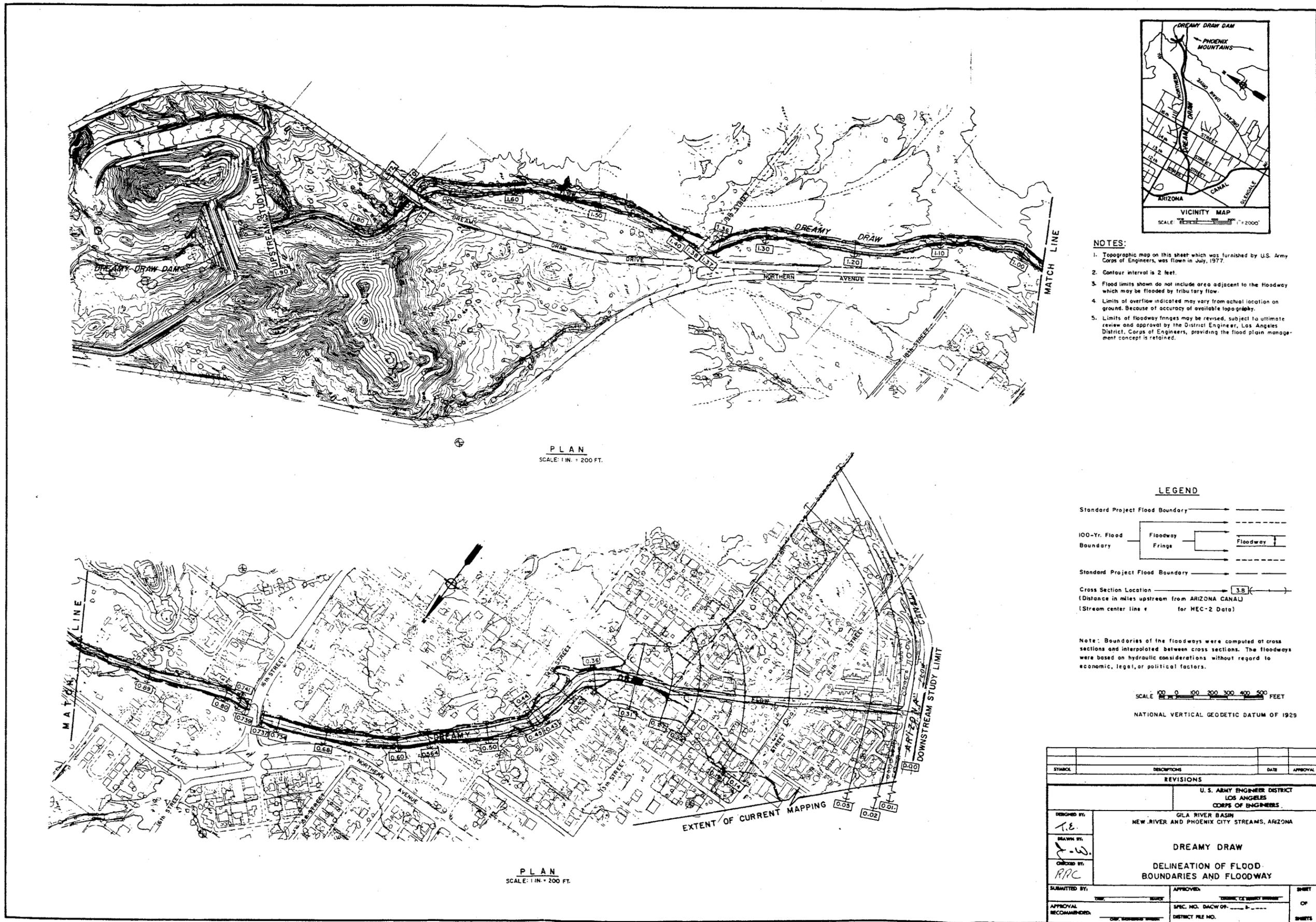
7.01 In accordance with the local cooperation agreement, we have delineated the designated floodway and floodway fringes for Dreamy Draw from Dreamy Draw Dam to the Arizona Canal. The delineations have been coordinated with the Flood Control District of Maricopa County and the City of Phoenix. The approved delineations, which will be incorporated into the Dreamy Draw Dam O&M manual, must be adopted by the Flood Control District and used as the basis for management and maintenance of the designated floodway and floodway fringes.

Respective
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 using July
 topography are
 however, the
 or to
 O&M Manual.
 of preparing

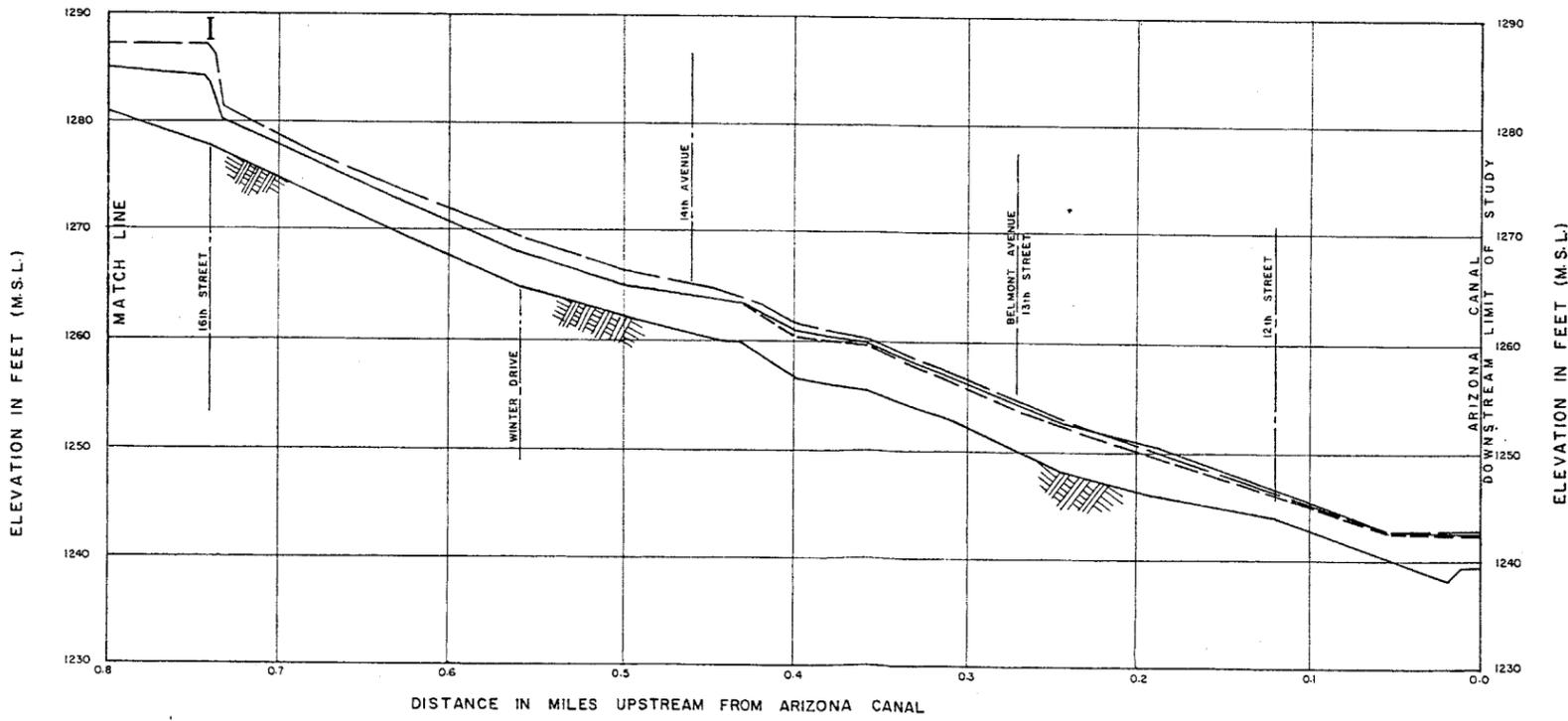
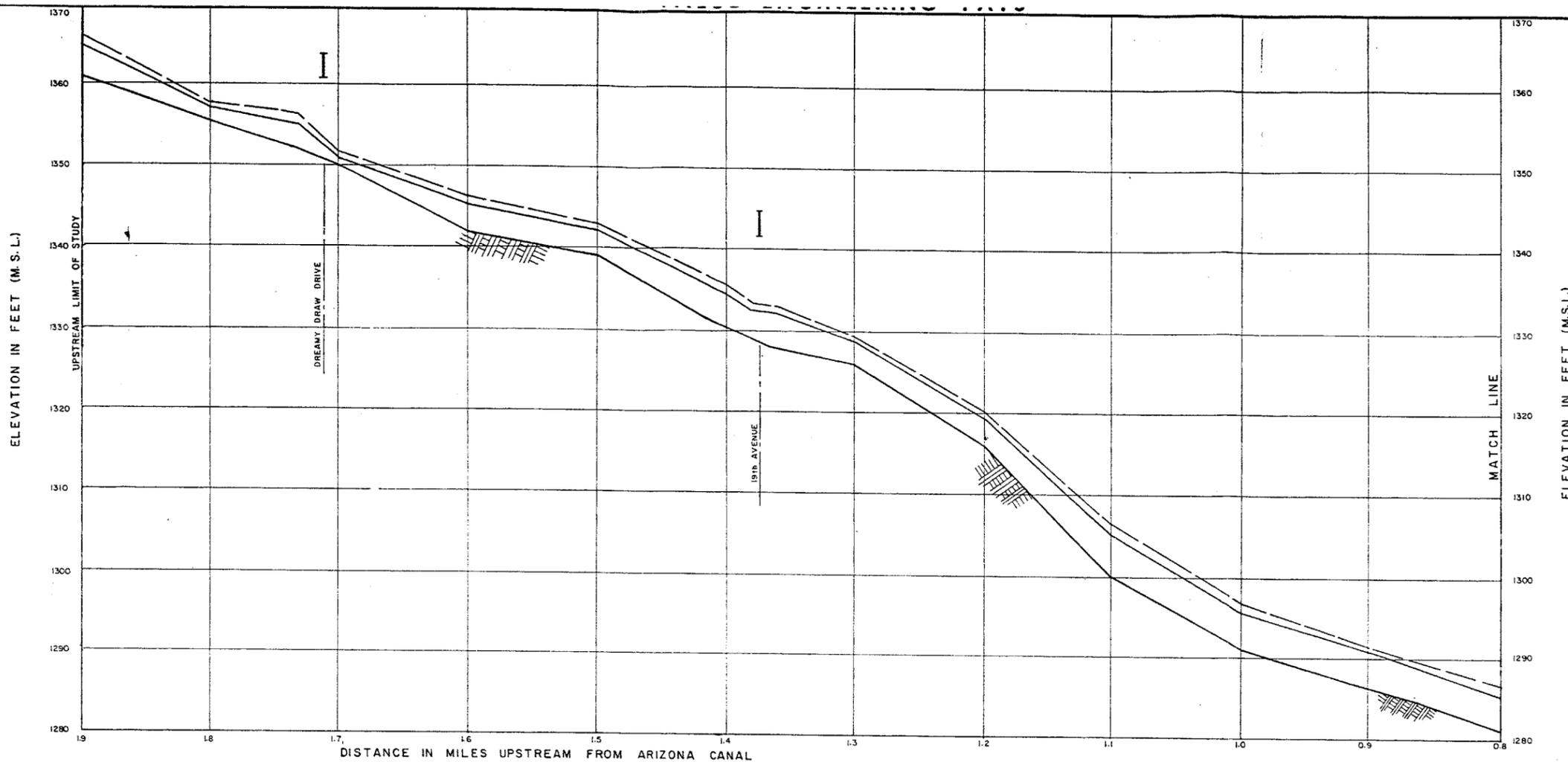
Amount
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 Total

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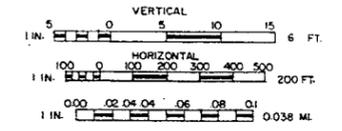
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ENVIRONMENTAL
ENHANCEMENT
THRU ENGINEERING



- STANDARD PROJECT FLOOD
- - - 100 YEAR FLOOD
- FLOODWAY
- ▨ STREAMBED
- ROADWAY
- BRIDGE
- SOFFIT



SYMBOL	DESCRIPTIONS	DATE	APPROVAL
REVISIONS			
U. S. ARMY ENGINEER DISTRICT LOS ANGELES CORPS OF ENGINEERS			
DESIGNED BY: <i>FE</i>	GILA RIVER BASIN NEW RIVER AND PHOENIX CITY STREAMS, ARIZONA		
DRAWN BY: <i>J.W.</i>	DREAMY DRAW WATER SURFACE PROFILES OF FLOOD BOUNDARIES AND FLOODWAY		
CHECKED BY: <i>MC</i>	DATE APPROVED:	SPEC. NO. DACW 09- _____	SHEET _____ OF _____
SUBMITTED BY:	DISTRICT FILE NO. _____		

SAFETY PAYS

GILA RIVER BASIN
NEW RIVER
AND PHOENIX CITY STREAMS
ARIZONA

DESIGN MEMORANDUM NO. 2

HYDROLOGY

Part 2

U.S. Army Engineer District, Los Angeles
Corps of Engineers
1982

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TABLE 1

**DESIGN PEAK DISCHARGES
FUTURE CONDITIONS WITH PROJECT**

CP	LOCATION	DRAINAGE AREA (mi ²)	SPF (ft ³ /s)	100-YEAR FLOOD (ft ³ /s)
	DREAMY DRAW			
1071U	Inflow - Dreamy Draw Dam	1.26	3600 ⁽¹⁾	1700 ⁽¹⁾
1071D	Outflow - Dreamy Draw Dam	0	220 ⁽⁹⁾	140 ⁽²⁾
107	At ACDC	0.74	2100 ⁽²⁾	1000 ⁽²⁾ ←
	CAVE CREEK			
1030U	Inflow - Cave Buttes Dam	191	89,000 ⁽³⁾	63,000 ⁽²⁾
1030D	Outflow - Cave Buttes Dam	0	486 ⁽⁴⁾	420 ⁽²⁾
1011U	Above Deer Valley Creek	4.5	11,000 ⁽⁵⁾	5000 ⁽⁵⁾
1011D	Below Deer Valley Creek	5.0	12,000 ⁽⁵⁾	5,400 ⁽⁵⁾
1013U	Above East Fork-Cave Creek	8.1	13,000 ⁽⁵⁾	5,800 ⁽⁵⁾
1013D	Below East Fork - Cave Creek	21.1	31,000 ⁽⁵⁾	14,000 ⁽⁵⁾
1015U	Above Moon Valley Creek	22.5	31,000 ⁽⁵⁾	14,000 ⁽⁵⁾
1015D	Below Moon Valley Creek	29.3	36,000 ⁽⁵⁾	16,000 ⁽⁵⁾
1016	At ACDC	30.4	36,000 ⁽⁵⁾	16,000 ⁽⁵⁾
	ACDC			
001	Cudia City Wash	4.9	15,000 ⁽²⁾	6800 ⁽²⁾
002	Above 32nd St.	6.3	8200 ⁽⁶⁾	8200 ⁽⁷⁾
003	Near Sahuaro Dr.	7.7	8500 ⁽⁶⁾	8500 ⁽²⁾
004	Near Ocotillo Rd.	8.8	9000 ⁽⁶⁾	9000 ⁽⁷⁾
005	Below 16th St.	9.9	9300 ⁽⁶⁾	9300 ⁽⁷⁾
007D	Above Northern Ave. (Below Dreamy Draw)	11.8	10,000 ⁽⁶⁾	10,000 ⁽²⁾
008	Below 10th St.	14.5	13,000 ⁽⁶⁾	13,000 ⁽⁷⁾

TABLE 1 (Continued)

CP	LOCATION	DRAINAGE AREA (mi ²)	SPF (ft ³ /s)	100-YEAR FLOOD (ft ³ /s)
00-YEAR (ft ³ /s)	AGUA FRIA RIVER ⁽¹⁴⁾			
15,000 ⁽²⁾	1039U Above New River	1929	135,000 ⁽⁵⁾	90,000 ⁽⁵⁾
25,000 ⁽⁵⁾	1039 Below New River	2088	142,000 ⁽⁵⁾	95,000 ⁽⁵⁾
26,000 ⁽⁵⁾	1040 At I-10 Fwy	2170	135,000 ⁽⁵⁾	91,000 ⁽⁵⁾
29,000 ⁽⁵⁾	1042 At Avondale	2241	131,000 ⁽⁵⁾	90,000 ⁽⁵⁾
	1043 Above Gila River	2250	130,000 ⁽⁵⁾	89,000 ⁽⁵⁾

Footnotes:

- (1) Ref. 1.
- (2) Ref. 3.
- (3) Ref. 3; local storm--not design flood.
- (4) Ref. 4.
- (5) Revised by this study.
- (6) 100-year design, without freeboard.
- (7) No comparable CP in previous reports.
- (8) Discharge assumes subarea 17 (D.A. = 11 mi²) is diverted by Black Canyon Highway and contributes to ACDC upstream of the Black Canyon Highway bridge that crosses ACDC; given drainage area includes subarea 17.
- (9) Ref. 5.
- (10) Drainage area includes an additional 5 mi² of the area between New River and Skunk Creek (see para. 8.04). Discharges determined using revised "natural" drainage boundaries are: SPF = 24,000 ft³/s; 100-year flood = 12,000 ft³/s.

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Gila River Basin

Phoenix, Arizona, and Vicinity
(Including New River)

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

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

FINAL

April 1986

ENGINEERING DIVISION

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PREFACE

The purpose of the Phase I studies was to review the New River and Phoenix City Streams, Arizona, Flood Control Project, as authorized (H. Doc. 89-216, 1st Sess.), and to either reaffirm the recommended plan or reformulate and develop a plan more suitable under existing conditions.

The purpose of the Phase II studies was to develop the technical design of the structures necessary to achieve the objectives selected in the Phase I report.

The purpose of this report is to provide the technical design of the Arizona Canal Diversion Channel (40th Street to Cactus Road), Cudia City Wash and Cave Creek Sediment Basins and Cave Creek Channel as a basis for preparing the plans and specifications for construction.

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EXECUTIVE SUMMARY

A flood hazard exists in the Phoenix metropolitan area (in south central Arizona) along Cave Creek from the existing Cave Buttes Dam to the Salt River, along and downstream from the Arizona Canal between Cudia City Wash and Skunk Creek, and along Skunk Creek and the New and Agua Fria Rivers. More specifically, the Arizona Canal intercepts and carries flows until its banks are overtopped and floodflows discharge into the metropolitan Phoenix area. Under standard project flood (SPF) conditions, the inundation area would comprise approximately 50,500 acres including approximately 25,000 acres in downtown Phoenix and surrounding urban areas.

A combination structural-nonstructural plan was determined to be the best solution to the flood problem in the project area. Normally, the Phase II Design Memorandum (DM) is a single report covering the entire project. In this instance, however, it has been prepared as a series of design memorandums for each of the separable features of the project because the approved plan is complex, requiring up-to-date information on rights-of-way and relocations. Additionally, this report has been prepared as a Feature Design Memorandum to present a detailed analysis of the (1) Arizona Canal Diversion Channel (ACDC) from 40th Street to Cactus Road (reaches 2, 3, and 4), (2) Cudia City Wash Sediment Basin, (3) Cave Creek Sediment Basin, and (4) Cave Creek Channel.

The ACDC will be constructed just north of the Arizona Canal. Where possible the left wall or side slope of the channel will be near the north rights-of-way line of the canal. Reaches 2, 3, and 4 will extend from Cudia City Wash to Cactus Road, a distance of approximately 12.5 miles. In conjunction with reach 1 (Cactus Road to Skunk Creek, discussed in DM No. 3, part 5), reaches 2, 3, and 4 will provide protection to residences, businesses, and other land uses of urban Phoenix that are south of the Arizona Canal by diverting flows to Skunk Creek and the New and Agua Fria Rivers.

Reach 4, the upstream part of the ACDC, will begin at Cudia City Wash and extend downstream to Dreamy Draw (4.2 miles). In this reach there will be a concrete rectangular section. The channel will be open except for covered reaches (1) along Stanford Drive just east of 32nd Street and (2) just east of the Arizona Biltmore Hotel to 24th Street.

Reach 3, a concrete rectangular section, will extend from Dreamy Draw to Cave Creek (3.6 miles). The channel will be open except for a covered reach adjacent to the Sunnyslope High School.

Reach 2 is comprised of reach 2B, a concrete rectangular channel, that will extend from Cave Creek to Cactus Road (3.7 miles) and reach 2A, a 1.0 mile-long concrete trapezoidal section, from just west of 43rd Avenue to approximately 1300 feet northwest of Cactus Road.

The ACDC and the two basins are designed to carry the 100-year flood. The channel will be entrenched for its entire length to allow side inflows to enter over the channel walls. Confluence structures will be required at major tributary locations, pipe inlets and overflow spillways will be used where local ponding occurs, and drop inlet structures will be used along the covered channel. A total of 28 vehicular bridges will be required at all streets, driveways, and highways that presently cross the canal; five new pedestrian bridges will also be required. A 14-foot-wide maintenance road will be constructed along the south side of the channel for its entire length, and wherever possible, on the north side. Bridge underpasses will be required on the south side of the channel at five heavy traffic intersections.

To reduce the amount of sediment entering the channel, two sediment basins will be required, one at the upper end of reach 4 on Cudia City Wash and one north of the ACDC on Cave Creek. Cave Creek Channel (1.86 miles) will extend from Cave Creek Sediment Basin to its confluence with the ACDC in reach 2. The channel will be trapezoidal from the basin to 1238 feet upstream from the confluence, where it will transition to a rectangular concrete section.

The total first cost for Stage 2 construction for the ACDC reaches 2, 3, and 4, Cudia City Wash Sediment Basin, Cave Creek Sediment Basin, and Cave Creek Channel (flood control and recreational facilities, as well as lands and relocations and cultural resources), is estimated at \$219.0^a million (October 1985 price levels), of which \$138.0^a million is a Federal cost and \$81.0^b million is a non-Federal cost.

^aRounded to three significant figures.

^bRounded to two significant figures.

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1. INTRODUCTION

Reaches 2 (comprised of 2A and 2B), 3, and 4 of the Arizona Canal Diversion Channel (ACDC), Cudia City Wash to Cactus Road, including Cudia City Wash Sediment Basin, Cave Creek Sediment Basin, and Cave Creek Channel, are features of the recommended plan presented in the Phase II General Design Memorandum. These features of the overall project and their locations are shown on plates 1 and 2. In conjunction with reach 1 (Cactus Road to Skunk Creek), the ACDC will intercept and divert tributary flows from Cudia City Wash to Skunk Creek, and will discharge the flows into Skunk Creek where they will eventually flow to the final point of disposal at the Gila River. The purpose of the ACDC is to eliminate the overtopping and levee failures along the Arizona Canal, and the subsequent flooding of urban Phoenix caused by floodflows. It is an integral part of the overall recommended plan.

Project Authorization

The Phoenix, Arizona, and Vicinity (including New River) Flood Control Project - also known as the New River and Phoenix City Streams Flood Control Project - was authorized by the Rivers and Harbors - Public Works Act of 1965, Pub. L. 89-298, 1965 U.S. Code Cong & Ad News (79 Stat.) 1074, which states, in part, under Section 204 that:

The project for flood protection at Phoenix, Arizona and vicinity, is hereby authorized substantially, in accordance with the recommendations of the Chief of Engineers in House Document Numbered 216, Eighty-ninth Congress, at an estimated cost of \$58,310,000.

* * * * *

Description of Area

LOCATION

The ACDC will be located in the metropolitan area of Phoenix, Arizona, adjacent to the north side of the Arizona Canal for most of

its extent. Reaches 2, 3, and 4 will extend upstream from Cactus Road to just west of 40th street following a southeast-to-northwest alignment. Cudia City Wash Sediment Basin will be north of the Arizona Canal and West of 40th Street at the upper end of the ACDC on Cudia City Wash. Cave Creek Channel will follow the natural alignment of Cave Creek, beginning just north of Cactus Road and extending southward to the ACDC. Cave Creek Sediment Basin will be located on Cave Creek north of Cactus Road. See plate 3 for project location.

DRAINAGE AREA

Reaches 2, 3, and 4 of the ACDC will drain an area of about 72 square miles. When all four reaches of the ACDC are complete, the ACDC will drain approximately 86 square miles of area from Cudia City Wash to Skunk Creek. Some of the drainage areas are very flat (10 to 20 ft/mi) and runoff will enter the ACDC as sheetflow over the north bank. The largest single contributing area in terms of discharge magnitude is Cave Creek. The channel will also carry outflows from Cave Buttes Dam (486 ft³/s maximum).

Scope of Report

The ACDC has been divided into five reaches for the purpose of staged construction. Reach 1 extends from Cactus Road to Skunk Creek, reach 2A from 47th Drive to Cactus Road, reach 2B from Cave Creek to 47th Drive, reach 3 from Dreamy Draw to Cave Creek, and reach 4 from Cudia City Wash to Dreamy Draw. Also to be constructed are Cave Creek Channel, Cave Creek Sediment Basin, and Cudia City Wash Sediment Basin.

The feature design for reach 1 was presented in a previous feature design memorandum, No. 3, part 5.

This report is a feature design memorandum for reaches 2, 3, and 4 of the ACDC (Cudia City Wash to Cactus Road), Cudia City Wash Sediment Basin, Cave Creek Sediment Basin, and Cave Creek Channel.

Coordination With Others

The studies described in this report were coordinated with the local sponsor, the Flood Control District of Maricopa County, and the representatives of the Town of Paradise Valley, City of Phoenix, Maricopa County, the State of Arizona, and the Federal agencies that have an interest in the project. Also, extensive coordination has been undertaken with the Salt River Valley Users' Association, also known as the Salt River Project (SRP), operators of the Arizona Canal. In six short reaches along the ACDC, the cut slope of the channel may encroach on SRP property. The Corps has informed SRP of these possible encroachments and is continuing to make necessary adjustments to satisfy SRP requirements.

2. RECOMMENDED PLAN

Reaches 2, 3, and 4 of the ACDC will be designed to carry a 100-year flood. The channel reaches will intercept flow from small drainage areas from the north and divert them westward to reach 1 and into Skunk Creek. Features of reaches 2, 3, and 4 will include a main channel (ACDC), Cudia City Wash Sediment Basin; Cave Creek Sediment; Cave Creek Channel; provisions for low flows, side drainage, and drainage system; relocations of utilities, roads, and bridges; safety provisions; maintenance roads; invert access ramps; invert access ladders; underpasses; esthetic design; erosion control; and recreational development. Pertinent information on these features is given in the following paragraphs. The principal features of the project are shown on plates 4 through 28. Sections showing channel cross-sectional geometry are shown on plates 29 through 34.

Flood Control

The flood control portion of the project will include the ACDC, Cave Creek Channel, and sediment basins on Cudia City Wash and Cave Creek.

SEDIMENT BASINS

Two sediment basins--Cudia City Wash Sediment Basin and Cave Creek Sediment Basin--will be constructed. The basins are designed to reduce the amount of sediment flowing in the ACDC by inducing deposition of most of the sand and all of the gravel load within the basins, thereby excluding this material from the ACDC. Each facility will consist basically of a basin excavated below existing grade, an inlet chute at the upstream end, and a spillway and outlet works at the downstream end.

Cudia City Wash Sediment Basin

The Cudia City Wash Sediment Basin site is north of the Arizona Canal and Camelback Road, and west of 40th Street and is mostly in an undeveloped area within the property boundaries of the Phoenix Country Day School (pl. 5).

3. BASIS FOR DESIGN

Hydrology

INTRODUCTION

This section presents design hydrology in support of the Feature Design Memorandum (FDM) studies for the Arizona Canal Diversion Channel (ACDC). It adds to, and in some instances, revises hydrologic information presented in the ACDC General Design Memorandum (GDM), No. 3, part 5, dated March 1985 and Design Memorandum No. 2, Hydrology, Part 2, dated 1982.

Design flows in the ACDC GDM are reproduced in table 3 and on plate 42. Boundaries for drainage areas are shown on plate 43. Since the GDM was written, detailed side inflow studies for reaches 2, 3, and 4 for the ACDC have been completed. Side inflows to reach 2 were determined in the GDM, but more inlet structures have since been added to the design in order to direct smaller flows into the ACDC. (See discussion under the heading, "Hydraulic Design Section.") The side inflow analysis for reaches 3 and 4, and interior drainage analysis for the Cave Creek Sediment Basin are briefly discussed. The standard project flood and 100-year flood peak discharges were developed according to the procedures outlined in DM No. 2. (See item "3" in the following list of previous reports).

PREVIOUS REPORTS

Previous design memorandum containing hydrology for the study area are:

1. "Gila River Basin, New River and Phoenix City Streams, Arizona, Design Memorandum No. 1, Feature Design for Dreamy Draw Dam," dated January 1972.

2. "Gila River Basin, New River and Phoenix City Streams, Arizona, Design Memorandum No. 2, Hydrology, Part 1," dated October 1974.
3. "Gila River Basin, Phoenix, Arizona, and Vicinity (Including New River), Design Memorandum No. 2, Hydrology, Part 2," dated 1982.
4. "Gila River Basin, New River and Phoenix City Streams, Arizona, Design Memorandum No. 3, General Design Memorandum - Phase I, Plan Formulation, Appendix 1," dated March 1976.
5. "Gila River Basin, New River and Phoenix City Streams, Arizona, Design Memorandum No. 3, General Design Memorandum - Phase II, Project Design, Part 1, Cave Buttes Dam (Including Cave Creek to Peoria Avenue)," dated July 1976.
6. "Gila River Basin, Phoenix, Arizona, and Vicinity (Including New River), Design Memorandum No. 3, General Design Memorandum-- Phase II, Project Design, Part 5 (Including Feature Design for Cactus Road to Skunk Creek)," dated March 1985 (hereafter referred to as the ACDC GDM).

Table 3. ACDC Design Discharges -- Future Conditions With Project.

CP	Location	Drainage Area (mi ²)	100-Year Flood (ft ³)
101	Cudia City Wash	4.9	6,700
102	Above 32nd Street	6.3	7,900
103	Near Sahuaro Drive	7.7	8,300
104	Near Ocotillo Road	8.8	8,700
105	Below 16th Street	9.9	9,000
107	Above Northern Avenue (Below Dreamy Draw)	11.8	10,000
108	Below 10th Street	14.5	13,000
1016U	Above Cave Creek	19.7	14,000
1016D	Below Cave Creek	61.1	25,000
1018	Near 51st Avenue	70.3	27,000
1019	Above Skunk Creek	85.4	29,000

SIDE INFLOW ANALYSIS

ACDC Reach 4 - Cudia City Wash to Dreamy Draw

Reach 4 has four major side inflows, which were determined for the ACDC GDM, No. 3, part 5 and are listed in table 4 of this FDM. Minor side inflows are presented in the Hydraulic Design Section of this report.

The ACDC is covered through the Arizona Biltmore Estates between an area west of 32nd Street and 24th Street (Sta. 945+45 to Sta. 899+20) approximately 4600 feet (pl. 43, sh. 1). A detailed side drainage

analysis was done to provide 100-year flood peak discharges for hydraulic design considerations associated with this covered section (pls. 42 and 43). Several small retarding structures and flood control swales regulate surface runoff over the Arizona Biltmore Hotel lands and north golf course. These structures and diversion swales were considered in the assesment of peak discharges at 11 concentration points along this proposed covered part of the ACDC. A schematic flow diagram for this analysis is presented on plate 44. Subarea boundaries, including retarding structures, are shown on plate 45. Basin characteristics are given in table 5, pertinent routing data in table 6, and storage-outflow data in table 7.

ACDC Reach 3 - Dreamy Draw to Cave Creek

Major side inflows to reach 3 are taken from the Phase II GDM and presented in table 4. About 2600 feet of the ACDC in this reach are covered from Central Avenue to Dunlap Avenue (Sta. 697+55 to Sta. 671+90), next to the Sunnyslope High School (pl. 43, sh. 2). Most of the flow which reaches this triangular side inflow area is diverted down Central or Dunlap where inlets to the ACDC will be provided. An existing 9-inch diameter pipe will drain the nuisance flow from the nearby football field and the flow will enter this covered part of the ACDC.

Table 4. Major Side Inflows.

Location		100-Year Flood Peak (ft ³ /s)
Reach 4	Cudia City Wash below the sediment basin	6,700
	Upstream from 32nd Street	2,000
	Downstream from Ocotillo Road	1,900
	Downstream from 16th Street (Myrtle Avenue Wash)	2,300
Reach 3	Dreamy Draw	1,000
	Northern Avenue (Little Dreamy Draw)	1,300
	10th Street Drain	3,900

Note: "Major" is defined as 1000 ft³/s or more.

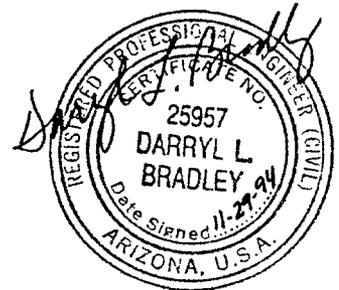
**CUDIA CITY WASH TO
10TH STREET WASH WATERSHED**

Volume 1.8

**Arizona Canal Diversion Channel
Area Drainage Master Study
ACDC/ADMS Phase I**

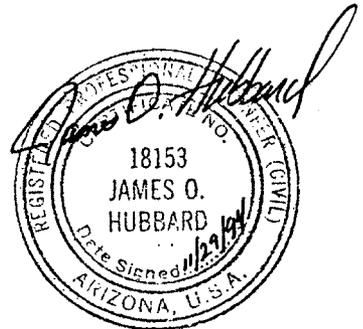
HYDROLOGY REPORT

November, 1994



Prepared For:

**Flood Control District Of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009
(60) 506-1501**



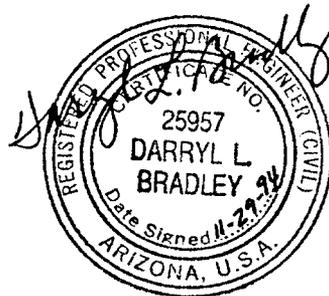
Prepared By:

**Kaminski-Hubbard Engineering, Inc.
4550 North Black Canyon Highway, Suite C
Phoenix, Arizona 85017
(602) 242-5588**

**CUDIA CITY WASH TO
10TH STREET WASH WATERSHED
HYDROLOGY REPORT**

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1.0 SYNOPSIS

Kaminski-Hubbard Engineering, Inc. (KHE) was retained by the Flood Control District of Maricopa County (FCDMC) to prepare a comprehensive hydrologic analysis of the watershed contributing to the Arizona Canal Diversion Channel (ACDC) from Cudia City Wash to 10th Street Wash for existing and future conditions. This study area, as indicated in Figure 1, is one of several subwatersheds analyzed as a part of the ACDC Area Drainage Master Study (ADMS). This watershed drains the southern portion of the Phoenix Mountains from the 10th Street Wash boundary to the Indian Bend Wash boundary.

Within the watershed, twelve sub-basin area groupings were defined to address the precipitation depth/areal reduction issue for side inflow to the ACDC. The size of area groupings ranged between 0.25 square miles to 4.82 square miles.

There are seven existing detention basins within the watershed that collect runoff from the Phoenix Mountains for flood control purposes. The largest of these detention basins is impounded behind the Dreamy Draw Dam. These detention basins greatly reduce the amount of runoff reaching the ACDC from the Phoenix Mountains. The only significant future condition improvement would be the extension of the Squaw Peak Highway from Northern Avenue to Shea Boulevard.

This report presents the hydrologic analysis of the Cudia City Wash to 10th Street Wash watershed for both existing and future conditions upstream of the ACDC. Table 1 summarizes the controlling peak discharges for existing conditions at specific locations along the ACDC. Table 2 presents the controlling peak discharges for future conditions.

TABLE 1

Controlling Peak Discharge (Existing Conditions)

Location	Drainage Area (Sq. Mi.)	2-Yr. (cfs)	10-Yr. (cfs)	100-Yr. (cfs)
Cudia City Wash	4.82	589	2,512	5,411
Stanford Drive Wash	1.17	131	551	1,329
Flynn Lane Wash	1.04	121	577	1,114
Myrtle Avenue Wash	0.80	137	535	1,115
Dreamy Draw East	0.68	154	664	1,230
Dreamy Draw	1.97	141	416	852
Northern Avenue	0.99	95	459	900

TABLE 2

Controlling Peak Discharge (Future Conditions)

Location	Drainage Area (Sq. Mi.)	2-Yr. (cfs)	10-Yr. (cfs)	100-Yr. (cfs)
Cudia City Wash	4.82	726	2,899	5,750
Stanford Drive Wash	1.17	170	644	1,479
Flynn Lane Wash	1.04	148	608	1,152
Myrtle Avenue Wash	0.80	141	532	1,146
Dreamy Draw East	0.68	183	730	1,358
Dreamy Draw	2.07	140	422	897
Northern Avenue	0.98	123	504	966



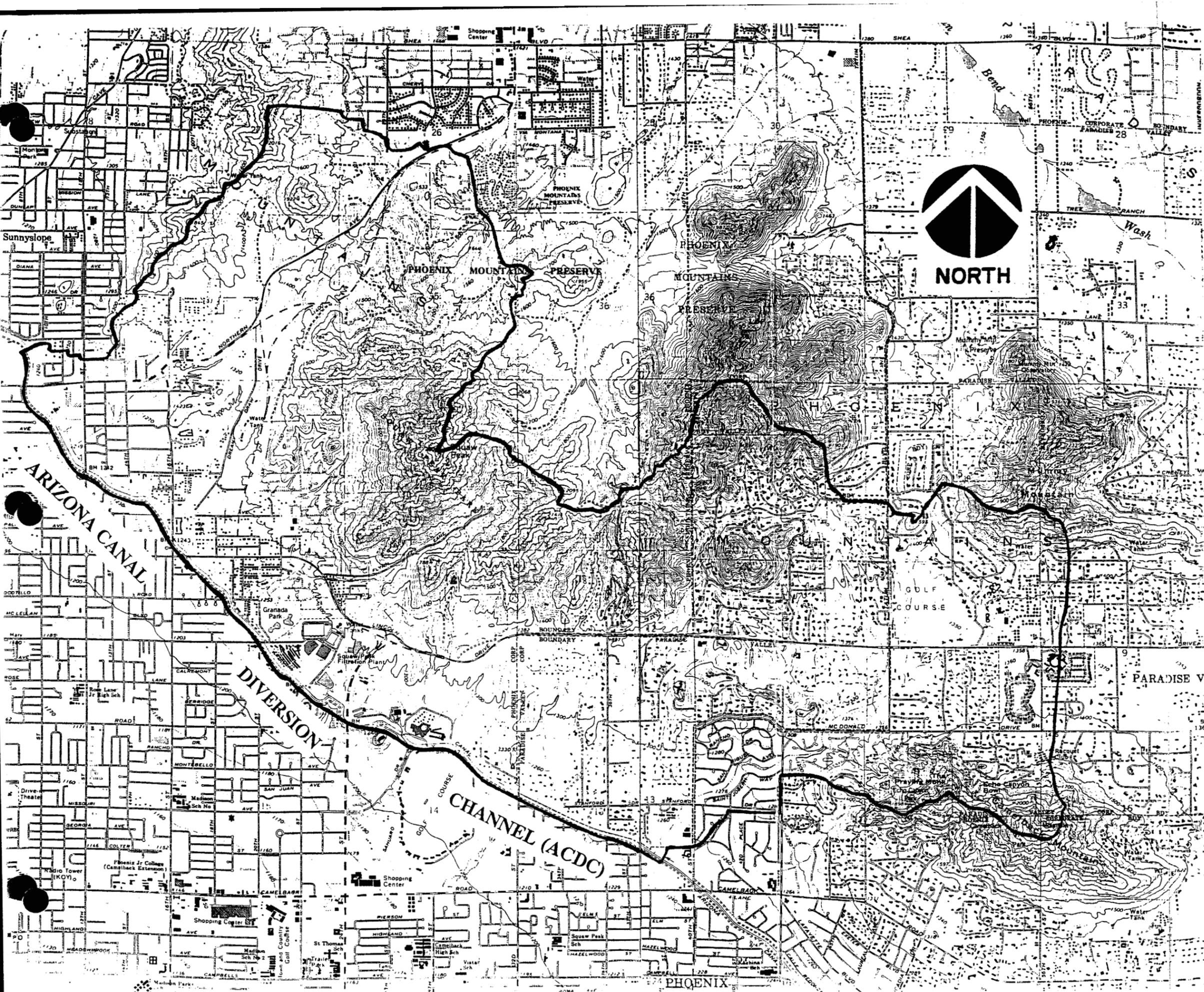


FIGURE 1 - VICINITY MAP

2.0 INTRODUCTION

A hydrologic analysis of the Cudia City Wash to 10th Street Wash watershed for both existing and future conditions was developed by Kaminski-Hubbard Engineering, Inc. (KHE) for the Flood Control District of Maricopa County (FCDMC) as part of the Arizona Canal Diversion Channel (ACDC) Area Drainage Master Study (ADMS), Phase I. The majority of flows contributing to the ACDC originate from the Phoenix Mountains. The watershed is bounded by the Indian Bend Wash boundary to the east and the 10th Street Wash boundary to the west.

The watershed contains seven existing detention basins that significantly affect the amount of runoff reaching the ACDC. The largest detention basin is impounded by the Dreamy Draw Dam and was modelled in the U.S. Army Corps of Engineers (COE) 1982 hydrology study (Ref. 16). However, the other detention basins were not included in the COE model which have necessitated a revision to this hydrologic analysis.

Currently, the Squaw Peak Highway from Glendale Avenue to Northern Avenue has an impact on the original flow patterns in the Dreamy Draw area. Associated with the highway improvements was the construction of the Myrtle Wash detention basin. For future considerations, the Squaw Peak Highway will be extended through the Dreamy Draw area from Northern Avenue to Shea Boulevard. These improvements will not greatly affect the flow patterns in the area.

This report presents the existing and future hydrologic analysis for the watershed contributing to the ACDC from Cudia City Wash to 10th Street Wash. The hydrology was developed using the FCDMC's new design criteria and included detention basin modelling excluded from the previous COE report (Ref. 16).

**DREAMY DRAW WASH WEST AT ACDC
LOMR PACKAGE FOR ZONE AE FLOODPLAIN WITHOUT
FLOODWAY**

FCD Contract No. 1999C048 - Assignment # 3

Prepared for:



Flood Control District of Maricopa County

2801 West Durango Street

Phoenix, AZ 85009-6399

Prepared by:



WEST Consultants, Inc

2151 East Broadway Road, Suite 116

Tempe, AZ 85282

December 27, 2000

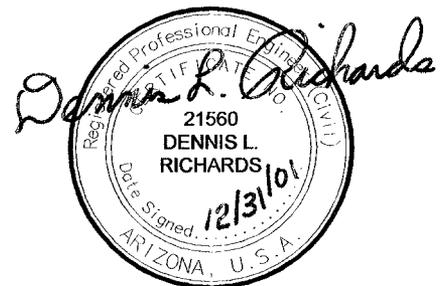


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1. Introduction

The Flood Control District of Maricopa County contracted WEST Consultants, Inc. (WEST) to perform a detailed Zone-AE type re-study of Dreamy Draw Wash West located in Phoenix, Arizona. The analysis did not include a floodway delineation. The existing Flood Insurance Rate Map (FIRM) was deemed insufficient as it did not reflect the presence of the Arizona Canal Diversion Channel (ACDC). Extents of this re-study are along the northeast side of the ACDC from approximately the Myrtle Avenue alignment to approximately the Griswold Road alignment, and upstream to approximately 300 feet northeast of the intersection of 13th Street and Belmont Avenue. The base surveying and hydrology for this project were provided by the District. Additional surveying was provided by Collins/Piña Consulting Engineers, Inc.

The goal of this analysis is to produce a model of the Dreamy Draw Wash West that includes the effects of the ACDC.

2. ADWR/FEMA Forms

2.1 Study Documentation Abstracts for ADWR Submittals

All information related to Sections 2.1.1 through 2.1.10 of the State Standard Attachment SSA1-97, dated November 1997, are included following page 1.

2.2 FEMA Forms

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

3. Surveying and Mapping Information

3.1 Field Survey Information

All surveying data was provided by the District. Under contract with the District, Collins/Piña Consulting Engineers, Inc. provided additional survey data of cross sections along Belmont Avenue and in the main channel of Dreamy Draw Wash West.

3.2 Mapping

Mapping for the study was provided by the District. The primary source of the mapping was the ACDC Area Drainage Master Study dated July 11, 1994. The topographic workmap of the study area is at a scale of 1" = 200' with a 2' vertical contour interval.

4. Hydrology

All hydrology for this analysis was provided by the District. The 100-year peak discharge for the study was determined to be 1,000 cubic feet per second. See Appendix A.2 for references of this flow rate.

Study Documentation Abstract for FEMA Submittals	Initial Study	Restudy	CLOMR	LOMR	X	Other
---	--------------------------	----------------	--------------	-------------	----------	--------------

Section 2.1: Study Documentation Abstract for FEMA Submittals

2.1.1	Date Study Accepted	
2.1.2	Study Contractor Contact(s) Address Phone Internal Reference Number	WEST Consultants, Inc. Dennis L. Richards, P.E. 2151 East Broadway Road, Suite 116 Tempe, Arizona 85282 (480) 345-2155 254A03
2.1.3	FEMA Technical Review Contractor Contact(s) Address Phone Internal Reference Number	
2.1.4	FEMA Regional Reviewer Phone	
2.1.5	State Technical Reviewer Phone	Arizona Department of Water Resources (602) 417-2400
2.1.6	Local Technical Reviewer Phone	Michael Duncan, P.E. - Flood Control District of Maricopa County (602) 506-4732
2.1.7	Reach Description	Dreamy Draw Wash West – FIRM Panel 1670E
2.1.8	USGS Quad Sheet(s) with original photo date & latest photo revision date	Sunnyslope Quadrangle Original Date 1965, Photorevised Date 1982
2.1.9	Unique Conditions and Problems	
2.1.10	Coordination of Q's (Agency, Date, Comments)	All hydrology was provided by the Flood Control District of Maricopa County

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

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

1. REQUESTED RESPONSE FROM FEMA

This request is for a:

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

2. OVERVIEW

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

- Physical Change Improved Methodology/Data Floodway Revision
- Other Describe: _____

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

2. Flooding Source: Dreamy Draw Wash West

3. Project Name/Identifier: Dreamy Draw Wash West at ACDC - LOMR Package for Zone AE Floodplain Without Floodway

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

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

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

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

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

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

4. ENCROACHMENT INFORMATION

1. Does the State have jurisdiction over the floodway or its adoption by communities participating in the NFIP?
 Yes No

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

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

If the answer to either items is Yes, please attach documentation that all requirements of Section 65.12 of the NFIP regulations have been met, regarding evaluation of alternatives, notice to individual legal property owners, concurrence of CEO, and certification that no insurable structures are impacted.

5. MAINTENANCE RESPONSIBILITY

The community is willing to assume responsibility for performing overseeing compliance with the maintenance and operation plans of the Arizona Canal Diversion Channel, which is maintained by the Flood Control District of Maricopa County

(Name)

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

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

6. REVIEW FEE

The review fee for the appropriate request category has been included. Yes No N/A Fee amount: \$ _____

OR

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

Please see Instructions for Fee Amounts

7. SIGNATURE

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



Signature of Revision Requester

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

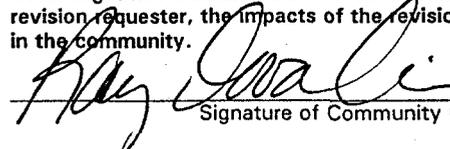
Flood Control District of Maricopa County
 Company Name

Telephone No.: (602) 506-4732

Date:

12-1-00

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

Ray Dovalina, P.E., Floodplain Manager
 Printed Name and Title of Community Official

City of Phoenix
 Community Name

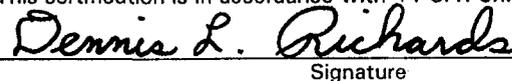
Telephone No.: (602) 262-4026

Date:

12-7-00

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

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



Signature

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

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

Type of License/Expertise: Civil Engineer

Check which forms have been included with this request

Form Name and (Number)

- Hydrologic (3)
- Hydraulic (4)
- Mapping (5)
- Channelization (6)
- Bridge/Culvert (7)
- Levee/Floodwall (8)
- Coastal (9)
- Coastal Structures (10)
- Dam (11)
- Alluvial Fan (12)

Required if

- new or revised discharges
- new or revised water-surface elevations
- floodplain/floodway changes
- channel is modified
- addition/revision of bridge/culvert
- addition/revision of levee/floodwall
- new or revised coastal elevations
- addition/revision of coastal structure
- addition/revision of dam
- structures proposed on alluvial fan

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2.25 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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

Note: Fill out one form for each flooding source studied

Community Name: City of Phoenix, Maricopa County, Arizona

Flooding Source: Dreamy Draw Wash West

Project Name/Identifier: Dreamy Draw Wash West at ACDC - LOMR Package for Zone AE Floodplain Without Floodway

1. REACH TO BE REVISED

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

Downstream Limit: Arizona Canal Diversion Channel

Upstream Limit: Approximately 300 feet upstream from the intersection of Belmont Avenue and 13th Street

2. MODELS SUBMITTED

Requirements: for areas which have detailed flooding:

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

for areas which do not have detailed flooding:

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

If hydraulic models are not developed, hydraulic analyses (including all calculations) for existing or pre-project conditions and revised or post-project conditions must be submitted.

1. Duplicate Effective Model Natural File Name N/A Floodway File Name N/A

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

2. Corrected Effective Model Natural File Name N/A Floodway File Name N/A

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

3. Existing or Pre-Project Conditions Model Natural File Name N/A Floodway File Name N/A

The Duplicate Effective model or Corrective Effective model is modified to produce the Existing or Pre-Project Conditions model to reflect any modifications that have occurred within the floodplain since the date of the Effective model but prior to the construction of the project for which the revision is being requested. If no modification has occurred since the date of the effective model, then this model would be identical to the Corrected Effective model or Duplicate Effective model.

4. Revised or Post-Project Conditions Model Natural File Name _____ Floodway File Name N/A

The Existing or Pre-Project Conditions model (or Duplicate Effective model or Corrected Effective model, as appropriate) is revised to reflect revised or post-project conditions. This model must incorporate any physical changes to the floodplain since the effective model was produced as well as the effects of the project. When the request is for the proposed project this model must reflect proposed conditions.

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

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. STARTING WATER-SURFACE ELEVATIONS

Explain how they were determined. Explanation Attached? Yes No

NOTE: If the effective study is an approximate study, the slope/area method is recommended.
For detailed analysis studies, using a known water-surface elevation is recommended.

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

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

- Supercritical depth Critical Depth Drawdowns Negative Floodway Surcharges
- Floodway Surcharges Greater Than Maximum Allowed by Community/State
- Water surface elevations higher than the end points of cross sections.
- Floodway discharge is different than the Natural 100-year (base) flood discharge.
- Project causes 100-year floodplain or floodway elevations to increase (state if increases are located off the requester's property)

Explanation attached with Form Explanation provided on attached printout

If Hydraulic model used is HEC-2, has it been checked with FEMA'S CHECK-2 computer program? Yes No
(see instructions for information on how to obtain CHECK-2)

5. REVISED FIRM/FBFM AND FLOOD PROFILES

1. Profile Transition

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

Downstream End _____ within _____ (feet) Upstream End _____ within _____ (feet)
Cross-Section # Cross-Section #

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

Downstream End _____ within _____ (feet) Upstream End _____ within _____ (feet)
Cross-Section # Cross-Section #

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

Downstream End _____ within _____ (feet) Upstream End _____ within _____ (feet)
Cross-Section # Cross-Section #

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

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

- Stream Name Community Name Corporate Limits labeled Study limits labeled
- Confluences labeled Channel Stationing Streambed profiled Cross Sections labeled
- Horizontal/Vertical Scales indicated 100-year elevs profiled*
- Road Crossings Labeled Low Chord Elevations Top of Road Elevations

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

Floodway Data Table

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

Floodway Data Table Attached Yes Not Required

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1.5 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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

Note: Fill out one form for each flooding source studied

Community Name: City of Phoenix, Maricopa County, Arizona

Flooding Source: Dreamy Draw Wash West

Project Name/Identifier: Dreamy Draw Wash West at ACDC - LOMR Package for Zone AE Floodplain Without Floodway

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

1. MAPPING CHANGES

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

- a. Revised approximate 100-year floodplain boundaries (Zone A) Yes No N/A
- b. Revised detailed 100- and 500-year floodplain boundaries. Yes No N/A
- c. Revised floodway boundaries Yes No N/A
- d. Location and alignment of all cross sections with stationing control indicated. Yes No N/A
- e. Stream alignments, road alignments and dam alignments. Yes No N/A
- f. Current community boundaries. Yes No N/A
- g. Effective 100- year floodplain and floodway boundaries from FIRM/FBFM reduced or enlarged to the scale of the topographic workmap Yes No N/A
- h. Tie-ins between the effective and revised 100-, 500-year and floodway boundaries Yes No N/A
- i. The requester's property boundaries and community easements Yes No N/A
- j. The signed certification of a registered professional engineer Yes No N/A
- k. Location and description of reference marks Yes No N/A
- l. Vertical datum (example: NGVD, NAVD) Yes No N/A
- m. Coastal zone designations tie into adjacent areas not being revised Yes No N/A
- n. Location and alignment of all coastal transects used to revise the coastal analyze Yes No N/A
- o. V-zone has been delineated to extend landward to the heel of the primary frontal dune Yes No N/A

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

2. What is the source and date of the updated topographic information (example: orthophoto maps, July 1985; filed survey, May 1979, beach profile, June 1987 etc.)? ACDC Area Drainage Master Study, July 1994; field survey, March 1999

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

Effective FIS Scale 1" = 200' Contour Interval 2'

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

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

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

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. EARTH FILL PLACEMENT

1. The fill is: Existing Proposed
2. Has fill been/will be placed in the regulatory floodway? Yes No
If Yes, please attach completed Riverine Hydraulic Analysis Form (Form 4).
3. Has fill been/will be placed in floodway fringe (*area between the floodway and 100-year floodplain boundaries*)? Yes No

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

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

If Yes, justify steeper slopes _____

- b. Is adequate erosion protection provided for fill slopes exposed to moving flood waters? (*Slopes exposed to flows with velocities of up to 5 feet per second (fps) during the 100-year flood must, at a minimum, be protected by a cover of grass, vines, weeds, or similar vegetation; slopes exposed to flows with velocities greater than 5 fps during the 100-year flood must, at a minimum, be protected by stone or rock riprap.*)

Yes No

If No, describe erosion protection provided _____

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

If Yes, attach certification of fill compaction (item 3c. above) by the community's NFIP permit official, a registered professional engineer, or an accredited soils engineer in accordance with Subparagraph 65.5(a)(6) of the NFIP regulations.

Fill certification attached Yes No

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

If Yes, is the fill protected from erosion by a flood control structure such as a revetment or seawall?

Yes No

If Yes, attach the Coastal Structures Form (Form 10).

Explanation of Results Indicated on MT-2 Form 4, page 2

Critical Depth

The model used to revise the 100-year water surface elevations contains four locations at which critical depth occurs. The first, at cross section 0.3, was an input boundary condition and represents the flow condition as Dreamy Draw Wash West spills into the ACDC. See section 5.1 for further details. The remaining three critical depths, at cross sections 13.33, 13.66 (both interpolated sections) and 14, were calculated by the model. The phenomena of critical depth in a wash as steep and relatively unobstructed as Dreamy Draw Wash West is not unrealistic.

5. Hydraulics

5.1 Method Description

Dreamy Draw Wash West drains a predominantly urbanized watershed in Phoenix, Arizona. The majority of the channel is in a natural state, however there are two instances where it crosses paved roads, first at the intersection of Belmont Avenue and 13th Street, and downstream at 12th Street. A mixture of hard-packed earth, gravel, small stones and various-sized weeds or brush are predominant in the composition of the natural portion of the wash's channel bottom. The channel is confined on either side for most of its length by intermittent brick, wood, and wire fencing, and in some areas by natural topography. Due to this confinement there are very few locations where significant overbank flow is possible. The boundaries of this re-study area run from approximately 300 feet upstream of the intersection of Belmont Avenue and 13th Street down the wash to the terminus of the wash at the ACDC. Approximate lateral bounds extend from the Myrtle Avenue alignment to the Griswold Road alignment.

The scope of this study specifies the use of the U.S. Army Corps of Engineers HEC-RAS River Analysis System, Version 2.2 dated September, 1998. Boundary conditions for the model were selected based on the reach's physical characteristics. At the downstream end to the reach, the flow spills over a weir into the ACDC. Therefore, critical depth was used to establish the starting water surface elevation at the downstream end.

5.2 Work Study Maps

The index map in Figure 5.1 below provides an overview of the study area, showing the surrounding streets and the Arizona Canal.

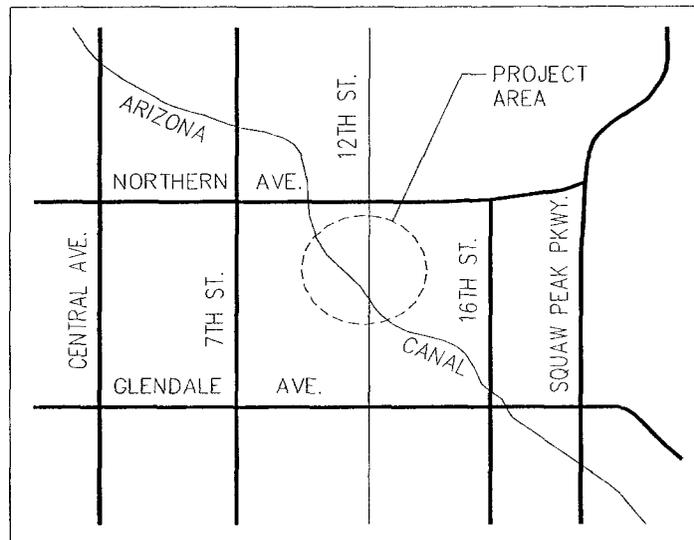


Figure 5.1 – Index Map of Study Area

A single work study map was produced for this re-study. An 11" by 17" print of the work map is included following page 3. The full size 24" by 36" plot is included in the Exhibit Maps section of this TDN following the Appendices. In order to maintain clarity and resolution, the 11" by 17" print only shows the local area surrounding the new delineation. The delineation from the existing Flood Insurance Rate Map (FIRM) extends some 2,090 feet northwest and another 3,000 feet southeast along the ACDC. The full size plot shows the areas not included in the 11" by 17" print and labels the study limits.

In the work study maps, the revised 100-year floodplain boundary is shown as a heavy solid line, and the 100-year floodplain from the existing FIRM panel is shown as a heavy dashed line. The thalweg of Dreamy Draw Wash West is shown as a thin dashed line. Each cross section is drawn in its true location and is labeled one through fourteen with the final computed water surface elevation. Major features, such as the Arizona Canal, ACDC, and relevant streets, are also shown. The 11" by 17" print is in color, with the features of revised floodplain, existing floodplain, and thalweg shown in blue, red, and magenta, respectively (with the same line types described above).

5.3 Parameter Estimation

5.3.1 Roughness Coefficients

Manning's roughness coefficients were established based on a field inspection. Photographs were taken of the entire reach (see Appendix E.1). The photos were used to help refine the estimate of Manning's- n . For the main channel, a Manning's- n of 0.035 was determined to be appropriate. Where the channel crossed or ran down a street, a Manning's- n of 0.025 was assigned. The 0.025 value was also used for the two most downstream cross sections (numbered 0.3 and 0.5) where the channel flows across an approximately fifteen foot wide pedestrian and bicycle path which runs along the north-east side of the ACDC. At cross section number 1.0, there is a concrete apron in the main channel for which a Manning's- n of 0.025 was also applied.

5.3.2 Expansion and Contraction Coefficients

For all cross sections, expansion coefficients were set at 0.3 and contraction coefficients were set at 0.1.

5.4 Cross Section Descriptions

The final HEC-RAS model has fourteen surveyed cross sections and sixteen interpolated cross sections. The interpolated cross sections were created within HEC-RAS using its built-in interpolation feature. Generating interpolated cross sections at specific locations was beneficial in the numerical calculations.

All cross sections were created from digital survey points provided by Collins/Piña under contract with the District. The data were provided in the form of AutoCAD drawings in which the surveyed points were superimposed over digitized topography from the ACDC ADMS dated July 11, 1994.

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF
DREAMY DRAW WASH WEST

F.C.D. CONTRACT NO. 1999C048
ASSIGNMENT NO. 3

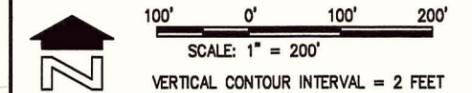
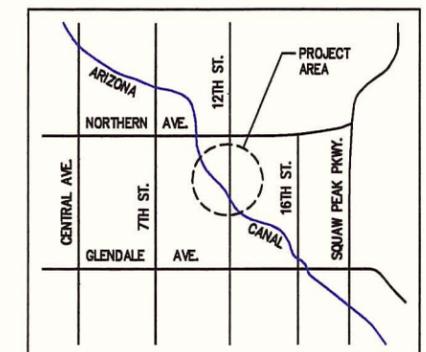
LEGEND

REVISED 100-YR FLOODPLAIN BOUNDARY	
EXISTING 100-YR FLOODPLAIN BOUNDARY	
HYDRAULIC BASELINE	
CROSS SECTION	
BASE FLOOD ELEVATIONS	
ZONE DESIGNATIONS	
SPOT ELEVATION MARKS	

NOTES

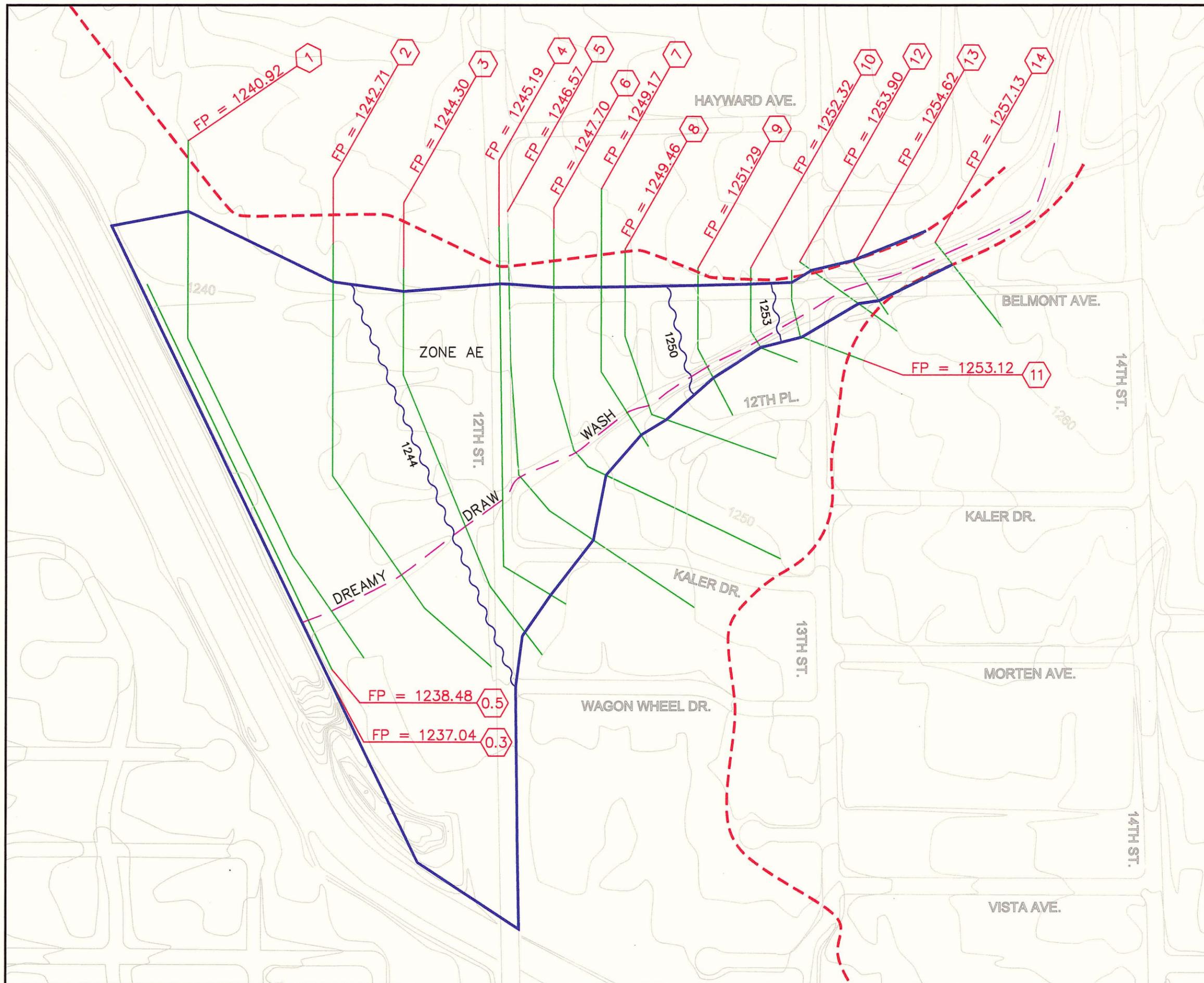
ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

INDEX MAP



WEST Consultants, Inc.

DESIGN	BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHECK	---	---	RECOMMENDED BY
PLANS	JEH	02/00	APPROVED BY
DESIGN CHECK	DLR	02/00	DATE
			ENGINEER AND SURVEYOR
			SHEET
			1 OF 1



Split flow occurs at the intersection of Belmont Avenue and 13th Street. A portion of the flow diverts down Belmont Avenue and enters the ACDC at a point approximately 800 feet northwest of where Dream Draw Wash West terminates. For this reason, field survey data for Belmont Avenue was obtained. At the direction of the District, a split flow analysis was not performed (see section 5.5.4 for more detail). At some locations the two sets of survey data were connected to form cross sections which spanned the entire width of the wash and Belmont Avenue. The area between the sets of surveyed points were modeled as ineffective flow (see section 5.5.5). An example of such a cross section is shown in Figure 5.2 below.

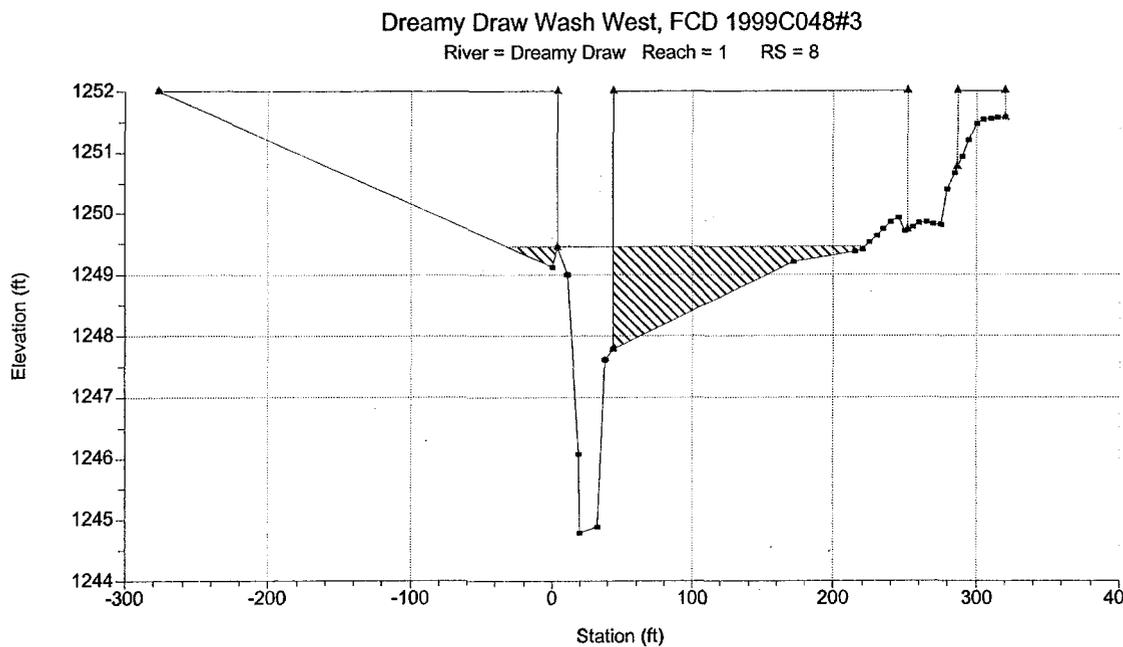


Figure 5.2 – Example of Connected Survey Data

In this example, the two sets of surveyed data are easily identified as the main channel and the right overbank section. The straight lines connecting the two sets of data (approximately between Stations 50 and 220 at this cross section) only reflect topography if a two-foot contour was crossed.

Figure 5.2 also illustrates the scenario in which the HEC-RAS computed water surface was beyond the lateral extents of the surveyed data points (in the right overbank at this cross section). In such cases, the topography was extended to the next two-foot contour.

5.5 Modeling Considerations

5.5.1 Hydraulic Jump and Drop Analysis

None identified.

5.5.2 Bridges and Culverts

None identified.

5.5.3 Levees and Dikes

None identified.

5.5.4 Islands and Split Flows

At the intersection of Belmont Avenue and 13th Street, the topographic and survey data indicated that split flow was a possibility. After conferring with the District, WEST was directed not to perform a split flow analysis. Instead, the portions of the model downstream from the intersection were modeled as one cross section with ineffective flow defined for the area between Belmont Avenue and the main channel of the wash. See section 5.4 for an explanation of the development of these cross sections.

5.5.5 Ineffective Flow Areas

The majority of the overbank area surrounding Dreamy Draw Wash West is a fully developed urban neighborhood. Bounding the wash on either side is typically a brick, stone, or wood fence at the edge of each property. While these yards may get wet during the 100-year peak event, the opportunity for flow conveyance in these areas is minimal. Because of this, points outside the banks of the wash were modeled with ineffective flow. Where a cross section intersects a street, the ineffective flow was not applied.

5.5.6 Supercritical Flow

None identified.

5.6 Floodway Modeling

The modeling of a floodway was not within the scope of this study.

5.7 Problems Encountered During the Study

5.7.1 Special Problems and Solutions

As mentioned in section 5.4, the two sets of survey data had to be combined to develop many of the cross sections in the model. By close inspection, the data from each set were lined up where appropriate to form cross sections that covered the full width of the wash.

Following preliminary hydraulic runs, it was found that the extent of the calculated water surface was beyond the lateral extent of the surveyed cross section data. This was remedied by extending the cross section data to the next two-foot contour which would encompass the water surface.

When it was determined there was flow down Belmont Avenue, the definition of ineffective flow areas had to be altered to reflect that added conveyance. The mapping provided from the ACDC ADMS study located the edges of the streets on the topographical map. From this, the location of Belmont Avenue in each cross section was determined and appropriate ineffective flow areas were coded into the geometry.

5.7.2 Modeling Warning and Error Messages

Most cross sections listed various warnings in the final run of the model. There were several instances where the model was unable to converge on a water surface elevation and defaulted to critical depth. Since the wash in general is fairly steep and unobstructed, this result is not unrealistic. Several locations indicated a velocity head or energy loss greater than the warning value and suggested more cross sections. Since more than half the cross sections in the final model are interpolated, it is unlikely that the addition of further interpolated cross sections will be of help.

5.8 Calibration

Dreamy Draw Wash West is an ungaged watershed, therefore calibration to historic events is not possible.

5.9 Final Results

5.9.1 Hydraulic Analysis Results

A summary table of hydraulic results is presented in Table 5.1 on page 7. The table summarizes the following variables by cross section: peak discharge, water surface elevation, critical water surface elevation, average channel velocity, top width, depth of flow at thalweg, Froude number, and stations for left and right edges of water surface.

The final plotted floodplain was established after adjusting two aspects of the output data from HEC-RAS. The first adjustment involved the model output along Belmont Avenue which had the floodplain limit moving back and forth across the edge of the street by ten to fifteen feet. The more realistic result, where the floodplain follows the north edge of the street, was instead applied to the final plotting. The second adjustment to the HEC-RAS model output involved the southern edge of the delineation along 12th Street. The raw model results would have the flow entirely contained within the cross section limits, cutting across 12th Street as it continues downstream to the ACDC. Further investigation of the area revealed that there was likely insufficient containment of the flow as it crosses 12th Street, and a portion of the flow could possibly divert down the street to the south. To account for this possibility, the District instructed WEST to alter the placement of the southerly edge of the floodplain, aligning it with the edge of 12th Street and extending south to the Arizona Canal.

5.9.2 Verification of Results

The results of this modeling effort are reasonable and well within expected parameters.

The re-study of Dreamy Draw Wash West resulted in a reduction of the 100-year floodplain. The prior Zone-A approximation was unable to accurately reflect the true size and shape of the floodplain because it did not account for the presence of the ACDC. The re-study shows the ACDC effectively alleviates the ponding of floodwaters against the banks of the Arizona Canal.

6. Erosion and Sediment Transport

Erosion and sediment transport are issues beyond the scope of this study and were therefore not addressed in this analysis.

HEC-RAS Plan: JEH-2 River: Dreamy Draw Reach: 1									
River Sta	Q Total (cfs)	W.S. Elev (ft)	Crit W.S. (ft)	Vel Chnl (ft/s)	Top Width (ft)	Max Flow Depth (ft)	Froude # Chl	Sta W.S. Lft (ft)	Sta W.S. Rgt (ft)
0.3	1000	1237.04	1237.04	6.63	1470.0	1.56	1.00	-480.0	990.0
0.5	1000	1238.48	1238.48	8.34	261.5	2.58	0.95	-10.0	809.5
1	1000	1240.92	1240.92	8.34	866.3	3.78	0.97	3.0	940.1
1.333*	1000	1241.55	1241.41	7.43	861.5	3.49	0.88	-3.3	858.3
1.666*	1000	1242.24	1242.11	6.97	803.7	3.25	0.82	-22.4	781.4
2	1000	1242.71	1242.70	7.72	711.2	2.80	0.92	-52.3	669.7
2.333*	1000	1243.50	1243.19	6.49	755.5	3.36	0.72	-100.5	655.0
2.666*	1000	1243.88	1243.55	6.75	706.2	3.51	0.74	-73.5	632.7
3	1000	1244.30	1243.83	6.63	661.9	3.70	0.71	-44.3	617.6
3.5*	1000	1244.60	1244.60	7.68	557.5	2.74	0.91	-62.9	560.2
4	1000	1245.19	1245.00	6.84	495.0	2.07	0.86	-102.5	392.5
5	1000	1246.57	1246.57	7.12	617.4	2.87	0.84	-138.7	478.7
5.333*	1000	1247.07	1246.78	6.33	565.1	3.53	0.68	-128.2	436.9
5.666*	1000	1247.13	1247.13	8.20	445.0	3.75	0.87	-57.2	387.8
6	1000	1247.70	1247.70	8.54	434.5	4.48	0.83	-69.6	368.9
6.333*	1000	1248.27	1248.27	8.16	441.8	4.59	0.77	-75.3	371.9
6.666*	1000	1248.42	1248.42	9.65	320.8	4.28	0.93	-39.1	347.9
7	1000	1249.17	1248.99	8.56	352.5	4.57	0.78	-24.4	361.9
8	1000	1249.46	1249.46	9.85	254.8	4.68	0.92	-32.6	222.2
8.333*	1000	1250.01	1250.01	10.15	168.0	4.92	0.95	-6.4	162.6
8.666*	1000	1250.89	1250.39	8.85	211.5	5.50	0.78	-5.6	230.1
9	1000	1251.29	1250.54	8.70	133.7	5.59	0.76	5.8	206.3
9.5*	1000	1251.64	1250.95	9.23	79.3	5.78	0.76	2.5	169.0
10	1000	1252.32	1251.34	8.50	137.9	6.29	0.64	1.0	138.9
10.5*	1000	1252.78	1251.98	7.38	133.0	5.39	0.62	-5.4	127.5
11	1000	1253.12	1253.12	7.99	117.8	4.37	0.78	-3.2	114.6
11.5*	1000	1253.89	1252.87	4.92	126.4	3.86	0.51	7.1	133.4
12	1000	1253.90	1253.66	6.04	120.2	2.59	0.82	25.8	146.0
13	1000	1254.62	1254.62	8.77	58.6	3.17	0.99	34.3	92.9
13.333*	1000	1255.54	1255.54	8.84	51.9	3.64	1.00	53.1	105.0
13.666*	1000	1256.37	1256.37	9.03	43.6	4.02	1.00	73.3	116.9
14	1000	1257.13	1257.13	9.28	40.3	4.33	1.00	88.1	128.5

Note: * Denotes cross section with interpolated geometry

Table 5.1 – HEC-RAS Output

7. Draft FIS Report Data

7.1 Summary of Discharges

Only the 100-year peak flow event of 1,000 cubic feet per second was used in this study.

7.2 Floodway Data

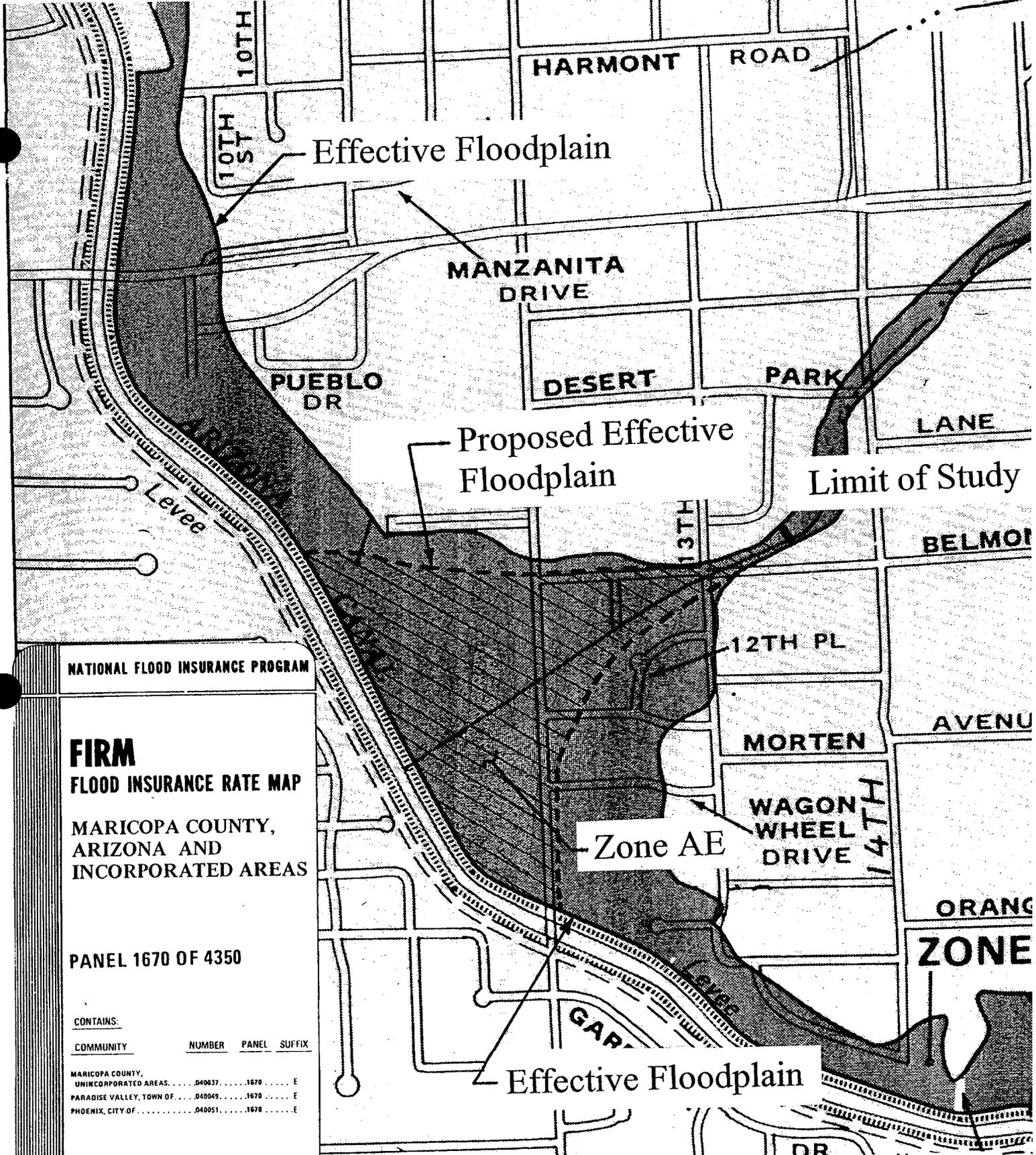
Floodway analysis is beyond the scope of this study.

7.3 Annotated Flood Insurance Rate Maps

A draft Flood Insurance Rate Map is included on the following page.

7.4 Flood Profiles

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



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

MARICOPA COUNTY,
UNINCORPORATED AREAS0400371670E
PARADISE VALLEY, TOWN OF0400491670E
PHOENIX, CITY OF0400511670E

MAP NUMBER
04013C1670 E

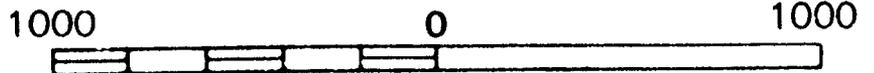
MAP REVISED:
SEPTEMBER 30, 1995



Federal Emergency Management Agency

Effective Floodplain

APPROXIMATE SCALE IN FEET



Proposed Effective Floodplain
Based on May 25, 2000 Study

Appendix A

A.1 Data Collection Summary
(Not applicable, not included)

A.2 Referenced Documents
Included on following page.

References

1. U.S. Army Corps of Engineers, "HEC-RAS User's Manual," Version 2.2, September 1998.
2. U.S. Army Corps of Engineers, "HEC-RAS Hydraulic Reference Manual," Version 2.2, September 1998.
3. Arizona Department of Water Resources, Flood Mitigation Section, "Requirements for Flood Study Technical Documentation," State Standard SS1-97, November 1997.
4. WEST Consultants, Inc., "LOMR for Dreamy Draw Wash West, Technical Data Notebook," FCD Contract Number 96-12, (Unpublished).
5. Chih Ted Yang, "Sediment Transport – Theory and Practice," The McGraw-Hill Companies, Inc., 1996.
6. U.S. Army Corp of Engineers, "Design Memorandum No. 1 – Feature Design for Dreamy Draw Dam Supplemental Report," July 1979. *(Referenced by FCDMC for hydrology)*
7. U.S. Army Corp of Engineers, "Gila River Basin, New River and Phoenix City Streams, Arizona – Design Memorandum No. 2, Hydrology, Part 2," 1982. *(Referenced by FCDMC for hydrology)*
8. U.S. Army Corp of Engineers, "Arizona Canal Diversion Channel, 40th Street to Cactus Road – Design Memorandum No. 12, Feature Design," April 1986. *(Referenced by FCDMC for hydrology)*
9. Kaminski-Hubbard Engineering, "Arizona Canal Diversion Channel Area Drainage Master Study Phase I, Volume 1.8, Hydrology Report," November 1994. *(Referenced by FCDMC for hydrology)*

Appendix B

- B.1 Special Problem Reports.
(Not applicable, not included)
- B.2 Contact (Telephone) Reports
(Not applicable, not included)
- B.3 Meeting Minutes or Reports
(Not applicable, not included)
- B.4 General Correspondence
Included in following pages.
- B.5 Contract Documents
Included in following pages.



WEST Consultants, Inc.
4500 South Lakeshore Drive
Suite 210
Tempe, Arizona 85282

F A X T R A N S M I T T A L

DATE:	03/13/2000	TIME:	3:53 PM
TO:	Michael Duncan	PHONE:	602.506.4732
	FCD MC	FAX:	602.506.7346
FROM:	James E. Heyen	PHONE:	(480) 345-2155
		FAX:	(480) 345-2156

SUBJECT: DREAMY DRAW WASH WEST

TOTAL NUMBER OF PAGES INCLUDING COVER SHEET: 3

COMMENTS:

Mike,

I've finished the alterations to Dreamy Draw Wash. Ineffective flow definitions were altered at cross section 3.5 per our discussion. I also lined up the ineffective flow definitions at some of the cross sections downstream of that point a little better with the apparent banks of the wash – nothing significant, just a couple of feet either way. It had virtually no effect on the outcome of the model. I've plotted on 11x17 the new floodplain with the "smoothing out" of the bound along the north side of Belmont Avenue. Have a look and let me know if this matches what you had in mind.

James

Phone Record

3/10/00
~ 3:00pm

Speaking w/ Michael Duncan, FCDMC

re: Dreamy Draw Wash West

> discussed some mapping (plotting) issues

> minor model alterations:

RS. 3.5 correct ineffective flow definition
to better match banks.

> plotting should include tie-in w/ studies to
the north + south along the ACDC.

need to rotate viewport in drawing to fit
onto sheet.

> send back over to Mike one last time before
fill size plots + TDN. (fax on Monday)

February 29, 2000

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

From: James Heyen, E.I.T., WEST Consultants, Inc.

Subject: Contract No. FCD 96-12 Dreamy Draw Wash West Floodplain Delineation

Included is a diskette with the first cut at Dreamy Draw Wash for your review and comment.

This document is to address the 'Review Comments for the Technical Data Notebook' dated September 28, 1999 and to give a general overview of the changes made to the HEC-RAS model.

Review Comments are listed first, in the same order as your document. Results and comments follow at the end of the document.

TIE-INS TO SURROUNDING STUDIES AND FLOODPLAINS

- 1. At the upstream end, Cross Section Station 14, the revised floodplain is plotted with a width of about 40 feet, but the existing FIRM at that point shows a width of about 100 feet.*

While the southern edge of the proposed Zone AE delineation ties in nicely with the existing F.I.R.M., the north side does not. The results at cross sections 13 and 14 could be adjusted (widened) to tie in with the F.I.R.M. I thought it best to wait for your suggestion on this point.

- 2. The "preliminary delineation" (work map) should indicate the full extent of the portions of the FIRM floodplain along the ACDC that will be revised by this study. Any proposed transitions of floodplain will need to be shown at both ends along the ACDC. There is a LOMR to the southeast at Dreamy Draw Wash East/Myrtle Ave. Wash, and there is a LOMR to the north at Tenth Street Wash. The size of the work map will need to be enlarged to cover both ends along the ACDC.*

I used the fax you sent over to reproduce the full extent of the existing FIRM Zone A delineation. A small portion of the north edge is just off page at the 1"=200' scale.

HEC-RAS GEOMETRIC PROBLEMS

The geometric data were adjusted throughout the model. Beginning with the Collins Piña data, several of the cross sections were corrected so they would line up better with the surveyed data points. This information was then used to correct the HEC-RAS geometry accordingly.

- 3. Cross sections with vertical projections to the computed water surface elevations Both ends of each cross section need to reflect the actual terrain.*

All cross sections at which the computed water surface extended laterally beyond the edges of the surveyed data were extended to the next contour. While the smaller flow rate lowered the computed water surface elevation through the majority of the model, it was still necessary to extend ten of the surveyed cross sections.

- 4. Cross section 5.5 issues...*

The revised geometry no longer has a cross section 5.5. In general, all cross sections that cross Belmont Ave. have been adjusted to reflect the proper width of the street (~35 feet).

Regarding the variation in flow velocity in the cross sections bounding 5.5, similar results were found with the new geometry at cross section 5.333. HEC-RAS output lists the computed water surface elevation at both bounding cross sections (5.0 and 5.666) at being equal to the critical water surface elevation. Section 5.333 is not so. Apparently, in the computation process the two bounding cross sections resulted in critical depth solutions, while section 5.333 was found to be sub-critical. This would naturally lead to slower velocity and perhaps a higher water surface elevation at section 5.333 than in the two critical sections bounding it.

- 5. Cross sections with inaccurate horizontal distances...*
- 6. Plotted floodplain boundaries vs. HEC-RAS results at various locations...*
- 7. Work map cross sections need to be extended to the floodplain boundaries...*

With the revision to the geometry described just above comment number 3 above the discrepancies listed in these two comments were corrected.

TYPOGRAPHICAL ERRORS

All typographical errors listed have been or will be corrected in the revised Exhibit Map and TDN.

MISSING ITEMS

All missing items will be included in revised TDN.

General Comments on Revised HEC-RAS Model

The revision of the model geometry started with revisiting the Collins Piña survey data. It became evident that the exhibit map was not properly drawn and did not give an especially accurate representation of the cross section location and orientation. This was corrected by adjusting the cross section data stationing (horizontal control) to line up with the true location of the survey points. This corrected the majority of the issues listed in your review comments regarding geometry.

The revised exhibit map represents the raw output from HEC-RAS. It has not been adjusted to follow along the edges of streets or any other features.

The two furthest downstream cross sections (0.3 and 0.5) were originally developed from the construction plans of the ACDC. They do not extend laterally far enough to encompass the entire flow. The computed water surface elevation was therefore projected out to the next highest elevation contour.

Model concerns:

The reduction of flow from the original model results in an interesting question regarding Belmont Avenue. The cross sections at the intersection of Belmont and 13th Street show a water surface elevation high enough to allow some flow down Belmont Avenue. However, due to the geometry and the one-dimensional nature of HEC-RAS, there are several cross sections further downstream where the flow is below the elevation of Belmont Avenue. See output for cross sections 9.5, 8.333, 8, and 4.

This raises the question of whether or not a split flow analysis is necessary to ensure physically realistic model results.

There are several locations along the reach where the computations in HEC-RAS were unable to come up with a valid sub-critical solution and the model defaulted to critical depth. See cross sections 1, 2, 3.5, 5, 5.666, 6, 6.333, 6.666, 8, 8.333, 11, 13, 13.333, 13.666, and 14.

On the question of ponding or lateral flow along the ACDC, there is none evident from the initial model results.

Regarding tie-ins at the edges of the model along the ACDC, at the present sheet size and drawing scale (24x36, 1"=200'), the northern edge of the existing Zone-A delineation is just off page. Possible solutions would be bumping up to a different drawing scale, however that would leave a great deal of empty space on the plot. We would also like more input on how FCD would prefer to represent the tie-ins to the studies to the north and south (10th Street Wash and Dreamy Draw Wash East/Myrtle Ave. Wash).

Fax Cover Sheet

FLOOD CONTROL DISTRICT
OF
MARICOPA COUNTY



2801 West Durango Street
Phoenix, Arizona 85009
Telephone (602)506-1501
Fax (602)506-7346
TDD (602)506-5897

FLOODPLAIN MANAGEMENT BRANCH
DELIMITATION

To: JAMES HAYEN

Company or Department: WEST CONSULTANTS

Fax Number: 480-345-2156

From: MIKE DUNCAN 602-506-4732 Date: 2-25-00

Number of pages being sent including cover sheet: 3

If there are any problems or questions, please call (602)506-1501

Comments:

HERE ARE THE LOMR ATTACHMENTS FOR FIRM PANEL NO. 1670 E

TENN STREET WASH LOMR DATED FEB 03 1998 (WEST CONSULTANTS)

MYRTLE AVENUE WASH LOMR DATED AUG 07 1997 (BASED ON MYRTLE AV. WASH

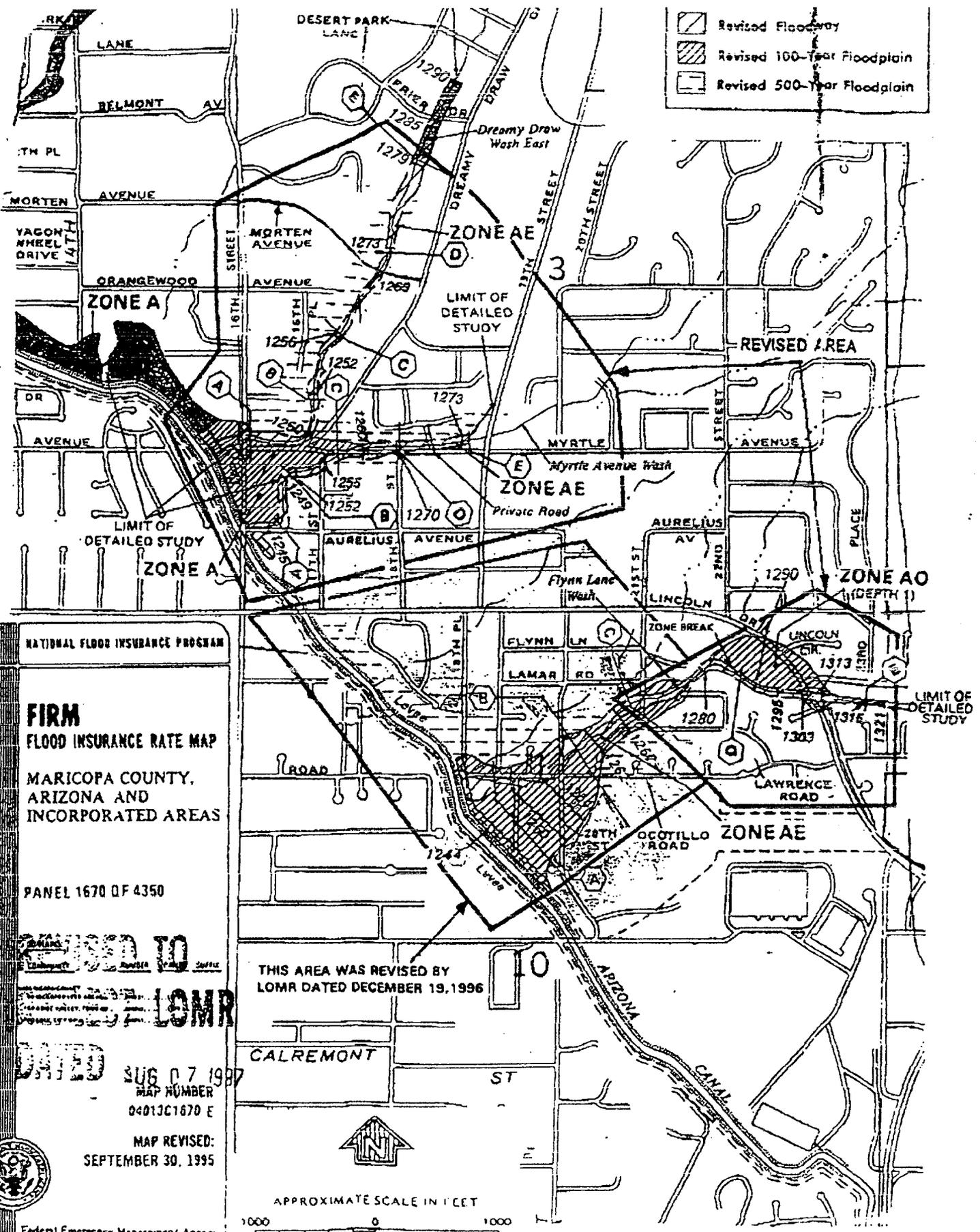
STUDY BY David Evans & Assoc., and Dreamy Draw Wash East study by D.E.A.)

THE WHITE STRIPE FOR LIMIT OF DETAILED STUDY THAT IS 200 FT. EAST OF 14TH ST.

IS FROM THE PREVIOUS F.I.R.M., NOT THE LOMR STUDIES.

LET ME KNOW WHAT ELSE YOU NEED.

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



REVISION TO

LOMR

DATE AUG 07 1997

MAP NUMBER
04013C1670 E

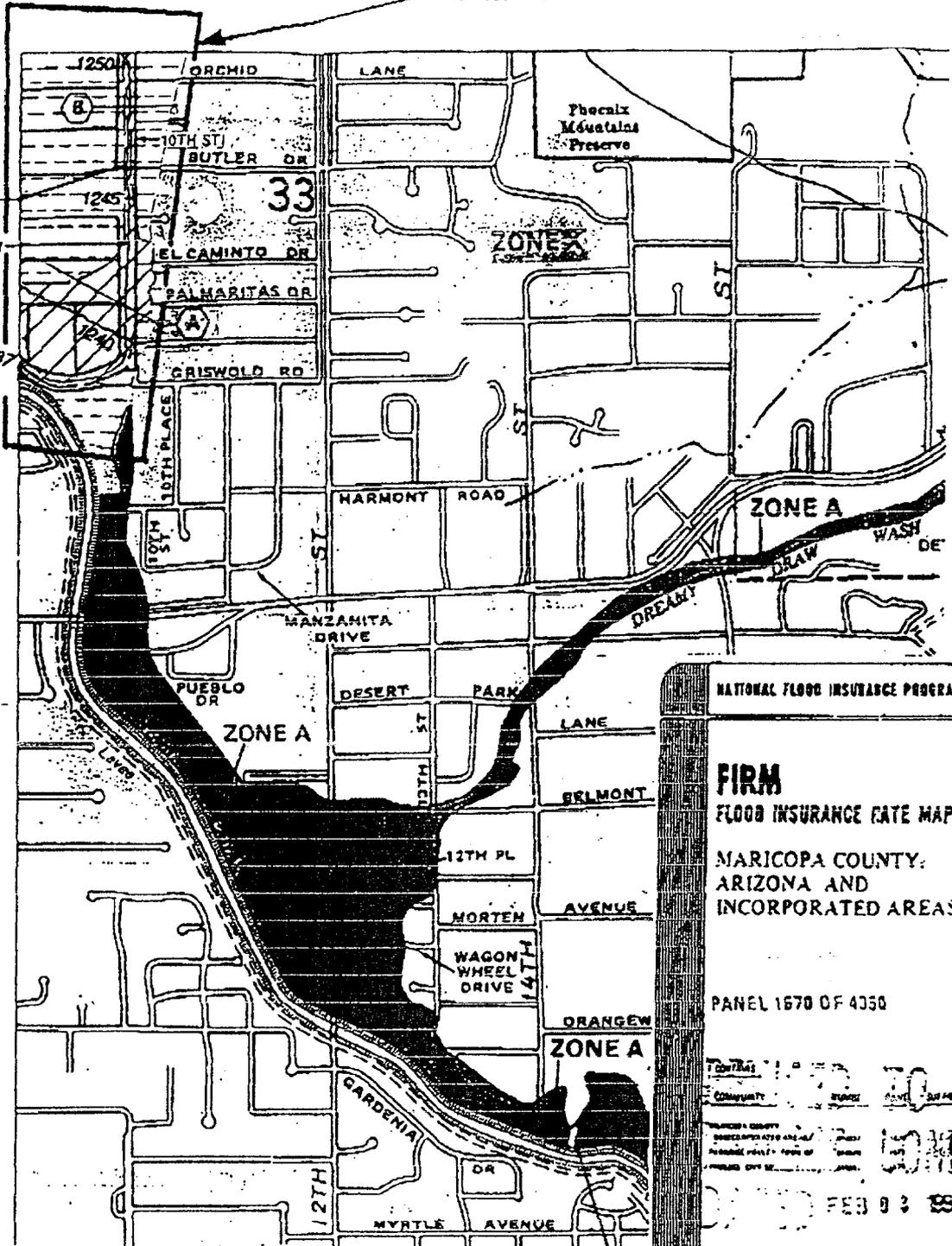
MAP REVISED:
SEPTEMBER 30, 1995

Federal Emergency Management Agency

REVISED AREA

ZONE AE

Tenth Street Wash



MAP LEGEND

-  Revised Floodway
-  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.



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY,
ARIZONA AND
INCORPORATED AREAS

PANEL 1670 OF 4350

DATE: FEB 03 1998

MAP NUMBER
04013CT670 E

MAP REVISED:
SEPTEMBER 30, 1995



Federal Emergency Management Agency

Fax Cover Sheet

FLOOD CONTROL DISTRICT
OF
MARICOPA COUNTY



2801 West Durango Street
Phoenix, Arizona 85009
Telephone (602)506-1501
Fax (602)506-7346
TDD (602)506-5897

FLOODPLAIN MANAGEMENT BRANCH

To: JAMES NGYEN

Company or Department: WEST CONSULTANTS

Fax Number: 480-345-2156

From: MIKE DUNNAN 602-506-4732 Date: 2-2-00

Number of pages being sent including cover sheet: 7

If there are any problems or questions, please call (602)506-1501

Comments: _____

HERE IS THE NOTICE TO PROCEED ITEMS FOR
DRENNY DRAW WITH WEST at ACDC THAT WE
ARE MAILING TO YOU.



Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009-6399
(602) 506-1501
Fax (602) 506-4801

LETTER OF TRANSMITTAL

TO: Dennis Richards
West Consultants, Inc.
4500 S. Lakeshore Drive, Suite 210
Tempe, AZ 85282

January 27, 2000

SUBJECT: Contract No. 1999C048
Assignment No. 3
LOMR Package for Zone AE Floodplain Without Floodway at
Dreamy Draw Wash West at ACDC

WE ARE SENDING YOU THE FOLLOWING ITEMS:
(X) Enclosed () Under separate cover

Shop Drawings	Prints	Legal Description	Samples
Specification	Change Order	Copy of Letter	Plans
X Notice to Proceed			
X Certificate of Performance			
X Scope of Work			

THESE ARE TRANSMITTED:

For Approval	Approved as submitted
X For your use	Approved as noted
As requested	Returned for corrections
Resubmit () copies for approval	For review and comments
Submit () copies for distribution	Return () corrected prints
FOR ESTIMATE DUE:	Borrowed prints being returned

Remarks: Please specify assignment number on all correspondence.

SIGNED: Michael Duncan
Michael Duncan, P.E.
Civil Engineer



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

NOTICE TO PROCEED

TO: Dennis Richards
West Consultants, Inc.

January 27, 2000

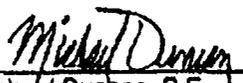
SUBJECT: PCN 01400.28.10
FCD Contract No. 1999C048
Assignment No. 3
LOMR Package for Zone AE Floodplain Without Floodway at
Dreamy Draw Wash West at ACDC

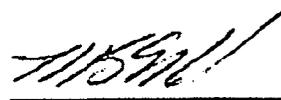
Your not-to-exceed cost estimate of \$ 3,834.00 for Assignment No. 3 has been received and accepted for this project. You are hereby authorized to proceed with the work for the referenced project as originally described in the attached Scope of Work. Please specify the assignment number on all related correspondence. Invoices should be sent to the attention of Linda Hannan of our accounting department.

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

I have enclosed a Certificate of Performance for this assignment. When you have completed all of the duties related to this project, please return the completed, notarized certificate to me. Feel free to call me if you have any questions.

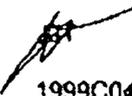
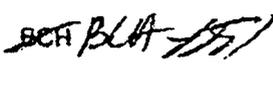
SIGNED:


Michael Duncan, P.E.
Civil Engineer


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

Copy to: LRH (Finance), BCH (Contracts), MWD (Engrg.)

COORD:

  BCH BLA 

FILE:

1999C048

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

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

Company understands that with receipt of payment for previously invoiced amounts plus any retained funds, that this is a settlement of all claims of every nature and kind against the FCDMC arising out of the performance of the FCDMC's specific assignment through FCDMC Contract 1999C048 for Assignment No. 1 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 _____, _____

Signature

Title: _____

SUBSCRIBED AND SWORN TO before me this _____ day of _____, _____

Notary Public

My Commission Expires: _____



WEST Consultants, Inc.
4500 South Lakeshore Drive
Suite 210
Tempe, Arizona 85282

F A X T R A N S M I T T A L

DATE:	10/05/99	TIME:	11:16 AM
TO:	Michael Duncan	PHONE:	602-506-4732
		FAX:	602-506-7346
FROM:	James E. Heyen	PHONE:	(480) 345-2155
		FAX:	(480) 345-2156

SUBJECT: DREAMY DRAW WASH HEC-2 OUTPUT

TOTAL NUMBER OF PAGES INCLUDING COVER SHEET: 4

COMMENTS:

Michael,

Per our meeting this morning, here is a copy of the first page of the HEC-2 output file and the cover page that accompanied it. It appears as two pages in this FAX, as I had to fold the 11x17 in half.

Let me know if there are any other pages from the output that could be of use to you and I'll FAX them over.

When you figure out what the city wants to do from this point on, give us a call. In the mean time, I'll be reviewing your comments and looking at the model.

James

THIS RUN EXECUTED 12 OCT 78 15,30,29

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ERROR CORR = 01,02

MODIFICATION = 50,51,52,53

C

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T3 100-YEAR OVERFLOW

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SECTION THRU TOP OF SERVICE ROAD ALONG NORTH ARIZ. CANAL BA

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SECTION THRU APARTMENT BLDG. BORDERING ARIZ. CANAL. BLDG. BLOC

WEST PROPERTY SIDE AND REAR BLOCK WALL FAIL. DUE TO HIGH WA

CREEKED FILLED WITH SEDIMENT TO LEVEL OF NORTH ARIZ. CANAL

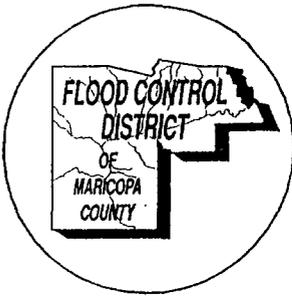
X1 .020 77,000 1975,000 2020,000 60,000 6

GR 1242,000 500,000 1240,000 860,000 1240,000 94

GR 1260,000 1100,000 1260,000 1180,000 1241,800 118

GR 1260,000 1330,000 1240,400 1330,000 1241,600 139

GR 1241,600 1550,000 1241,600 1560,000 1260,000 156



FLOOD CONTROL DISTRICT of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009
(602) 506-1501 (Office)
(602) 506-7346 (Fax)

September 28, 1999

Martin J. Teal, P.E., P.H.
WEST Consultants, Inc.
4500 South Lakeshore Drive, Suite 210
Tempe, AZ 85282

FROM: Michael W. Duncan, P.E., Project Manager

VIA: Joe Tram, P.E., Manager of Floodplain Delineation and Special Projects Branch

SUBJECT: Contract No. FCD 96-12 Dreamy Draw Wash West Floodplain Delineation Study
Review Comments for Technical Data Notebook

TIE-INS TO SURROUNDING STUDIES AND FLOODPLAINS

1. At the upstream end, Cross Section Station 14, the revised floodplain is plotted with a width of about 40 feet, but the existing F.I.R.M. at that point shows a width of about 100 feet.
- in a channel + true
2. The "preliminary delineation" (work map) should indicate the full extent of the portions of the FIRM floodplain along the ACDC that will be revised by this study. Any proposed transitions of floodplain will need to be shown at both ends along the ACDC. There is a LOMR to the southeast at Dreamy Draw Wash East / Myrtle Ave. Wash, and there is a LOMR to the north at Tenth Street Wash. The size of the work map will need to be enlarged, to cover both ends along the ACDC.

HEC-RAS GEOMETRIC PROBLEMS

3. At cross-sections 1, 1.5, 2, 2.33, 4, 5.5, 6, 6.5, and 7, cross-section end points are extended vertically to reach the computed water surface elevations. When this occurs, the result is not the true width of the floodplain. Both ends of each cross-section need to reflect the actual terrain.
4. At cross-section 5.5, the width of the effective flow area for Belmont Ave. is modeled as 52 feet, but it is only 31 ft. at cross-sec. 6 and only 37 ft. at cross-sec. 5. Also, the average velocity at cross-sec. 5.5 is much lower than just upstream and just downstream. Please correct or explain.

125:37

5. The following cross-sections have inaccurate horizontal distances between the bottom of the wash and the centerline of Belmont Avenue:

Cross-section No.	Horizontal Distance from HEC-RAS	Actual Horizontal Distance
3	437 ft.	~490 ft.
4	337	~410
5	356	~390
8	181	~230
8.5	114	~180
9	98	~160

DISCREPANCIES BETWEEN HEC-RAS AND PLOTTED FLOODPLAIN

6. The plotted floodplain boundaries do not match the HEC-RAS results at the following locations:

Cross-Section Number	Horizontal Distance from deepest point of wash to left edge		Horizontal Distance from centerline of Belmont to right edge		Top width of Floodplain	
	Plotted	From HEC-RAS	Plotted	From HEC-RAS	Plotted	From HEC-RAS
3	275 ft	247				
4	450	300 *				
5	420	443	15	47		
6			15	at least 72		
7	80	over 480			365	792
8	35	173			280	364
9			15	34		
10			10	24		
11	130	162	75 ft from wash bot.	86 ft from wash bot.		
12					100	155

* -- from water surface elevation intersection with contour

7. On the work map, cross-sections 3, 4, 6, 7, 9, 10, and 11 need to be extended to the floodplain boundaries.

TYPOGRAPHICAL ERRORS

8. On page 5, section 5.1, last sentence of first paragraph, should read "intersection of Belmont Avenue and 13th Street" rather than "intersection of Belmont and 13th Streets."
9. At FEMA MT-2 Form 1 Page 1 of 2, item 5, the example lines for Katy and Harris County should be removed.

sheet 3, review comments for Dreamy Draw Wash West, 9-28-99

10. On the exhibit map, 14th Street is labeled as 13th Street.

MISSING ITEMS

11. Diskette of the HEC-~~2~~^{RAS} model

12. Reference to a specific study is needed at Section 4 Hydrology, page 5.

13. Appendix E.1, roughness coefficient value report and photos (mentioned on page 5, section 5.3.1)

14. Annotated FIRMs (referred to at page 8, section 7.3)

scanned ok if clear enough

15. Field survey notes from Collins/Pina (Appendix C)

16. At FEMA form MT-2 Form 1 Page 2 of 2, item 6, fee amount is missing.

**SCOPE OF ASSIGNMENT
DREAMY DRAW WASH WEST AT ACDC
LOMR PACKAGE FOR ZONE AE FLOODPLAIN WITHOUT FLOODWAY**

FCD Contract No. 1999C048

January 14, 2000

Assignment # 3

A. GENERAL

The existing Flood Insurance Rate Map floodplain for Dreamy Draw Wash West is a Zone A (approximate) and does not reflect the presence of the Arizona Canal Diversion Channel (ACDC). This Assignment is for a detailed Zone-AE-type re-study of this floodplain, but without a floodway analysis. The extent of this re-study shall be along the northeast side of the ACDC from approximately the Myrtle Avenue alignment to approximately the Griswold Road alignment, and upstream to approximately 300 feet northeast of the intersection of 13th Street and Belmont Avenue. The surveying, hydraulic modeling, and other work done for this floodplain under a previous on-call engineering contract (FCD 96-12) will be used as the basis for this Assignment. All work under this Scope of Assignment shall be completed within 150 calendar days from the date of Notice to Proceed, including 30 calendar days for District review.

= May 20th for submittal of report

B. HYDROLOGY

The design flowrate for this assignment is 1,000 cfs. The references for this flowrate are:

- > Design Memorandum No. 1 Feature Design for Dreamy Draw Dam Supplemental Report, U.S. Army Corps of Engineers, July 1979, p. 3;
- > Gila River Basin, New River and Phoenix City Streams, Arizona, Design Memorandum No. 2, Hydrology, Part 2, U.S.A.C.o.E., 1982, p. 31;
- > Arizona Canal Diversion Channel, 40th Street to Cactus Road, Design Memorandum No. 12, Feature Design, U.S.A.C.o.E., April 1986, p. 35; and
- > Arizona Canal Diversion Channel Area Drainage Master Study Phase I, Volume 1.8, Hydrology Report, Kaminski-Hubbard Engineering, November 1994, p. 2.

C. TASKS

1. Revise hydraulic cross-sections and modeling to address the FCD review comments of September 28, 1999, and to reflect the new flowrate of 1,000 cfs. HEC-RAS Version 2.2 should be used for the modeling. The level of analysis will be that required to produce a Zone AE floodplain and without a floodway analysis.
2. Submit a diskette of the revised model and a paper copy of a draft floodplain work study map with a scale of 1 inch = 200 feet of the subject study area to the FCD project manager for review.
3. After approval of the items of Task 2 by the FCD project manager, prepare and submit the following to FCD:
 - A. One copy of Technical Data Notebook (TDN), prepared according to ADWR State Standard SSA1-97.
 - B. A CD or diskette of the floodplain information of the floodplain work study map in CADD format, according to FCD's CADD Data Delivery Specifications Rev. 1.0 January 2000.

HIS required themes?

4. After approval of the items of Task 3 by FCD, prepare and submit the following:
 - A. Two (2) copies of the TDN, prepared according to ADWR State Standard SSA1-97. This submittal item should include two (2) copies of completed FEMA forms and two (2) copies of annotated FIRM(s) with the proposed delineation.
 - B. Two (2) paper copies of the floodplain work study map with a scale of 1 inch = 200 feet.
 - C. Two (2) electronic copies of hydraulic model on CD or diskette.
 - D. Two (2) electronic copies of the floodplain CADD information of the floodplain work study map on CD or diskette.

5. After issuance of the resulting LOMR by FEMA, the following shall be submitted for the Final Submittal:
 - A. Three (3) complete copies of TDN, prepared according to ADWR State Standard SSA1-97. This submittal of the TDN shall include any correspondence and/or meeting with the reviewing agencies, and shall reflect any revisions required by those reviewing agencies. Revisions may include, but are not limited to, modifications to the delineation maps and the hydraulic analyses.
 - B. Three (3) paper copies of the floodplain work study map with a scale of 1 inch = 200 feet.
 - C. Three (3) electronic copies of the hydraulic model on CD or diskette.
 - D. Three (3) electronic copies of the floodplain CADD information of the floodplain work study map on CD or diskette.

COLLINS/PIÑA
 CONSULTING ENGINEERS, INC.
 40 EAST VIRGINIA AVENUE, SUITE 200
 PHOENIX, ARIZONA 85004

LETTER OF TRANSMITTAL

Phone (602) 264-7505

DATE: 3/17/99	JOB NO. 4037
ATTENTION: Martin J. Teal	

TO West Consultants, Inc.
11848 Bernardo Plaza Court, Suite 140-B
San Diego, CA 92128-2417

- WE ARE SENDING YOU Attached Under separate cover via e-mail the following items:
- Shop drawings Prints Plans Samples Specifications
- Copy of letter Change order Disk

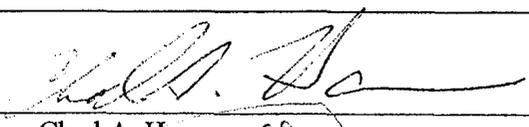
COPIES	DATE	NO.	DESCRIPTION
1	3/17/99		Disk: File 4037-2.dwg.

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 4037

SIGNED: 
 Chad A. Hanson

3-25-99 Chad - HEC-2 format.

IF ENCLOSURES ARE NOT AS NOTED, PLEASE NOTIFY US AT ONCE

3-25-99 - asked Art for HEC-2 format, he is checking on -

Art Witzell

3-26 - NA

3-29 - NA/LM.

COLLINS/PIÑA
 CONSULTING ENGINEERS, INC.
 40 EAST VIRGINIA AVENUE, SUITE 200
 PHOENIX, ARIZONA 85004

LETTER OF TRANSMITTAL

Phone (602) 264-7505

DATE: 9/24/98	JOB NO. 4037
ATTENTION: Martin Teal	
RE: Dreamy Draw	

TO West Consultants, Inc.
11848 Bernardo Plaza Court, Suite 140B
San Diego, CA 92128-2417

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	9/24/98		Disk and descriptive codes

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: 4037 SIGNED: Arthur A. Witzell
 Arthur A. Witzell

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

**SCOPE OF ASSIGNMENT
DREAMY DRAW WASH WEST AT ACDC
LOMR PACKAGE FOR ZONE AE FLOODPLAIN WITHOUT FLOODWAY**

FCD Contract No. 1999C048
January 14, 2000
Assignment # 3

A. GENERAL

The existing Flood Insurance Rate Map floodplain for Dreamy Draw Wash West is a Zone A (approximate) and does not reflect the presence of the Arizona Canal Diversion Channel (ACDC). This Assignment is for a detailed Zone-AE-type re-study of this floodplain, but without a floodway analysis. The extent of this re-study shall be along the northeast side of the ACDC from approximately the Myrtle Avenue alignment to approximately the Griswold Road alignment, and upstream to approximately 300 feet northeast of the intersection of 13th Street and Belmont Avenue. The surveying, hydraulic modeling, and other work done for this floodplain under a previous on-call engineering contract (FCD 96-12) will be used as the basis for this Assignment. All work under this Scope of Assignment shall be completed within 150 calendar days from the date of Notice to Proceed, including 30 calendar days for District review.

B. HYDROLOGY

The design flowrate for this assignment is 1,000 cfs. The references for this flowrate are:

- > Design Memorandum No. 1 Feature Design for Dreamy Draw Dam Supplemental Report, U.S. Army Corps of Engineers, July 1979, p. 3;
- > Gila River Basin, New River and Phoenix City Streams, Arizona, Design Memorandum No. 2, Hydrology, Part 2, U.S.A.C.o.E., 1982, p. 31;
- > Arizona Canal Diversion Channel, 40th Street to Cactus Road, Design Memorandum No. 12, Feature Design, U.S.A.C.o.E., April 1986, p. 35; and
- > Arizona Canal Diversion Channel Area Drainage Master Study Phase I, Volume 1.8, Hydrology Report, Kaminski-Hubbard Engineering, November 1994, p. 2.

C. TASKS

1. Revise hydraulic cross-sections and modeling to address the FCD review comments of September 28, 1999, and to reflect the new flowrate of 1,000 cfs. HEC-RAS Version 2.2 should be used for the modeling. The level of analysis will be that required to produce a Zone AE floodplain and without a floodway analysis.
2. Submit a diskette of the revised model and a paper copy of a draft floodplain work study map with a scale of 1 inch = 200 feet of the subject study area to the FCD project manager for review.
3. After approval of the items of Task 2 by the FCD project manager, prepare and submit the following to FCD:
 - A. One copy of Technical Data Notebook (TDN), prepared according to ADWR State Standard SSA1-97.
 - B. A CD or diskette of the floodplain information of the floodplain work study map in CADD format, according to FCD's CADD Data Delivery Specifications Rev. 1.0 January 2000.

4. After approval of the items of Task 3 by FCD, prepare and submit the following:
 - A. Two (2) copies of the TDN, prepared according to ADWR State Standard SSA1-97. This submittal item should include two (2) copies of completed FEMA forms and two (2) copies of annotated FIRM(s) with the proposed delineation.
 - B. Two (2) paper copies of the floodplain work study map with a scale of 1 inch = 200 feet.
 - C. Two (2) electronic copies of hydraulic model on CD or diskette.
 - D. Two (2) electronic copies of the floodplain CADD information of the floodplain work study map on CD or diskette.

5. After issuance of the resulting LOMR by FEMA, the following shall be submitted for the Final Submittal:
 - A. Three (3) complete copies of TDN, prepared according to ADWR State Standard SSA1-97. This submittal of the TDN shall include any correspondence and/or meeting with the reviewing agencies, and shall reflect any revisions required by those reviewing agencies. Revisions may include, but are not limited to, modifications to the delineation maps and the hydraulic analyses.
 - B. Three (3) paper copies of the floodplain work study map with a scale of 1 inch = 200 feet.
 - C. Three (3) electronic copies of the hydraulic model on CD or diskette.
 - D. Three (3) electronic copies of the floodplain CADD information of the floodplain work study map on CD or diskette.

Appendix C

- C.1 Survey Field Notes for Aerial Mapping Control
(Not applicable, not included)
- C.2 Survey Field Notes for Hydrologic Modeling
(Not applicable, not included)
- C.3 Survey Field Notes for Hydraulic Modeling
(Not applicable, not included)

Appendix D

- D.1 Precipitation Data
(Not applicable, not included)
- D.2 Physical Parameter Calculations.
(Not applicable, not included)
- D.3 Hydrograph Routing Data
(Not applicable, not included)
- D.4 Reservoir Routing Data
(Not applicable, not included)
- D.5 Flow Splits and Diversions Data
(Not applicable, not included)
- D.6 Hydrologic Calculations
(Not applicable, not included)

Appendix E

- E.1 Roughness Coefficient Estimation
Included in following pages.
- E.2 Cross Section Plots
Included in following pages.
- E.3 Expansion and Contraction Coefficients
(Not applicable, not included)
- E.4 Analysis of Structures
(Not applicable, not included)
- E.5 Hydraulic Calculations
Included in following pages.

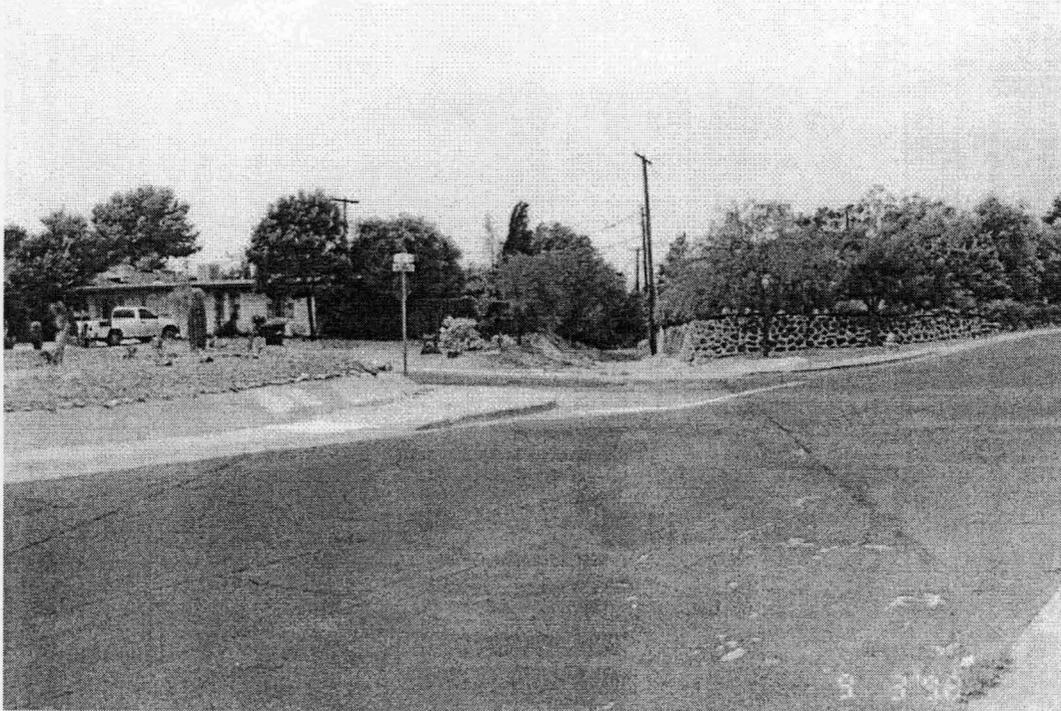


Photo 1 – Roll 1

From sidewalk, upstream side of Belmont Ave., looking downstream along flow path.



Photo 2 – Roll 1

From sidewalk, upstream side of Belmont Ave. at 13th Street intersection, looking downstream at 13th.

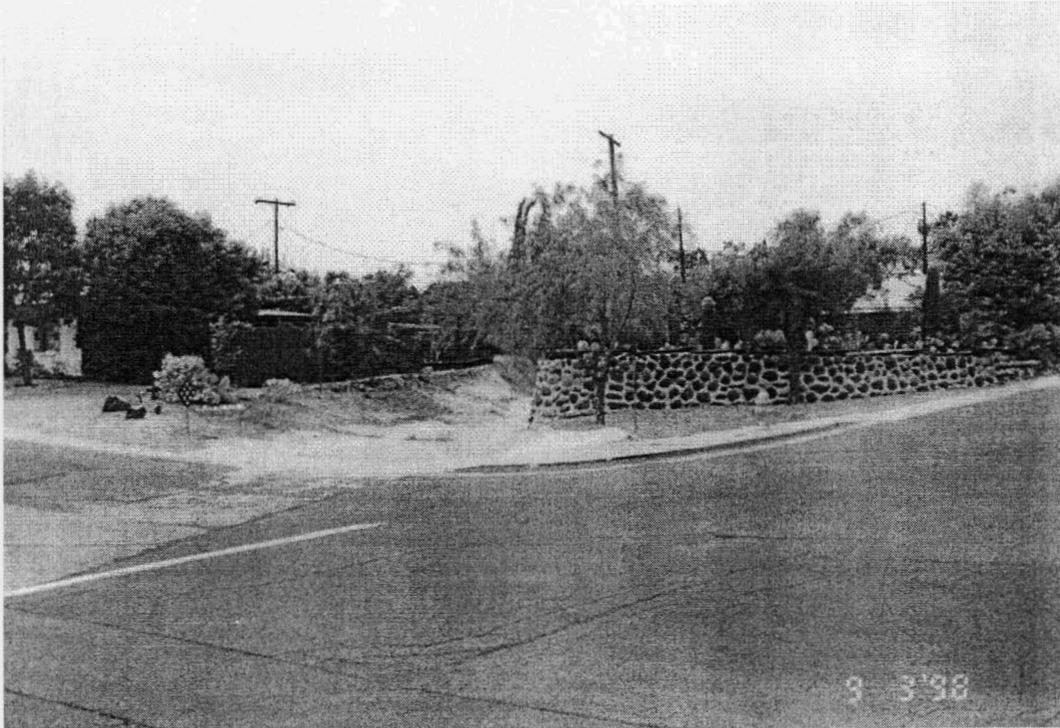


Photo 3 – Roll 1

From sidewalk, upstream side of Belmont Ave. at 13th Street intersection, panning right.

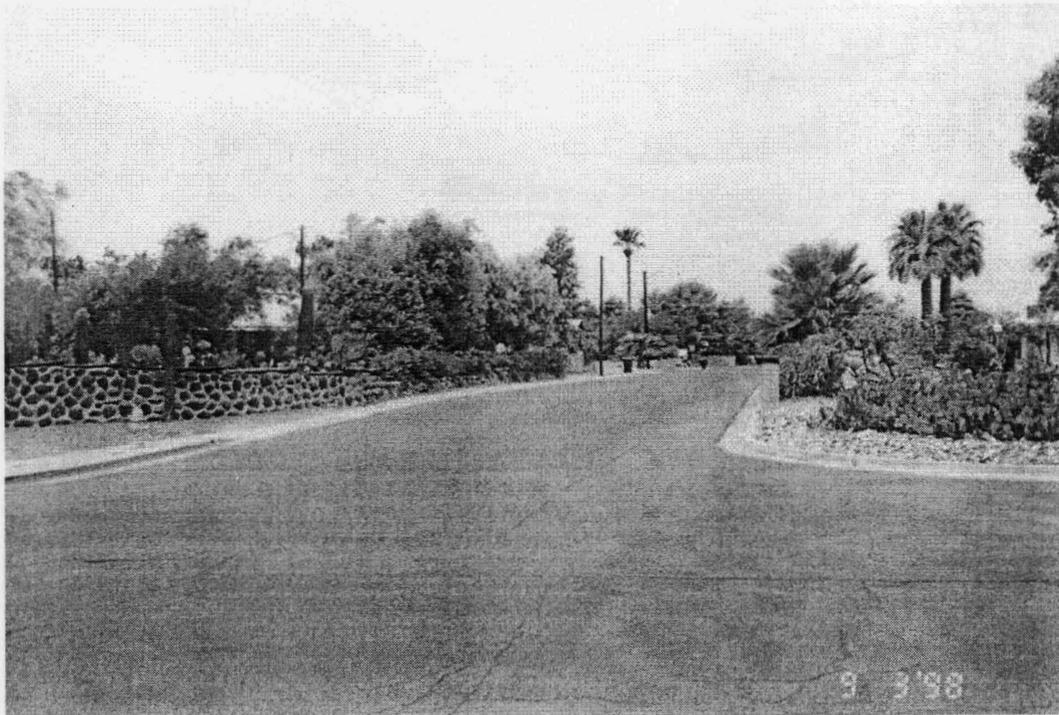


Photo 4 – Roll 1

From sidewalk, upstream side of Belmont Ave. at 13th Street intersection, panning right.

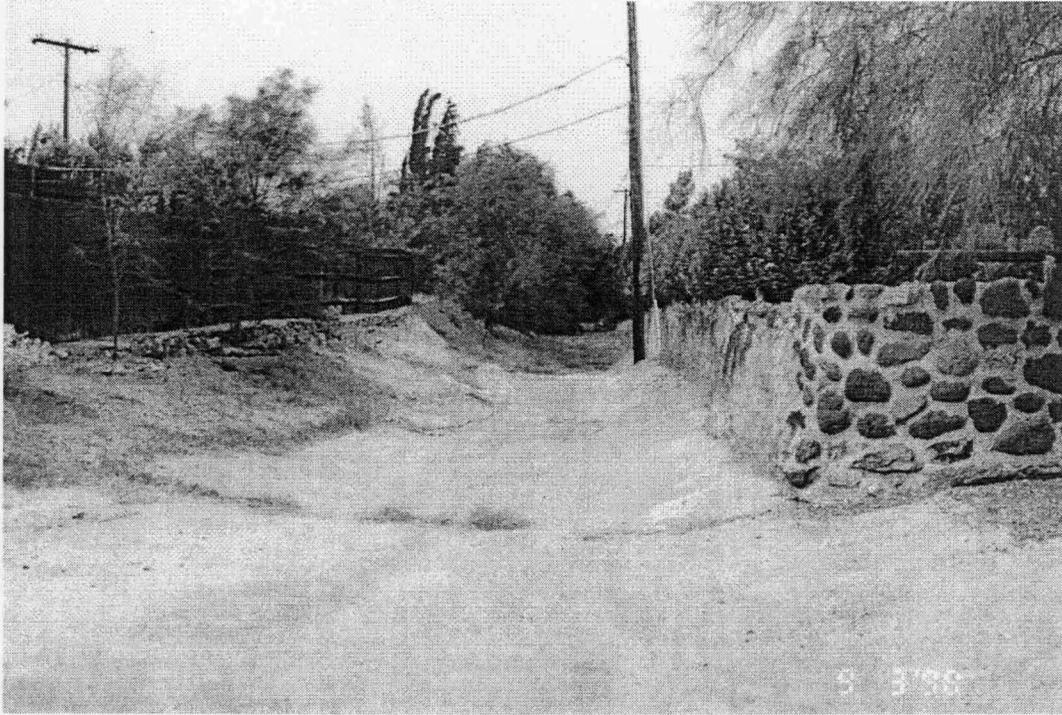


Photo 5 – Roll 1

From sidewalk, downstream side of Belmont Ave. at 13th Street, looking downstream.

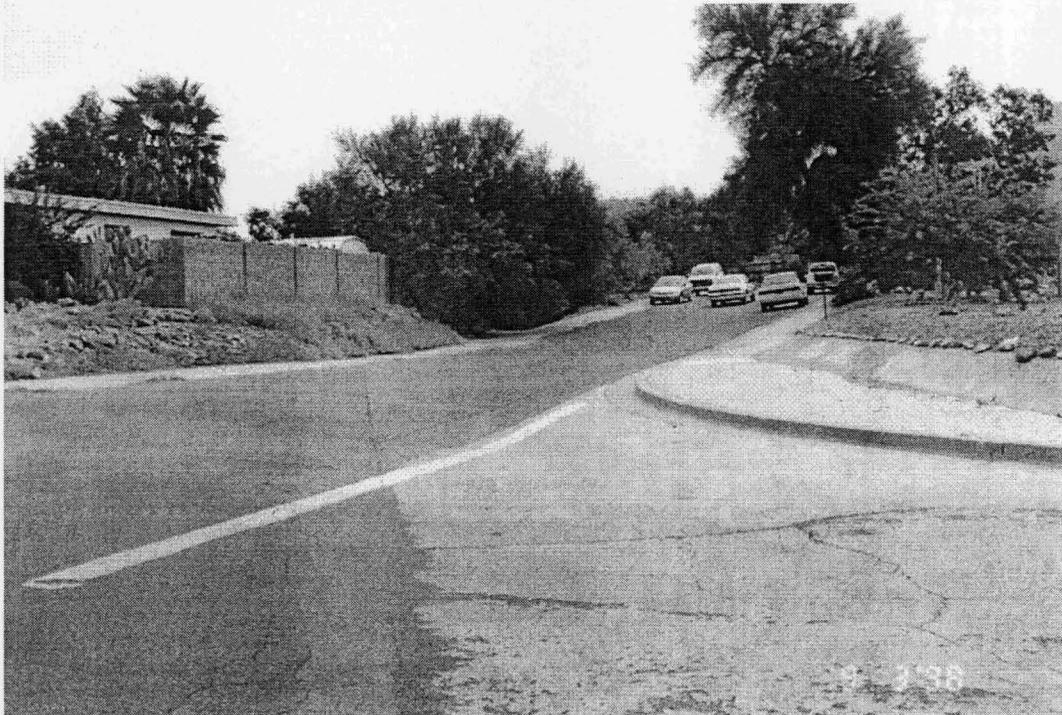


Photo 6 – Roll 1

From sidewalk, downstream side of Belmont Ave. at 13th Street, looking upstream.



Photo 7 – Roll 1

From approximately 100 feet downstream of 13th Street, looking downstream.

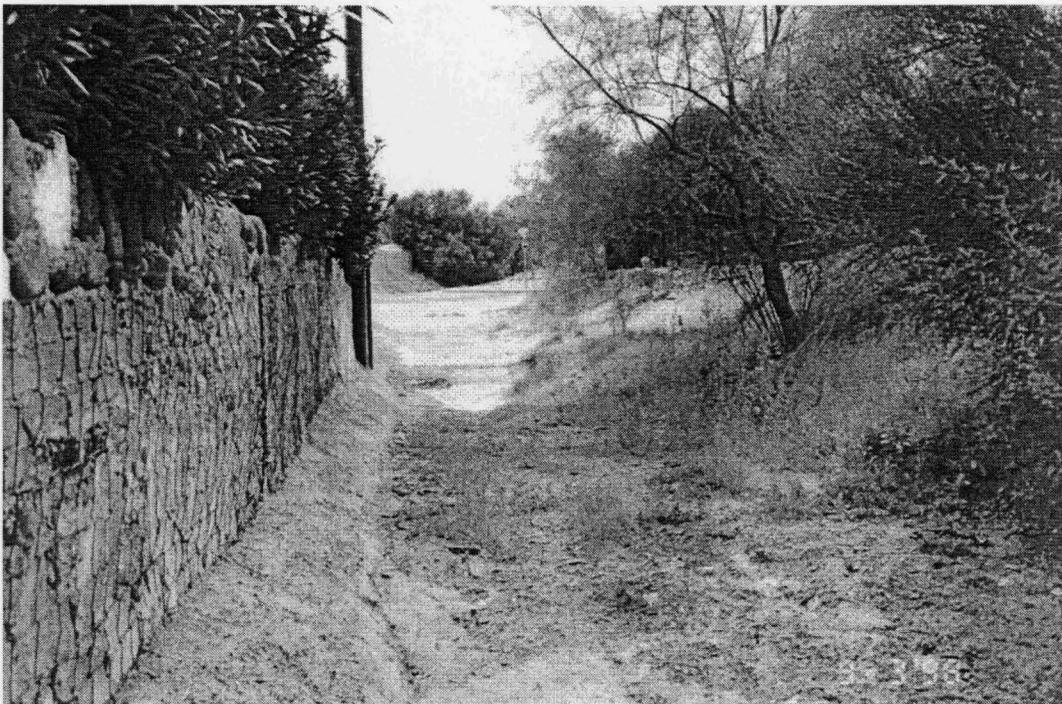


Photo 8 – Roll 1

From approximately 100 feet downstream of 13th Street, looking upstream.



Photo 9 – Roll 1

From approximately 200 feet downstream of 13th Street, looking downstream.



Photo 10 – Roll 1

From approximately 200 feet downstream of 13th Street, looking upstream.



Photo 11 – Roll 1
From top right bank at possible breakout at 12th Place, looking downstream.



Photo 12 – Roll 1
From top right bank at possible breakout at 12th Place, panning left.



Photo 13 – Roll 1

From top right bank at possible breakout at 12th Place, panning left down side street.



Photo 14 – Roll 1

From top right bank at possible breakout at 12th Place, looking downstream
(Note 12th Street in background).



Photo 15 – Roll 1
At 12th Street upstream side, looking downstream.



Photo 16 – Roll 1
At 12th Street upstream side, panning left.



Photo 17 – Roll 1
At 12th Street upstream side, panning left.



Photo 18 – Roll 1
At 12th Street upstream side, looking upstream.



Photo 19 – Roll 1
At 12th Street upstream side, panning left.



Photo 20 – Roll 1
At 12th Street upstream side, panning left.



Photo 21 – Roll 1
From 12th Street downstream side, looking upstream.



Photo 22 – Roll 1
From approximately 20 feet downstream of 12th Street at edge of concrete, looking downstream.



Photo 23 – Roll 1

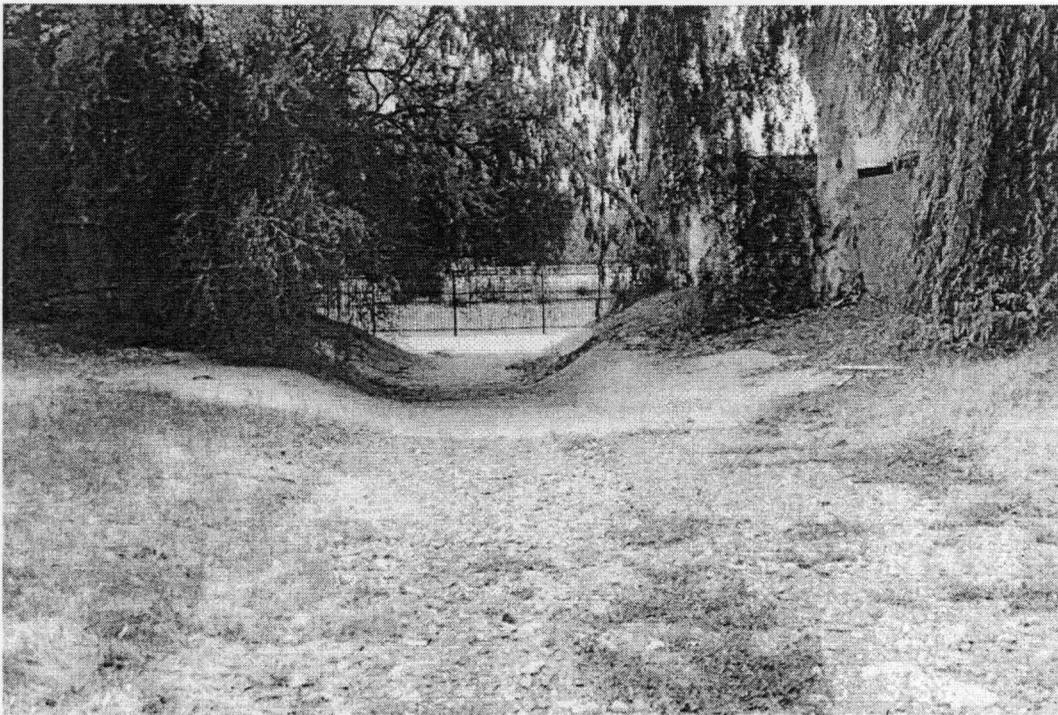


Photo 24 – Roll 1

From approximately 20 feet upstream of concrete apron, looking downstream at ACDC.



Photo 25 – Roll 1
From ACDC, looking upstream.



Photo 26 – Roll 1
From ACDC Station 780+00, along spillway (in direction of flow). Note dip Section, which is Dreamy Draw main stem.

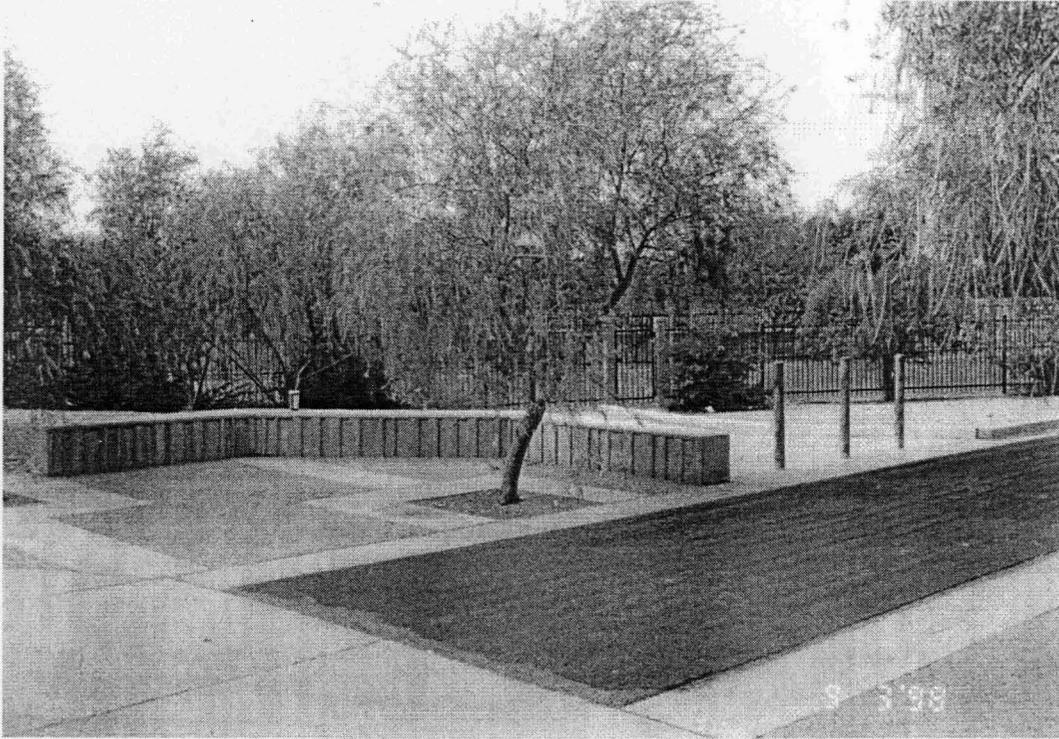


Photo 27 – Roll 1

From 12th Street looking towards ACDC spillway, looking along probably flow path for street drainage.



Photo 28 – Roll 1

From 12th Street looking towards ACDC spillway, panning left.



Photo 29 – Roll 1

From spillway face (near 13th Street and Orangewood), looking upstream (left side).

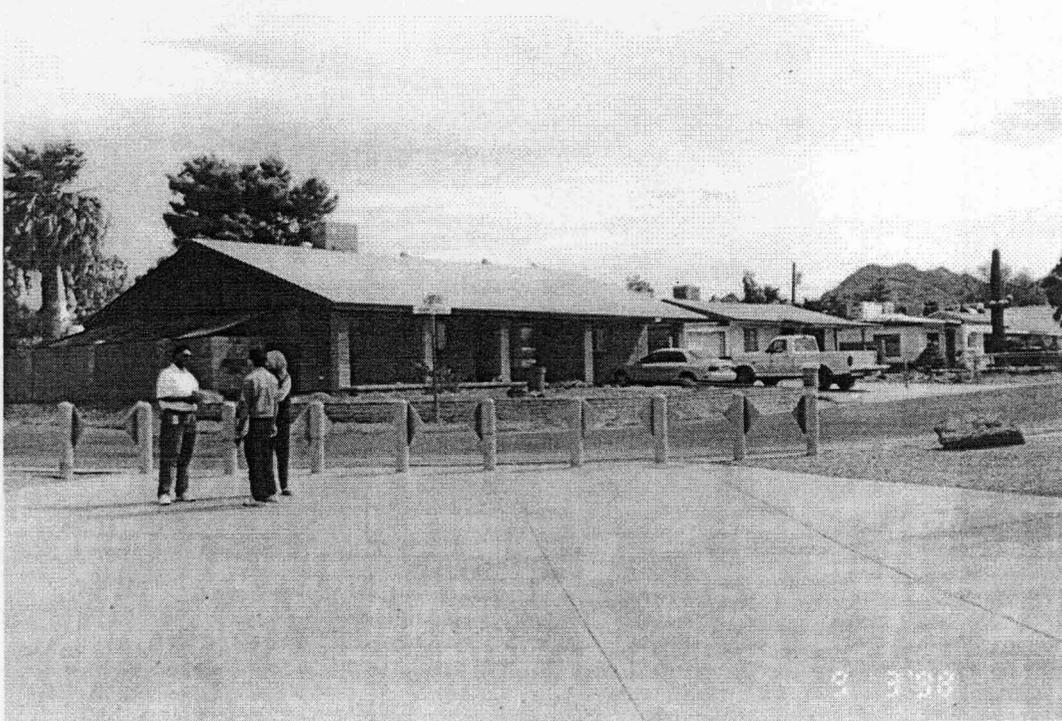


Photo 30 – Roll 1

From spillway face (near 13th Street and Orangewood), panning right.



Photo 31 – Roll 1
From spillway face (near 13th Street and Orangewood), panning right.



Photo 32 – Roll 1
From downstream edge of intersection of 13th Street and Orangewood, looking upstream at 13th.



Photo 33 – Roll 1

From downstream edge of intersection of 13th Street and Orangewood, looking upstream on Orangewood.

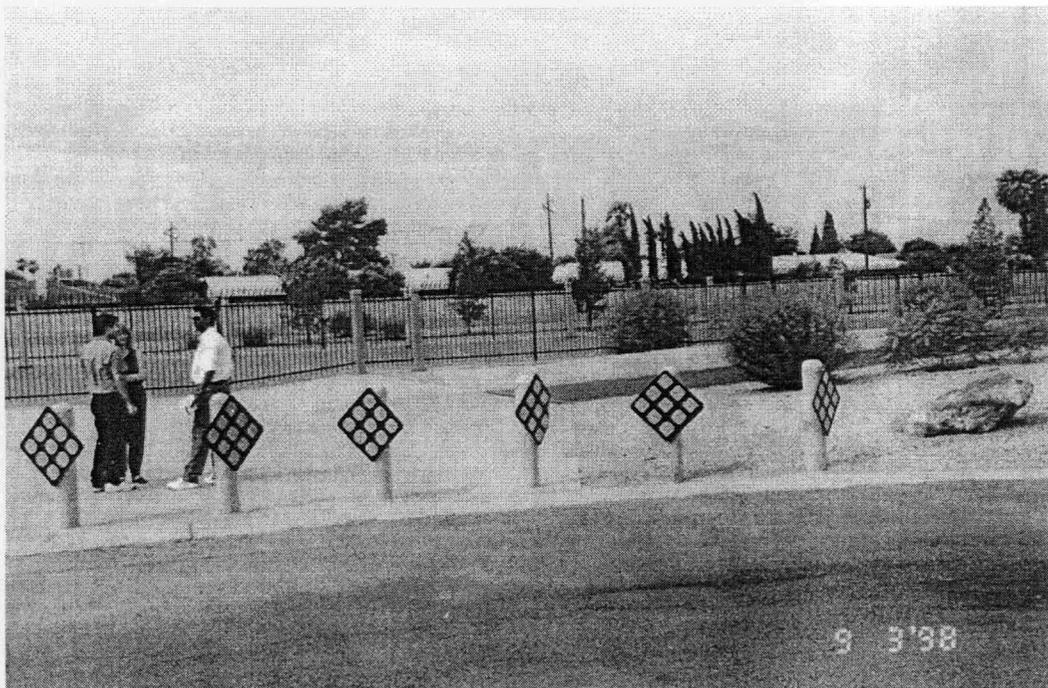


Photo 34 – Roll 1

From across the street (#32 & #33), looking downstream at spillway (from right).

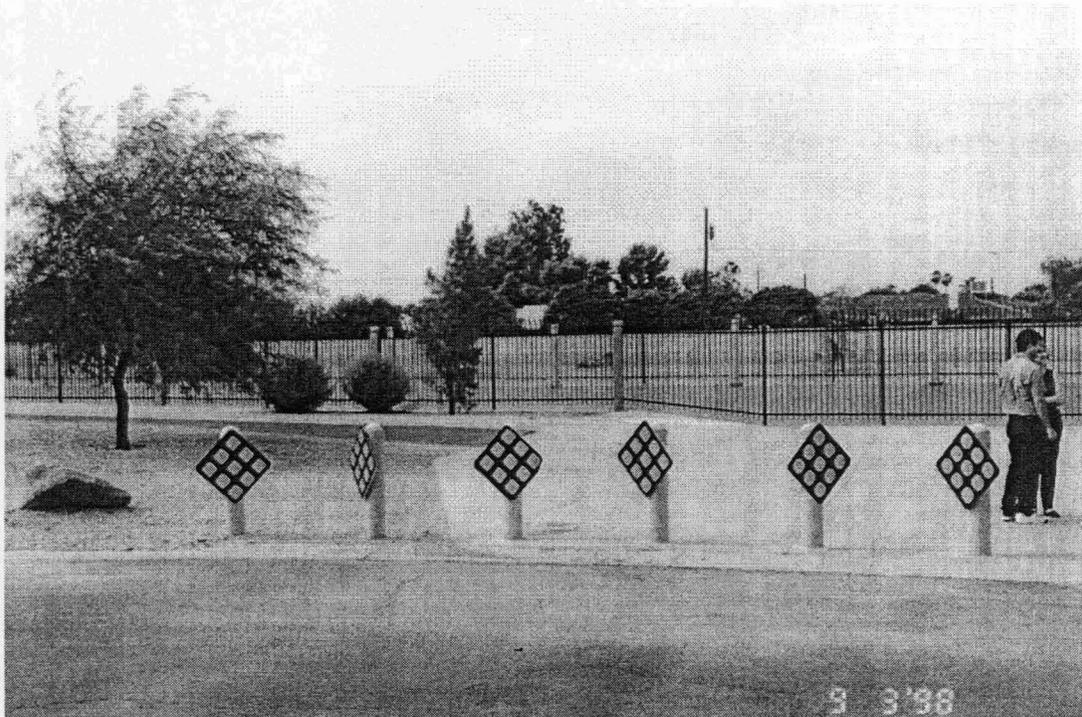


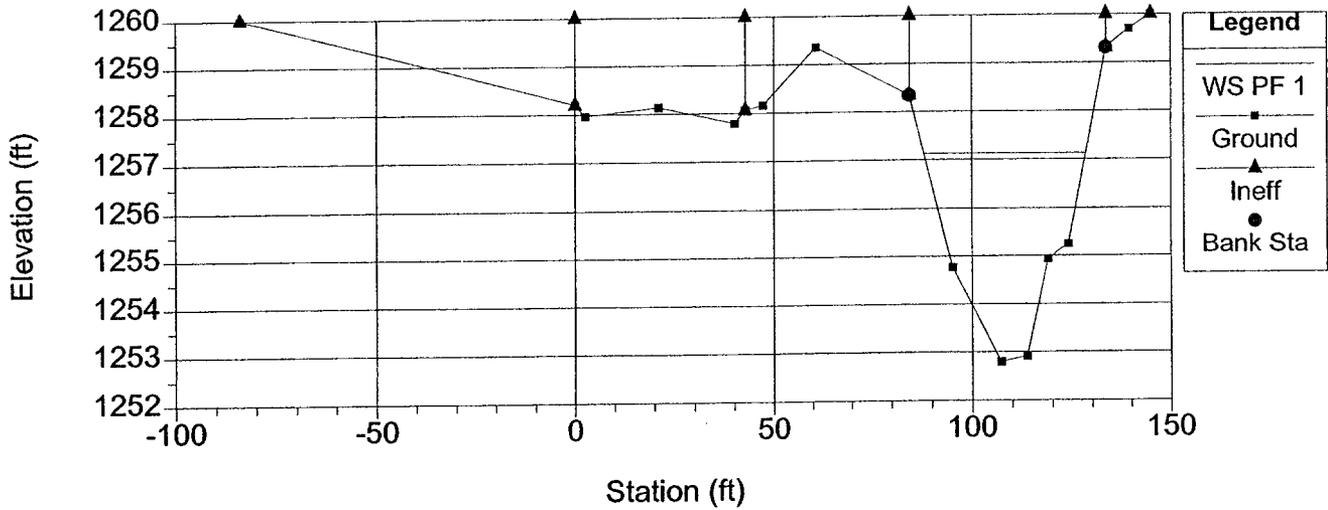
Photo 35 – Roll 1
From across the street (#32 & #33), panning left.



Photo 36 – Roll 1
From corner of 13th Street and Vista, looking downstream towards spillway.

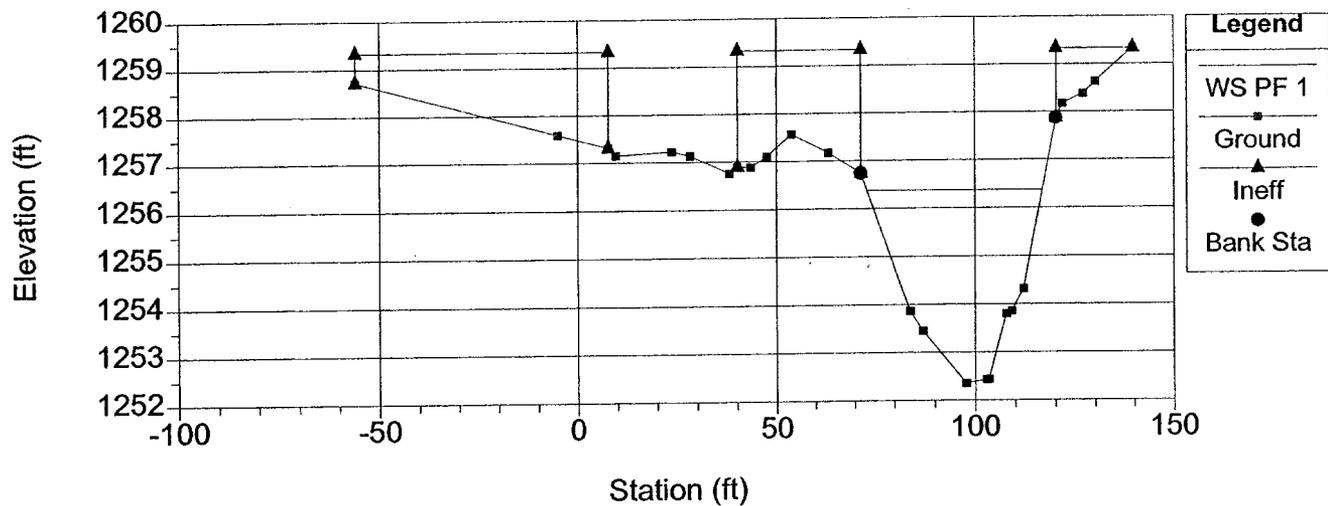
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 14



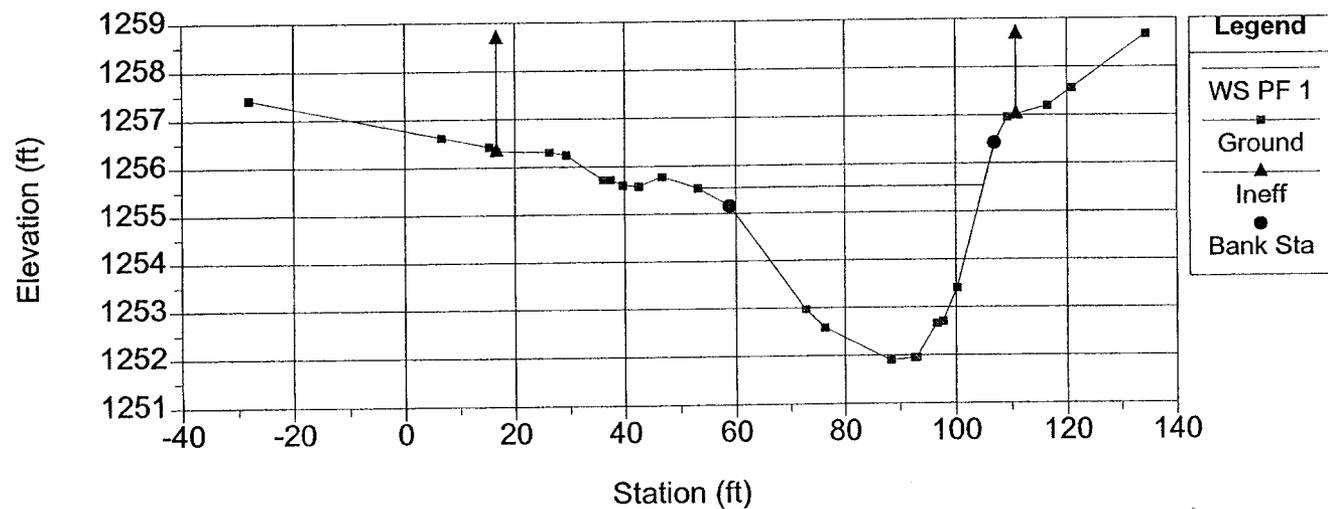
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 13.6666*



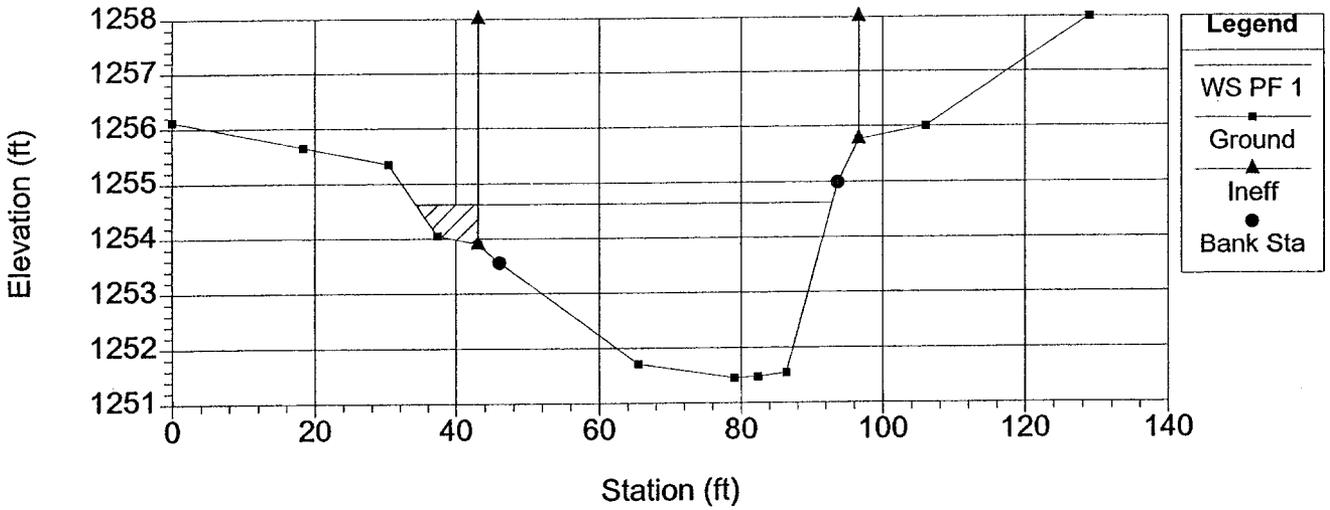
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 13.33333*



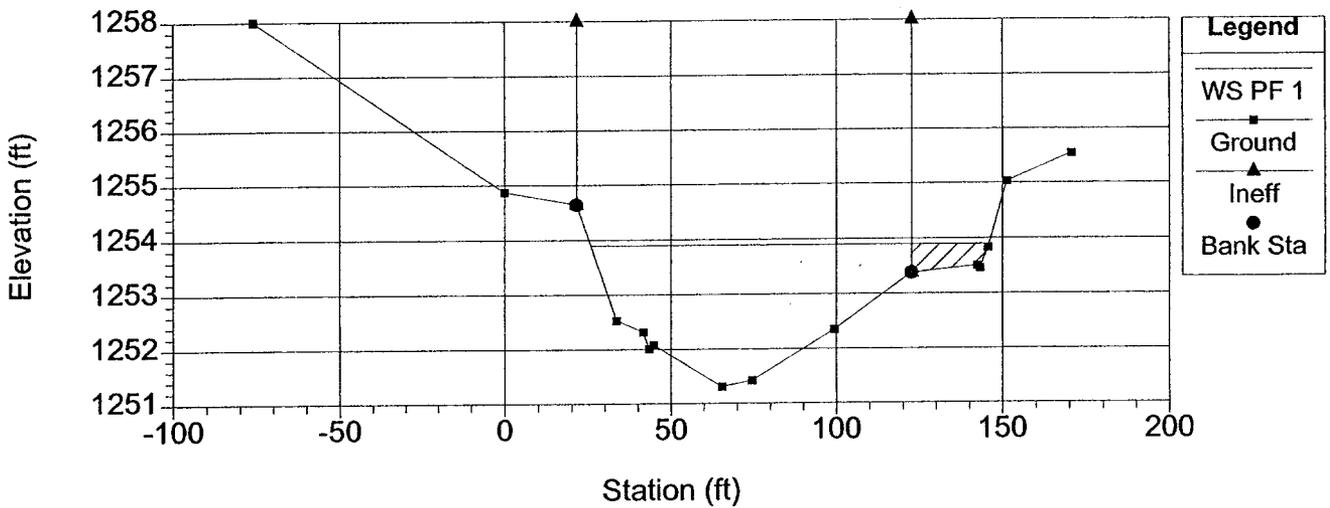
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 13



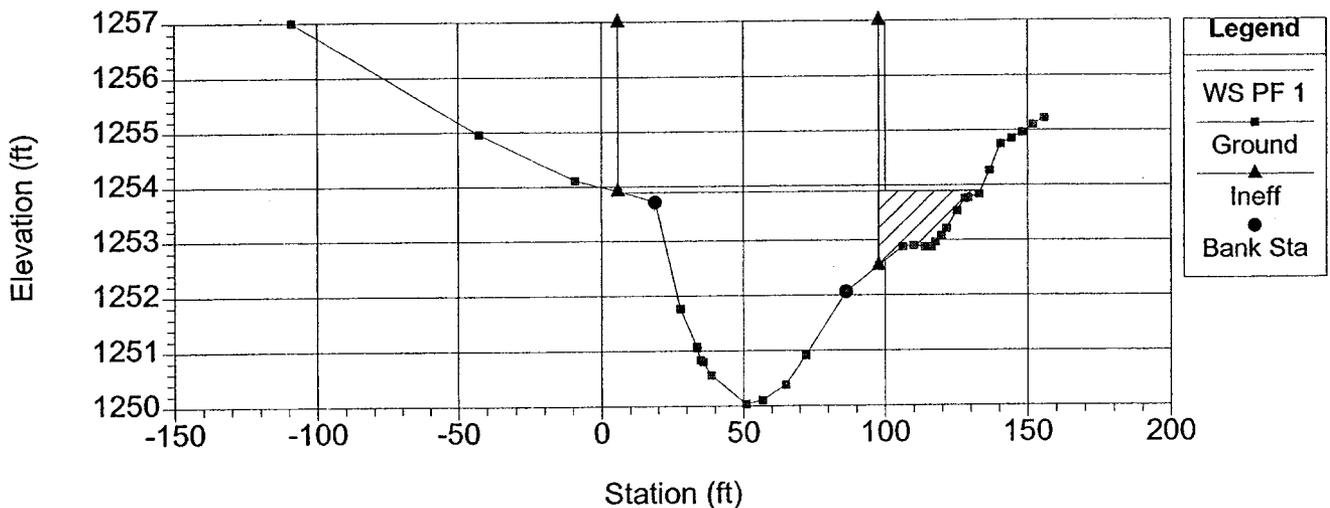
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 12



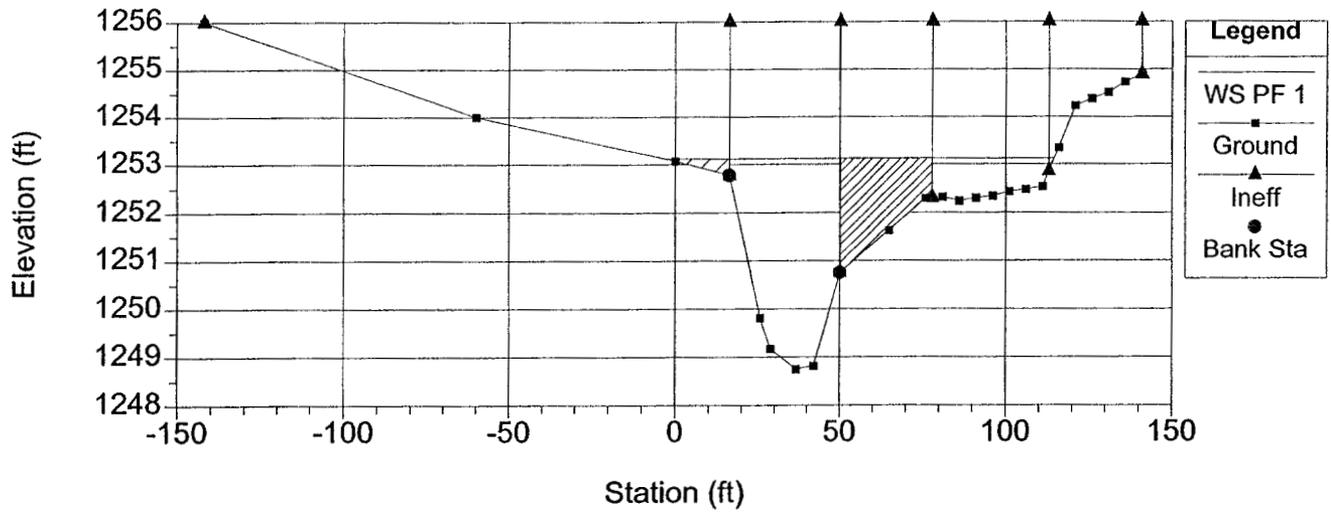
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 11.5*



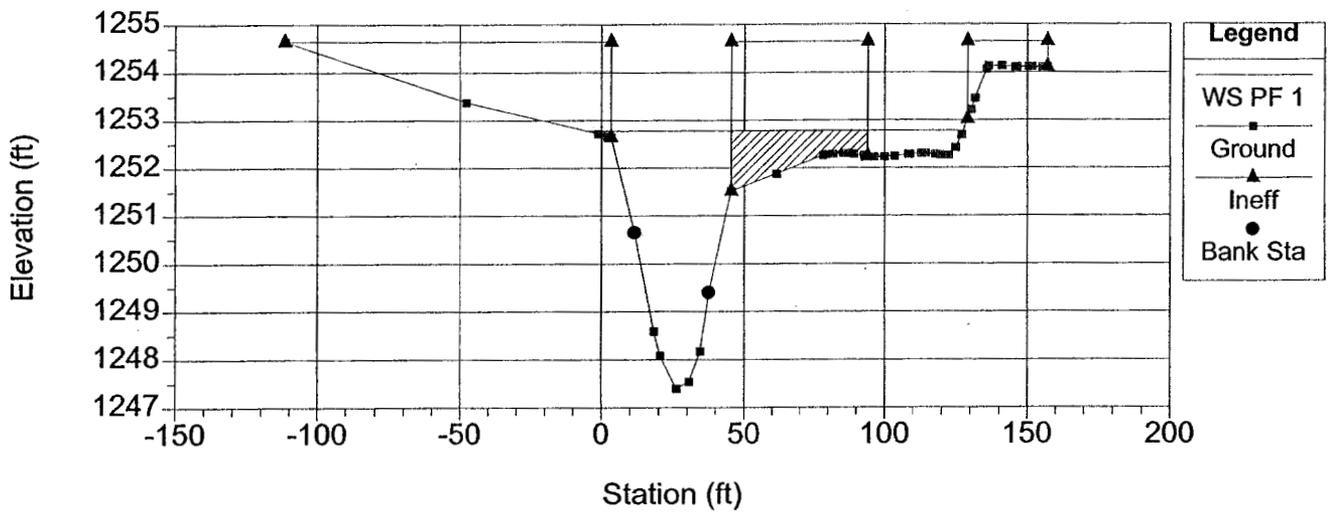
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 11



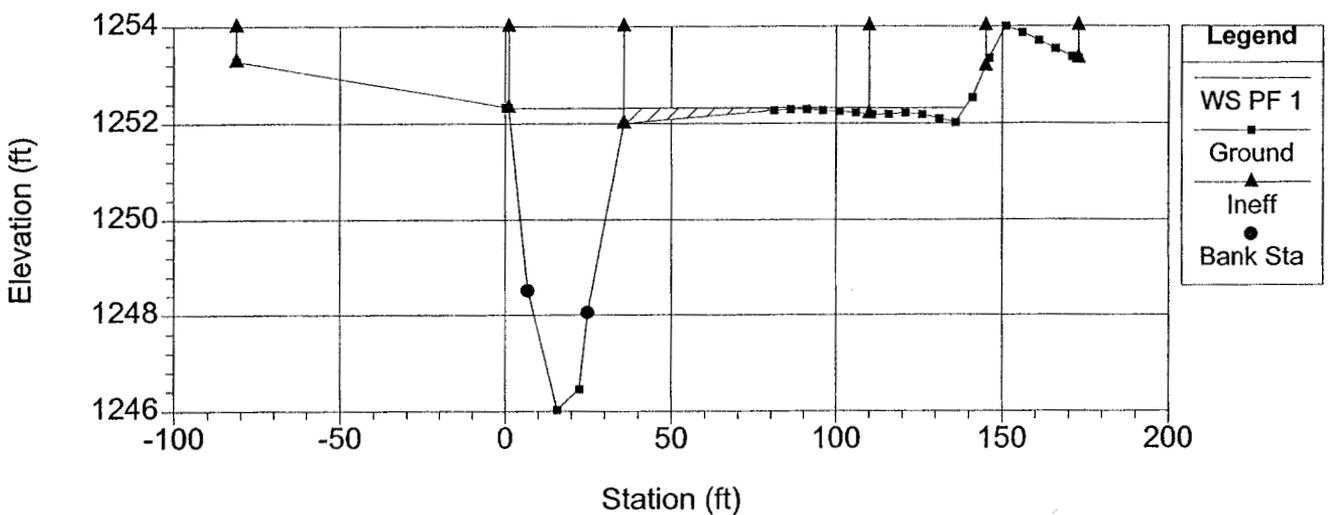
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 10.5*



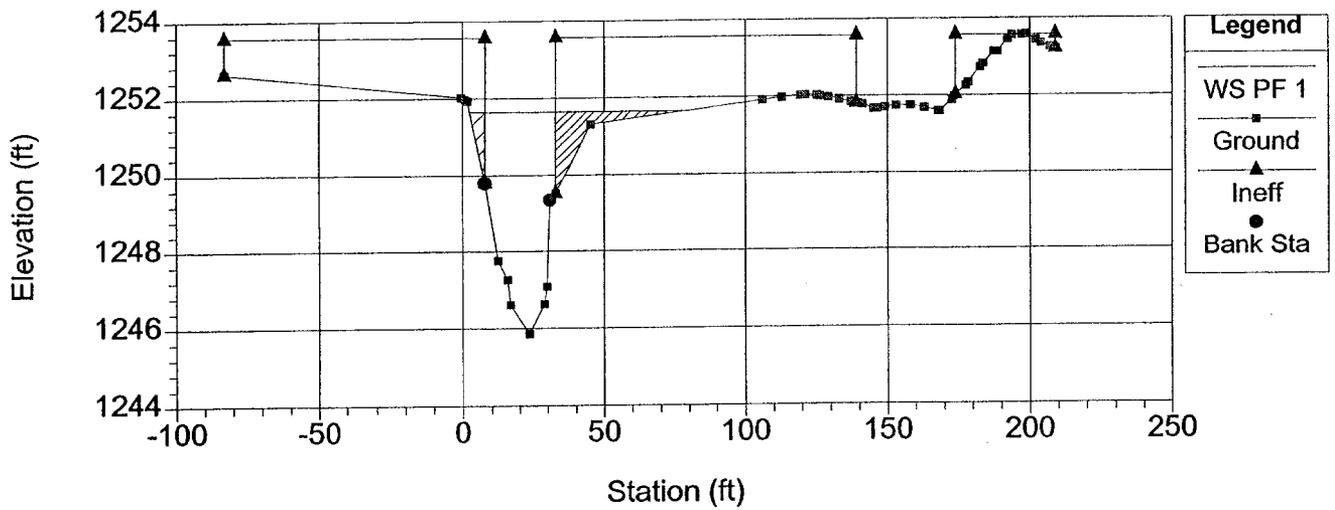
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 10



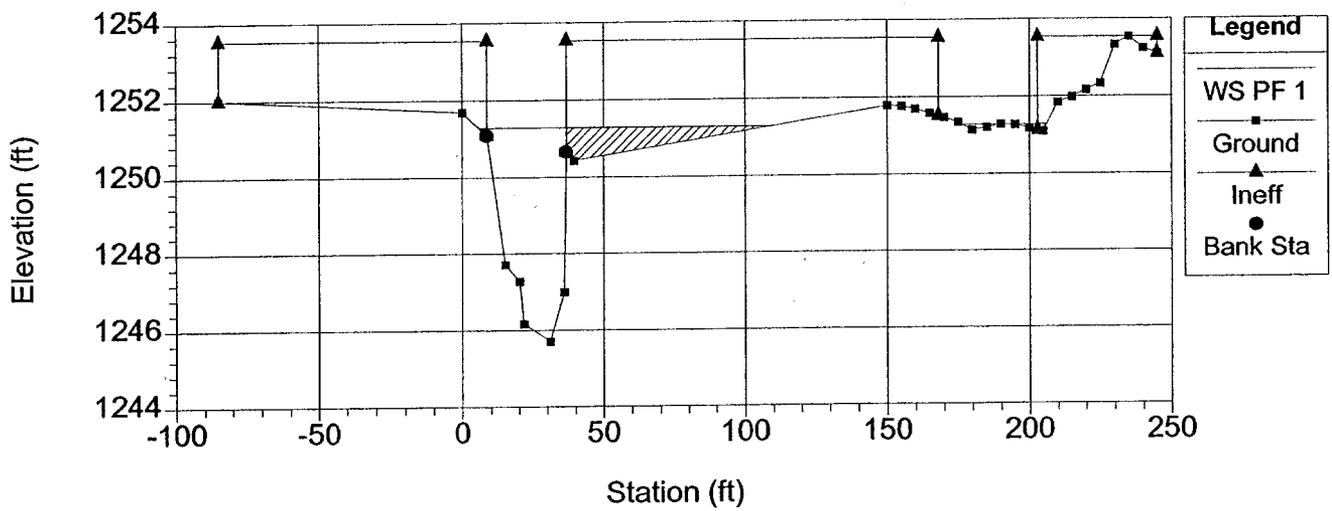
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 9.5*



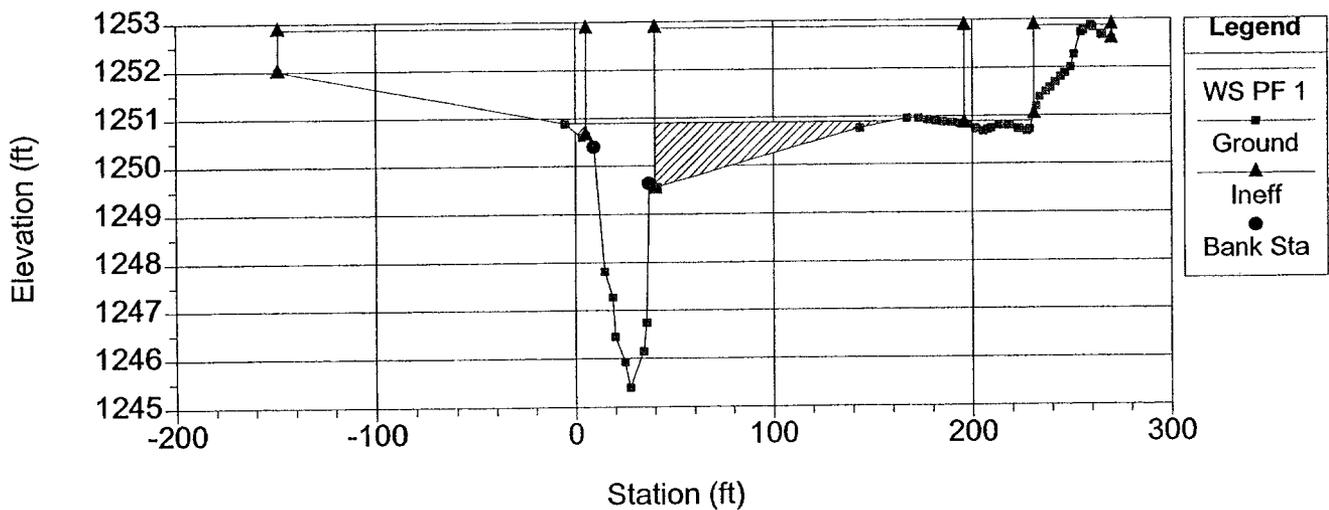
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 9



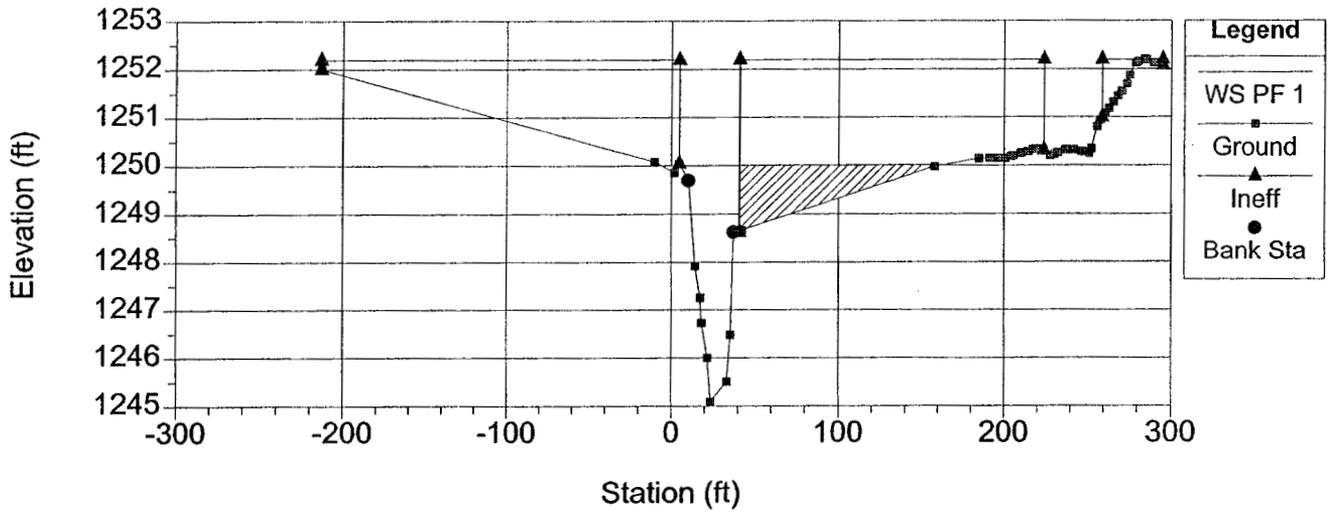
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 8.66666*



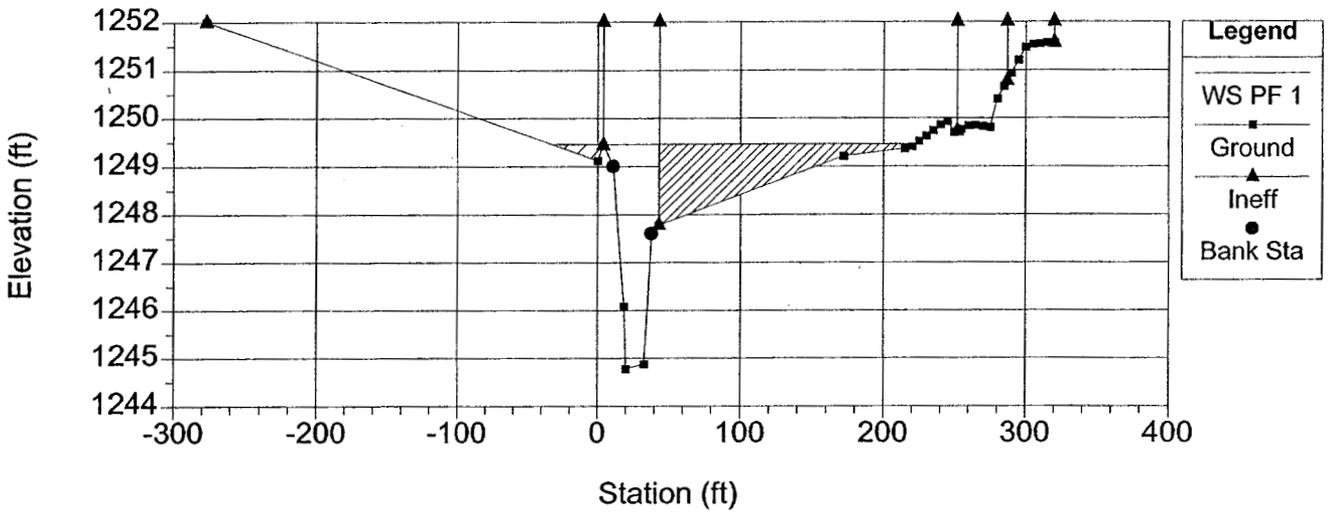
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 8.33333*



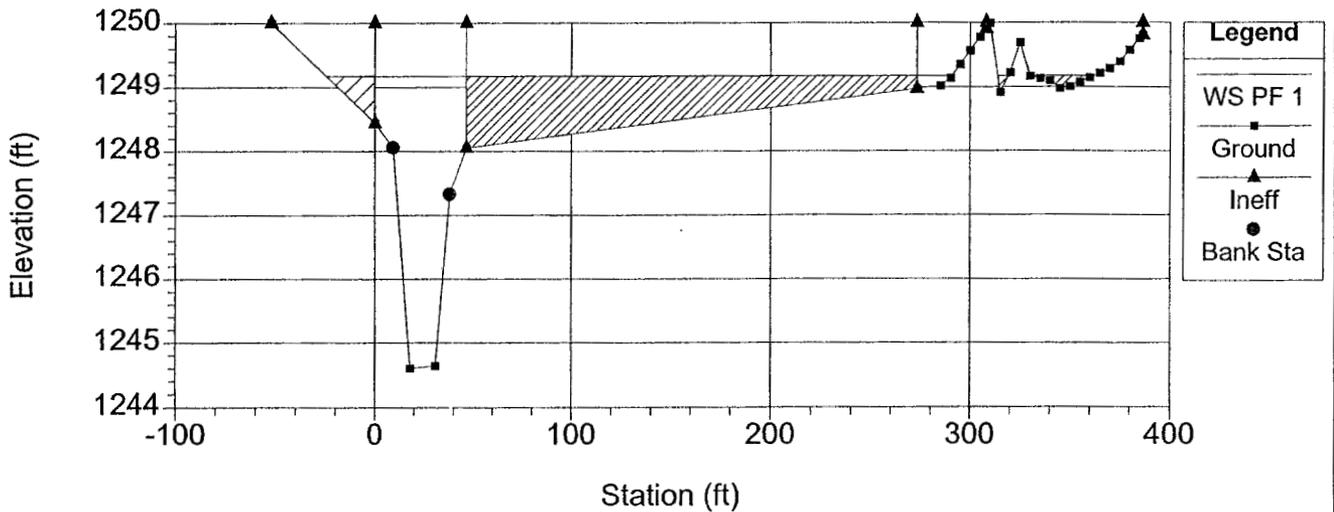
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 8



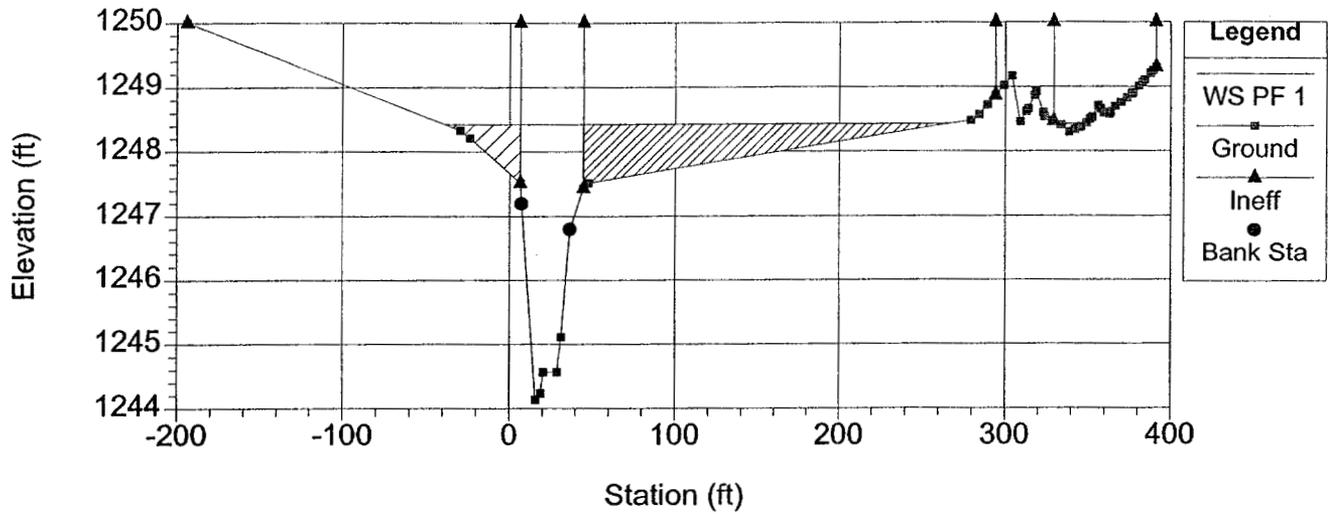
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 7



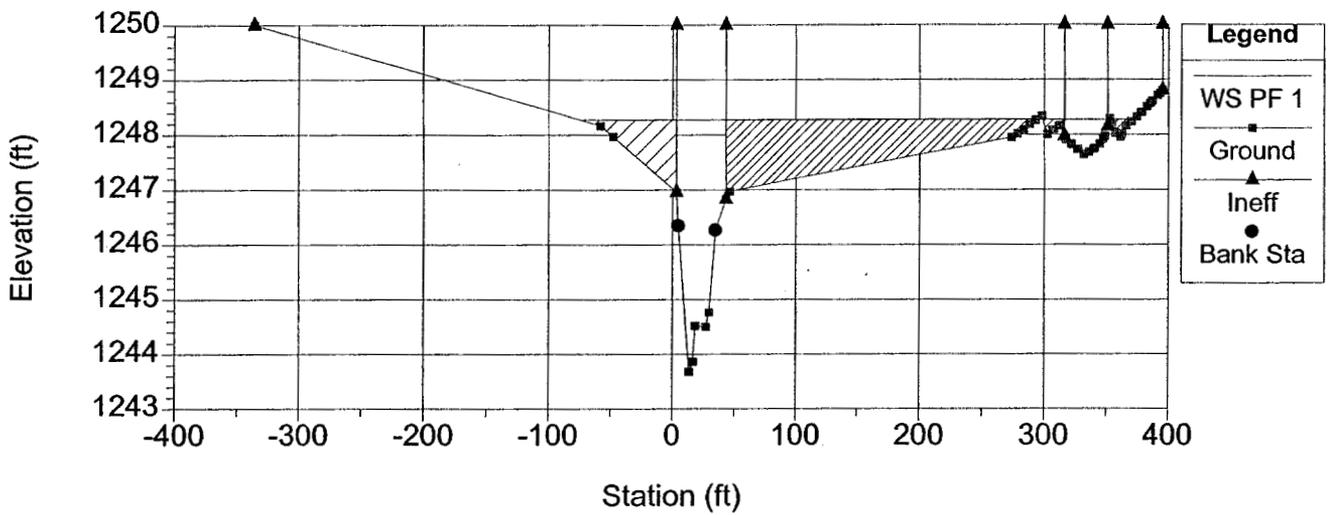
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 6.66666*



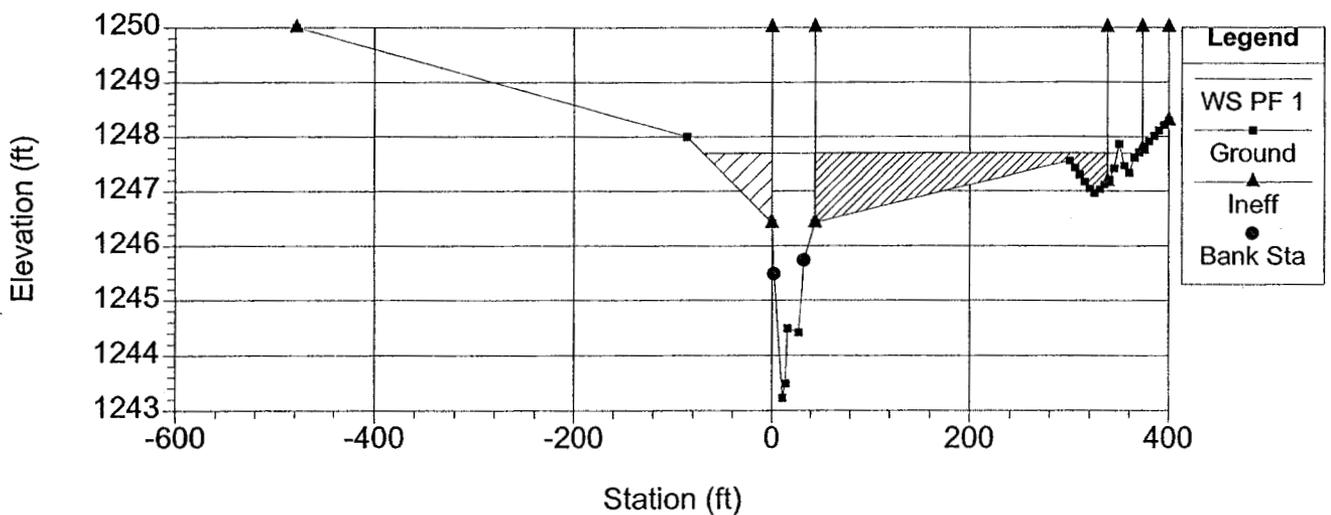
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 6.33333*



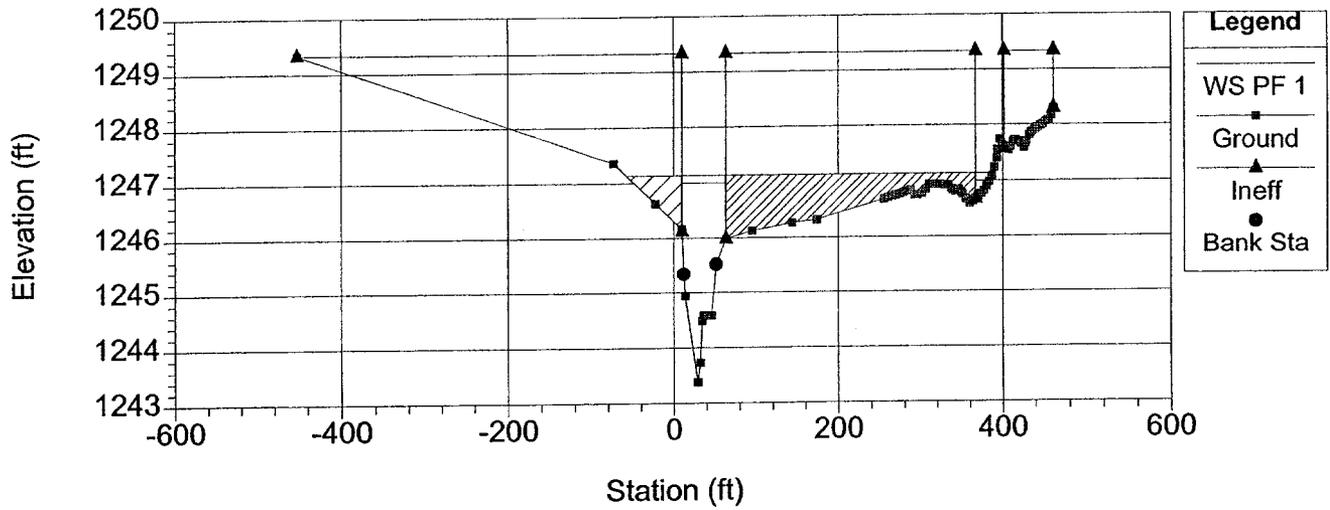
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 6



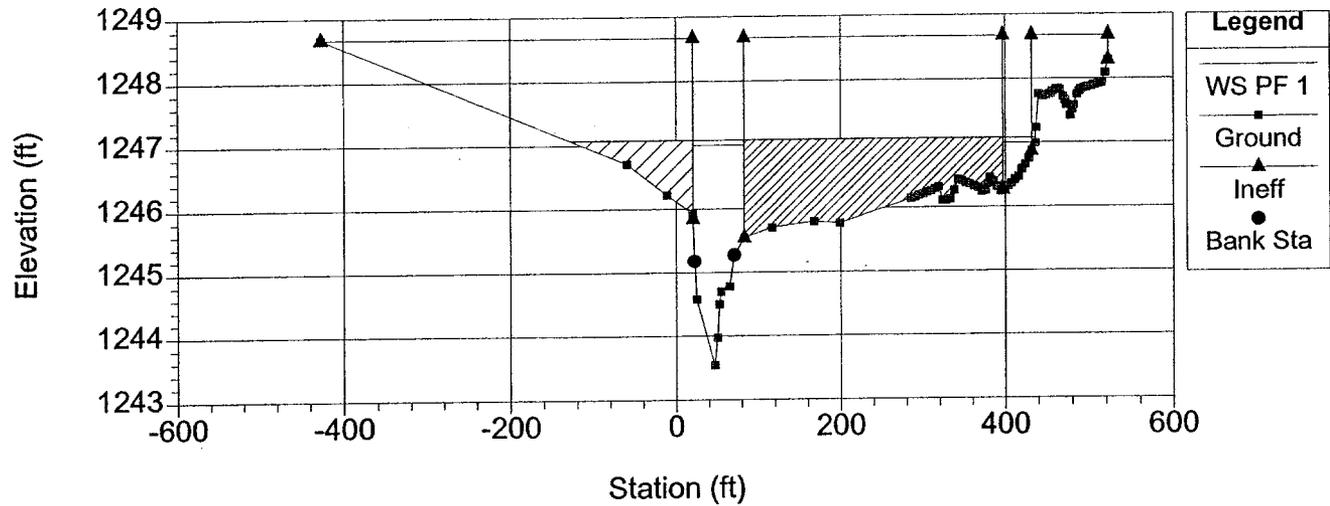
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 5.66666*



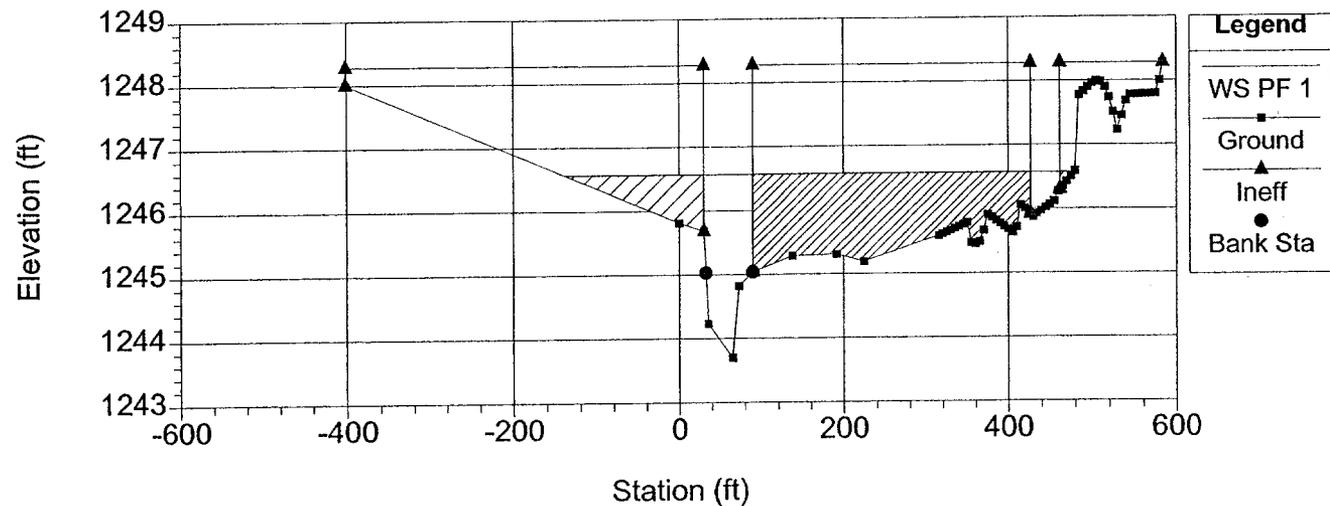
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 5.33333*



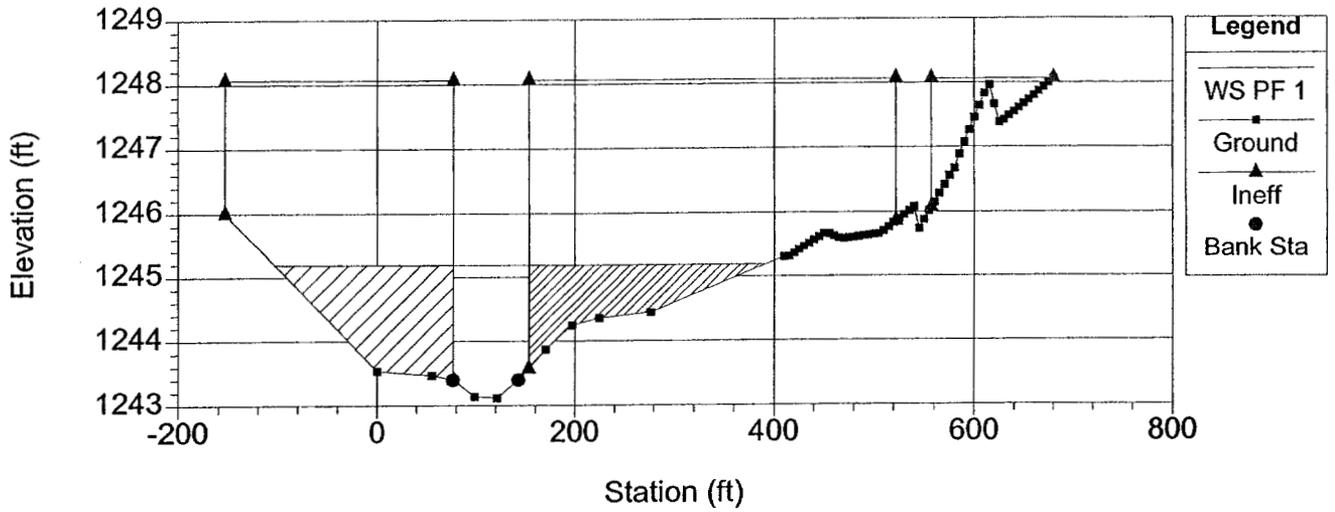
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 5



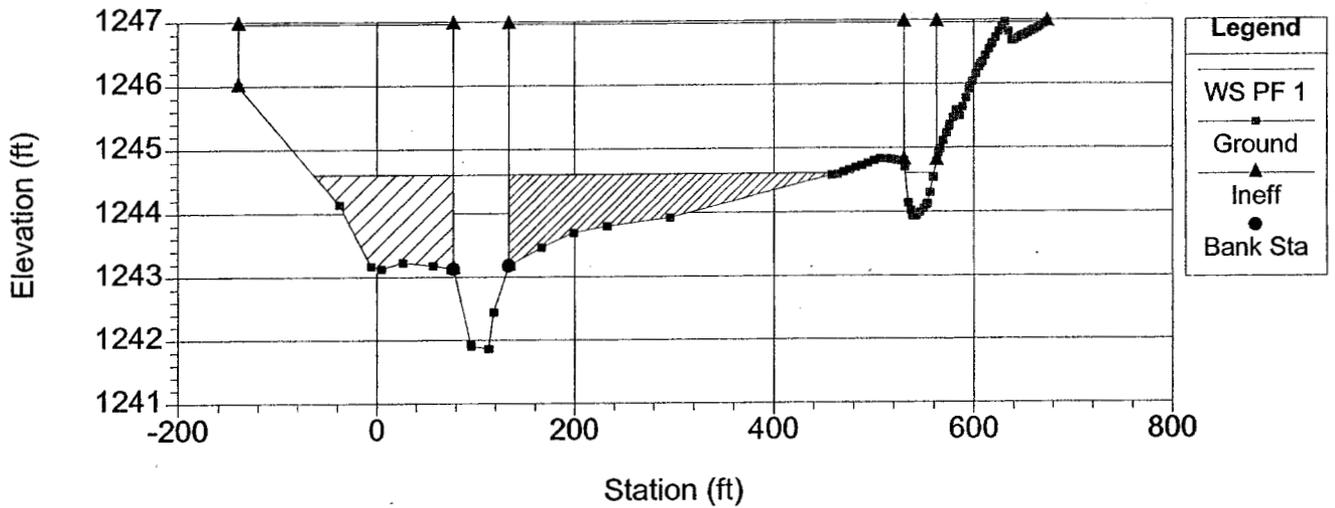
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 4



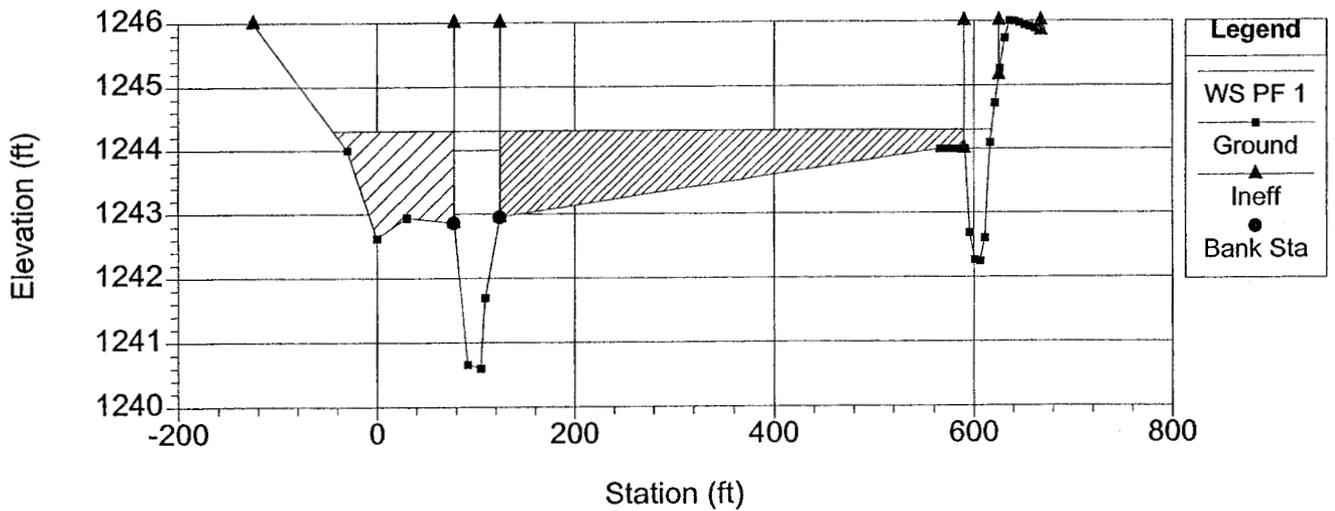
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 3.5*



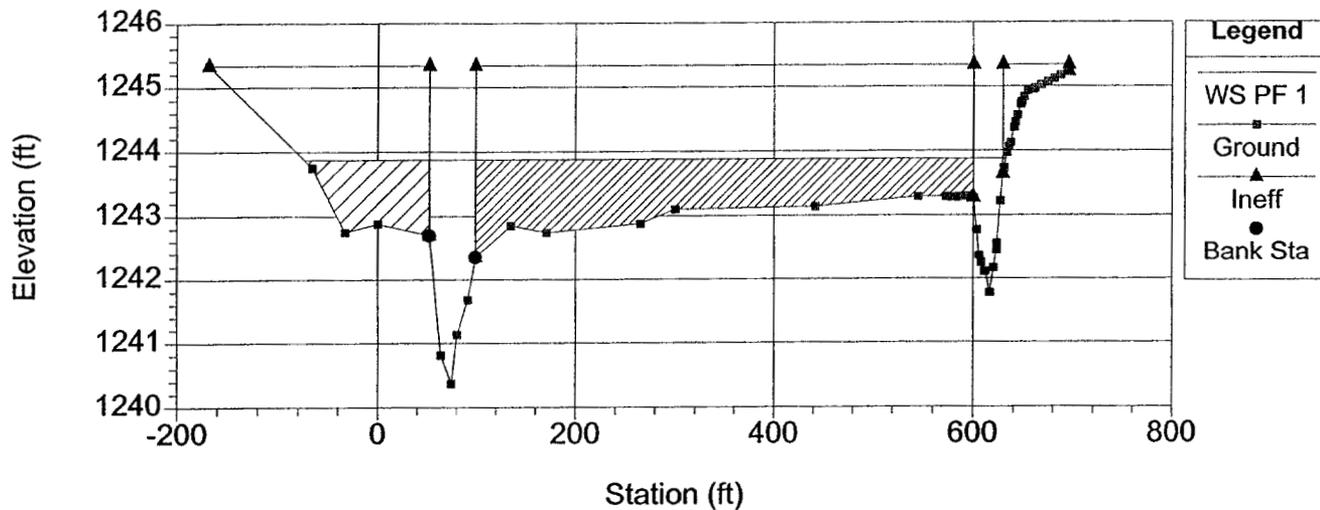
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 3



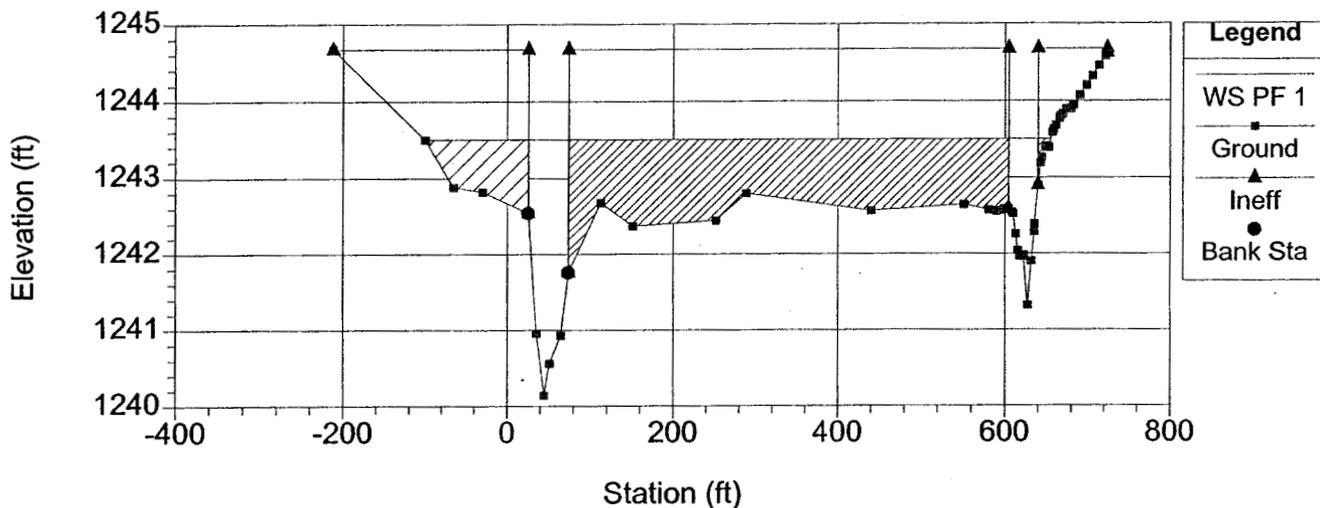
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 2.66666*



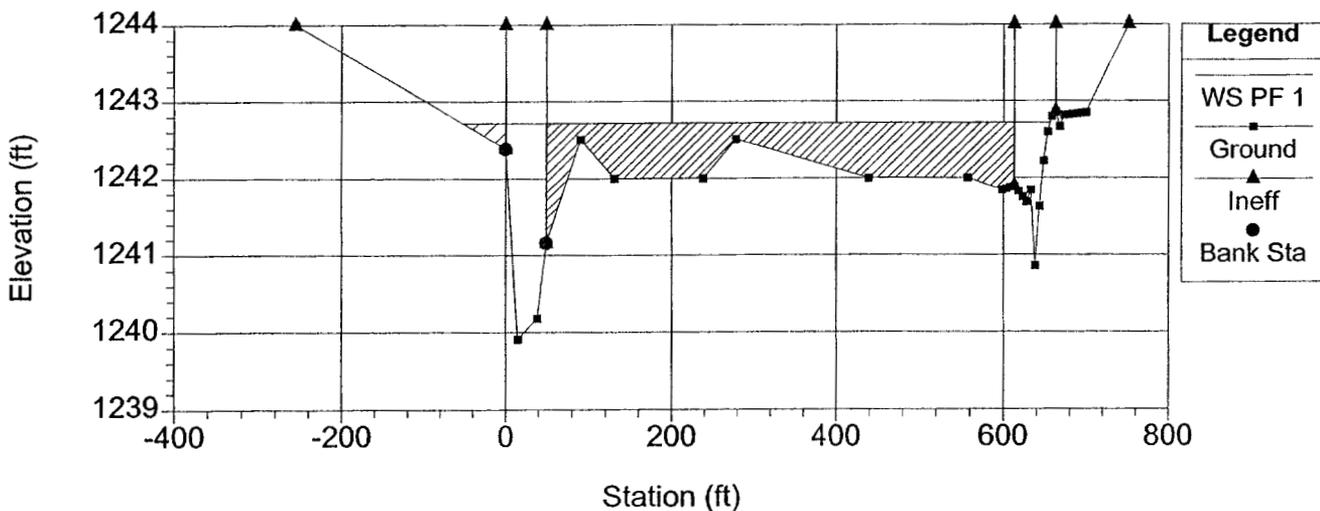
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 2.33333*



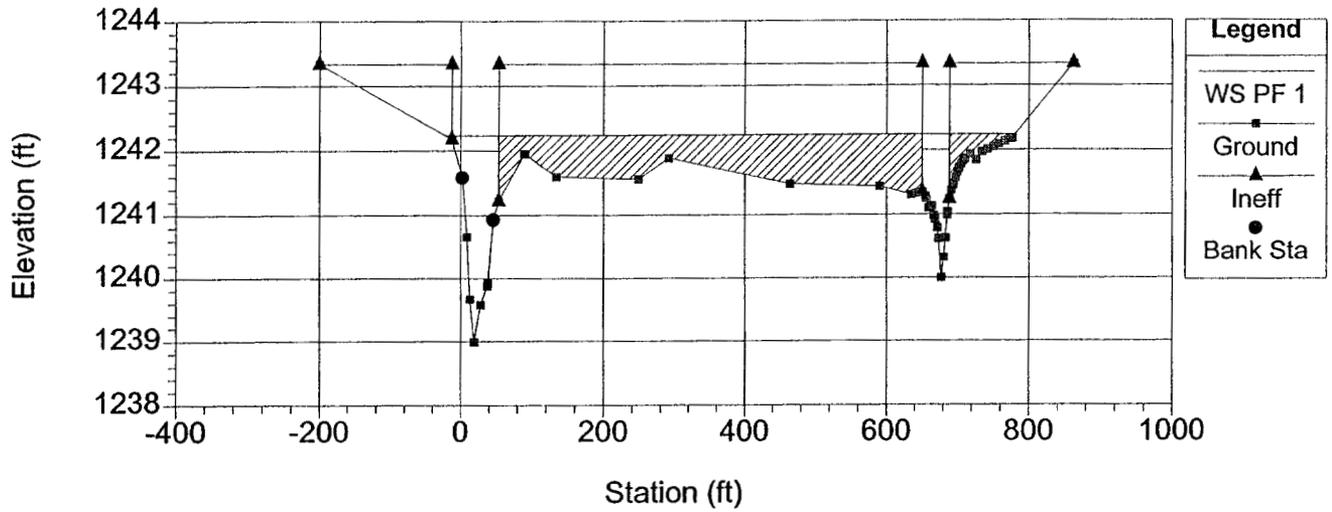
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 2



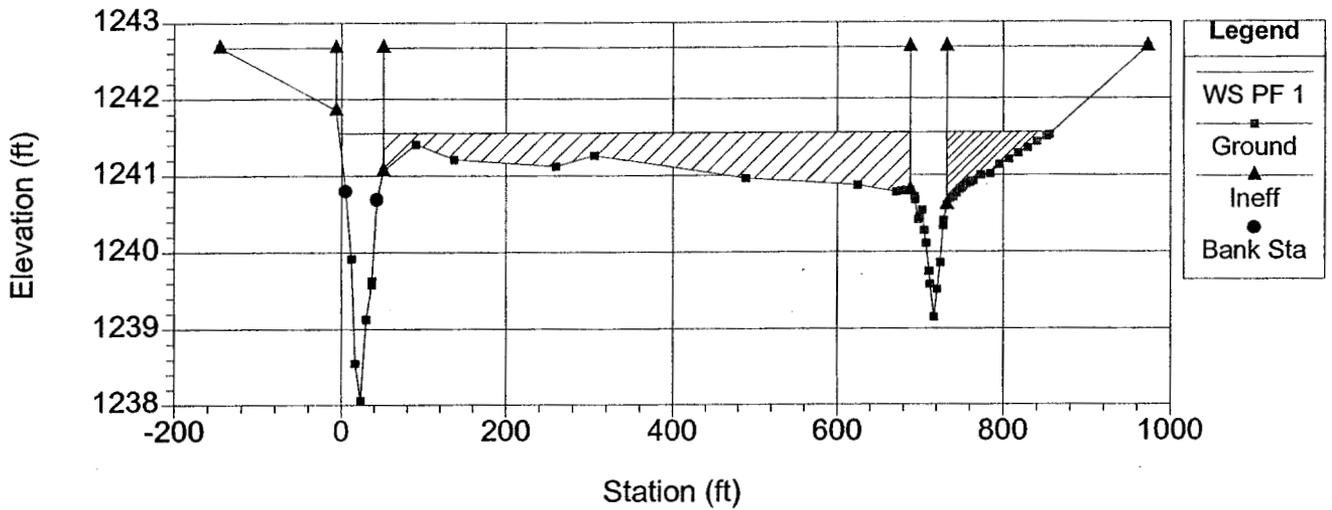
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 1.66666*



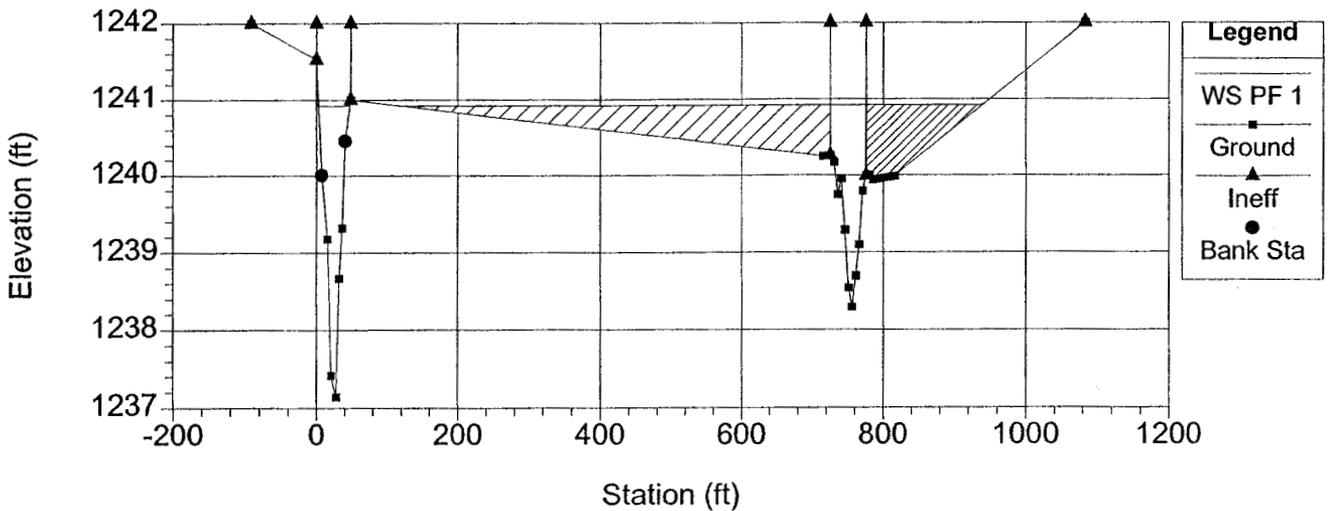
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 1.33333*



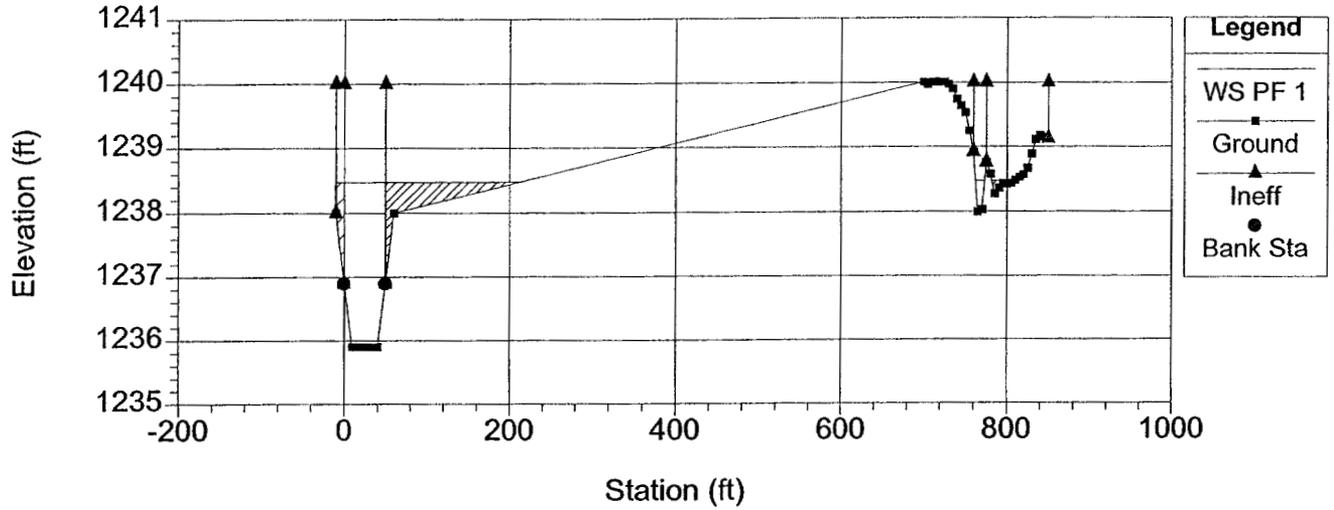
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 1



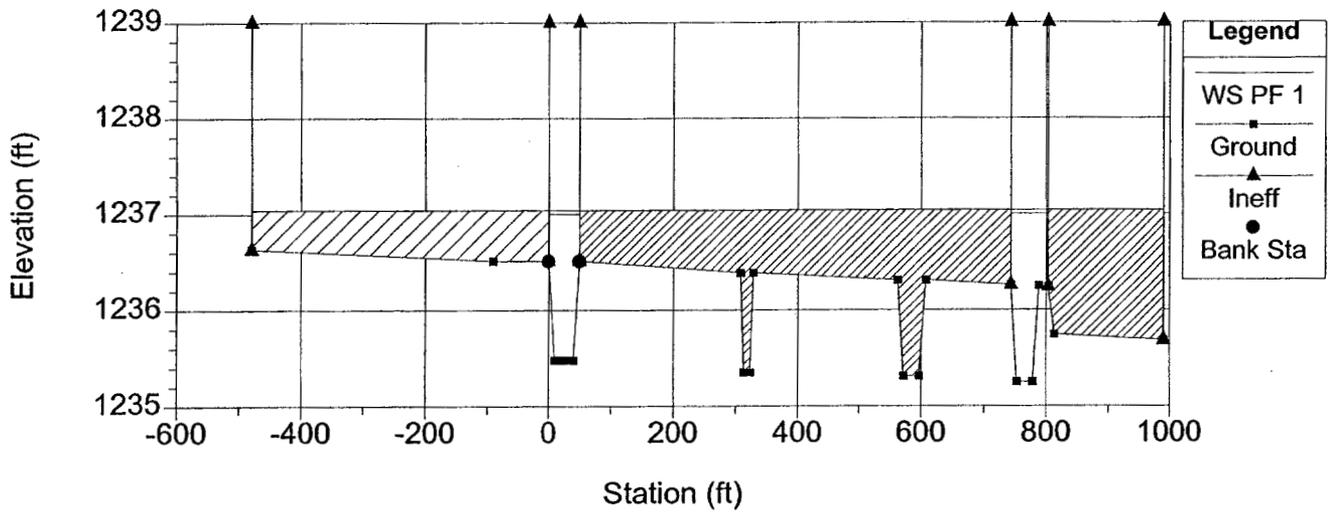
Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 0.5



Dreamy Draw Wash West, FCD 1999C048#3

River = Dreamy Draw Reach = 1 RS = 0.3



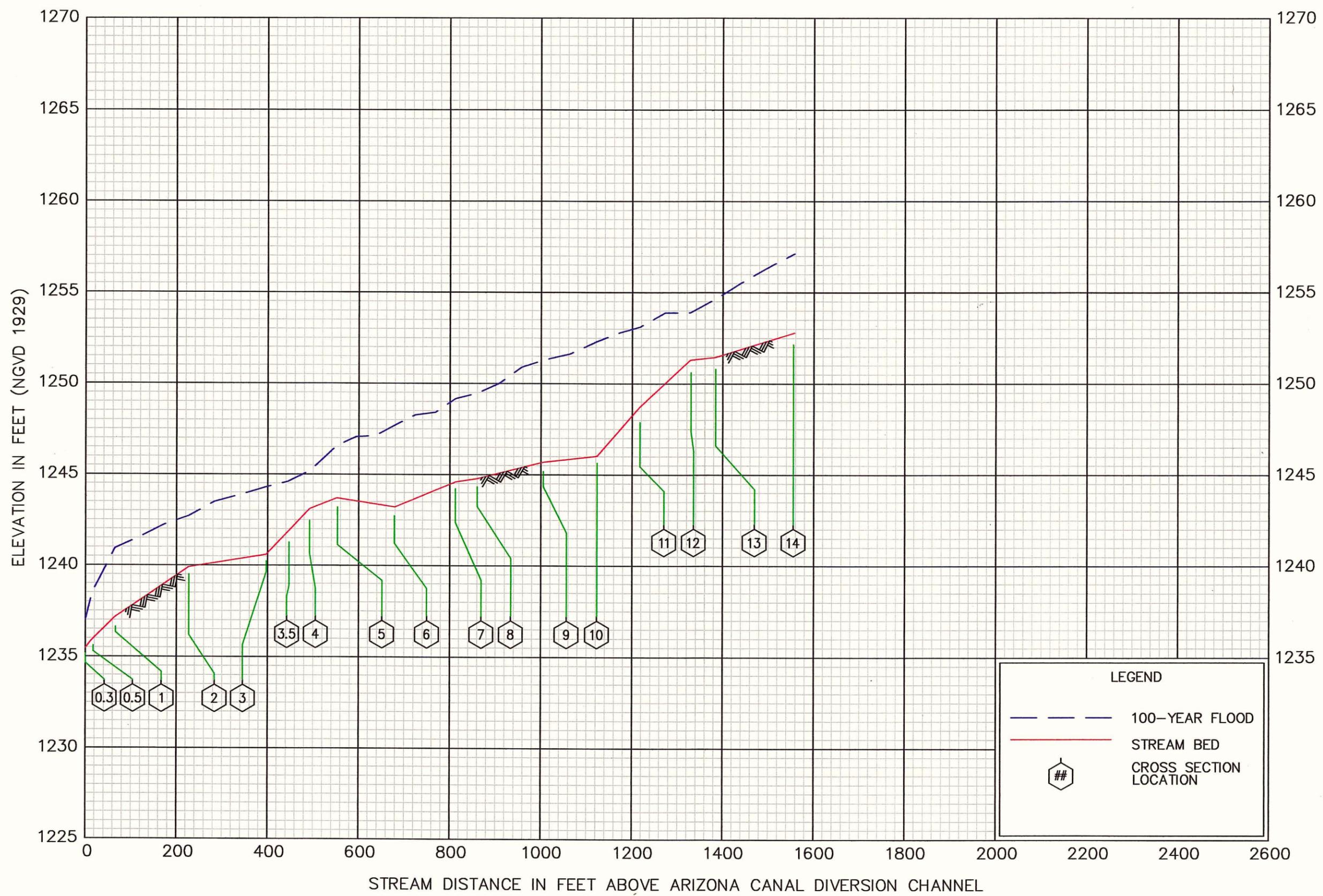
HEC-RAS Plan: JEH-2 River: Dreamy Draw Reach: 1

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	0.3	1000.00	1235.48	1237.04	1237.04	1237.73	0.008318	6.63	150.12	1470.00	1.00
1	0.5	1000.00	1235.90	1238.48	1238.48	1239.55	0.006213	8.34	122.60	261.50	0.95
1	1	1000.00	1237.14	1240.92	1240.92	1241.72	0.006702	8.34	157.16	866.28	0.97
1	1.33333*	1000.00	1238.06	1241.55	1241.41	1242.26	0.010859	7.43	155.95	861.53	0.88
1	1.66666*	1000.00	1238.99	1242.24	1242.11	1242.87	0.009125	6.97	165.13	803.73	0.82
1	2	1000.00	1239.91	1242.71	1242.70	1243.53	0.011626	7.72	146.83	711.24	0.92
1	2.33333*	1000.00	1240.14	1243.50	1243.19	1244.08	0.006828	6.49	170.51	755.51	0.72
1	2.66666*	1000.00	1240.37	1243.88	1243.55	1244.51	0.007309	6.75	161.47	706.18	0.74
1	3	1000.00	1240.60	1244.30	1243.83	1244.92	0.006431	6.63	165.00	661.94	0.71
1	3.5*	1000.00	1241.86	1244.60	1244.60	1245.49	0.011254	7.68	139.06	557.45	0.91
1	4	1000.00	1243.12	1245.19	1245.00	1245.90	0.005367	6.84	147.80	495.00	0.86
1	5	1000.00	1243.70	1246.57	1246.57	1247.31	0.009647	7.12	150.10	617.38	0.84
1	5.33333*	1000.00	1243.54	1247.07	1246.78	1247.63	0.005947	6.33	174.57	565.05	0.68
1	5.66666*	1000.00	1243.38	1247.13	1247.13	1248.09	0.009886	8.20	132.84	445.01	0.87
1	6	1000.00	1243.22	1247.70	1247.70	1248.73	0.008481	8.54	129.83	434.51	0.83
1	6.33333*	1000.00	1243.68	1248.27	1248.27	1249.20	0.007108	8.16	139.38	441.81	0.77
1	6.66666*	1000.00	1244.14	1248.42	1248.42	1249.81	0.010898	9.65	109.00	320.76	0.93
1	7	1000.00	1244.60	1249.17	1248.99	1250.23	0.007505	8.56	129.63	352.51	0.78
1	8	1000.00	1244.78	1249.46	1249.46	1250.91	0.010819	9.85	106.22	254.81	0.92
1	8.33333*	1000.00	1245.09	1250.01	1250.01	1251.58	0.011764	10.15	101.24	168.03	0.95
1	8.66666*	1000.00	1245.39	1250.89	1250.39	1252.08	0.007912	8.85	119.97	211.49	0.78
1	9	1000.00	1245.70	1251.29	1250.54	1252.46	0.007799	8.70	116.55	133.67	0.76
1	9.5*	1000.00	1245.86	1251.64	1250.95	1252.94	0.007089	9.23	110.01	79.29	0.76
1	10	1000.00	1246.03	1252.32	1251.34	1253.30	0.004448	8.50	138.68	137.92	0.64
1	10.5*	1000.00	1247.39	1252.78	1251.98	1253.53	0.004332	7.38	158.33	132.95	0.62
1	11	1000.00	1248.75	1253.12	1253.12	1254.03	0.007464	7.99	137.38	117.82	0.78
1	11.5*	1000.00	1250.03	1253.89	1252.87	1254.25	0.001685	4.92	213.52	126.35	0.51
1	12	1000.00	1251.31	1253.90	1253.66	1254.46	0.005083	6.04	165.43	120.15	0.82
1	13	1000.00	1251.45	1254.62	1254.62	1255.81	0.006872	8.77	115.75	58.62	0.99
1	13.33333*	1000.00	1251.90	1255.54	1255.54	1256.75	0.013443	8.84	114.03	51.93	1.00
1	13.66666*	1000.00	1252.35	1256.37	1256.37	1257.64	0.013475	9.03	110.70	43.57	1.00
1	14	1000.00	1252.80	1257.13	1257.13	1258.47	0.013467	9.28	107.71	40.32	1.00

Appendix F

Erosion and Sediment Transport Analysis Supporting
Documentation

(Not applicable, not included)



LEGEND

- 100-YEAR FLOOD
- STREAM BED
- ## CROSS SECTION LOCATION

FLOOD PROFILE DREAMY DRAW WASH WEST	FEDERAL EMERGENCY MANAGEMENT AGENCY PHOENIX, AZ MARICOPA COUNTY
01P	

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD DELINEATION STUDY OF DREAMY DRAW WASH WEST
 F.C.D. CONTRACT NO. 1999C048
 ASSIGNMENT NO. 3

LEGEND

- REVISED 100-YR FLOODPLAIN BOUNDARY ———
- EXISTING 100-YR FLOODPLAIN BOUNDARY - - - - -
- HYDRAULIC BASELINE - - - - -
- CROSS SECTION ——— 2
- BASE FLOOD ELEVATIONS ~ ~ ~ ~ ~ 1224
- ZONE DESIGNATIONS ZONE AE
- SPOT ELEVATIONS 72.6 ×

ELEVATION REFERENCE MARKS

NONE IDENTIFIED

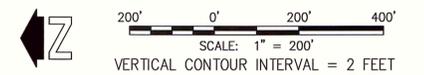
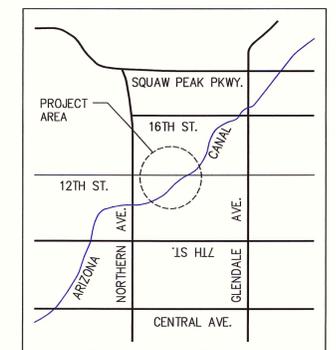
NOTES

ALL ELEVATIONS BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

REVISIONS

- 1 06/05/01 FLOODPLAIN WIDENED TO TIE INTO EFFECTIVE FLOODPLAIN BOUNDARY

INDEX MAP



WEST Consultants, Inc.

BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN	---	RECOMMENDED BY: _____ DATE: _____
DESIGN CHECK	---	APPROVED BY: _____ DATE: _____
PLANS	JEH 02/00	CHEF ENGINEER AND GENERAL MANAGER
PLANS CHECK	DLR 02/00	SHEET 1 OF 1
SUBMITTED BY:	DATE	

