Cave Creek Wash

Conditional Letter of Map Revision

Prepared for:

City of Phoenix
Floodplain Management
5th Floor
200 W. Washington St.
Phoenix, AZ 85003

Prepared by:

AZTEC Since 1992

4561 E. McDowell Road
Phoenix, Arizona 85008
[602] 454-0402 Tel
[602] 454-0403 FAX

April 2006

May 31, 2006

City of Phoenix

STREET TRANSPORTATION DEPARTMENT

FEMA DEPOT
3601 Eisenhower Avenue
Alexandria, Virginia 22304

ATTN: LOMR Depot

RE: CONDITIONAL LETTER OF MAP REVISION (CLOMR)
CAVE CREEK WASH, PHOENIX, AZ
PANEL 04013C1220J, SEPTEMBER 30, 2005

Please find enclosed a Conditional Letter of Map Revision (CLOMR) application for Cave Creek Wash in Phoenix, Arizona. The following items are included with this application.

ITEMS:

1- Check for $4,000.
2- Overview & Concurrence Form.
3- Riverine Hydrology & Hydraulics Form.
4- Riverine Structures Form.
5- Photographs (Appendix A).
6- Survey Field Notes (Appendix B).
7- Current FIS (Appendix C).
8- Duplicate Effective Model Input/Output (Appendix D).
9- Revised Model Input/Output (Appendix E).
10-Proposed Floodplain Delineation (Appendix F).
11-Bridge, Channel, and Drop Structure Design Drawings (Appendix G).
12-Digital Copies (Appendix H).

If you have any technical questions regarding this project, please contact Mr. Patrick Wolf, P.E., AZTEC, phone number 602-454-0402, fax number 602-454-0403. For any other questions, please contact this office at 602-262-4960.

Sincerely,

Hasan Mushtaq, Ph.D., P.E., CFM
Floodplain Manager

Cc: Mr. Brian Cosson, CFM, Arizona Department of Water Resources
Mr. Tim Murphy, P.E., CFM, Flood Control District of Maricopa County
Mr. Patrick Wolf, P.E., AZTEC

200 West Washington Street, Fifth Floor, Phoenix, Arizona 85003-1611 • 602-262-6284 • Fax: 602-495-2016
Recycled Paper

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Registered Professional Engineer (Civil)
CERTIFICATE NO.
34024
PATRICK A.
WOLF
Date Signed 4-24-06
ARIZONA, U.S.A.

April 2006

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1.0 INTRODUCTION

1.1 Purpose and Authorization of Study

The purpose of this study is to obtain a Conditional Letter of Map Revision (CLOMR) for the proposed floodplain/floodway of Cave Creek Wash in the vicinity of Deer Valley Road. The CLOMR will be based on a new hydraulic design for Cave Creek Wash. The wash will be channelized through the Deer Valley Road crossing with two-drop structures. Deer Valley Road is going to be bridged across Cave Creek Wash, and wash improvements are required so that 100-year access will be maintained on Deer Valley Road. There will be no revision to the existing hydrology.

This study and analysis was authorized by the Floodplain Management & Street Transportation Departments for the City of Phoenix.

1.2 Project Location

The project area is located in the City of Phoenix within Maricopa County as shown in Figure 1. The project is within Section 16 & 21, Township 4 North and Range 3 East. The site map is shown in Figure 2. The study reach is just upstream and downstream of the crossing of Cave Creek Wash and Deer Valley Road, an oblique view of the project area is shown in Figure 3.

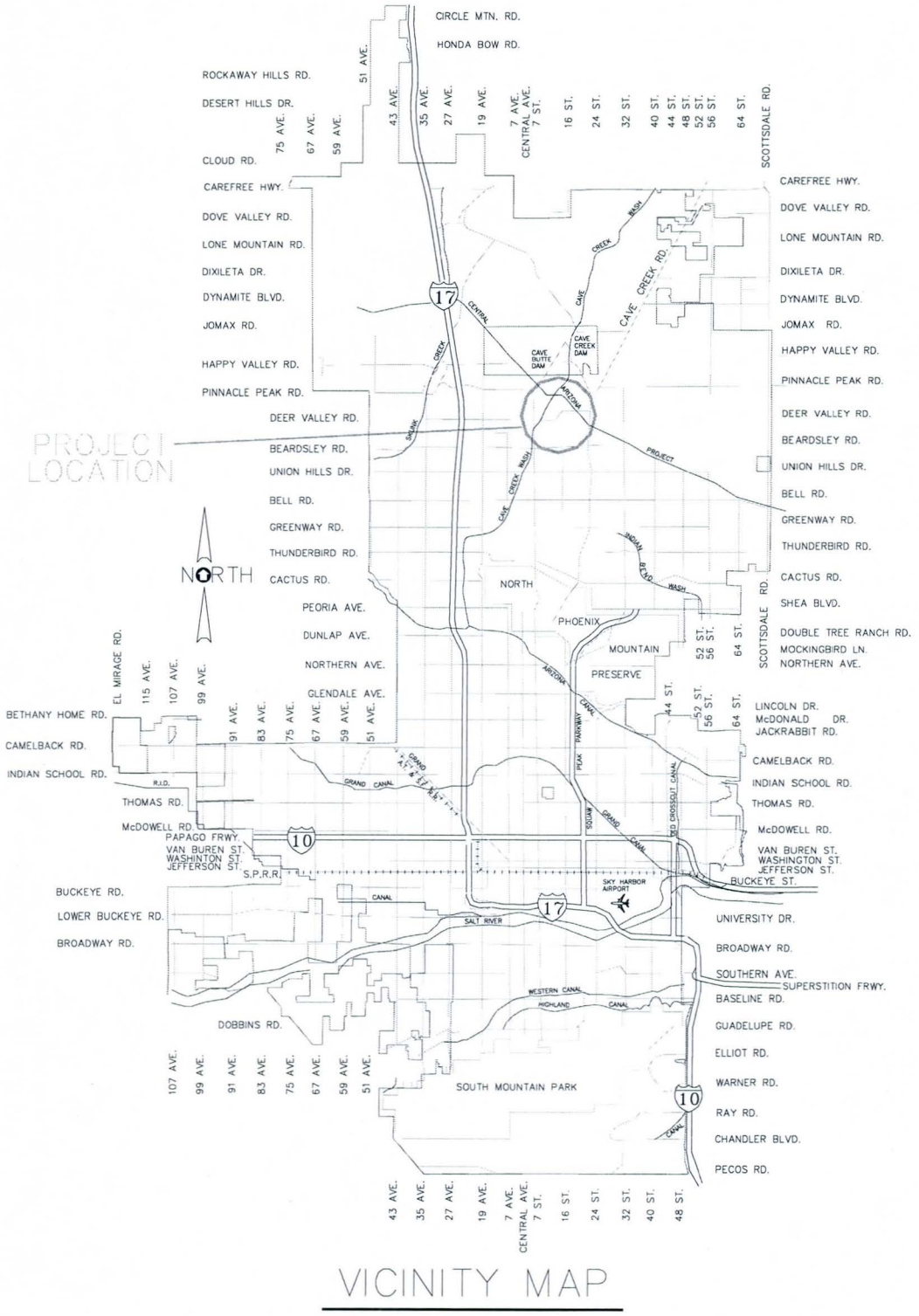
The project area is located within Zone AE of the FEMA Flood Insurance Rate Map (FIRM), Panel No. 04013C1220J, revised September 30, 2005. Zone AE is defined as "The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual flood can be carried without substantial increase in flood heights, Base flood elevations determined." Figure 4 provides a copy of the FIRM Map for the project location.

1.3 Floodplain History

1.3.1 Effective FIS

A search was done for the existing regulatory model through Cave Creek Wash. This search included contacting the FEMA library, and a search through existing information within the City of Phoenix. A floodplain delineation study by Burgess & Niple in 1989 created the current Flood Insurance Study for Cave Creek Wash. The study was done for the Flood Control District of Maricopa County (FCDMC). The portion of this original model that pertains to our project area is included in **Appendix C.**

Figure 1, Project Location Map



VICINITY MAP

Figure 2, Site Map

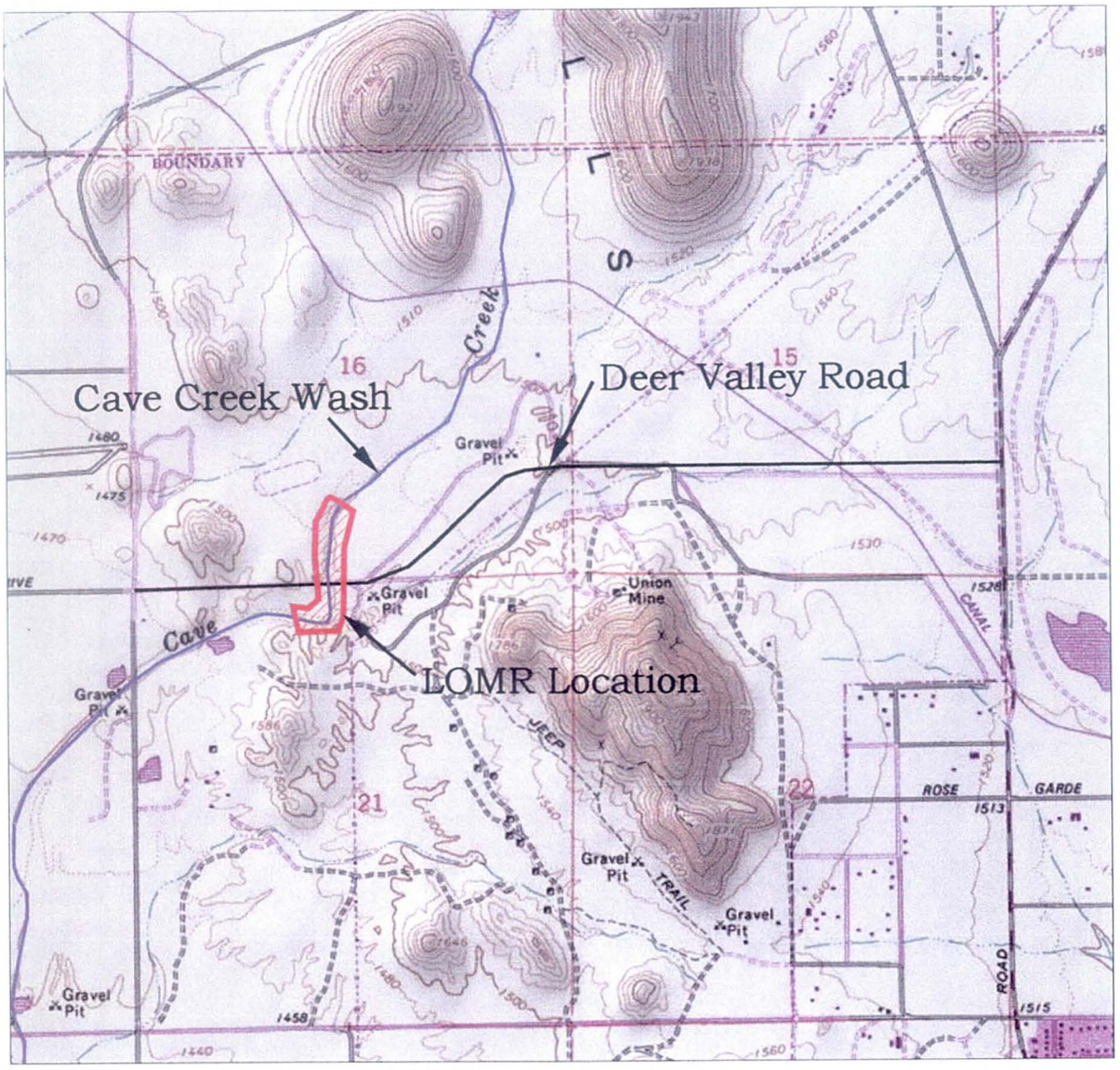
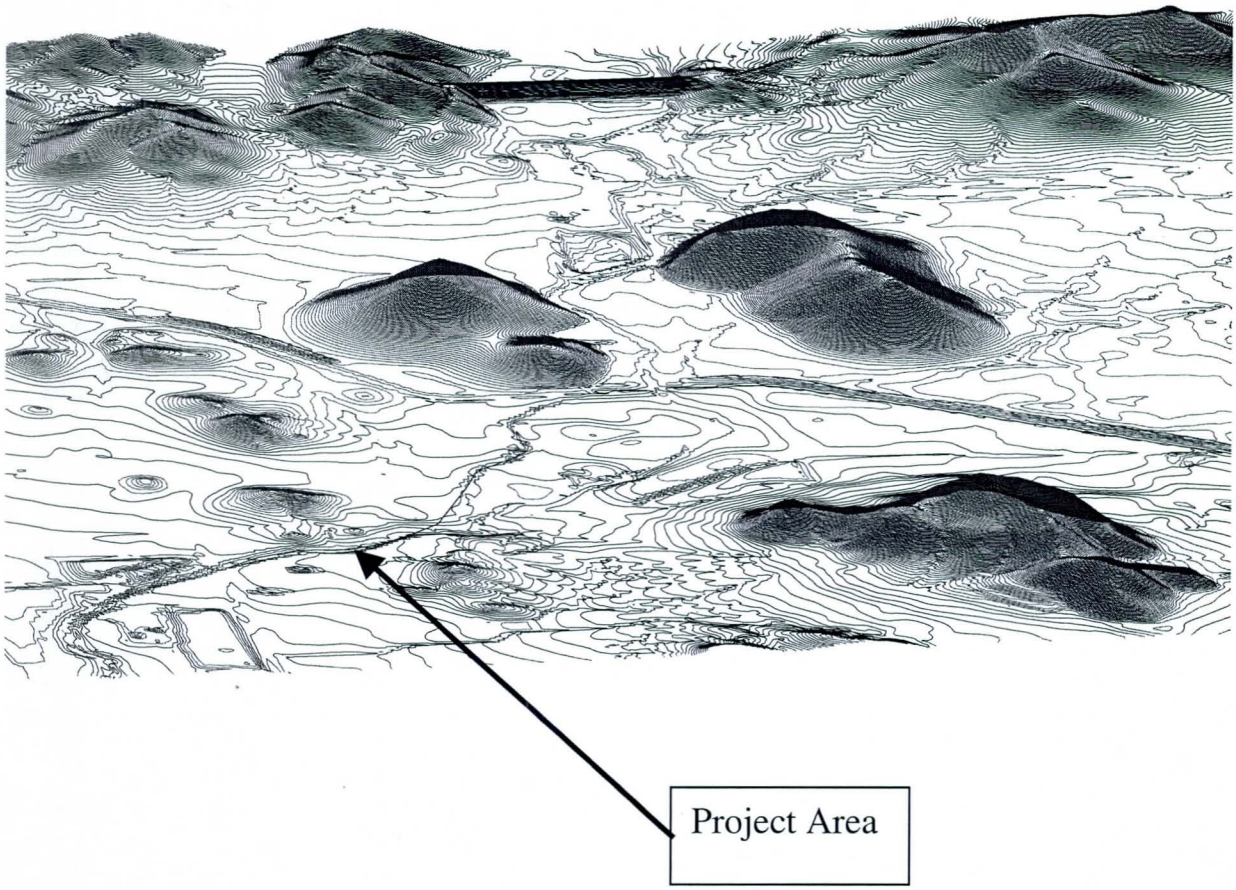
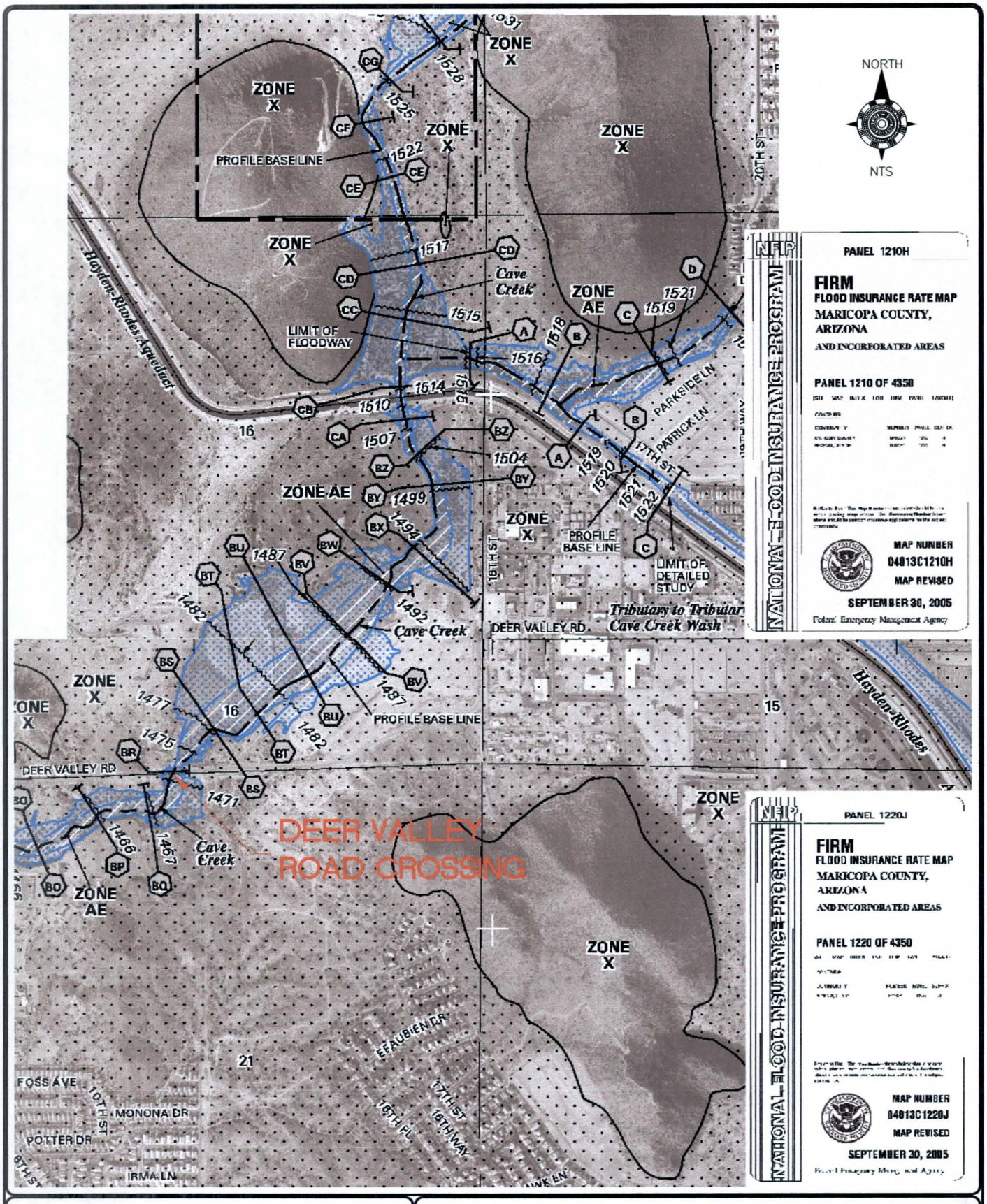


Figure 3, Oblique View of Project Area





AZTEC

Project: CAVE CREEK WASH
FIRM MAPS

Project No: AZ03007 Date: APRIL 2006 Fig. No: 4

2.0 ABSTRACT AND FEMA FORMS

2.1 Study Documentation Abstract

2.1.1	Date Study Accepted	No Acceptance
2.1.2	Study Contractor	Aztec Engineering
	Contact (s)	Patrick Wolf, P.E.
		Tony Bokich, P.E.
	Address:	4561 E. McDowell Road
		Phoenix, AZ 85008
	Phone / Fax	(602) 454-0402 / (602) 454-0403
	Email	pwolf@aztec.us
2.1.3	FEMA Technical Review Contractor	Unknown
	Contact (s)	
	Address	
	Phone	
2.1.4	FEMA Regional Reviewer	Unknown
	Phone	
2.1.5	State Technical Reviewer	Unknown
	Phone	
2.1.6	Local Technical Reviewer	Hasan Mushtaq, City of Phoenix
	Phone	(602) 262-4960
2.1.7	Reach Description	Cave Creek Wash at the Deer Valley Road Crossing
2.1.8	Aerial Mapping Source	Kenney Aerial
	Phone	602 258-6471
	Survey Date / Contour Interval	January 23, 2003 / 1" = 20', 1' CI
2.1.9	Unique Conditions and Problems	• New Bridge • Channelization • Drop Structures (Design drawings in Appendix G)
2.1.10	Coordination of Peak Discharges	Used Existing FIS Discharges

2.2 FEMA Forms

Application for a Conditional Letter of Map Revision requires the use of the FEMA Form Series 81-89, MT-2 forms. The following is a list of the forms required for this submittal:

- MT-2, Form 1 – Overview & Concurrence Form.
- MT-2, Form 2 - Riverine Hydrology & Hydraulic Form.
- MT-2, Form 3 – Riverine Structures Form.

The remainder of this section is comprised of the completed forms.

FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

O.M.B No. 3067-0148
Expires September 30, 2005

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 hour per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this 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, SW, Washington DC 20472, Paperwork Reduction Project (3067-0148). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

A. REQUESTED RESPONSE FROM FEMA

This request is for a (check one):

☑ 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, regulatory floodway or flood elevations. (See Parts 60 & 65 of the NFIP Regulations.)

B. OVERVIEW

1. 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 480287	City of Katy Harris County	TX TX	480301 48201C	0005D 0220G	02/08/83 09/28/90
040051	PHOENIX, CITY OF	AZ	04013C	1220J	9/30/05
		AZ	0413C	1210H	9/30/05

2. Flooding Source: CAVE CREEK WASH

3. Project Name/Identifier: CAVE CREEK WASH CLOMR

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

5. Basis for Request and Type of Revision:

a. The basis for this revision request is (check all that apply)

☑ Physical Change ☐ Improved Methodology/Data

☐ Regulatory Floodway Revision ☐ Other (Attach Description)

Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

b. The area of revision encompasses the following types of flooding and structures (check all that apply)

Types of Flooding: ☐ Riverine ☐ Coastal ☐ Shallow Flooding (e.g., Zones AO and AH)

☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

Structures: ☑ Channelization ☐ Levee/Floodwall ☑ Bridge/Culvert

☐ Dam ☐ Fill ☐ Other, Attach Description

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☑ Yes Fee amount: $ 4,500

☐ No, Attach Explanation

Please see the FEMA Web site at http://www.fema.gov/fhm/frm_fees.shtm **for Fee Amounts and Exemptions.**

D. SIGNATURE

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

Name: PATRICK A. WOLF, P.E.	Company: AZTEC ENGINEERING	
Mailing Address: 4561 EAST MCDOWELL ROAD PHOENIX, AZ 85008	Daytime Telephone No.: 602.458.9269	Fax No.: 602.454.0403
	E-Mail Address: PWOLF@AZTEC.US	
Signature of Requester (required): Patrick Wolf		Date: 4/24/06

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirement that no fill be placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title: Hasan Mushtaq, Ph.D., P.E., CFM, Floodplain Manager		Telephone No.: 602.262.4960
Community Name: CITY OF PHOENIX	Community Official's Signature (required): Hmushtaq	Date: 6/15/06

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is to be signed and sealed by a licensed land surveyor, registered professional engineer, or architect authorized by law to certify elevation information. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: Al Reece	License No.: AZ 25396	Expiration Date: 3/31/2007
Company Name: Aztec Engineering	Telephone No.: (602) 454-0402	Fax No.: (602) 454-0403
Signature: Alan D. Reece		Date: 4/24/06

Ensure the forms that are appropriate to your revision request are included in your submittal.

Form Name and (Number)	Required if ...
☑ Riverine Hydrology and Hydraulics Form (Form 2)	New or revised discharges or water-surface elevations
☑ Riverine Structures Form (Form 3)	Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam
☐ Coastal Analysis Form (Form 4)	New or revised coastal elevations
☐ Coastal Structures Form (Form 5)	Addition/revision of coastal structure
☐ Alluvial Fan Flooding Form (Form 6)	Flood control measures on alluvial fans

Seal (Optional)

FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE HYDROLOGY & HYDRAULICS FORM

O.M.B No. 3067-0148
Expires September 30, 2005

PAPERWORK REDUCTION ACT

Public reporting burden for this form is estimated to average 3 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this 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, SW, Washington DC 20472, Paperwork Reduction Project (3067-0148). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

Flooding Source: Cave Creek Wash
Note: Fill out one form for each flooding source studied

A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☑ Not revised (skip to section 2) ☐ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

Location	Drainage Area (Sq. Mi.)	FIS (cfs)	Revised (cfs)

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☐ Precipitation/Runoff Model [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☐ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

B. HYDRAULICS

1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevations (ft.) Effective	Proposed/Revised
Downstream Limit	SEC. DOWNSTREAM OF LOWER DROP STRUCTURE	(BN) 24.195	1465.7	1465.7
Upstream Limit	SEC. UPSTREAM OF UPPER DROP STRUCTURE	(BN) 24.838	1480.3	1480.3

2. Hydraulic Method Used

Hydraulic Analysis HEC-2 [HEC-2 , HEC-RAS, Other (Attach description)]

B. HYDRAULICS (CONTINUED)

3. Pre-Submittal Review of Hydraulic Models

FEMA has developed two review programs, CHECK-2 and CHECK-RAS, to aid in the review of HEC-2 and HEC-RAS hydraulic models, respectively. These review programs verify that the hydraulic estimates and assumptions in the model data are in accordance with NFIP requirements, and that the data are comparable with the assumptions and limitations of HEC-2/HEC-RAS. CHECK-2 and CHECK-RAS identify areas of potential error or concern. These tools do not replace engineering judgment. CHECK-2 and CHECK-RAS can be downloaded from http://www.fema.gov/fhm/frm_soft.shtm. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS. If you disagree with a message, please attach an explanation of why the message is not valid in this case. Review of your submittal and resolution of valid modeling discrepancies will result in reduced review time.

HEC-2/HEC-RAS models reviewed with CHECK-2/CHECK-RAS? ☐ Yes ☑ No

4. Models Submitted

Duplicate Effective Model*	Natural File Name:	Floodway File Name:
Corrected Effective Model*	Natural File Name:	Floodway File Name:
Existing or Pre-Project Conditions Model	Natural File Name:	Floodway File Name:
Revised or Post-Project Conditions Model	Natural File Name:	Floodway File Name:
Other - (attach description)	Natural File Name:	Floodway File Name:

*Not required for revisions to approximate 1%-annual-chance floodplains (Zone A) – for details, refer to the corresponding section of the instructions.

The document "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

C. MAPPING REQUIREMENTS

A **certified topographic map** must be submitted showing the following information (where applicable): the boundaries of the effective, existing, and proposed conditions 1%-annual-chance floodplain (for approximate Zone A revisions) or the boundaries of the 1%- and 0.2%-annual-chance floodplains and regulatory floodway (for detailed Zone AE, AO, and AH revisions); location and alignment of all cross sections with stationing control indicated; stream, road, and other alignments (e.g., dams, levees, etc.); current community easements and boundaries; boundaries of the requester's property; certification of a registered professional engineer registered in the subject State; location and description of reference marks; and the referenced vertical datum (NGVD, NAVD, etc.).

Note that the boundaries of the existing or proposed conditions floodplains and regulatory floodway to be shown on the revised FIRM and/or FBFM must tie-in with the effective floodplain and regulatory floodway boundaries. Please attach **a copy of the effective FIRM and/or FBFM,** annotated to show the boundaries of the revised 1%- and 0.2%-annual-chance floodplains and regulatory floodway that tie-in with the boundaries of the effective 1%- and 0.2%-annual-chance floodplain and regulatory floodway at the upstream and downstream limits of the area of revision.

D. COMMON REGULATORY REQUIREMENTS

1. For CLOMR requests, do Base Flood Elevations (BFEs) increase? ☐ Yes ☑ No

For CLOMR requests, if either of the following is true, please submit evidence of compliance with Section 65.12 of the NFIP regulations:

- The proposed project encroaches upon a regulatory floodway and would result in increases above 0.00 foot.
- The proposed project encroaches upon a SFHA with BFEs established and would result in increases above 1.00 foot.

2. Does the request involve the placement or proposed placement of fill? ☐ Yes ☑ No

If Yes, the community must be able to certify that the area to be removed from the special flood hazard area, to include any structures or proposed structures, meets all of the standards of the local floodplain ordinances, and is reasonably safe from flooding in accordance with the NFIP regulations set forth at 44 CFR 60.3(a)(3), 65.5(a)(4), and 65.6(a)(14). Please see the MT-2 instructions for more information.

3. For LOMR requests, is the regulatory floodway being revised? ☐ Yes ☐ No

If Yes, attach evidence of regulatory floodway revision notification. As per Paragraph 65.7(b)(1) of the NFIP Regulations, notification is required for requests involving revisions to the regulatory floodway. (Not required for revisions to approximate 1%-annual-chance floodplains [studied Zone A designation] unless a regulatory floodway is being added. Elements and examples of regulatory floodway revision notification can be found in the MT-2 Form 2 Instructions.)

4. For LOMR requests, does this request require property owner notification and acceptance of BFE increases? ☐ Yes ☐ No

If Yes, please attach proof of property owner notification and acceptance (if available). Elements of and examples of property owner notification can be found in the MT-2 Form 2 Instructions.

FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

O.M.B. No. 3067-0148
Expires September 30, 2005

PAPERWORK REDUCTION ACT

Public reporting burden for this form is estimated to average 7 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this 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, SW, Washington DC 20472, Paperwork Reduction Project (3067-0148). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

Flooding Source: Cave Creek Wash
Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization ..... complete Section B
Bridge/Culvert ..... complete Section C
Dam..... complete Section D
Levee/Floodwall ..... complete Section E
Sediment Transport..... complete Section F (if required)

Description Of Structure

1. **Name of Structure:**

Type (check one): ☑ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

Location of Structure: TROUGH THE PROPOSED DEER VALLEY ROAD BRIDGE

Downstream Limit/Cross Section: 24.655

Upstream Limit/Cross Section: 24.701

2. **Name of Structure:**

Type (check one): ☐ Channelization ☑ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

Location of Structure: DEER VALLEY ROAD OVER CAVE CREEK WASH

Downstream Limit/Cross Section: 24.655

Upstream Limit/Cross Section: 24.701

3. **Name of Structure:**

Type (check one) ☐ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

Location of Structure:

Downstream Limit/Cross Section:

Upstream Limit/Cross Section:

NOTE: For more structures, attach additional pages as needed.

B. CHANNELIZATION

Flooding Source: Cave Creek Wash

Name of Structure: Channel under Deer Valley Road

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
- ☐ Superelevated sections
- ☐ Debris basin/detention basin
- ☐ Other (Describe):
- ☑ Drop structures
- ☐ Transitions in cross sectional geometry
- ☐ Energy dissipator

2. Drawing Checklist

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Hydraulic Considerations

The channel was designed to carry 5,000 (cfs) and/or the 100 -year flood.

The design elevation in the channel is based on (check one):

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

If there is the potential for a hydraulic jump at the following locations, check all that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel.

☐ Inlet to channel ☐ Outlet of channel ☑ At Drop Structures ☐ At Transitions
☐ Other locations (specify):

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☑ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

C. BRIDGE/CULVERT

Flooding Source:

Name of Structure:

1. This revision reflects (check one):

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

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8):
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

- ☑ Dimensions (height, width, span, radius, length)
- ☐ Shape (culverts only)
- ☐ Material
- ☐ Beveling or Rounding
- ☐ Wing Wall Angle
- ☐ Skew Angle
- ☐ Distances Between Cross Sections
- ☑ Erosion Protection
- ☑ Low Chord Elevations – Upstream and Downstream
- ☑ Top of Road Elevations – Upstream and Downstream
- ☐ Structure Invert Elevations – Upstream and Downstream
- ☑ Stream Invert Elevations – Upstream and Downstream
- ☑ Cross-Section Locations

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☑ No If yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

D. DAM

Flooding Source:

Name of Structure:

1. This request is for (check one): ☐ Existing dam ☐ New dam ☐ Modification of existing dam
2. The dam was designed by (check one): ☐ Federal agency ☐ State agency ☐ Local government agency

   ☐ Private organization Name of the agency or organization:
3. Does the project involve revised hydrology? ☐ Yes ☐ No

   If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2).
4. Does the submittal include debris/sediment yield analysis? ☐ Yes ☐ No

   If yes, then fill out Section F (Sediment Transport).
   If No, then attach your explanation for why debris/sediment analysis was not considered.
5. Does the Base Flood Elevation behind the dam or downstream of the dam change?

   ☐ Yes ☐ No If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2) and complete the table below.

   Stillwater Elevation Behind the Dam

FREQUENCY (% annual chance)	FIS	REVISED
10-year (10%)		
50-year (2%)		
100-year (1%)		
500-year (0.2%)		
Normal Pool Elevation		

6. Please attach a copy of the formal Operation and Maintenance Plan

E. LEVEE/FLOODWALL

1. System Elements

a. This Levee/Floodwall analysis is based on (check one):

☐ upgrading of an existing levee/floodwall system
☐ a newly constructed levee/floodwall system
☐ reanalysis of an existing levee/floodwall system

b. Levee elements and locations are (check one):

☐ earthen embankment, dike, berm, etc.	Station	to
☐ structural floodwall	Station	to
☐ Other (describe):	Station	to

c. Structural Type (check one):

☐ monolithic cast-in place reinforced concrete
☐ reinforced concrete masonry block
☐ sheet piling
☐ Other (describe):

d. Has this levee/floodwall system been certified by a Federal agency to provide protection from the base flood?

☐ Yes ☐ No

If Yes, by which agency?

e. Attach certified drawings containing the following information (indicate drawing sheet numbers):

1. Plan of the levee embankment and floodwall structures. Sheet Numbers:
2. A profile of the levee/floodwall system showing the Base Flood Elevation (BFE), levee and/or wall crest and foundation, and closure locations for the total levee system. Sheet Numbers:
3. A profile of the BFE, closure opening outlet and inlet invert elevations, type and size of opening, and kind of closure. Sheet Numbers:
4. A layout detail for the embankment protection measures. Sheet Numbers:
5. Location, layout, and size and shape of the levee embankment features, foundation treatment, floodwall structure, closure structures, and pump stations. Sheet Numbers:

2. Freeboard

a. The minimum freeboard provided above the BFE is:

Riverine

3.0 feet or more at the downstream end and throughout	☐ Yes	☐ No
3.5 feet or more at the upstream end	☐ Yes	☐ No
4.0 feet within 100 feet upstream of all structures and/or constrictions	☐ Yes	☐ No

Coastal

1.0 foot above the height of the one percent wave associated with the 1%-annual-chance stillwater surge elevation or maximum wave runup (whichever is greater).	☐ Yes	☐ No
2.0 feet above the 1%-annual-chance stillwater surge elevation	☐ Yes	☐ No

2. Freeboard (continued)

Please note, occasionally exceptions are made to the minimum freeboard requirement. If an exception is requested, attach documentation addressing Paragraph 65.10(b)(1)(ii) of the NFIP Regulations.

If No is answered to any of the above, please attach an explanation.

b. Is there an indication from historical records that ice-jamming can affect the BFE? ☐ Yes ☐ No

If Yes, provide ice-jam analysis profile and evidence that the minimum freeboard discussed above still exists.

3. Closures

a. Openings through the levee system (check one): ☐ exists ☐ does not exist

If opening exists, list all closures:

Channel Station	Left or Right Bank	Opening Type	Highest Elevation for Opening Invert	Type of Closure Device

(Extend table on an added sheet as needed and reference)

Note: Geotechnical and geologic data

In addition to the required detailed analysis reports, data obtained during field and laboratory investigations and used in the design analysis for the following system features should be submitted in a tabulated summary form. (Reference U.S. Army Corps of Engineers [USACE] EM-1110-2-1906 Form 2086.)

4. Embankment Protection

a. The maximum levee slope landside is:

b. The maximum levee slope floodside is:

c. The range of velocities along the levee during the base flood is: (min.) to (max.)

d. Embankment material is protected by (describe what kind):

e. Riprap Design Parameters (check one): ☐ Velocity ☐ Tractive stress
Attach references

Reach		Sideslope	Flow Depth	Velocity	Curve or Straight	Stone Riprap			Depth of Toedown
						D_{100}	D_{50}	Thickness	
Sta	to								
Sta	to								
Sta	to								
Sta	to								
Sta	to								
Sta	to								

(Extend table on an added sheet as needed and reference each entry)

4. Embankment Protection (continued)

f. Is a bedding/filter analysis and design attached? ☐ Yes ☐ No

g. Describe the analysis used for other kinds of protection used (include copies of the design analysis):

Attach engineering analysis to support construction plans.

5. Embankment And Foundation Stability

a. Identify locations and describe the basis for selection of critical location for analysis:

☐ Overall height: Sta. ; height ft.

☐ Limiting foundation soil strength:

Sta. , depth to

strength ϕ = degrees, c = psf

slope: SS = (h) to (v)

(Repeat as needed on an added sheet for additional locations)

b. Specify the embankment stability analysis methodology used (e.g., circular arc, sliding block, infinite slope, etc.):

c. Summary of stability analysis results:

Case	Loading Conditions	Critical Safety Factor	Criteria (Min.)
I	End of construction		1.3
II	Sudden drawdown		1.0
III	Critical flood stage		1.4
IV	Steady seepage at flood stage		1.4
VI	Earthquake (Case I)		1.0

(Reference: USACE EM-1110-2-1913 Table 6-1)

d. Was a seepage analysis for the embankment performed? ☐ Yes ☐ No

If Yes, describe methodology used:

e. Was a seepage analysis for the foundation performed? ☐ Yes ☐ No

f. Were uplift pressures at the embankment landside toe checked? ☐ Yes ☐ No

g. Were seepage exit gradients checked for piping potential? ☐ Yes ☐ No

h. The duration of the base flood hydrograph against the embankment is hours.

Attach engineering analysis to support construction plans.

6. Floodwall And Foundation Stability

a. Describe analysis submittal based on Code (check one):

☐ UBC (1988) or ☐ Other (specify):

b. Foundation scour protection is provided check box

☐ Overturning ☐ Sliding If not, explain:

c. Loading included in the analyses were:

☐ Lateral earth @ P_A = psf; P_p = psf

☐ Surcharge-Slope @ ☐ surface psf

☐ Wind @ P_w = psf

☐ Seepage (Uplift); ☐ Earthquake @ P_{eq} = %g

☐ 1%-annual-chance significant wave height: ft.

☐ 1%-annual-chance significant wave period: sec.

d. Summary of Stability Analysis Results: Factors of Safety.

Itemize for each range in site layout dimension and loading condition limitation for each respective reach.

Loading Condition	Criteria (Min)		Sta	To	Sta	To
	Overturn	Sliding	Overturn	Sliding	Overturn	Sliding
Dead & Wind	1.5	1.5				
Dead & Soil	1.5	1.5				
Dead, Soil, Flood, & Impact	1.5	1.5				
Dead, Soil, & Seismic	1.3	1.3				

(Ref: FEMA 114 Sept 1986; USACE EM 1110-2-2502)

(Note: Extend table on an added sheet as needed and reference)

e. Foundation bearing strength for each soil type:

Bearing Pressure	Sustained Load (psf)	Short Term Load (psf)
Computed design maximum		
Maximum allowable		

f. Foundation scour protection ☐ is, ☐ is not provided. If provided, attach explanation and supporting documentation:

Attach engineering analysis to support construction plans.

7. Settlement

a. Has anticipated potential settlement been determined and incorporated into the specified construction elevations to maintain the established freeboard margin? ☐ Yes ☐ No

b. The computed range of settlement is ft. to ft.

c. Settlement of the levee crest is determined to be primarily from :

☐ Foundation consolidation
☐ Embankment compression
☐ Other (Describe):

d. Differential settlement of floodwalls ☐ has ☐ has not been accommodated in the structural design and construction.

Attach engineering analysis to support construction plans.

8. Interior Drainage

a. Specify size of each interior watershed:

Draining to pressure conduit: acres
Draining to ponding area: acres

b. Relationships Established

Ponding elevation vs. storage	☐ Yes	☐ No
Ponding elevation vs. gravity flow	☐ Yes	☐ No
Differential head vs. gravity flow	☐ Yes	☐ No

c. The river flow duration curve is enclosed: ☐ Yes ☐ No

d. Specify the discharge capacity of the head pressure conduit: cfs

e. Which flooding conditions were analyzed?

• Gravity flow (Interior Watershed)	☐ Yes	☐ No
• Common storm (River Watershed)	☐ Yes	☐ No
• Historical ponding probability	☐ Yes	☐ No
• Coastal wave overtopping	☐ Yes	☐ No

If No for any of the above, attach explanation.

f. Interior drainage has been analyzed based on joint probability of interior and exterior flooding and the capacities of pumping and outlet facilities to provide the established level of flood protection. ☐ Yes ☐ No

If No, attach explanation.

g. The rate of seepage through the levee system for the base flood is cfs

h. The length of levee system used to drive this seepage rate in item g: ft.

8. Interior Drainage (continued)

i. Will pumping plants be used for interior drainage? ☐ Yes ☐ No

If Yes, include the number of pumping plants:
For each pumping plant, list:

	Plant #1	Plant #2
The number of pumps		
The ponding storage capacity		
The maximum pumping rate		
The maximum pumping head		
The pumping starting elevation		
The pumping stopping elevation		
Is the discharge facility protected?		
Is there a flood warning plan?		
How much time is available between warning and flooding?		

Will the operation be automatic? ☐ Yes ☐ No

If the pumps are electric, are there backup power sources? ☐ Yes ☐ No

(Reference: USACE EM-1110-2-3101, 3102, 3103, 3104, and 3105)

Include a copy of supporting documentation of data and analysis. Provide a map showing the flooded area and maximum ponding elevations for all interior watersheds that result in flooding.

9. Other Design Criteria

a. The following items have been addressed as stated:

Liquefaction ☐ is ☐ is not a problem
Hydrocompaction ☐ is ☐ is not a problem
Heave differential movement due to soils of high shrink/swell ☐ is ☐ is not a problem

b. For each of these problems, state the basic facts and corrective action taken:

Attach supporting documentation

c. If the levee/floodwall is new or enlarged, will the structure adversely impact flood levels and/or flow velocities floodside of the structure?
☐ Yes ☐ No

Attach supporting documentation

d. Sediment Transport Considerations:

Was sediment transport considered? ☐ Yes ☐ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

E. LEVEE/FLOODWALL (CONTINUED)

10. Operational Plan And Criteria

    a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No

    b. Does the operation plan incorporate all the provisions for closure devices as required in Paragraph 65.10(c)(1) of the NFIP regulations? ☐ Yes ☐ No

    c. Does the operation plan incorporate all the provisions for interior drainage as required in Paragraph 65.10(c)(2) of the NFIP regulations? ☐ Yes ☐ No

    If the answer is No to any of the above, please attach supporting documentation.

11. Maintenance Plan

    a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No
    If No, please attach supporting documentation.

12. Operations and Maintenance Plan

    Please attach a copy of the formal Operations and Maintenance Plan for the levee/floodwall.

F. SEDIMENT TRANSPORT

Flooding Source:

Name of Structure:

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the Base Flood Elevation (BFE); and/or based on the stream morphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including scour and deposition) to affect the BFEs, then provide the following information along with the supporting documentation:

Sediment load associated with the base flood discharge: Volume acre-feet

Debris load associated with the base flood discharge: Volume acre-feet

Sediment transport rate (percent concentration by volume)

Method used to estimate sediment transport:

Most sediment transport formulas are intended for a range of hydraulic conditions and sediment sizes; attach a detailed explanation for using the selected method.

Method used to estimate scour and/or deposition:

Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport:
Please note that bulked flows are used to evaluate the performance of a structure during the base flood; however, FEMA does not map BFEs based on bulked flows.

If a sediment analysis has not been performed, an explanation as to why sediment transport (including scour and deposition) will not affect the BFEs or structures must be provided.

3.0 SURVEY AND MAPPING INFORMATION

3.1 Field Survey Information

Horizontal and vertical survey control for this project was performed by AZTEC and was conducted in March, April, and July 2003. The survey was performed under the direct supervision of Alan D. Reece, R.L.S. (AZ RLS No. 25396). The survey work included establishment of a horizontal and vertical control network and topographic surveys.

3.2 Topographic Mapping

One-foot contour interval aerial mapping compiled to a horizontal scale accuracy of 1-inch equals 20-feet was created for this project. The flight date for the aerial topography was January 23, 2003 and was flown by Kenney Aerial.

The coordinate grid is based on the North American Datum of 1983 (NAD 83), Central Zone of Arizona State Plane Coordinate System. Elevations are based upon the National Geodetic Vertical Datum of 1929 (NGVD 29). The conversion factor to the North American Vertical Datum of 1988 (NAVD 88) is +1.92'. Field notes of the survey are provided in Appendix B.

4.0 HYDROLOGY

4.1 General

No new hydrology was developed for this study. Existing peak discharges published in the current Flood Insurance Study (FIS) were used without change. The 100-year peak discharges for the subject reach of Cave Creek Wash are summarized in Table 1 below.

Table 1
Summary of FIS Discharges

Location	River Mile	Drainage Area (sq mi)	Peak 100-Yr Discharge (cfs)
Downstream of Deer Valley Road	24.542	5.0	5,400
Upstream of Deer Valley Road	24.738	4.5	5,000

5.0 HYDRAULICS

5.1 Method Description

The U.S. Army Corps of Engineers computer program, HEC-2 (version 4.6.2., released August 1991) was used with the program BOSS RMS (River Modeling System) for AutoCAD to analyze the 100-year floodplain conditions along Cave Creek Wash and to develop the models for the project site. Three hydraulic models are included in this report: the Duplicate Effective Model, the Revised Model, and the Revised Floodway Model.

5.1.1 Duplicate Effective Model

A duplicate effective model was prepared using data available from the FEMA library. This model is included in Appendix D. The duplicate effective model starts approximately 1,000 feet upstream of Deer Valley Road and terminates 2,400 feet downstream of Deer Valley Road. The FIRM dated July 19, 2001 (Figure 4) includes this entire reach. The data from **Table 5** (Appendix C) of the FIS, "Floodway Data", was used for the effective flood upstream. This reach includes Sections "BN" through "BT" on the FIRM. Table 2 compares the results of the FIS effective model, the duplicate effective model, and the revised model.

5.1.2 Revised Model

AZTEC performed a detailed hydraulic analysis of the study reach using survey data collected by AZTEC survey crews beginning at the Cave Creek Wash crossing of the Central Arizona Project (CAP) Canal upstream and continuing downstream to just about 750 feet downstream of Seventh Street. The survey data of the wash included top of bank and toe of bank elevation shots about every 500 feet. This data was then combined with scaled points off of topographic maps prepared by Kenney Aerial. Cross sections were then plotted and oriented to be perpendicular to expected streamlines during a 100-year event.

The starting downstream water surface elevation (WSEL) and discharge were set to the FIS values as boundary conditions for this revised conditions model.

The revised model reach ties back into the effective flood two sections upstream of the Deer Valley Road crossing where the 100-year water surface and the revised water surface elevations are 1480.33. The revised model is included in Appendix E.

Table 2

Water Surface Elevation Comparison

Cross Section	River Mile (1)	Revised Model CROSS SECTION NAME	REGULATORY WSEL (ft)	DUPLICATE EFFECTIVE MODEL WSEL (ft)	ELEV. DIFF. (ft)	REVISED MODEL WSEL (ft)	ELEV. DIFF. (ft)
BN	24.195	3	1465.70	1465.70	0.00	1465.70	0.00
BO	24.322	4	1466.20	1465.92	0.28	1465.92	0.28
BP	24.444	5	1466.00	1465.96	0.04	1465.97	0.03
BQ	24.542	6	1466.30	1466.28	0.02	1466.24	0.06
BR	24.635	40	1472.10	1471.83	0.27	1473.95	1.85
BS	24.738	70	1476.90	1476.78	0.12	1477.68	0.78
BT	24.838	80	1480.30	1480.27	0.03	1480.30	0.00

Notes: (1) River Mile is distance upstream of the confluence with the Salt River.

5.2 Work Study Maps

Work maps are provided with this TDN, shown on Figure 5, and included in Appendix F.

5.3 Parameter Estimation

5.3.1 Roughness Coefficients

The Manning 'n' Coefficients used in this study are similar to those in previous studies to provide continuity and to reflect increased GR (ground) data available. Coefficients used were:

Feature	n
Roadways	.016
Desert over banks	.045
Natural wash bottom	.038 to .045
Concrete bank protection (In the improved channel)	.016
Improved Channel (Concrete)	.016

The over banks in the study area had sparse vegetation, so there is only a slight difference in the Manning's values. The wash is going to be channelized through the Deer Valley Road crossing. The channelized

section will be concrete with concrete bank protection, which justifies the lower Manning's values.

5.3.2 Expansion and Contraction Coefficients

Coefficients for expansion and contraction of 0.1 and 0.3, respectively, were used throughout the study reach, except through the transition into the improved channelized section. Coefficients for expansion and contraction of 0.3 and 0.5, respectively, were used through this transition.

5.4 Cross Section Description

New cross section data were generated for the proposed improved channel, from river mile 24.569 (downstream of the lower drop structure) through river mile 24.698 (upstream of the upper drop structure) using the two-foot contour interval mapping from Kaminski Hubbard generated for the FIS, AZTEC survey data, and the design drawings. The design drawings are included in Appendix G. AZTEC crews surveyed the wash prism at intervals averaging 500 feet, taking elevations at the top and toe of the banks of the wash. The cross section geometry was then completed by plotting each surveyed section on the topographic map and scaling off the distance and elevation off of the topographic map. The cross sections were oriented to be perpendicular to the predominant flow path.

5.5 Modeling Considerations

5.5.1 Hydraulic Jump and Drop Analysis

No significant hydraulic jumps occur in the study reach, an undular jump occurs in the upstream drop structure. An undular jump occurs with Froude Numbers in the range of 1.0 to 1.7, the Froude Number in the cross-section just upstream of the drop structure is 1.0. The energy loss due to this type of hydraulic jump is very low, typically 0.5%.

Most flows for the 100-year flood in the study reach are expected to remain near or below critical energy, except just upstream of each drop structure. At these two locations, the flow transitions into a supercritical flow regime, which is expected. All remaining cross-sections are considered stable based on the criteria set forth in the State Standard.

5.5.2 Culverts

There are no culverts within the study reach.

5.5.3 Ineffective Flow Areas

Ineffective flow areas were set to model a one-to-one contraction of the flows into the levee just upstream of the northern drop structure.

5.6 Floodway Modeling

Floodway encroachments are analyzed for the study reach for the 100-year flow of the revised model. Method Four was the encroachment type used in the floodway model. This method was used to encroach the floodplain so that the water surface was increased by a maximum of one foot.

5.7 Special Problems

There are no special problems to report.

5.7.1 Errors and Warning Messages

There are no modeling error messages and the warnings primarily deal with the defaulting of calculations to critical depth and minimum specific energy.

5.8 Final Results

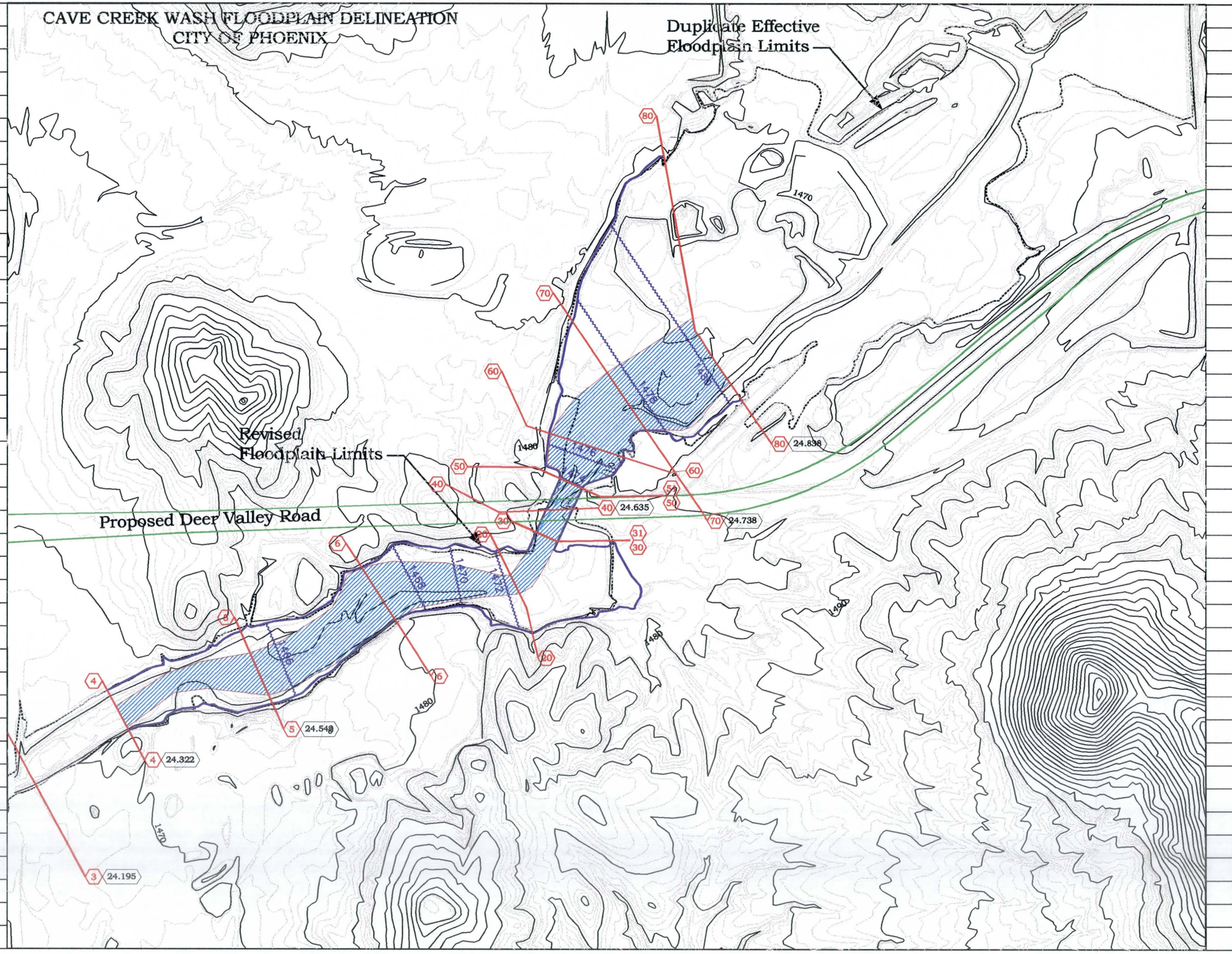
Results are presented in Table 2.

The 100-year water surface resulting from this study is delineated on Figure 5. The revised flood profile is shown in Figure 6. Tabulation of the water surface elevations for the revised flood is shown in Table 2 and a printout of the revised model is included in Appendix E. The water surface elevation for a surveyed cross section just upstream of the north drop structure is 1480.30, which is the same elevation shown in the FIRM.

There were no structures within the floodplain prior to this study. This area is undeveloped and no new structures were added to the floodplain.

5.8.1 HEC-2 Files and Output

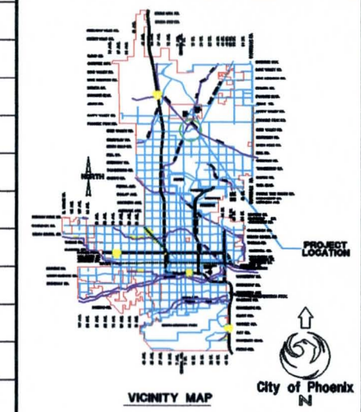
Table 3 provides a summary of the project files and associated plans for the HEC-2 analysis. Detailed input and outputs for each of these plans are included in Appendices D and E. Electronic files are included on CD in Appendix H.



F.H.W.A. REGION	STATE	PROJ. NO.	NO.	TOTAL	AS BUILT
	ARIZ	AZ03007			

AZTEC

DR: PAW | DES: PAW | CK: TB | DATE: 5/19



VICINITY MAP

CROSS SECTION	RIVER MILE	ID
BN	24.195	3
		4
BO	24.322	5
BP	24.444	6
BQ	24.542	20
		30
BR	24.635	40
		50
		60
BS	24.738	70
BT	24.838	80

LEGEND

- LIMITS OF 100 YEAR FLOODPLAIN
- LIMITS OF DUPLICATE EFFECTIVE FLOODPLAIN
- (3) CROSS SECTION DESIGNATION
- 1474 Base Flood Elevation–Elevation in Feet
- FLOODWAY LIMITS

PER CITY OF PHOENIX ORDINANCE G-4396, THESE PLANS ARE FOR OFFICIAL USE ONLY AND MAY NOT BE SHARED WITH OTHERS EXCEPT AS REQUIRED TO FULFILL THE OBLIGATIONS OF YOUR CONTRACT WITH THE CITY OF PHOENIX.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 34024 PATRICK A. WOLF Date Signed ARIZONA, U.S.A.

CALL TWO WORKING DAYS BEFORE YOU DIG CALL FOR THE BLUE STAKES 602-263-1100 1-800-STAKE-IT OUTSIDE MARICOPA COUNTY

FLOODPLAIN DELINEATION

CITY OF PHOENIX, ARIZONA
STREET TRANSPORTATION DEPARTMENT

CAVE CREEK WASH
DEER VALLEY ROAD BRIDGE CROSSING

FIGURE 5

DR: PAW	DES: PAW	CK: TB	SHEET NO.	TOTAL SHEETS	AS BUILT
DATE: 5/19	DATE: 5/19	DATE: 5/20	1	1	

SCALE: 1"=200' HORIZONTAL
2' CONTOUR INTERVALS

REVISION BY CITY OF PHOENIX

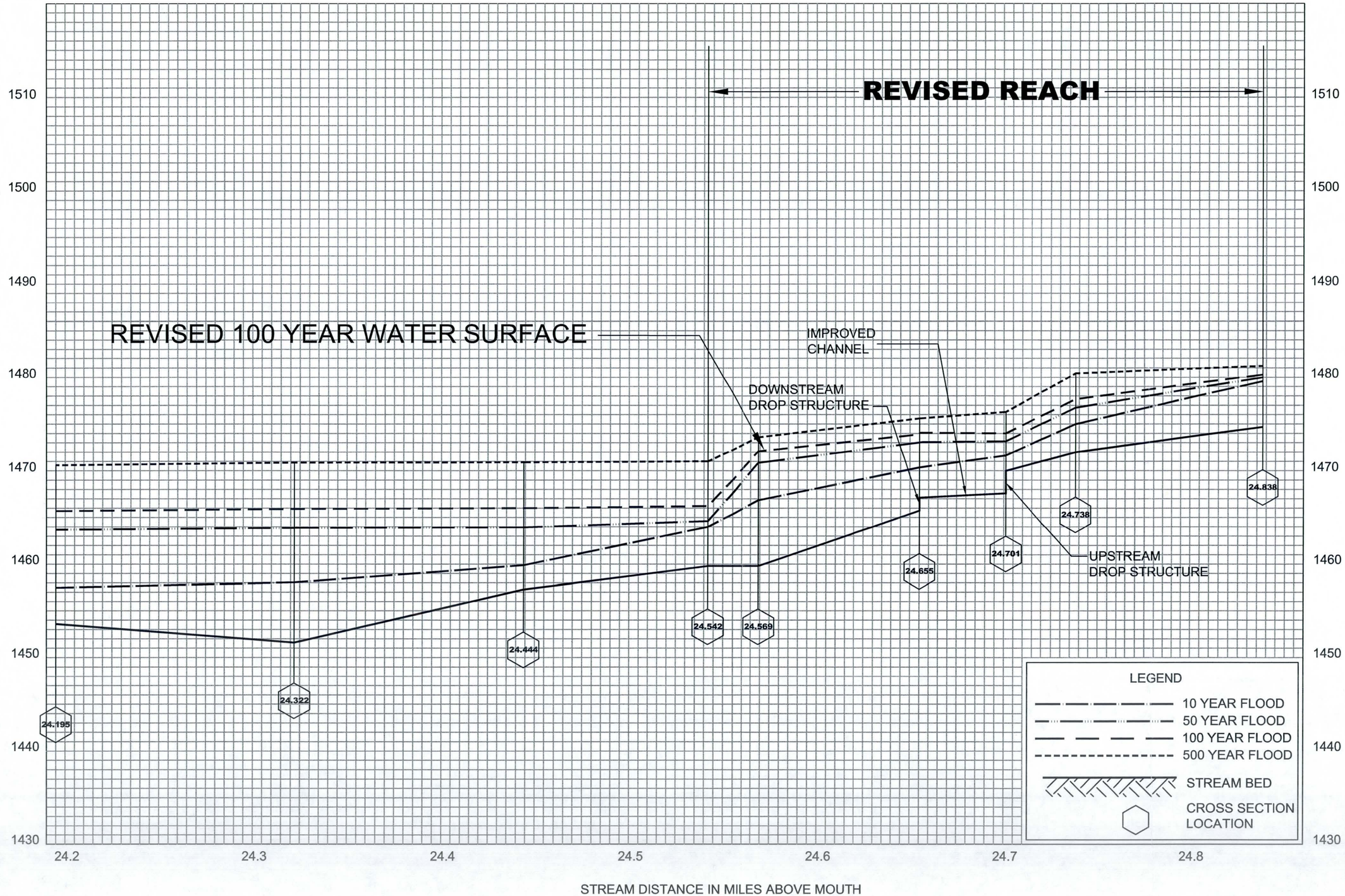
NO.	DESCRIPTION	REV BY	CKD BY	DATE

REVISION BY CITY OF PHOENIX

NO.	DESCRIPTION	REV BY	CKD BY	DATE

REVISION BY CITY OF PHOENIX

NO.	DESCRIPTION	REV BY	CKD BY	DATE



FLOOD PROFILES

CAVE CREEK WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND UNINCORPORATED AREAS

FIGURE 6

Table 3
Summary of Project Files for CLOMR Submittal

Modeling Condition	HEC-2 File Name	Appendix for Output
Duplicate Effective	Effctve.dat	D
Revised Model	Revised.dat	E

APPENDIX A

PHOTOGRAPHS

Picture 1: Looking at the Cave Creek Wash crossing at Deer Valley Road.

Picture 2: Looking upstream in Cave Creek Wash at Deer Valley Road crossing.

Picture 3: Looking upstream in Cave Creek Wash at Deer Valley Road crossing.

Picture 4: Looking upstream in Cave Creek Wash at Deer Valley Road crossing.

Picture 5: Looking upstream in Cave Creek Wash at Deer Valley Road crossing.

Picture 6: Looking upstream in Cave Creek Wash at Deer Valley Road crossing.

Picture 7: Looking upstream in Cave Creek Wash at Deer Valley Road crossing.

APPENDIX B

Survey Field Notes

2-7-03 44/332

PC JSB BASE FILE 3007B-020703
TGLM
BM-TMB

PT's 500-825

GAF1.000160

1,976401.7520,654928.9504,1469.44,CPT
2,976441.6392,655599.4587,1488.32,CPT
500,975035.5636,654140.1747,1462.65,NG
501,975015.1978,654152.7271,1463.96,TOP
502,974990.2209,654170.3311,1450.41,TOE
503,974980.8834,654177.0816,1449.41,NG
504,974963.7767,654186.3032,1448.62,TOE1
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521,975473.9419,655017.5940,1467.94,EL
522,975710.5014,655484.4333,1470.75,EL
523,975736.3133,655480.4753,1470.30,TOP1
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532,976104.7726,655923.6615,1459.67,TOE
533,976073.8138,655933.4705,1458.96,NG
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535,975984.9792,655961.3834,1461.94,NG
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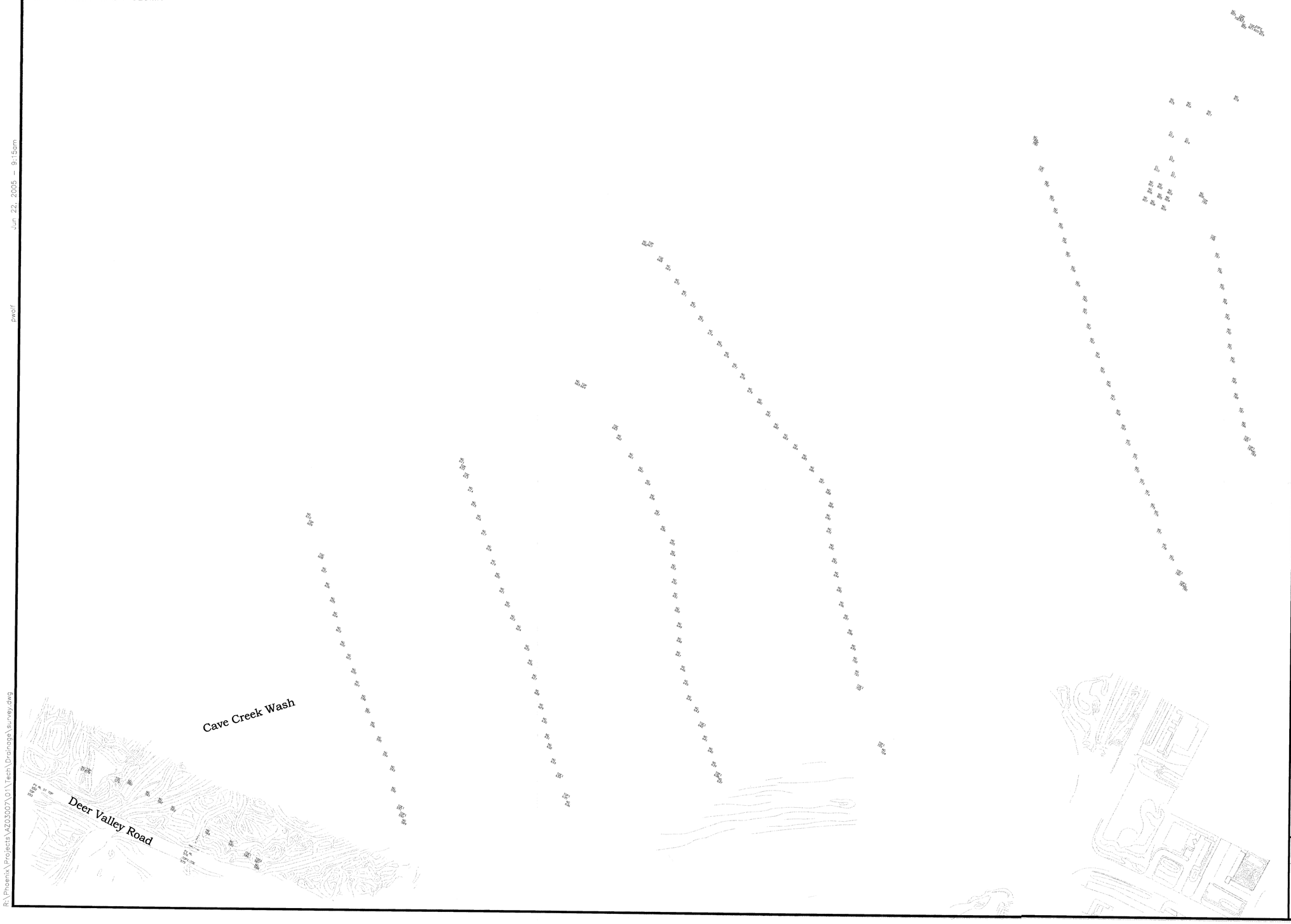
DEER VALLEY ROAD
PHOENIX STREETS – MARICOPA COUNTY
7TH STREET TO CAVE CREEK ROAD
CAVE CREED WASH CLOMR



F.H.W.A. REGION	STATE	PROJ. NO.	NO.	TOTAL	AS BUILT
9	ARIZ	ST85100044			

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-4505
Tel(602)454-0402
Fax(602)454-0403

City of Phoenix

Scale: 1" =150'

CITY OF PHOENIX, ARIZONA
STREET TRANSPORTATION DEPARTMENT

DEER VALLEY ROAD
7TH STREET TO CAVE CREEK ROAD
CAVE CREEK WASH CLOMR
ST85100044

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DEER VALLEY ROAD
PHOENIX STREETS – MARICOPA COUNTY
7TH STREET TO CAVE CREEK ROAD
CAVE CREED WASH CLOMR

Scale: 1" =100'

F.H.W.A. REGION	STATE	PROJ. NO.	NO.	TOTAL	AS BUILT
9	ARIZ	ST85100044			

AZTEC
4041 E. McDowell Road
Phoenix, AZ 85008-4505
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CITY OF PHOENIX, ARIZONA
STREET TRANSPORTATION DEPARTMENT

DEER VALLEY ROAD
7TH STREET TO CAVE CREEK ROAD
CAVE CREEK WASH CLOMR
ST85100044

Jun 21, 2005 – 3:39pm
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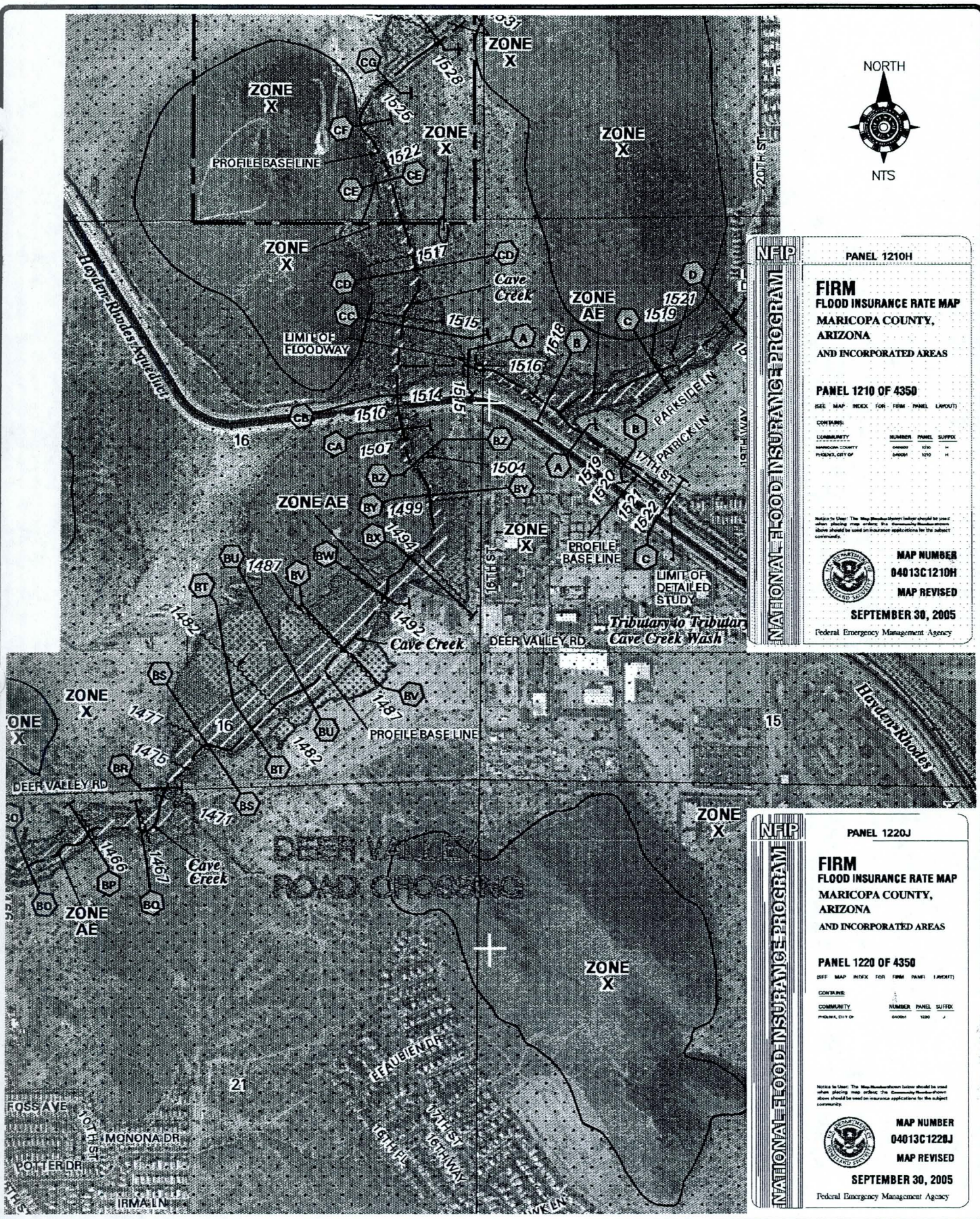
APPENDIX C

CURRENT FIS



AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-4505
Tel(602)454-0402
Fax(602)454-0403
www.aztec.us

Project: CAVE CREEK WASH FIRM MAPS

Project No: AZ03007 **Date:** APRIL 2006 **Fig. No:** 4

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Cave Creek Wash (Cont'd)								
BA	22.990	136	643	8.6	1,423.6	1,423.6	1,424.6	1.0
BB	23.097	132	561	9.8	1,429.9	1,429.9	1,430.6	0.7
BC	23.168	310	1,322	4.2	1,433.1	1,433.1	1,433.7	0.6
BD	23.253	45	250	13.6	1,434.5	1,434.5	1,434.5	0.0
BE	23.334	67	355	9.6	1,440.4	1,440.4	1,440.4	0.0
BF	23.416	59	318	10.7	1,443.8	1,443.8	1,443.8	0.0
BG	23.514	57	365	9.3	1,448.1	1,448.1	1,448.1	0.0
BH	23.591	75	478	7.1	1,453.2	1,453.2	1,453.2	0.0
BI	23.691	65	368	9.2	1,455.2	1,455.2	1,455.2	0.0
BJ	23.815	86	521	8.4	1,459.0	1,459.0	1,459.0	0.0
BK	23.912	76	619	8.6	1,461.0	1,461.0	1,461.0	0.0
BL	23.989	99	835	6.3	1,462.6	1,462.6	1,462.6	0.0
BM	24.106	100	922	5.7	1,465.2	1,465.2	1,465.2	0.0
BN	24.195	100	1,135	4.7	1,465.7	1,465.7	1,465.7	0.0
BO	24.322	140	1,776	3.0	1,465.9	1,465.9	1,466.2	0.3
BP	24.444	153	1,144	4.6	1,466.0	1,466.0	1,466.4	0.4
BQ	24.542	210	647	8.2	1,466.3	1,466.3	1,467.3	1.0
BR	24.635	120	494	10.7	1,472.1	1,472.1	1,472.2	0.1
BS	24.738	264	935	5.6	1,476.9	1,476.9	1,477.8	0.9
BT	24.838	382	787	6.6	1,480.3	1,480.3	1,481.0	0.7
BU	24.943	440	1,411	3.7	1,483.4	1,483.4	1,484.4	1.0
BV	25.048	400	676	7.7	1,487.3	1,487.3	1,487.6	0.3
BW	25.163	235	927	5.3	1,492.2	1,492.2	1,493.1	0.9
BX	25.262	273	1,082	4.5	1,494.0	1,494.0	1,495.0	1.0
BY	25.374	98	432	11.3	1,499.4	1,499.4	1,500.2	0.8
BZ	25.434	66	368	13.3	1,504.0	1,504.0	1,504.2	0.2

[1]Miles Above Confluence With Salt River

Table 3. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
Cave Creek Wash (cont'd)					
At Confluence with Arizona Canal Diversion Channel	34.7[1]	10,300[2]	16,100[2]	18,500[2]	N/A
Below confluence With Moon Valley Wash	33.1[1]	10,100[2]	15,300[2]	17,500[2]	N/A
Below confluence with East Fork Cave Creek	22.5[1]	3,100[2]	8,700[2]	11,000[2]	25,000[2]
Below Deer Valley Road	5.0[1]	1,400[2]	3,800[2]	5,400[2]	11,000[2]
Above Deer Valley Road	4.5[1]	1,300[2]	3,500[2]	5,000[2]	10,000[2]
Below Carefree Highway	126.9[3]	20,600	32,975	36,860	52,000
Above Carefree Highway	121.5[3]	20,130	32,180	35,900	51,000
At confluence with Andora Hills Wash	115.1[3]	19,640	31,430	35,000	50,000
Above confluence with Willow Springs Wash	80.3[3]	13,210	21,480	23,600	33,000
At Morning Star Road	75.86	16,890	24,831	28,338	34,901
At River Mile 35.77 above Minor Tributary	75.13	16,888	24,817	28,319	34,868
At River Mile 36.78 above Minor Tributary	73.94	16,870	24,778	28,271	34,802
At River Mile 37.37 above Minor Tributary	71.70	16,966	24,890	28,381	34,909
Above confluence with Cottonwood Creek	70.78	7,105	9,819	10,979	13,168
At River Mile 38.79 concentration point for Upper Basin	60.21	16,613	24,246	27,603	33,871
East Fork Cave Creek					
Near Coral Gables & 7th Avenue	14.1	5,500	8,200	9,400	N/A
Near Paradise Lane & Central Avenue	13.4	5,300	7,900	9,100	N/A
Below 7th Street	12.4	2,200	5,900	8,400	17,000
Above 7th Street	10.0	1,900	5,300	7,500	15,200
At Bell Road	3.4	1,100	2,900	4,200	8,200
Below Cave Creek Road	3.0	1,000	2,800	3,900	7,900
At Utopia Road	1.8	800	2,100	3,000	5,800
At Beardsley Road	1.0	600	1,500	2,100	4,300

[1]Contributing Drainage Area Below Cave Creek Dam Only
[2]Regulated by Cave Creek Dam and Cave Buttes Dam
[3]Decrease Due to Storage in Overbanks upstream

APPENDIX D

DUPLICATE EFFECTIVE MODEL INPUT / OUTPUT

Duplicate Effective Model - 100-year HEC-2 Input File

```
T1      Cave Creek Wash
T2      FIS Effective Flood
T3
T4      HEC-2 Run
T4
T4              This is the effective flood using FIS data.
T4
T4      Aztec Engineering    June 6, 2005
T4      Deer Valley Road Improvement Project for the City of Phoenix
T4
T4
T4      EFFCTVE.DAT
T4
T4
T4
T4
J1   -10       2                                                  5000  1465.7
J2    -1              -1                                           -6
J5   -10     -10
NC 0.045   0.045   0.045     0.1     0.3
X124.195      13    9933   10142
X2         1465.7
GR1498.7    9862  1497.1    9889  1470.4    9933  1454.1    9961  1453.6    9996
GR1453.6   10000  1453.9   10032  1455.5   10052  1456.3   10073  1458.8   10093
GR1462.3   10117  1466.4   10142  1468.9   10164
X124.322      11    9871   10064     640     630     671
GR1473.7    9820  1463.5    9871  1453.2    9895  1451.6    9972  1452.1   10000
GR1454.5   10042  1456.8   10064  1457.7   10134  1459.6   10177  1465.2   10220
GR1470.9   10262
X124.444      16    9928   10122     640     600     644
GR1478.8    9885  1478.7    9906    1465    9928  1457.6    9939    1458    9972
GR1457.3    9995  1457.7   10000  1459.1   10027  1460.4   10064  1459.3   10097
GR1461.7   10122  1458.9   10142  1460.7   10166  1460.3   10180  1468.5   10215
GR1474.2   10230
X124.542      20    9914   10187     470     530     517
GR1488.2    9844    1464    9914  1463.2    9948  1460.4    9968  1459.8    9996
GR1459.8   10000  1461.4   10017  1462.3   10033  1470.7   10056  1470.3   10083
GR1472.2   10112  1470.9   10127  1464.4   10141  1462.5   10166    1463   10171
GR1464.7   10175  1467.8   10187  1473.8   10237  1475.2   10268  1478.9   10283
*
*
X124.635       8    9876   10111     650     220     491
GR1480.9    9752  1474.5    9876    1467    9983  1466.8   10000  1467.9   10037
GR1472.4   10111  1478.6   10193 1480.14   10247
QT     1    4900
*
*
*

X124.738      22    9897   10038     350     630     544
GR1490.4    9703  1489.7    9717  1479.2    9736  1479.3    9805  1477.7    9884
GR1481.2    9897  1477.6    9931  1472.8    9965  1472.3    9986    1472   10000
GR1473.5   10023  1480.9   10038  1480.9   10038  1476.7   10045  1480.8   10067
GR1477.6   10079  1473.6   10088  1473.6   10127  1472.5   10224  1474.4   10291
GR1473.6   10330  1477.6   10343
*
NC 0.045   0.045   0.045     0.1     0.3
X124.838      20    9945   10019     470     450     528
GR1488.5    9909  1483.8    9945  1477.7    9986  1474.8    9991  1474.7   10000
GR  1475   10004  1483.5   10019    1479   10032  1479.5   10066    1479   10111
GR  1479   10133    1479   10162    1479   10185    1479   10199    1479   10219
GR  1479   10270    1479   10365    1479   10450    1479   10630    1490   10660
*

EJ


ER
```

Duplicate Effective Model - 100-year HEC-2 Output File

```
1*****************************************
 *  HEC-2 WATER SURFACE PROFILES          *
 *                                        *
 *  Version   4.6.2;  May 1991            *
 *                                        *
 *  RUN DATE    06JUN05    TIME   13:27:11 *
 *****************************************
```

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

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

```
1
   06JUN05      13:27:11                                                                    PAGE    1
```

```
                                                                THIS RUN EXECUTED 06JUN05     13:27:11
 *************************************
 HEC-2 WATER SURFACE PROFILES

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


T1      Cave Creek Wash
T2      FIS Effective Flood
T3
T4      HEC-2 Run
T4
T4              This is the effective flood using FIS data.
T4
T4      Aztec Engineering    June 6, 2005
T4      Deer Valley Road Improvement Project for the City of Phoenix
T4
T4
T4      EFFCTVE.DAT
T4
T4
T4
T4

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

     -10       2                                                          5000     1465.7

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     -1                  -1                                                -6

J5  LPRNT     NUMSEC                        ********REQUESTED SECTION NUMBERS********

    -10       -10
```

1
06JUN05 13:27:11
PAGE 2

THIS RUN EXECUTED

06JUN05 13:27:11
****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

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

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	24.195	.00	.00	.00	1453.60	5000.00	1465.70	.00	1465.83	4.51	2.93	1708.76	2354.02
*	24.322	671.00	.00	.00	1451.60	5000.00	1465.92	.00	1465.95	.83	1.59	3458.72	5491.08
*	24.444	644.00	.00	.00	1457.30	5000.00	1465.96	.00	1466.09	6.44	2.99	1733.31	1969.65
*	24.542	517.00	.00	.00	1459.80	5000.00	1466.28	.00	1467.12	82.48	7.35	684.17	550.56
*	24.635	491.00	.00	.00	1466.80	5000.00	1471.83	1471.70	1473.15	189.17	9.21	542.62	363.53
*	24.738	544.00	.00	.00	1472.00	4900.00	1476.78	.00	1477.06	32.96	4.23	1158.16	853.52
*	24.838	528.00	.00	.00	1474.70	4900.00	1480.27	1480.27	1480.86	167.34	8.78	885.19	378.79

1
06JUN05 13:27:11 PAGE 3

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	24.195	5000.00	1465.70	.00	.00	.00	196.66	.00
*	24.322	5000.00	1465.92	.00	.22	.00	366.36	671.00
*	24.444	5000.00	1465.96	.00	.05	.00	277.72	644.00
*	24.542	5000.00	1466.28	.00	.32	.00	180.73	517.00
*	24.635	5000.00	1471.83	.00	5.54	.00	187.48	491.00
*	24.738	4900.00	1476.78	.00	4.95	.00	352.87	544.00
*	24.838	4900.00	1480.27	.00	3.49	.00	649.77	528.00

1
06JUN05 13:27:11
PAGE 4

SUMMARY OF ERRORS AND SPECIAL NOTES

```
WARNING SECNO=     24.322  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     24.444  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     24.542  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     24.635  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     24.738  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     24.838  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     24.838  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     24.838  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
```

APPENDIX E

REVISED MODEL INPUT / OUTPUT

100-year HEC-2 Input File

```
T1      AZ03152
T2      CAVE CREEK WASH LOMR
T3      REVISED MODEL
T4
T4      Aztec Engineering    June 6, 2005
T4      Deer Valley Road Improvement Project for the City of Phoenix
T4
T4
T4      Revised.dat
T4
T4      FLOODPLAIN RUN
J1   -10       2                                                    1465.7
J2    -1              -1                                   -6
J5   -10     -10
*
NC 0.045   0.045   0.045     0.1     0.3
*
QT     1    5000
*
X1     3      12    9933   10142       0       0       0
X3     0                                             1467.99 1467.52
GR1498.7    9862  1497.1    9889  1470.4    9933  1454.4    9961  1453.6    9996
GR1453.6   10000  1453.9   10032  1455.5   10052  1456.3   10073  1458.8   10093
GR1466.4   10142  1468.9   10164
*
*
NC 0.045   0.045   0.045     0.1     0.3
X1     4      10    9871   10064     640     630     671
X3     0                                             1467.99 1467.52
GR1473.7    9820  1463.5    9871  1453.2    9895  1451.6    9972  1452.1   10000
GR1454.5   10042  1456.8   10064  1457.7   10134  1459.6   10177  1470.9   10262
*
*
NC 0.045   0.045   0.045     0.1     0.3
X1     5      15    9928   10122     640     600     644
X3     0                                             1467.99 1467.52
GR1478.8    9885  1478.7    9906    1465    9928  1457.6    9939    1458    9972
GR1457.3    9995  1457.7   10000  1459.1   10027  1460.4   10064  1459.3   10097
GR1461.7   10122  1458.9   10142  1460.7   10166  1460.3   10180  1468.5   10215
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1     6      18    9914   10187     470     530     517
X3     0                                             1467.99 1467.52
GR1488.2    9844    1464    9914  1460.4    9968  1459.8    9996  1461.4   10017
GR1462.3   10033  1470.7   10056  1470.3   10083  1472.2   10112  1470.9   10127
GR1464.4   10141  1462.5   10166    1463   10171  1464.7   10175  1467.8   10187
GR1473.8   10237  1475.2   10268  1478.9   10283
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1    20      27  135.07  224.67  115.44   81.32  144.28
X3     0                                             1469.55 1470.25
GR  1494       0    1492   22.56    1490   42.53    1488   60.58    1486   75.57
GR  1484   83.33    1482   90.83    1480   98.33    1478  105.15    1478  105.89
GR  1476  113.34    1474     120    1474  120.72    1472  127.97    1470  135.07
GR  1470  135.45    1468  143.11    1466  150.44    1466  150.83    1466  196.44
GR  1468  210.46    1470  224.67    1472  418.21    1474  477.02    1476  514.59
GR  1478  547.46    1480  579.25
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1    30       7    10.4   133.9   567.6  248.47  455.88
X3     0                                             1470.32 1470.09
GR1478.9       0 1475.92     7.8 1473.92    10.4 1465.74    18.4 1465.74   125.9
GR1473.9   133.9 1475.92   148.9
*
*
NC 0.016   0.016   0.016     0.1     0.3
```

```
X1    31       7    10.4   133.9       2       2       2
X3     0                                             1476.23 1476.47
GR1480.3       0 1477.32     7.8 1475.32    10.4 1467.14    18.4 1467.14   125.9
GR1475.3   133.9 1477.32   148.9
*
*
NC 0.016   0.016   0.016     0.1     0.3
X1    40       7    10.4   133.9   133.7   133.7   133.7
X3     0                                             1476.23 1476.47
GR1480.4       0 1477.39     7.8 1475.39    10.4 1467.38    18.4 1467.38   125.9
GR1475.4   133.9 1477.39   148.9
*
*
NC 0.016   0.016   0.016     0.1     0.3
X1    49       7    10.4   133.9  122.91  122.91  122.91
X3     0                                             1476.23 1476.47
GR1480.6       0  1477.6     7.8  1475.6    10.4  1467.6    18.4  1467.6   125.9
GR1475.6   133.9  1477.6   148.9
*
*
*
NC 0.045   0.045   0.038     0.3     0.5
X1    50       7    10.4   133.9       2       2       2
X3     0                                             1476.23 1476.47
GR  1483       0    1480     7.8    1478    10.4    1470    18.4    1470   125.9
GR  1478   133.9    1480   148.9
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1    60      12    20.6   428.3  205.54  189.57  197.32
X3     0                                                1476 1475.55
GR  1480       0    1478     4.9    1477    12.6    1476    20.6    1475    45.1
GR  1474    57.3    1473    60.2    1472    98.9  1470.4   137.6    1472   176.3
GR  1480   428.3    1486   509.8
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1    70      21    9897   10038  144.24  519.52  213.69
GR1490.4    9703  1489.7    9717  1479.2    9736  1479.3    9805  1477.7    9884
GR1481.2    9897  1477.6    9931  1472.8    9965  1472.3    9986    1472   10000
GR1473.5   10023  1480.9   10038  1476.7   10045  1480.8   10067  1477.6   10079
GR1473.6   10088  1473.6   10127  1472.5   10224  1474.4   10291  1473.6   10330
GR1477.6   10343
*
*
NC 0.045   0.045   0.045     0.1     0.3
X1    80      20    9945   10019     470     450     528
GR1488.5    9909  1483.8    9945  1477.7    9986  1474.8    9991  1474.7   10000
GR  1475   10004  1483.5   10019    1479   10032  1479.5   10066    1479   10111
GR  1479   10133    1479   10162    1479   10185    1479   10199    1479   10219
GR  1479   10270    1479   10365    1479   10450    1479   10630    1490   10660
*
*
EJ
*
*
*
ER
*
*
ZZ
```

100-year HEC-2 Output File

```
1*****************************************
 *  HEC-2 WATER SURFACE PROFILES          *
 *                                        *
 *  Version   4.6.2;  May 1991            *
 *                                        *
 *  RUN DATE    20APR06    TIME   13:14:28 *
 *****************************************
```

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

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

```
1
    20APR06       13:14:28
PAGE     1
```

```
                                                                    THIS RUN EXECUTED
20APR06     13:14:28
 *************************************
  HEC-2 WATER SURFACE PROFILES

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


 T1       AZ03152
 T2       CAVE CREEK WASH LOMR
 T3       REVISED MODEL
 T4
 T4       Aztec Engineering    June 6, 2005
 T4       Deer Valley Road Improvement Project for the City of Phoenix
 T4
 T4
 T4       Revised.dat
 T4
 T4       FLOODPLAIN RUN

 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

      -10        2                                                                  1465.7

 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      -1                  -1                                                  -6

 J5  LPRNT    NUMSEC                    ********REQUESTED SECTION NUMBERS********

     -10       -10
1
    20APR06       13:14:28
PAGE     2
1
    20APR06       13:14:28
PAGE     3
```

THIS RUN EXECUTED 20APR06 13:14:28
****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

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

REVISED MODEL

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	3.000	.00	.00	.00	1453.60	5000.00	1465.70	.00	1465.84	4.63	2.95	1694.29	2324.92
*	4.000	671.00	.00	.00	1451.60	5000.00	1465.92	.00	1465.95	.83	1.59	3456.97	5485.04
*	5.000	644.00	.00	.00	1457.30	5000.00	1465.97	.00	1466.10	6.43	2.99	1734.36	1971.57
*	6.000	517.00	.00	.00	1459.80	5000.00	1466.24	.00	1467.02	51.01	7.06	713.16	700.09
*	20.000	144.28	.00	.00	1466.00	5000.00	1472.10	1472.10	1473.34	67.89	9.51	679.73	606.85
*	30.000	455.88	.00	.00	1465.74	5000.00	1474.08	.00	1474.49	12.21	5.19	964.17	1431.00
*	31.000	2.00	.00	.00	1467.14	5000.00	1473.91	.00	1474.56	4.34	6.47	773.22	2401.32
	40.000	133.70	.00	.00	1467.38	5000.00	1473.95	.00	1474.64	4.80	6.68	748.78	2281.12
	49.000	122.91	.00	.00	1467.60	5000.00	1473.98	.00	1474.71	5.29	6.89	726.11	2173.15
*	50.000	2.00	.00	.00	1470.00	5000.00	1474.00	1474.00	1475.95	140.88	11.21	445.99	421.26
*	60.000	197.32	.00	.00	1470.40	5000.00	1476.85	.00	1477.20	29.26	4.77	1049.63	924.31
*	70.000	213.69	.00	.00	1472.00	5000.00	1477.68	.00	1477.86	14.41	3.68	1485.47	1317.27
*	80.000	528.00	.00	.00	1474.70	5000.00	1480.30	1480.30	1480.88	164.05	8.71	902.96	390.38

1
20APR06 13:14:28 PAGE 4

REVISED MODEL

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	3.000	5000.00	1465.70	.00	.00	.00	196.26	.00
*	4.000	5000.00	1465.92	.00	.22	.00	365.64	671.00
*	5.000	5000.00	1465.97	.00	.05	.00	277.74	644.00
*	6.000	5000.00	1466.24	.00	.28	.00	180.25	517.00
*	20.000	5000.00	1472.10	.00	5.86	.00	293.63	144.28
*	30.000	5000.00	1474.08	.00	1.97	.00	125.00	455.88
*	31.000	5000.00	1473.91	.00	-.16	.00	120.77	2.00
	40.000	5000.00	1473.95	.00	.03	.00	120.61	133.70
	49.000	5000.00	1473.98	.00	.03	.00	120.25	122.91
*	50.000	5000.00	1474.00	.00	.02	.00	115.50	2.00
*	60.000	5000.00	1476.85	.00	2.85	.00	315.17	197.32
*	70.000	5000.00	1477.68	.00	.83	.00	372.45	213.69
*	80.000	5000.00	1480.30	.00	2.62	.00	650.15	528.00

SUMMARY OF ERRORS AND SPECIAL NOTES

```
WARNING SECNO=      4.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      5.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      6.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     20.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     20.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     20.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=     30.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     31.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     50.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     50.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     50.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=     60.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     70.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     80.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     80.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     80.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
```

10-year HEC-2 Input File

```
T1      AZ03152
T2      CAVE CREEK WASH LOMR
T3      REVISED MODEL
T4
T4      Aztec Engineering    April 2006
T4      Deer Valley Road Improvement Project for the City of Phoenix
T4
T4      HEC-2 Run for 10-year flow of 1300 cfs.
T4
T4      Rev-10.dat
T4
T4      FLOODPLAIN RUN
J1   -10       2                                                  1457.49
J2    -1              -1                                     -6
J5   -10     -10
*
NC 0.045   0.045   0.045     0.1     0.3
*
QT     1    1300
*
X1     3      12    9933   10142       0       0       0
X3     0                                             1467.99 1467.52
GR1498.7    9862  1497.1    9889  1470.4    9933  1454.4    9961  1453.6    9996
GR1453.6   10000  1453.9   10032  1455.5   10052  1456.3   10073  1458.8   10093
GR1466.4   10142  1468.9   10164
*
*
NC 0.045   0.045   0.045     0.1     0.3
X1     4      10    9871   10064     640     630     671
X3     0                                             1467.99 1467.52
GR1473.7    9820  1463.5    9871  1453.2    9895  1451.6    9972  1452.1   10000
GR1454.5   10042  1456.8   10064  1457.7   10134  1459.6   10177  1470.9   10262
*
*
NC 0.045   0.045   0.045     0.1     0.3
X1     5      15    9928   10122     640     600     644
X3     0                                             1467.99 1467.52
GR1478.8    9885  1478.7    9906    1465    9928  1457.6    9939    1458    9972
GR1457.3    9995  1457.7   10000  1459.1   10027  1460.4   10064  1459.3   10097
GR1461.7   10122  1458.9   10142  1460.7   10166  1460.3   10180  1468.5   10215
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1     6      18    9914   10187     470     530     517
X3     0                                             1467.99 1467.52
GR1488.2    9844    1464    9914  1460.4    9968  1459.8    9996  1461.4   10017
GR1462.3   10033  1470.7   10056  1470.3   10083  1472.2   10112  1470.9   10127
GR1464.4   10141  1462.5   10166    1463   10171  1464.7   10175  1467.8   10187
GR1473.8   10237  1475.2   10268  1478.9   10283
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1    20      27  135.07  224.67  115.44   81.32  144.28
X3     0                                             1469.55 1470.25
GR  1494       0    1492   22.56    1490   42.53    1488   60.58    1486   75.57
GR  1484   83.33    1482   90.83    1480   98.33    1478  105.15    1478  105.89
GR  1476  113.34    1474     120    1474  120.72    1472  127.97    1470  135.07
GR  1470  135.45    1468  143.11    1466  150.44    1466  150.83    1466  196.44
GR  1468  210.46    1470  224.67    1472  418.21    1474  477.02    1476  514.59
GR  1478  547.46    1480  579.25
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1    30       7    10.4   133.9   567.6  248.47  455.88
X3     0                                             1470.32 1470.09
GR1478.9       0 1475.92     7.8 1473.92    10.4 1465.74    18.4 1465.74   125.9
GR1473.9   133.9 1475.92   148.9
*
*
```

```
NC 0.016   0.016   0.016     0.1     0.3
X1    31       7    10.4   133.9       2       2       2
X3     0                                             1476.23 1476.47
GR1480.3       0 1477.32     7.8 1475.32    10.4 1467.14    18.4 1467.14   125.9
GR1475.3   133.9 1477.32   148.9
*
*
NC 0.016   0.016   0.016     0.1     0.3
X1    40       7    10.4   133.9   133.7   133.7   133.7
X3     0                                             1476.23 1476.47
GR1480.4       0 1477.39     7.8 1475.39    10.4 1467.38    18.4 1467.38   125.9
GR1475.4   133.9 1477.39   148.9
*
*
NC 0.016   0.016   0.016     0.1     0.3
X1    49       7    10.4   133.9  122.91  122.91  122.91
X3     0                                             1476.23 1476.47
GR1480.6       0  1477.6     7.8  1475.6    10.4  1467.6    18.4  1467.6   125.9
GR1475.6   133.9  1477.6   148.9
*
*
*
NC 0.045   0.045   0.038     0.3     0.5
X1    50       7    10.4   133.9       2       2       2
X3     0                                             1476.23 1476.47
GR  1483       0    1480     7.8    1478    10.4    1470    18.4    1470   125.9
GR  1478   133.9    1480   148.9
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1    60      12    20.6   428.3  205.54  189.57  197.32
X3     0                                                1476 1475.55
GR  1480       0    1478     4.9    1477    12.6    1476    20.6    1475    45.1
GR  1474    57.3    1473    60.2    1472    98.9  1470.4   137.6    1472   176.3
GR  1480   428.3    1486   509.8
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1    70      21    9897   10038  144.24  519.52  213.69
GR1490.4    9703  1489.7    9717  1479.2    9736  1479.3    9805  1477.7    9884
GR1481.2    9897  1477.6    9931  1472.8    9965  1472.3    9986    1472   10000
GR1473.5   10023  1480.9   10038  1476.7   10045  1480.8   10067  1477.6   10079
GR1473.6   10088  1473.6   10127  1472.5   10224  1474.4   10291  1473.6   10330
GR1477.6   10343
*
*
NC 0.045   0.045   0.045     0.1     0.3
X1    80      20    9945   10019     470     450     528
GR1488.5    9909  1483.8    9945  1477.7    9986  1474.8    9991  1474.7   10000
GR  1475   10004  1483.5   10019    1479   10032  1479.5   10066    1479   10111
GR  1479   10133    1479   10162    1479   10185    1479   10199    1479   10219
GR  1479   10270    1479   10365    1479   10450    1479   10630    1490   10660
*
*
EJ
*
*
*
ER
*
*
ZZ
```

10-year HEC-2 input/output file

10-year HEC-2 Output File

```
1*****************************************
 *  HEC-2 WATER SURFACE PROFILES          *
 *                                        *
 *  Version   4.6.2;  May 1991            *
 *                                        *
 *  RUN DATE    19APR06    TIME   16:05:07 *
 *****************************************

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

                                    X     X  XXXXXXX   XXXXX             XXXXX
                                    X     X  X        X     X           X     X
                                    X     X  X        X                       X
                                    XXXXXXX  XXXX     X          XXXXX    XXXXX
                                    X     X  X        X                 X
                                    X     X  X        X     X           X
                                    X     X  XXXXXXX   XXXXX            XXXXXXX
1
   19APR06      16:05:07                                                                          PAGE    1


                                                                                                THIS RUN EXECUTED
19APR06     16:05:07
 ***************************************
  HEC-2 WATER SURFACE PROFILES

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


 T1       AZ03152
 T2       CAVE CREEK WASH LOMR
 T3       REVISED MODEL
 T4
 T4       Aztec Engineering    April 2006
 T4       Deer Valley Road Improvement Project for the City of Phoenix
 T4
 T4       HEC-2 Run for 10-year flow of 1300 cfs.
 T4
 T4       Rev-10.dat
 T4
 T4       FLOODPLAIN RUN

 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

      -10        2                                                                   1457.5

 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      -1                  -1                                                  -6


 J5  LPRNT    NUMSEC                    ********REQUESTED SECTION NUMBERS********

     -10       -10

1
   19APR06      16:05:07
PAGE    2


1
   19APR06      16:05:07
PAGE    3


                                                                                                THIS RUN EXECUTED
19APR06     16:05:07
 ***************************************
  HEC-2 WATER SURFACE PROFILES
```

10-year HEC-2 input/output file

Version 4.6.2; May 1991
****

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

REVISED MODEL

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	3.000	.00	.00	.00	1453.60	1300.00	1457.50	.00	1457.70	29.61	3.59	361.87	238.91
*	4.000	671.00	.00	.00	1451.60	1300.00	1458.06	.00	1458.09	2.26	1.43	948.12	864.65
*	5.000	644.00	.00	.00	1457.30	1300.00	1459.89	1459.89	1460.55	254.86	6.57	203.00	81.43
*	6.000	517.00	.00	.00	1459.80	1300.00	1464.01	.00	1464.24	32.43	3.82	340.61	228.28
*	20.000	144.28	.00	.00	1466.00	1300.00	1468.61	1468.61	1469.68	167.87	8.31	156.50	100.34
*	30.000	455.88	.00	.00	1465.74	1300.00	1470.42	.00	1470.51	5.65	2.48	524.88	547.15
	31.000	2.00	.00	.00	1467.14	1300.00	1470.34	.00	1470.55	3.55	3.67	354.08	690.18
	40.000	133.70	.00	.00	1467.38	1300.00	1470.37	.00	1470.61	4.44	3.93	330.54	617.21
	49.000	122.91	.00	.00	1467.60	1300.00	1470.41	.00	1470.68	5.43	4.19	310.57	557.90
*	50.000	2.00	.00	.00	1470.00	1300.00	1471.65	1471.65	1472.46	182.06	7.23	179.84	96.35
*	60.000	197.32	.00	.00	1470.40	1300.00	1473.92	.00	1474.17	47.84	4.01	324.03	187.96
*	70.000	213.69	.00	.00	1472.00	1300.00	1475.01	.00	1475.10	20.19	2.90	560.49	289.33
*	80.000	528.00	.00	.00	1474.70	1300.00	1479.59	1479.59	1479.87	80.66	5.72	441.73	144.75

1

19APR06 16:05:07
PAGE 4

REVISED MODEL

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	3.000	1300.00	1457.50	.00	.00	.00	127.02	.00
*	4.000	1300.00	1458.06	.00	.56	.00	258.45	671.00
*	5.000	1300.00	1459.89	.00	1.83	.00	158.28	644.00
*	6.000	1300.00	1464.01	.00	4.12	.00	151.06	517.00
*	20.000	1300.00	1468.61	.00	4.60	.00	74.03	144.28
*	30.000	1300.00	1470.42	.00	1.81	.00	116.67	455.88
	31.000	1300.00	1470.34	.00	-.08	.00	113.77	2.00
	40.000	1300.00	1470.37	.00	.03	.00	113.47	133.70
	49.000	1300.00	1470.41	.00	.04	.00	113.13	122.91
*	50.000	1300.00	1471.65	.00	1.24	.00	110.80	2.00
*	60.000	1300.00	1473.92	.00	2.27	.00	179.11	197.32
*	70.000	1300.00	1475.01	.00	1.10	.00	326.59	213.69
*	80.000	1300.00	1479.59	.00	4.57	.00	640.07	528.00

1

SUMMARY OF ERRORS AND SPECIAL NOTES

```
WARNING SECNO=      4.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=      5.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      5.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      5.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=      6.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     20.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     20.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     20.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=     30.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     50.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     50.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     50.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=     60.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     70.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     80.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     80.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     80.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
```

50-year HEC-2 Input File

```
T1      AZ03152
T2      CAVE CREEK WASH LOMR
T3      REVISED MODEL
T4
T4      Aztec Engineering    April 2006
T4      Deer Valley Road Improvement Project for the City of Phoenix
T4
T4      HEC-2 Run for 50-year flow of 3500 cfs.
T4
T4      Rev-50.dat
T4
T4      FLOODPLAIN RUN
J1   -10       2                                                  1463.7
J2    -1              -1                                   -6
J5   -10     -10
*
NC 0.045   0.045   0.045     0.1     0.3
*
QT     1    3500
*
X1     3      12    9933   10142       0       0       0
X3     0                                                 1467.99 1467.52
GR1498.7    9862  1497.1    9889  1470.4    9933  1454.4    9961  1453.6    9996
GR1453.6   10000  1453.9   10032  1455.5   10052  1456.3   10073  1458.8   10093
GR1466.4   10142  1468.9   10164
*
*
NC 0.045   0.045   0.045     0.1     0.3
X1     4      10    9871   10064     640     630     671
X3     0                                                 1467.99 1467.52
GR1473.7    9820  1463.5    9871  1453.2    9895  1451.6    9972  1452.1   10000
GR1454.5   10042  1456.8   10064  1457.7   10134  1459.6   10177  1470.9   10262
*
*
NC 0.045   0.045   0.045     0.1     0.3
X1     5      15    9928   10122     640     600     644
X3     0                                                 1467.99 1467.52
GR1478.8    9885  1478.7    9906    1465    9928  1457.6    9939    1458    9972
GR1457.3    9995  1457.7   10000  1459.1   10027  1460.4   10064  1459.3   10097
GR1461.7   10122  1458.9   10142  1460.7   10166  1460.3   10180  1468.5   10215
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1     6      18    9914   10187     470     530     517
X3     0                                                 1467.99 1467.52
GR1488.2    9844    1464    9914  1460.4    9968  1459.8    9996  1461.4   10017
GR1462.3   10033  1470.7   10056  1470.3   10083  1472.2   10112  1470.9   10127
GR1464.4   10141  1462.5   10166    1463   10171  1464.7   10175  1467.8   10187
GR1473.8   10237  1475.2   10268  1478.9   10283
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1    20      27  135.07  224.67  115.44   81.32  144.28
X3     0                                                 1469.55 1470.25
GR  1494       0    1492   22.56    1490   42.53    1488   60.58    1486   75.57
GR  1484   83.33    1482   90.83    1480   98.33    1478  105.15    1478  105.89
GR  1476  113.34    1474     120    1474  120.72    1472  127.97    1470  135.07
GR  1470  135.45    1468  143.11    1466  150.44    1466  150.83    1466  196.44
GR  1468  210.46    1470  224.67    1472  418.21    1474  477.02    1476  514.59
GR  1478  547.46    1480  579.25
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1    30       7    10.4   133.9   567.6  248.47  455.88
X3     0                                                 1470.32 1470.09
GR1478.9       0 1475.92     7.8 1473.92    10.4 1465.74    18.4 1465.74   125.9
GR1473.9   133.9 1475.92   148.9
*
*
```

```
NC 0.016   0.016   0.016     0.1     0.3
X1    31       7    10.4   133.9       2       2       2
X3     0                                             1476.23 1476.47
GR1480.3       0 1477.32     7.8 1475.32    10.4 1467.14    18.4 1467.14   125.9
GR1475.3   133.9 1477.32   148.9
*
*
NC 0.016   0.016   0.016     0.1     0.3
X1    40       7    10.4   133.9   133.7   133.7   133.7
X3     0                                             1476.23 1476.47
GR1480.4       0 1477.39     7.8 1475.39    10.4 1467.38    18.4 1467.38   125.9
GR1475.4   133.9 1477.39   148.9
*
*
NC 0.016   0.016   0.016     0.1     0.3
X1    49       7    10.4   133.9  122.91  122.91  122.91
X3     0                                             1476.23 1476.47
GR1480.6       0  1477.6     7.8  1475.6    10.4  1467.6    18.4  1467.6   125.9
GR1475.6   133.9  1477.6   148.9
*
*
*
NC 0.045   0.045   0.038     0.3     0.5
X1    50       7    10.4   133.9       2       2       2
X3     0                                             1476.23 1476.47
GR  1483       0    1480     7.8    1478    10.4    1470    18.4    1470   125.9
GR  1478   133.9    1480   148.9
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1    60      12    20.6   428.3  205.54  189.57  197.32
X3     0                                                1476 1475.55
GR  1480       0    1478     4.9    1477    12.6    1476    20.6    1475    45.1
GR  1474    57.3    1473    60.2    1472    98.9  1470.4   137.6    1472   176.3
GR  1480   428.3    1486   509.8
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1    70      21    9897   10038  144.24  519.52  213.69
GR1490.4    9703  1489.7    9717  1479.2    9736  1479.3    9805  1477.7    9884
GR1481.2    9897  1477.6    9931  1472.8    9965  1472.3    9986    1472   10000
GR1473.5   10023  1480.9   10038  1476.7   10045  1480.8   10067  1477.6   10079
GR1473.6   10088  1473.6   10127  1472.5   10224  1474.4   10291  1473.6   10330
GR1477.6   10343
*
*
NC 0.045   0.045   0.045     0.1     0.3
X1    80      20    9945   10019     470     450     528
GR1488.5    9909  1483.8    9945  1477.7    9986  1474.8    9991  1474.7   10000
GR  1475   10004  1483.5   10019    1479   10032  1479.5   10066    1479   10111
GR  1479   10133    1479   10162    1479   10185    1479   10199    1479   10219
GR  1479   10270    1479   10365    1479   10450    1479   10630    1490   10660
*
*
EJ
*
*
*
ER
*
*
ZZ
```

50-year HEC-2 Output File

```
1*****************************************
 *  HEC-2 WATER SURFACE PROFILES          *
 *                                        *
 *  Version   4.6.2;  May 1991            *
 *                                        *
 *  RUN DATE    20APR06    TIME   13:28:06 *
 *****************************************
```

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

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

```
1
    20APR06       13:28:06
PAGE     1
```

THIS RUN EXECUTED

```
20APR06    13:28:06
 ************************************
  HEC-2 WATER SURFACE PROFILES

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


 T1       AZ03152
 T2       CAVE CREEK WASH LOMR
 T3       REVISED MODEL
 T4
 T4       Aztec Engineering    April 2006
 T4       Deer Valley Road Improvement Project for the City of Phoenix
 T4
 T4       HEC-2 Run for 50-year flow of 3500 cfs.
 T4
 T4       Rev-50.dat
 T4
 T4       FLOODPLAIN RUN

 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

      -10        2                                                                   1463.7

 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      -1                  -1                                                  -6

 J5  LPRNT    NUMSEC                    ********REQUESTED SECTION NUMBERS********

     -10       -10

1
    20APR06       13:28:06
PAGE     2
1
    20APR06       13:28:06
PAGE     3
```

THIS RUN EXECUTED

20APR06 13:28:06

****

HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991

****

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

REVISED MODEL

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	3.000	.00	.00	.00	1453.60	3500.00	1463.70	.00	1463.81	4.65	2.66	1318.17	1623.86
*	4.000	671.00	.00	.00	1451.60	3500.00	1463.90	.00	1463.93	.82	1.40	2743.63	3875.90
*	5.000	644.00	.00	.00	1457.30	3500.00	1463.95	.00	1464.09	10.63	3.07	1185.83	1073.35
*	6.000	517.00	.00	.00	1459.80	3500.00	1464.63	.00	1465.63	111.31	8.02	436.64	331.74
*	20.000	144.28	.00	.00	1466.00	3500.00	1470.87	1470.87	1472.35	105.30	9.85	385.66	341.09
*	30.000	455.88	.00	.00	1465.74	3500.00	1473.17	.00	1473.43	8.81	4.10	852.83	1179.11
*	31.000	2.00	.00	.00	1467.14	3500.00	1473.06	.00	1473.48	3.34	5.22	670.18	1916.44
	40.000	133.70	.00	.00	1467.38	3500.00	1473.08	.00	1473.54	3.77	5.43	645.12	1802.85
	49.000	122.91	.00	.00	1467.60	3500.00	1473.11	.00	1473.60	4.20	5.62	623.25	1706.84
*	50.000	2.00	.00	.00	1470.00	3500.00	1473.17	1473.17	1474.72	149.58	9.98	350.84	286.18
*	60.000	197.32	.00	.00	1470.40	3500.00	1475.81	.00	1476.15	37.66	4.70	744.41	570.34
*	70.000	213.69	.00	.00	1472.00	3500.00	1476.76	.00	1476.91	15.44	3.42	1153.64	890.60
*	80.000	528.00	.00	.00	1474.70	3500.00	1480.05	1480.05	1480.52	144.06	7.98	742.60	291.61

1

20APR06 13:28:06 PAGE 4

REVISED MODEL

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	3.000	3500.00	1463.70	.00	.00	.00	179.87	.00
*	4.000	3500.00	1463.90	.00	.20	.00	340.33	671.00
*	5.000	3500.00	1463.95	.00	.05	.00	266.01	644.00
*	6.000	3500.00	1464.63	.00	.68	.00	161.49	517.00
*	20.000	3500.00	1470.87	.00	6.24	.00	176.78	144.28
*	30.000	3500.00	1473.17	.00	2.30	.00	122.05	455.88
*	31.000	3500.00	1473.06	.00	-.11	.00	119.08	2.00
	40.000	3500.00	1473.08	.00	.02	.00	118.88	133.70
	49.000	3500.00	1473.11	.00	.03	.00	118.53	122.91
*	50.000	3500.00	1473.17	.00	.06	.00	113.84	2.00
*	60.000	3500.00	1475.81	.00	2.64	.00	271.09	197.32
*	70.000	3500.00	1476.76	.00	.95	.00	352.59	213.69
*	80.000	3500.00	1480.05	.00	3.29	.00	646.66	528.00

SUMMARY OF ERRORS AND SPECIAL NOTES

```
WARNING SECNO=      4.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      5.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      6.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     20.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     20.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     20.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=     30.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     31.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     50.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     50.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     50.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

WARNING SECNO=     60.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=     70.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO=     80.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     80.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     80.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL
```

500-year HEC-2 Input File

```
T1      AZ03152
T2      CAVE CREEK WASH LOMR
T3      REVISED MODEL
T4
T4      Aztec Engineering    April 2006
T4      Deer Valley Road Improvement Project for the City of Phoenix
T4
T4      HEC-2 Run for 500-year flow of 10,000 cfs.
T4
T4      Rev500.dat
T4
T4      FLOODPLAIN RUN
J1   -10       2                                                  1470.6
J2    -1              -1                                   -6
J5   -10     -10
*
NC 0.045   0.045   0.045     0.1     0.3
*
QT     1   10000
*
X1     3      12    9933   10142       0       0       0
X3     0                                                 1467.99 1467.52
GR1498.7    9862  1497.1    9889  1470.4    9933  1454.4    9961  1453.6    9996
GR1453.6   10000  1453.9   10032  1455.5   10052  1456.3   10073  1458.8   10093
GR1466.4   10142  1468.9   10164
*
*
NC 0.045   0.045   0.045     0.1     0.3
X1     4      10    9871   10064     640     630     671
X3     0                                                 1467.99 1467.52
GR1473.7    9820  1463.5    9871  1453.2    9895  1451.6    9972  1452.1   10000
GR1454.5   10042  1456.8   10064  1457.7   10134  1459.6   10177  1470.9   10262
*
*
NC 0.045   0.045   0.045     0.1     0.3
X1     5      15    9928   10122     640     600     644
X3     0                                                 1467.99 1467.52
GR1478.8    9885  1478.7    9906    1465    9928  1457.6    9939    1458    9972
GR1457.3    9995  1457.7   10000  1459.1   10027  1460.4   10064  1459.3   10097
GR1461.7   10122  1458.9   10142  1460.7   10166  1460.3   10180  1468.5   10215
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1     6      18    9914   10187     470     530     517
X3     0                                                 1467.99 1467.52
GR1488.2    9844    1464    9914  1460.4    9968  1459.8    9996  1461.4   10017
GR1462.3   10033  1470.7   10056  1470.3   10083  1472.2   10112  1470.9   10127
GR1464.4   10141  1462.5   10166    1463   10171  1464.7   10175  1467.8   10187
GR1473.8   10237  1475.2   10268  1478.9   10283
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1    20      27  135.07  224.67  115.44   81.32  144.28
X3     0                                                 1469.55 1470.25
GR  1494       0    1492   22.56    1490   42.53    1488   60.58    1486   75.57
GR  1484   83.33    1482   90.83    1480   98.33    1478  105.15    1478  105.89
GR  1476  113.34    1474     120    1474  120.72    1472  127.97    1470  135.07
GR  1470  135.45    1468  143.11    1466  150.44    1466  150.83    1466  196.44
GR  1468  210.46    1470  224.67    1472  418.21    1474  477.02    1476  514.59
GR  1478  547.46    1480  579.25
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1    30       7    10.4   133.9   567.6  248.47  455.88
X3     0                                                 1470.32 1470.09
GR1478.9       0 1475.92     7.8 1473.92    10.4 1465.74    18.4 1465.74   125.9
GR1473.9   133.9 1475.92   148.9
*
*
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NC 0.016   0.016   0.016     0.1     0.3
X1    31       7    10.4   133.9       2       2       2
X3     0                                             1476.23 1476.47
GR1480.3       0 1477.32     7.8 1475.32    10.4 1467.14    18.4 1467.14   125.9
GR1475.3   133.9 1477.32   148.9
*
*
NC 0.016   0.016   0.016     0.1     0.3
X1    40       7    10.4   133.9   133.7   133.7   133.7
X3     0                                             1476.23 1476.47
GR1480.4       0 1477.39     7.8 1475.39    10.4 1467.38    18.4 1467.38   125.9
GR1475.4   133.9 1477.39   148.9
*
*
NC 0.016   0.016   0.016     0.1     0.3
X1    49       7    10.4   133.9  122.91  122.91  122.91
X3     0                                             1476.23 1476.47
GR1480.6       0  1477.6     7.8  1475.6    10.4  1467.6    18.4  1467.6   125.9
GR1475.6   133.9  1477.6   148.9
*
*
*
NC 0.045   0.045   0.038     0.3     0.5
X1    50       7    10.4   133.9       2       2       2
X3     0                                             1476.23 1476.47
GR  1483       0    1480     7.8    1478    10.4    1470    18.4    1470   125.9
GR  1478   133.9    1480   148.9
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1    60      12    20.6   428.3  205.54  189.57  197.32
X3     0                                                1476 1475.55
GR  1480       0    1478     4.9    1477    12.6    1476    20.6    1475    45.1
GR  1474    57.3    1473    60.2    1472    98.9  1470.4   137.6    1472   176.3
GR  1480   428.3    1486   509.8
*
*
NC 0.045   0.045   0.038     0.1     0.3
X1    70      21    9897   10038  144.24  519.52  213.69
GR1490.4    9703  1489.7    9717  1479.2    9736  1479.3    9805  1477.7    9884
GR1481.2    9897  1477.6    9931  1472.8    9965  1472.3    9986    1472   10000
GR1473.5   10023  1480.9   10038  1476.7   10045  1480.8   10067  1477.6   10079
GR1473.6   10088  1473.6   10127  1472.5   10224  1474.4   10291  1473.6   10330
GR1477.6   10343
*
*
NC 0.045   0.045   0.045     0.1     0.3
X1    80      20    9945   10019     470     450     528
GR1488.5    9909  1483.8    9945  1477.7    9986  1474.8    9991  1474.7   10000
GR  1475   10004  1483.5   10019    1479   10032  1479.5   10066    1479   10111
GR  1479   10133    1479   10162    1479   10185    1479   10199    1479   10219
GR  1479   10270    1479   10365    1479   10450    1479   10630    1490   10660
*
*
EJ
*
*
*
ER
*
*
ZZ
```

500-year HEC-2 Output File

```
1*****************************************
 *  HEC-2 WATER SURFACE PROFILES          *
 *                                        *
 *  Version   4.6.2;  May 1991            *
 *                                        *
 *  RUN DATE    20APR06    TIME   13:28:20 *
 *****************************************

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

                                  X     X  XXXXXXX   XXXXX             XXXXX
                                  X     X  X        X     X           X     X
                                  X     X  X        X                       X
                                  XXXXXXX  XXXX     X          XXXXX    XXXXX
                                  X     X  X        X                  X
                                  X     X  X        X     X            X
                                  X     X  XXXXXXX   XXXXX             XXXXXXX
1
    20APR06       13:28:20
PAGE     1

                                                                                          THIS RUN EXECUTED
20APR06     13:28:20
 ***************************************
  HEC-2 WATER SURFACE PROFILES

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


 T1       AZ03152
 T2       CAVE CREEK WASH LOMR
 T3       REVISED MODEL
 T4
 T4       Aztec Engineering    April 2006
 T4       Deer Valley Road Improvement Project for the City of Phoenix
 T4
 T4       HEC-2 Run for 500-year flow of 10,000 cfs.
 T4
 T4       Rev500.dat
 T4
 T4       FLOODPLAIN RUN

 J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

      -10        2                                                                   1470.6

 J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      -1                  -1                                                  -6


 J5  LPRNT    NUMSEC                    ********REQUESTED SECTION NUMBERS********

     -10       -10

1
    20APR06       13:28:20
PAGE     2
1
    20APR06       13:28:20
PAGE     3
```

THIS RUN EXECUTED

20APR06 13:28:20

****

HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991

****

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

REVISED MODEL

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
	3.000	.00	.00	.00	1453.60	10000.00	1470.60	.00	1470.81	4.22	3.68	2762.42	4865.61
*	4.000	671.00	.00	.00	1451.60	10000.00	1470.88	.00	1470.93	.89	2.06	5421.78	10599.38
*	5.000	644.00	.00	.00	1457.30	10000.00	1470.91	.00	1471.07	3.78	3.30	3166.41	5143.38
*	6.000	517.00	.00	.00	1459.80	10000.00	1471.02	.00	1471.55	18.34	5.93	1749.73	2335.00
*	20.000	144.28	.00	.00	1466.00	10000.00	1473.60	1473.60	1475.28	75.52	11.91	1157.92	1150.75
*	30.000	455.88	.00	.00	1465.74	10000.00	1475.93	.00	1477.01	23.89	8.36	1210.56	2046.12
*	31.000	2.00	.00	.00	1467.14	10000.00	1475.54	.00	1477.18	8.40	10.28	973.12	3450.64
	40.000	133.70	.00	.00	1467.38	10000.00	1475.61	.00	1477.32	9.01	10.50	952.25	3332.29
	49.000	122.91	.00	.00	1467.60	10000.00	1475.67	.00	1477.46	9.63	10.72	932.96	3221.84
*	50.000	2.00	.00	.00	1470.00	10000.00	1476.30	1476.30	1479.32	124.25	13.95	717.08	897.12
*	60.000	197.32	.00	.00	1470.40	10000.00	1479.92	.00	1480.25	15.09	4.61	2192.96	2574.21
	70.000	213.69	.00	.00	1472.00	10000.00	1480.44	.00	1480.64	9.96	3.78	2847.79	3168.48
*	80.000	528.00	.00	.00	1474.70	10000.00	1481.23	.00	1481.93	128.36	8.36	1521.03	882.65

1

20APR06 13:28:20 PAGE 4

REVISED MODEL

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	3.000	10000.00	1470.60	.00	.00	.00	231.33	.00
*	4.000	10000.00	1470.88	.00	.28	.00	427.67	671.00
*	5.000	10000.00	1470.91	.00	.03	.00	296.49	644.00
*	6.000	10000.00	1471.02	.00	.11	.00	288.77	517.00
*	20.000	10000.00	1473.60	.00	2.59	.00	343.23	144.28
*	30.000	10000.00	1475.93	.00	2.33	.00	141.12	455.88
*	31.000	10000.00	1475.54	.00	-.39	.00	125.63	2.00
	40.000	10000.00	1475.61	.00	.07	.00	125.35	133.70
	49.000	10000.00	1475.67	.00	.06	.00	124.14	122.91
*	50.000	10000.00	1476.30	.00	.63	.00	120.10	2.00
*	60.000	10000.00	1479.92	.00	3.62	.00	425.54	197.32
	70.000	10000.00	1480.44	.00	.52	.00	594.24	213.69

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 *     80.000  10000.00   1481.23       .00       .80       .00    663.42    528.00

1
    20APR06       13:28:20
PAGE    5


  SUMMARY OF ERRORS AND SPECIAL NOTES

 WARNING SECNO=       4.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

 WARNING SECNO=       5.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

 WARNING SECNO=       6.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

 CAUTION SECNO=      20.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=      20.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
 CAUTION SECNO=      20.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

 WARNING SECNO=      30.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

 WARNING SECNO=      31.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

 CAUTION SECNO=      50.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=      50.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
 CAUTION SECNO=      50.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

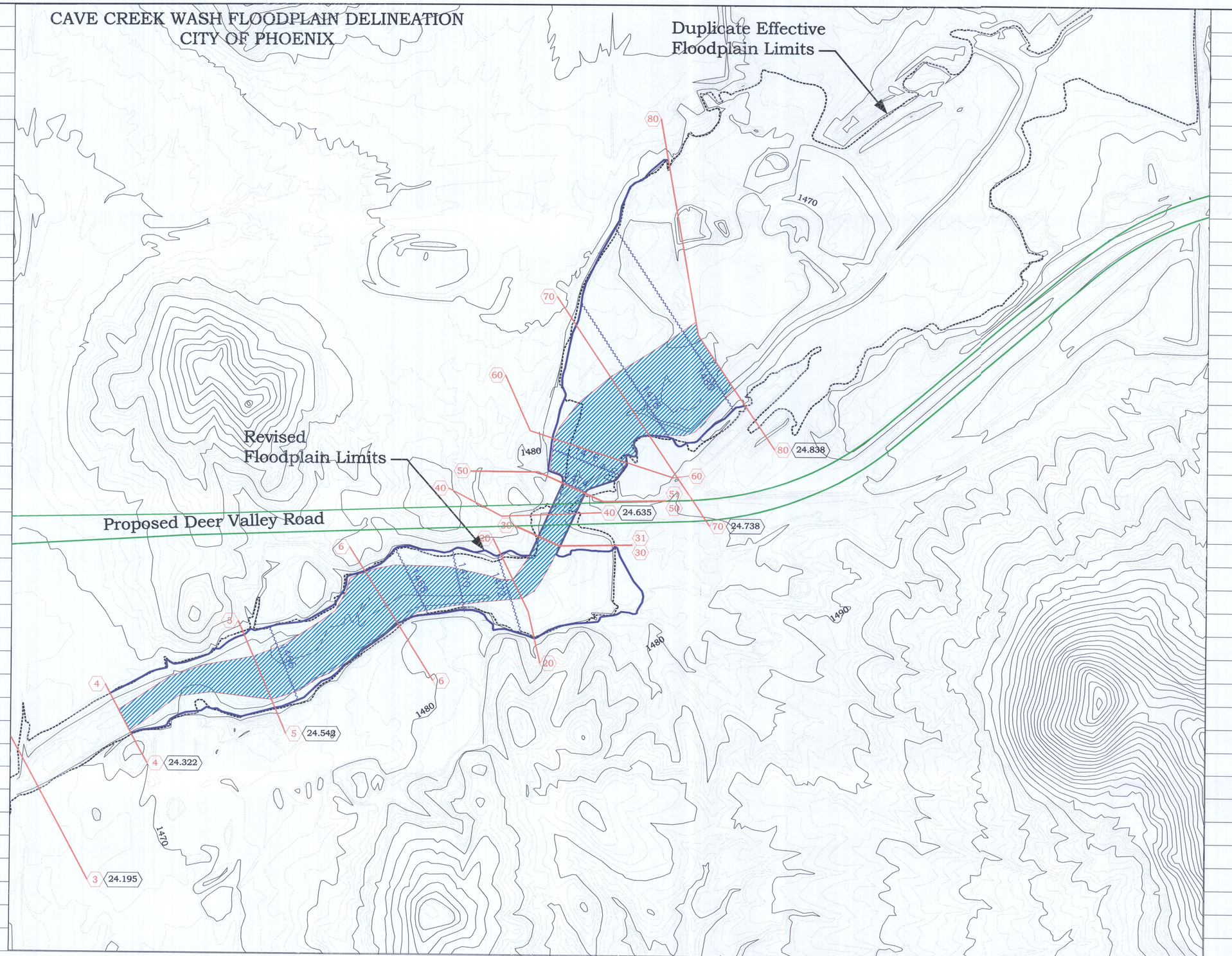
 WARNING SECNO=      60.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

 WARNING SECNO=      80.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
```

APPENDIX F

24" X 36" COPY OF FIGURES 5

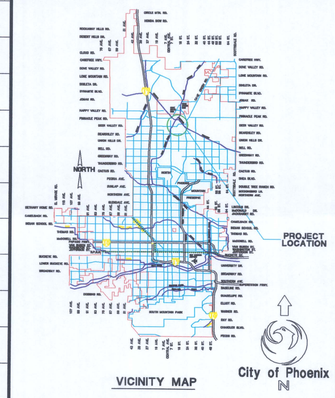
CAVE CREEK WASH FLOODPLAIN DELINEATION
CITY OF PHOENIX



F.H.W.A. REGION	STATE	PROJ. NO.	NO.	TOTAL	AS BUILT
	ARIZ	AZ03007			

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel(602)454-0402 Fax(602)454-0403 www.aztecae.com

DR: PAW | DES: PAW | CK: TB | DATE: 5/19



VICINITY MAP

CROSS SECTION	RIVER MILE	ID
BN	24.195	3
		4
BO	24.322	5
BP	24.444	6
BQ	24.542	20
		30
BR	24.635	40
		50
		60
BS	24.738	70
BT	24.838	80

LEGEND

- LIMITS OF 100 YEAR FLOODPLAIN
- LIMITS OF DUPLICATE EFFECTIVE FLOODPLAIN
- 3 CROSS SECTION DESIGNATION
- 1474 Base Flood Elevation–Elevation in Feet
- FLOODWAY LIMITS

PER CITY OF PHOENIX ORDINANCE G-4396, THESE PLANS ARE FOR OFFICIAL USE ONLY AND MAY NOT BE SHARED WITH OTHERS EXCEPT AS REQUIRED TO FULFILL THE OBLIGATIONS OF YOUR CONTRACT WITH THE CITY OF PHOENIX.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 34024 PATRICK A. WOLF ARIZONA, U.S.A. Date Signed 7-14-19

CALL TWO WORKING DAYS BEFORE YOU DIG CALL FOR THE BLUE STAKES 602-263-1100 1-800-STAKE-IT OUTSIDE MARICOPA COUNTY

FLOODPLAIN DELINEATION

CITY OF PHOENIX, ARIZONA
STREET TRANSPORTATION DEPARTMENT

CAVE CREEK WASH
DEER VALLEY ROAD BRIDGE CROSSING

FIGURE 5

DR: PAW DATE: 5/19	DES: PAW DATE: 5/19	CK: TB DATE: 5/20	SHEET NO.	TOTAL SHEETS	AS BUILT
SCALE: 1"=200' HORIZONTAL 2' CONTOUR INTERVALS			1	1	

REVISION BY CITY OF PHOENIX

NO.	DESCRIPTION	REV BY	CKD BY	DATE

APPENDIX G

BRIDGE, CHANNEL, AND DROP STRUCTURE DESIGN DRAWINGS

F.H.W.A. REGION	STATE	PROJ. NO.	NO.	TOTAL	AS BUILT
9	ARIZ	ST83110041	108A	379	

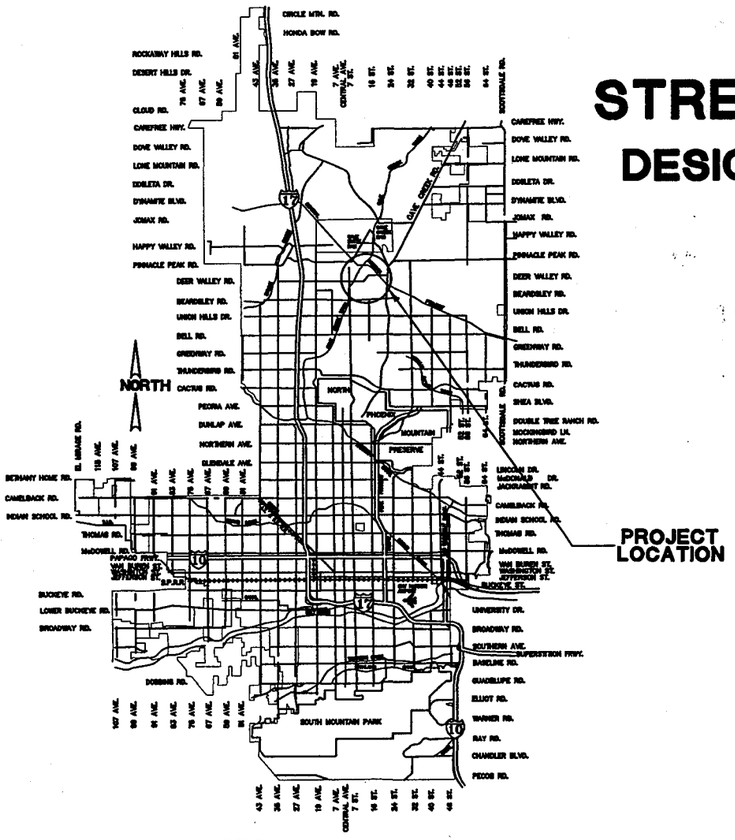
AZTEC

DES: DRR	DR: ASR	CK: CCW	DATE: 08/05

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 24671 TONY A. BOKICH DATE SIGNED ARIZONA U.S.A.

PER CITY OF PHOENIX ORDINANCE G-4396, THESE PLANS ARE FOR OFFICIAL USE ONLY AND MAY NOT BE SHARED WITH OTHERS EXCEPT AS REQUIRED TO FULFILL THE OBLIGATIONS OF YOUR CONTRACT WITH THE CITY OF PHOENIX.

CITY OF PHOENIX
STREET TRANSPORTATION DEPARTMENT
DESIGN & CONSTRUCTION MANAGEMENT DIVISION
ST83110041
DEER VALLEY ROAD STORM DRAIN
7TH STREET TO CAVE CREEK ROAD



VICINITY MAP

APPROVED _____ ASSISTANT STREET TRANSPORTATION DIRECTOR _____ DATE

MAYOR
PHIL GORDON

CITY MANAGER
FRANK FAIRBANKS

CITY COUNCIL

DISTRICT NO. 1 DAVE SIEBERT
DISTRICT NO. 2 PEGGY NEELY
DISTRICT NO. 3 PEGGY BILSTEN
DISTRICT NO. 4 TOM SIMPLOT
DISTRICT NO. 5 CLAUDE MATTOX
DISTRICT NO. 6 GREG STANTON
DISTRICT NO. 7 DOUG LINGNER
DISTRICT NO. 8 MICHAEL JOHNSON

INDEX OF SHEETS

1	GENERAL COVER SHEET
2-107	SEE PROJECT ST85100044 FOR PAVING PLANS
108A	STORM DRAIN COVER SHEET
108B	STORM DRAIN GENERAL LEGEND & NOTES
108C-108D	DRAINAGE SUMMARY SHEETS
108-109	ALTERNATE PIPE MATERIAL TABLE
110-111	STORM DRAIN SUMMARY SHEET
112-141	STORM DRAIN PLAN SHEETS
142-161	CONNECTOR PIPE PROFILE SHEETS
162-163	BOX CULVERT PLAN & PROFILE SHEETS
164-170	DRAINAGE DETAILS
171-172	HYDRAULIC GRADE LINE SHEETS
173-174	CAVE CREEK WASH SHEETS
175-180	SOIL BORING LOG SHEETS
181-379	SEE PROJECT ST85100044 FOR BRIDGE AND LANDSCAPE PLANS

2005

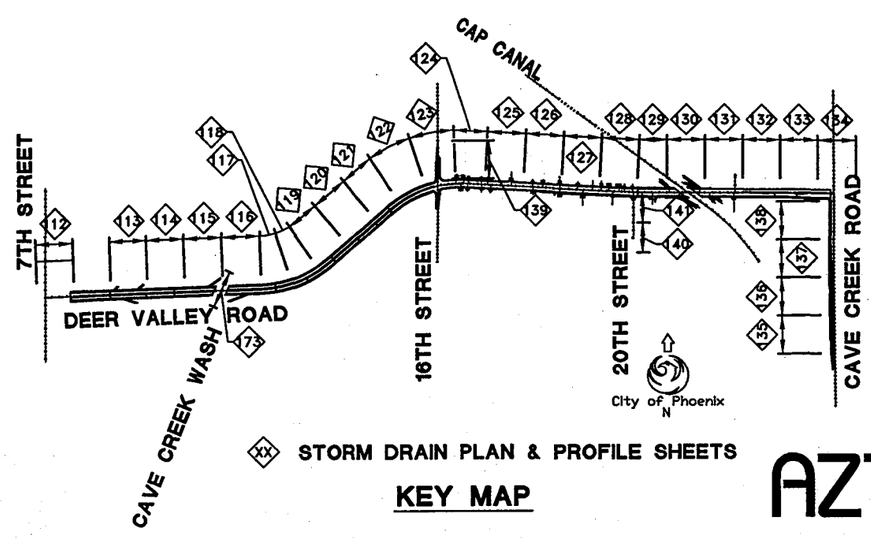
BENCHMARKS

BM- TOP OF BRASS CAP FLUSH AT THE INTERSECTION OF 7TH ST AND DEER VALLEY RD
ELEV= 1470.07 (C.O.P. DATUM)

BM- TOP OF BRASS CAP FLUSH AT THE INTERSECTION OF CAVE CREEK RD AND DEER VALLEY RD
ELEV= 1536.85 (C.O.P. DATUM)

LENGTH OF PROJECT

LENGTH OF PROJECT = 10,836 L.F. = 2.05 MILE



STORM DRAIN PLAN & PROFILE SHEETS

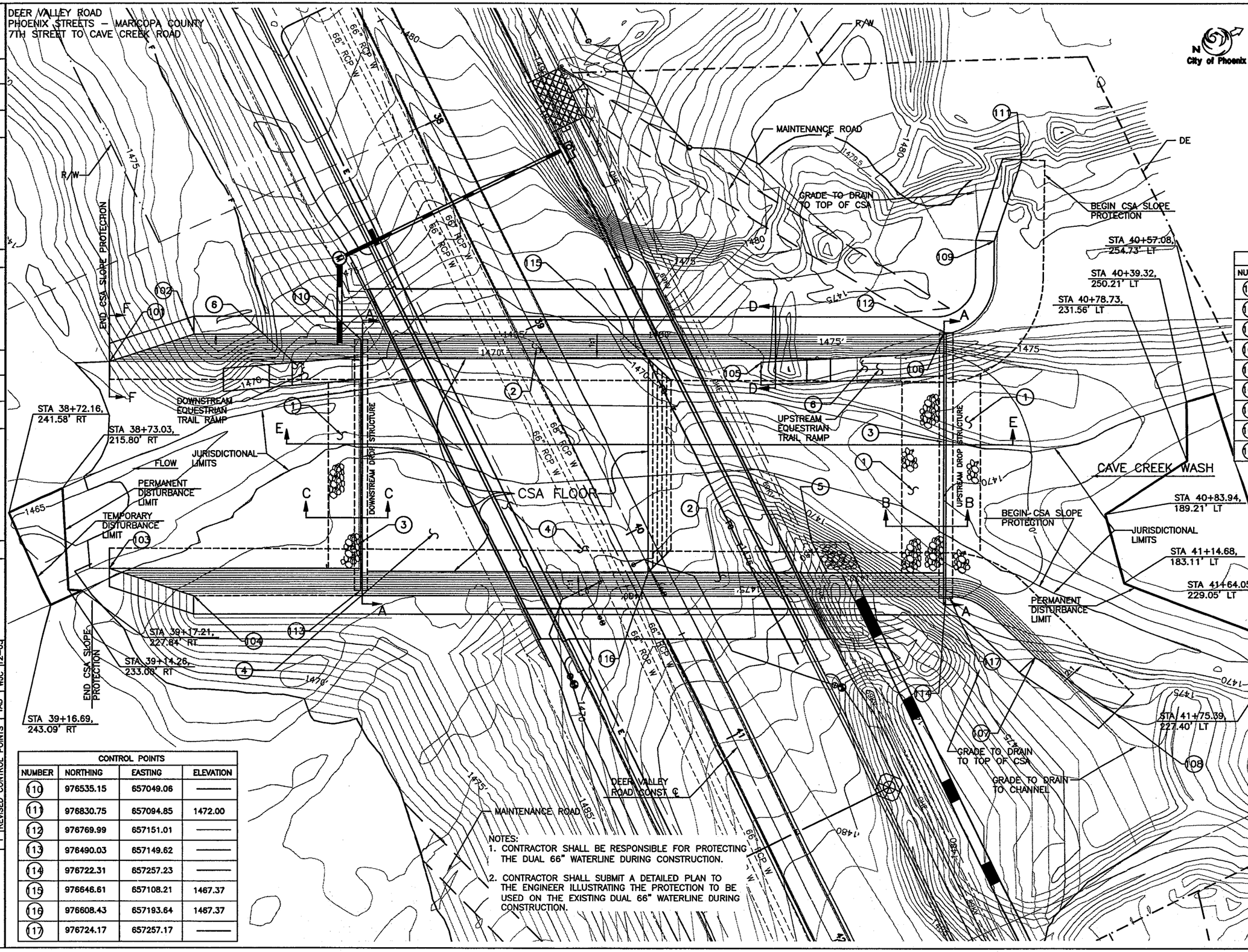
KEY MAP

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-4505
Tel(602)454-0402
Fax(602)454-0403
www.aztec.us

CALL TWO WORKING DAYS BEFORE YOU DIG
CALL FOR THE BLUE STAKES
602-263-1100
1-800-STAKE-IT
OUTSIDE MARICOPA COUNTY

ST83110041

DEER VALLEY ROAD
PHOENIX STREETS – MARICOPA COUNTY
7TH STREET TO CAVE CREEK ROAD



F.H.W.A. REGION	STATE	PROJ. NO.	NO.	TOTAL	AS BUILT
9	ARIZ	ST83110041	173	379	

AZTEC

DR: KL	DES: PAW	CK: TAB	DATE: 03/08

CONSTRUCTION NOTES

	NO DESCRIPTION	UNIT	QTY
1	DUMPED RIPRAP D_{50}=36"	CY	6925
2	CSA SLOPE PROTECTION	CY	6920
3	REINFORCED CONCRETE DROP STRUCTURE	SF	2777
4	CSA CHANNEL FLOOR	CY	1095
5	RIPRAP PLUNGE POOL D_{50}=24"	CY	84
6	EQUESTRIAN TRAIL RAMP CSA	CY	140

CONTROL POINTS

NUMBER	NORTHING	EASTING	ELEVATION
101	976430.57	657012.81	1463.00
102	976469.41	657017.09	———
103	976393.31	657095.55	1463.00
104	976422.28	657121.74	———
105	976690.78	657129.68	1465.00
106	976765.96	657150.19	———
107	976748.77	657296.76	———
108	976768.72	657333.44	1471.00
109	976805.63	657122.59	———

CONTROL POINTS

NUMBER	NORTHING	EASTING	ELEVATION
110	976535.15	657049.06	———
111	976830.75	657094.85	1472.00
112	976769.99	657151.01	———
113	976490.03	657149.62	———
114	976722.31	657257.23	———
115	976646.61	657108.21	1467.37
116	976608.43	657193.64	1467.37
117	976724.17	657257.17	———

NOTES:
1. CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING THE DUAL 66" WATERLINE DURING CONSTRUCTION.
2. CONTRACTOR SHALL SUBMIT A DETAILED PLAN TO THE ENGINEER ILLUSTRATING THE PROTECTION TO BE USED ON THE EXISTING DUAL 66" WATERLINE DURING CONSTRUCTION.

PER CITY OF PHOENIX ORDINANCE G-4396, THESE PLANS ARE FOR OFFICIAL USE ONLY AND MAY NOT BE SHARED WITH OTHERS EXCEPT AS REQUIRED TO FULFILL THE OBLIGATIONS OF YOUR CONTRACT WITH THE CITY OF PHOENIX.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 24971 TONY A. BOKICH Date Signed ARIZONA, U.S.A.

602-263-1
1-800-STAK

CAVE CREEK WASH CROSSING PLAN

CITY OF PHOENIX, ARIZONA
STREET TRANSPORTATION DEPARTMENT

DEER VALLEY ROAD
7TH STREET TO CAVE CREEK ROAD

ST83110041

DR: KL DATE:03/08	DES: PAW DATE:03/08	CK: TAB DATE:03/08	SHEET NO.	TOTAL SHEETS	AS BUILT
SCALE: 1"=20' HORIZONTAL			173	379	

REVISION BY CITY OF PHOENIX

NO.	DESCRIPTION	REV BY	CKD BY	DATE

REVISION BY CITY OF PHOENIX

NO.	DESCRIPTION	REV BY	CKD BY	DATE

REVISION BY CITY OF PHOENIX

NO.	DESCRIPTION	REV BY	CKD BY	DATE
1	REVISED CONTROL POINTS	TAB	WJC	12-05

DEER VALLEY ROAD
PHOENIX STREETS – MARICOPA COUNTY
7TH STREET TO CAVE CREEK ROAD

F.H.W.A. REGION	STATE	PROJ. NO.	NO.	TOTAL	AS BUILT
9	ARIZ	ST83110041	174	379	

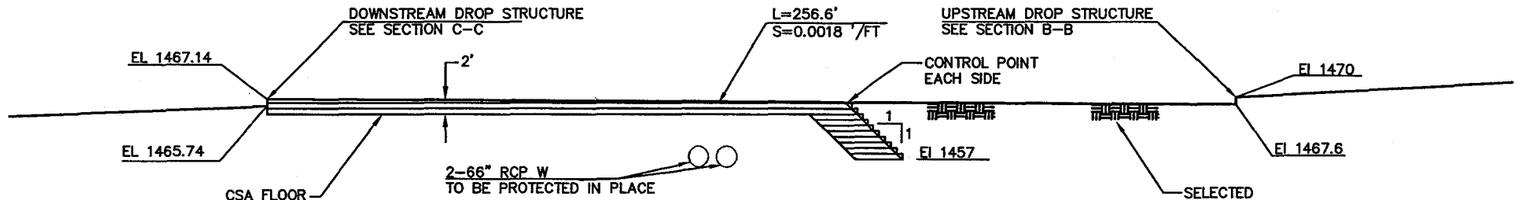
AZTEC

DR: KL	DES: PAW	CK: TAB	DATE: 03/06

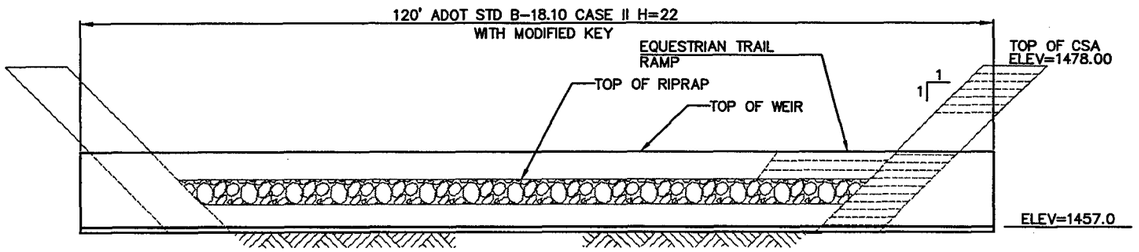
City of Phoenix

REVISION BY CITY OF PHOENIX

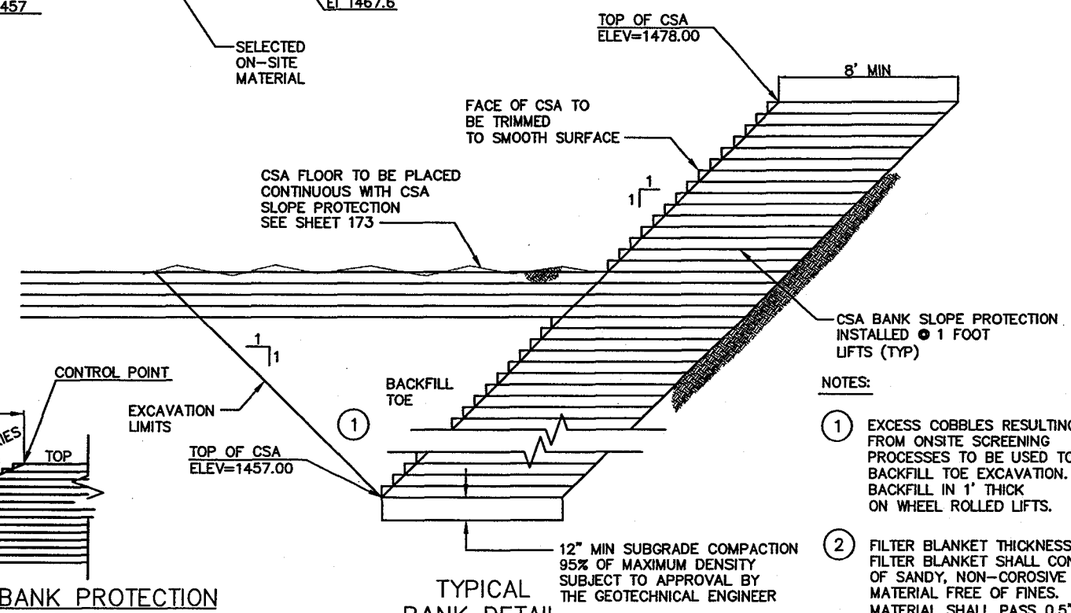
NO.	DESCRIPTION	REV BY	CKD BY	DATE



Section E–E
SEE SHEET 173
N.T.S.



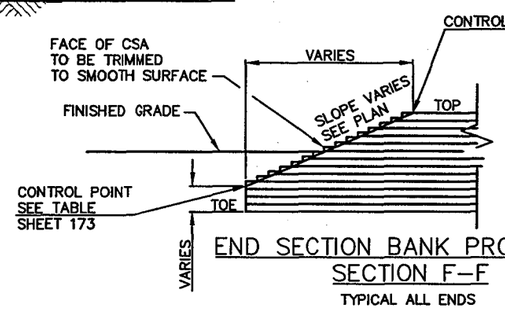
ELEVATION
SECTION A–A
SEE SHEET 173
N.T.S.



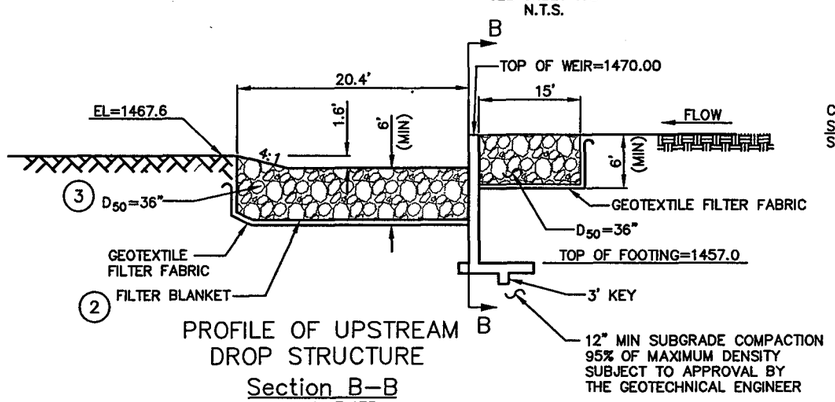
TYPICAL
BANK DETAIL
SECTION D–D
SEE SHEET 173
N.T.S.

NOTES:

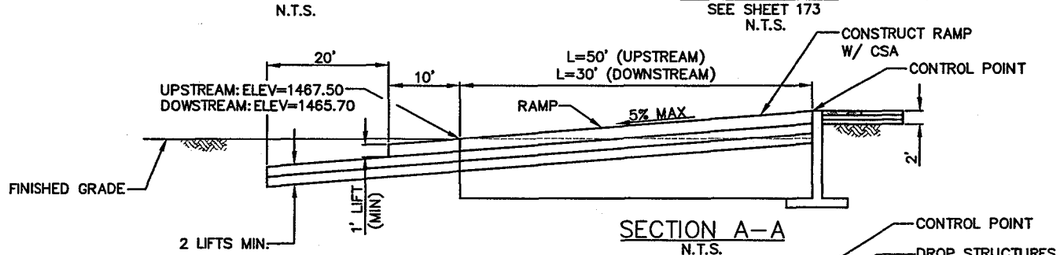
1. EXCESS COBBLES RESULTING FROM ONSITE SCREENING PROCESSES TO BE USED TO BACKFILL TOE EXCAVATION. BACKFILL IN 1' THICK ON WHEEL ROLLED LIFTS.
2. FILTER BLANKET THICKNESS =6", FILTER BLANKET SHALL CONSIST OF SANDY, NON–COROSIVE MATERIAL FREE OF FINES. ALL MATERIAL SHALL PASS 0.5" SIEVE AND BE DISTRIBUTED TO A UNIFORM 6" THIICKNESS BEFORE PLACING RIP RAP.



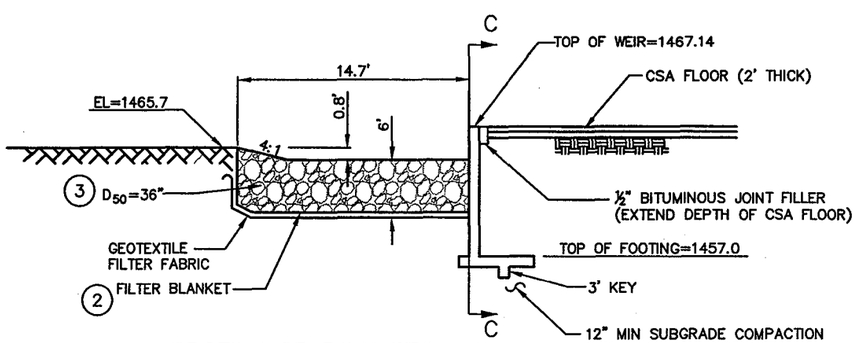
END SECTION BANK PROTECTION
SECTION F–F
TYPICAL ALL ENDS
N.T.S.



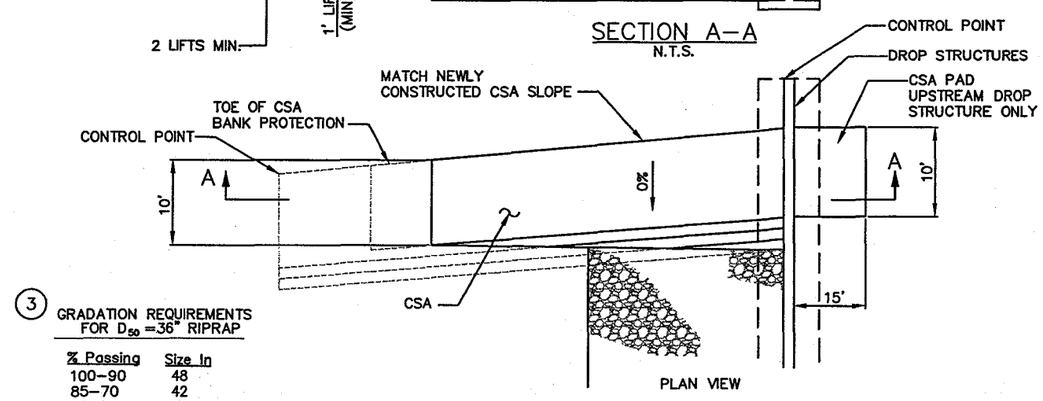
PROFILE OF UPSTREAM
DROP STRUCTURE
Section B–B
SEE SHEET 173
N.T.S.



SECTION A–A
N.T.S.



PROFILE OF DOWNSTREAM
DROP STRUCTURE
Section C–C
SEE SHEET 173
N.T.S.



EQUESTRIAN TRAIL
RAMPS
N.T.S.

3 GRADATION REQUIREMENTS FOR D_{50} =36" RIPRAP

% Passing	Size In
100–90	48
85–70	42
50–30	36
15–5	18
5–0	8

PER CITY OF PHOENIX ORDINANCE G–4396, THESE PLANS ARE FOR OFFICIAL USE ONLY AND MAY NOT BE SHARED WITH OTHERS EXCEPT AS REQUIRED TO FULFILL THE OBLIGATIONS OF YOUR CONTRACT WITH THE CITY OF PHOENIX.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 24971 TONY A. BOKICH DATE SIGNED 03/06/08 ARIZONA, U.S.A.

602–263–1
1–800–STAK

CAVE CREEK WASH CROSSING DETAILS

CITY OF PHOENIX, ARIZONA
STREET TRANSPORTATION DEPARTMENT

DEER VALLEY ROAD
7TH STREET TO CAVE CREEK ROAD

ST83110041

DR: KL DATE:03/06	DES: PAW DATE:03/06	CK: TAB DATE:03/06	SHEET NO.	TOTAL SHEETS	AS BUILT
SCALE: NONE			174	379	

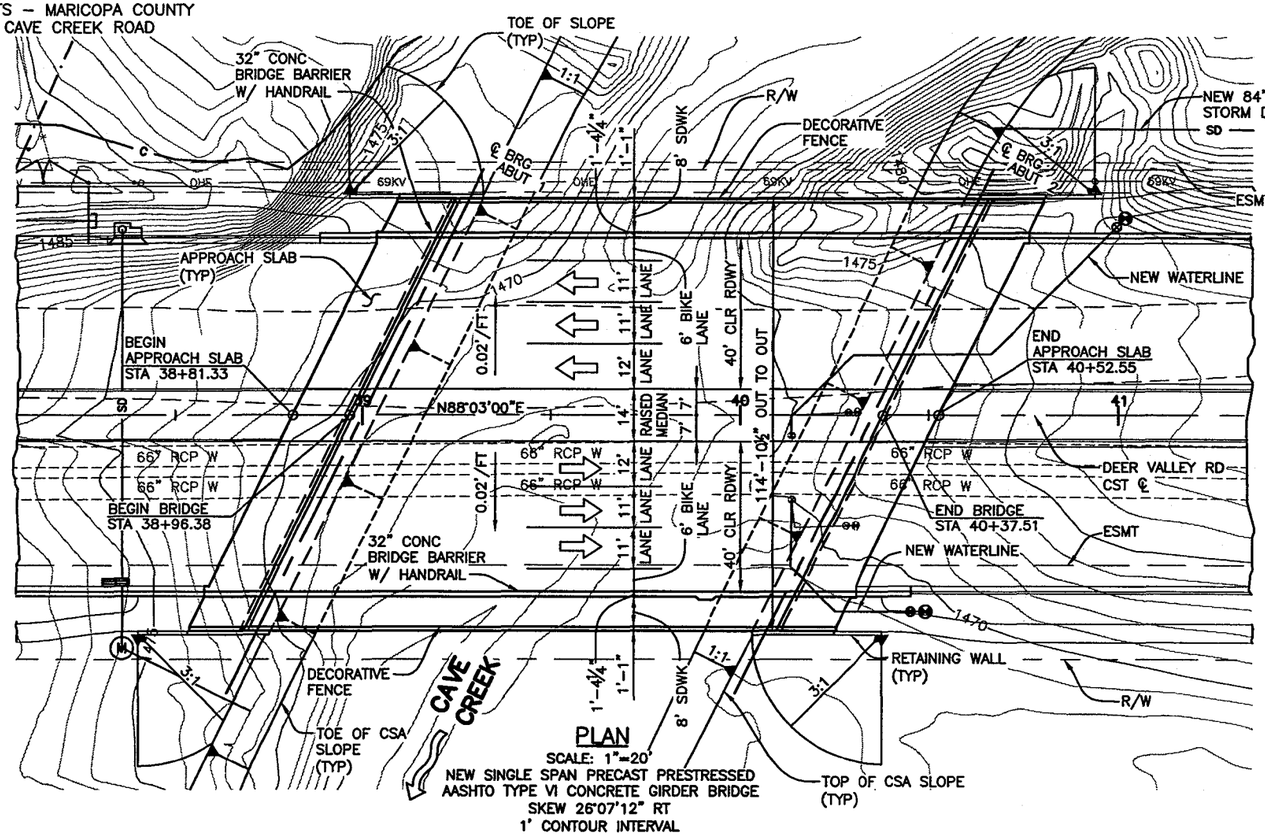
DEER VALLEY ROAD
PHOENIX STREETS – MARICOPA COUNTY
7TH STREET TO CAVE CREEK ROAD

F.H.W.A. REGION	STATE	PROJ. NO.	NO.	TOTAL	AS BUILT
9	ARIZ	ST85100044	182	379	

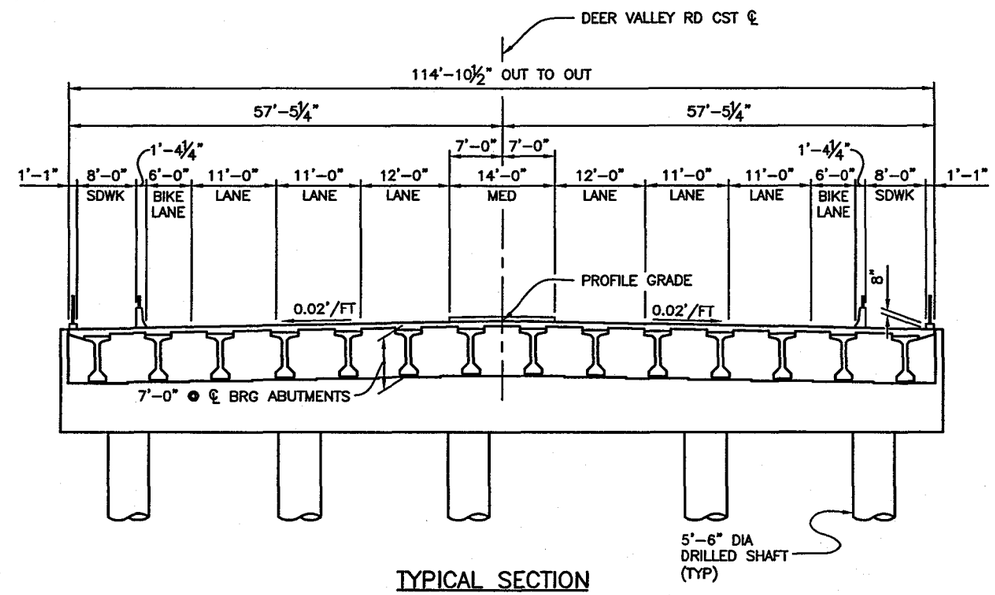
AZTEC 4041 E. McDowell Road Phoenix, AZ 85008-4605 (602)454-5100 Fax(602)454-0403 www.aztec.us

DR: RAN	DES: JMC	CK: RDA	DATE: 09/05

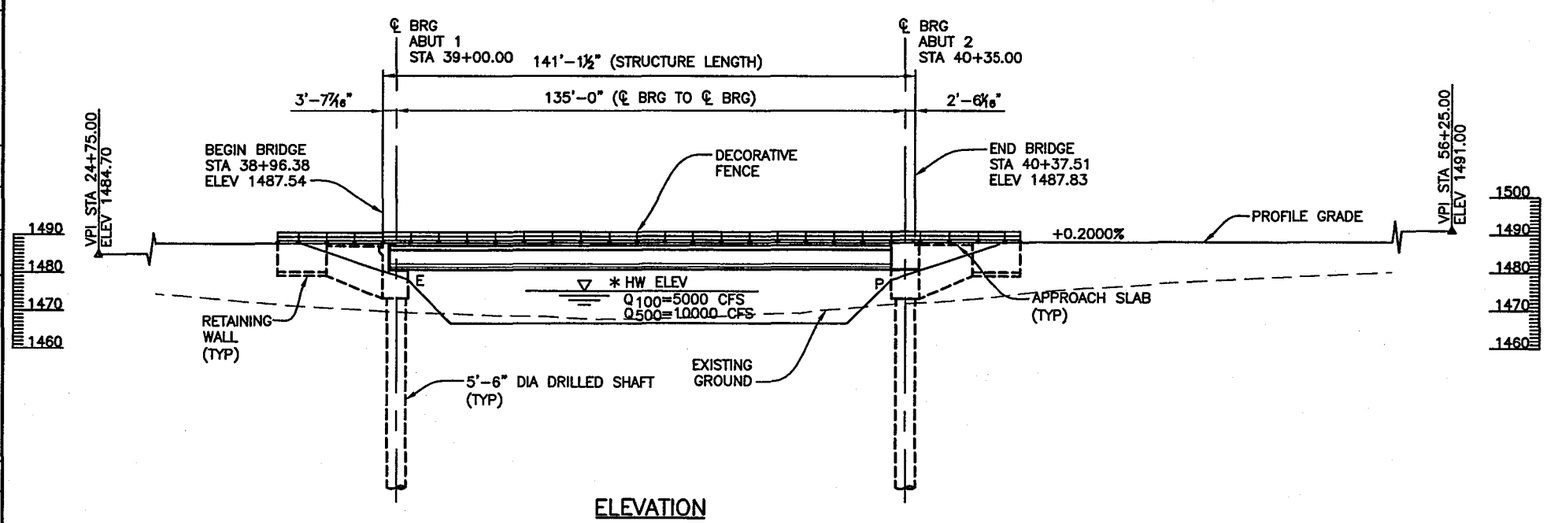
CAUTION
HIGH VOLTAGE POWER LINES
TO REMAIN IN SERVICE



PLAN
SCALE: 1"=20'
NEW SINGLE SPAN PRECAST PRESTRESSED
AASHTO TYPE VI CONCRETE GIRDER BRIDGE
SKEW 26°07'12" RT
1' CONTOUR INTERVAL



TYPICAL SECTION
SCALE: 1"=10'



ELEVATION
SCALE: 1"=20'
STATIONING, DIMENSIONS AND ELEVATIONS
ALONG DEER VALLEY RD CST ℄

*HIGH WATER ELEVATIONS:
100 YR = 1474.00
500 YR = 1475.74

PER CITY OF PHOENIX ORDINANCE G-4396, THESE PLANS ARE FOR OFFICIAL USE ONLY AND MAY NOT BE SHARED WITH OTHERS EXCEPT AS REQUIRED TO FULFILL THE OBLIGATIONS OF YOUR CONTRACT WITH THE CITY OF PHOENIX.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 36799 MARK A. CHASE Date Signed ARIZONA, U.S.A.

CALL TWO WORKING DAYS BEFORE YOU DIG FOR THE EXACT LOCATION OF UNDERGROUND UTILITIES
602-263-1
1-800-STAK

GENERAL PLAN & ELEVATION

CITY OF PHOENIX, ARIZONA
STREET TRANSPORTATION DEPARTMENT

DEER VALLEY ROAD
7TH STREET TO CAVE CREEK ROAD
CAVE CREEK BRIDGE
ST85100044

DR: RAN DATE:09/05	DES: JMC DATE:09/05	CK: RDA DATE:09/05	SHEET NO.	TOTAL SHEETS	AS BUILT
SCALE: AS SHOWN			182	379	

REVISION BY CITY OF PHOENIX

NO.	DESCRIPTION	REV BY	CKD BY	DATE

REVISION BY CITY OF PHOENIX

NO.	DESCRIPTION	REV BY	CKD BY	DATE

REVISION BY CITY OF PHOENIX

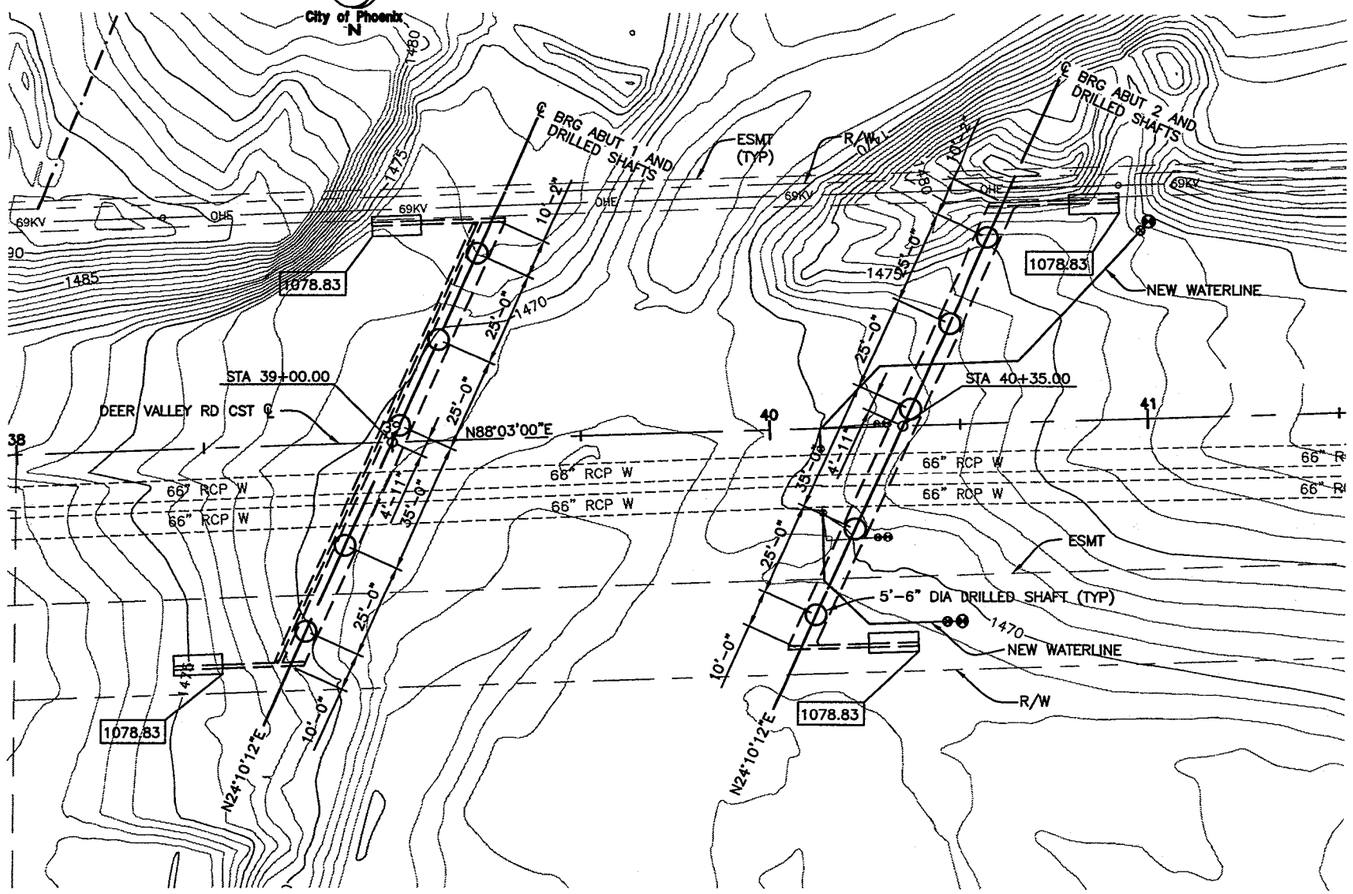
NO.	DESCRIPTION	REV BY	CKD BY	DATE

DEER VALLEY ROAD
PHOENIX STREETS – MARICOPA COUNTY
7TH STREET TO CAVE CREEK ROAD

F.H.W.A. REGION	STATE	PROJ. NO.	NO.	TOTAL	AS BUILT
9	ARIZ	ST85100044	186	379	

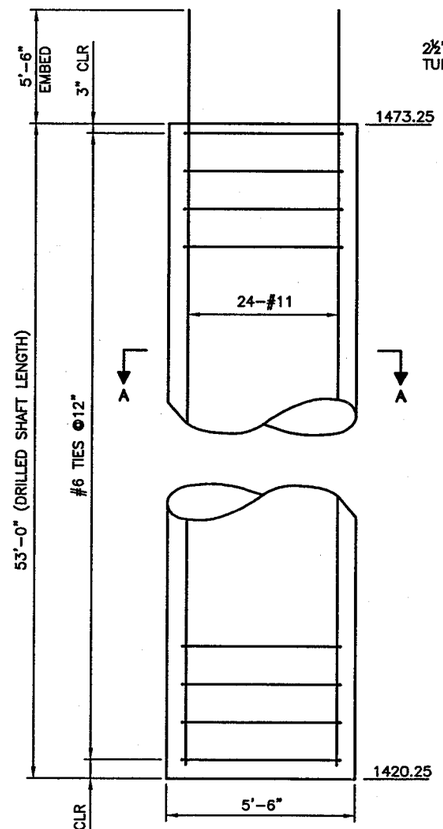
AZTEC 4041 E. McDowell Road Phoenix, AZ 85008-1505 Tel:(602)454-0402 Fax:(602)454-0403 www.aztec.us

DR: RAN	DES: JMC	CK: RDA	DATE: 09/05



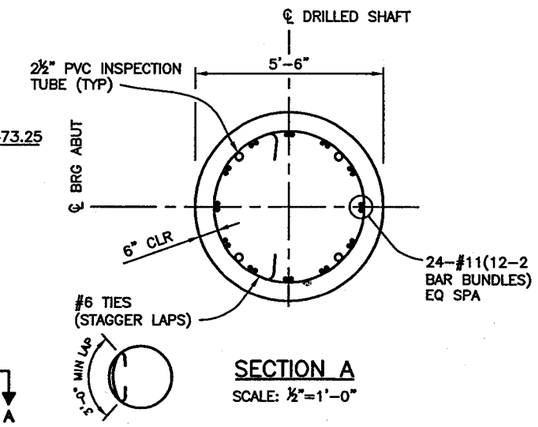
DRILLED SHAFT LAYOUT PLAN

SCALE: 1"=20'-0"



DRILLED SHAFT ELEVATION

SCALE: ½"=1'-0"



SECTION A

SCALE: ½"=1'-0"

MAPPING NOTES:

1. CONTOUR INTERVAL = 1 FT.
2. MAPPING PERFORMED BY KENNEY AERIAL IN JANUARY, 2003. SUPPLEMENTAL SURVEY PERFORMED BY AZTEC ENGINEERING

EXCAVATION NOTES:

1. THE CONTRACTOR SHALL REFER TO THE PROJECT GEOTECHNICAL REPORT FOR RECOMMENDATIONS CONCERNING TEMPORARY CONSTRUCTION SLOPES. IF SHORING IS REQUIRED, THE CONTRACTOR SHALL PROVIDE DETAILS OF THE PROPOSED SYSTEM FOR REVIEW BY THE ENGINEER. NO ADDITIONAL PAYMENT WILL BE MADE FOR SHORING.
2. THE CONTRACTOR SHALL VERIFY THE LOCATION AND STATUS OF ALL UTILITIES IN THE VICINITY OF THE BRIDGE PRIOR TO CONSTRUCTION. ANY CONFLICT SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE ENGINEER.

FOUNDATION NOTES:

1. RETAINING WALLS ARE SUPPORTED ON SPREAD FOOTING THAT BEAR ON COMPACTED STRUCTURE BACKFILL IN ACCORDANCE WITH THE DETAILS SHOWN ON SHEET 183, UNO.
2. RETAINING WALL FOOTING EQUIVALENT UNIFORM BEARING PRESSURE=1600 PSF.
3. [ ] INDICATES BOTTOM OF FOOTING ELEVATION.

DRILLED SHAFT NOTES:

1. EXCAVATION OF AN ADJACENT DRILLED SHAFT WILL NOT BE PERMITTED UNTIL 48 HOURS AFTER THE ADJACENT DRILLED SHAFT HAS BEEN POURED. AN ADJACENT SHAFT IS ANY SHAFT WITHIN THREE DIAMETERS MEASURED CENTER TO CENTER.
2. CONSTRUCTION JOINTS NOT SHOWN ON THE PLANS SHALL REQUIRE THE APPROVAL OF THE ENGINEER PRIOR TO CONSTRUCTION.
3. THE CONTRACTOR SHALL SELECT A CONFIRMATION SHAFT FOR THE ABUTMENTS, SEE SPECIAL PROVISIONS.
4. THE CONTRACTOR SHALL ORIENT THE DRILLED SHAFT REINFORCING CAGE AS SHOWN TO MINIMIZE CONFLICT WITH THE REINFORCING IN ABUTMENT CAP.
5. ELEVATIONS AND DIMENSIONS ARE GIVEN AT ℄ OF DRILLED SHAFT.
6. EACH DRILLED SHAFT CONSTRUCTED BY A WET EXCAVATION METHOD SHALL HAVE 4 PVC OR BLACK STEEL PIPES FOR INTEGRITY TESTING (ONE PLACED IN EACH QUADRANT AS SHOWN). THE PIPES MAY BE OMITTED FOR DRILLED SHAFTS CONSTRUCTED UNDER DRY CONDITIONS. SEE SPECIAL PROVISIONS FOR OTHER REQUIREMENTS.
7. DRILLED SHAFT REINFORCING MAY BE SPLICED IN THE BOTTOM HALF OF THE DRILLED SHAFT LENGTH. LAP SPLICES SHALL BE STAGGERED AS FAR AS POSSIBLE WITHIN THIS AREA. THE MINIMUM LAP LENGTH SHALL BE 7'-0".
8. SHAFT DESIGN LOAD – 1140 KIPS.
   SHAFT CAPACITY – 1220 KIPS.
9. CASING/SHORING SHALL CONFORM TO THE DESIGN AND CONSTRUCTION SPECIFICATIONS NOTED IN THE GENERAL NOTES ON SHEET 181.
10. NEW CSA DRAINAGE SLOPE SHALL BE CONSTRUCTED PRIOR TO DRILLING.

PER CITY OF PHOENIX ORDINANCE G-4396, THESE PLANS ARE FOR OFFICIAL USE ONLY AND MAY NOT BE SHARED WITH OTHERS EXCEPT AS REQUIRED TO FULFILL THE OBLIGATIONS OF YOUR CONTRACT WITH THE CITY OF PHOENIX.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 36799 MARK A. CHASE Date Signed ARIZONA, U.S.A.

602-263-1
1-800-STAK

DRILLED SHAFT LAYOUT & DETAILS

CITY OF PHOENIX, ARIZONA
STREET TRANSPORTATION DEPARTMENT

DEER VALLEY ROAD
7TH STREET TO CAVE CREEK ROAD
CAVE CREEK BRIDGE
ST85100044

DR: RAN DATE:09/05	DES: JMC DATE:09/05	CK: RDA DATE:09/05	SHEET NO.	TOTAL SHEETS	AS BUILT
SCALE: AS SHOWN			186	379	

REVISION BY CITY OF PHOENIX

NO.	DESCRIPTION	REV BY	CKD BY	DATE

REVISION BY CITY OF PHOENIX

NO.	DESCRIPTION	REV BY	CKD BY	DATE

REVISION BY CITY OF PHOENIX

NO.	DESCRIPTION	REV BY	CKD BY	DATE

APPENDIX H

DIGITAL COPIES