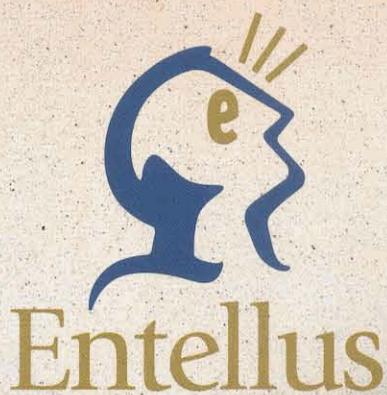




FEMA SUBMITTAL





FEMA SUBMITTAL

Contract FCD 99-44

May 30, 2001

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Prepared by:



Intelligent Engineering
Environmental Solutions



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In association with:

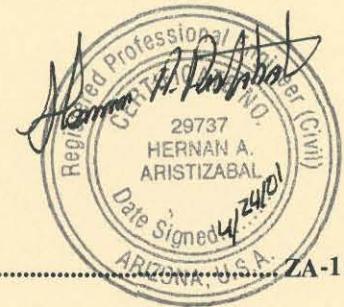


LTM Engineering, Inc.
3823 East Thunderbird Road Suite 26-121
Phoenix, Arizona 85032

GLENDALE/PEORIA AREA DRAINAGE MASTER PLAN UPDATE

FCD 99-44

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SAVIERO

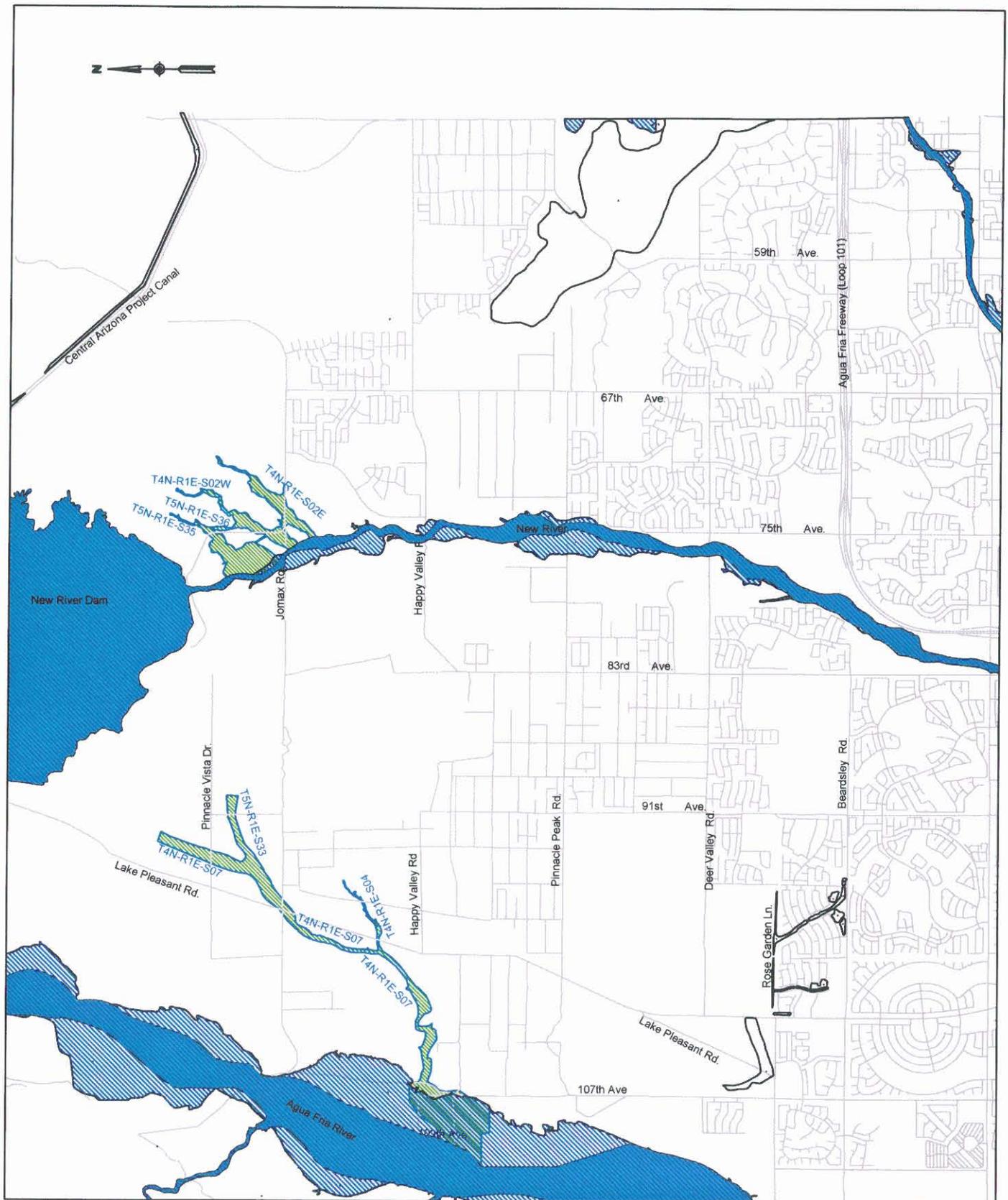


SECTION ZA-1: INTRODUCTION

The information and analysis presented in this report are a portion of the scope of work for Glendale/Peoria Area Drainage Master Plan (ADMP), performed by Entellus, Inc. for the Flood Control District of Maricopa County (District) under the contract of FCD 99-44. The work under this portion of contract consists of the development of the 100-year hydrology and delineation of approximate Zone A 100-year floodplain for the following seven (7) watercourses that are located within an area generally bounded by Dynamite Road on the north, Happy Valley Road on the south, 51st Avenue on the east, and the Aqua Fria River on the west.

Watercourse	Tributaries
T4N-R1E-S07	T4N-R1E-S04 T5N-R1E-S33
T5N-R1E-S35	None
T4N-R1E-S02W	T5N-R1E-S36
T4N-R1E-S02E	None

Locations of the watercourses are shown in **Figure ZA-1**. Watersheds of these watercourses are mostly natural desert land. Wash T4N-R1E-S02E crosses a portion of the Terramar development currently under construction. Floodplain analysis in this section was developed by Coe and Van Loo Consultants Inc., and has been incorporated into this study.



Legend

-  Existing Floodway
-  Existing Floodplain
-  100 Year Approximated Floodplain Identified in this Study
-  Street Centerlines
-  Wash Names

Figure ZA-1
 Glendale/Peoria ADMP Update
 Zone A Floodplain Delineation
 Vicinity Map



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AMERICAN

SECTION ZA-2: ADWR/FEMA FORMS

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

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

1. REQUESTED RESPONSE FROM FEMA

This request is for a:

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

2. OVERVIEW

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

- Physical Change
- Improved Methodology/Data
- Floodway Revision

Other Describe: New flood insurance study

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

2. Flooding Source: Washes within the Glendale/Peoria drainage basin

3. Project Name/Identifier: Glendale/Peoria ADMP Update - Zone A floodplain delineation

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

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

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Ex: 480301	Katy, City	TX	480301	0005D	02/08/83
480287	Harris County	TX	48201C	0220G	09/28/90
040050	Peoria, City of	AZ	04013C	1160	04/15/88
040037	Maricopa County, Unincorporated Areas		04013C	1160	04/15/88
040037	Maricopa County, Unincorporated Areas		04013C	1180	09/29/89
040037	Peoria, City of	AZ	04013C	1180	09/29/89

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

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

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

4. ENCROACHMENT INFORMATION

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

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

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

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

5. MAINTENANCE RESPONSIBILITY

The community is willing to assume responsibility for performing overseeing compliance with the maintenance and operation plans of the _____
 (Name)

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

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

6. REVIEW FEE

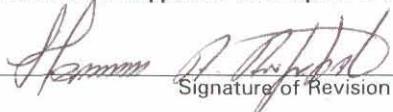
The review fee for the appropriate request category has been included. Yes No Fee amount: \$ _____
OR

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

Please see Instructions for Fee Amounts

7. SIGNATURE

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

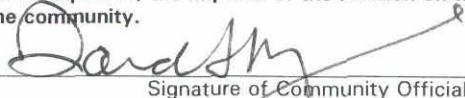

 Signature of Revision Requester

Hernan A. Aristizabal P.E. Project Manager
 Printed Name and Title of Revision Requester

Entellus, Inc.
 Company Name

Telephone No.: (602) 244-2566 Date: Jan 22, 2001

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


 Signature of Community Official

Dave Moody, City Engineer
 Printed Name and Title of Community Official

Peoria, City of
 Community Name

Telephone No.: (623) 773-7212 Date: Feb 23, 2001

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

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


 Signature

Hernan A. Aristizabal P.E. Project Manager
 Printed Name and Title of Revision Requester

Registr No. 29737 Expires (Date) _____ State AZ

Type of License/Expertise: Registered Professional Engineer (Civil)

Check which forms have been included with this request

Form Name and (Number)	Required if
<input checked="" type="checkbox"/> Hydrologic (3)	new or revised discharges
<input checked="" type="checkbox"/> Hydraulic (4)	new or revised water-surface elevations
<input checked="" type="checkbox"/> Mapping (5)	floodplain/floodway changes
<input type="checkbox"/> Channelization (6)	channel is modified
<input type="checkbox"/> Bridge/Culvert (7)	addition/revision of bridge/culvert
<input type="checkbox"/> Levee/Floodwall (8)	addition/revision of levee/floodwall
<input type="checkbox"/> Coastal (9)	new or revised coastal elevations
<input type="checkbox"/> Coastal Structures (10)	addition/revision of coastal structure
<input type="checkbox"/> Dam (11)	addition/revision of dam
<input type="checkbox"/> Alluvial Fan (12)	structures proposed on alluvial fan

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

Note: Fill out one form for each flooding source studied

Community Name: Peoria, City of

Flooding Source: Wash T5N-R1E-S35

Project Name/Identifier: Glendale/Peoria ADMP Update - Zone A Floodplain Delineation

1. REASON FOR NEW HYDROLOGIC ANALYSIS

- No existing analysis Improved data Changed physical condition of watershed
 Alternative methodology Proposed Conditions (CLOMR) Other

For the reason stated above, please attach a detailed explanation. If a computer program/model was used in revising the hydrologic analysis, please provide a diskette with the input files for the same flood recurrence intervals contained in the FIS for that stream; and at least for the 1% annual chance (base) flood where no detailed study exists.

Explanation provided: Yes No Diskettes provided: Yes No

2. METHODOLOGY FOR NEW ANALYSIS

Indicate Method	Required Data	Data Included
<input type="checkbox"/> Statistical Analysis of Gage Records	Form 3 - Attachment A	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input type="checkbox"/> Regional Regression Equations	Form 3 - Attachment C	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input type="checkbox"/> Precipitation/Runoff Model	Form 3 - Attachment D	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input checked="" type="checkbox"/> Other	Back-up computations and supporting data	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

3. APPROVAL OF ANALYSIS

The hydrologic analysis has already been approved by a local, state, or Federal Agency. Yes No Not Required

If Yes, attach evidence of approval. Approval attached. If No, attach explanation. Explanation attached.

4. COMPARISON OF BASE FLOOD DISCHARGES

Location:	Drainage Area (SqMi)	FIS(cfs)	Revised (cfs)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

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

If only a portion of a detailed study area was revised please attach an explanation describing the transition from the proposed discharges to the effective discharges. Explanation Included Explanation Not Required

5. HISTORICAL FLOODING INFORMATION

If historical data are available for the flooding source please provide: Location, peak discharges/water-surface elevations and dates, and source of information. Data Attached Data Not Available

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

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Note: Fill out one form for each flooding source studied

Community Name: Peoria, City of

Flooding Source: Wash T5N-R1E-S36

Project Name/Identifier: Glendale/Peoria ADMP Update - Zone A Floodplain Delineation

1. REASON FOR NEW HYDROLOGIC ANALYSIS

- No existing analysis Improved data Changed physical condition of watershed
 Alternative methodology Proposed Conditions (CLOMR) Other

For the reason stated above, please attach a detailed explanation. If a computer program/model was used in revising the hydrologic analysis, please provide a diskette with the input files for the same flood recurrence intervals contained in the FIS for that stream; and at least for the 1% annual chance (base) flood where no detailed study exists.

Explanation provided: Yes No Diskettes provided: Yes No

2. METHODOLOGY FOR NEW ANALYSIS

Indicate Method	Required Data	Data Included
<input type="checkbox"/> Statistical Analysis of Gage Records	Form 3 - Attachment A	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input type="checkbox"/> Regional Regression Equations	Form 3 - Attachment C	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input type="checkbox"/> Precipitation/Runoff Model	Form 3 - Attachment D	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input checked="" type="checkbox"/> Other	Back-up computations and supporting data	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

3. APPROVAL OF ANALYSIS

The hydrologic analysis has already been approved by a local, state, or Federal Agency. Yes No Not Required

If Yes, attach evidence of approval. Approval attached. If No, attach explanation. Explanation attached.

4. COMPARISON OF BASE FLOOD DISCHARGES

Location:	Drainage Area (SqMi)	FIS(cfs)	Revised (cfs)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

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

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5. HISTORICAL FLOODING INFORMATION

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Note: Fill out one form for each flooding source studied

Community Name: Peoria, City of

Flooding Source: Wash T4N-R1E-S02W

Project Name/Identifier: Glendale/Peoria ADMP Update - Zone A Floodplain Delineation

1. REASON FOR NEW HYDROLOGIC ANALYSIS

- No existing analysis Improved data Changed physical condition of watershed
 Alternative methodology Proposed Conditions (CLOMR) Other

For the reason stated above, please attach a detailed explanation. If a computer program/model was used in revising the hydrologic analysis, please provide a diskette with the input files for the same flood recurrence intervals contained in the FIS for that stream; and at least for the 1% annual chance (base) flood where no detailed study exists.

Explanation provided: Yes No Diskettes provided: Yes No

2. METHODOLOGY FOR NEW ANALYSIS

Indicate Method	Required Data	Data Included
<input type="checkbox"/> Statistical Analysis of Gage Records	Form 3 - Attachment A	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input type="checkbox"/> Regional Regression Equations	Form 3 - Attachment C	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input type="checkbox"/> Precipitation/Runoff Model	Form 3 - Attachment D	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input checked="" type="checkbox"/> Other	Back-up computations and supporting data	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

3. APPROVAL OF ANALYSIS

The hydrologic analysis has already been approved by a local, state, or Federal Agency. Yes No Not Required

If Yes, attach evidence of approval. Approval attached. If No, attach explanation. Explanation attached.

4. COMPARISON OF BASE FLOOD DISCHARGES

Location:	Drainage Area (SqMi)	FIS(cfs)	Revised (cfs)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

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

If only a portion of a detailed study area was revised please attach an explanation describing the transition from the proposed discharges to the effective discharges. Explanation Included Explanation Not Required

5. HISTORICAL FLOODING INFORMATION

If historical data are available for the flooding source please provide: Location, peak discharges/water-surface elevations and dates, and source of information. Data Attached Data Not Available

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Note: Fill out one form for each flooding source studied

Community Name: Peoria, City of

Flooding Source: Wash T4N-R1E-S02E

Project Name/Identifier: Glendale/Peoria ADMP Update - Zone A Floodplain Delineation

1. REASON FOR NEW HYDROLOGIC ANALYSIS

- No existing analysis Improved data Changed physical condition of watershed
 Alternative methodology Proposed Conditions (CLOMR) Other

For the reason stated above, please attach a detailed explanation. If a computer program/model was used in revising the hydrologic analysis, please provide a diskette with the input files for the same flood recurrence intervals contained in the FIS for that stream; and at least for the 1% annual chance (base) flood where no detailed study exists.

Explanation provided: Yes No Diskettes provided: Yes No

2. METHODOLOGY FOR NEW ANALYSIS

Indicate Method	Required Data	Data Included
<input type="checkbox"/> Statistical Analysis of Gage Records	Form 3 - Attachment A	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input type="checkbox"/> Regional Regression Equations	Form 3 - Attachment C	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input type="checkbox"/> Precipitation/Runoff Model	Form 3 - Attachment D	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input checked="" type="checkbox"/> Other	Back-up computations and supporting data	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

3. APPROVAL OF ANALYSIS

The hydrologic analysis has already been approved by a local, state, or Federal Agency. Yes No Not Required

If Yes, attach evidence of approval. Approval attached. If No, attach explanation. Explanation attached.

4. COMPARISON OF BASE FLOOD DISCHARGES

Location:	Drainage Area (SqMi)	FIS(cfs)	Revised (cfs)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

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

If only a portion of a detailed study area was revised please attach an explanation describing the transition from the proposed discharges to the effective discharges. Explanation Included Explanation Not Required

5. HISTORICAL FLOODING INFORMATION

If historical data are available for the flooding source please provide: Location, peak discharges/water-surface elevation, dates, and source of information. Data Attached Data Not Available

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Note: Fill out one form for each flooding source studied

Community Name: Peoria, City of and Maricopa County Unincorporated Area

Flooding Source: Wash T4N-R1E-S07

Project Name/Identifier: Glendale/Peoria ADMP Update - Zone A Floodplain Delineation

1. REASON FOR NEW HYDROLOGIC ANALYSIS

- No existing analysis Improved data Changed physical condition of watershed
 Alternative methodology Proposed Conditions (CLOMR) Other

For the reason stated above, please attach a detailed explanation. If a computer program/model was used in revising the hydrologic analysis, please provide a diskette with the input files for the same flood recurrence intervals contained in the FIS for that stream; and at least for the 1% annual chance (base) flood where no detailed study exists.

Explanation provided: Yes No Diskettes provided: Yes No

2. METHODOLOGY FOR NEW ANALYSIS

Indicate Method	Required Data	Data Included
<input type="checkbox"/> Statistical Analysis of Gage Records	Form 3 - Attachment A	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input type="checkbox"/> Regional Regression Equations	Form 3 - Attachment C	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input type="checkbox"/> Precipitation/Runoff Model	Form 3 - Attachment D	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input checked="" type="checkbox"/> Other	Back-up computations and supporting data	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

3. APPROVAL OF ANALYSIS

The hydrologic analysis has already been approved by a local, state, or Federal Agency. Yes No Not Required

If Yes, attach evidence of approval. Approval attached. If No, attach explanation. Explanation attached.

4. COMPARISON OF BASE FLOOD DISCHARGES

Location:	Drainage Area (SqMi)	FIS(cfs)	Revised (cfs)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

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

If only a portion of a detailed study area was revised please attach an explanation describing the transition from the proposed discharges to the effective discharges. Explanation Included Explanation Not Required

5. HISTORICAL FLOODING INFORMATION

If historical data are available for the flooding source please provide: Location, peak discharges/water-surface elevations and dates, and source of information. Data Attached Data Not Available

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 3.67 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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

Note: Fill out one form for each flooding source studied

Community Name: Peoria, City of

Flooding Source: Wash T4N-R1E-S04

Project Name/Identifier: Glendale/Peoria ADMP Update - Zone A Floodplain Delineation

1. REASON FOR NEW HYDROLOGIC ANALYSIS

- No existing analysis Improved data Changed physical condition of watershed
 Alternative methodology Proposed Conditions (CLOMR) Other

For the reason stated above, please attach a detailed explanation. If a computer program/model was used in revising the hydrologic analysis, please provide a diskette with the input files for the same flood recurrence intervals contained in the FIS for that stream; and at least for the 1% annual chance (base) flood where no detailed study exists.

Explanation provided: Yes No Diskettes provided: Yes No

2. METHODOLOGY FOR NEW ANALYSIS

Indicate Method	Required Data	Data Included
<input type="checkbox"/> Statistical Analysis of Gage Records	Form 3 - Attachment A	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input type="checkbox"/> Regional Regression Equations	Form 3 - Attachment C	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input type="checkbox"/> Precipitation/Runoff Model	Form 3 - Attachment D	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input checked="" type="checkbox"/> Other	Back-up computations and supporting data	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

3. APPROVAL OF ANALYSIS

The hydrologic analysis has already been approved by a local, state, or Federal Agency. Yes No Not Required

If Yes, attach evidence of approval. Approval attached. If No, attach explanation. Explanation attached.

4. COMPARISON OF BASE FLOOD DISCHARGES

Location:	Drainage Area (SqMi)	FIS(cfs)	Revised (cfs)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

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

If only a portion of a detailed study area was revised please attach an explanation describing the transition from the proposed discharges to the effective discharges. Explanation Included Explanation Not Required

5. HISTORICAL FLOODING INFORMATION

If historical data are available for the flooding source please provide: Location, peak discharges/water-surface elevations and dates, and source of information. Data Attached Data Not Available

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average **3.67** hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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Note: Fill out one form for each flooding source studied

Community Name: Peoria, City of

Flooding Source: Wash T5N-R1E-S33

Project Name/Identifier: Glendale/Peoria ADMP Update - Zone A Floodplain Delineation

1. REASON FOR NEW HYDROLOGIC ANALYSIS

- No existing analysis Improved data Changed physical condition of watershed
 Alternative methodology Proposed Conditions (CLOMR) Other

For the reason stated above, please attach a detailed explanation. If a computer program/model was used in revising the hydrologic analysis, please provide a diskette with the input files for the same flood recurrence intervals contained in the FIS for that stream; and at least for the 1% annual chance (base) flood where no detailed study exists.

Explanation provided: Yes No Diskettes provided: Yes No

2. METHODOLOGY FOR NEW ANALYSIS

Indicate Method	Required Data	Data Included
<input type="checkbox"/> Statistical Analysis of Gage Records	Form 3 - Attachment A	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input type="checkbox"/> Regional Regression Equations	Form 3 - Attachment C	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input type="checkbox"/> Precipitation/Runoff Model	Form 3 - Attachment D	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<input checked="" type="checkbox"/> Other	Back-up computations and supporting data	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

3. APPROVAL OF ANALYSIS

The hydrologic analysis has already been approved by a local, state, or Federal Agency. Yes No Not Required

If Yes, attach evidence of approval. Approval attached. If No, attach explanation. Explanation attached.

4. COMPARISON OF BASE FLOOD DISCHARGES

Location:	Drainage Area (SqMi)	FIS(cfs)	Revised (cfs)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

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

If only a portion of a detailed study area was revised please attach an explanation describing the transition from the proposed discharges to the effective discharges. Explanation Included Explanation Not Required

5. HISTORICAL FLOODING INFORMATION

If historical data are available for the flooding source please provide: Location, peak discharges/water-surface elevations and dates, and source of information. Data Attached Data Not Available

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

PUBLIC BURDEN DISCLOSURE NOTICE

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

Note: Fill out one form for each flooding source studied

Community Name: Peoria, City of

Flooding Source: Wash T5N-R1E-S35

Project Name/Identifier: Glendale/Peoria ADMP Update - Zone A floodplain delineation

1. REACH TO BE REVISED

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

Downstream Limit: New River Confluence, 1/4 Mile North of Jomax Rd.

Upstream Limit: 1/2 Mile North of Jomax Rd., and 74th Ave. Alignment

2. MODELS SUBMITTED

Requirements: for areas which have detailed flooding:

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

for areas which do not have detailed flooding:

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

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

1. Duplicate Effective Model Natural File Name _____ Floodway File Name _____

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

2. Corrected Effective Model Natural File Name _____ Floodway File Name _____

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

3. Existing or Pre-Project Conditions Model Natural File Name _____ Floodway File Name _____

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

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

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

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

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. STARTING WATER-SURFACE ELEVATIONS

Explain how they were determined.

Explanation Attached?

Yes

No

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

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

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

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

Explanation attached with Form

Explanation provided on attached printout

If Hydraulic model used is HEC-2, has it been checked with FEMA'S CHECK-2 computer program? Yes

No

(see instructions for information on how to obtain CHECK-2)

5. REVISED FIRM/FBFM AND FLOOD PROFILES

1. Profile Transition

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

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

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

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

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

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

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

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

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

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

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

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

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

Floodway Data Table

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

Floodway Data Table Attached Yes

Not Required

PUBLIC BURDEN DISCLOSURE NOTICE

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Note: Fill out one form for each flooding source studied

Community Name: Peoria, City of

Flooding Source: Wash T5N-R1E-S36

Project Name/Identifier: Glendale/Peoria ADMP Update - Zone A floodplain delineation

1. REACH TO BE REVISED

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

Downstream Limit: Confluence With Wash T4N-R1E-S02W at 74th Ave. Alignment

Upstream Limit: Split Flow From Wash T5N-R1E-S35 at 1/2 Mile North of Jomax Rd.

2. MODELS SUBMITTED

Requirements: for areas which have detailed flooding:

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

for areas which do not have detailed flooding:

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

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

1. Duplicate Effective Model Natural File Name _____ Floodway File Name _____

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

2. Corrected Effective Model Natural File Name _____ Floodway File Name _____

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

3. Existing or Pre-Project Conditions Model Natural File Name _____ Floodway File Name _____

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

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

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

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

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. STARTING WATER-SURFACE ELEVATIONS

Explain how they were determined.

Explanation Attached?

Yes

No

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

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

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

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

Explanation attached with Form

Explanation provided on attached printout

If Hydraulic model used is HEC-2, has it been checked with FEMA'S CHECK-2 computer program? Yes

No

(see instructions for information on how to obtain CHECK-2)

5. REVISED FIRM/FBFM AND FLOOD PROFILES

1. Profile Transition

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

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

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

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

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

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

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

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

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

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

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

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

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

Floodway Data Table

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

Floodway Data Table Attached Yes

Not Required

PUBLIC BURDEN DISCLOSURE NOTICE

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Note: Fill out one form for each flooding source studied

Community Name: Peoria, City of

Flooding Source: Wash T4N-R1E-S02W

Project Name/Identifier: Glendale/Peoria ADMP Update - Zone A floodplain delineation

1. REACH TO BE REVISED

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

Downstream Limit: New River Confluence at 74th Ave. Alignment and Jomax Rd.

Upstream Limit: 1/4 Mile South of Dynamite Rd., and 1/2 Mile West of the 67th Ave. Alignment

2. MODELS SUBMITTED

Requirements: for areas which have detailed flooding:

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

for areas which do not have detailed flooding:

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

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

1. Duplicate Effective Model Natural File Name _____ Floodway File Name _____

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

2. Corrected Effective Model Natural File Name _____ Floodway File Name _____

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

3. Existing or Pre-Project Conditions Model Natural File Name _____ Floodway File Name _____

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

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

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

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

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. STARTING WATER-SURFACE ELEVATIONS

Explain how they were determined.

Explanation Attached?

Yes

No

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

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

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

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

Explanation attached with Form

Explanation provided on attached printout

If Hydraulic model used is HEC-2, has it been checked with FEMA'S CHECK-2 computer program? Yes

No

(see instructions for information on how to obtain CHECK-2)

5. REVISED FIRM/FBFM AND FLOOD PROFILES

1. Profile Transition

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

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

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

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

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

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

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

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

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

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

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

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

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

Floodway Data Table

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

Floodway Data Table Attached Yes

Not Required

PUBLIC BURDEN DISCLOSURE NOTICE

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

Note: Fill out one form for each flooding source studied

Community Name: Peoria, City of

Flooding Source: Wash T4N-R1E-S02E

Project Name/Identifier: Glendale/Peoria ADMP Update - Zone A floodplain delineation

1. REACH TO BE REVISED

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

Downstream Limit: New River Confluence at 1/4 Mile South of Jomax Rd.

Upstream Limit: 1/2 Mile North of Jomax Rd., and 1/2 Mile West of 67th Ave. Alignment

2. MODELS SUBMITTED

Requirements: for areas which have detailed flooding:

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

for areas which do not have detailed flooding:

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

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

1. Duplicate Effective Model Natural File Name _____ Floodway File Name _____

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

2. Corrected Effective Model Natural File Name _____ Floodway File Name _____

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

3. Existing or Pre-Project Conditions Model Natural File Name _____ Floodway File Name _____

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

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

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

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

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. STARTING WATER-SURFACE ELEVATIONS

Explain how they were determined.

Explanation Attached?

Yes

No

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

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

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

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

Explanation attached with Form

Explanation provided on attached printout

If Hydraulic model used is HEC-2, has it been checked with FEMA'S CHECK-2 computer program?
(see instructions for information on how to obtain CHECK-2)

Yes

No

5. REVISED FIRM/FBFM AND FLOOD PROFILES

1. Profile Transition

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

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

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

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

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

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

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

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

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

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

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

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

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

Floodway Data Table

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

Floodway Data Table Attached Yes

Not Required

PUBLIC BURDEN DISCLOSURE NOTICE

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

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

Note: Fill out one form for each flooding source studied

Community Name: Peoria, City of and Maricopa County Unincorporated Area

Flooding Source: Wash T4N-R1E-S07

Project Name/Identifier: Glendale/Peoria ADMP Update - Zone A floodplain delineation

1. REACH TO BE REVISED

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

Downstream Limit: Aqua Fria River Confluence at Happy Valley Rd., and 107th Ave.

Upstream Limit: 1/5 Mile South of Dynamite Rd., and 1/5 Mile West of 91st Ave. Alignment

2. MODELS SUBMITTED

Requirements: for areas which have detailed flooding:

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

for areas which do not have detailed flooding:

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

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

1. Duplicate Effective Model Natural File Name _____ Floodway File Name _____

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

2. Corrected Effective Model Natural File Name _____ Floodway File Name _____

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

3. Existing or Pre-Project Conditions Model Natural File Name _____ Floodway File Name _____

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

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

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

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

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. STARTING WATER-SURFACE ELEVATIONS

Explain how they were determined.

Explanation Attached?

Yes

No

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

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

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

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

Explanation attached with Form

Explanation provided on attached printout

If Hydraulic model used is HEC-2, has it been checked with FEMA'S CHECK-2 computer program? Yes

No

(see instructions for information on how to obtain CHECK-2)

5. REVISED FIRM/FBFM AND FLOOD PROFILES

1. Profile Transition

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

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

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

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

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

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

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

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

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

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

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

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

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

Floodway Data Table

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

Floodway Data Table Attached Yes Not Required

PUBLIC BURDEN DISCLOSURE NOTICE

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

Note: Fill out one form for each flooding source studied

Community Name: Peoria, City of and Maricopa County Unincorporated Area

Flooding Source: Wash T4N-R1E-S04

Project Name/Identifier: Glendale/Peoria ADMP Update - Zone A floodplain delineation

1. REACH TO BE REVISED

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

Downstream Limit: Confluence With Wash T4N-R1E-S07 :3/8 Mile North of Happy Valley Rd., and 1/4 Mile East of Lake Pleasant Rd.

Upstream Limit: 1/2 Mile North of Happy Valley Rd., and 1/2 Mile East of Lake Pleasant Rd.

2. MODELS SUBMITTED

Requirements: for areas which have detailed flooding:

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

for areas which do not have detailed flooding:

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

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

1. Duplicate Effective Model Natural File Name _____ Floodway File Name _____

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

2. Corrected Effective Model Natural File Name _____ Floodway File Name _____

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

3. Existing or Pre-Project Conditions Model Natural File Name _____ Floodway File Name _____

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

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

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

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

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. STARTING WATER-SURFACE ELEVATIONS

Explain how they were determined.

Explanation Attached?

Yes

No

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

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

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

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

Explanation attached with Form

Explanation provided on attached printout

If Hydraulic model used is HEC-2, has it been checked with FEMA'S CHECK-2 computer program? Yes

No

(see instructions for information on how to obtain CHECK-2)

5. REVISED FIRM/FBFM AND FLOOD PROFILES

1. Profile Transition

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

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

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

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

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

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

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

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

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

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

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

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

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

Floodway Data Table

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

Floodway Data Table Attached Yes

Not Required

PUBLIC BURDEN DISCLOSURE NOTICE

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

Note: Fill out one form for each flooding source studied

Community Name: Peoria, City of

Flooding Source: Wash T5N-R1E-S33

Project Name/Identifier: Glendale/Peoria ADMP Update - Zone A floodplain delineation

1. REACH TO BE REVISED

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

Downstream Limit: Confluence With Wash T4N-R1E-S07 at 1/4 Mile North of Jomax Rd., and 1/4 Mile East of Lake Pleasant Rd.

Upstream Limit: 1/2 Mile North of Jomax Rd., and 1/4 Mile East of the 91st Ave. Alignment

2. MODELS SUBMITTED

Requirements: for areas which have detailed flooding:

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

for areas which do not have detailed flooding:

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

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

1. Duplicate Effective Model Natural File Name _____ Floodway File Name _____

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

2. Corrected Effective Model Natural File Name _____ Floodway File Name _____

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

3. Existing or Pre-Project Conditions Model Natural File Name _____ Floodway File Name _____

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

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

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

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

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. STARTING WATER-SURFACE ELEVATIONS

Explain how they were determined.

Explanation Attached?

Yes

No

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

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

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

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

Explanation attached with Form

Explanation provided on attached printout

If Hydraulic model used is HEC-2, has it been checked with FEMA'S CHECK-2 computer program? Yes

No

(see instructions for information on how to obtain CHECK-2)

5. REVISED FIRM/FBFM AND FLOOD PROFILES

1. Profile Transition

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

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

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

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

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

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

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

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

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

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

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

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

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

Floodway Data Table

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

Floodway Data Table Attached Yes

Not Required

PUBLIC BURDEN DISCLOSURE NOTICE

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

Community Name: City of Peoria

Flooding Source: Wash T4N-R1E-S02E

Project Name/Identifier: Glendale/ Peoria ADMP Update - Zone A Floodplain Delineation

1. IDENTIFIER

1. Name of structure (roadway, railroad, etc.): Culvert / Roadway
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):
1/4 mile northeast from downstream limit, between cross sections 10 and 30 (20 was omitted)

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

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

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

Culvert Master V1.0

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

Justification attached Yes No N/A

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. DRAWING CHECKLIST

Attach plans of the structure(s) certified by a registered professional engineer. The plan detail and information should include the following (check the boxes if the information has been provided):

- Dimensions (height, width, span, radius, length)
- Shape (culverts only)
- Material
- Beveling or Rounding
- Wing Wall Angle
- 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
- Skew Angle
- Cross-Section Locations
- Distances Between Cross Sections
- Erosion Protection

3. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information (Check the box if provided):

- Estimated sediment load
- Method used to estimate sediment transport
- Method used to estimate scour and/or deposition
- Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

 AVERY

SECTION ZA-3: MAPPING AND SURVEY INFORMATION

3.1 Field Survey Information

Field surveys were conducted in order to supplement aerial topographic mapping, establish Elevation Reference Markers (ERM's), and to verify the project's topographic mapping. Field survey results are documented in **Appendix C**.

3.2 Mapping

3.2.1 Watershed Map

The watershed boundaries and hydrologic parameters were obtained primarily from the 200 scale, two (2)-foot contour mapping generated as part of the *Arizona Canal Diversion Channel Area Drainage Master Plan (ACDC ADMP)* prepared by Kaminski-Hubbard for the District (**Reference 1**). This mapping covers most of the study area. However, the western and northern portions of the study were not covered. For these areas, USGS 7.5 minutes quadrangle maps (**Reference 2**) and mapping developed for the Agua Fria River Corridor (**Reference 3**) were used for developing the hydrology parameters.

3.2.2 Soils Map

Electronic soils maps were obtained from the District's GIS department. This mapping is a digital version of the NRCS (formerly SCS) *Soil Survey of Aguila-Carefree Area, Parts of Maricopa and Pinal Counties, Arizona* (**Reference 7**) and *Soil Survey of Central Maricopa County, Arizona* (**Reference 8**).

3.2.3 Land Use Map

The existing land use mapping was obtained from 1999 aerial photos provided by the District (**Reference 6**) and *The Aerial Photo Book – The Real Estate Atlas – Phoenix, First Quarter 1999* (**Reference 5**).

3.2.4 Floodplain Maps

In general, the same maps used to develop the hydrology were used to delineate the floodplain. Exceptions are the areas that were included as part of the Glendale Peoria Area Drainage Master Plan New Mapping (**Reference 4**). Furthermore, some areas required more detailed topographic information of man made channels and hydraulic structures. Floodplain mapping was also provided by Coe and Van Loo Consultants Inc., for the south reach of Wash T4N-R1E-S02E (**Reference 20**).



SECTION ZA-4: HYDROLOGY

4.1 Method Description

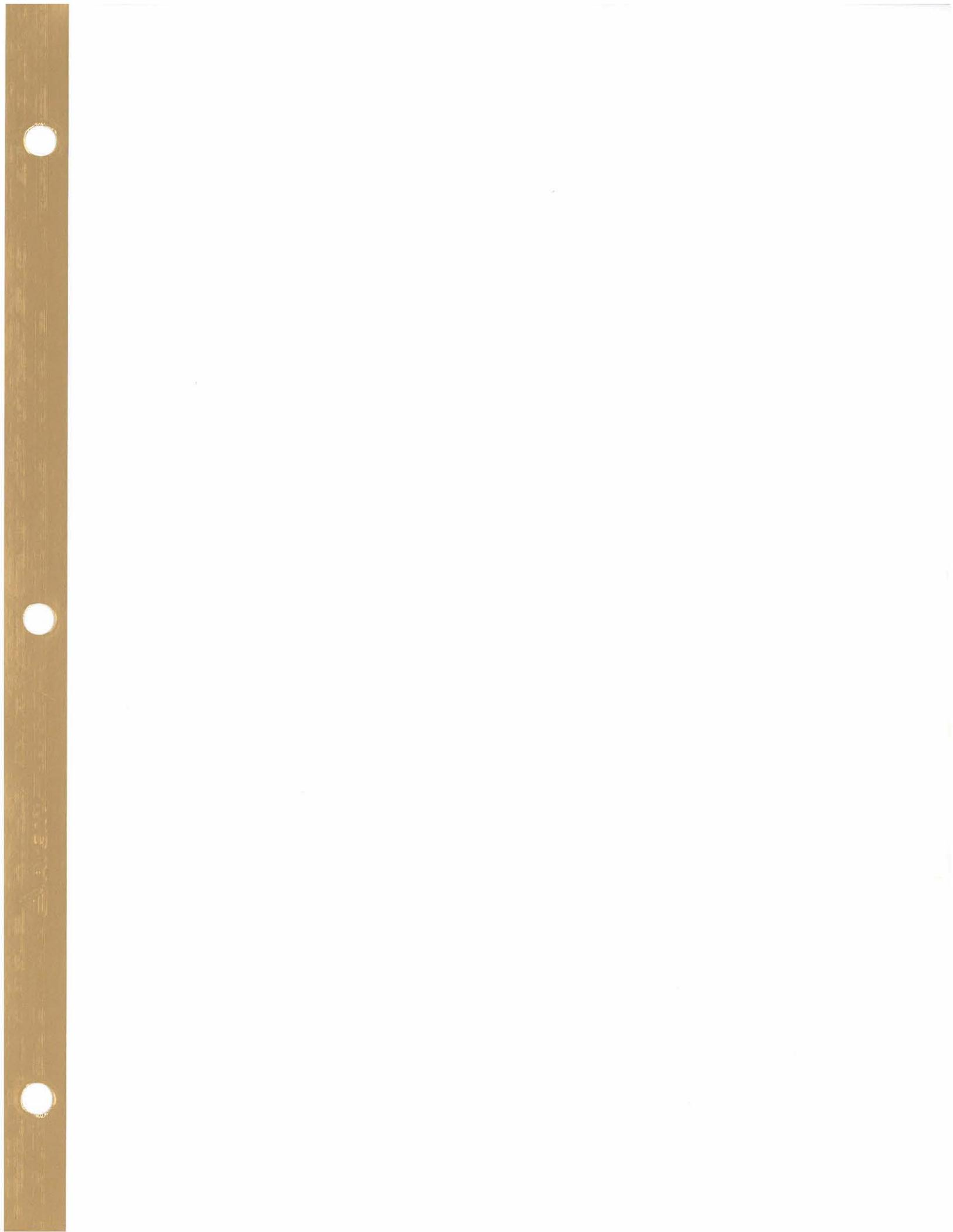
The peak flows in this study area were obtained through precipitation/runoff modeling. The hydrologic modeling was performed by means of the 1991 version of the HEC-1 computer program as developed by the U.S. Army Corps of Engineers (**Reference 9**). In some of the model development, the HEC-DSS utility was used to integrate existing HEC-1 model data into the modeling that was developed for this study. The models were developed using Green and Ampt methodology to estimate the rainfall losses. Excess rainfall was then routed to the concentration points using the Clark Unit Hydrograph. The estimation procedures for model parameters and components were based on the *Drainage Design Manual for Maricopa County – Volume 1 – Hydrology* (**Reference 10**).

A duration of six hours was used as the base model for this study, because it produced higher peak flows than the 24-hour storm. However, the 24-hour storm was used to analyze storage requirements. Flow through regional detention basins was modeled using the level-pool reservoir routing method. The normal depth routing method was predominantly utilized for routing hydrographs from one concentration point to the next.

Detailed discussions on parameter estimation and problems encountered during the study are presented in *Glendale Peoria Area Drainage Master Plan Update- Hydrology- Volume HY* (hereinafter referred to as The Hydrology Report).

The estimated 100-year peak discharges that are relevant to this Zone A floodplain delineation are summarized in **Table ZA 7-1** and detailed in **Appendix D.6**. In many cases the original hydrology routing schematic from The Hydrology Report did not allow for the flows at important wash concentration points to be obtained directly. In

order to obtain the desired flows, minor modifications were made. These modifications are presented in **Appendix D.6**.



SECTION ZA-5: HYDRAULICS

5.1 Method Description

The floodplain limits were estimated using approximate methods. Cross-sections were obtained using Boss RMS software (**Reference 11**). Using these cross-sections along with the general slope of the wash and estimated n-values, a normal depth was calculated using Manning's formula. The resulting water surface elevation was then inputted into RMS as a known water surface. The inundation limits were plotted automatically by RMS and adjusted manually in areas where RMS had problems.

5.2 Work Study Maps

The work study maps consisted of grids generated using Eagle Point TINS. These tins were obtained using topographic data obtained from the ACDC ADMP (**Reference 1**), Glendale Peoria ADMP Update Mapping (**Reference 6**), USGS 7.5 Minute Quadrangles (**Reference 2**) and 1999 Aerial Photographs (**Reference 5**).

5.3 Parameter Estimation

5.3.1 Roughness Coefficient

The roughness coefficients were estimated from field observations and using the methodology described in *Manning's Roughness Coefficient for Stream Channels and Flood Plains in Arizona* (**Reference 13**). Detailed location information and field photographs are included in **Appendix E.1**.

5.3.2 Expansion and Contraction Coefficients

Since this is an approximate method study using normal depth calculations, the use of expansion and contraction coefficients is not required.

5.3.3 Riverine Stations

Riverine stations were not developed for this approximate method study. Since there is no base flood elevations associated with the approximate method, this stationing is not required.

5.4 Cross Section Description

Cross-sections for this study were obtained from the project's work map. Plots of the cross-sections used for the hydraulic analysis are included in **Appendix E.2**.

5.5 Modeling Considerations

5.5.1 Hydraulic Jumps and Drop Analysis

No obvious hydraulic jumps or drops occur within the study area.

5.5.2 Bridges and Culverts

The only significant culvert within the study area is located in wash T4N-R1E-S02E. The analysis for this culvert was performed by Coe and Van Loo Consultants Inc. using Culvert Master (**Reference 19**) and is included in **Appendix E**.

5.5.3 Levees and Dikes

The only levees or dikes within the delineated area are non-engineered, and are expected to fail under the 100-year flooding conditions. Hence, the study has assumed that they have little or no effect on the floodplain limits.

5.5.4 Islands and Flow Splits

Approximate methodology is usually not detailed enough to accurately depict the effect of flow splits. However, where obvious splits occurred additional analysis was performed. The procedure is described in **Section 5.7**

5.5.5 Ineffective Flow Areas

After the preliminary flooding boundaries were plotted, the wash cross-sections were checked to insure that each reflected the actual flow area. Several cross-sections were modified to exclude tributaries and non-effective areas.

5.5.6 Supercritical Flow

All of the washes analyzed in this study appear to be in the sub-critical regime. However, the approximate methodology is not detailed enough to discern reaches of possible super-critical flow in all of the washes.

5.6 Floodway Modeling

Floodway modeling is not required under approximate methodology.

5.7 Problems Encountered During Modeling

5.7.1 Special Problems and Solutions

Some problems were encountered while generating the cross-sections and plotting the limits of inundation. The following paragraphs describe these problems and how they were solved.

5.7.1.1 Flow Splits

The topography of the study area is very flat and for this reason flow splits are very common. Most of the flow splits either merge with another wash or return to the original wash further downstream creating islands. Flow splits required the use of iterative methods to determine the flow in each branch. Flow splits were identified as situations in which the normal depth calculations showed that the water was not contained within the wash overbanks, and spilled into another area.

When this occurred, the water surface elevation of the normal depth for the original wash was calculated using the original full flow. Then a new cross section was created using only the ground geometry of the area that was to convey the overspilling, or split, flow. The normal depth in this new cross section was iterated using varying flow values, until the water surface elevation was equal to that of the original wash. The flow corresponding to this normal depth was assumed to be the split flow amount. This flow was conveyed downstream via a different route.

A flow split occurs in wash T5N-R1E-S35. This wash conveys the runoff from basins located near the east side of the New River Dam. Two flow splits actually occur in this wash. However, the flow split depicted on the delineation map, (see **Exhibit 4**), at Jomax road is not significant enough to warrant any additional analysis. This flow split was created by the roadside ditch constructed on the upstream edge of Jomax Rd. The ditch will carry flow up to its banks. Any additional flow would spill over the road, and flow back to the original wash. Therefore, the inundation limits were located at the banks.

The other flow split in Wash T5N-R1E-S35 was analyzed using the previously described iterative method. It had a noticeable effect on the flow in the downstream reaches of the washes. The banks of the wash are overtopped at cross section number 80. (see **Appendix E.2.**) The flow that spills out is then conveyed downstream in what appears to be an old wash bed. This wash was named T5N-R1E-S36, and ends up connecting into wash T4N-R1E-S02W. Hence, the original flow in wash T4N-R1E-S02W was increased by the flow conveyed in wash T5N-R1E-S36 (split flow from T5N-R1E-S35). Conversely, the original flow in wash T5N-R1E-S35 was decreased by the flow overspilling into wash T5N-R1E-S36.

5.7.1.2 Wash T4N-R1E-S02E and the Terramar Development

The southern reach of wash T4N-R1E-S02E passes through the Terramar development. This is a new development that was not included on the mapping that Entellus used for the floodplain delineation. However, a channel is currently in place through the development that is intended to carry the 100-year flow. The design of this channel was part of the Drainage and Infrastructure Design Report for the Terramar Development by Coe and Van Loo Consultants Inc. (**Reference 18**) It was decided that the proposed Zone A floodplain would consider the channel through the Terramar development. Coe and Van Loo was responsible for modifying the preliminary floodplain delineated by Entellus. Coe and Van Loo provided hydraulic calculations from the Jomax Road crossing to the southwest limit of the Terramar development. This analysis included the crossing of Jomax Road, which they analyzed using more detailed mapping and survey information than was previously available to Entellus. From their analysis, the portion of the road that is overtopped by the 100-year peak flow is much more narrow than previously assumed. These calculations have been included in **Appendix E**. Furthermore, Coe and Van Loo designed the existing channel through the Terramar development for a flow greater than the estimated 100-year flow. A copy of the HEC-2 model prepared by Coe and Van Loo is included in **Appendix E** as well. Coe and Van Loo adjusted the floodplain to show that Jomax Road tends to concentrate the flow at the location of a set of culverts on the northwest corner of the Terramar development (approximately the 75th Avenue alignment). The flow

then passes through the culverts and over a dip section in the road. Their analysis also shows that the 100-year flow is conveyed entirely within the channel through the Terramar Development.

5.7.2 Modeling Warning and Errors

This section does not apply to approximate methodology

5.8 Calibration

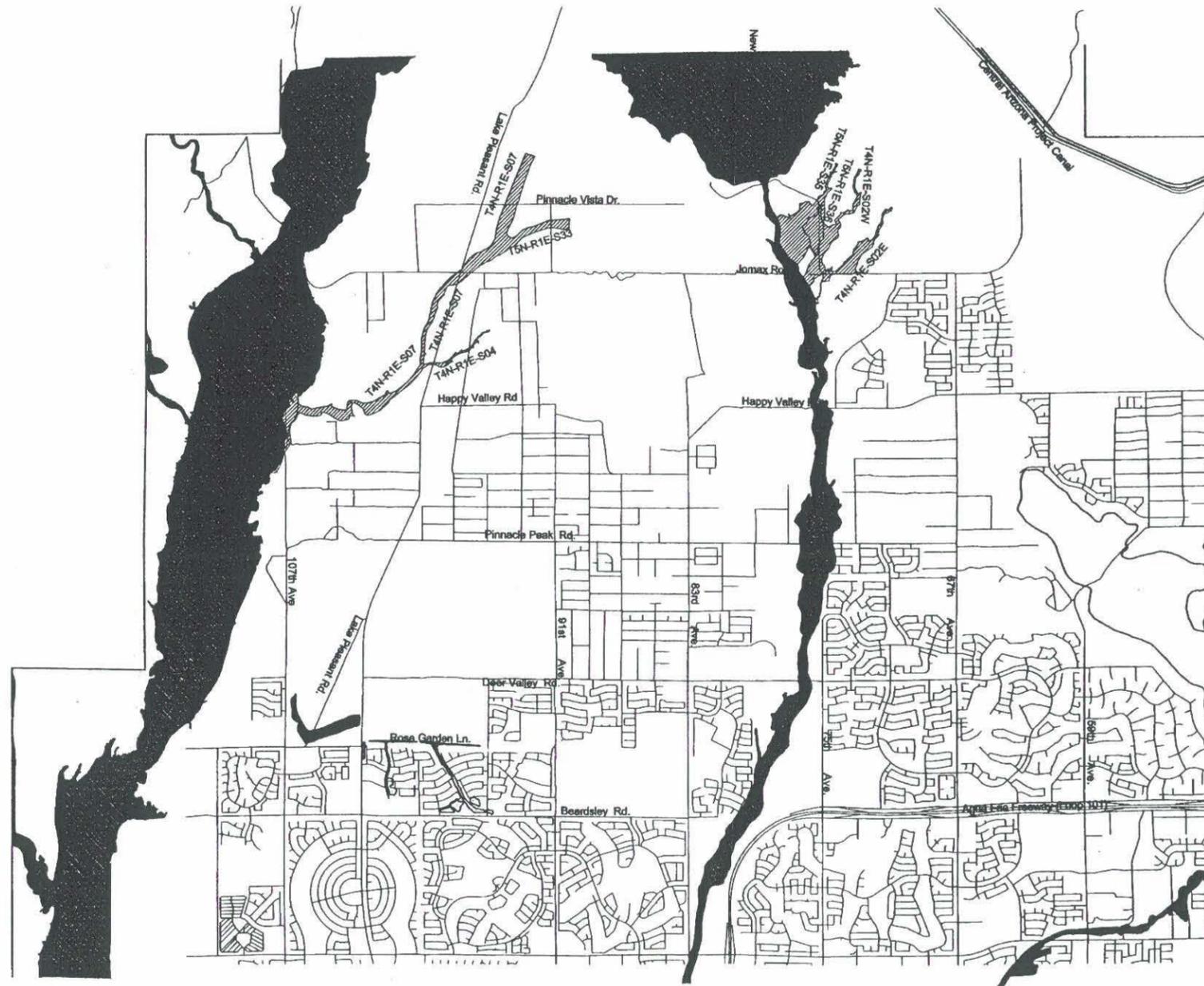
This section does not apply to approximate methodology

5.9 Final Results

5.9.1 Hydraulic Analysis Results

The results of the normal depth hydraulic analysis are included in **Appendix E.2.** and the flooding limits are shown in **Exhibits 1 through 6.** Full size exhibits are located in the pockets at the end of this volume and half sizes are at the end of this section. A digital copy of the exhibits and hydraulic calculations are also included on a CD on the back cover of this volume.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY GLENDALE PEORIA AREA DRAINAGE MASTER PLAN UPDATE ZONE A - FLOODPLAIN DELINEATION FEMA SUBMITTAL F.C.D. CONTRACT NO. 99-44



- Legend**
- Existing Floodzones
 - Existing Floodplain
 - 100 Year Approximate Floodplain Identified in this Study
 - Street Centerlines
 - Wash Names

Entellus			2256 N. 44th Street Suite 126 Phoenix, AZ 85008-2279 Tel 602.944.2666 Fax 602.944.8947 E-mail www.entellus.com
DESIGN	BY HAA	DATE 04/01	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.	SEK	04/01	
PLANS	GLT/JA	04/01	RECOMMENDED BY: _____ DATE _____
PLANS CHK.	HAA	04/01	APPROVED BY: _____ DATE _____
SUBMITTED BY: _____			CHIEF ENGINEER AND GENERAL MANAGER

**GLENDALE/PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION
F.C.D. CONTRACT NO. 99-44**

LEGEND

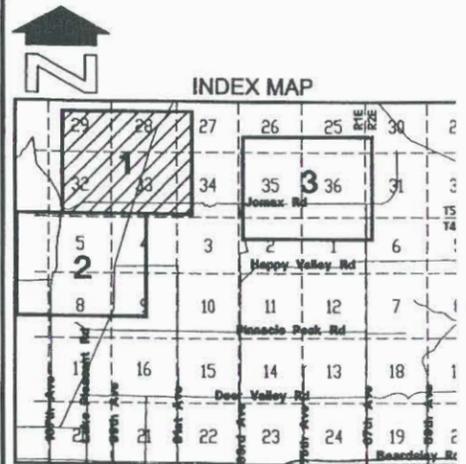
100-YR APPROXIMATE ZONE A FLOODPLAIN BOUNDARY	
HYDRAULIC BASE LINE	
CROSS SECTION	
ELEVATION REFERENCE MARK	
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	Corporate Limits
LIMIT OF STUDY	Limit of Study
LIMIT OF THIS STUDY	Limit of This Study
SECTION LINES	

SECTION CORNER	29 28 32 33
WASH I.D. LABEL	T4N-R1E-S07
EXISTING ZONE A	
EXISTING FLOOD PLAIN	
EXISTING FLOODWAY	
FLOW AT DOWNSTREAM CONC. POINT	Q ₁₀₀ = 850 cfs

ELEVATION REFERENCE MARKS
NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM 1929

I.D. NUMBER	ELEV. (FT)	DESCRIPTION/LOCATION
1	1396.80	FCDMC brass cap set in a ring of stones approx. 0.2 miles east of Lake Pleasant Road, 4 feet north of a 4-strand barbed wire fence.

NOTES
NGVD 29 + 1.85 FEET = NAVD 88



ACDC-ADMP CONTOUR INTERVAL = 2 FEET
USGS CONTOUR INTERVAL = 10 FEET

400' 0' 400'
SCALE: 1" = 400'

		2255 N. 44th Street Suite 125 Phoenix, AZ 85008-3279 Tel: 802-244-2598 Fax: 802-244-8047 E-mail: www.entellus.com	
DESIGN	BY HAA/JCS	DATE	04/2001
DESIGN CHK.	SEK	DATE	04/2001
PLANS	RCS/JCS	DATE	04/2001
PLANS CHK.	HAA	DATE	04/2001
SUBMITTED BY:		DATE:	
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY		RECOMMENDED BY:	DATE:
		APPROVED BY:	DATE:
		CHIEF ENGINEER AND GENERAL MANAGER	
		SHEET	1 OF 3



FILE: 3103100171\MapSheet_1.Dwg DATE: 01/26/01

Topographic Mapping: ACDC-ADMP Mapping with 2 ft. Contour Intervals or USGS 7.5 minute quadrangles with 10 ft. Contour Intervals

**GLENDALE/PEORIA AREA DRAINAGE
MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINATION
F.C.D. CONTRACT NO. 99-44**

LEGEND

100-YR APPROXIMATE ZONE A FLOODPLAIN BOUNDARY	
HYDRAULIC BASE LINE	
CROSS SECTION	
ELEVATION REFERENCE MARK	
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
LIMIT OF STUDY	
LIMIT OF THIS STUDY	
SECTION LINES	
SECTION CORNER	29 28 + 32 33
WASH I.D. LABEL	T4N-R1E-S07
EXISTING ZONE A	
EXISTING FLOOD PLAIN	
EXISTING FLOODWAY	
FLOW AT DOWNSTREAM CONC. POINT	Q ₁₀₀ = 850 cfs

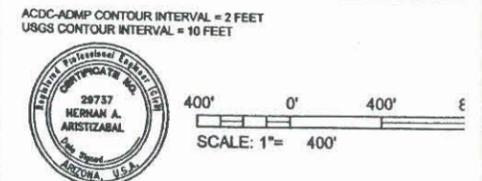
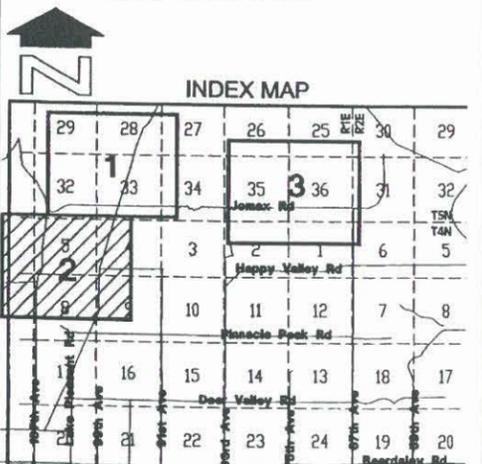
ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM 1929

I.D. NUMBER	ELEV. (FT)	DESCRIPTION/LOCATION
2	1332.49	FCDMC brass cap set in a ring of stones approx. 0.2 miles west of Lake Pleasant Road, on Happy Valley Road (d/r) and approx. 300 feet south of Happy Valley Road

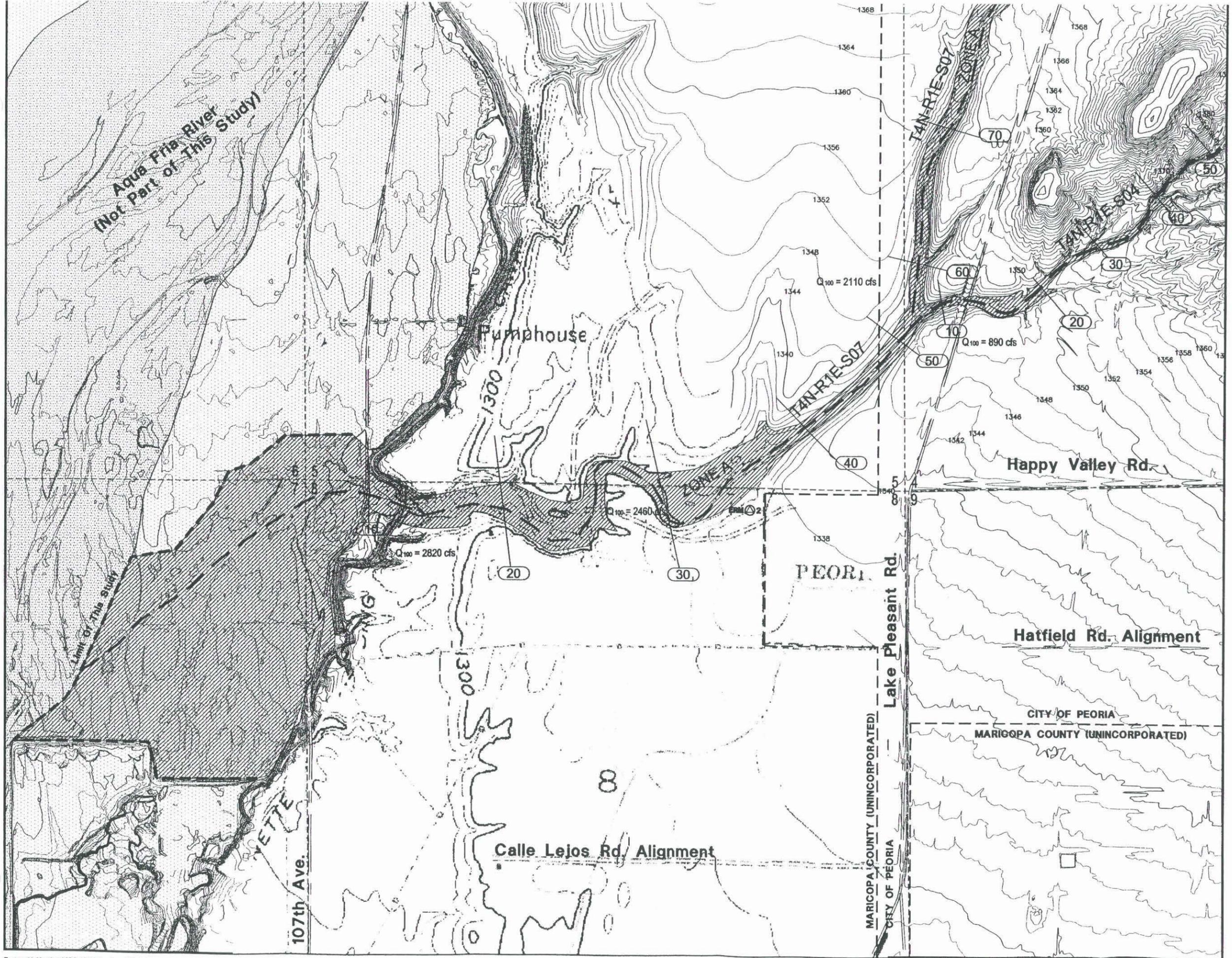
NOTES

NGVD 29 + 1.95 FEET = NAVD 88



Entellus
2255 N. 44th Street Suite 125
Phoenix, AZ 85008-3279
Tel: 802.244.2566
Fax: 802.244.8947
E-mail: www.entellus.com

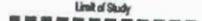
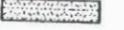
DESIGN	BY HAA/JCS	DATE 04/2001	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.	SEK	04/2001	
PLANS	RCS/JCS	04/2001	RECOMMENDED BY: _____ DATE: _____
PLANS CHK.	HAA	04/2001	APPROVED BY: _____ DATE: _____
SUBMITTED BY:			CHIEF ENGINEER AND GENERAL MANAGER
	DATE:		SHEET 2 OF 3



Topographic Mapping: ACDC-ADMP Mapping with 2 ft. Contour Intervals or USGS 7.5 minute quadrangles with 10 ft. Contour Intervals

**FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
GLENDALE/PEORIA AREA DRAINAGE
MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINATION
F.C.D. CONTRACT NO. 99-44**

LEGEND

- 100-YR APPROXIMATE ZONE A FLOODPLAIN BOUNDARY 
- HYDRAULIC BASE LINE 
- CROSS SECTION 
- ELEVATION REFERENCE MARK  6 30
- ZONE DESIGNATIONS **ZONE A**
- CORPORATE LIMITS 
- LIMIT OF STUDY 
- LIMIT OF THIS STUDY 
- SECTION LINES 
- SECTION CORNER $\frac{29}{32} \frac{28}{33}$
- WASH LD. LABEL **T4N-R1E-S07**
- EXISTING ZONE A 
- EXISTING FLOOD PLAIN 
- EXISTING FLOODWAY 
- FLOW AT DOWNSTREAM CONC. POINT $Q_{100} = 850$ cfs

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM 1929

I.D. NUMBER	ELEV. (FT)	DESCRIPTION/LOCATION
6	1371.02	Top of ADOT aluminum cap (BM 517-6) located at the northwest corner of section 2, Pleasant Road, on Happy Valley T4N-R1E-S07R00AM. Also is DTM, Inc. aerial mapping control point.

NOTES

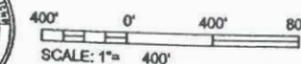
NGVD 29 + 1.95 FEET = NAVD 88



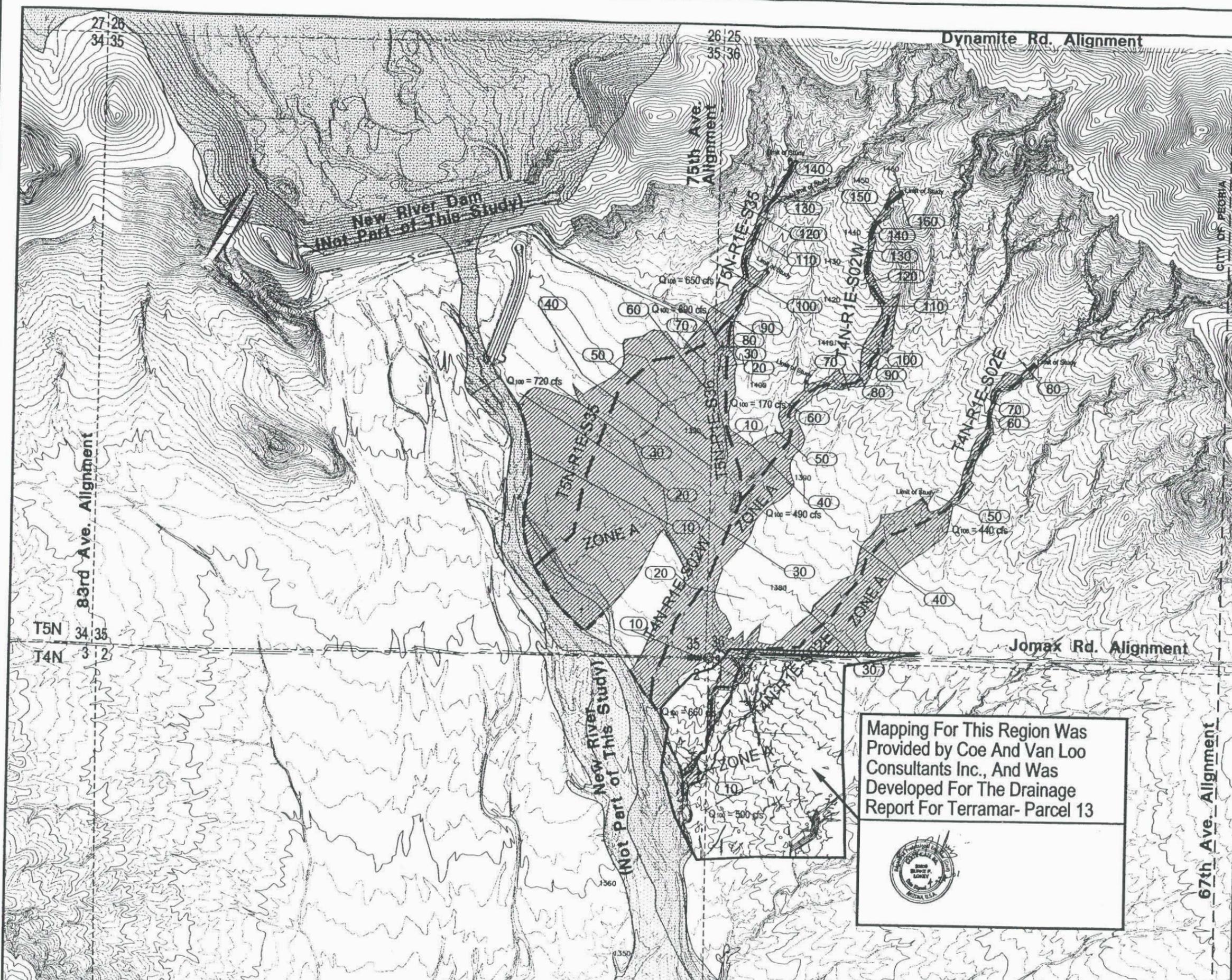
INDEX MAP



ACDC-ADMP CONTOUR INTERVAL = 2 FEET
CVL- TERRAMAR MAPPING CONTOUR INTERVAL = 1 FOOT



DESIGN	BY: HAA/JCS	DATE: 04/2001	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.	SEK	04/2001	
PLANS	RCS/JCS	04/2001	
PLANS CHK.	HAA	04/2001	
SUBMITTED BY:			
			RECOMMENDED BY: _____ DATE _____
			APPROVED BY: _____ DATE _____
			CHEF ENGINEER AND GENERAL MANAGER
			SHEET _____

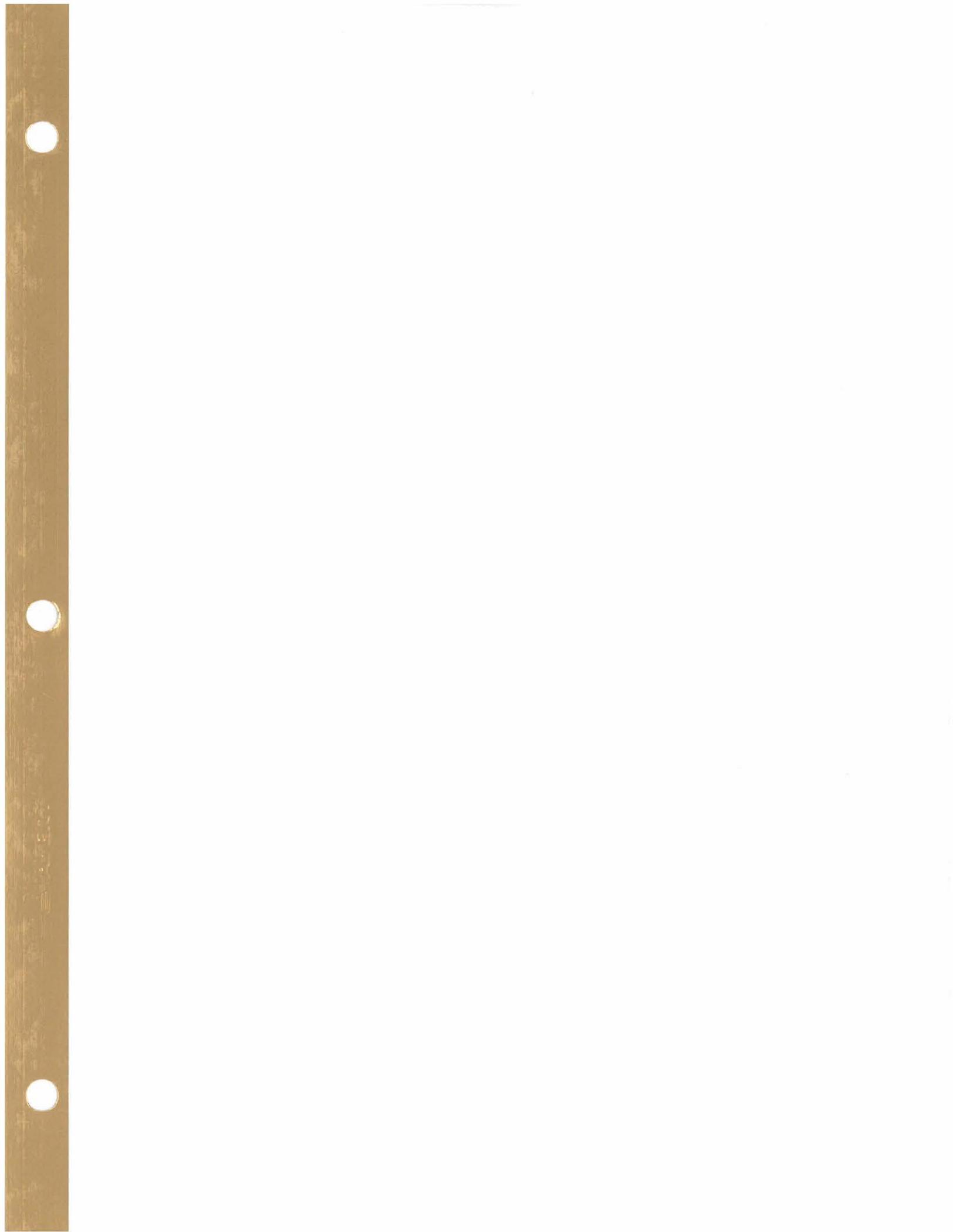


Mapping For This Region Was Provided by Coe And Van Loo Consultants Inc., And Was Developed For The Drainage Report For Terramar- Parcel 13



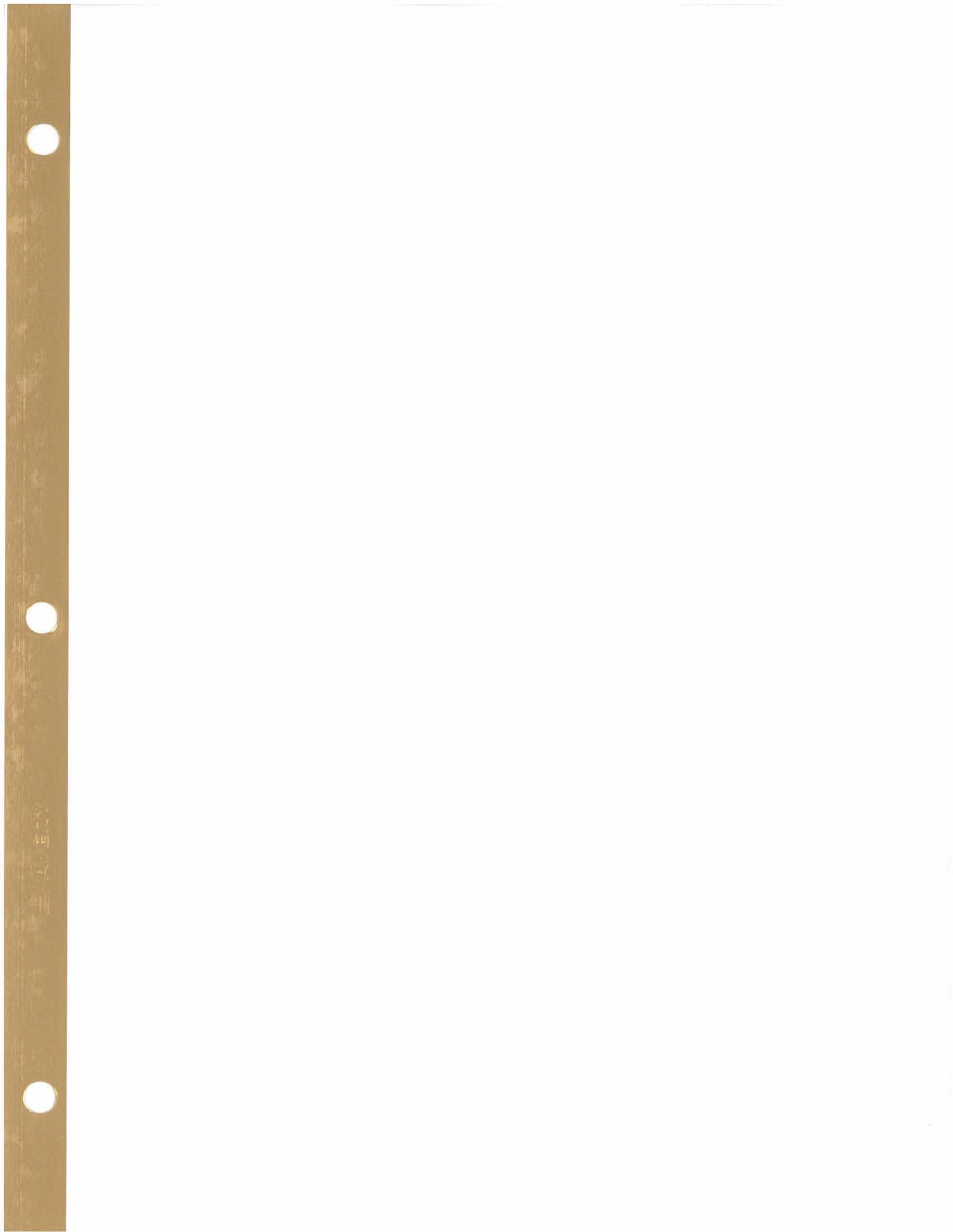
FILE: 310510011\mudoc\port\shdr\Deliverables\MapSheet_A.Dwg DATE: 04/20/01

Topographic Mapping: ACDC-ADMP with 2 ft. Contour Intervals, and Supplemented With Mapping From Coe And Van Loo Consultants Inc. (1 foot Contour Intervals)



SECTION ZA-6: EROSION AND SEDIMENT TRANSPORT

Erosion and sediment control are not in the scope of work for this project. No significant signs of erosion were observed in the field.



SECTION ZA-7: DRAFT FIS DATA

7.1 Summary of Discharges

The discharge summary is provided in **Table ZA -7.1**

TABLE ZA – 7.1: SUMMARY OF DISCHARGES

Flood Source and Location	100 Year Discharge (cfs)
<u>T4N-R1E-S07</u>	
Aqua Fria River Confluence	6790
Happy Valley Rd. and 107 th Ave.	2820
Happy Valley Rd. and Lake Pleasant Rd.	2460
3/8 Mile North of Happy Valley Rd.	2110
Alignment and 1/8 Mile East of Lake Pleasant Rd.	
1/2 Mile North of Jomax Rd. and 1/4 Mile East of Happy Valley Rd.	850
<u>T4N-R1E-S04</u>	
3/8 Mile North of Happy Valley Rd. and 1/4 Mile East of Lake Pleasant Rd.	890
<u>T4N-R1E-S33</u>	
1/4 Mile North of Jomax Rd. and 1/4 Mile West of 91 st Ave. Alignment	780

Flood Source and Location	100 Year Discharge (cfs)
<u>T5N-R1E-S35</u>	
New River Confluence, 1/4 Mile North of Jomax Rd., Upstream of flow split T5N-R1E-S36	890
New River Confluence, 1/4 Mile North of Jomax Rd., Downstream of flow split T5N-R1E-S36	720
1/2 Mile North of Jomax Rd. and 74 th Ave. Alignment	650
<u>T5N-R1E-S36</u>	
Split Flow from T5N-R1E-S35	170
<u>T4N-R1E-S02W</u>	
New River Confluence at Jomax Rd. and 75 th Ave. Alignment, Downstream of T5N-R1E-S36	660
New River Confluence at Jomax Rd. and 75 th Ave. Alignment, Upstream of T5N-R1E-S36	490
<u>T4N-R1E-S02E</u>	
New River Confluence at 1/4 Mile South of Jomax Rd.	500
1/4 Mile North of Jomax Rd. and 69 th Ave. Alignment	440

7.2 Floodway Data

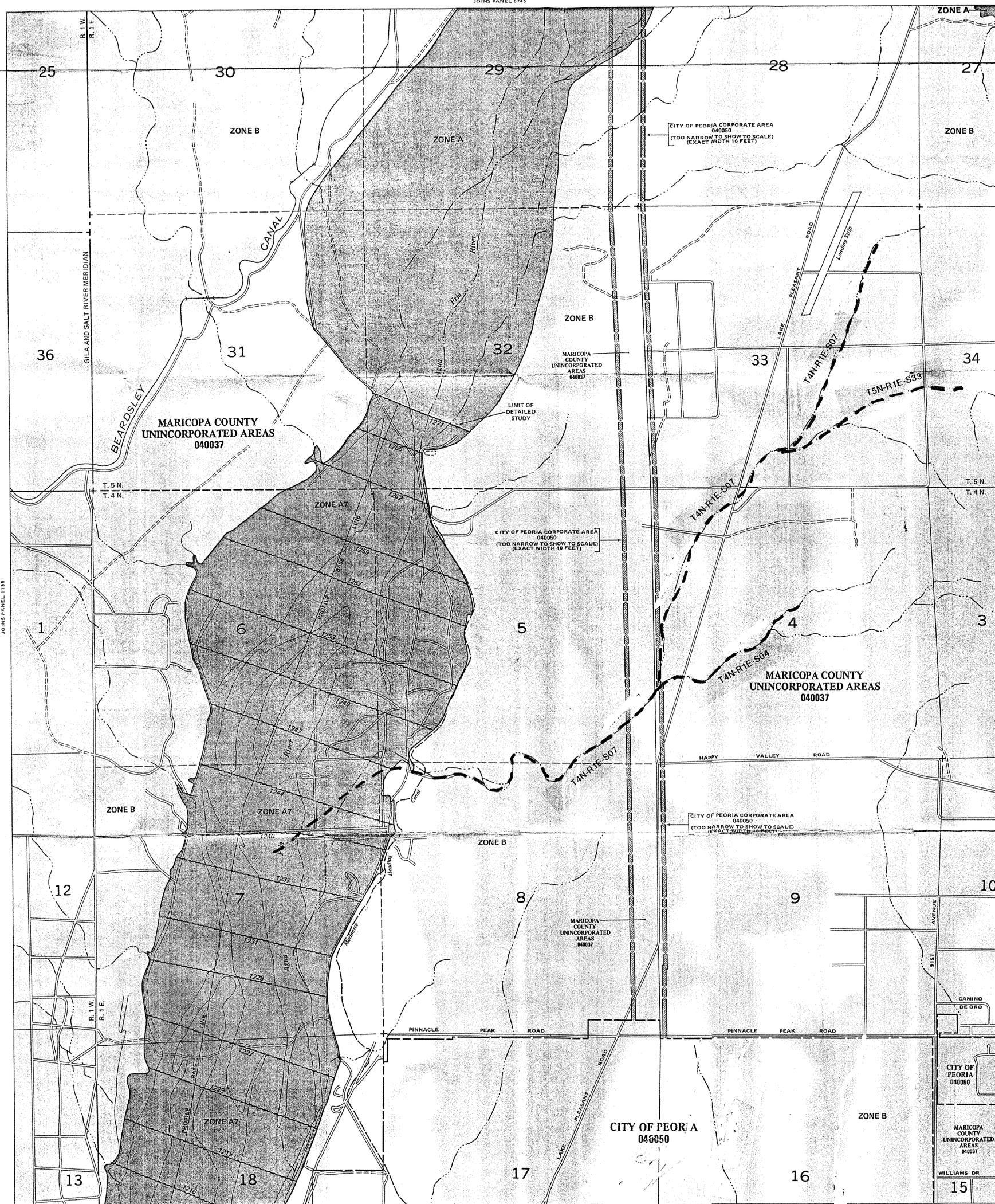
Floodway data is not required for approximate methodology.

7.3 Annotated Flood Insurance Maps

The most recent Flood Insurance Rate Maps (FIRMS) have been annotated with the thalwegs of the delineated washes. The applicable panels are 1180E and 1160. They have been included in the pocket at the end of this section.

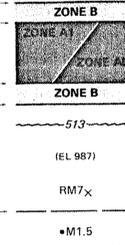
7.4 Flood Profiles

Flood profiles are not required for approximate methodology.



KEY TO MAP

- 500-Year Flood Boundary
- 100-Year Flood Boundary
- Zone Designations
- 100-Year Flood Boundary
- 500-Year Flood Boundary
- Base Flood Elevation Line With Elevation In Feet**
- Base Flood Elevation In Feet Where Uniform Within Zone**
- Elevation Reference Mark
- Zone D Boundary
- River Mile



EXPLANATION OF ZONE DESIGNATIONS

- | ZONE | EXPLANATION |
|--------|--|
| A | Areas of 100-year flood; base flood elevations and flood hazard factors not determined. |
| A0 | Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined. |
| AH | Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined. |
| A1-A30 | Areas of 100-year flood; base flood elevations and flood hazard factors determined. |
| A9 | Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined. |
| B | Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading) |
| C | Areas of minimal flooding. (No shading) |
| D | Areas of undetermined, but possible, flood hazards. |
| V | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined. |
| V1-V30 | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined. |

NOTES TO USER

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

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

Coastal base flood elevations apply only landward of the shoreline.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of the map.

For community map revision history prior to countywide mapping, see Section 5.4 of the Flood Insurance Study Report.

For adjoining map panels, see separately printed Map Index.

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

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

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

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



APPROXIMATE SCALE IN FEET
1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 1160 OF 4350

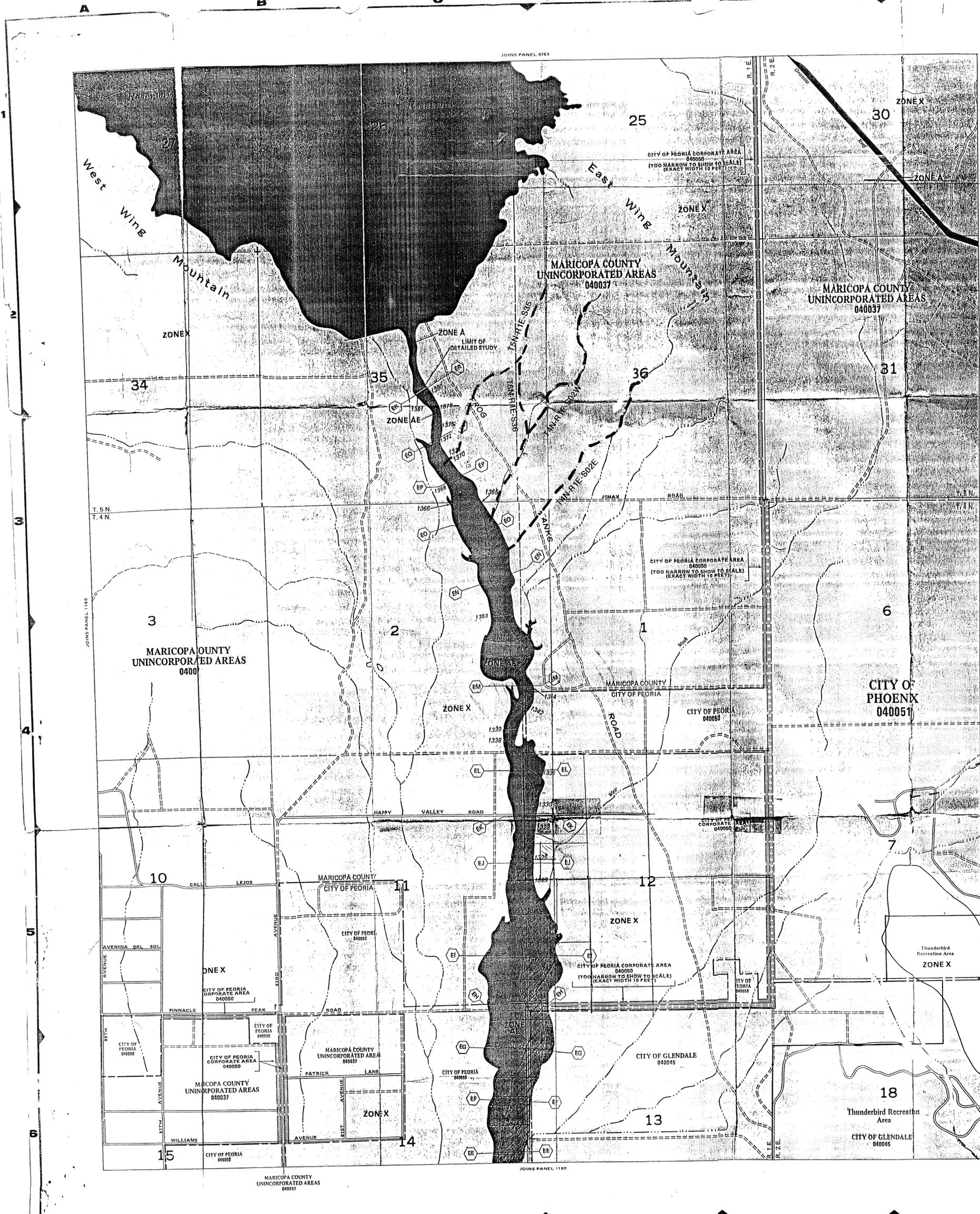
COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY, UNINCORPORATED AREAS	040037	1160	D
PEORIA, CITY OF	040050	1160	D

MAP NUMBER 04013C1160 D

EFFECTIVE DATE: APRIL 15, 1988



Federal Emergency Management Agency



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATE BY 100-YEAR FLOOD

- ZONE A** No base flood elevations determined.
- ZONE AE** Base flood elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponds); base flood elevations determined.
- ZONE AD** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE A99** To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
- ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

- ZONE X** Areas determined to be outside 500-year flood plain.
- ZONE D** Areas in which flood hazards are undetermined.

Flood Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 Base Flood Elevation Line; Elevation in Feet*

EL 967 Cross Section Line

RM7x Base Flood Elevation in Feet Where Uniform Within Zone*

Elevation Reference Mark

*Referenced to the National Geodetic Vertical Datum of 1929

NOTES

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

Areas of special flood hazard (100-year flood) include Zones A, A1-30, AE, AH, AD, A99, V, VE, 30 AND VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Coastal base flood elevations apply only landward of the shoreline.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of the map.

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For adjoining map panels see separately printed Map Index.

For adjoining map panels see separately printed Map Index.

MAP REPOSITORY

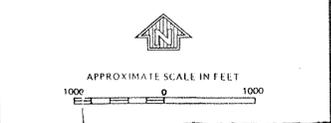
Refer to Repository Listing on Index Map

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

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

Map revised SEPTEMBER 29, 1989 to change base flood elevations and special flood hazard areas, to add base flood elevations and special flood hazard areas, to change zone designations, to reflect updated topographic information, to incorporate previously issued letters of map revision and map amendments, and to update map format.

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



1180E

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

**MARICOPA COUNTY,
ARIZONA AND
INCORPORATED AREAS**

PANEL 1180 OF 4350

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GLENDALE, CITY OF	040045	1180	E
MARICOPA COUNTY UNINCORPORATED AREAS	040037	1180	E
PEORIA, CITY OF	040050	1180	E
PHOENIX, CITY OF	040051	1180	E

MAP NUMBER
04013C1180 E

MAP REVISED:
SEPTEMBER 29, 1989

 Federal Emergency Management Agency

APPENDIX A. REFERENCES

A.1. Data Collection Summary

For data collection, refer to the *Glendale Peoria Area Drainage Master Plan Update Data Collection Report Volume DC*.

A.2. Reference Documents

The following is a list of references used during the course of this study:

1. Kaminski-Hubbard Engineering, Inc. *Arizona Canal Diversion Channel Area Drainage Master Study*, Volumes 1.2, 1.3 and 1.5, May 1995
2. United States Geological Survey, 7.5 minutes quadrangle topographic mapping.
3. Aerial Mapping Company, *Aqua Fria River Study*, February 1995.
4. Databased Terrain Mapping, Inc. *Glendale Peoria ADMP Update Aerial Mapping and Photography*, January 2000.
5. Rupp Aerial, *The Aerial Photo Book- The Real Estate Atlas – Phoenix*. Third Quarter, 1999.
6. Flood Control District of Maricopa County, *Aerial Photographs*, First Quarter, 1999.
7. U.S. Department of Agriculture, Soil Conservation Service, *Soil Survey of Aquila- Carefree Area*, April 1986.
8. U.S. Department of Agriculture, Soil Conservation Service, *Soil Survey of Maricopa County, Arizona- Central Part*, April 1986.

9. U.S. Department of Army, Corps of Engineers, Hydrologic Engineering Center, *Generalized Computer Program 723-X6-L2010, HEC-1 Flood Hydrograph Package*, Davis California, February 1981, Revised May 1991.
10. Flood Control District of Maricopa County, *Hydrology Design Manual for Maricopa County, Arizona, Volume I, Hydrology*, January 1995.
11. Boss International, Inc. River Modeling System (RMS) version 4.1.
12. Arizona Department of Water Resources, Flood Warning and Dam Safety Section, *Delineation of Riverine Floodplains in Arizona*.
13. U.S. Geological Survey, 1991. *Manning's Roughness Coefficients for Stream Channels and Floodplains in Maricopa County, Arizona*.
14. Flood Control District of Maricopa County, *Drainage design Manual for Maricopa County, Volume II, Hydraulics*.
15. Chow, V.T., *Open Channel Hydraulics*, McGraw-Hill, 1959.
16. Federal Highway Administration, HY8 version 6.0
17. United States Department of Transportation, September 1985. *Hydraulic design of Highway culverts, Hydraulic Design Series No. 5. FHWA Report No. 1-P-85-15*.
18. Coe & Van Loo Consultants, Inc., *Drainage Report For Terramar – Parcel 13 Peoria, AZ, 1998*
19. Haestad Methods, Inc., *Culvert Master Version 1.0*

20. Coe and Van Loo Consultants, Inc., Aerial Mapping, 1996

APPENDIX B. GENERAL DOCUMENTATION AND CORRESPONDANCE

B.1. Special Problems Reports

Documentation of special problems correspondence is located in *Glendale Peoria Area Drainage Master Plan Update- Administrative Report- Volume AR.*

B.2. Contact (telephone) Reports

All contact reports are located in *Glendale Peoria Area Drainage Master Plan Update- Administrative Report- Volume AR.*

B.3. Meeting Minutes or Reports

Most meeting minutes and reports are located in *Glendale Peoria Area Drainage Master Plan Update- Administrative Report- Volume AR.* Notes from the public involvement meeting, and applicable exhibits have been included in this section.

B.4. General Correspondence

All general correspondence is located in *Glendale Peoria Area Drainage Master Plan Update- Administrative Report- Volume AR.*

B.5. Contract Documents

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**GLENDALE/PEORIA AREA DRAINAGE MASTER PLAN UPDATE
APPROXIMATED FLOODPLAIN DELINEATION STUDY**

This notice has been mailed to persons on record as owning property within the boundaries of a recently completed floodplain delineation study performed as a part of the Glendale/Peoria Area Drainage Master Plan (ADMP) Update Study.

The floodplain delineation study involved the hydraulic analysis of several unnamed washes within three areas in the northwest part of the Phoenix metropolitan area. The first area includes a wash tributary to the Agua Fria River and two of its tributaries in the vicinity of Lake Pleasant Road between Happy Valley Road and Dynamite Boulevard alignments (see Attachment 1); the second area includes two washes and a breakout wash south of Pinnacle Peak Road between Lake Pleasant Road and 91st Avenue (see Attachment 2); and the third area includes three washes tributary to the New River near Jomax Road (see Attachment 3).

The study identified approximated floodplain boundaries for the 100-year peak flood. The study results are summarized on the exhibit attached to this mailer. Persons wishing to view the study report or the detailed delineation exhibits will be able to do so at the following public open house:

What: Public Open House for Glendale/Peoria ADMP Update, Floodplain Delineation Studies
When: Tuesday, January 30, 2001, from 5:30 to 7:00 p.m.
Where: City Council Chambers, City of Peoria

Representatives from the City of Peoria, the Flood Control District of Maricopa County, and the engineering consulting firm will be available to discuss the results and answer questions.

The completed study and delineation exhibit maps will be used to regulate future development so as to reduce or prevent possible flood damage to property and structures. The study results will be submitted to the Federal Emergency Management Agency (FEMA) for use in revising Flood Insurance Rate Maps for the area. Buildings located within a 100-year floodplain are required by FEMA to have flood insurance coverage if they are financed by federally insured loans.

For more information about the Glendale/Peoria ADMP Update Floodplain Delineation studies contact:

Mr. Burton Charron
City of Peoria, Public Works/Engineering
8401 West Monroe Street
Peoria, AZ 85345
Phone (623) 773-7212, E-mail burtonc@peoriaaz.com

or
Ms. Marilyn DeRosa
Flood Control District of Maricopa County, Planning Branch
2801 West Durango Street
Phoenix, AZ 85009
Phone (602) 506-4766, E-mail mdr@mail.maricopa.gov

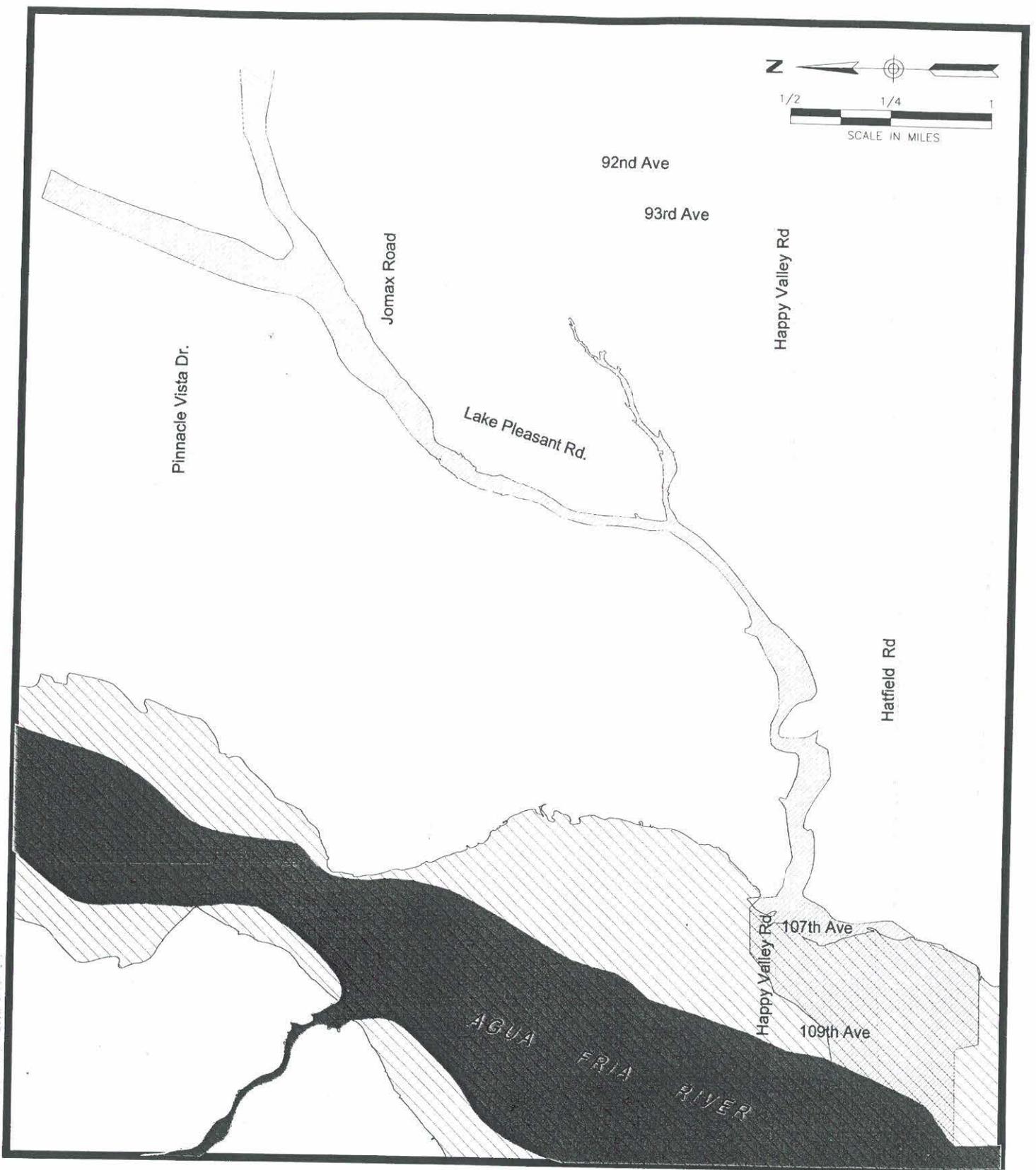
RECEIVED

JAN 19 2001

Entellus

Attachments

www.peoriaaz.com

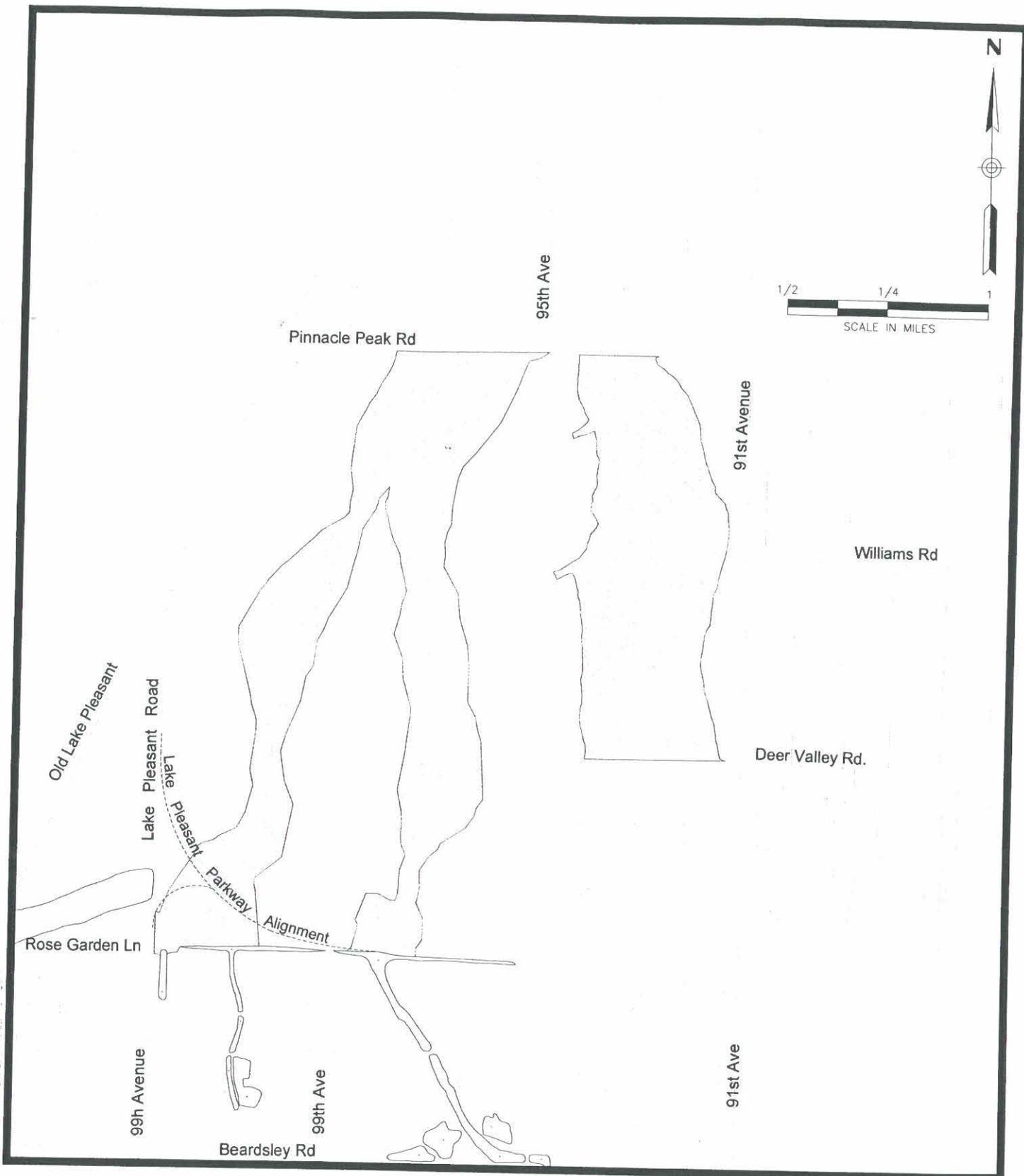


Legend

-  Existing Floodway
-  Existing Floodplain
-  100 Year Approximated Floodplain Identified in this Study

Exhibit 1

Glendale/Peoria ADMP Update
Zone A Floodplain Delineation



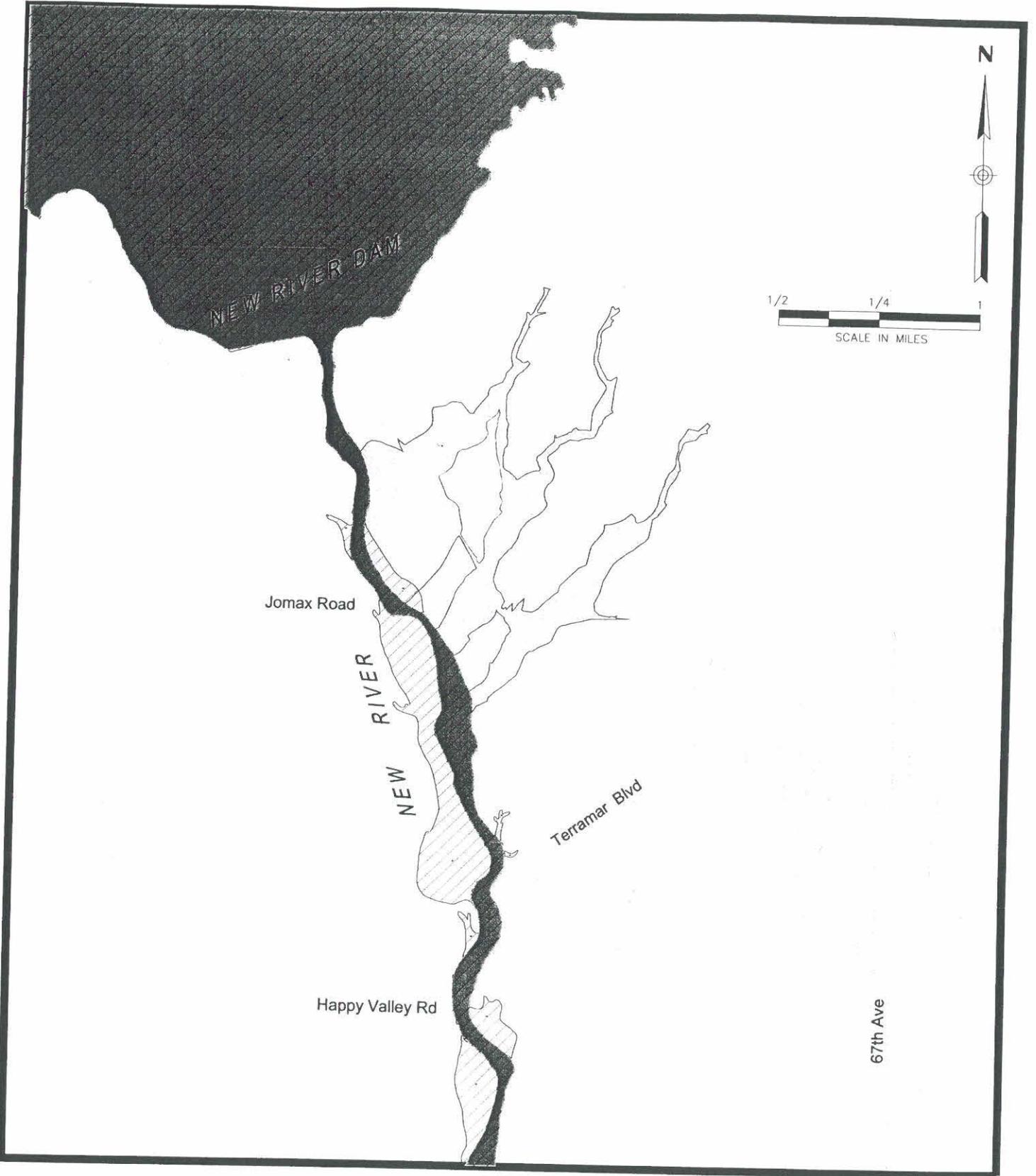
Legend

-  Existing Floodway
-  Existing Floodplain
-  100 Year Approximated Floodplain Identified in this Study

Exhibit 2

Glendale/Peoria ADMP Update
Zone A Floodplain Delineation

 **Entellus**
 2720 N. 44th Street Suite 122
 Phoenix, AZ 85018-5279
 602.244.2068
 602.244.8947
 E-Mail: www.entellus.com



Legend

-  Existing Floodway
-  Existing Floodplain
-  100 Year Approximated Floodplain Identified in this Study

Exhibit 3

Glendale/Peoria ADMP Update
Zone A Floodplain Delineation

 **Entellus**[™]
 2755 N 44th Street Suite 129
 Phoenix, AZ 85008-5779
 Tel: 602.244.2500
 Fax: 602.244.6947
 E-Mail: www.entellus.com

APPENDIX B. GENERAL DOCUMENTATION AND CORRESPONDANCE

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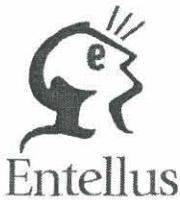
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2255 N. 44th St., Suite 125
 Phoenix, AZ 85008
 Phone (602)244-2566
 Fax (602)244-8947
 E-Mail Address herman@entellus.com

LETTER OF TRANSMITTAL

DATE:	12-4-00	JOB	310.017
ATTENTION:	Marilyn DeRosa		
RE:	PEORIA/GLENDALE ADMP UPDATE FCD (99-44)		
ZONE A PUBLIC INFO MEETING FEMA DISCUSSIONS			

TO: Marilyn DeRosa (Fax 602-506-8561)
Flood Control District of Maricopa County
2801 W. Durango
Phoenix, AZ 85009

- WE ARE SENDING YOU Attached Under separate cover via _____ the following items
- Shop Drawings Prints Plans Samples Specifications
- Copy of Letter Change Order _____

COPIES	DATE	NO.	DESCRIPTION
1			Zone A Public Meeting Discussions Memo
1		1-3	8.5x11 copies of exhibits 1-3

THESE ARE TRANSMITTED as checked below:

- For Approval Approved as submitted Resubmit _____ copies for approval
- Approved as noted Submit _____ copies for distribution
- For your use Returned for corrections Return _____ corrected prints
- For Review and Comments _____
- FOR BID DUE _____ PRINTS RETURNED AFTER LOAN TO US

REMARKS

COPY TO: Dave Moody, City of Peoria (Fax 623-773-⁷²¹¹~~7324~~)

SIGNED

Jacob Sweeting, EIT

(If enclosures are not as noted, kindly notify us at once.)



2255 N. 44th St., Suite 125
Phoenix, AZ 85008
Phone (602)244-2566
Fax (602)244-8947
Website www.entellus.com

Glendale/Peoria ADMP Update Zone A Floodplain
JOB: Delineation

TO M. DeRosa, FCDMC
FROM: Jacob Sweeting
JOB NO: 310.017
DATE: January 30, 2001

MEMORANDUM

Re: FEMA Submittal on Zone A Floodplain Delineation

The following is a summary of discussions during the Zone A Public Information Meeting on January 30, 2001. Entellus presented three exhibits showing the proposed Zone A floodplains. (See Attachments 1 thru 3)

Exhibit 1: This exhibit showed the delineated washes that flow south from the West Wing Mountains, along Lake Pleasant Road, and converge with the Aqua Fria River at the Happy Valley Road Alignment. The City of Peoria and the District agreed that these washes should be submitted to FEMA. The City of Peoria noted that a development is planned for one of the areas within the floodplain limits. This area is located between the West Wing Mountains and Jomax Road. The City of Peoria said it would send the proposed floodplain to a representative of the development.

Exhibit 2: This exhibit showed the delineated washes that flow south from Pinnacle Peak Road, through the state land bounded by Lake Pleasant Road and 91st Avenue. The City of Peoria said that these washes should not be submitted to FEMA. Instead, the District will discuss the issue with the State Land Department at a future meeting. The objective will be to require that future developments on the state land provide adequate means of conveying the ultimate design flows that are conveyed in the delineated washes.

Exhibit 3: This exhibit showed the delineated washes that flow south from the East Wing Mountains and converge with the New River north of the Terramar development. The District and the City of Peoria both agreed that the floodplains presented in this exhibit are feasible for a FEMA submittal. However, it was recognized that the southern most delineated wash portrayed in the exhibit would need further attention before a FEMA submittal could be made. This wash appeared to flow through the Terramar development area that already has a drainage design. Entellus will check if the wash flows through the development, and if it has been addressed in the drainage report and design. Entellus will draft a memo for the District to send to Coe & Van Loo (CVL), the consultant that prepared the drainage design and report. This memo will state that the District intends to submit the wash to FEMA for Zone A designation.

Floodplains Not Presented: The wash delineated in the eastern most part of the Glendale Peoria ADMP was not presented at this meeting. This wash is located in the Cities of Phoenix and Glendale. It flows south from the Ludden Mountain, through the Thunderbird Park Recreation Area, and into the Arrowhead Lakes Ranch development. Though Entellus did not present this wash at the meeting, it said that they would meet January 31 with the City of Phoenix and February 1 with the City of Glendale for further discussion. A decision will be made at this time whether this floodplain will be submitted to FEMA or not.

1/2 1/4 1
SCALE IN MILES



Legend

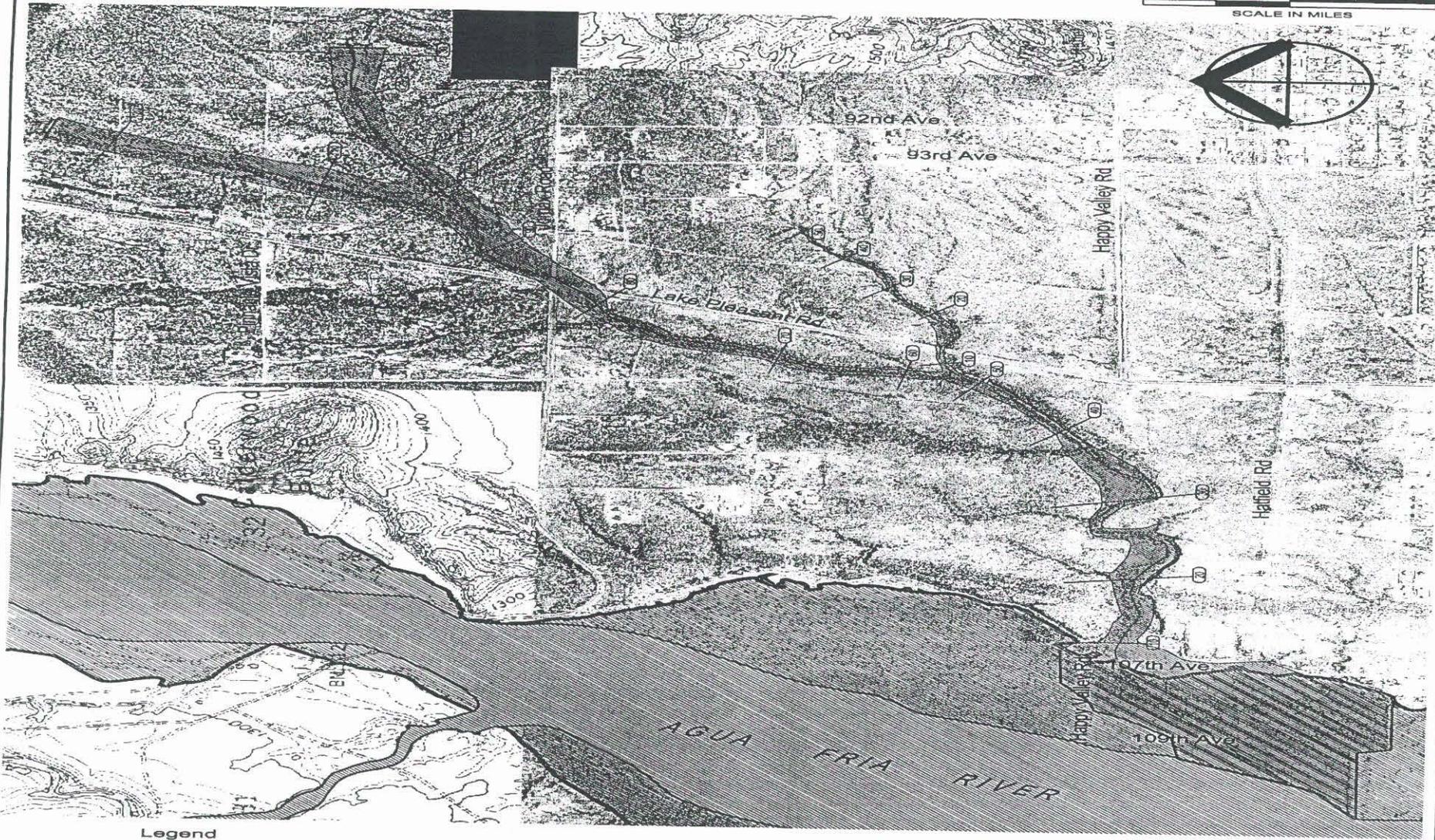
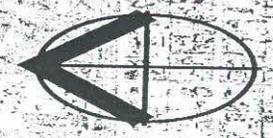
-  Existing Floodway
-  Existing Floodplain
-  100 Year Approximated Floodplain Identified in this Study
-  Existing 100 Year Approximated Floodplain
-  Cross Section Locations

Exhibit 3
Glendale/Peoria ADMP Update
Zone A Floodplain Delineation

File: 20060101.mxd Date: 07/27/2006



1/2 1/4 1
SCALE IN MILES



Legend

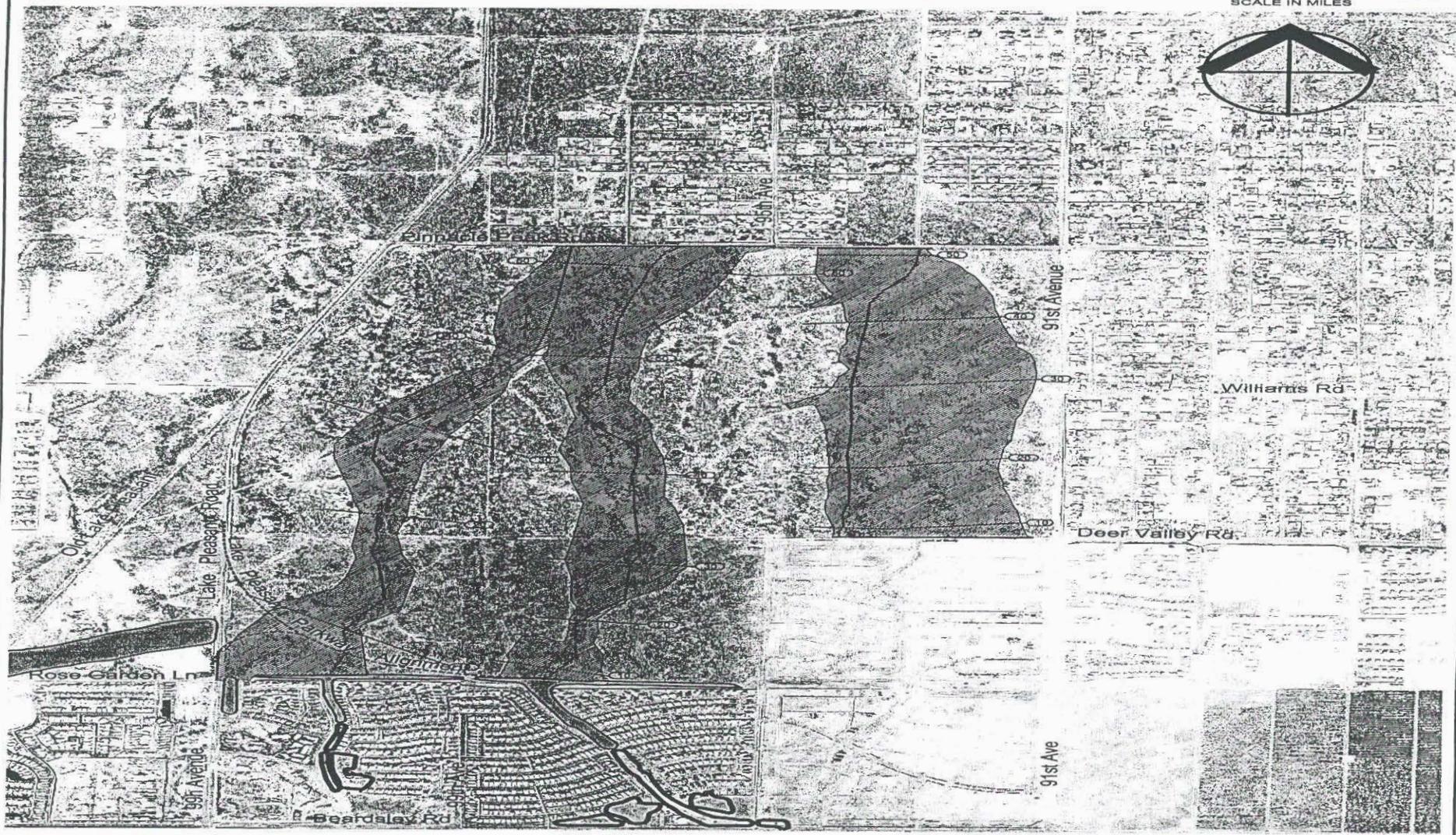
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-  Existing Floodplain
-  100 Year Approximated Floodplain Identified in this Study
-  Existing 100 Year Approximated Floodplain
-  Cross Section Locations

Exhibit 1
Glendale/Peoria ADMP Update
Zone A Floodplain Delineation

File: \\server\mapdata\Map_07_02_09



1/2 1/4 1
SCALE IN MILES



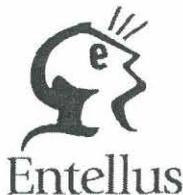
Legend

-  Existing Floodway
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-  100 Year Approximated Floodplain Identified in this Study
-  Existing 100 Year Approximated Floodplain
-  Cross Section Locations

Exhibit 2
Glendale/Peoria ADMP Update
Zone A Floodplain Delineation

Peoria, Illinois Date: 07/20/2008





2255 N. 44th St., Suite 125
 Phoenix, AZ 85008
 Phone (602)244-2566
 Fax (602)244-8947
 E-Mail Address herman@entellus.com

LETTER OF TRANSMITTAL

DATE:	12-4-00	JOB	310.017
ATTENTION:	Marilyn DeRosa		
RE:	PEORIA/GLENDALE ADMP UPDATE FCD (99-44)		
ZONE A PUBLIC INFO MEETING FEMA DISCUSSIONS			

TO: Marilyn DeRosa (Fax 602-506-8561)
Flood Control District of Maricopa County
2801 W. Durango
Phoenix, AZ 85009

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- Copy of Letter Change Order

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REMARKS

COPY TO: Dave Moody, City of Peoria (Fax 623-773-7321)

SIGNED

Jacob Sweeting, EIT

(If enclosures are not as noted, kindly notify us at once.)



Entellus™

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Phoenix, AZ 85008
Phone (602)244-2566
Fax (602)244-8947
Website www.entellus.com

Glendale/Peoria ADMP Update Zone A Floodplain

JOB: Delineation

TO M. DeRosa, FCDMC
FROM: Jacob Sweeting
JOB NO: 310.017
DATE: January 30, 2001

MEMORANDUM

Re: FEMA Submittal on Zone A Floodplain Delineation

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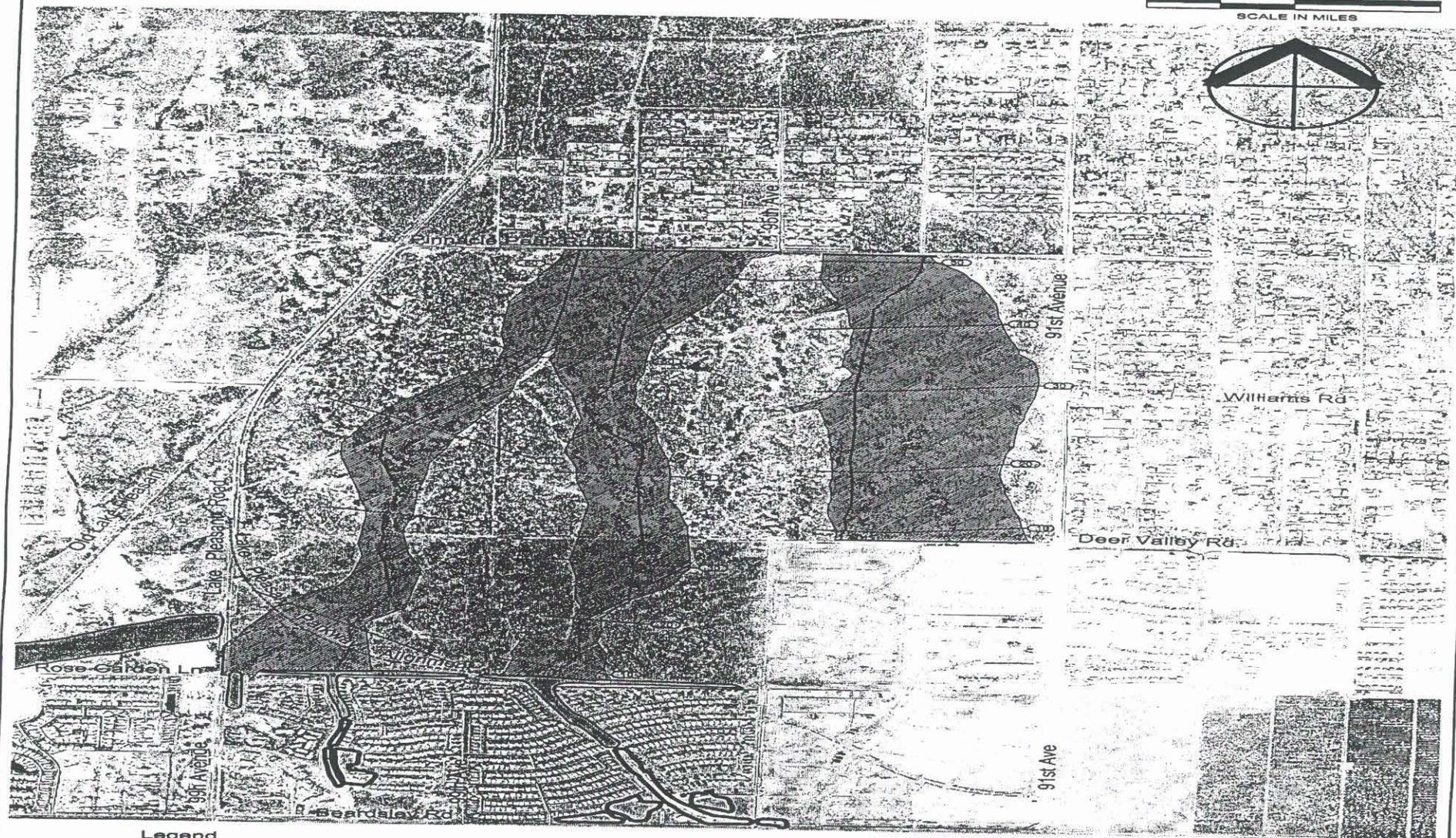
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1/2 1/4 1
SCALE IN MILES



Legend

-  Existing Floodway
-  Existing Floodplain
-  100 Year Approximated Floodplain Identified in this Study
-  Existing 100 Year Approximated Floodplain
-  Cross Section Locations

Exhibit 2
Glendale/Peoria ADMP Update
Zone A Floodplain Delineation



1/2 1/4 1
SCALE IN MILES



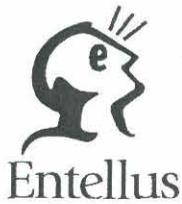
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-  Existing Floodway
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-  100 Year Approximated Floodplain Identified in this Study
-  Existing 100 Year Approximated Floodplain
-  Cross Section Locations

Exhibit 3
Glendale/Peoria ADMP Update
Zone A Floodplain Delineation



FILE: 10000_3000.dwg DATE: 07/20/09



2255 N. 44th St., Suite 125
 Phoenix, AZ 85008
 Phone (602)244-2566
 Fax (602)244-807
 E-Mail Address hernan@entellus.com

LETTER OF TRANSMITTAL

DATE: 01-30-01	JOB 310.017
ATTENTION:	Tim Murphy
RE:	PEORIA/GLENDALE ADMP UPDATE FCD (99-44) ZONE A- PRE-FINAL

TO: Flood Control District of Maricopa County
2801 W. Durango
Phoenix, AZ 85009

- WE ARE SENDING YOU Attached Under separate cover via _____ the following items
- Shop Drawings Prints Plans Samples Specifications
- Copy of Letter Change Order _____

COPIES	DATE	NO.	DESCRIPTION
1	12-4-2000		Data Notebook (Redlined Set)
1	12-4-2000		Sheets (Redlined Set)
1	01-17-2000		District Comments
1	01-29-2000		Glendale Peoria Area Drainage Master Plan Update- Zone A Floodplain Delineation- Volume ZA
1	01-29-2000	cover - 6	Delineation Maps:Cover + Sheets 1-6

THESE ARE TRANSMITTED as checked below:

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- As Requested Returned for corrections Return _____ corrected prints
- _____ _____
- FOR BID DUE _____ PRINTS RETURNED AFTER LOAN TO US

REMARKS This is the pre-final submittal of the Zone A Technical Notebook, and the Delineation Maps

COPY TO: Marilyn DeRosa

SIGNED _____
 Hernan A. Aristizabal P.E.

(If enclosures are not as noted, kindly notify us at once.)



Flood Control District of Maricopa County

Interoffice Memorandum

January 17, 2001

MEMO TO: Marilyn DeRosa

FROM: Tim Murphy

VIA: Joe Tram

SUBJECT: Glendale/Peoria Area Drainage Master Plan Update
Zone A – Floodplain Delineation
December 2000, Preliminary

Throughout the report and on the drawings I've included other red line comments that aren't listed here. Entellus' should have caught most of the comments listed here during their quality control check.

Who is going to be responsible for sending this study to FEMA for their adoption of the results?

Comments on the report

1. The Final Report will have to be sealed by the engineer. ✓
2. There are some differences between the section titles, section numbers, and page numbers used in the Table of Contents and the ones used in the main body of the report. ✓
3. In Section 1 of the report watercourse T4N-R1E-S36 is listed as a tributary to watercourse T4N-R1E-S02. ✓
From what I can see on sheet 4 I don't think this is the case.
- HAA . 4. Figure 1 has nothing to do with this study. ✓
- HAA . 5. They still need to include the FEMA forms in section 2 of the report.
6. Check the title for section 4.3.1.1. ✓
7. There is a section 4.3.1.2 listed in the Table of Contents that isn't in the report. ✓
8. The Manning's n values aren't shown on Figure 4.1, and on Figure 4.2 they are hard to read. ✓

9. A tab divider page wasn't provided for Section 7. ✓
- JS 10. Table 7 needs a lot of work, most of the location descriptions are wrong, and most of the locations that are correct could use a better description.
11. Most of the Appendices are far from complete, and a couple of the pages appear to be numbered incorrectly. ✓
Photos for thunderbird wash (n-values).

General comments on the drawings

- RS 1. The drawings don't seem to be plotted at 1" = 400'. The bar scale seems to be off just a little bit. ✓
2. The hatching used in the legend doesn't seem to match the hatching used for the floodplain. ✓
- RS 3. Use the word approximate instead of approximated. ✓
4. In the notes use NAVD 88 instead of NVAD 88. ✓
- J 5. The downstream limit of the Zone A floodplains need to be noted. ✓
6. All existing floodplains should be labeled that they aren't part of this study. Also consider screening or using a lighter line weight for the existing floodplains in order to distinguish them from the floodplains being developed by Entellus. ✓
7. Entellus' e-mail address is messed up. ✓
8. On some sheets a dashed line is used for the limit of study and on others a solid line is used. ✓
9. On some sheets the hydraulic baseline is dashed and on others it is a solid line. The hydraulic baseline should be narrower or not so bold. ✓
10. On some sheets the section lines are dashed and on others they are solid lines. The section lines don't line up very well with the roads. The section lines need to line up with the roads. ✓
11. Check all the ERM numbers and descriptions, I found quite a few errors in them. ✓
12. The drawings will have to be signed and sealed by the engineer. ✓

Specific comments on the drawings

- 1) T4N-R1E-S08 (sheets 1 and 2)
 - a) Should this be named T4N-R1E-S07? ✓
- 2) T4N-R1E-S33 (sheet 1)
 - a) This should be named T5N-R1E-S33. ✓

11/10. b) The plotted floodplain widths don't match with the wetted top widths shown in the calculation. Are the calculated widths incorrect?

3) T4N-R1E-S20 (sheet 2)

a) Between cross sections 20 and 30 the floodplain delineation crosses a ridge that I don't think it should have crossed. *ok*

4) Sheet 3

a) The floodplain on the right hand side needs to be identified. ✓

b) ERM number 2 isn't on this sheet, so it shouldn't be listed in the ERM data for this sheet. ✓

5) T4N-R2E-S18 (sheets 5 and 6)

a) The plotted width is different then the calculated width for cross sections 1, 8, 10, 40, 50, 70. *adjusted FP or X-sec*

b) Between cross sections 50 and 60 there are a lot of changes happening to the plotted floodplain and there doesn't seem to be a lot of topographic data here.

c) There are a couple of places where the floodplain seems to be affected by the fencing around the subdivision. Is Glendale okay with showing these areas protected by the fencing? FEMA might question these areas. *Will talk to Roy Dovelino and Dan Sherwood.*

To be talked to Dan.

d) Between cross sections 100 and 200 the floodplain is contained within a channel flowing supercritical, is Glendale okay with the analysis that has been done here? FEMA doesn't usually like to use supercritical flow in a floodplain analysis, so they might have questions about this area. Who is responsible for maintaining this channel? What are the chances that debris could at least partially block the channel? *will talk to Roy about conjugate depth, most likely will be contained in within channel banks*

6) T4N-R1E-S01 (sheet 4)

a) Consider renaming this to T5N-R1E-S36, or point the hydraulic baseline to section 1.

Section line location has been moved and washes renamed accordingly

Page 3 of 6 - Question what happens to floodplain @ downstream end of T4N-R1E-S22(?) - is there a flood hazard in the subdivision? Does the channel through the subdivision convey 500+ cfs? Are the finished floors safe - where is the confluence with the downstream floodplain - How does the floodplain transition to the channel (Can it be technically substantiated?) Should the floodplain be extended further south?

this floodplain was delineated to insure we have a corridor to bring flows south from Pinnacle Peak to the proposed improvements of Deer Valley Rd where a channel will pick this flow and convey it to the Agua Fria River

APPENDIX B. GENERAL DOCUMENTATION AND CORRESPONDANCE

B.1. Special Problems Reports

Documentation of special problems correspondence is located in *Glendale Peoria Area Drainage Master Plan Update- Administrative Report- Volume AR*.

B.2. Contact (telephone) Reports

All contact reports are located in *Glendale Peoria Area Drainage Master Plan Update- Administrative Report- Volume AR*.

B.3. Meeting Minutes or Reports

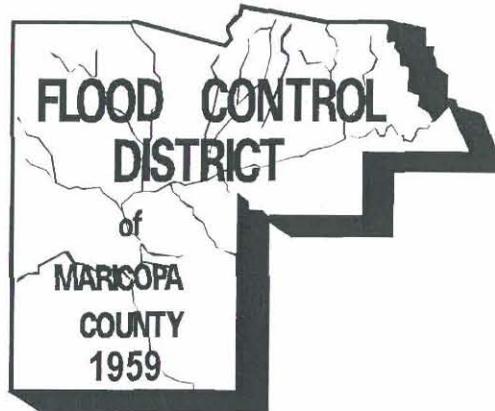
Most meeting minutes and reports are located in *Glendale Peoria Area Drainage Master Plan Update- Administrative Report- Volume AR*. Notes from the public involvement meeting, and applicable exhibits have been included in this section.

B.4. General Correspondence

All general correspondence is located in *Glendale Peoria Area Drainage Master Plan Update- Administrative Report- Volume AR*.

B.5. Contract Documents

All contract documents are located in *Glendale Peoria Area Drainage Master Plan Update- Administrative Report- Volume AR*.



SCOPE OF WORK

Glendale/Peoria Area Drainage Master Plan Update FCD No. 99-44

FLOOD CONTROL DISTRICT of Maricopa County

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1.0 GENERAL DESCRIPTION

1.1 PROJECT DESCRIPTION

1.1.1 This scope-of-work (SOW) is to contract for professional engineering services necessary to update the existing Glendale/Peoria Area Drainage Master Plan (ADMP). Current drainage facilities, provided mainly through private development, often do not meet the requirements as developed in the original ADMP study. Private developers have pursued detailed individual and independent hydrology studies used to make drainage improvements for protection of their specific developments only. In many rural areas drainage has been altered by individual property owners to suit their particular needs. These changes alter overall drainage in the region, resulting in increased downstream liabilities.

The Glendale/Peoria ADMP Update will identify current drainage problems and develop cost-effective solutions to alleviate known and potential flooding problems. Flooding solutions may include storm water collection and disposal systems, drainage design policies, standards and guidelines, or some combination of these.

The SOW will include public coordination, survey and mapping, hydraulics, hydrology, identification of drainage problems, environmental overview, visual resource assessment, development of alternative solutions, and preparation of preliminary design plans based on a preferred alternative(s).

1.2 PURPOSE AND NEED

1.2.1 The purpose of the Glendale/Peoria ADMP Update is to update a portion of the existing Glendale/Peoria ADMP study completed in May 1987, by quantifying the extent of flooding problems and developing alternative solutions to flooding problems. Arizona Revised Statutes Title 48, Chapter 21 requires the Board of Directors to identify flooding problems and plan for the construction of facilities which will eliminate or minimize flooding problems.

1.2.2 There are two major objectives of the study. The first is to quantify selected drainage problems within the study area. The second is to develop a plan to control runoff to prevent flood damage to developments within the study area.

1.2.3 Since current models do not accurately reflect the conditions of the study area, this work is necessary to update the hydrology to meet current DISTRICT standards. Area floodplain managers, municipalities, and developers will use this study as a basis for drainage regulation, improvements and design. This study will impact the floodplain administration for the Agua Fria River at the conceptual level.

1.2.4 The expectation of this study is to identify flooding solutions for the study area that may be implemented together, individually or not at all, based on scheduling, funding and cost sharing.

1.3 LOCATION

1.3.1 The area of study for the Glendale/Peoria ADMP Update is comprised of all the area of the original study north of the Arizona Canal Diversion Channel (ACDC) and Skunk Creek, and west of the New River. The area approximately includes the Skunk Creek drainage area downstream of Adobe Dam and west of 51st Avenue, the New River drainage area downstream of the New River Dam to its confluence with Skunk Creek, the drainage area to the west of New River from its confluence with Skunk Creek to its confluence with the Agua Fria River, the drainage area to the east of the Agua Fria River downstream of the Dynamite Boulevard alignment to its confluence with New River, and a small portion of the ACDC watershed west of 51st Avenue and south of Skunk Creek.

The southern boundary of the study area is formed by the ACDC structure and the New River; the north and easterly boundaries are formed by 51st Avenue, the dams on Skunk Creek and New

River, and the Hedgpeth Hills and East Wing and Ludden Mountains (trending NW-SE between the two structures); the western boundary is formed by the Agua Fria River. The ACDC is tributary to Skunk Creek at approximately 75th Avenue, which is tributary to the New River at approximately 87th Avenue, which is tributary to the Agua Fria River between Bethany Home Road and Camelback Road, forming the southerly extent of the study area. The total study area is approximately 85 square miles.

1.4 PARTICIPANTS

1.4.1 The following project Participants will be receiving copies of project submittals and will act as the agency point-of-contact:

Marilyn DeRosa, R.G.
Planning Project Manager
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

Burton R. Charron, P.E.
Civil Engineer, Public Works Department
City of Peoria
8401 West Monroe Street
Peoria, AZ 85345

Daniel A. Sherwood, P.E.
Senior Civil Engineer, Engineering Department
City of Glendale
5850 West Glendale Avenue
Glendale, AZ 85301

1.4.2 The CONSULTANT may be coordinating with the following organizations for information and input in the study:

Flood Control District of Maricopa County
Arizona Department of Transportation
Maricopa County Parks and Recreation Department
Maricopa County Department of Transportation
City of Glendale
City of Peoria
City of Phoenix
Central Arizona Project
Arizona State Land Department

1.5 CONTRACT TIMEFRAME AND SCHEDULE

1.5.1 The DISTRICT shall issue the Notice to Proceed on/or about November 3, 1999, with completion of the project expected by approximately February 25, 2001.

1.5.2 The CONSULTANT shall complete the ADMP Update within the contract period of 480 calendar days.

1.6 PROJECT REFERENCES

1.6.1 All work under this SOW will be in accordance with the DISTRICT Consultant Guidelines dated October 1998, unless otherwise noted.

1.6.2 General references and standards available are as outlined in Section 20, Consultant Guidelines, October 1, 1998. This section provides general requirements, methodologies, and

procedures to be followed in completing work for the DISTRICT. Any specific work tasks described in this SOW should be completed consistent with this SOW. Any variations from this SOW or the Consultant Guidelines document shall not be undertaken without written concurrence from the DISTRICT.

1.6.3 The DISTRICT will make available to the CONSULTANT, the following project related references and information:

Addendum to Glendale/Peoria ADMP, prepared for the Flood Control District of Maricopa County (FCDMC) by Camp Dresser and McKee, Inc., and James M. Montgomery, Consulting Engineers, Inc., May 1987.

Orangewood Alignment Concept/Routing Study, prepared for FCDMC by Wood, Patel and Associates, November 1995.

ACDC Area Drainage Master Study: 500-foot Swath Drainage Plan, prepared for FCDMC by Kaminski-Hubbard Engineering, Inc., July 1997.

Drainage Report on Union Hills Drive: 27th Avenue to 57th Avenue, Phoenix and Glendale, Arizona, prepared for FCDMC by Erikson and Salmon, Inc., August 1987.

Cactus Road Storm Drain (67th Avenue to the Agua Fria Freeway), prepared for FCDMC by Stanley Franzoy Corey, Engineering Company, dated November 1992.

Storm Drain along Cactus Road: 67th Avenue to Agua Fria Outer Loop Freeway, prepared for FCDMC by Steve Corrales Engineering Corp., September 1990.

Northern/Orangewood Storm Drain Project: Concept/Routing Study prepared for FCDMC by Wood, Patel and Associates, Inc., March 1996.

Northern/Orangewood Storm Drain Project: Location Study, prepared for FCDMC by Wood, Patel and Associates, Inc., March 1996.

Arrowhead Ranch Development, Glendale, Arizona: Specific Area Plan, Storm Drainage Plan, prepared for the City of Glendale, Arizona, April 1992.

City of Glendale, Arizona: Storm Water Management Plan, Capital Improvement Program Summary, prepared for the City of Glendale, Arizona, and FCDMC by Camp Dresser and McKee, Inc., January 1986.

Glendale General Plan Development Guide, DRAFT, prepared by the City of Glendale, Arizona, September 1987.

Hydrology Update on Glendale/Peoria ADMP, DRAFT, prepared by FCDMC, January 1993.

Glendale/Peoria/Sun City Drainage Area No. 1, prepared by FCDMC, January 1995.

Glendale/Peoria/Sun City Drainage Area No. 2, prepared by FCDMC, January 1995.

City of Peoria: Master Plan of Storm Drainage, prepared for the City of Peoria, Arizona, and the FCDMC by James M. Montgomery, Consulting Engineers, Inc., April 1988.

Master Grading and Drainage Plan: Westbrook Village, Section 27, Peoria, Arizona, prepared for UDC Homes by Carter Associates, Inc., revised June 1989.

Westbrook Village East Drainage Study, prepared for the City of Peoria, Arizona, by Goldman, Toy and Associates, Inc., October 1998.

Gila River and Tributaries in Arizona and New Mexico, Flood Damage Report, Storm and Flood of August 16-17, 1963, Glendale/Maryvale Area, prepared for FCDMC by U.S. Army Corps of Engineers, Los Angeles District, June 1964.

City of Glendale, Arizona: Storm Water Management Plan, prepared for the City of Glendale and FCDMC by Camp Dresser and McKee, Inc., January 1986.

City of Peoria, Arizona: Storm Water Master Plan Hydrology Report, prepared for the City of Peoria by James M. Montgomery, Consulting Engineers, Inc., April 1985.

91st Avenue Drain Hydrology Update, DRAFT, prepared by FCDMC, October 1994.

Preliminary Drainage Report for 95th Avenue and Beardsley Road, prepared for Continental Homes by Coe and Van Loo, Consultants, Inc., April 1994.

Preliminary Drainage Report For Intersection Improvements: 99th Avenue, Bell Road to Thunderbird Road, prepared for the Maricopa County Department of Transportation by Hendrich, Eberhart and Associates, Inc., August 1995.

Desert Amethyst Drainage Master Plan: Summary Report prepared for the City of Peoria, Arizona, by Montgomery Watson, July 1997.

Desert Amethyst Drainage Report: Design Documentation Summary for 60 percent Plan Submittal, prepared for the City of Peoria, Arizona, by Wood, Patel and Associates, Inc., May 1999.

Final Drainage Report for Parkridge: 95th Avenue and Beardsley Road, prepared for Continental Homes by Coe and Van Loo, Consultants, Inc., January 1994.

Final Drainage Report for Parkridge II, prepared for Continental Homes by Coe and Van Loo, Consultants, Inc., January 1995.

Marinette Heading Canal Floodplain Removal Request for Conditional Letter of Map Revision for "Parkridge and Parkridge II" (Subdivision Development), prepared for Continental Homes by Coe and Van Loo, Consultants, Inc., September 1995.

Supplement to Marinette Heading Canal Floodplain Removal Request for Conditional Letter of Map Revision for "Parkridge and Parkridge II" (Subdivision Development), prepared for Continental Homes by Coe and Van Loo, Consultants, Inc., March 1995.

Deer Village Units 1, 2, 3 and 4, Final Drainage Report, prepared for Woodside Homes by Coe and Van Loo, Consultants, Inc., revised December 1996.

Deer Village Units 5 and 6, Final Drainage Report prepared for Woodside Homes by Coe and Van Loo, Consultants, Inc., December 1996.

Deer Village Unit 1, Revisions to Final Drainage Report, prepared for the City of Peoria, Arizona, by Coe and Van Loo, Consultants, Inc., March 1997.

Drainage Report for Alta Vista Estates, Units 1 and 2: Peoria, Arizona, prepared for Capital-Deer Valley, L.L.C., by the CMX Group, Inc., revised January 1997.

Drainage Report for Alta Vista Estates, Units 3 and 4: Peoria, Arizona, prepared for Capital-Deer Valley, L.L.C., by the CMX Group, Inc., revised January 1998.

Ironwood-Lake Pleasant Road and Williams Road, Peoria, Arizona, Final Drainage Plan, prepared for Fidelity Properties, L.L.C., by the CMX Group, Inc., revised September 1998.

Final Drainage Report for Eagle Canyon, prepared for A and B Investments, Inc., by American Engineering Company, revised May 1998.

Silverton Drainage Report, prepared for Beazer Homes Holdings Corp. by Sage Engineering Corp., August 1997.

Silverton HEC-RAS, HEC-FDA Summary, prepared for Beazer Homes Holdings Corp. by Sage Engineering Corp., August 1997.

Fletcher Heights, Phase 1: Final Drainage Plan Volume 2 of 2, Appendix F, prepared for Fulton Homes at Fletcher Heights by the CMX Group, Inc., revised March 1997.

Lake Pleasant Road and New River Road Corridor Study, DRAFT, prepared for Maricopa County Department of Transportation by Kirkham Michael Consulting Engineers, May 1999.

Final Drainage Report for Dove Valley Ranch Planned Area Development: Parcels 2, 3 and 5, prepared by Neil/McGill Consultants, Inc., revised October 1998.

Gila River Basin: Phoenix, Arizona, and Vicinity (including New River), Hydrology Part 2: Design Memorandum No. 2, prepared for FCDMC by U.S. Army Corps of Engineers, Los Angeles District, 1982.

Sun City Area Hydrologic Study, DRAFT, prepared by FCDMC, revised September 1998.

ACDC ADMS, Volumes I and II (New River and Skunk Creek areas), prepared for FCDMC by Kaminsky-Hubbard Engineering, Inc., July 1997.

2.0 TASKS

2.1 DATA COLLECTION AND EXISTING CONDITIONS ANALYSIS

2.1.1 The CONSULTANT shall conduct this portion of the study in accordance with Section 14.2, Data Collection and Existing Conditions Analysis, Consultant Guidelines, October 1, 1998.

2.1.2 The CONSULTANT shall review pertinent data from the DISTRICT and other outside sources. Data to be reviewed will include materials relevant to the project such as existing topographic mapping, as-built plans for existing structures, FEMA Flood Hazard Boundary Maps and any Letters of Map Amendment and/or Revisions, drainage reports, site plans and future drainage improvement plans and other pertinent information. Interviews should be arranged with the DISTRICT's On-Call Consultant for Planning and the appropriate agencies for information on

drainage problems in the area.

2.1.3 The CONSULTANT shall review the provided list of known flooding problems as well as identify any additional potential flooding areas. This data collection and existing conditions analysis will result in a preliminary list of problem areas suitable for evaluation during the Level I – Alternatives Formulation/Preliminary Analysis stage of this study. A preliminary list of flooding problem areas is provided in this section.

2.1.3.1 North side of ACDC Canal.

No provisions were made to convey water from subdivisions adjacent to the ACDC to the canal itself. Kaminsky-Hubbard (K-H) did a preliminary study for a 500-foot wide swath along the north side of the ACDC. The CONSULTANT shall review the K-H “500-foot swath” report on the local drainage problems adjacent to the ACDC. The CONSULTANT should verify the K-H sites in the field and investigate whether the problem sites are the same as during the time of the report. Anticipating concept design requirements, while in the field the CONSULTANT should identify locations where spot elevations are needed to support basic design concepts as well as measuring potential corridor locations between houses or buildings.

Given the age of the K-H report and the rapid pace of development in the Valley, the CONSULTANT should note changes in the flooding areas adjacent to the ACDC that may influence the problem sites, as well as changes in the contributing sub-basins west of 51st Avenue that may increase or decrease the volume of water that finds its way to the problem locations.

Results of the CONSULTANT's findings to this point should be conveyed to the Project Manager at the DISTRICT in a memorandum. At that time, there will be an informal prioritization of the problem sites (some may be eliminated). Those sites given high priority will be evaluated further during the Level I – Alternatives Formulation/Preliminary Analysis.

2.1.3.2 Ninety-first Avenue to the New River along Union Hills Drive.

As a partial “ultimate” discharge point, the Union Hills Storm drain (95 percent design plans) will accept the Q100 minus Q10, but the remainder of the 100-year flow will remain in the street. The CONSULTANT shall review the reports which provide background for the site and shall evaluate the hydrology for those contributing sub-basins reflecting any new development.

When the updated hydrology model has been developed the flow into the Union Hills Storm drain should be diverted within the HEC-1 model. The remainder of the flow should be split and routed, as appropriate, either down Union Hills Drive to the New River, or down 91st Avenue to Bell Road, and then east over to the New River or continue south through the existing subdivision to the New River at approximately the alignment of Thunderbird Road. The CONSULTANT shall check the outlet capacity of the channel leading to New River. The proportioning on the flow splits should be according to the street capacity, street slopes and topography at the arterial intersections.

If the arterial streets have sufficient capacity to carry the flows while observing the one drivable lane in each direction requirement, the analysis will be complete. A written summary of the findings should be prepared for the DISTRICT, along with the updated HEC-1 model and supporting documentation. If the streets do not have sufficient capacity, the site will be evaluated further during the Level I – Alternatives Formulation/Preliminary Analysis.

2.1.3.3 Ninety-first Avenue to the Agua Fria River along Beardsley and Bell Roads.

The south part of sub-basin 502 discharges to a channel along Beardsley Road which then flows towards the Agua Fria River. There is significant overflow from the adjacent subdivision lakes. Upon reaching the 115th Avenue channel, these additional and unanticipated flows cause the 115th Avenue channel to overtop. Design of aeration ponds for the adjacent treatment plant did not preserve an adequate corridor to the Agua Fria River for storm water

flows. Berms were subsequently constructed to divert water to the south. Local development to the south did not anticipate these diversions and did not design sufficient capacity into the system. A diversion constructed around an adjacent sand and gravel operation exacerbates the problem. As a result, flows cannot adequately reach the Agua Fria River resulting in flooding problems at and near 115th Avenue and Bell Road. The CONSULTANT shall take into account and assess current plans to design a channel down the Beardsley Road alignment.

2.1.3.4 Eighty-third Avenue to the New River north of Beardsley Road.

Flooding along the northerly reaches of 83rd Avenue is due to piecemeal development coupled with the lack of an overall drainage plan coordinated between Maricopa County and the City of Peoria. There are two types of problems: 1) Concentrated flow around developments that lack an ultimate discharge point. 2) Developments down-gradient of undeveloped areas result in substantial offsite flows impacting the development. Even when a developer "follows all of the rules" and accommodates offsite drainage around or through his development, there will be a discontinuity up and downstream.

2.1.3.5 Rock Springs Creek.

The DISTRICT is currently undertaking a Floodplain Delineation study for Rock Springs Creek (FCD No. 98-47, Stantec Consulting). Historically, the creek flowed south through sub-basins 540, 541, 542 and 553 to join the New River north of Beardsley Road. A field investigation reveals that the Creek has been diverted at a 90-degree angle at one point, diverted into an extended (> ¼ mile) box culvert and forced to travel along various man-made conveyance corridors. The most striking observation from an informal field investigation is the inconsistent sizing along the channel of the stabilization measures.

2.1.3.6 Channel along north side of Grand Avenue.

Flooding occurs along Grand Avenue at various points between the Agua Fria and New Rivers. Sun City was designed prior to most of the current retention policies or hydrologic master planning, resulting in a somewhat inconsistent drainage system. The capacity of the channel and the hydraulic structures along Grand Avenue should be verified.

2.1.3.7 Drainage on west side of Sun City.

Minor drainage channels along the west side of Sun City are undersized. On the uphill side, there is head cutting into the perimeter wall of Sun City. On the downstream side, water flows into the SRP easement north of Grand Avenue.

2.1.3.8 Beardsley Drainage Channel between Lake Pleasant Road and 107th Avenue.

Lakes designed for storm water runoff are kept too full to accommodate storm events. During relatively minor rainstorms the capacity of the lakes is exceeded resulting in overtopping.

2.1.3.9 Pinnacle Peak Road and 67th Avenue.

There have been repeated flooding problems in the subdivision south of Pinnacle Peak Road, east of the New River. Water from the upbasin undeveloped area impacts the subdivision along the northern perimeter. The first row (northern edge) of homes are elevated. However, off-site flows move west along the northern perimeter and are then directed into the subdivision, follow a circuitous route down steeply sloping local streets, including several right angle turns, and finally into a large storm drain in a cul-de-sac along the westerly edge of the sub-division. The storm drain flows west and discharges into a channel at the 75th Avenue alignment. The channel then discharges into New River.

2.1.3.10 Wier Wash.

Much development is currently underway in the Weir Wash area. The CONSULTANT shall identify all current and planned projects and evaluate drainage plans to anticipate potential drainage problems. The CONSULTANT should identify candidate segments of Weir Wash for floodplain delineation under Section 2.2 of this SOW.

2.1.4 The CONSULTANT shall prepare an inventory of drainage facilities that are being

planned by other public jurisdictions, irrigation districts or private development.

2.1.5 The CONSULTANT shall develop a comprehensive list of proposed development planned within the study area.

2.1.6 The CONSULTANT shall prepare an Existing Facilities Exhibit illustrating the location of man-made drainage facilities in the watershed. The condition, type and ownership of man-made facilities will be noted. These facilities will become part of the base map for alternatives. The CONSULTANT shall make maximum use of these facilities, where feasible, as part of the stormwater management plan alternatives. Base mapping will include land ownership, land use types, and soil types available from the DISTRICT. The land ownership maps will indicate whether property is publicly or privately held and the owning agency.

2.1.7 The CONSULTANT shall become familiar and give consideration to existing hydrologic studies and models, and assumptions made to assist with the new hydrologic analysis.

2.1.8 The CONSULTANT shall collect and compile a list of historic flooding information and drainage problem areas in the study area.

2.2 FEMA FLOODPLAIN AND FLOODWAY DELINEATION

2.2.1 This ADMP Update study will include A-Zone floodplain delineation studies and/or Letters of Map Revision (LOMRs), whichever is appropriate, at the following locations for submittal to the Federal Emergency Management Agency (FEMA).

2.2.1.1 Unnamed tributary wash to the Agua Fria River (approximately 4 miles in length) adjacent to Lake Pleasant Road (reference in Loop 303 drainage plan completed by HDR).

2.2.1.2 Unnamed wash flowing south through sub-basins 501 and 502 (approximately 2 miles in length).

2.2.1.3 Unnamed tributary wash to the New River (approximately 2 miles in length) flowing south-southwest through sub-basin 550.

2.2.1.4 Any washes or tributaries identified during the Weir Wash evaluation conducted in Section 2.1.3.10 of the SOW.

2.2.1.5 Unnamed wash flowing south through sub-basins 395, 396 and 397 (approximately 6 miles in length). The wash discharges to Arrowhead Ranch Lakes creating a possible overflow/sediment problem.

2.2.1.6 Small localized floodplains west of 91st Avenue, between Beardsley and Deer Valley Roads. CONSULTANT shall evaluate drainage and submit LOMRs where appropriate.

2.2.2 The CONSULTANT shall prepare Letter of Map Revision (LOMR) submittals in accordance with 44 CRF §65.8 Review of Proposed Projects and 44 CFR §65.6 Revision of Base Flood Elevation Determinations.

2.2.3 The CONSULTANT shall prepare floodplain delineations and FEMA submittals in accordance with Sections 11 and 12, Floodplain Delineation Studies, and FEMA Submittals, Consultant Guidelines, October 1, 1998. The CONSULTANT shall submit the delineations to the DISTRICT for review and approval prior to submittal to FEMA so that the DISTRICT can coordinate with the effected jurisdictions.

2.3 LEVEL I ANALYSIS – ALTERNATIVES FORMULATION/PRELIMINARY ANALYSIS

2.3.1 The CONSULTANT shall prepare the Level I Analysis in accordance with Section 14.3, Level I Analysis – Alternatives Formulation/Preliminary Analysis, Consultant Guidelines, October

1, 1998.

2.3.2 The CONSULTANT shall prepare an existing constraints map based on information derived from the existing data for presentation at a Brainstorming Meeting of the participants to initiate the Level I Analysis. The presentation shall identify existing flooding problem areas and the results from existing studies in the area. The CONSULTANT will provide several seed ideas for potential solutions and consideration. During the Brainstorming Meeting, the participants shall include any information provided by the Cultural, Environmental, Ecological, Visual and/or other analyses that have been conducted. The CONSULTANT shall document all the possible alternatives identified during the Brainstorming Meeting.

2.3.3 Based on the concepts identified in the Brainstorming Meeting, the CONSULTANT shall identify those alternatives which can be discarded with no or minimal analysis, and eliminated from further consideration.

2.3.4 The CONSULTANT shall identify possible project alternatives for mitigation of flooding and conveyance of storm flows.

2.3.5 The CONSULTANT shall recommend those alternatives to be studied further. The DISTRICT, with input from the study participants, will make the final selection of alternatives.

2.3.6 The CONSULTANT shall submit schematic drawings and a narrative description of the potential alternatives for review (Potential Alternatives Submittal). The purpose is to review and approve the alternatives prior to proceeding with the analysis. The drawings shall be sufficient to describe and compare the project requirements and alignment of the alternative. The narrative shall describe the alternatives and identify the advantages and disadvantages.

2.3.7 The CONSULTANT shall develop evaluation criteria with input from the participating agencies for evaluation of the alternatives and prepare a matrix by which alternatives can be evaluated by assigning scores to each of the evaluation criteria. Socioeconomic, physical and natural environmental, flood safety, and cultural and visual resource impacts are to be included, as applicable, in the evaluation criteria.

2.3.8 The CONSULTANT shall include a No-Action Alternative during development of the alternatives.

2.4 LEVEL II ANALYSIS – ALTERNATIVE ANALYSIS

2.4.1 The CONSULTANT shall prepare the Level II Analysis in accordance with Section 14.4, Level II Analysis – Alternative Analysis, Consultant Guidelines, October 1, 1998.

2.4.2 The CONSULTANT shall evaluate the approved alternatives with respect to potential flood safety issues by evaluating proposed future recreational facilities and develop a summary of potential flood safety needs/constraints for these facilities and identifying potential mitigation techniques such as augmenting the existing DISTRICT Alert System, the use of passive safety devices such as posting evacuation routes, and the role of public education.

2.4.3 The CONSULTANT shall evaluate the approved alternatives to determine the engineering feasibility and approximate costs. Conceptual design of the project features shall be limited to typical sizes and dimensions and shall be sufficient to determine the costs of major project components. Conceptual design will be based on the 100-year/6-hour, existing conditions runoff. Capital cost estimates shall include design, major construction items, rights-of-way, and major utility relocations.

2.4.4 The CONSULTANT shall prepare an Alternatives Summary presenting the alternatives and evaluation criteria to be reviewed by the Participants and used to evaluate the selected alternatives at a comparative level of detail. The CONSULTANT shall prepare a minimum of two (2) alternative solutions per identified problem site. An Alternative Evaluation meeting of the

Participants will be held to evaluate the alternatives. The CONSULTANT shall assemble the evaluations and identify the preferred alternative receiving the highest composite score based on the scores assigned by the reviewers. The preferred alternative may be comprised of multiple features, providing a collective solution.

2.4.5 (OPTIONAL) The CONSULTANT shall prepare up to an additional 12 alternative solutions for consideration by the public and project Participants during the Alternatives Analysis. These additional 12 alternative analyses would be distributed among all problem areas as needed.

2.5 LEVEL III ANALYSIS – PREFERRED ALTERNATIVE ANALYSIS

2.5.1 The CONSULTANT shall prepare the Level III Analysis in accordance with Section 14.5, Level III Analysis – Preferred Alternative Analysis, Consultant Guidelines, October 1, 1998.

2.5.2 The CONSULTANT shall refine the design and cost estimate for the preferred alternative identified in the Alternatives Analysis Report.

2.5.3 The CONSULTANT shall prepare Conceptual Design Plans (15 percent) which will identify the approximate sizes, slopes, profiles, alignments, cross-sections and plan and profile for proposed channels, culverts, basins and/or other features. These plans shall be presented on a 100-scale base drawing, containing available contour, utility, and right-of-way information.

Recreation, cultural, environmental, and/or ecological sites and aesthetic features shall be shown in project drawings where they are contained within the plan view of the drawings.

The landscape conceptual design plans (15 percent) will identify the geographic boundaries of proposed landscape treatment areas. The landscape treatment areas will correspond with the integrated drainage solution selected for each specific problem area. Schematic landscape treatments and cross-sections will be prepared for each problem area as appropriate.

2.5.4 The CONSULTANT shall present the Preferred Alternative to the participant. The Participants shall prioritize the features of the preferred alternative and the CONSULTANT shall include the prioritization in the final report.

2.6 MAINTENANCE PLAN

2.6.1 The CONSULTANT shall estimate maintenance requirements and costs for the preferred alternative on an annual basis. The life cycle to be used in calculations shall be 50 years.

2.6.2 The CONSULTANT shall prepare general maintenance and operation guidelines for operation and maintenance for features of the preferred alternative.

2.7 IMPLEMENTATION PLAN

2.7.1 The CONSULTANT shall prepare an implementation plan for the preferred alternative that shall document the available tools or procedures, including funding mechanisms, for implementing the results of the Project. The CONSULTANT shall prepare the necessary submittals for inclusion of the recommended projects in the DISTRICT's CIP Prioritization Process. Submittals will include addressing the Prioritization Procedure currently accepted by the DISTRICT. The CONSULTANT shall identify tools, such as existing ordinances and regulations, for each jurisdiction within the study area that may be modified or created to encourage development standards that are compatible with the Project.

2.8 FIELD SURVEY AND MAPPING

2.8.1 The CONSULTANT shall evaluate and verify the usefulness of existing aerial and topographic mapping and survey work within the ADMP Update area.

2.8.2 The CONSULTANT shall obtain supplemental field surveys as needed of bridges, culverts, and drainage structures when record drawings or previous survey data is not available. Benchmark control data shall be provided by the DISTRICT from the control survey established for the aerial mapping to be provided under Task 2.8.4 following herein. At least two recoverable control points, located within one mile of each study area to be surveyed, shall be provided by the DISTRICT for the CONSULTANT'S use in the supplemental survey.

2.8.3 The aerial mapping control survey for Task 2.8.4 herein (and hence all supplemental surveys), shall tie to the Maricopa County Department of Transportation's control system where available. If not available, the control survey shall be referenced to the DISTRICT's Glendale/Peoria structural control for New River and Adobe Dams.

2.8.4 The CONSULTANT shall coordinate with the DISTRICT'S on-call aerial mapping and survey consultants who will prepare aerial photography at a scale of 1:7200 (1 inch = 600 feet) and digital topographic mapping at a scale of 1 inch = 200 feet with a 2-foot contour interval for a half-mile wide band along the points of detailed study (approximately 20 linear miles). The CONSULTANT will work with the DISTRICT to identify the specific limits of mapping. The contour map will be derived from a digital terrain model using break lines and a 50-foot spacing grid of mass points. Planimetric data will be compiled in separate layers to facilitate translation to the DISTRICT's HIS database. Only major landmark buildings will be compiled. Spot elevations shall be placed along roadways, and in road intersections, saddles, depressions, and on significant tops.

2.8.5 The CONSULTANT shall establish five (5) Elevation Reference Markers (ERMs) for the Zone A floodplain delineations of Task 2.2 herein. The final location of the ERMs shall be proposed by the CONSULTANT and approved by the DISTRICT prior to surveying (and possibly setting) the final monumentation. Any new monumentation shall be set in accordance with Section 11.3.4.2, of the Consultant Guidelines, October 1, 1998.

2.9 HYDRAULIC ANALYSIS

2.9.1 The CONSULTANT shall prepare preliminary hydraulic analysis in accordance with Chapter 10, Hydraulics, Consultant Guidelines, October 1, 1998.

2.9.2 The CONSULTANT shall prepare hydraulic analysis for bridge crossings and culverts as applicable.

2.9.3 The CONSULTANT shall prepare digital deliverables in accordance with the DISTRICT's Data Delivery Specifications, Revision 3.1, June 1998. The CONSULTANT will submit the following coverages:

PRJ	Project Boundaries	CP-60
DQ	Data Quality	CP-410
NDXPRJ	Map Sheet Boundaries	CP-40
FPCTLFCD	Elevation Reference Marks	CP-523
FPZNFCD	Floodplain Zones	CP-550

2.10 HYDROLOGIC ANALYSIS

2.10.1 The CONSULTANT shall prepare preliminary hydrologic analysis in accordance with Chapter 9, Hydrology, Consultant Guidelines, October 1, 1998.

2.10.2 The CONSULTANT shall prepare or update the following hydrologic models:

2.10.2.1 South of Skunk Creek, north of the ACDC, west of 51st Avenue, and east of 71st Avenue. Using the Kaminski-Hubbard ACDC ADMS study hydrology as a basis, the

CONSULTANT shall develop a more detailed hydrologic analysis by splitting the previously identified sub-basins where needed. The analysis will include an identification of the aerial extent of flooding (i.e., the number of homes potentially flooded).

2.10.2.1.1 The CONSULTANT shall update and refine the current Existing Condition 100-year/24-hour, 100-year/6-hour, and 10-year/6-hour hydrology with sub-basins and points-of-concentration defined as applicable for the model frequency. Updated DDMS files shall be included.

2.10.2.1.2 The CONSULTANT shall update the current Future Condition 100-year/24-hour, 100-year/6-hour, and 10-year/6-hour models with sub-basins and points-of-concentration defined as applicable for the model frequency. The CONSULTANT should assume that 80 percent of retention requirements (100-year/2-hour volume) are met for Future Conditions modeling. A DDMS update shall be included.

2.10.2.1.3 The CONSULTANT shall develop runoff hydrographs for input to the updated models for all areas east of 51st Avenue. These input hydrographs shall be generated using the existing HEC-1 modeling documented in the Kaminski-Hubbard ACDC ADMS. No modifications or updating of data east of 51st Avenue will be performed as part of this project.

2.10.2.2 South of New River Dam, north of Skunk Creek and the Sun Cities, west of the 51st Avenue alignment, and east of the Agua Fria River (the numbered sub-basins as identified in the ACDC hydrologic models prepared by Kaminski-Hubbard).

2.10.2.2.1 The CONSULTANT shall update the Existing Conditions 100-year/24-hour, 100-year/6-hour, and 10-year/6-hour models with sub-basins and points-of-concentration defined as applicable for the model frequency. The CONSULTANT shall update the sub-basin boundaries as needed. A DDMS update shall be included.

2.10.2.2.2 The CONSULTANT shall prepare Future Conditions 100-year/24-hour, 100-year/6-hour, and 10-year/6-hour models with sub-basins and points-of-concentration defined as applicable for the model frequency. The CONSULTANT should assume that 80 percent of retention requirements (100-year/2-hour volume) are met for Future Conditions modeling.

2.10.2.2.3 The CONSULTANT shall modify the northeastern drainage area boundary from approximately Pinnacle Peak Road to the CAP.

2.10.2.3 Sun City north of Grand Avenue (as defined in the Sun City Area Hydrologic Study, DRAFT, prepared by the DISTRICT).

2.10.2.3.1 The CONSULTANT shall verify the input assumptions made for the Sun City Area Hydrologic Study, DRAFT, north of Grand Avenue. The DISTRICT study includes only the Existing Conditions 100-year/6-hour model.

2.10.2.3.2 The CONSULTANT shall incorporate the DISTRICT's Existing Conditions 100-year/6-hour model into the overall model for the ADMP. The CONSULTANT shall prepare the Existing Conditions 100-year/24-hour and 10-year/6-hour models with sub-basins and points-of-concentration defined as applicable for the model frequency.

2.10.2.3.3 The CONSULTANT shall prepare Future Conditions 100-year/24-hour, 100-year/6-hour, and 10-year/6-hour models with sub-basins and points-of-concentration defined as applicable for the model frequency. The CONSULTANT should assume that 80 percent of retention requirements are met (100-year/2-hour volume) for Future Conditions modeling.

2.10.2.4 North of Grand Avenue to the northern ADMP Update study area boundary, west

of the Sun City Area Hydrologic Study, and east of the Agua Fria River 100-year floodplain (portions of sub-basins BBB and CCC).

2.10.2.4.1 The CONSULTANT shall prepare Existing Conditions 100-year/24-hour, 100-year/6-hour, and 10-year/6-hour models with sub-basins and points-of-concentration defined as applicable for the model frequency.

2.10.2.4.2 The CONSULTANT shall prepare Future Conditions 100-year/24-hour, 100-year/6-hour, and 10-year/6-hour models with sub-basins and points-of-concentration defined as applicable for the model frequency. The CONSULTANT should assume that 80 percent of retention requirements (100-year/2-hour volume) are met for Future Conditions modeling.

2.10.3 The CONSULTANT shall provide the same hydrology models incorporating the hydrologic effects of the preferred alternative(s) and features once identified through this ADMP Update.

2.10.4 The CONSULTANT shall prepare a package for use by the DISTRICT, Peoria, Glendale, and other designated users that contains the final Hydrology model, the CAD watershed map, and a brief information packet. The information packet will describe the model and main assumptions, the restrictions on use, and will reference people to contact when using or modifying the model. The information packet will be developed and reviewed by the users listed above. The three items listed above will be placed on CD ROM and submitted with an additional hard copy of the information packet at the end of the project.

2.10.5 The CONSULTANT shall prepare digital deliverables in accordance with the DISTRICT's Data Delivery Specifications Rev. 3.1 June 1, 1998. The CONSULTANT will submit the following coverages:

PRJ.REL	Contract Name/ID	CP-430
PRJ	Project Boundaries	CP-60
DQ	Data Quality	CP-410
DRNBSN	Drainage Basin	CP-920
DRNPATH	Drainage Paths	CP-930
LAKE	-----	CP-950
CULVERTS	-----	CP-620

2.10.6 (OPTIONAL) Arrowhead Ranch Lakes Analysis for the Lakes and Legends Communities north of ADOT Loop 101 (Beardsley Road alignment) (Subbasins 397, 398B, and 570).

At the option of the DISTRICT, a detailed hydrologic study will be performed for this area. Currently, most of the runoff from offsite areas and the developed residential communities within this study area drain directly to a series of lakes that are situated internally within the Arrowhead Ranch Lakes and Legends communities. The lakes were primarily designed to provide a source of irrigation water for the adjacent golf courses by storing effluent and/or pumped well water and as an aesthetic feature. Surcharge storage of approximately 3-feet was also designed into the overbank areas of the lake for the attenuation of onsite and offsite area runoff. For its design, the lake system hydrology was modeled for a 100-year/24-hour storm using the NRCS (formerly SCS) TR20 model. Each lake employs a series of weirs that control the operational water surface and the flood flow water surface. Storm flows cascade through the system and ultimately outfall to one of two locations along the perimeter of the study area. The main outfall is located just north of Loop 101 at approximately the 55th Avenue alignment. The second outfall is located at 67th Avenue approximately 0.5 miles south of Deer Valley Road. The system on a whole, has reportedly never been completely as-built and hydrologically analyzed for the as-built conditions. Glendale has received complaints from the community homeowner's associations regarding flooding problems with the lakes. It is requested by the City of Glendale, that the entire lake system be hydrologically updated in detail for the as-built, existing lake conditions to assess the potential operation of the lakes during the design 100-year/24-hour event.

The CONSULTANT shall obtain all available design data for the lakes including design and construction drawings and as-builts, the design report and TR20 models, and any drainage reports of subdivisions developed within area. The CONSULTANT shall also meet with representatives of the homeowners associations and appropriate maintenance personnel to identify and document their concerns regarding flooding problems, and to identify the current lake operational procedures. The CONSULTANT shall model in detail the lake systems for the 100-year, 24-hour existing and future condition storms. The entire watershed for this study area shall be updated to current County methodology. The CONSULTANT shall perform adequate field surveys of the lake system weirs to establish the as-built conditions and develop stage/discharge rating relations for each lake. The CONSULTANT shall also develop stage/storage and other routing parameters using the 1990 topographic mapping developed for the ACDC ADMP (to be supplied by the DISTRICT).

The CONSULTANT shall summarize the results of the as-built surveys and hydrologic analyses in a report. If problem areas are identified, the CONSULTANT shall also summarize those areas in the report and present the overall findings to the DISTRICT and Glendale for discussion.

Mitigative measures may be formulated to address problem areas identified in the analysis. At the option and direction of the DISTRICT, the CONSULTANT shall conduct Level I, II, and III Alternative Analyses. For viable alternatives, the CONSULTANT shall prepare 15 percent conceptual level design plans of the proposed solution(s). These will be presented in the Alternatives Analysis Report and Recommended Design Report.

2.11 LAND OWNERSHIP, RIGHT-OF-WAY AND EASEMENTS

2.11.1 The CONSULTANT shall review assessor parcel ownership maps and identify which properties will be affected by the preferred alternatives.

2.11.2 The CONSULTANT shall identify permanent and temporary right-of-way and easement requirements necessary for the preferred alternatives. The CONSULTANT will identify the right-of-way in the specific areas of alternatives that are to be given a level II evaluation. The DISTRICT will provide all GIS right-of-way information available to the CONSULTANT. The remaining right-of-way will be researched and drawn on the alternative study area base sheets by the CONSULTANT. Only right-of-way information needed to obtain approximate areas of additional right-of-way or easements necessary to construct the alternatives will be identified.

2.11.3 The CONSULTANT will identify any necessary rights-of-entry within the study area. The DISTRICT will obtain any necessary rights-of-entry for the study area and furnish the CONSULTANT with Right-of-Entry letters.

2.12 ENVIRONMENTAL OVERVIEW

2.12.1 The CONSULTANT shall prepare an Environmental Overview analysis in accordance with Chapter 7, Environmental Requirements, Consultant Guidelines, October 1, 1998. The Environmental Overview shall include a comparative analysis for each of the alternatives identified to include socioeconomic, physical and natural environmental impacts, and cultural aspects of the study area. This comprehensive analysis shall address all of the major environmental disciplines and identify any potential problem areas (fatal flaws) that might exist.

2.12.2 Environmental Permits and Approvals. For the Preferred Alternative, the CONSULTANT shall be responsible for identifying project-specific plan approvals, permits, or licenses from other agencies that will be required. Other agencies may include, but may not be limited to: municipalities, tribal governments, the U.S. Environmental Protection Agency (EPA), the Maricopa County Department of Environmental Services (MCDES), the Arizona Department of Environmental Quality (ADEQ), the Arizona Department of Water Resources (ADWR), the Army Corps of Engineers (ACOE), railroads, utilities, and water districts. The primary emphasis of this

task is to identify the Section 404 permit requirements. Requirements for permits shall be documented in the Implementation Plan.

2.12.3 Cultural Resources Assessment.

2.12.3.1 The CONSULTANT shall complete a Class I Survey and an Archeological Assessment to identify any prehistoric and historic resources for the entire study area. The purpose of the archeological inventory is to determine the effects of each proposed alternative on the identified cultural resources.

2.12.3.2 The CONSULTANT shall prepare a report documenting the results of the archeological assessment. The report shall describe the size, features and significance of any identified or known cultural resources (up to and including one mile outside the study boundaries on the north and east sides) and the potential impact of the preliminary project alternatives on the sites based on existing information. The report shall include recommendations for further study and associated costs, including testing or mitigation, if required. In addition, the CONSULTANT shall map (hand draw) the sites on USGS 7.5 minute quad maps and on aerial photos. Aerials to be provided by the DISTRICT. Digital mapping will not be required. The DISTRICT will provide the results of cultural investigations being completed for current projects on the Agua Fria and New Rivers.

2.12.4 Environmental Regulatory Records Review.

2.12.4.1 The CONSULTANT shall conduct a search of the federal, state, and local environmental lists and databases located in the project area and their respective search radius (ASTM 1527 - 97) for each proposed alternative.

2.12.4.2 The CONSULTANT shall document the locations of the regulatory sites on the area map. The CONSULTANT shall include a brief description of the regulatory sites which should include, the descriptive location of the site, the type of regulated substance or waste at the site, the extent of the contamination, the status of the site (i.e. closed or open status), remediation plans of the site, and the named potentially responsible party(s). The CONSULTANT is not expected to conduct extensive file review on the identified regulatory sites to obtain this information.

2.12.4.3 The CONSULTANT shall recommend alternative locations and/or solutions to avoid costly remediation if any of the proposed alternatives appears to require land that is listed as a regulatory site or may be affected by a regulatory site.

2.12.4.4 The CONSULTANT shall make a qualitative estimate of the general cost to investigate and remediate the potential problem resulting from the regulatory sites in terms of relative magnitude, i.e. high, moderate or low. The information will be used in the analysis of the alternatives.

2.12.5 Ecological Assessment.

2.12.5.1 The CONSULTANT shall conduct a non-intensive field survey and use current aerial photographs to identify and map the existing ecological resources within the project area including the riparian vegetation communities (xeric, meso and hydrophytic), wildlife, sensitive species and critical habitat, water resources, and potential wetlands. Upland vegetation communities will not be mapped. The CONSULTANT shall contact the U.S. Fish and Wildlife Service (USFWS) and the Arizona Game and Fish Department (AGFD) to obtain information regarding the presence of listed Threatened and Endangered Species, Wildlife Species of Special Concern, and designated critical habitat in the project area.

2.12.5.2 The CONSULTANT shall determine the effects of each of the proposed alternatives on the identified ecological resources and any identified sensitive species or habitat.

2.12.5.3 The CONSULTANT shall prepare a report summarizing the results of the ecological assessment. The report shall include a description and maps or aerial photographs (scale: 1 inch = 400 feet) depicting the locations of the identified ecological resources. In addition, the report shall describe the identified effects of each alternative on the ecological resources. The CONSULTANT shall recommend methods to avoid or minimize any negative effects the proposed alternatives may have on the ecological resources. If any of the negative effects can not be avoided or minimized, then the CONSULTANT shall make a qualitative estimate of the general mitigation costs for the negative effects in terms of the relative magnitude, i.e. high, moderate or low. This information will be used in the analysis of the alternatives.

2.12.6 Title VI Environmental Justice Assessment. The CONSULTANT shall document and map the social and economic attributes of the citizens affected by this study using current census data (1995 preferred). The factors prohibited from serving as a basis for action or inaction which discriminates include, race, color, national origin, sex, age, and handicap/disability. Therefore, the efforts to prevent discrimination must address, but not be limited to a program's impacts, access, benefits, participation, treatment, services, contracting opportunities, training opportunities, investigations of complaints, allocations of funds, prioritization of projects and the functions of right-of-way, research, planning and design.

2.13 VISUAL RESOURCES AND MULTIPLE USE OPPORTUNITIES ASSESSMENT

2.13.1 Visual Resources Assessment. The purpose of this assessment is to identify aesthetic features and geographic units of the study area that may be preserved, enhanced, or improved. The units will serve as the basis for establishing landscape design themes and the future desired character for each alternative.

2.13.1.1 The CONSULTANT shall delineate the existing landscape character units within the study area. The units should be delineated based on land use, landforms, spatial enclosure, land marks, and/or vegetation conditions within the study area which give each unit an identifiable character and sense of place. The landscape character units will be mapped and documented with photographs of each unit cross referenced to their location on the map. A brief narrative will be prepared describing each unit.

2.13.1.2 The CONSULTANT shall prepare a visual analysis map and brief narrative that identifies distinct features (cultural or natural), areas of low feature/visual diversity, major viewpoints within and adjacent to the study area, opportunities for aesthetic improvements/restoration, and areas to be preserved because of their inherent aesthetic value (visual diversity).

2.13.1.3 The CONSULTANT shall prepare a map and brief narrative of the existing visual conditions to identify relative levels of intactness of natural and cultural features. This information may be included on the visual analysis map.

2.13.1.4 The CONSULTANT shall assess the extent to which existing flood control facilities and their related features incorporate the aesthetic treatment guidelines contained in the DISTRICT's Policy for the Aesthetic Treatment and Landscaping of Flood Control Projects. In cases where existing flood control facilities are found to be in non-conformance with the DISTRICT's aesthetic treatment policy, the CONSULTANT shall identify possible measures for retrofitting existing facilities to achieve consistency with the policy.

2.13.1.5 The CONSULTANT shall utilize the visual resource assessment to develop the desired landscape character themes (visions) for each alternative that will protect and enhance local community character and create aesthetic value. The CONSULTANT shall prepare graphic exhibits which may include rendered conceptual plans, cross sections, sketches, simulations and/or other media appropriate for public communication that illustrates the desired landscape character and aesthetic features for the recommended alternative for

use in future design phases. The CONSULTANT shall identify ways to enhance public landscape viewing opportunities through the location, orientation and design of the recommended alternative.

2.13.2 Multiple-Use Opportunities Assessment. The purpose of this assessment is to serve as a basis for the formulation of alternatives that will provide flood control functions while maximizing opportunities to meet local community needs for recreation, open space, protection and enhancement of natural landscape and local community character, alternative forms of transportation, and/or ground water recharge.

2.13.2.1 The CONSULTANT shall inventory and map existing and future planned land uses, including recreation sites, open spaces, transportation systems and nodes, residential, commercial, educational, and industrial centers within the study area and including the area within one-mile of the study area. The CONSULTANT shall also review the inventory of existing conditions including the natural and/or cultural landscape features. The DISTRICT will provide data and resource mapping prepared by Carter-Burgess for the West Valley Recreation Corridor Study. This information will be illustrated on the site inventory map(s), and a brief narrative explaining the site inventory map will be prepared.

2.13.2.2 The CONSULTANT shall prepare a planning influences map that identifies the opportunities and limitations based on the analysis of the site inventory and visual analysis information. A brief narrative will be prepared to describe the planning influences map.

2.13.2.3 The CONSULTANT will utilize the inventory and analysis information and the planning and design requirements for flood control to identify and describe the types of multi-uses that might be appropriately incorporated into the alternatives developed for flood control management. The CONSULTANT shall briefly describe the benefits associated with integrating the identified multiple-use opportunities into the various alternatives. The multiple-use opportunities will be delineated on a map and briefly described.

2.13.2.4 The CONSULTANT shall identify and briefly describe, in general, potential partners and funding sources for implementation of multiple-use opportunities for each alternative.

2.13.2.5 The CONSULTANT shall identify design guidelines for integration of multi-use opportunities with flood control management facilities to guide subsequent design phases for the recommended alternative.

2.14 PUBLIC INVOLVEMENT

2.14.1 The CONSULTANT will plan and conduct a total of six open houses/public meetings throughout the Update study area in conjunction with this study. Meetings may serve any of the following functions:

2.14.1.1 Open House/Public Meeting to inform the public of the purpose and scope of the study, including the floodplain delineation components of the study, and to receive comments and concerns.

2.14.1.2 Open House/Public Meeting to present project alternatives to be studied and/or to present the results of the floodplain delineation study, and to receive public comments. The purpose of the meeting shall be to request public input regarding the alternatives, their preferences, and any recommendations they may have for other alternatives that need to be evaluated. In addition, the meeting will be to obtain public comment on the floodplain delineation study results. Any public meetings in conjunction with the floodplain delineation component of this study must take place prior to the submittal of floodplain delineation studies to FEMA.

2.14.1.3 Open House/Public Meeting to inform the public and obtain public comment on the study results. The purpose of the meeting is to present the results of the alternative analysis and the recommended alternative.

2.14.2 The CONSULTANT shall be responsible for the preparation of handouts and display boards for open houses and/or public meetings (assume 500 handouts/comments sheets per open house meeting). The CONSULTANT will be responsible for the preparation of all the graphic displays for neighborhood meetings and public agency board meetings. The CONSULTANT will provide, in digital and printed format, an exhibit showing the general project features or project impact area suitable for reproduction or publication.

2.14.3 The CONSULTANT shall chair the meetings as necessary. The CONSULTANT shall participate in the presentation, and respond to questions as required by making formal presentations or by written document addressing the issue.

2.14.4 The CONSULTANT shall provide required refreshments.

2.14.5 The CONSULTANT shall prepare a summary of the open houses and neighborhood meetings, including concerns raised by the public.

2.14.6 (OPTIONAL) The CONSULTANT shall participate with the DISTRICT in up to 20 miscellaneous meetings as requested by the DISTRICT, including any City or Town Council Meetings or Work-Study Sessions to present the study effort purpose, scope and progress to date. It is anticipated that illustration boards and graphics prepared for the open houses will be used to partially fulfill the needs for this task.

2.14.7 The CONSULTANT will provide all public notification and/or placement of the required legal advertising.

2.14.8 At the start of the project the CONSULTANT shall prepare a one-page front and back, tri-color, tri-fold project brochure for distribution to the public (assume 5,000 total), providing the project purpose, background, history, schedule, and points-of-contact. The DISTRICT will provide final review and approval of any document to be sent to the public. The CONSULTANT will mail any documents using a mailing list approved by the DISTRICT.

2.14.9 (OPTIONAL) Up to 7,000 additional brochures will be prepared and distributed as directed by the DISTRICT.

2.14.10 The CONSULTANT shall prepare two project milestone (as defined by the DISTRICT) newsletters/project status updates for distribution to the public (assume 5,000 x 2 distributions), the project participants, and other interested parties. The newsletter/update will provide at a minimum a project update of work conducted during the previous time-period, work to be conducted during the next time-period, upcoming events, questions and answers to questions identified during the study effort, and the project schedule. The DISTRICT will provide final review and approval of any document to be sent to the public. The CONSULTANT will mail any documents.

2.14.11 (OPTIONAL) Up to 7,000 additional newsletters will be prepared and distributed as directed by the DISTRICT.

2.14.12 Early in the project the CONSULTANT shall develop internet webpages for the project to communicate project information and status. Webpages shall be updated at project completion to include project results. Content, format and design of the webpages shall be approved by the DISTRICT. The webpages shall be linked to the DISTRICT website.

2.14.13 (OPTIONAL) The CONSULTANT shall be responsible for the establishment and maintenance of a voice-mail hotline. The hotline will allow the public to leave a voice-mail message which will provide another medium for the public to comment on the project. The

hotline will be checked at appropriate intervals, but in no case more than every second day, and the messages will be summarized in a weekly report. If a message requires a verbal or written response, the appropriate DISTRICT or CONSULTANT personnel will be contacted. The message summary will contain information on who and what response was provided to the caller.

2.15 UTILITIES

2.15.1 The CONSULTANT shall identify major existing utilities for the alternatives. Utilities shall be identified within the project construction limits that may impact the project. The alignment of the utilities shall be shown on the alternative sketches and in the Conceptual Design Plans. Estimates of the cost to relocate or realign the utilities shall be included in the project cost estimates as a separate line item. The CONSULTANT shall contact each utility company that has facilities, known or suspected, within the project area, to request the alignment and size of the utility facilities. Record drawings shall be obtained to ascertain all underground utility locations. Where record drawings are not available, blue stake services shall be utilized to locate the horizontal alignment of the underground facilities.

2.15.2 The CONSULTANT shall provide the vertical location of sanitary and storm sewers which will be determined from field surveys as appropriate.

2.16 SITE VISITS

2.16.1 The CONSULTANT shall make site visits as necessary to become familiar with existing conditions.

2.16.2 The DISTRICT will conduct three site visits, generally as follows:

2.16.2.1 Site visit to orient the CONSULTANT and the DISTRICT with the project area, and to determine any initial conflicts or opportunities.

2.16.2.2 Site visit near the end of the Alternatives Analysis. This site visit shall incorporate any environmental, ecological or cultural field review as appropriate.

2.16.2.3 Site visit during the Preferred Alternative Analysis and to verify that the conditions have not significantly changed during the final stages of the project.

2.17 MEETINGS

2.17.1 The CONSULTANT shall meet with the jurisdictions, other affected agencies and utilities as required, generally being held at their offices. The DISTRICT shall be kept informed of all such meetings, and shall attend the meetings whenever possible and as required. The DISTRICT shall be copied on all meeting minutes.

2.17.2 The CONSULTANT is responsible for the minutes of any meetings and shall include copies of minutes of meetings, telephone conversations, and correspondence to the DISTRICT in the Project Administrative Report.

2.17.3 The CONSULTANT shall participate in the following specific meetings, monthly progress meetings and other meetings as dictated by the project. Meetings, when possible, will be generally held at municipality offices or at the CONSULTANT office.

2.17.3.1 Kick Off Meeting. The CONSULTANT shall meet with the DISTRICT to submit the project schedule (completed in Microsoft Project 98 or compatible software) that shall include dates of all proposed submittals and review meetings, and to discuss the schedule and the tasks necessary to accomplish it. The CONSULTANT shall bring the key project team members, including the project checkers, to the meeting to introduce them to the DISTRICT staff who will be working on the project. The DISTRICT will give available aerial topographic mapping to the CONSULTANT at this time.

2.17.3.2 Data Collection Report Review Meeting. The CONSULTANT shall meet with the DISTRICT Project Manager to review the overall project status and to discuss the Data Collection Report review comments which will be provided to the CONSULTANT at the meeting. The CONSULTANT should be prepared to explain all information and any assumptions made up to this point. Any problems will be identified and discussed.

2.17.3.3 Alternatives Brainstorming Meeting. A brainstorming session with the participants to discuss existing flooding problems, existing studies and to identify potential solutions.

2.17.3.4 Alternative Evaluation Meeting. A meeting with Review Committee members to evaluate the alternatives.

2.17.3.5 Landscaping and Aesthetics Committee Meeting No. 1. A meeting with the DISTRICT's Landscaping and Aesthetics Committee to review landscaping issues.

2.17.3.6 Alternatives Analysis Report Review Meeting. Three weeks after submittal of the Alternatives Analysis Report, the CONSULTANT shall meet with the DISTRICT Project Manager to review the overall project status and to discuss the Alternatives Analysis Report review comments. The CONSULTANT should be prepared to discuss alternative flood mitigation solutions and the preliminary cost estimates.

2.17.3.7 Feature Prioritization Meeting. A meeting with the participants to discuss implementation of the Recommended Plan and develop project priorities and phasing.

2.17.3.8 Landscaping and Aesthetics Committee Meeting No. 2. A meeting with the DISTRICT Landscaping and Aesthetics Committee to review final landscaping issues.

2.17.3.9 Recommended Design Report and Preliminary Plans Submittal Meeting. Three weeks after submittal of the Recommended Design Report and Preliminary Plans, the CONSULTANT shall meet with the DISTRICT Project Manager to review the overall project status and to discuss the Recommended Design Report. The CONSULTANT will be prepared to explain all assumptions and calculations completed up to this point. Any problems will be identified and corrective actions agreed upon at this meeting. The CONSULTANT will make any necessary corrections and provide written responses to all comments and will resubmit the Recommended Design Report Preferred Alternative and Preliminary plans as required to the satisfaction of the DISTRICT.

2.17.3.10 Final (100 percent) Submittal Meeting. The CONSULTANT shall meet with the DISTRICT Project Manager to make the final submittal of the hydrology and hydraulic analyses, the alternative flood mitigation solutions, the cost estimates, and the final recommended solution as revised per the Recommended Design Report review comments. The CONSULTANT shall supply the hydraulic data and plans on 3.5-inch diskettes or CDs. The plans should be in AutoCAD version 13 format. A Final Performance Evaluation will be completed at this time.

3.0 PROJECT ADMINISTRATION

The CONSULTANT shall prepare project schedules and projected billings in accordance with Section 2.0 of the Consultant Guidelines with the following inclusions or exceptions:

3.1 SCHEDULE

3.1.1 The project schedule outline will be consistent with the numbering and tasks defined in this SOW and the fee proposal.

3.1.2 The CONSULTANT shall prepare a significant event calendar in Microsoft Project 98 or

compatible software that shows, at a minimum, general timeframes for participant, agency and public meetings, and submittal milestones. The CONSULTANT shall update the calendar as necessary and provide it to the DISTRICT Project Manager, to keep it current.

3.2 INVOICES

3.2.1 The CONSULTANT will submit a projection of monthly project billings within 14 days of Notice to Proceed (NTP). The projected billing will be consistent with the tasking of the SOW, the project schedule and the fee proposal.

3.2.2 The DISTRICT will provide a general format for invoices. The invoices will be consistent with the tasking of the SOW, project schedule, fee proposal and projected billing.

3.2.3 The CONSULTANT shall submit invoices to Accounts Payable, Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona 85009. A copy of the invoice will be forwarded to the DISTRICT Project Manager.

3.2.4 The CONSULTANT shall submit progress reports with each invoice reflecting the work completed during the previous pay period. The DISTRICT will provide the CONSULTANT with the desired format.

3.3 PROJECT MANAGEMENT

3.3.1 The CONSULTANT shall appoint a Project Manager who shall be knowledgeable of the progress of each phase of the project. The Project Manager shall be the same person listed in the CONSULTANT Technical Proposal unless otherwise approved by the DISTRICT. The Project Manager shall be the point of contact for the DISTRICT. The CONSULTANT Project Manager shall attend all meetings as required by the DISTRICT. The CONSULTANT Project Manager shall keep the DISTRICT informed of all coordination with outside agencies and other affected parties. The DISTRICT may terminate this agreement if the Project Manager is not available or if the CONSULTANT is unable to provide a replacement Project Manager acceptable to the DISTRICT. The DISTRICT may request replacement of the Project Manager if the DISTRICT determines that this would be in the best interest of the project.

3.4 REPORTS

3.4.1 All reports shall be submitted to the DISTRICT for review in draft form. Upon receipt of review comments, the CONSULTANT shall incorporate appropriate revisions and complete the report.

3.4.2 The CONSULTANT shall provide the DISTRICT, in the project schedule, a three-week review period for each submittal.

3.4.3 Data Collection Report. The Data Collection Report will contain a description of information collected for this project. Other data collected pertinent to the project should also be contained in the Data Collection Report. Existing major natural washes and existing and planned man-made drainage facilities in the watershed should be shown on the Existing Facilities Exhibit to be submitted with the Data Collection Report. The Existing Facilities Exhibit will be prepared in AutoCAD format.

3.4.3.1 The Data Collection Report should include the following as applicable:

- Executive Summary
- Project Description
- Scope of Project
- Data Collection Results
 - Current Conditions
 - Areas of Flooding

- Existing and Future Development Plans
- Areas and Locations of Potential Flooding
- Existing and Future Drainage Facilities
- Environmental Overview
 - Environmental Permits and Approvals
 - Biological Survey Analysis
 - Cultural Resources Analysis
 - Environmental Regulatory Records Review
- Visual Resources and Multi-Use Opportunities Assessment
- Land
 - Parcel Ownership
 - Rights-of-Entry Requirements
- Hydrology/Hydraulics Models
 - Summary of Models/Conditions
 - Concerns
- Major Utilities
- Existing Facilities Exhibit
- References/Figures

3.4.4 Alternative Analysis Report. The Alternative Analysis Report shall be prepared containing narrative descriptions of the alternatives considered and discarded, the alternatives selected for analysis, the results of the analysis of alternatives, and comparative cost estimates. The advantages and disadvantages and general impacts of each alternative shall be identified. The recommended alternative shall be identified in the report.

3.4.4.1 The Alternatives Analysis Report Format should include the following as applicable:

- Summary
- Description of Study Area
- Scope of Project
- Environmental Overview
 - Socioeconomic Environment
 - Physical and Natural Environment
 - Cultural Resources
- Visual Resources and Multi-Use Opportunities Overview
- Alternatives Descriptions/ Sketches
- Alternatives Eliminated
- Cost Estimates
- Evaluation Criteria/Matrix
- Evaluation of Alternatives
- References/Figures

3.4.5 Recommended Design Report. The CONSULTANT shall prepare a Recommended Design Report which will include engineering design guidelines to maintain 100-year conveyance, landscaping, habitat and recreation considerations, cost estimates and Conceptual Design plans.

3.4.5.1 The Recommended Design Report should include the following as applicable:

- Summary
- Description of Study Area
- Scope of Project
- Evaluation Criteria
- Selection of Preferred Alternative
- Recommendations to Regulators
- Environmental Overview Summary
- Visual and Multi-Use Overview Summary
- Costs
- Priority of Features

Maintenance Plan
Implementation Plan
References/Figures
Disk or CD ROM Copies of applicable hydrologic, hydraulic models

3.4.5.2 Conceptual Design Plans:

Indicate existing topography.
Indicate cultural, biological, environmental impact areas.
Indicate conveyance criteria – approximate size and configuration, invert, typical cross-section.
Indicate conflicting utilities.

3.4.6 Project Final Submittal. Upon approval of the Recommended Design Report, the CONSULTANT shall incorporate review comments and make any required corrections and changes to the hydrology and/or hydraulic models.

3.4.6.1 The CONSULTANT shall submit a Final Design Submittal with final versions of all reports applicable to the Project including:

Data Collection Report
Alternatives Analysis Report
Recommended Design Report
Project Survey Report Appendix
Technical Report Appendix
Administrative Report Appendix

3.4.6.2 The CONSULTANT shall prepare a separate, reproducible Executive Summary of the Final Design Submittal.

3.4.7 Project Survey Report Appendix. Survey data will be documented in a Project Survey Appendix to the Project Final Submittal. Copies of all survey note books or printout of digital files developed with data collectors will be provided. The horizontal and vertical benchmarks used for the survey shall be documented along with documentation of the datum upon which the benchmark was originally established. Conversion to other datum as required herein shall be documented in the report. A summary table of the ERMs and benchmarks shall be included.

3.4.8 Project Technical Report Appendix. The CONSULTANT shall maintain a technical report throughout the project, which contains documentation of the designs, analysis, and calculations. The report shall be organized to include, but not limited to, the following sections as appropriate to the project:

Lateral design, configuration, alignment, and feature locations.
Right-of-way and easement information.
Special project features, including unusual construction techniques, special materials, and/or conditions.
Maps, sketches, calculations, and other supporting documentation as required.
Hydrology and hydraulics.
Cost estimates.
Conflicting utilities that are to be relocated and/or protected.
Preliminary hydrology and hydraulics analysis and calculations.
Environmental and Permit requirements.

3.4.9 Project Administration Appendix. The Project Administration Appendix shall include copies of all correspondence, minutes of meetings and conversations with the DISTRICT, affected agencies and others as appropriate.

3.5 DELIVERABLES

3.5.1 The CONSULTANT shall submit all items 'sealed' by a registered civil engineer in the State of Arizona. Upon receipt of the final submittal, the DISTRICT shall review the report and preliminary plans for the accurate incorporation of all final comments. If incomplete and/or incorrect incorporation of those comments is found, the original documents shall be returned to the CONSULTANT for correction and resubmittal.

3.5.2 The CONSULTANT shall submit computer files of the information to the DISTRICT delivered on 3.5-inch diskettes or CDs.

3.5.3 Reports and tables should be in Word 6.0 and/or Excel 97 or DISTRICT acceptable software.

3.5.4 Plans should be in AutoCAD version 13 format (dwg) or MicroStation (dgn) format in accordance with Section 19, CADD Drafting Standards, Consultant Guidelines dated October 1, 1998.

3.5.5 The CONSULTANT shall submit three (3) copies for each DRAFT report, estimates, schedules or drawings to the DISTRICT and one (1) copy for each DRAFT report, estimates, schedules or drawings to each participating agency.

3.5.6 The CONSULTANT shall submit five (5) copies for each FINAL report, estimates, schedules or drawings to the DISTRICT and two (2) copies for each FINAL report, estimates, schedules or drawings to each participating agency.

TRANSMITTAL

Entellus
Attn: Jacob Sweeney
2255 N. 44th St., #125
Phoenix, AZ 85008

Date: April 26, 2001
Project Name: Terracita Parcel 13
Project Number: 240
Transmitting Via: Delivery

THE FOLLOWING ARE SUBMITTED:

ORIGINALS	AS REQUESTED	FOR YOUR REPLY/ACTION
PRINTS	FOR YOUR INPUT	FOR YOUR INFORMATION/FILE
FEES (SEE BELOW)	FOR YOUR APPROVAL	
✓ OTHER (SEE BELOW)	FOR YOUR SIGNATURE	

NUMBER SUBMITTED	DATED	DESCRIPTION
2-sets		Sealed Calculations

MARKS OR REPLY:

RECEIVED
APR 26 2001
Entellus

COPY TO:

SINCERELY,
COE & VAN LOO CONSULTANTS, INC.

RECEIVED BY: _____ DATE _____

J. Doug Both
Project Manager

APPENDIX C. SURVEY AND FIELD NOTES

C.1. Survey Field Notes for Mapping Control

Survey field notes for mapping control are located in *Glendale Peoria Area Drainage Master Plan Update- Data Collection- Volume DC*.

C.2. Survey Field Notes for Hydrology Modeling

Survey field notes for hydrology modeling are located in *Glendale Peoria Area Drainage Master Plan Update- Data Collection- Volume DC*.

C.3. Survey Notes for Hydraulic modeling

C.3.1 SURVEY REPORT: Zone A Delineation ERM's.....C-2

C.3.1 SURVEY REPORT: Zone A Delineation ERM's

SURVEY REPORT

For

Glendale/Peoria ADMP Update FCD 99-44

Zone A Delineation ERM's

Prepared for:

Entellus, Inc.
2255 North 44th Street, Suite 125
Phoenix, Arizona 85008

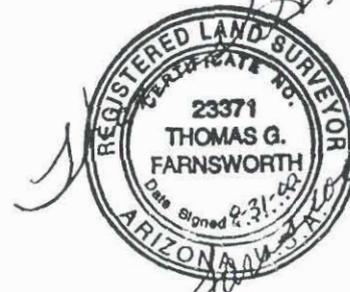
Prepared by:



PENTACORE
A R I Z O N A

2255 North 44th Street, Suite 255
Phoenix, Arizona 85008
(602) 681-9272

August, 2000



INTRODUCTION

Pentacore Arizona, under contract to Entellus, Inc. with the Flood Control District of Maricopa County as project owner, has surveyed and established Elevation Reference Marks (ERM's) for use with the Zone A flood hazard area delineations and submittal to FEMA. Pentacore surveyed a total of six ERM locations and set five new FCDMC brass caps stamped with the appropriate elevations.

VERTICAL CONTROL

All elevations surveyed are based on NGVD 29 datum. The aerial mapping control point data documented in the June 2000 report prepared by Digital Terrain Mapping, Inc. entitled *Aerial Mapping and Survey Services for Glendale/Peoria ADMP Update, Survey Report for Photogrammetric Control and Independent QA/QC, FCD 1999C065* was used as the starting points for each bench loop survey. Pertinent excerpts from that report are provided in Appendix A for reference, including an equation for converting from NGVD 29 to NAD 88 datums. Copies of the level loop field notes, including sketches for each ERM location, are provided in Appendix B. The table on the following page summarizes the ERM's established for this site. A site map indicating the location of each ERM is provided in Appendix C.

ERM No.	Bench Loop No.	Description	Elevation (NGVD 29)
1	4	FCDMC brass cap set in a ring of stones approximately 0.2 miles east of Lake Pleasant Road, 4-feet north of a 4-strand barb wire fence.	1396.80 feet
2	5	FCDMC brass cap set in a ring of stones approximately 0.2 miles west of Lake Pleasant Road on Happy Valley Road (dirt) and approximately 300-feet south of Happy Valley Road.	1332.49 feet
3	6	Aluminum cap (2-inch) stamped with "Collar, Williams, & White – RLS 18214" located approximately 1-mile north of Happy Valley Road, approximately 300-feet east of 51 st Avenue, and then approximately 50-feet north.	1472.76 feet
4	1	FCDMC brass cap set in a ring of stones along the east side of wash approximately 15-feet north of the Parkside Road edge of pavement, 60-feet west of "No Outlet" sign, and approximately 0.5 miles east of 67 th Avenue.	1342.06 feet
5	3	FCDMC brass cap set at the southwest corner of the headwall located at the southwest corner of Questa Drive & 61 st Place.	1375.67 feet
6	---	Top of ADOT aluminum cap (BM 517-6) located at the northwest corner of Section 2, T4N, R1E, G&SRB&M. Also is DTM, Inc. aerial mapping control point No. 99917 (see Appendix A).	1371.02 feet
7	2	FCDMC brass cap set at the northwest corner of the headwall at southwest corner of 93 rd Avenue & Deer Valley Road.	1277.33 feet

Appendix A

DTM, Inc. Report Excerpts

**FLOOD CONTROL
DISTRICT OF
MARICOPA COUNTY**

CONTRACT FCD 1999C065

**AERIAL MAPPING AND SURVEY
SERVICES
FOR
GLENDALE/PEORIA ADMP UPDATE**

**SURVEY REPORT
FOR
PHOTOGRAMMETRIC CONTROL
AND
INDEPENDENT QA/QC**

SUBMITTED BY:

**DATABASED TERRAIN MAPPING, INC.
1075 E. Ft. Lowell Road, Suite A-1
Tucson, Arizona 85719-2159
(520) 292-2020 (FAX) 520-888-4393
E-mail: lharbers@mapauto.com**

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2. **Survey Control Diagram**
GPS Data Collection Sheets
GPS Post-processing
Control Data Spread Sheets

3. **QA/QC Spread Sheet**
"Blind Targets/Aerotriangulation
Field Verification Cross Section Data



June 21, 2000

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

Attn.: Marilyn DeRosa, R.G.
Planning Project Manager

RE: Contract FCD 1999C065
Aerial Mapping & Survey Services for
Glendale/Peoria ADMP Update

SURVEY REPORT

The contract for photogrammetric mapping and related survey services required several steps to establish all necessary field survey data as required by the contract. As the Prime Consultant, Databased Terrain Mapping, Inc. approached the field survey activities by initially involving Pentacore, Arizona as our QA/QC subconsultant. Databased Terrain Mapping, Inc. completed all the necessary survey work to meet the contract requirements. Additionally, Pentacore, Arizona provided field survey services that included:

1. Establish field survey values on numerous "blind targets" throughout the project area. These points were used to verify and validate the quality of the photogrammetric aerotriangulation process typically used to "extend" the base control network for photogrammetric data collection.
2. Conduct field surveys for cross section data collection as verification and validation of the final topographic mapping.

FIELD SURVEYS

Databased Terrain Mapping, Inc. began field survey activities in December of 1999. Based on the contract criteria, locations of photogrammetric control points were based on the plan to provide photographic coverage for a project area that extended beyond the initial topographic map boundaries.

After developing the control point "layout," research was conducted to gather information from various operating agencies within the project limits. Agencies contacted include:

Maricopa County Flood Control District
Maricopa County Department of Transportation
City of Peoria
City of Glendale
Arizona Department of Transportation
US Geological Survey
Salt River Project

During negotiations, discovery was made of existing FCD survey and map information for the New River alignment (FCD Contract 97-04 - completed by Stantech with Aerial Mapping Company and Alcocer Land Surveys.) Our reconnaissance enabled us to recover 15 of the 19 "ERM's" set or recovered for the New River mapping, including point "NG-3" located isouthwest of New River Dam. Other research lead to recovery of USGS Bench Mark D475 in Thunderbird Park, and Aerial Mapping Co.'s point "AF8" southwest of 107th Ave & Hatfield Road.

Additional existing monumentation with published data by SRP and ADOT was recovered. Due to their questionable datums and sources, the published values were not used in the final adjustment of survey data for the Glendale/Peoria ADMP Update.

DTM, Inc. initially set (or recovered existing monuments) photogrammetric control points throughout the project area in preparation for aerial photography. The spread sheet listing our 9****-series, 8*****-series and 7***-series of control point numbers identifies all control set for the project. The 9****-series of points were the control points established for the base contract. The 8*****-series reflect points that were located as "blind targets" for the QA/QC by Pentacore, Arizona, and the 7***-series of points are photo-identifiable features used as control points for mapping areas not covered in the base contract but added as a result of change order.

Wherever possible, existing monuments were used for control points. These include jurisdictional monuments (brass caps at intersections), property corners (rebar) and existing "ERM's," etc. Pk nails or 40d/60d nails were set only if no other existing monumentation could be found in the general vicinity of the required control point locations.

GPS SURVEYS

After all control point reconnaissance and pre-marking was completed, Databased Terrain Mapping, Inc. mobilized for GPS data collection. All 9****-series and 7****-series points were occupied with static GPS equipment. The static sessions ran for a minimum of 35 minutes, using at least five units. 30% of the control points were occupied in multiple sessions. All primary control points were included in the GPS sessions. Final constrained adjustments were based on geoid modeling and testing solutions based on constraints to different known points (AMC Point "AF8," USGS Point D475, and several Stantech/Alcocer "ERM's" for the New River Mapping. All solutions proved completely acceptable and validated the continuity of datums between the different data sources. The final adjustment constraints were based on the coordinate values established by Stantech/Alcocer for their "ERM #19" (NG-3) and ERM #1 (on Desert Harbor Drive.) The vertical constraints held the Stantech/Alcocer "ERM #1", USGS Point "D475", and AMC Point "AF8".

FINAL CORRECTION FACTORS ARE:

NAD83	minus 1927	+0.13744(N)	+2.56284 (E)
NAVD88	minus NGVD29	+0.5813 (meters)	+1.907 (feet)

These corrections reflect the same calculations provided in the Survey Report for New River (submitted by Alcocer Land Surveys) to the nearest 0.0000X horizontally and 0.000X vertically. The control network for the Glendale/Peoria ADMP Update is published to perpetuate the previously established control and ERM values. DTM's submittal of ERM information duplicates the data submitted for Contract 07-04.

PHOTOGRAMMETRIC QA/QC

Databased Terrain Mapping, Inc., during the reconnaissance and control point pre-marking phase, located the "blind targets." In some cases the point locations were pre-marked. In other cases, photo-identifiable features were used. None of the "blind targets" were surveyed by DTM, Inc. during the control collection (GPS) effort. All "blind targets" were surveyed by Pentacore, Arizona, tying their values to the existing primary control network and the photogrammetry control network, thereby validating DTM's GPS work on numerous photogrammetric control points.

All "blind targets" were "read" in the stereo aerial imagery during the aerotriangulation process. The results were then compared to values provided to DTM by Pentacore, Arizona to validate and insure that the aerotriangulation calculations met accuracy criteria for mapping. The results (comparisons of field survey values and aerotriangulation values) are published in the enclosed spread sheet (refer to the section title "BLIND TARGETS.")

entacore, Arizona also conducted field surveys to establish random cross section field checks of the topographic mapping per FEMA specifications. The cross section data collection values are published in the QA/QC section of this report, along with plots of the cross section alignments overlaid to the topographic maps. The cross sections, although random, are identified by a number that corresponds to the final map sheets numbering system for the project. The number of cross sections collected exceeds the requirements established in the FEMA Mapping Guidelines.

All survey work meets or exceeds the minimum standards and criteria established in *FEMA Document 37, Flood Insurance Study Guidelines and Specifications for Study Contractors*. This includes the photogrammetric control surveys, verification by "blind targets," field cross section collection and establishment of ERM's". The survey work for this contract DOES NOT INCLUDE CADASTRAL WORK to recover, locate, set, or establish PLSS corners are any other property descriptions.

Respectfully Submitted


DATABASED TERRAIN MAPPING, INC.
Lee Harbers, RLS, Certified Photogrammetrist
President



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY											
Aerial Mapping and Survey Services for Glendale/Peoria ADMP Update FGD 999C065											
POINT NO	83x	83y	29z	Description	27x	27y	Fp Ctr-ID	Em	Rm	Gmd	
99001	624858.26	945981.63	1229.48	Sanitary manhole located at 4829 W. Corrine Ave (Intersection of Corrine Ave & 48th Drive)						1229.48	
99002	623178.24	944377.14	1221.3	City of Glendale water manhole 75' West of 51st Ave between drainage channel and Arizona Canal, +/- 250' South of Cactus Road				#72		1221.3	
99003	621736.86	947300.88	1222.65	City of Glendale brass cap at the Intersection of 54th Ave and Wood						1222.65	
99004	617998.73	948041.72	1219.81	Brass cap tagged SRP 539 epoxed to curb on Southwest Corner of bridge at 59th Ave and AZ Canal.				#71		1219.81	
99005	619435.64	950928.57	1225.94	City of Glendale brass cap at centerline of cul-de-sac @ 5637 W. Redfield.				#69		1225.94	
99006	616074.02	952167.81	1218.17	City of Glendale brass cap at centerline of Hearn Road and N. 83rd Ave.				#35		1218.17	
99007	612935.79	952696.97	1217.54	Manhole at NW Corner of 87th Ave and AZ Canal.						1217.54	
99008	613970.74	955883.09	1223.59	Set PK & shiner 10' South of fire hydrant at the Northwest corner of 66th Ave. and Mary Jane						1223.59	
99009	610344.87	956095.61	1213.78	City of Glendale brass cap at the Intersection of 71st Ave and Carol Ann.				#64		1213.78	
99010	607646.38	957531.3	1212.82	Brass cap "US ARMY CORP OF ENG. STA Designation AC-89-3-DC 1989-USCE LADO" at 75th Ave & AZ Canal, at Southwest Corner of bridge.				#44		1211.5	
99011	609813.49	959931.65	1219.28	Gas valve cover in 5' diameter concrete ring. Located north side Bell Road on west end of Skunk Creek Bridge.						1219.28	
99012	594331.77	944155.33	1138.36	Set PK & shiner on east bound Grand Ave at west end of New River Bridge. Point in asphalt at west end of guard rail (3' south of guard rail on east side of driveway to "Ed's Automotive" 9449 W. Grand Ave.)						1138.36	
99013	596519.87	946597.44	1140.45	Set 60d nail & shiner on North edge of concrete drainage channel +/- 400' West of Loop 101 +/- 1/2-mile South of Thunderbird Road						1140.45	
99014	592497.72	947094.23	1142.83	Set PK & shiner in expansion joint of sidewalk on north side of bridge over drainage channel on the centerline of 99th Ave. at Forrester						1142.83	

POINT NO.	83x	83y	29z	Description	27x	27y	Fp Ctr-Id	Em	Rm	Gmd
99015	589040.24	946257.09	1143.63	Set PK & shiner at the Southwest corner of 103rd Ave and Sante Fe. Point is at south end of concrete drainage apron on north edge of drainage channel +/-20' East of 3-tube culvert.						1143.63
99016	589269.01	949417.73	1155.1	Brass cap in centerline of 103rd Ave and Bolivar.				#67		1155.1
99017	585062.6	949405.79	1150.32	Set PK & shiner at 109th Ave and Topaz. Point is along gutter on east side of 109th in line with the easterly projection of Topaz centerline.						1150.32
99018	582124.11	948479.71	1135.01	Northeast corner of catch basin in median of Grand Ave +/-50' East of the east end of the Agua Fria Bridge.						1135.01
99019	582696.23	950863.53	1157.45	Set 60d nail & shiner +/-1/2 mile north of Grand Ave along transmission line trail west of Sun City (Eastside of Agua Fria River). Point is +/-40' West of trail on flat area before drop-off and end of vehicle travel.						1157.45
99020	578228.79	950337.9	1127.11	Maricopa county brass cap at intersection of Ventura & El Frio.						1127.11
99021	579653.73	954503.19	1135.36	Set 60d & shiner. From the intersection of El Mirage and Greenway, travel 0.65miles due east on dirt track road (North side of irrigation ditch) to end of travel and point on right (dead end at chain link fence). Point is +/-50' west of chain link fence.						1135.36
99022	579703.74	957250.64	1146.6	2" angle iron(4'tall) stamped "Sec W1/2NE1/4". on 15' high bluff on east side of plant road 1/2-mile South of Bell road.						1146.6
99023	578379.64	960387.92	1164.34	MCDOT stainless steel rod in casing. East bank of Agua Fria River +/-150' north of Bell Road bridge. 4' tall white "survey monument" sign @ monument.						1164.6
99024	582471.22	961013.24	1178.15	1"x2" hub along clearing line for development +/-500' north of Bell Road & +/-500' east of Fine Arts Ave. (500' east of Fine Arts Bldg.)						1178.15
99026	580103.62	964307.68	1173.96	City of Surprise Brass cap at Intersection of 116th Drive and Cactus Wren Ct. (In Coyote Springs subdivision)						1173.96
99027	582596.62	965150.55	1195.11	Brass cap in handhole at Union Hills and 113th Ave. Monument on North edge pavement of Union Hills in line with the northerly projection of 113th Ave centerline						1195.11

POINT NO.	33x	33y	29z	Description	27x	27y	Fp Ctr-ID	Erm	Rm	Qtd
99028	579984.87	968545.14	1186.69	Brass cap at Pine Mountain Ct. cul-de-sac on West side of Coyote Springs Pkwy				#36		1186.69
99029	580999.58	967788.44	1181.74	Aluminum cap on East edge of 115th Ave. 1.5 mile North of Bell Road.				#37		1181.74
99030	578343.21	973342.15	1194	Set 60d nail & shiner at 119th Ave and Rose Garden on west side of 119th Ave on centerline projection of Rose Garden Lane. 2.5' East (In front of) "Dead End" traffic control sign.						1194
99031	581777.07	973180.63	1193.8	Set 60d nail & shiner 75' North of Rose Garden Lane 0.4 miles west of 111th Ave on flat ground West of small ridge. +/-400' East of entrance to Pioneer Sun City plant. Due north of yellow traffic control sign.						1193.8
99032	584126.93	975753.76	1242.12	5/8" rebar +/-60' North of wooden power pole on wooden power line along alignment of Deer Valley Road +/-800' West of 109th Ave. Point is 150' West of transmission tower line and +/-100' East of top of bank of Agua Fria River.				#52		
99033				Set PK & shiner at Southwest corner of Elks lodge parking lot- North side of Union Hills +/-1/4 mile west of 107th Ave.						
99034	585129.59	973116.71	1234.58	Brass cap at centerline of 109th Ave and Rose Garden.				#53		1234.58
99035	585786.29	984591.35	1236.18	1/2" rebar w/alum cap stamped "Aerial Mapping Co." "AF8" +/-800' SW of 107th Ave and Hatfield Road. +/-50' south of the southerly of (2) 4-legged steel transmission towers.			#578	#54		1236.1
99036	587209.29	969144.46	1235.21	Maricopa County brass cap at intersection of Weik Drive and Turquoise Hill Dr.				#63		1235.21
99037	586508.97	977091.42	1250.8	C.O.P. Brass cap at intersection of 107th Ave and West Angels Lane.				#49		
99038				Set 60d nail & shiner 1/4 mile north of Hatfield Road on West side of 107th Ave (gravel road). Point is on top of cutbank 25' West of centerline of 107th +/-100' South of wooden power pole on west side of 107th. Point is +/-75' south of wash crossing 107th Ave.						
99039				Set 40d nail & shiner in concrete seam at driveway to Marinette well on South side of Union Hills 1/2 block West of 99th Ave.						
99040	588961.29	973120.71	1251.88	Brass cap (flush) at Intersection of 102nd Lane and Rose Garden. Monument on north edge of pavement on Rose Garden in line w/ centerline projection on 102nd Lane.				#56		1251.88

POINT NO.	63x	63y	29z	Description	27x	27y	Fp Ctr Id	Erm	Rm	Ord
99041	588560.65	978421.71	1286.64	C.O.P. brass cap in concrete 0.2 miles West of Lake Pleasant Road on South edge of Williams Road in line with southerly projection of new un-named road to the North.				#50		
99042				60d nail 1/2 mile West of Lake Pleasant Road along westerly projection of Happy Valley Road. Point is on South side of dry wash where foot trail crosses						
99043	591086.22	969456.77	1240.18	Maricopa County BC at Intersection of Pine Springs and Hassayampa.				#30		1240.18
99044	591288.81	976912.09	1285.74	Set 60d & shiner +/-1/4 mile North of Deer Valley and 0.1 mile West of 99th Ave. Point is in large gravel clearing surrounded by low greasewood.						
99045				Punch mark in 12"x12" concrete corner stone 0.2miles West of Lake Pleasant Road. +/-100' north of Calle Lejos monument is 1.5' above ground and northerly of two similar concrete cornerstones +/-100' westerly of small turnout on North side of Calle Lejos.						
99046				C.O.P. brass cap at Intersection of Westbrook and Lakeview. Monument is 15' West of bullnose for Lakeview centerline on East side of Westbrook. 250+/- North of Union Hills.						
99047	593044.84	972621.65	1259.84	Brass cap at Intersection of 96th Drive and Ross (centerline of Ross at projection of centerline of 96th - easterly of two BC's)				#57		1259.84
99048	593107.43	981330.47	1314.55	Brass cap at Intersection of 97th Ave and Electra Lane				#27		
99049				Set PK & shiner on north edge of Happy Valley Road +/-100' west of gas line crossing.						
99050	595934.49	969320.67	1240.02	Brass cap at Intersection of West Behrend and West Escuda				#32		1240.02
99051	595410.12	977436.52	1291.09	Set 60d & shiner at Southwest corner of Intersection of two trails in SE Quarter in Section 16-T4N, R1E						
99052				Set PK & shiner at Intersection of 59th Ave and Calle Lejos (Pt is on North edge of asphalt on Calle Lejos on centerline of 95th Ave. 3' south of traffic control sign.						
99053	597022.83	949609.95	1149.64	Set PK & shiner South end of curb (bullnose) at 91st Ave at Thunderbird.						1149.64
99054	597058.57	954826.77	1176.79	C.O.P. brass cap in handhole at 91st Ave and Greenway. On West side of 91st Ave in line with left turn lane on Eastbound Greenway				#46		1177.2

POINT NO.	83x	83y	29z	Description	27x	27y	Fp Ctr Id	Erm	Rm	Grid
99055	597083.01	961848.64	1204.52	Set PK & shiner on centerline of Greenbriar Drive at 91st Ave (Point is on East side of 91st Ave on centerline of Greenbriar, in line with stop sign for Westbound Greenbriar)						1204.52
99056	597141	965075.65	1221.29	Base of broken 4"x4" sign post on SE corner of 91st Ave and Union Hills. 40' South of south curb of Union Hills, 60' East of east curb on 91st Ave.						1221.29
99057	597070.55	973111.48	1263.19	City of Peoria brass cap in handhole in centerline of 91st Ave, 1/2 mile north of Beardsley. Monument is in East edge of center turn lane.				#58		1263.9
99058	597062.43	981032.22	1313.47	Brass cap in handhole intersection of 91st Ave and Pinnacle Peak.				#28		1314
99059				1/2" rebar at Southwest corner of 91st Ave and Happy Valley Road at corner of 3' high brown wrought iron fence.						
99060	599538.85	957857.81	1191.31	C.O.P. brass cap at intersection of 87th Ave and Paradise Lane.				#42		1191.31
99161	585937.06	980436.66	1257.89	1/2" rebar w/plastic cap "stamped 21786AZ & 7438NM" 0.1 mile West of 107th Ave on South side Pinnacle Peak alignment. Point is 5.0' South of centerline of track road and 25-30' east of steel gate to private property (At West end of track road West of 107th is 23023 N, 107th.)						
99062	599070.77	977055.18	1286.1	Set tent spike & shiner inside low stucco wall on east side of 88th Ave at southwest corner of vacant lot for 22051 N, 88th Ave. Point is 10' North and 10' East of corner of wall.						1286.1
99063	599693	982974.05	1333.7	Set 60d & shiner at Southwest corner of 87th Ave and Mariposa Grande. Point is +/-10' Southwest of street name sign on Southwest corner.						1333.7
99064	601088.54	949640.93	1163.01	Manhole cover on catch basin, North side of Thunderbird 1/4 mile West of 83rd Ave. +/-500' East of loop 101 (75' East of right turn lane access to 101 North.)						1163.01
99068	601072.17	960598.09	1204.93	C.O.P. brass cap at intersection of 84th Ave and Continental Drive.				#41		1204.93
99067	600854.96	964948.7	1226.43	Brass cap in centerline of Audrey, 1 block East of Country Club.				#38		1226.43
99068	600913.15	970452.3	1252.54	Set 40d nail & shiner on north R.O.W. of Beardsley 1/4 mile West of 83rd Ave. Point is in dirt +/-12' Southwest of West gate post of green gate at dirt trail and irrigation ditch between orange groves on north side of Beardsley.						1252.54

POINT NO.	83x	83y	29z	Description	27x	27y	Fp Grid	Erm	Rm	Grid
99069	601029.52	978351.2	1291.47	City of Peoria brass cap at 85th and Williams. Monument is on centerline of 85th on north edge of Williams.				#51		1291.47
99070				1/2" rebar w/tag "LS 13554" at Northeast corner of vacant lot on West side of 85th Ave, approx. 680' North of Calle Lejos. Monument is +/-75' East of concrete bridge to 24441 N. 85th Ave.						
99071	603150.91	968085.74	1243.4	Set 60d nail & shiner on West bank of the New River +/-0.4miles South of 81st Ave and Beardsley.						1243.4
99072	602235.55	975605.43	1280.12	ADOT brass cap stamped "PT4475" epoxied to well casing at the Southwest corner of 83rd Ave and Deer Valley Road.				#59		1280.12
99073	602386.7	983644.93	1332.14	Maricopa County Eng. Div. Brass cap in handhole centerline of 83rd Ave and Calle Lejos.				#47		1332.4
99074	602273.51	991469.17	1380.28	AZDOT Highway Division P&M Geodetic Survey 3 1/2" disc in 9" round concrete post near the Northwest Corner of Sec.2, T4N, R1E				#22		1380
99075	596948.72	992662.73	1405.18	Set 60d nail & shiner 1.0' East of 4 strand barbed-wire fence (between fence and track road) 1/4mile South of the East 1/4 Corner Sec 33, T5N, R1E						1405.18
99076	597199.03	995714.91	1428.11	Ed 1/2" rebar with red plastic cap stamped "Trav. Point" +/-10-15' East of track road 0.33 miles North of the East 1/4 corner Sec. 33, T5N, R1E						1428.11
99077	599585.84	994121.42	1426.09	1/2" rebar +/-30' South of track road along east/west centerline of Section 34 1/2mile east of East 1/4 corner Sec 33, T5N, R1E						1426.09
99078	602243.63	994122.7	1405.74	Bent 1" O.P. at the E1/4 corner of Section 34, T5N,R1E				#21		1404.8
99079	607559.86	992990.52	1384.26	Set 60d nail & shiner, 25' west of centerline on 75th Ave, 1/4mile North of Jomax. Point is 25' West of gravel road at yellow & black markers						1384.26
99080	604712.28	964584.2	1224.53	C.O.P. brass cap in southbound left-turn lane entrance to 18555 N. 79th Ave 1 block South of Union Hills.				#39		1224.53
99081	604821.55	973184.32	1267.31	City of Peoria brass cap at Intersection of 79th Ave and Frank. Approx center of Sec 23, T4N,R1E				#61		1267.31
99082	605055.93	981056.44	1310.42	Set 60d nail & shiner at Northeast corner of 79th Ave and Pinnacle Peak. Point is +/-25' East of utility box & telephone pedestal on East side of 79th Ave +/-50' North of centerline of Pinnacle Peak						1310.42

POINT NO.	83x	83y	29z	Description	87x	87y	Fp Ctr-ID	Em	Rm	Glnd
99083	604967.84	986233.27	1338.28	Set 40d nail in shiner 25' South of power pole with guy wire to East. 40' East of 6' dirt pile. Approx. North 1/4 Corner Sec 11-T4N,R1E. 0.6 miles West of intersection of Terra Mar and Happy Valley Road						1338.28
99084	607593.43	970404.64	1258.43	ADOT brass cap in handhole @ 75th Ave and 101. Monument is in traffic island on centerline of 75th Ave on South side of 101.				#34		1258
99085	606938.32	975669.35	1273.82	Set Pk & shiner on South edge of Deer Valley Road. 0.1 mile West of 75th Ave Point is on asphalt apron on South side of road.						1273.82
99087	608877.05	965109.31	1228.39	Survey monument in handhole at intersection of 73rd Ave and Union Hills				#40		1228.39
99088	615733.56	973456.76	1282.24	City of Glendale BC at intersection of Rose Garden and Arrowhead Loop						1282.24
99089	610253.17	978277.53	1309.45	City of Glendale BC in centerline of 70th Drive/71st Ave at North end of Hillcrest Park. Monument is point of northbound curve						1309.45
99090	608600.74	983642.61	1326.91	1/2" rebar 0.75 miles West of 67th Ave and Calle Lejos +/-150' west of end of pavement at curve in gravel trail, +/-18' NNE of 4' tall steel post						1327.2
99091	610109.47	987638.02	1369.15	City of Peoria brass cap at intersection of 71st Drive and Saddlehorn.				#25		
99092				5/8" rebar at fence corner, South side of gravel road, 3/4 mile West of 67th Ave on Jomax alignment. +/-500' east of curve in road.						
99093				City of Glendale BC at intersection 69th Ave and Tonto.						
99094				Survey monument at intersection 67th Ave and Union Hills.						
99095	612670.61	973342.98	1271.45	City of Glendale BC at intersection of Monona and 67th Drive				#62		
99096	612845.84	983639.59	1350.07	Set PK & shiner on centerline of Calle Lejos, Approximately 50' West of the centerline of 67th Ave.						1350.07
99097	612886.43	987852.19	1387.1	Brass cap in casting at intersection of 67th Ave and Saddlehorn (West)				#26		
99098				Set PK & shiner South edge of concrete ring of handhole at intersection of 67th Ave and Jomax Road.						
99099				City of Glendale BC at intersection 63rd and Utopia.						

POINT NO	33x	83y	29z	Description	27x	27y	Fp Grid Id	Err	Fun	Grid
99100	614510.81	979453.91	1391.54	Set PK & shiner North of gate to ramadas 9,10,11 in Thunderbird Park						
99101				City of Glendale BC at intersection 61st Ave and Pontiac						
99102				City of Glendale BC at Intersection of Deer Valley Road and 61st Drive.						
99103				City of Phoenix BC at intersection of 61st Ave and Alameda Road.						
99104				BC on westbound Happy Valley Road at 61st Ave.						
99105				MCCDOT BC at Intersection of 64th Ave and Jomax						
99107				City of Glendale BC at intersection of 65th Ave and 56th Ave						
99108				Fd City of Glendale BC at intersection of 65th Ave and Arrowhead Lakes Dr.						
99109				Set PK & shiner in southbound 55th Ave and Pinnacle Peak, point is +/-5' North of stop sign in traffic control area						
99110				Survey monument at 55th Ave and Happy Valley						
99111				Set PK & shiner at South end of centerline divider bullnose at 51st Ave and Beardley (North frontage road of Loop 101)						
99112				C.O.G. BC on centerline of Arrowhead Drive, East of Melinda Lane. Point is at West end of bullnose at gated entrance to private subdivision						
99113				BC "SK101" at Southeast corner of Skunk Creek and Union Hills						
99901	597876.41	950020.43	1158.24	C.O.P. BC on centerline of Desert Harbor +/-600' East of 91st Ave				#1		1158.24
99902	600083.94	952352.85	1167.04	C.O.P. BC in handhole in center median of Desert Harbor +/-300' North of Acoma Drive.				#2		1167.04
99903	600649.88	955371.46	1176.08	C.O.P. BC at intersection of 86th Drive and Betty Elyse Lane.				#3		1176.5
99904	600876.51	957952.51	1187.9	C.O.P. BC at intersection of 86th Ave and Paradise Lane.				#4		1187.9
99600	613151.2	979327.49	1350.75	NGS BM "D475" in Thunderbird Park East of 67th Ave, South of Patrick Lane						1350.747

POINT No.	83x	83y	28z	Description	27x	27y	Fb Gr Id	Elev	Rm	Gms
99905	603591.63	959865.4	1202.16	C.O.G. BC in handhole at Intersection of 83rd and Bell Road.				#5		1202.16
99906	601757.3	962778.29	1212.88	BC at Intersection of 83rd Drive and 84th Ave.				#6		1212.88
99907	602319.85	965165.98	1228.43	C.O.P. BC in handhole at Intersection of 83rd Ave and Union Hills Road				#7		1228.43
99908	602310.36	967794.09	1243.04	2" iron pipe in handhole at the Intersection of 83rd Ave and Village Pkwy.				#8		1243.04
99909	604816.57	970052.7	1254.71	ADOT aluminum cap along the North side of 101 Freeway (P.O.C. Sta. 918+00.00)				#9		1254.71
99910	607608.97	973052.17	1269.56	C.O.G. BC in handhole at Intersection of 75th Ave and Rose Garden Ln.				#10		1269.9
99911	607625.37	976699.55	1282.71	Maricopa County BC in handhole at Intersection of 75th Ave and Deer Valley Road				#11		1282.71
99912	607618.83	977959.81	1292.23	BC on 75th Ave and centerline (P.C. +/-400' South of East 1/4 Corner Section 14, T4N,R1E				#12		1292.23
99913	607965.92	980803.87	1308.21	BC at center of cul-de-sac at 7431 W. Monte Lindo.				#13		1308.21
99914	607924.47	983629.75	1324.91	FCDMC BC in concrete, +/-300' East of the West 1/4 Corner Section 12 T4N, R1E				#14		1342.91
99915	608184.88	988334.78	1342.98	Chiseled "x" on center of top of West of 4'x10' storm culvert 573' East of Southwest Corner of Section 1, T4N, R1E				#15		1342.98
99916	607591.74	988916.25	1352.51	FCDMC BC in concrete +/-20' West of the East 1/4 Corner of Sec. 2, T4N, R1E				#16		1352.51
99917	607592.68	991467.78	1371.02	AZDOT aluminum cap (BM517-6) at Northwest Corner of Sec. 2, T4N, R1E.				#17		1370.8
99918	581030.3	949292.81	1120.71	Stone with chiseled "+" (Section Corner) North of Grand Ave Ave along wood power pole line on West side of paved road to batch plant at Southwest corner of Sec. 7, T3N, R1E			#248	#18	#928	1121.1
99919	603962.53	994248.69	1427	3/4" rod with 2" copper cap, "USCE NR3" at the top of hill +/-500' South of the West end of New River Dam.				#19		1426.8

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

"BLIND TARGETS"

POINT NO.	83x	83y	29z	Description	Aerotrig X	Aerotrig Y	Aerotrig Z	Em	Rm	Gmb
888001	623262.73	947247.44	1227.27	Set PK & shiner at Intersection of crosswalk lines at the Northwest corner of 51st Ave and Sweetwater	604881.79	947247.48	1227.16			1227.27
888002	622612.04	944546.97	1221.1	Set PK & shiner 1000' +/- West of 51st Ave on the South side of Cactus Road. Angle point of sidewalk on the South side of Cactus +/-100' West of the West end of the bridge over the AZ Canal.	622612.44	944547.13	1221.2			1221.09
888003	621122.05	946231.63	1219.65	Southeast corner of 6'x12' concrete slab at well site #10 at 53rd Ave East side of Thunderbird Paseo. West end of Sweetwater "5558 W. Sweetwater"	621122.44	946231.83	1219.54			1219.65
888004	619732.82	947716.01	1213.99	PK nail with white aerial target by "Do not Enter" sign at access road to Thunderbird Paseo Park at 56th Ave and 56th	619733.13	947715.86	1214.37			1213.99
888005	618006.9	949899.25	1217.38	Set PK & shiner at center of curb return/gutter and curb cut for handicap access at Northwest corner of 59th Ave and Thunderbird	618007.18	949899.51	1217.51			1217.38
888006	616606.67	951223.16	1213.08	Southeast corner 6'x12' concrete slab at well site #9 at intersection of Crocus & Hearn.	616606.96	951223.23	1213.18			1213.07
888007	614361.49	952907.13	1214.65	C.O.G. BC in centerline of cul-de-sac at 15001 N. 64th Ave	614361.45	952907.46	1214.69			1214.65
888008	612947.47	955036.28	1218.04	Set PK & shiner at the South end of the stop/crosswalk line for eastbound Greenway at the Southwest corner of Greenway and 87th Ave.	612947.23	955036.66	1218.05			1218.04
888009	611061.14	955047.12	1214.92	BC at Intersection of 70th Ave and Greenway	611061.14	955047.12	1214.93	#65		1214.92
888010	610098.86	957664.87	1217.91	Maricopa County BC at Intersection Paradise and 71st Ave	610099.27	957665.12	1217.78	#45		1217.91
888011	608915.69	959878.22	1214.58	BC marked "WP203 at Intersection of Bell and 73rd.	608916.42	959878.39	1214.52	#43		1214.57
888012	593851.17	946619.84	1138.45	Drain grate on centerline of 98th Ave midway between Forrester and Emberwood	608916.03	959877.91	1214.42			
888013	591962.67	945375.3	1141.29	Top of headwall. Far Northwest corner of drainage structure on East side of 99th Ave +300' North of Grand Ave.	591962.88	945374.85	1141.51			

POINT NO	83x	83y	28z	Description	Aerotrip x	Aerotrip y	Aerotrip z	Em	Rm	Grnd
888014	589031.45	947858.75	1149.62	Top of curb at curb return on Northeast corner of 103rd and Thunderbird	589031.54	947857.51	1149.58			
888015	585750.18	947774.51	1146.09	Curb-cut handicap access at Northwest corner of Sante Fe and 108th Ave	585750.12	947774.98	1146.66			
888016	583727.6	948086.85	1148.63	3-1/2" aluminum disc epoxied to canal headwall at 111th Ave and Grand Ave. Monument is on South end of headwall on East side of 111th Ave. +100'. North of the centerline of Grand Ave.	583727.73	948086.6	1148.62	#70		
888021	579543.87	960198.63	1163.12	Set PK & shiner at Northeast corner of curb and valley gutter on North side of Bell at Calmat entrance. 600' West of Coyote springs 600' East of Agua Fria River bridge.						
888022	580839.6	970108.4	1189.57	BC at Intersection of Coyote Springs Pkwy and 115th Drive	580839.82	970108.01	1189.81	#29		
888023	583806.25	970472.14	1221.86	Water valve on centerline Beardsley and 111th Ave.	583806.7	970471.65	1221.75			
888024	586457.33	970540.84	1240.35	"Test box" cover in asphalt at Northeast corner of 107th Ave and Beardsley	586457.42	970541.25	1240.6			
888025	586454.51	973131.56	1238.36	BC in handhole at Intersection of 107th Ave and Rose Garden	586454.98	973131.57	1239.05	#55		
888026	589532.58	970473.17	1241.82	Water valve centerline of Beardsley on East side of Lake Pleasant Road in line with stop sign for westbound Beardsley	589532.44	970473.72	1241.68			
888027	591724.3	970460.81	1246.68	BC in handhole at Intersection of 99th Ave and Beardsley	591723.72	970460.48	1247.47	#73		
888028	594383.1	970463.71	1248.89	BC in handhole at Intersection of 95th Ave and Beardsley	594382.99	970463.69	1249.06	#31		
888029	594378.85	972747.95	1261.22	Set PK & shiner at Intersection of north/south valley gutter on West side of 95th and east/west rolled curb/gutter on North side of Ross	594379.14	972748.58	1261.21			
888030	597059.05	970483.41	1247.81	Water valve in asphalt at Northeast corner of Beardsley and 81st Ave.	597058.92	970483.44	1248.04			
888035	599673.04	961702.15	1204.48	C.O.P. BC in handhole at Intersection of 87th Ave and Meadows	599672.91	961702.16	1204.84			
888036	602291.58	965223.67	1228.43	Set PK & shiner at traffic control white stripe at Northwest corner of 83rd Ave and Union Hills	602291.76	965222.52	1228.49			
888037	602318	967796.95	1241.55	Water valve on East edge of 83rd Ave at Village Parkway	6022319.16	967797.03	1241.73			
888039	602347.59	970461.22	1255.18	Set PK & shiner in asphalt in Northeast corner of 83rd Ave and Beardsley	602346.78	970460.62	1255.36			

POINT NO.	83x	83y	29z	Description	Aerotrig x	Aerotrig y	Aerotrig z	Erm	Rm	Qm
888040	603478.95	970414.07	1253.76	City of Peoria BC at Intersection of 81st Ave and Beardsley	603480.5	970414.39	1254.15	#33		
888043	602233.09	973189.21	1267.81	Southeast corner of catch basin grate, South of southerly entrance to Sunrise Mtn. High School, on West side of 83rd Ave 1/2mile North of Beardsley.	602232.93	973189.41	1268.17			
888044	604284.22	975677.96	1282.29	City of Glendale BC at Intersection of Deer Valley and 79th Ave	604283.95	975677.72	1282.46	#76		
888045	602296.89	977211.78	1287.32	Set PK & shiner at low point of sidewalk handicap ramp at gutter/curb return on Northwest corner of 83rd Ave and Via Montoya.	602297.11	977211.64	1287.62			
888046	602374.09	979714.98	1302.09	Set PK & shiner at South end of roadway edge painted strip on 83rd Ave (Northbound 83rd) and Patrick Lane	602374.27	979715.01	1301.73			
888048	611090.69	980998.77	1327.14	C.O.G. BC on North edge of Pinnacle Peak Road at 69th Ave	611090.82	980998.83	1326.81	#48		
888049	608352.18	981003.3	1309.96	C.O.G. BC at Intersection of Pinnacle Peak & 74th Ave	608352.09	981003.74	1309.71	#75		
888050	605016.94	983643.32	1323.03	Set PK & shiner on East end of pavement at 79th Ave alignment and Calle Lejos	605017.07	983643.18	1323.55			
888051	608274.17	986280.98	1346.27	City of Peoria survey monument in handhole at Happy Valley and Terramar. South edge of Happy Valley Road on centerline of Terramar	608274.1	986280.79	1346.47	#24		
888052	605966.88	988527.93	1353.67	Set 80d & shiner +/-30' West of track road and +/-60' South of wash. near the center of Section 2, T4N,R2E. +/-0.4 miles North of power line along South line of Section 2.	605966.84	988527.84	1353.23			
888054	604906.75	991469.45	1369.24	1-1/2" open pipe in circle of small rocks with lathe marked S1/4 Corner Pipe is 4.0' WNW of AZ DOT Highway Div. Geodetic SM	604906.92	991469.3	1369	#23		
888055	601464.31	994206.79	1411.97	40d nail +/-35' North of Sec 34 east/west centerline track road 3/4-mile East of East 1/4 Corner of Sec 33, T5N, R1E	601464.17	994206.95	1412.53			
888056	598225.65	994181.31	1419.21	80d nail for construction limit boundary 20' North of track road (East/West centerline Sec 34, T5N,R1E) Approx. 0.2 miles West of the W1/4 Corner of Sec 34.	598225.68	994181.26	1419.72			
888401	586517.21	975952.33	1247.33	Set PK & shiner on North point of long traffic control stripe on northbound 107th Ave North of Rose Garden Lane	586517.4	975952.09	1247.15			

POINT NO	83x	83y	28z	Description	Aeromg x	Aeromg y	Aeromg z	Erm	Rm	Gmd
888402	586599.86	979790.41	1259.73	Water valve in westbound lane of Villa Chula +/-50' east of 107th Ave	586599.88	979790.28	1259.73			
888403	589499.66	975742.56	1271.17	Aerial target in centerline of Lake Pleasant Road, 1/2mile North of Rose Garden Lane	589499.56	975742.43	1272.24			
888404	589742.75	978460.12	1291.74	Set PK & shiner at South point of traffic control stripe on centerline of Lake Pleasant Road at Williams Road	589745.08	978459.77	1292.61			
888405	594498.61	975731.49	1278.36	Set PK & shiner at West end of centerline stripe at West end of Deer Valley Road at 95th Ave	594499.54	975731.34	1278.6			
888406	594735.97	981038.72	1314.8	Set PK & shiner at West end of traffic control stripping on North side of Pinnacle Peak Road +/-300' East of 95th Ave.	594736.78	981038.83	1314.56			
888407	597282.81	975751.83	1278.99	Set PK & shiner at intersection of painted stripes in North side of westbound Deer Valley Road +/- 200' East of 91st Ave.	597282.48	975751.82	1279.22			
888408	597099.97	978424.35	1295.64	Set PK & shiner at North end of valley gutter at northeast corner of 91st Ave and Williams Drive.	597098.33	978424.42	1295.8			
888409	608450.1	973109.42	1269.67	Set PK & shiner in pavement at East end of bullnose on the centerline of Rose Garden Lane on West side of 74th Ave.	608450.21	973109.3	1270			
888410	610145.16	974895.91	1288.15	Set PK & shiner in asphalt at south end of bullnose on centerline of 71st Ave on North side of Lone Cactus	610144.95	974895.78	1288.37			
888411	611798.59	975226.89	1287.82	Set PK & shiner at intersection of valley gutters at Southwest corner of 69th Ave and Morning Dove.	611796.24	975226.6	1287.9			
888412	613131.39	984091.06	1357.57	BC in centerline of cul-de-sac at North end of 68th Lane North of Chester.	613131.39	984091.08	1357.51			
888413	612847.46	986812.49	1380.08	Set PK & shiner at North end of traffic control/crosswalk stripe for eastbound Happy Valley Road on West side of 67th Ave	612847.55	986812.15	1380.16			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
CONTROL POINTS

POINT NO.	83x	83y	29z	Description	27x	27y	FP Ctrl Id	Em	Rm	Omd
7001	583449.39	961717.18	1203.48	Set PK & Shiner at Intersection of Boswell Blvd and Jacaranda Dr., Westerly most end of painted center line on East side of Jacaranda Dr.						
7002	584119.04	958421	1191.3	Set PK & Shiner at painted crosswalk on Hutton Dr. between Crestbrook Dr. and Canyon Creek Dr						
7003	585811.35	959943.46	1204.63	South edge of paint on North end of bullnose of divider island at West entrance to shopping center at the Northwest corner of 98th Ave & Bell Road						
7004	587562.75	961355.14	1205.72	Set PK & shiner at intersection of Del Webb Blvd and 106th Ave. 5' north of Del Webb Blvd, painted strip of East side of street. End of 2nd painted strip.						
7005	587991.8	957744.75	1192.11	Set PK & shiner at intersection of Brookside Dr. and 106th Ave. Point is where centerline of valley gutter and asphalt intersect at Southeast corner of 106th Ave						
7006	589298.66	960075.96	1199.32	Set PK & shiner on North end of centerline stripe on 105th Ave between Bell Road and Granada Dr						
7007	591281.82	958415.51	1190.52	Set PK & shiner at intersection of painted white "cross" of compass layout in the Southwest corner of the parking lot for "Bell Recreation Center" at the Southwest corner of 99th & Hutton						
7008	591328.9	961904.43	1203.47	Set PK & shiner at end of painted strip running east/west on Palmeras Drive on East side of Foothills Drive						
7009	593090.3	959652.57	1195.59	Set PK & shiner at intersection of asphalt and concrete on the Southwest corner of the first cul-de-sac on Campana Drive East of 98th Ave						
7010	580263.52	957889.97	1149.27	Set PK & shiner at Northwest corner of asphalt, at West end of Tiny Warrior Drive, West of American Beauty Ave. In the Rose Garden mobile home subdivision (11596 Sierra Dawn Blvd.)						

POINT NO.	12x	83y	20z	Description	12x	21y	Pp Cn Id	Em	Rm	Qmd
7011	579379.34	972075.64	1193.82	Set 40d and shiner set in small creosote bush 20' North and 8' East of Southeast corner of chain link fence at East end of Sun Valley Lane East of 118th Ave						
7012	583987.13	968735.92	1216.72	City of Peoria sanitary sewer manhole at intersection of 110th Ave and West Tonto Lane.						
7013	591644.56	972110.11	1256.54	City of Peoria sanitary sewer manhole in street on West Burnett Ave. between 99th Ave & 99th Drive						
7014	595538.68	972392.33	1255.3	Water valve northbound 93rd Lane midway between Runion Drive and Irma Drive						
7015	599390.38	949640.55	1158.42	Set PK & shiner at point of traffic arrow in front (South side) of vacant building at 8736 W. Thunderbird						
7016	599512.19	954613.36	1173.6	Set PK & shiner at corner of asphalt & concrete valley gutter at the Northwest corner of 87th Drive & Acapulco Lane.						
7017	599189.11	958961.53	1195.8	Punch mark in top of bullnose at South end of parking bullnose at West end of building at 8748 W. Kelton						
7018	599556.81	969178.64	1238.96	Set PK & Shiner at intersection of valley gutter and asphalt at Southeast corner of 87th and Westbrook						
7019	599631.7	975023.34	1268.83	1/2" rebar in drainage ditch where small concrete channel meets drainage basin on South side of Malinda Lane on West side of 87th Ave.						
7020	599481.18	980773.43	1309.32	City of Peoria sanitary sewer manhole at West end of cul-de-sac on Monte Lindo West of 87th Ave						
7021	602293.09	952663.97	1174.47	Set 40d & shiner in small bush in front of Peoria School District bus yard on West side of 83rd Ave, 1/2 mile North of Thunderbird. Point is +/- 10' East of chain link fence and +/- 50' North of power pole in West ROW of 83rd Ave						
7022	603283.67	973346.08	1268.27	City of Peoria sanitary sewer manhole in pavement on South side of Deanna Drive between 81st Lane & 81st Lane						

POINT No	85x	85y	88z	Description	77x	77y	Fp Ctr-Id	Emm	Rm	Gmb
7023				City of Peoria sanitary sewer manhole in street at intersection of 81st Ave and West Robin Lane.						
7024	603698.25	979640.68	1303.4	Water valve 2 feet East of stop sign at Southeast corner of 81st Ave and Patrick Lane.						1303.2
7025	603165.22	986252.29	1358.3	Set 40d & shiner in small bush- 6 feet South of power pole 1/4-mile North of Hatfield Road and +/- 850' East of the 83rd Ave alignment						
7026	607454.61	967831.78	1244.73	Set PK & shiner at West end of bike lane stripe on North side of Westbound Utopia between 75th Ave & 75th Drive.						
7028	611114.24	983622.29	1340.47	Set PK & shiner at Intersection of asphalt surfaces-(South edge of Calle Lejos and East edge of driveway to residence on South side of Calle Lejos +/-1800' west of 67th Ave.						
7029	612935.66	985474.38	1367.94	Set PK & Shiner in centerline of sidewalk and drain inlet on East side of 67th Ave +/- 340' North of east-west transmission line crossing 67th Ave at Hatfield Road (+/-2000' North of Calle Lejos)						
7201	615057.67	987962.3	1416.53	Manhole at Intersection of Saddlehorn & 63rd Drive						
7202	614943.22	983537.07	1364.55	Manhole on Southwest side of easterly-most street/cul-de-sac in private subdivision. Enter on Chester (East from 67th Ave. 1/8mile North of Calle Lejos)						
7203	614382.58	975909.77	1293.6	Set PK & shiner at corner of asphalt & gutter at Northeast corner of 64th and Louise Drive						
7204	612879.55	970450.69	1255.33	Survey monument at North end of bulinose on centerline of 67th Ave on South side of eastbound on/off ramp for 101 Freeway				#74		
7205	611172.85	975205.54	1287.07	Set PK & shiner in centerline of North end of valley gutter where it meets north curb at intersection of Morning Dove Drive & 69th Ave						
7206	610796.92	971424.01	1259.31	Manhole at Intersection of 70th Ave & Blackhawk drive						
7207	596045.62	982012.35	1321.27	Manhole in cul-de-sac at West end of Camino Del Oro, East of 93rd Ave						
7208	591787.69	981019.78	1311.13	Survey Monument in handhole in centerline of Pinnacle Peak Road +/-750' east of Lake Pleasant Road						1311.63
7209	587678.98	980266.66	1267.51	Manhole in Intersection of 105th Drive and Via Hermosa						

POINT NO	83x	83y	83z	Description	87x	87y	Fp Ctr Id	Em	Rm	Om
7210	587825.22	975989.38	1265.96	Manhole in Intersection of 105th Ave & Via del Sol						
7500	596950.51	994139.63	1406.35	Rebar with aluminum cap marked "LS 19234" at 1/4 Corner of Section 33/34, T5N, R1E				#20		
7600	612990.91	954350.8	1217.29	BC at intersection of 67th Ave and Port Au Prince				#66		
7700	812976.91	952491.92	1215.76	BC at intersection of 67th Ave and Acoma				#68		

Appendix B

Bench Loop Field Notes

SOKKIA™

SOKKIA™

~~FCD 99-44~~

ECONOMY
FIELD BOOK

ADMP
UPDATE

SOKKIA

8152-05



603056 NOV2398

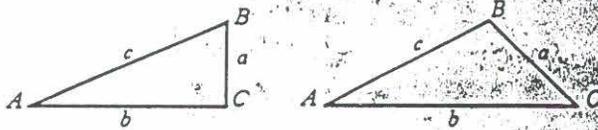
SOKKIA ECONOMY STUDENT FIELD BOOK

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No. 8152-05

FORMULAE FOR SOLVING RIGHT TRIANGLES



$$\begin{aligned} \sin A &= \frac{a}{c} = \cos B & \cot A &= \frac{b}{a} = \tan B \\ \cos A &= \frac{b}{c} = \sin B & \sec A &= \frac{c}{b} = \operatorname{cosec} B \\ \tan A &= \frac{a}{b} = \cot B & \operatorname{cosec} A &= \frac{c}{a} = \sec B \end{aligned}$$

Given	Required	Solution
A, c	B, a, b	$B = 90^\circ - A, a = c \sin A, b = c \cos A.$
A, b	B, a, c	$B = 90^\circ - A, a = b \tan A, c = \frac{b}{\cos A}.$
A, a	B, b, c	$B = 90^\circ - A, b = a \cot A, c = \frac{a}{\sin A}.$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B, b = \sqrt{(c+a)(c-a)}.$
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B, c = \sqrt{a^2 + b^2}.$

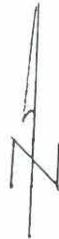
FORMULAE FOR SOLVING OBLIQUE TRIANGLES

Given	Required	Solution
A, a, b	B, c	$\sin B = \frac{b \sin A}{a}, c = \frac{a \sin C}{\sin A}$
A, B, a	b	$b = \frac{a \sin B}{\sin A}$
a, b, C	A, c	$A + B = 180^\circ - C, c = \frac{a \sin C}{\sin A}$
a, b, c	Area	side $\frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	area $= \frac{a^2 \sin B \sin C}{2 \sin A}$

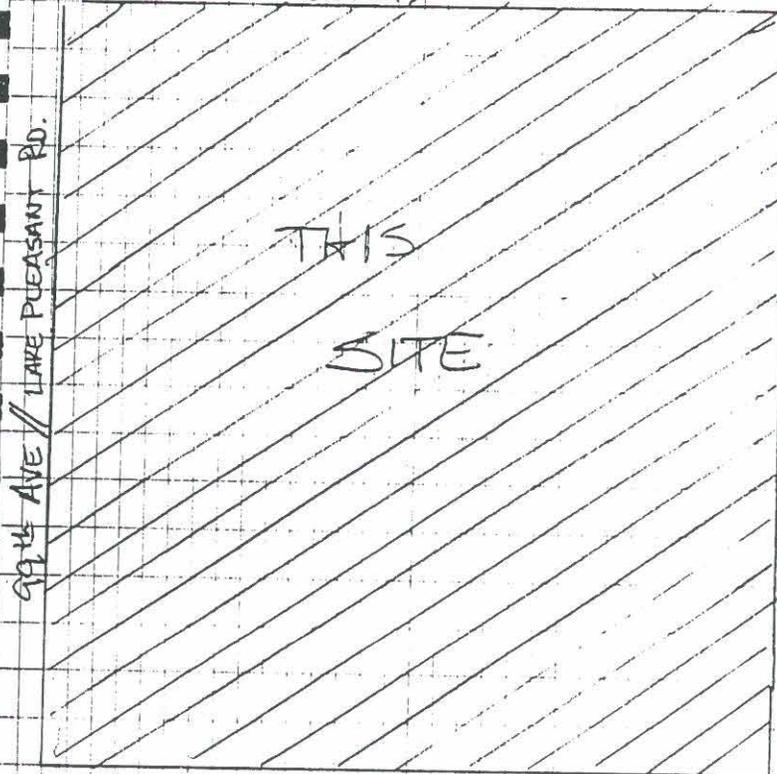
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ADMP UPDATE

5043.0001
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JOMAX



UNION HILLS

Pg #

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BENCH LOOPS FOR
FLOOD CONT. B.C.'S

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MAPS FOR FLOOD CONT. B.C.'S

FLOOD CONTROL BENCH LOOP

R. ROMAN 6-8-2000
 M. BROWN SUNNY & HOT 95°

STA	+	HI	-	ELEV.	DESCRIPTION
				1327.14	BCE @ PINNACLE PEAK & 69 th AVE #88048
TP #1			3.13	1330.24	P.K. NAIL APPROX. 600' E. OF TBM @ EDGE OF PAVEMENT (W. SIDE)
	7.47	1337.71			
TP #2			2.92	1334.79	P.K. NAIL APPROX 1200' E. OF TBM @ N. EDGE OF PAVEMENT (300' E. OF 67 th AVE)
	6.33	1341.12			
TP #3			3.13	1337.99	P.K. NAIL APPROX 300' E. OF 67 th AVE @ N. EDGE OF PAVEMENT (CLOSE TO 2 ND PP)
	9.01	1347.00			
TP #4			2.44	1344.56	P.K. NAIL 100' E. OF 65 th PL // BY W.M. @ S. EDGE OF PAVEMENT
	4.00	1348.56			
TP #5			5.25	1343.31	P.K. NAIL IN FRONT OF 6323 PARKCREST @ N. EDGE OF PAVEMENT

CONT'

STA	+	HI	-	ELEV.	DESCRIPTION
	4.47	1347.78			
TP #6			5.72	1342.06	
	5.49	1347.55			FLOOD CONTROL B.C. @ E. SIDE OF WASH APPROX. 15' N. OF EDGE OF PAVEMENT @ 60' W. OF No OUTLET SIGN @ P. RANCH SIGN
TP #5			4.24	1343.31	
	5.38	1348.69			
TP #4			4.13	1344.56	
	1.78	1346.34			
TP #3			8.34	1338.00	
	3.30	1341.30			
TP #2			6.50	1334.80	
	2.41	1337.21			
TP #1			6.97	1330.24	
	3.22	1333.46			
T.B.M			6.32	1327.14 ✓	B.C.F. @ PINNACLE PEAK @ 69 th AVE (#88048) EL = 1327.14

STA	+	#2 HI	-	ELEV.	DESCRIPTION
TBM				1280.12	ADOT B.C STAMPED "PT4475" EPOXIED TO WELL CASING @ THE S.W. COR. OF 83 RD AVE & DEER VALLEY RD.
	5.53	1285.65			
TP#1			5.74	1279.91	3/4 - 1/4 600' +/- W. OF 83 RD AVE @ END CURB ON S. SIDE OF RD.
	6.11	1286.02			
TP#2			5.74	1280.28	3/4 - 1/4 300' +/- W. OF 85 TH AVE. "+" ON CONC.
	5.07	1285.35			
TP#3			5.13	1280.22	3/4 - 1/4 200' +/- W. OF 86 TH AVE. "+" ON CONC. // @ W. EDGE C.B.
	5.63	1285.85			
TP#4			5.78	1280.07	3/4 - 1/4 400' +/- W. OF 87 TH AVE. "+" ON CONC. // @ CURB OPENING
	5.45	1285.52			
TP#5			5.00	1280.52	3/4 - 1/4 30' +/- W. OF 89 TH AVE. "+" ON CONC. // @ N.W. RET (S. SIDE RD.)

CONT'

STA	+	HI	-	ELEV.	DESCRIPTION
	5.47	1285.99			
TP #6			5.29	1280.70	3/4 - 1/4 100' +/- E. OF 90 th AVE "+" ON CONC.
	5.44	1286.14			
TP #7			3.80	1282.34	3/4 - 1/4 200' +/- W. OF 91 st AVE. "+" ON CONC.
	4.98	1287.32			
TP #8			5.57	1281.75	3/4 - 1/4 800' +/- W. OF 91 st AVE. "+" ON CONC.
	6.08	1287.83			
TP #9			10.50	1277.33	FLOOD CONTROL BC @ N.W. COR. HEADWALL @ S.W. COR. 93 RD AVE E DEER VALLEY RD.
	10.67	1288.00			
TP #8			6.25	1281.75	
	5.05	1286.80			
TP #7			4.47	1282.33	
	3.90	1286.23			
TP #6			5.53	1280.70	

CONT'

STA	+	HI	-	ELEV.
	5.13	1285.83		
TP#5			5.30	1280.53
	4.89	1285.42		
TP#4			5.34	1280.08
	5.67	1285.75		
TP#3			5.52	1280.23
	5.34	1285.57		
TP#2			5.27	1280.30
	5.73	1286.03		
TP#1			6.10	1279.93
	5.65	1285.58		
TBM			5.45	1280.13

DESCRIPTION

ADOT B.C. STAMPED "PT4475" EPOXIED TO WELL CASING @ THE S.W. COR. OF 83RD AVE & DEER VALLEY RD. EL = 1280.12

CLOSURE ERROR +0.01
ADT. PER TURN. = 0.0011

STA	+	# 3 HI	-	ELEV.	DESCRIPTION
				1387.10	BCHH @ 67 th AVE E SADDLE HORN W. (ELEV. PER DTM INFO) #99097
	3.53	1390.63			SLOT ON RING OF H.H.
TP #1			5.88	1384.75	PK NAIL APPROX. 200' +/- N OF HAPPY VALLEY @ E EDGE OF PAVEMENT ON 67 th AVE.
	1.04	1385.79			
TP #2			3.92	1381.87	PK NAIL APPROX. 300' +/- E. OF 67 th AVE @ S. EDGE OF PAVEMENT ON HAPPY VALLEY
	6.60	1388.47			
TP #3			5.89	1382.58	B/C T/C APPROX. 200' +/- FROM W. END CURB @ S. SIDE OF HAPPY VALLEY RD. "t" ON CURB
	4.04	1386.62			
TP #4			4.33	1382.29	B/C T/C APPROX. 300' +/- FROM HEATHER RIDGE ENTRANCE. "t" ON CURB, S. SIDE RD.
	6.95	1389.24			
TP #5			1.47	1387.77	B/C T/C APPROX. 50' +/- E. OF 62 ND AVE "t" ON CURB, S. SIDE RD.

CONT'

R. ROMAN 6-9-2000
M. BROWN SUNNY & HOT 95°

6

STA	+	HI	-	ELEV.	DESCRIPTION
	9.48	1397.25			
TP #6			2.61	1394.64	B/W - T/W APPROX. 300' ± W. OF 61 ST AVE. "+" ON CONC.
	11.94	1406.58			
TP #7			0.78	1405.80	B/C - T/C @ S.W. RETURN OF 61 ST AVE & HAPPY VALLEY "+" ON CONC.
	0.15	1405.95			
TP #8			10.43	1395.52	B/C - T/C @ SE RETURN OF 61 ST AVE & W. VILLA LINDA "+" ON CURB
	0.60	1396.12			
TP #9			11.04	1386.08	B/C - T/C BETWEEN WESTWIND & WHISPERING WIND "+" ON CURB, BY TRANS. PADS.
	3.34	1388.42			
TP #10			4.56	1383.86	B/C - T/C APPROX 40' ± N. OF SAGUARO PARK "+" ON CURB.
	0.93	1384.79			
TP #11			7.92	1376.87	B/C - T/C APPROX 300' ± W. OF 61 ST AVE "+" ON CURB, S. SIDE QUESTA DR.

CONT'

STA	+	HI	-	ELEV.	DESCRIPTION
	4.38	1381.25			
TP#12			5.58	1375.67	FLOOD CONTROL BC. ON HEADWALL @ THE S.W. COR. OF QUESTA DR. E 6 TH PL. ON S.W. COR. OF HEADWALL
	5.62	1381.29			
TP#11			4.41	1376.88	
	8.18	1385.06			
TP#10			1.19	1383.87	
	4.48	1388.35			
TP#9			3.25	1385.10	
	11.05	1396.15			
TP#8			0.61	1395.54	
	10.62	1406.16			
TP#7			0.34	1405.82	
	1.29	1407.11			
TP#6			12.45	1394.66	
	3.13	1397.79			
TP#5			10.01	1387.78	
	1.26	1389.04			
TP#4			6.73	1382.31	
	4.57	1386.88			
TP#3			4.27	1382.61	NOT SAME AS ORIG. T.P. / ORIG. GOT REMOVED (SAME GEN. LOCATION THOUGH)
	5.46	1388.07			
TP#2			6.19	1381.88	

CONT'

STA	+	HI	-	ELEV
	4.68	1386.56		
TP #1			1.83	1384.73
	6.02	1390.75		
TBM			3.66	1387.07

DESCRIPTION

BCHH @ 67th AVE E SADDLEHORN W. #99097
SHOT ON RING OF H.H. (INFO PER DTM)
ELEV. = 1387.10

CLOSURE ERROR = -0.03
ADJUSTMENT PER TURN = 0.0025

STA	+	# 4 HI	-	ELEV.	DESCRIPTION
	2.95	1408.13		1405.18	SET 60d NAIL w/SHINER 1'E. OF 4 STRAND BARBWIRE FENCE (BETWEEN FENCE & TRACK RD) 1/4 MILE S. OF THE E. 1/4 COR. SEC. 33
TP # 1			8.39	1399.74	SET RANDOM HUB
	3.55	1403.29			
TP # 2			5.17	1398.12	SET RANDOM HUB
	7.53	1405.65			
TP # 3			5.25	1400.40	SET RANDOM HUB
	2.65	1403.05			
TP # 4			6.25	1396.80	FLOOD CONTROL B.C. 0.2 MILES E. OF LAKE PLEASANT RD. 4' N. OF 4 STRAND BARBWIRE FENCE. SET IN RING OF STONE STAMPED FCD 99-44
	6.42	1403.22			
TP # 3			2.83	1400.39	
	5.25	1405.64			
TP # 2			7.53	1398.11	1396.80
	5.13	1403.24			
TP # 1			3.49	1399.75	

CONT'

STA	+	HI	-	ELEV
	8.55	1408.30		
TBM			3.11	1405.19

DESCRIPTION

SET 6.0d NAIL w/SHINER 1' E. OF 4 STRAND
 BARB WIRE FENCE (BETWEEN FENCE & TRACK RD.)
 1/4 MILE S. OF THE E 1/4 COR. SEC. 33
 ELEV = 1405.18

CLOSURE ERROR = +0.01
 ADJUSTMENT PER TURN = 0.0025

		#5			R. ROMAN K. KESTI	6-12-2000 SUNNY & HOT 100°	12
STA	+	HI	-	ELEV.	DESCRIPTION		
TBM	1.36	1312.49		1311.13	BCHH CO.P. @ PINNACLE PEAK & 99 th AVE		
					SHOT ON RIM OF H.H.		
TP#1			8.37	1304.12	- 60d NAIL @ NE COR. OF LAKE		
	8.44	1312.56			PLEASANT & PINNACLE PEAK (2' SOUTH OF STOP SIGN)		
TP#2			1.87	1310.69	60d NAIL 10' ± E. OF EDGE OF PAVEMENT		
	9.19	1319.88			600' ± N. OF PINNACLE PEAK (4' W. OF ST. SIGN)		
TP#3			3.33	1316.55	60d NAIL 10' ± E. OF E.P. 300' ± N. OF		
	9.04	1325.59			HACIENDA DEL SOL		
TP#4			3.57	1322.02	60d NAIL 10' ± E. OF E.P. 400' ± N. OF		
	8.40	1330.42			MARIPOSA GRANDE		
TP#5			3.66	1326.76	60d NAIL 10' ± E. OF E.P. 300' ± N. OF		
	7.88	1334.64			CALLE DE JOS		

CONT'

STA	+	HI	-	ELEV.	DESCRIPTION
	7.88	1334.4			
TP #6			3.91	1330.73	60d NAIL 10' +/- W OF E.P. 300' +/- N. OF HATFIELD.
	6.85	1337.58			
TP #7			3.64	1333.94	60d NAIL. RANDOM IN DESERT
	5.42	1339.36			
TP #8			6.87	1332.49	FLOOD CONTROL B.C. 1/2 MILES W. ON HAPPY VALLEY RD. (DIRT). THEN 300' +/- SOUTH B.C. IN RING OF STONE. @ E SIDE OF WASH
	7.03	1339.52			
TP #7			5.57	1333.95	
	5.86	1339.81			
TP #6			9.07	1330.74	
	2.19	1332.93			
TP #5			6.16	1326.77	
	2.57	1329.14			
TP #4			7.10	1322.04	
	3.03	1325.07			
TP #3			8.50	1316.57	

CONT'

STA	+	HI	-	ELEV.	DESCRIPTION
TP#2	2.38	1318.95			
			8.23	1310.72	
TP#1	0.73	1311.45			
			7.30	1304.15	
TBM	7.81	1311.96			
			0.83	1311.13	COP BCHA @ PINNACLE PEAK & 99th AVE. SHOT ON RIM OF H.H.

#6

STA	+	HI	-	ELEV.	DESCRIPTION
				1405.80	TP #7, BENCH LOOP # 3, Pg. 7 B/C-T/C S.W. RETURN OF 61 ST AVE. HAPPY VALLEY "T" ON CONC.
	11.26	1417.06			
TP #1			1.53	1415.53	WOOD NAIL 10' +/- S. OF E.P. @ 600' +/- E OF 61 ST AVE.
	2.93	1418.46			
TP #2			9.57	1408.89	WOOD NAIL 10' +/- S. OF E.P. @ 1200' +/- E OF 61 ST AVE.
	2.21	1411.10			
TP #3			5.36	1405.74	WOOD NAIL 10' +/- S. OF E.P. @ 300' +/- E. OF ENTRANCE TO IND. PARK
	10.42	1416.16			
TP #4			6.13	1410.03	B/C-T/C S. SIDE HAPPY VALLEY 200' +/- E. OF END OF CURB "T" ON CONC.
	7.63	1417.66			
TP #5			0.68	1416.98	B/C-T/C S. SIDE HAPPY VALLEY 800' +/- E. OF END OF CURB, "T" ON CONC.

CONT'

STA	+ HI	-	ELEV	DESCRIPTION
8.17	1425.15			
TP#6		4.41	1420.74	
5.49	1426.23			3/4 - 1/4 S. SIDE HAPPY VALLEY 300' +/- E. OF 53 RD AVE. "T" ON CONC.
TP#7		4.46	1421.77	
4.38	1426.15			3/4 - 1/4 S. SIDE HAPPY VALLEY 100' +/- W. OF 53 RD AVE "T" ON CONC.
TP#8		5.40	1420.75	
4.53	1425.28			WOOD NAIL 10' +/- S OF E.P. 500' +/- E. OF 53 RD AVE.
TP#9		1.47	1423.81	
9.43	1433.24			3/4 - 1/4 300' +/- N OF HAPPY VALLEY ON E. SIDE OF 51 ST AVE "T" ON CONC.
TP#10		2.46	1430.78	
9.29	1340.07			WOOD NAIL 300' +/- N. OF BARRICADES @ END OF 51 ST AVE @ DIRT RD.
TP#11		0.59	1439.48	
				WOOD NAIL 900' +/- N. OF BARRICADES @ DIRT RD.

STA	+	HI	-	ELEV.	DESCRIPTION
	8.90	1448.38			
TP #12			0.97	1447.41	60d NAIL @ Ⓢ DIRT RD.
	9.27	1456.68			
TP #13			0.93	1455.75	60d NAIL @ Ⓢ DIRT RD.
	11.17	1466.92			
TP #14			1.40	1465.52	60d NAIL @ Ⓢ DIRT RD.
	13.16	1478.68			
TP #15			5.92	1472.76	2" ALUM. CAP // COLLAR, WILLIAMS & WHITE
	5.90	1478.66			RLS 18214 @ 1 MILE N. OF HAPPY
TP #14			13.14	1465.52	VALLEY & 300' E OF 51 ST AVE,
	1.62	1467.14			AND 50' ± North
TP #13			11.39	1455.75	↳ Description for
	1.17	1456.92			ERM # 3
TP #12			9.53	1447.39	

CONT'

STA	+ HI	-	ELEV.	DESCRIPTION
TP #11	1.73	1449.12	9.66	1439.46
TP #10	1.25	1440.71	9.95	1430.76
TP #9	2.37	1433.13	9.33	1423.80
TP #8	1.43	1425.23	4.47	1420.76
TP #7	5.68	1426.44	4.69	1421.75
TP #6	4.27	1426.02	5.29	1420.73
TP #5	4.33	1425.06	8.08	1416.98
TP #4	0.67	1417.65	7.62	1410.03
TP #3	6.47	1416.50	10.75	1405.75
TP #2	7.65	1413.40	4.51	1408.89
TP #1	10.36	1419.25	3.71	1415.54
TBM	3.29	1418.83	13.04	1405.79

TP #7, BENCH. LOOP #3, pg. 7
 EL = 1405.80 CLOSURE ERROR = -0.01
 ADJ PER TURN = 0.0007

MAPS FOR BENCH LOOPS

#1

HAPPY VALLEY RD.

PINNACLE
PEAK

0.5 MILES

PARKSIDE RD

15'

WASH

67th Ave

DEER VALLEY

FLOOD CONTROL B.C. SET IN RING OF STONE
@ E. SIDE OF WASH APPROX. 15' N OF EP.
6' 60" WEST OF NO OUTLET SIGN

FLOOD CONTROL B.C. @ N.W. COR. OF
HEADWALL @ S.W. COR. OF Q3RD AVE &
DEER VALLEY RD.

Q3RD AVE

HEADWALL

15'

DEER VALLEY RD.

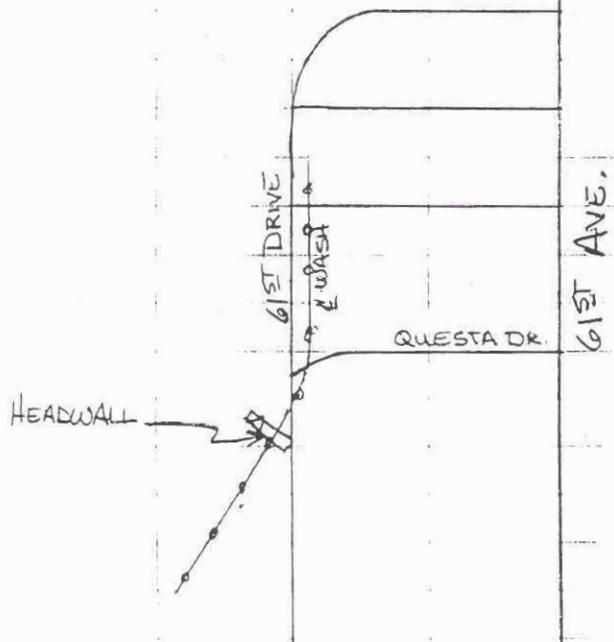
Q1ST AVE

PINNACLE PEAK

#2

3

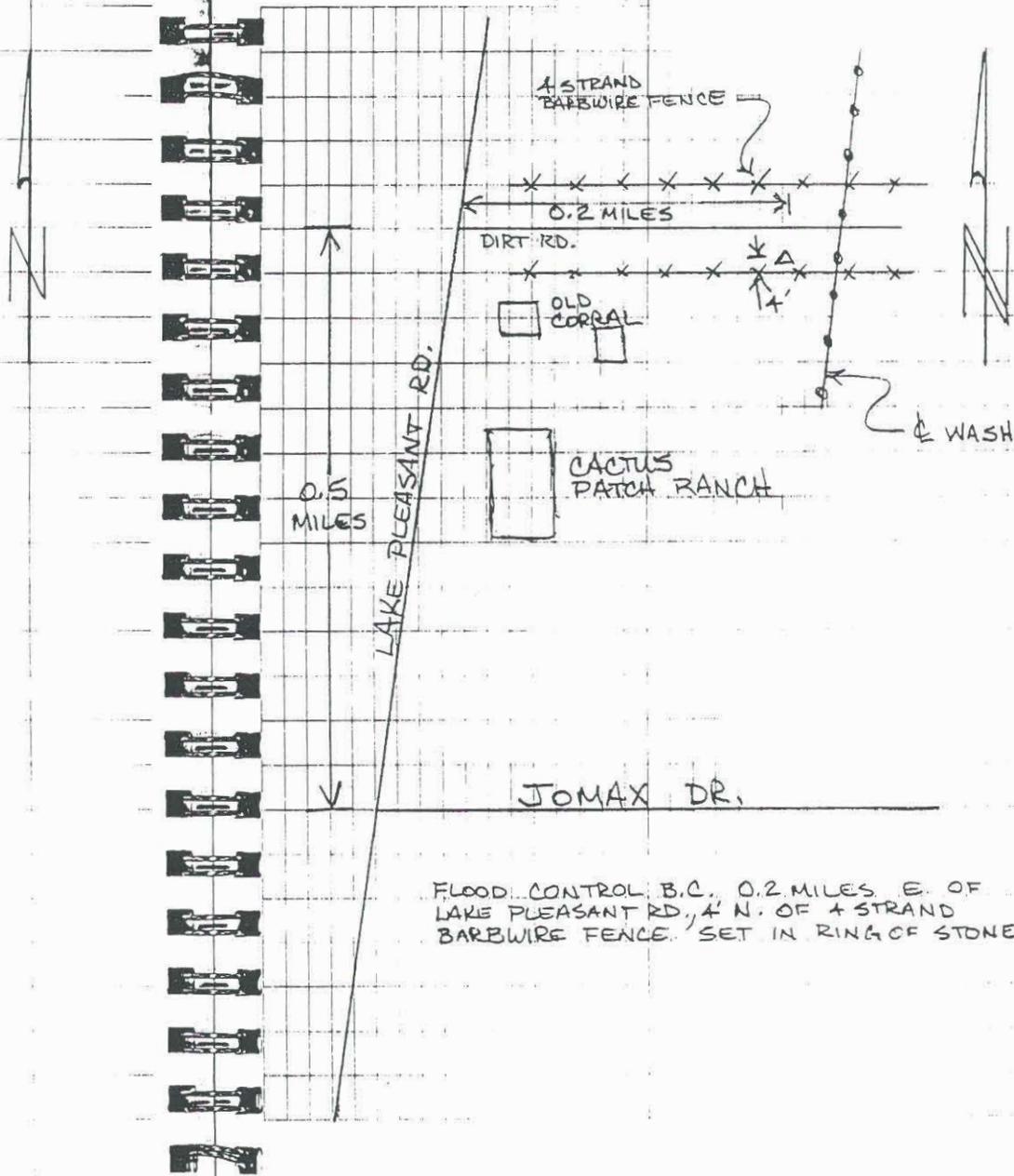
HAPPY VALLEY



FLOOD CONTROL B.C. @ S.W. CORNER
OF HEADWALL @ THE S.W. COR. OF
QUESTA DR. & 61ST PLACE

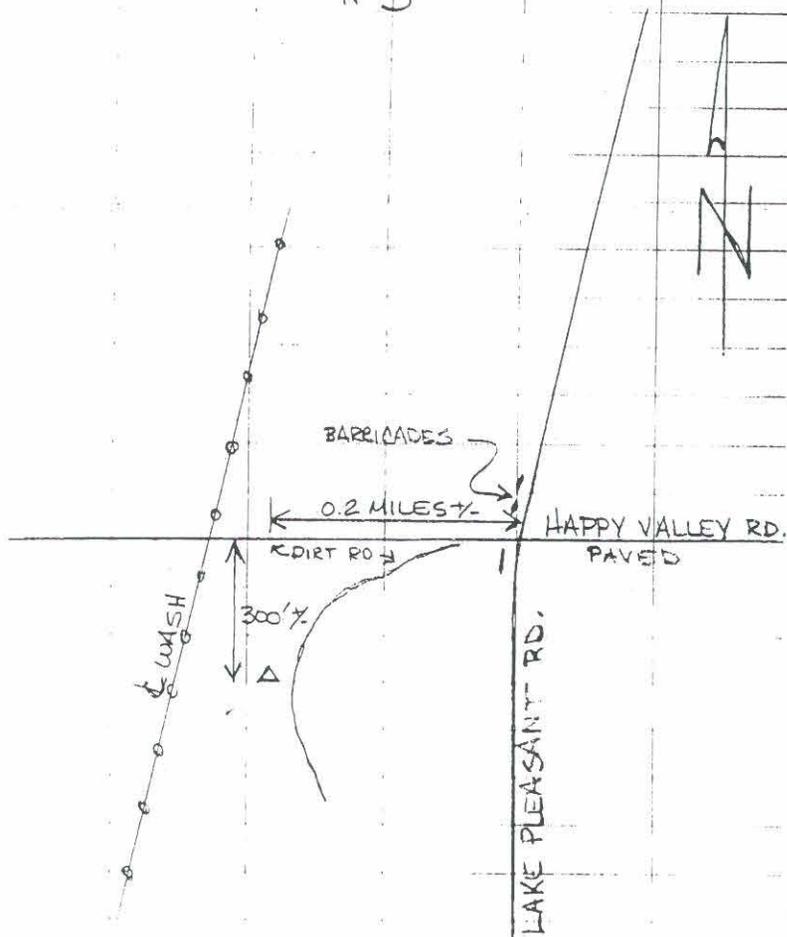
4

20



FLOOD CONTROL B.C. 0.2 MILES E. OF
LAKE PLEASANT RD. & N. OF 1 STRAND
BARB WIRE FENCE. SET IN RING OF STONE

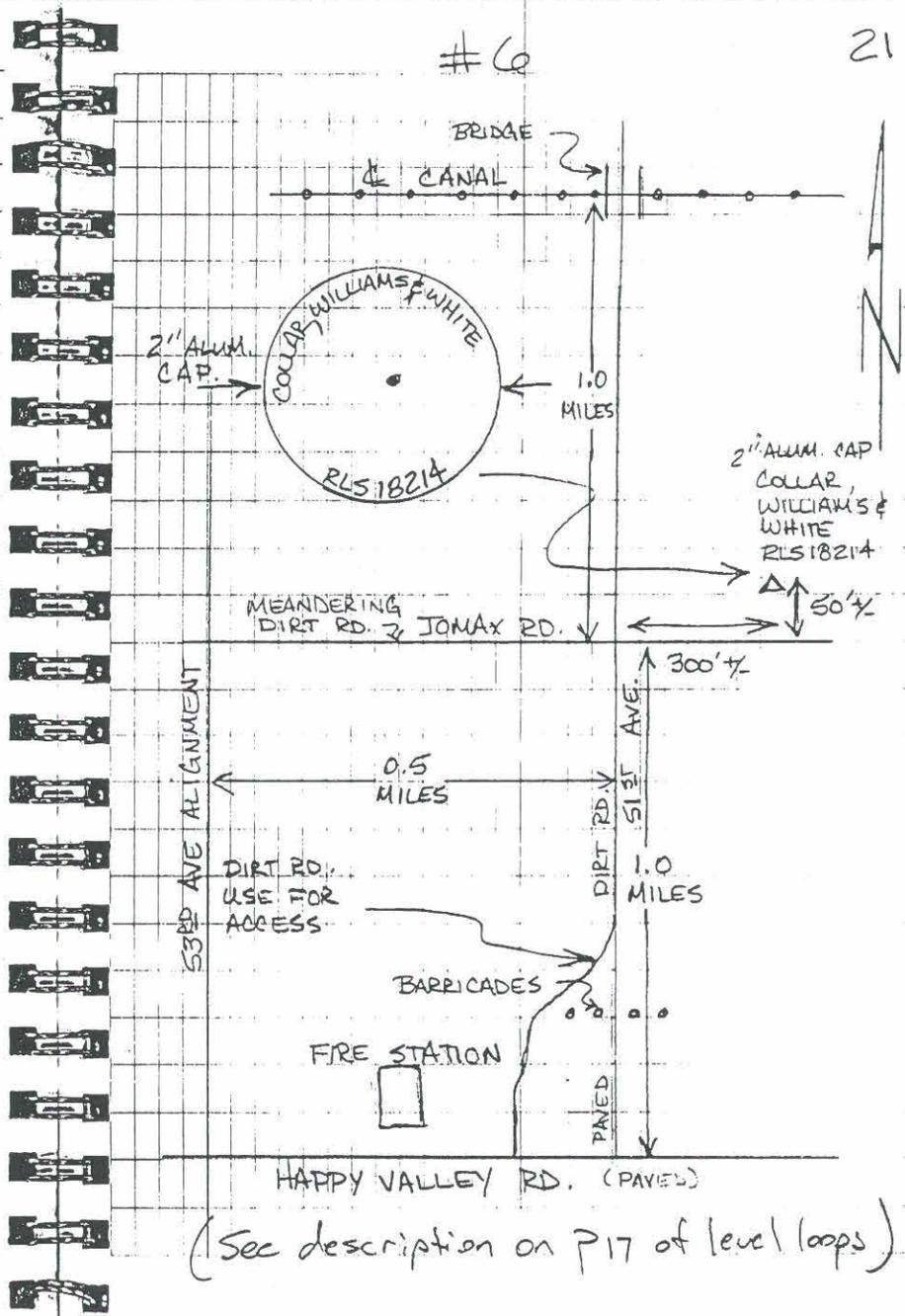
#5



FLOOD CONTROL B.C. SET IN RING OF STONE. 0.2 MILES W. OF LAKE PLEASANT RD. ON HAPPY VALLEY RD. THEN 300' S. ON E SIDE OF WASH

#6

21



(See description on p 17 of level loops)

ERM	Bench loop #	Elevation
#1	4	1396.80
#2	5	1332.49
#3	6	1472.76
#4	1	1342.06
#5	3	1375.67
#6	**	1371.02

** DTM control Pt # 999.17

Desc: Top of AEDOT aluminum
cap (BM 517-6), at
NW corner of Section 2,
T4N, R1E

Appendix C

ERM Site Map

APPENDIX D. HYDROLOGIC ANALYSIS SUPPORTING DOCUMENTATION

D.1. Precipitation Data

All precipitation data is located in *Glendale Peoria Area Drainage Master Plan Update- Hydrology- Volume HY*.

D.2. Physical Parameters Calculations

All physical parameters calculations are located in *Glendale Peoria Area Drainage Master Plan Update- Hydrology- Volume HY*.

D.3. Hydrograph Routing Data

All hydrograph routing data is located in *Glendale Peoria Area Drainage Master Plan Update- Hydrology- Volume HY*.

D.4. Reservoir Routing Data

All reservoir routing data is located in *Glendale Peoria Area Drainage Master Plan Update- Hydrology- Volume HY*.

D.5. Flow Splits and Diversion Data

All flow splits and diversion data is located *Glendale Peoria Area Drainage Master Plan Update- Hydrology- Volume HY* and in **Section 5.7** of this volume.

D.6. Hydrologic Calculations

The original hydrologic calculations are located in *Glendale Peoria Area Drainage Master Plan Update- Hydrology- Volume HY*. Routing modifications, in order to obtain flow values at desired wash locations, are included on subsequent pages.

D.6. Hydrologic Calculations

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Glendale/ Peoria Area Drainage Master Plan Update

Zone A Floodplain Delineation

Hydrology/ Hydraulic Summary

Table D.6-1

* See Section D.6 for more explanation of Hydrology Modifications

Hydrology information was referenced from the *Glendale Peoria Area Drainage Master Plan Update- Hydrology- Volume HY*

Wash ID	Reach	Location	Length [ft]	Mannings n bank,center,bank	Slope [ft/ft]	Peak 100yr/6hr Flow [cfs]	Cross Sections	Concentration Point	Comments
T4N-R1E-S07	1	Aqua Fria River Confluence	1000	.05,.07,.05	0.014	6790	-	CA11	Aqua Fria River Flow
	2	Happy Valley Rd. and 107 th Ave	2425	.05,.07,.05	0.014	2820	10 - 30	CA11A*	RA11D Excluded
	3	Happy Valley Rd. and Lake Pleasant Rd.	3130	.05,.07,.05	0.013	2460	40 - 50	CX23*	RX22 Excluded
	4	3/8 Mile North of Happy Valley Rd. Alignment and 1/8 Mile East of Lake Pleasant Rd.	5320	.05,.07,.05	0.016	2110	60 - 100	CA11E*	RA11FN Diversion Excluded from CP
	5	1/2 Mile North of Jomax Rd. and 1/4 Mile East of Happy Valley Rd.	1160	.045,.055,.045	0.007	850	110 - 120	A11J*	Combine flow from A11J, A11M
T4N-R1E-S04	1	3/8 Mile North of Happy Valley Rd. and 1/4 Mile East of Lake Pleasant Rd.	4340	.04,.06,.04	0.0144	890	10 - 70	A11F	Runoff from basin A11F
T5N-R1E-S33	1	Aqua Fria River Confluence	600	.05,.07,.05	0.007	2020	-	CA11I	
	2	1/4 Mile North of Jomax Rd. and 1/4 Mile West of 91 st Ave. Alignment	1725	.05,.07,.05	0.007	780	10 - 30	A11K*	Combine flow from A11K,RA11N,RA11O
T5N-R1E-S35	1	New River Confluence, 1/4 Mile North of Jomax Rd., Upstream of flow split T5N-R1E-S36	2500	.05,.07,.05	0.021	890	80	CN27G*	
	2	New River Confluence, 1/4 Mile North of Jomax Rd., Downstream of flow split T5N-R1E-S36	400	.05,.07,.05	0.011	720	10 - 70	CN27E*	
	3	1/2 Mile North of Jomax Rd. and 74 th Ave. Alignment	2600	.05,.07,.05	0.011	650	90 - 140	N27F	Flow decreased by T5N-R1E-S36
T5N-R1E-S36	1	Split Flow from T5N-R1E-S35	900	.05,.07,.05	0.011	170	10 - 30	CN27E**	Old Wash, Now perched
T4N-R1E-S02W	1	New River Confluence at Jomax Rd. and 75 th Ave. Alignment, Downstream of T5N-R1E-S36	3200	.05,.07,.05	0.018	660	10 - 40	CN27E*	
	2	New River Confluence at Jomax Rd. and 75 th Ave. Alignment, Upstream of T5N-R1E-S36	2370	.05,.07,.05	0.011	490	50 - 160	N27G	Flow increased by T5N-R1E-S36
T4N-R1E-S02E	1	New River Confluence at 1/4 Mile South of Jomax Rd.	2500	.05,.07,.05	0.014	500	10 - 50	CN27C*	
	2	1/4 Mile North of Jomax Rd. and 69 th Ave. Alignment	4000	.05,.07,.05	0.011	440	60 - 80	N27H	

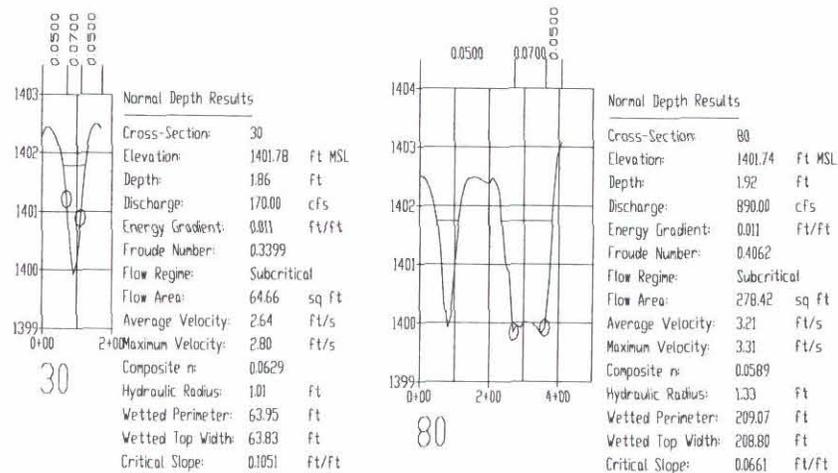
D.6-2 Modified Hydrology: CN27E*, CN27E**

The two cross sections below were used to determine the flows in reach 3 of wash T5N-R1E-S35, reach 2 of T4N-R1E-S02W, and wash T5N-R1E-S36. Cross section number 80 shows that T5N-R1E-S35 splits. The flow carried by the left channel of the cross section was delineated independently as shown by cross section 30. This separate wash is T5N-R1E-S36, and analysis shows it actually connects with wash T4N-R1E-S02W. Hence, the flow carried by T5N-R1E-S36 was added to the runoff from basin N27G, in order to determine the peak flow in reach 2 of wash T4N-R1E-S02W. Likewise, the flow carried by T5N-R1E-S36 was subtracted from the runoff from basins N27F and N27E. The normal depth calculations below show that the flow picked up in wash T5N-R1E-S36 is 170 cfs. The resulting flow calculations are as follows:

CN27E* : Wash T5N-R1E-S36, Peak Flow = 170 cfs

CN27E** : Wash T4N-R1E-S02W (Reach 2), Peak Flow = 490 + 170 = 660 cfs

CN27E** : Wash T5N-R1E-S35 (Reach 3), Peak Flow = 890 - 170 = 720 cfs

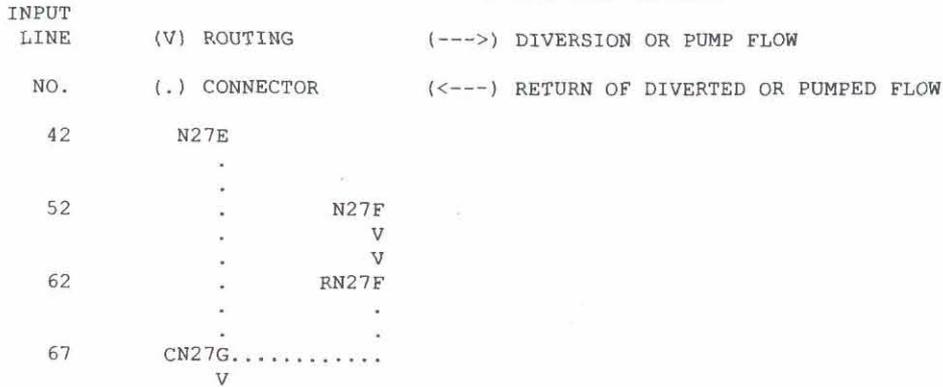


Refer to Section 5.7.1.1.2 of this volume for more discussion on the split flow. For the original hydrology model, refer to the *Glendale Peoria Area Drainage Master Plan Update- Hydrology- Volume HY*. **Figure D.6-2** (of this volume) is a schematic reflecting the modifications discussed above.

D.6-3 Hydrology Modification: CN27G*

The text below was extracted from the HEC-1 model, and used to determine peak flows in the second reach of wash **T5N-R1E-S35**. This model originates from the *Glendale Peoria Area Drainage Master Plan Update- Hydrology- Volume HY*. The original model was modified so that only basins N27E and N27F would contribute to the peak flow in the reach (see **Figure D.6-2**).

SCHEMATIC DIAGRAM OF STREAM NETWORK



RUNOFF SUMMARY FLOW IN CUBIC FEET PER SECOND TIME IN HOURS, AREA IN SQUARE MILES

MAXIMUM STAGE +	TIME OF OPERATION MAX STAGE	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA
					6-HOUR	24-HOUR	72-HOUR	
+	HYDROGRAPH AT	N27E	287.	4.27	26.	6.	5.	0.19
+	HYDROGRAPH AT	N27F	659.	4.10	48.	12.	9.	0.28
+	ROUTED TO	RN27F	630.	4.17	48.	12.	9.	0.28
+	2 COMBINED AT	CN27G	890.	4.20	74.	18.	13.	0.47

D.6-4 Hydrology Modification: A11F*,A11J*,A11K*,N27F*,N27H*

Some washes contained reaches that only had a single basin contributing to the 100yr flow. Hence, a downstream concentration point was needed that only reflected the peak runoff from the single basin. The nomenclature for these concentration points is the name of the contributing basin with an asterisk placed at the end. For more clarification refer to **Figures D.6-1** and **Figure D.6-2**. Since the HEC-1 output gives the peak runoff for each basin, no modifications to the original model was necessary. For the original model, refer to the *Glendale Peoria Area Drainage Master Plan Update- Hydrology- Volume HY*.

D.6-5 Hydrology Modification: CA11A*

The text below was extracted from the HEC-1 model used to determine peak flow in the second reach of wash **T4N-R1E-S07**. This model originates from the *Glendale Peoria Area Drainage Master Plan Update- Hydrology- Volume HY*. The original model was modified so that route RA11D did not contribute to the flow in this reach (see **Figure D.6-2**). The flow routed through RA11D is not conveyed to CA11A within the wash, and therefore has been excluded from CA11A*.

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) ROUTING NO.	(--->) DIVERSION OR PUMP FLOW (.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW			
3119
	CX22.....	.
	V	.
	V	.
3121	RX22	.

3126	CX23.....	.
	V	.
	V	.
3128	RX23	.

3133	A11B	.

3143	A11A	.

3153	CA11A*.....	.
	V	.
	V	.
3155	RA11A	.
+						
4.	0.18		RX22	210.	4.43	25. 6.

RUNOFF SUMMARY FLOW IN CUBIC FEET PER SECOND TIME IN HOURS, AREA IN SQUARE MILES

MAXIMUM STAGE	TIME OF OPERATION MAX STAGE	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA
					6-HOUR	24-HOUR	72-HOUR	
+	3 COMBINED AT							
+		CX23	2596.	4.47	380.	95.	69.	2.38
+	ROUTED TO							
+		RX23	2519.	4.70	380.	95.	69.	2.38
+	HYDROGRAPH AT							
+		A11B	196.	4.23	21.	5.	4.	0.15
+	HYDROGRAPH AT							
+		A11A	659.	4.43	93.	23.	17.	0.59

+	3 COMBINED AT	CA11A*	2815.	4.70	460.	116.	83.	3.12
+	ROUTED TO	RA11A	2795.	4.73	460.	116.	83.	3.12
+	HYDROGRAPH AT	A11C	152.	4.33	16.	4.	3.	0.12

D.6-6 Hydrology Modification: CX23*

The text below was extracted from the HEC-1 model used to determine peak flow in the third reach of wash T4N-R1E-S07. This model originates from the *Glendale Peoria Area Drainage Master Plan Update- Hydrology- Volume HY*. The original model was modified so that route RX22 did not contribute to the flow in this reach (see **Figure D.6-2**). The flow routed through RX22 is not conveyed to CX23 within the wash, and therefore has been excluded from CX23*.

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW			
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW			
3033	.	.	.	A11E	
	
3043	.	.	.	A11F	
	
3054	
3053	.	.	.	DA11F	-----> A11FI
	.	.	.	V	
3057	.	.	.	V	
	.	.	.	RA11FN	
	
3062	.	.	.	CA11E
	.	.	.	V	
	.	.	.	V	
3064	.	.	.	RA11E	
	
3069	.	.	.	A11H	
	.	.	.	V	
	.	.	.	V	
3079	.	.	.	RA11H	
	
3084	.	.	.	CX23*
	.	.	.	V	
	.	.	.	V	
3086	.	.	.	RX23	
	
3091	.	.	.	A99Z	
	.	.	.	V	
	.	.	.	V	
3101	.	.	.	RA99Z	
	
3106	.	.	.	A11D	
	
3116	.	.	.	CA11D
+					
14.	0.47		RA11FN	866.	4.23
					78.
					20.

RUNOFF SUMMARY
 FLOW IN CUBIC FEET PER SECOND
 TIME IN HOURS, AREA IN SQUARE MILES

MAXIMUM STAGE +	TIME OF OPERATION MAX STAGE	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA
					6-HOUR	24-HOUR	72-HOUR	
+	3 COMBINED AT							
+		CA11E	2428.	4.37	351.	88.	64.	2.13
+	ROUTED TO							
+		RA11E	2399.	4.47	351.	88.	64.	2.13
+	HYDROGRAPH AT							
+		A11H	188.	4.07	10.	2.	2.	0.07
+	ROUTED TO							
+		RA11H	149.	4.37	10.	2.	2.	0.07
+	2 COMBINED AT							
+		CX23*	2454.	4.47	358.	90.	65.	2.20
+	ROUTED TO							
+		RX23	2374.	4.70	358.	90.	65.	2.20
+	HYDROGRAPH AT							
+		A99Z	333.	4.17	32.	8.	6.	0.16

LEGEND

T2N-R5W-S04 WASH ID. LABEL

- ROADWAY CENTER LINE
- WASH BASELINE
- EXISTING FLOODPLAIN
- EXISTING FLOODWAY

- A09G BASIN
- CA09G CONCENTRATION POINT
- DA11G DIVERSION POINT
- DA11G IN DIVERSION RECOVERY POINT
- RA11G ROUTING REACH
- LA09G STORAGE ROUTING
- BASIN BOUNDARIES

SHEET INDEX

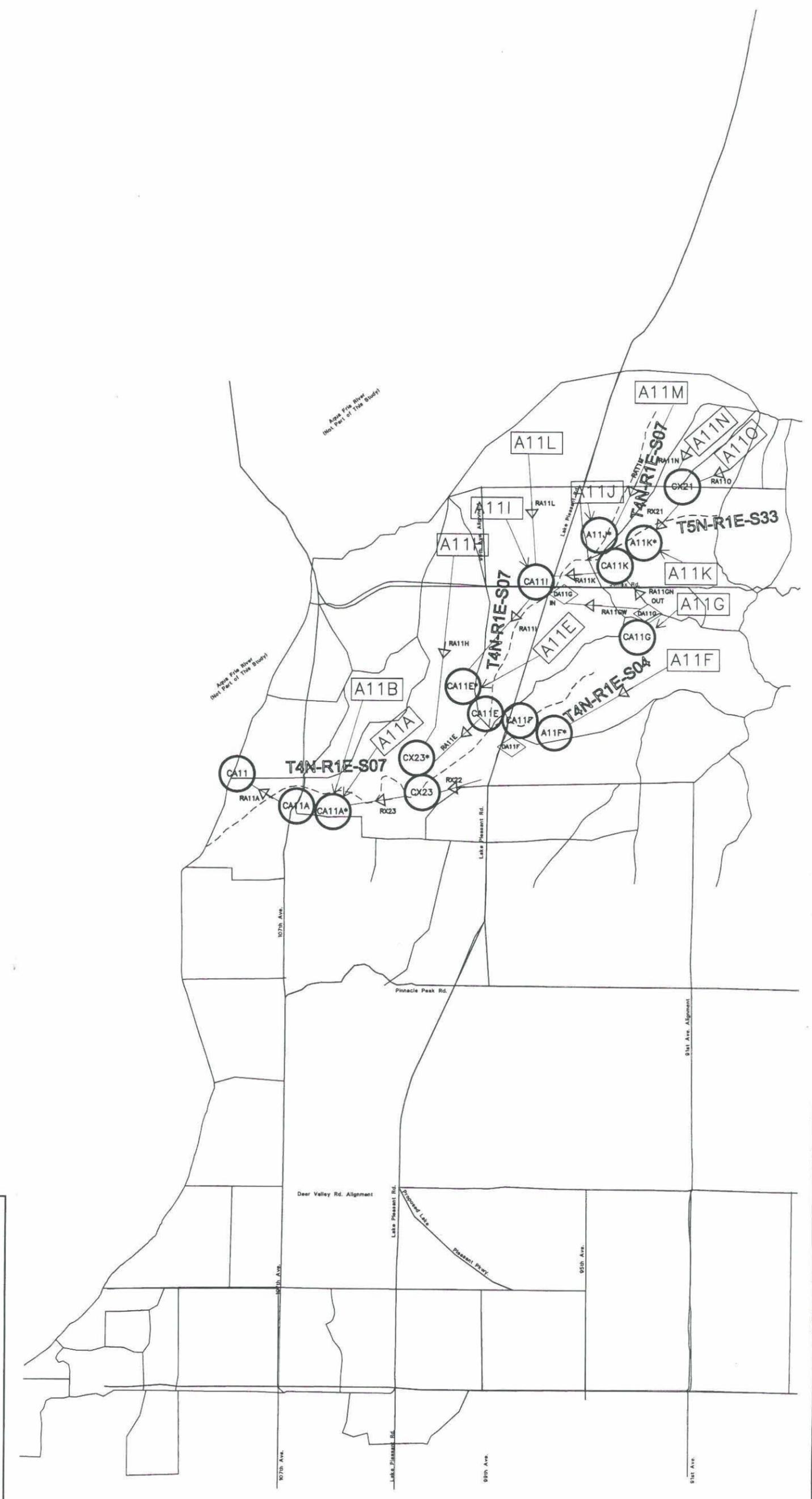


Not To Scale

Entellus
 2225 N. 44th Street Suite 125
 Phoenix, AZ 85018-3270
 Tel: 602.244.2000
 Fax: 602.244.0947

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
 GLENDALE PEORIA ADMP: ZONE A

HYDROLOGY ROUTING MODIFICATIONS
 Figure D.6-1
 Sheet 1 of 2



APPENDIX E. HYDRAULIC ANALYSIS SUPPORTING DOCUMENTATION

E.1. Roughness Coefficient Estimate

E.2. Cross Section Plots

E.3. Expansion and Contraction Coefficients

Expansion and contraction coefficients are not required under the approximate method.

E.4. Analysis of Structures

No significant structures exist within the study area.

E.5. Hydraulic Calculations

Normal depth calculations are located on the cross section plots. These are labeled **Figure E-2**, and are located in **Section E.2**.

E.1. Roughness Coefficient Estimation

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Figure E.1-7 Field Photographs (T4N-R1E-S02E)	E-9

E.1.1 Manning's Roughness
Wash T4N-R1E-S07

DETERMINATION OF MANNING'S ROUGHNESS COEFFICIENTS BY FCDMC METHOD
TABLE E.1-1.1

Project: Zone A Floodplain Delineation Study
Stream: T4N-R1E-S07
Location: Reaches - 1, 2
Photo No: Photos: 4, 5

Channel Conditions		Manning's n Adjustment		Left Overbank (West)	Channel	Right Overbank (East)
Channel Material	Concrete	n _c	.012 - .018			
	Firm Soil		.025 - .032			
	Coarse Sand		.026 - .035			
	Gravel		.028 - .035			
	Cobble		.030 - .050	.030	.045	.030
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n _i	0	0	0	0
	Minor		.001 - .005			
	Moderate		.006 - .010			
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n _o	.000 - .004			
	Minor		.005 - .015		0	
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n _v	.002 - .010			
	Medium		.010 - .025	.020	.020	.020
	Large		.025 - .050			
	Very Large		.050 - .100			
Variations in Channel Cross section	Gradual	n _s	0	0		0
	Occ. Alt.		.001 - .005		.005	
	Freq. Alt.		.010 - .015			
				0.050	0.070	0.050
Degree of Meandering	Minor	m	1	1	1	1
	Appreciable		1.15			
	Sever		1.3			
n = (n _c +n _i +n _o +n _v +n _s)m				0.050	0.070	0.050

FIGURE E.1-1.1

5a: Left Overbank



5b: Right Overbank



4b: Channel



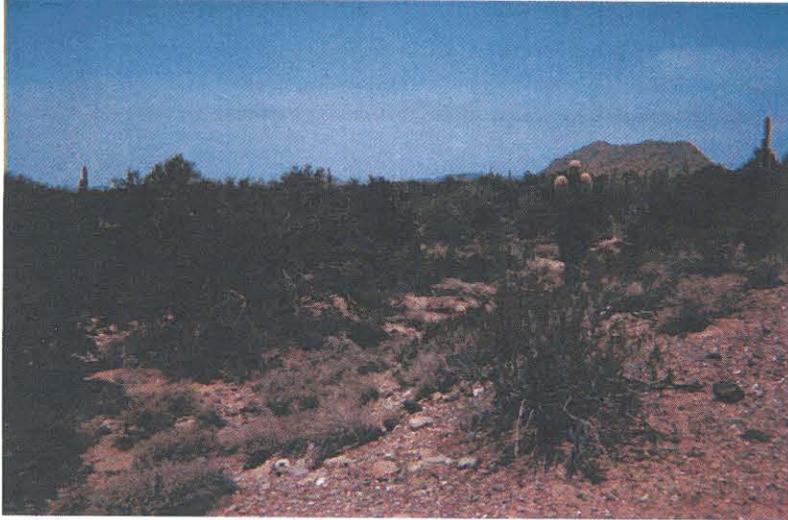
DETERMINATION OF MANNING'S ROUGHNESS COEFFICIENTS BY FCDMC METHOD
TABLE E.1-1.2

Project: Zone A Floodplain Delineation Study
Stream: T4N-R1E-S07
Location: Reaches - 3, 4
Photo No: Photos: 5, 7

Channel Conditions		Manning's n Adjustment		Left Overbank (West)	Channel	Right Overbank (East)
Channel Material	Concrete	n _c	.012 - .018			
	Firm Soil		.025 - .032			
	Coarse Sand		.026 - .035			
	Gravel		.028 - .035			
	Cobble		.030 - .050	.030	.045	.030
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n _i	0	0	0	0
	Minor		.001 - .005			
	Moderate		.006 - .010			
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n _o	.000 - .004		0	
	Minor		.005 - .015			
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n _v	.002 - .010			
	Medium		.010 - .025	.020	.020	.020
	Large		.025 - .050			
	Very Large		.050 - .100			
Variations in Channel Cross section	Gradual	n _s	0	0		0
	Occ. Alt.		.001 - .005		.005	
	Freq. Alt.		.010 - .015			
				0.050	0.070	0.050
Degree of Meandering	Minor	m	1	1	1	1
	Appreciable		1.15			
	Sever		1.3			
n = (n _c +n _i +n _o +n _v +n _s +n _m)m				0.050	0.070	0.050

FIGURE E.1-1.2

5a: Left Overbank



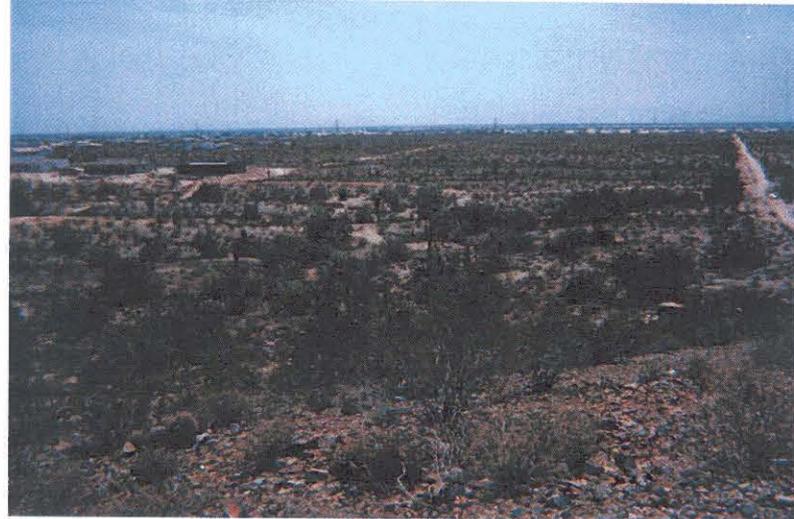
5b: Right Overbank



5c: Channel



7a: Overlooking Banks



DETERMINATION OF MANNING'S ROUGHNESS COEFFICIENTS BY FCDMC METHOD
TABLE E.1-1.3

Project: Zone A Floodplain Delineation Study
Stream: T4N-R1E-S07
Location: Reach - 5
Photo No: Photos: 7, 10

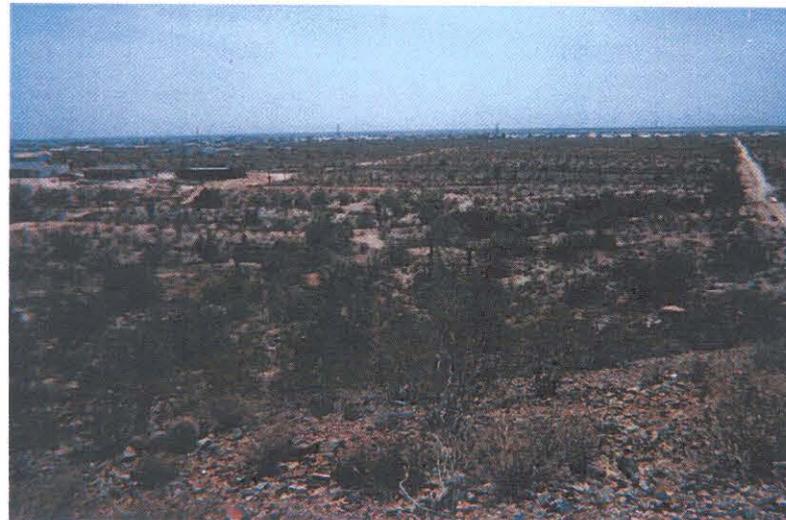
Channel Conditions		Manning's n Adjustment		Left Overbank (West)	Channel	Right Overbank (East)
Channel Material	Concrete	n _c	.012 - .018			
	Firm Soil		.025 - .032			
	Coarse Sand		.026 - .035	.035		.035
	Gravel		.028 - .035		.030	
	Cobble		.030 - .050			
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n _i	0	0	0	0
	Minor		.001 - .005			
	Moderate		.006 - .010			
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n _o	.000 - .004			
	Minor		.005 - .015		0	
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n _v	.002 - .010			
	Medium		.010 - .025	.01		.01
	Large		.025 - .050		.025	
	Very Large		.050 - .100			
Variations in Channel Cross section	Gradual	n _s	0	0		0
	Occ. Alt.		.001 - .005		0	
	Freq. Alt.		.010 - .015			
				0.045	0.055	0.045
Degree of Meandering	Minor	m	1	1	1	1
	Appreciable		1.15			
	Sever		1.3			
n = (n _c +n _i +n _o +n _v +n _s)m				0.045	0.055	0.045

FIGURE E.1-1.3

10a: Channel



7a: Overlooking Banks



E.1.2 Manning's Roughness
Wash T4N-R1E-S04

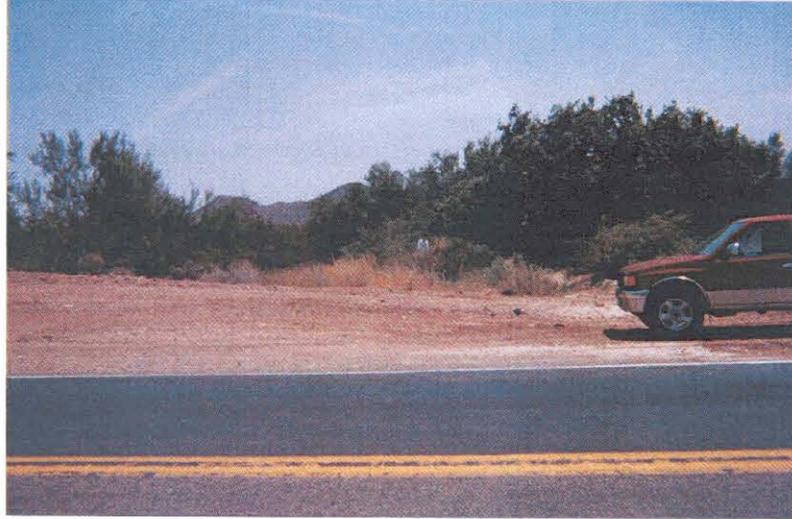
DETERMINATION OF MANNING'S ROUGHNESS COEFFICIENTS BY FCDMC METHOD
TABLE E.1-2.1

Project: Zone A Floodplain Delineation Study
Stream: T4N-R1E-S04
Location: Reaches - 1
Photo No: Photos: 6

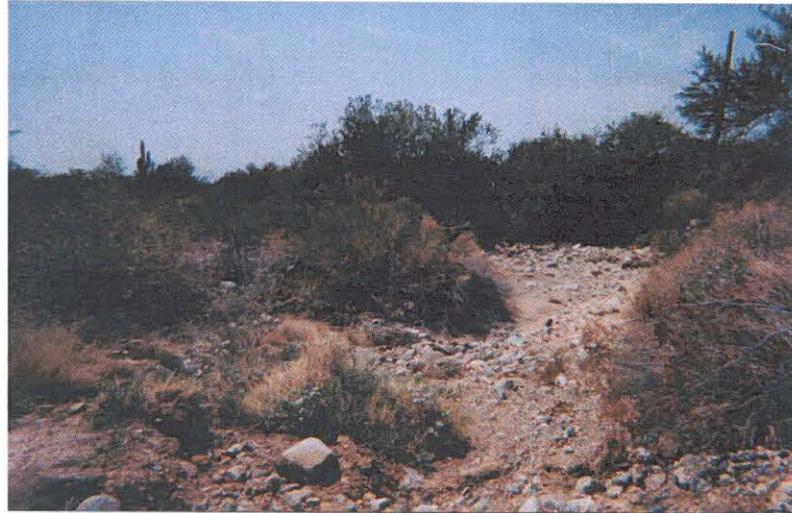
Channel Conditions		Manning's n Adjustment		Left Overbank (West)	Channel	Right Overbank (East)
Channel Material	Concrete	n ₁	.012 - .018			
	Firm Soil		.025 - .032			
	Coarse Sand		.026 - .035			
	Gravel		.028 - .035			
	Cobble		.030 - .050	.030	.035	.030
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n ₂	0	0	0	0
	Minor		.001 - .005			
	Moderate		.006 - .010			
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n ₃	.000 - .004			
	Minor		.005 - .015		0	
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n ₄	.002 - .010			
	Medium		.010 - .025	.010	.025	.010
	Large		.025 - .050			
	Very Large		.050 - .100			
Variations in Channel Cross section	Gradual	n ₅	0	0		0
	Occ. Alt.		.001 - .005			
	Freq. Alt.		.010 - .015			
				0.040	0.060	0.040
Degree of Meandering	Minor	m	1	1	1	1
	Appreciable		1.15			
	Sever		1.3			
n = (n₁+n₂+n₃+n₄+n₅)m				0.040	0.060	0.040

FIGURE E.1-2.1

6a



6b



E.1.3 Manning's Roughness
Wash T5N-R1E-S33

DETERMINATION OF MANNING'S ROUGHNESS COEFFICIENTS BY FCDM METHOD
TABLE E.1-3.1

Project: Zone A Floodplain Delineation Study
Stream: T5N-R1E-S33
Location: Reaches - 1, 2
Photo No: Photo 8 - 9

Channel Conditions		Manning's n Adjustment		Left Overbank (West)	Channel	Right Overbank (East)
Channel Material	Concrete	n _c	.012 - .018			
	Firm Soil		.025 - .032			
	Coarse Sand		.026 - .035	.030		.030
	Gravel		.028 - .035		.030	
	Cobble		.030 - .050			
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n _i	0	0	0	0
	Minor		.001 - .005			
	Moderate		.006 - .010			
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n _o	.000 - .004			
	Minor		.005 - .015		0	
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n _v	.002 - .010			
	Medium		.010 - .025	.020		.02
	Large		.025 - .050		.040	
	Very Large		.050 - .100			
Variations in Channel Cross section	Gradual	n _s	0	0		0
	Occ. Alt.		.001 - .005		0	
	Freq. Alt.		.010 - .015			
				0.050	0.070	0.050
Degree of Meandering	Minor	m	1	1	1	1
	Appreciable		1.15			
	Sever		1.3			
n = (n _c +n _i +n _o +n _v +n _s)m				0.050	0.070	0.050

FIGURE E.1-3.1

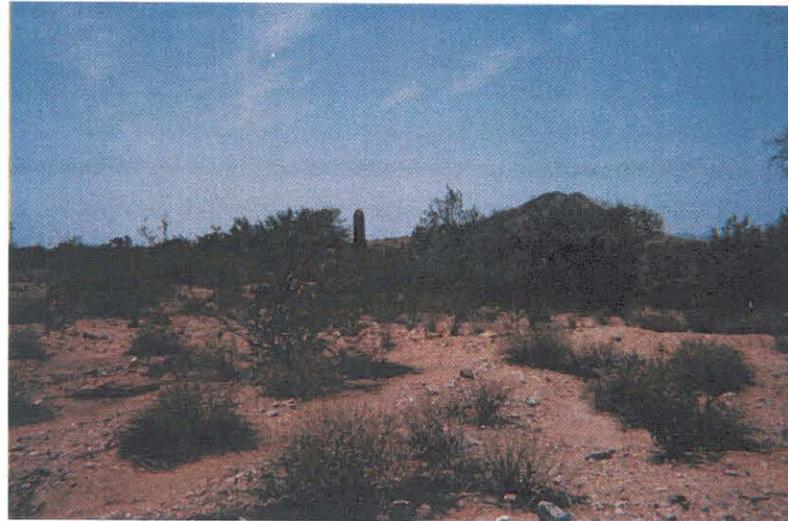
8a: Left Overbank



9a: Channel



9b: Right Overbank



E.1.4 Manning's Roughness
Wash T5N-R1E-S35

DETERMINATION OF MANNING'S ROUGHNESS COEFFICIENTS BY FCDM METHOD
TABLE E.1-4.1

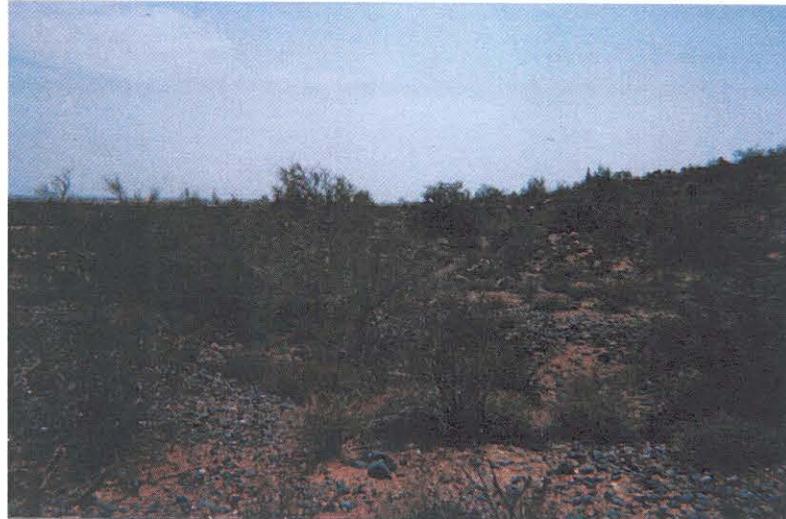
Project: Zone A Floodplain Delineation Study
Stream: T5N-R1E-S35
Location: Reaches - 1, 2, 3
Photo No: Photos 15 - 16

Channel Conditions		Manning's n Adjustment		Left Overbank (West)	Channel	Right Overbank (East)
Channel Material	Concrete	n _c	.012 - .018			
	Firm Soil		.025 - .032			
	Coarse Sand		.026 - .035	.030		.030
	Gravel		.028 - .035		.030	
	Cobble		.030 - .050			
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n _i	0	0	0	0
	Minor		.001 - .005			
	Moderate		.006 - .010			
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n _o	.000 - .004			
	Minor		.005 - .015		0	
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n _v	.002 - .010			
	Medium		.010 - .025	.020		.02
	Large		.025 - .050		.040	
	Very Large		.050 - .100			
Variations in Channel Cross section	Gradual	n _s	0	0		0
	Occ. Alt.		.001 - .005		0	
	Freq. Alt.		.010 - .015			
				0.050	0.070	0.050
Degree of Meandering	Minor	m	1	1	1	1
	Appreciable		1.15			
	Sever		1.3			
n = (n _c +n _i +n _o +n _v +n _s)m				0.050	0.070	0.050

16a: Left Overbank



15: Channel



E.1.5 Manning's Roughness
Wash T5N-R1E-S36

DETERMINATION OF MANNING'S ROUGHNESS COEFFICIENTS BY FCDM METHOD
TABLE E.1-5.1

Project: Zone A Floodplain Delineation Study
Stream: T5N-R1E-S36
Location: Reaches - 1
Photo No: Photos 15 - 16

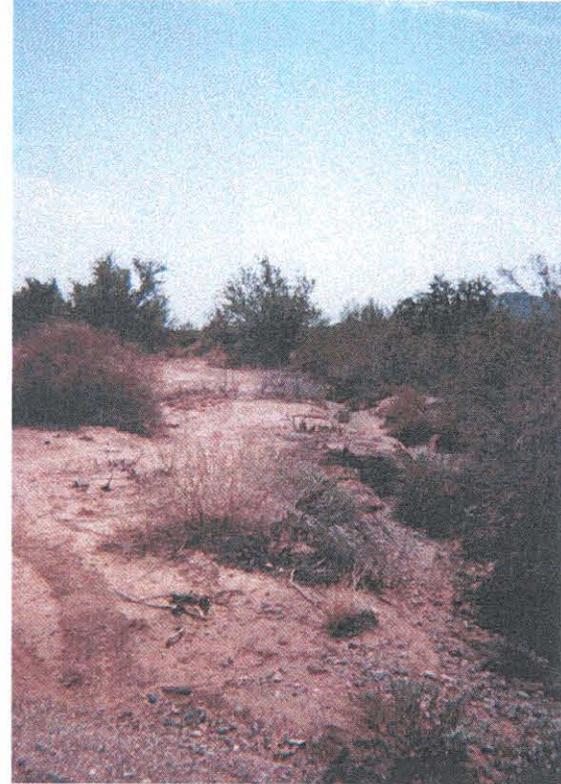
Channel Conditions		Manning's n Adjustment		Left Overbank (West)	Channel	Right Overbank (East)
Channel Material	Concrete	n _s	.012 - .018			
	Firm Soil		.025 - .032			
	Coarse Sand		.026 - .035	.030		.030
	Gravel		.028 - .035		.030	
	Cobble		.030 - .050			
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n _i	0	0	0	0
	Minor		.001 - .005			
	Moderate		.006 - .010			
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n _o	.000 - .004			
	Minor		.005 - .015		0	
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n _v	.002 - .010			
	Medium		.010 - .025	.020		.02
	Large		.025 - .050		.040	
	Very Large		.050 - .100			
Variations in Channel Cross section	Gradual	n _c	0	0		0
	Occ. Alt.		.001 - .005		0	
	Freq. Alt.		.010 - .015			
				0.050	0.070	0.050
Degree of Meandering	Minor	m	1	1	1	1
	Appreciable		1.15			
	Sever		1.3			
n = (n _s +n _i +n _o +n _v +n _c)m				0.050	0.070	0.050

FIGURE E.1-5.1

16a: Left Overbank



16b: Right Overbank



15: Channel



E.1.6 Manning's Roughness
Wash T4N-R1E-S02W

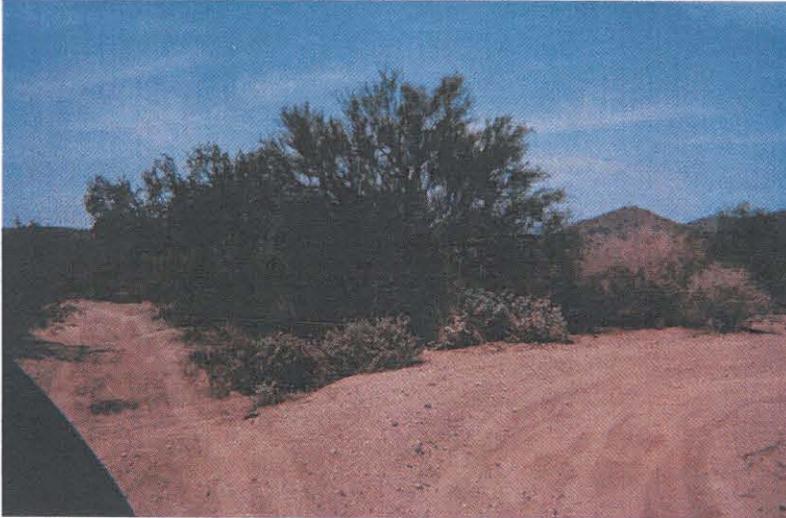
DETERMINATION OF MANNING'S ROUGHNESS COEFFICIENTS BY FCDMC METHOD
TABLE E.1-6.1

Project: Zone A Floodplain Delineation Study
Stream: T4N-R1E-S02W
Location: Reaches - 1, 2
Photo No: Photos 15 - 16

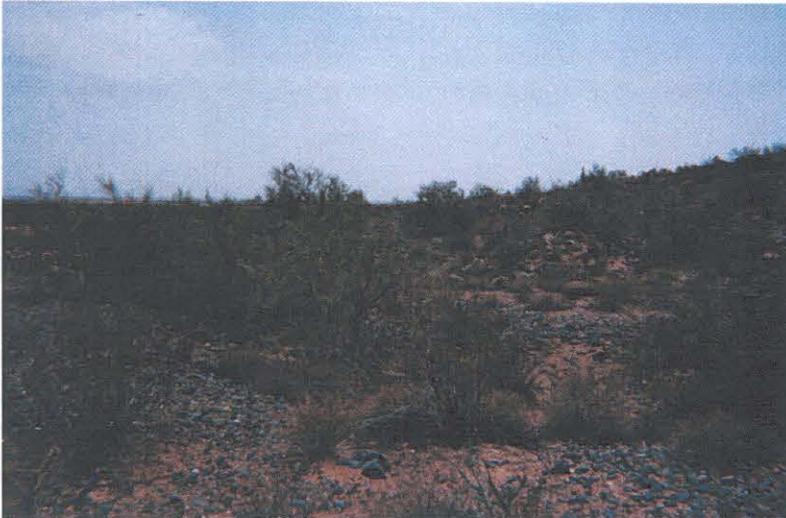
Channel Conditions		Manning's n Adjustment		Left Overbank (West)	Channel	Right Overbank (East)
Channel Material	Concrete	n ₁	.012 - .018			
	Firm Soil		.025 - .032			
	Coarse Sand		.026 - .035	.030		.030
	Gravel		.028 - .035		.030	
	Cobble		.030 - .050			
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n ₁	0	0	0	0
	Minor		.001 - .005			
	Moderate		.006 - .010			
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n ₂	.000 - .004			
	Minor		.005 - .015		0	
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n ₃	.002 - .010			
	Medium		.010 - .025	.020		.02
	Large		.025 - .050		.040	
	Very Large		.050 - .100			
Variations in Channel Cross section	Gradual	n ₄	0	0		0
	Occ. Alt.		.001 - .005		0	
	Freq. Alt.		.010 - .015			
				0.050	0.070	0.050
Degree of Meandering	Minor	m	1	1	1	1
	Appreciable		1.15			
	Sever		1.3			
n = (n ₁ +n ₂ +n ₃ +n ₄ +n ₅)m				0.050	0.070	0.050

FIGURE E.1-6.1

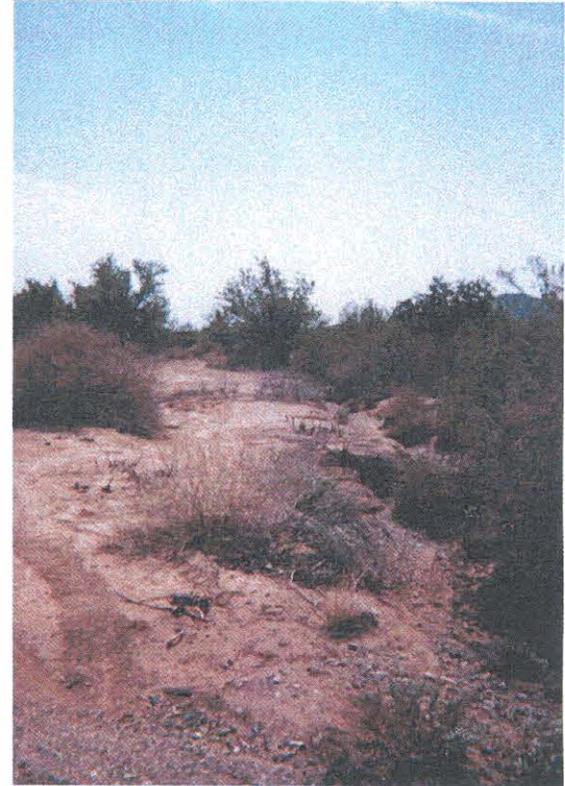
16a: Left Overbank



15: Channel



16b: Right Overbank



E.1.7 Manning's Roughness

Wash T4N-R1E-S02E

DETERMINATION OF MANNING'S ROUGHNESS COEFFICIENTS BY FCDM METHOD
TABLE E.1-7.1

Project: Zone A Floodplain Delineation Study
Stream: T4N-R1E-S02E
Location: Reaches - 1, 2
Photo No: Photos 13 -14

Channel Conditions		Manning's n Adjustment		Left Overbank (West)	Channel	Right Overbank (East)
Channel Material	Concrete	n ₁	.012 - .018			
	Firm Soil		.025 - .032			
	Coarse Sand		.026 - .035	.030		.030
	Gravel		.028 - .035		.030	
	Cobble		.030 - .050			
	Boulder		.040 - .070			
Degree of Irregularity	Smooth	n ₁	0	0	0	0
	Minor		.001 - .005			
	Moderate		.006 - .010			
	Severe		.011 - .020			
Effects of Obstruction	Negligible	n ₂	.000 - .004			
	Minor		.005 - .015		0	
	Appreciable		.020 - .030			
	Severe		.040 - .060			
Vegetation	Small	n ₃	.002 - .010			
	Medium		.010 - .025	.020		.02
	Large		.025 - .050		.040	
	Very Large		.050 - .100			
Variations in Channel Cross section	Gradual	n ₄	0	0		0
	Occ. Alt.		.001 - .005		0	
	Freq. Alt.		.010 - .015			
				0.050	0.070	0.050
Degree of Meandering	Minor	m	1	1	1	1
	Appreciable		1.15			
	Sever		1.3			
n = (n ₁ +n ₂ +n ₃ +n ₄)m				0.050	0.070	0.050

FIGURE E.1-7.1

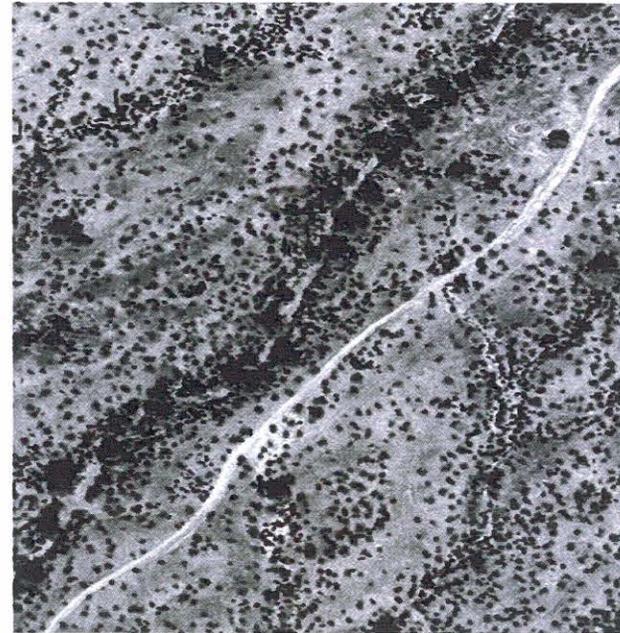
16a: Typical of Left Overbank



16b: Typical of Right Overbank



15: Channel



Aerial of Channel and Overbanks

APPENDIX E. HYDRAULIC ANALYSIS SUPPORTING DOCUMENTATION (Continued)

E.1. Roughness Coefficient Estimate

E.2. Cross Section Plots

E.3. Expansion and contraction coefficients

Expansion and contraction coefficients are not required under the approximate method.

E.4. Analysis of Structures

No significant structures exist within the study area.

E.5. Hydraulic Calculations

Normal depth calculations are located on the cross section plots. These are labeled **Figure E-2**, and are located in **Section E.2**.

E.2. Cross Section Plots

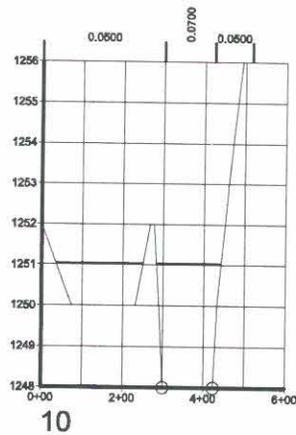
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E.2.1 Cross Section Plots
Wash T4N-R1E-S07

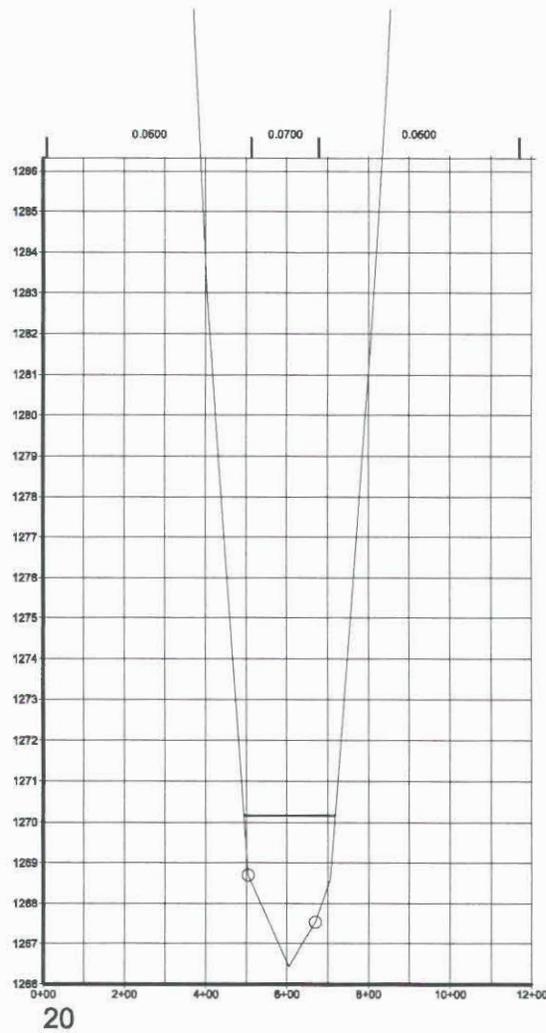


Normal Depth Results

Cross-Section:	10	
Elevation:	1251.04	ft MSL
Depth:	3.04	ft
Discharge:	2820.00	cfs
Energy Gradient:	0.014	ft/ft
Froude Number:	0.4608	
Flow Regime:	Subcritical	
Flow Area:	618.36	sq ft
Average Velocity:	4.57	ft/s
Maximum Velocity:	5.29	ft/s
Composite n:	0.057	
Hydraulic Radius:	1.65	ft
Wetted Perimeter:	374.47	ft
Wetted Top Width:	373.87	ft
Critical Slope:	0.0734	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
 FIGURE E2 - WASH: T4N-R1E-S07-10



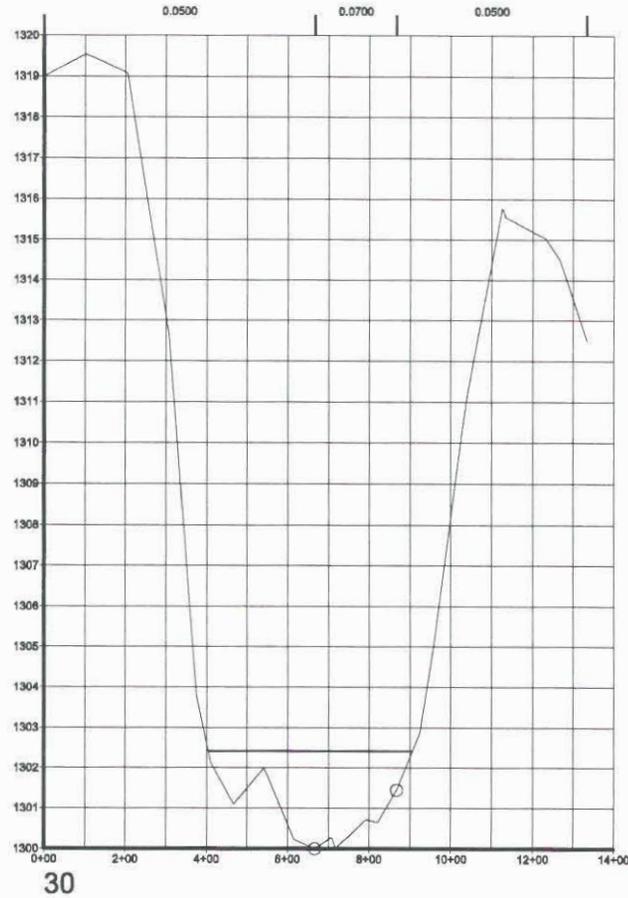


Normal Depth Results

Cross-Section:	20	
Elevation:	1270.17	ft MSL
Depth:	3.74	ft
Discharge:	2820.00	cfs
Energy Gradient:	0.014	ft/ft
Froude Number:	0.458	
Flow Regime:	Subcritical	
Flow Area:	561.36	sq ft
Average Velocity:	5.03	ft/s
Maximum Velocity:	5.16	ft/s
Composite n:	0.0649	
Hydraulic Radius:	2.5	ft
Wetted Perimeter:	224.71	ft
Wetted Top Width:	224.45	ft
Critical Slope:	0.0675	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S07-20



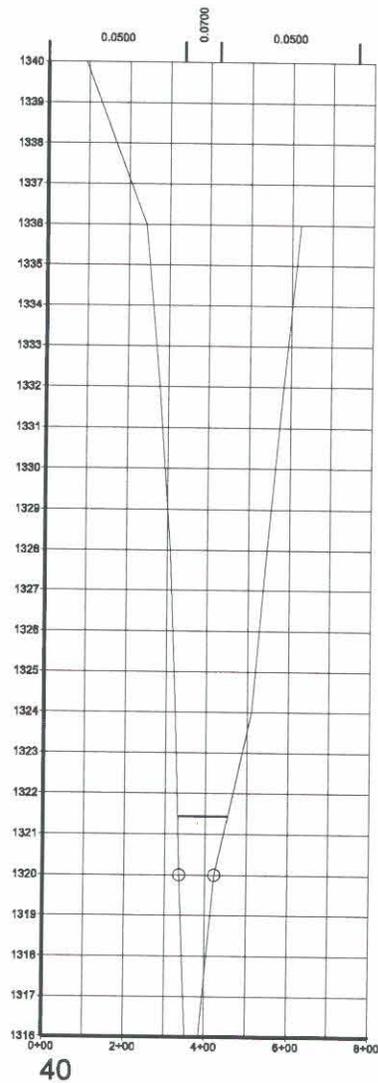


Normal Depth Results

Cross-Section:	30	
Elevation:	1302.41	ft MSL
Depth:	2.41	ft
Discharge:	2820.00	cfs
Energy Gradient:	0.014	ft/ft
Froude Number:	0.4418	
Flow Regime:	Subcritical	
Flow Area:	724.41	sq ft
Average Velocity:	3.91	ft/s
Maximum Velocity:	4.06	ft/s
Composite n:	0.0583	
Hydraulic Radius:	1.44	ft
Wetted Perimeter:	501.82	ft
Wetted Top Width:	501.75	ft
Critical Slope:	0.073	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S07-30



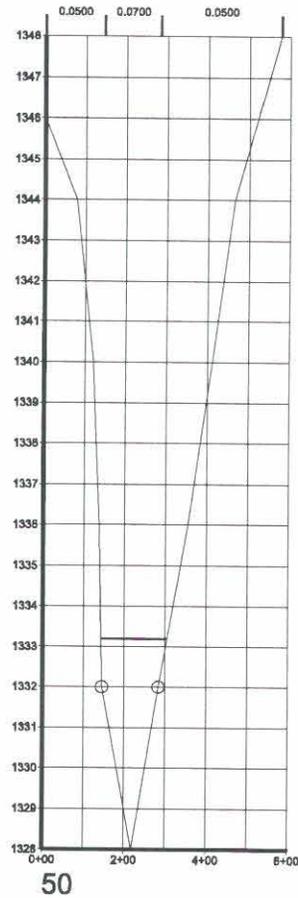


Normal Depth Results

Cross-Section:	40	
Elevation:	1321.44	ft MSL
Depth:	5.44	ft
Discharge:	2460.00	cfs
Energy Gradient:	0.014	ft/ft
Froude Number:	0.476	
Flow Regime:	Subcritical	
Flow Area:	390.48	sq ft
Average Velocity:	6.29	ft/s
Maximum Velocity:	6.54	ft/s
Composite n:	0.0644	
Hydraulic Radius:	3.16	ft
Wetted Perimeter:	123.54	ft
Wetted Top Width:	122.59	ft
Critical Slope:	0.0705	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S07-40



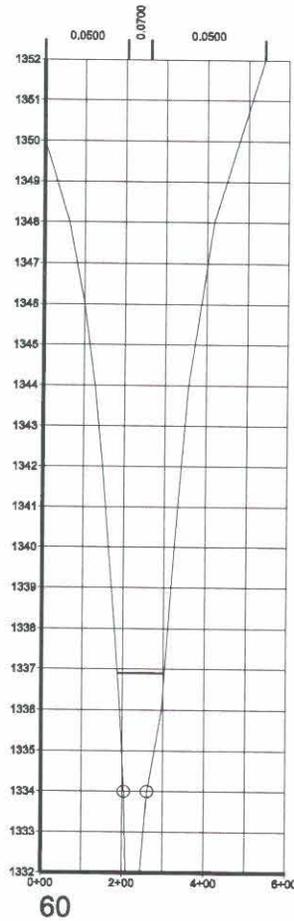


Normal Depth Results

Cross-Section:	50	
Elevation:	1333.20	ft MSL
Depth:	5.20	ft
Discharge:	2460.00	cfs
Energy Gradient:	0.014	ft/ft
Froude Number:	0.4165	
Flow Regime:	Subcritical	
Flow Area:	456.71	sq ft
Average Velocity:	5.37	ft/s
Maximum Velocity:	5.46	ft/s
Composite n:	0.0672	
Hydraulic Radius:	2.81	ft
Wetted Perimeter:	162.53	ft
Wetted Top Width:	161.95	ft
Critical Slope:	0.0859	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S07-50



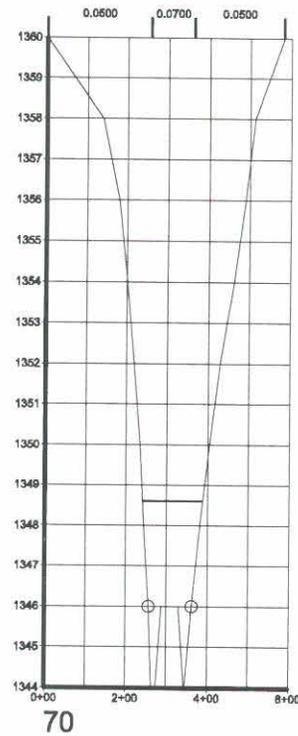


Normal Depth Results

Cross-Section:	60	
Elevation:	1336.89	ft MSL
Depth:	4.89	ft
Discharge:	2110.00	cfs
Energy Gradient:	0.013	ft/ft
Froude Number:	0.4838	
Flow Regime:	Subcritical	
Flow Area:	347.53	sq ft
Average Velocity:	6.07	ft/s
Maximum Velocity:	6.59	ft/s
Composite n:	0.0603	
Hydraulic Radius:	3.01	ft
Wetted Perimeter:	115.46	ft
Wetted Top Width:	114.63	ft
Critical Slope:	0.0593	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
 FIGURE E2 - WASH: T4N-R1E-S07-60



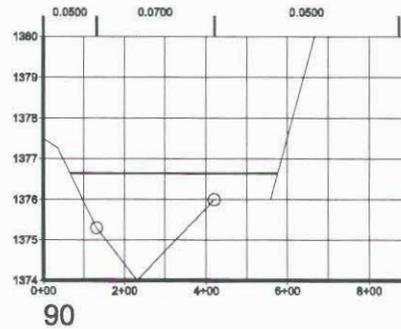


Normal Depth Results

Cross-Section:	70	
Elevation:	1348.61	ft MSL
Depth:	4.61	ft
Discharge:	2110.00	cfs
Energy Gradient:	0.013	ft/ft
Froude Number:	0.4276	
Flow Regime:	Subcritical	
Flow Area:	405.28	sq ft
Average Velocity:	5.21	ft/s
Maximum Velocity:	5.39	ft/s
Composite n:	0.0646	
Hydraulic Radius:	2.74	ft
Wetted Perimeter:	148.12	ft
Wetted Top Width:	147.11	ft
Critical Slope:	0.0729	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S07-70



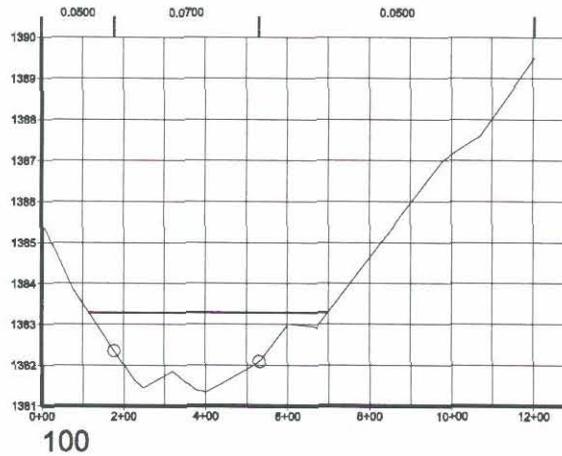


Normal Depth Results

Cross-Section:	90	
Elevation:	1376.63	ft MSL
Depth:	2.63	ft
Discharge:	2110.00	cfs
Energy Gradient:	0.013	ft/ft
Froude Number:	0.3558	
Flow Regime:	Subcritical	
Flow Area:	644.12	sq ft
Average Velocity:	3.31	ft/s
Maximum Velocity:	3.53	ft/s
Composite n:	0.0617	
Hydraulic Radius:	1.26	ft
Wetted Perimeter:	509.81	ft
Wetted Top Width:	509.76	ft
Critical Slope:	0.1065	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S07-90



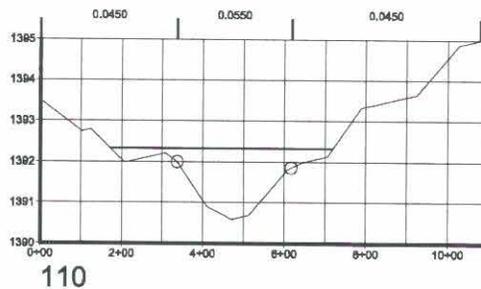


Normal Depth Results

Cross-Section:	100	
Elevation:	1383.29	ft MSL
Depth:	1.96	ft
Discharge:	2110.00	cfs
Energy Gradient:	0.013	ft/ft
Froude Number:	0.3919	
Flow Regime:	Subcritical	
Flow Area:	678.26	sq ft
Average Velocity:	3.12	ft/s
Maximum Velocity:	3.33	ft/s
Composite n:	0.0625	
Hydraulic Radius:	1.16	ft
Wetted Perimeter:	584.50	ft
Wetted Top Width:	584.48	ft
Critical Slope:	0.0909	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S07-100



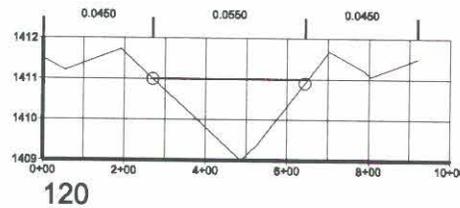


Normal Depth Results

Cross-Section:	110	
Elevation:	1392.32	ft MSL
Depth:	1.73	ft
Discharge:	850.00	cfs
Energy Gradient:	0.006	ft/ft
Froude Number:	0.288	
Flow Regime:	Subcritical	
Flow Area:	395.92	sq ft
Average Velocity:	2.15	ft/s
Maximum Velocity:	2.36	ft/s
Composite n:	0.0502	
Hydraulic Radius:	0.73	ft
Wetted Perimeter:	545.56	ft
Wetted Top Width:	545.54	ft
Critical Slope:	0.0968	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S07-110





Normal Depth Results

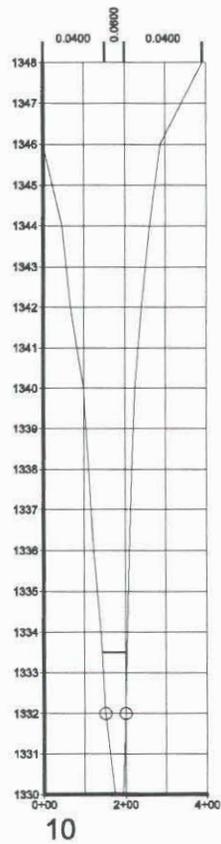
Cross-Section:	120	
Elevation:	1411.00	ft MSL
Depth:	2.00	ft
Discharge:	850.00	cfs
Energy Gradient:	0.006	ft/ft
Froude Number:	0.2716	
Flow Regime:	Subcritical	
Flow Area:	390.12	sq ft
Average Velocity:	2.16	ft/s
Maximum Velocity:	2.16	ft/s
Composite n:	0.0548	
Hydraulic Radius:	1.02	ft
Wetted Perimeter:	380.64	ft
Wetted Top Width:	380.62	ft
Critical Slope:	0.0842	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S07-120



E.2.2 Cross Section Plots

Wash T4N-R1E-S04

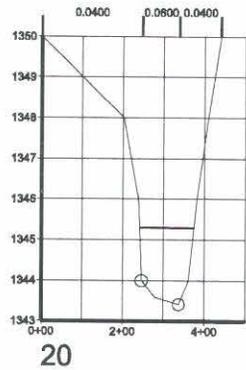


Normal Depth Results

Cross-Section:	10	
Elevation:	1333.49	ft MSL
Depth:	3.49	ft
Discharge:	890.00	cfs
Energy Gradient:	0.014	ft/ft
Froude Number:	0.5474	
Flow Regime:	Subcritical	
Flow Area:	153.31	sq ft
Average Velocity:	5.81	ft/s
Maximum Velocity:	5.94	ft/s
Composite n:	0.0565	
Hydraulic Radius:	2.47	ft
Wetted Perimeter:	62.07	ft
Wetted Top Width:	61.22	ft
Critical Slope:	0.0484	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S04-10



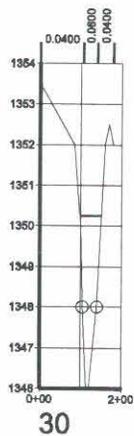


Normal Depth Results

Cross-Section:	20	
Elevation:	1345.30	ft MSL
Depth:	1.88	ft
Discharge:	890.00	cfs
Energy Gradient:	0.014	ft/ft
Froude Number:	0.5625	
Flow Regime:	Subcritical	
Flow Area:	203.53	sq ft
Average Velocity:	4.37	ft/s
Maximum Velocity:	5.14	ft/s
Composite n:	0.054	
Hydraulic Radius:	1.53	ft
Wetted Perimeter:	133.26	ft
Wetted Top Width:	133.02	ft
Critical Slope:	0.0452	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S04-20



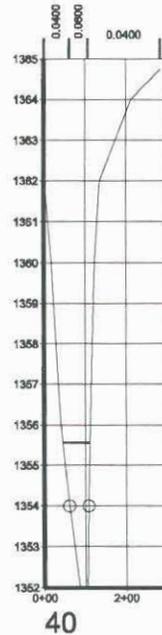


Normal Depth Results

Cross-Section:	30	
Elevation:	1350.26	ft MSL
Depth:	4.26	ft
Discharge:	890.00	cfs
Energy Gradient:	0.014	ft/ft
Froude Number:	0.5446	
Flow Regime:	Subcritical	
Flow Area:	139.61	sq ft
Average Velocity:	6.36	ft/s
Maximum Velocity:	6.66	ft/s
Composite n:	0.0535	
Hydraulic Radius:	2.59	ft
Wetted Perimeter:	53.88	ft
Wetted Top Width:	52.93	ft
Critical Slope:	0.0497	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S04-30



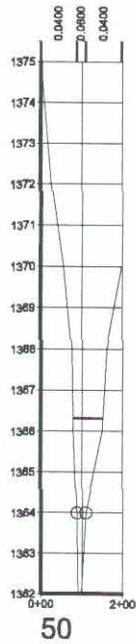


Normal Depth Results

Cross-Section:	40	
Elevation:	1355.55	ft MSL
Depth:	3.55	ft
Discharge:	890.00	cfs
Energy Gradient:	0.014	ft/ft
Froude Number:	0.5391	
Flow Regime:	Subcritical	
Flow Area:	154.41	sq ft
Average Velocity:	5.78	ft/s
Maximum Velocity:	6.00	ft/s
Composite n:	0.0546	
Hydraulic Radius:	2.29	ft
Wetted Perimeter:	67.30	ft
Wetted Top Width:	66.15	ft
Critical Slope:	0.0507	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
 ZONE A FLOODPLAIN DELINEATION: FCD 99-44
 FIGURE E2 - WASH: T4N-R1E-S04-40





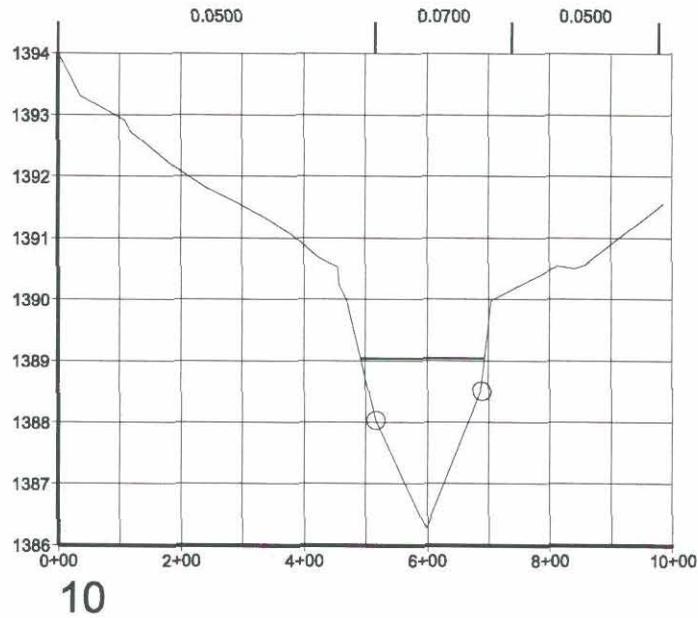
Normal Depth Results

Cross-Section:	50	
Elevation:	1366.32	ft MSL
Depth:	4.32	ft
Discharge:	890.00	cfs
Energy Gradient:	0.014	ft/ft
Froude Number:	0.5151	
Flow Regime:	Subcritical	
Flow Area:	146.59	sq ft
Average Velocity:	6.09	ft/s
Maximum Velocity:	6.85	ft/s
Composite n:	0.0486	
Hydraulic Radius:	1.97	ft
Wetted Perimeter:	74.47	ft
Wetted Top Width:	73.33	ft
Critical Slope:	0.0551	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S04-50



E.2.3 Cross Section Plots
Wash T5N-R1E-S33

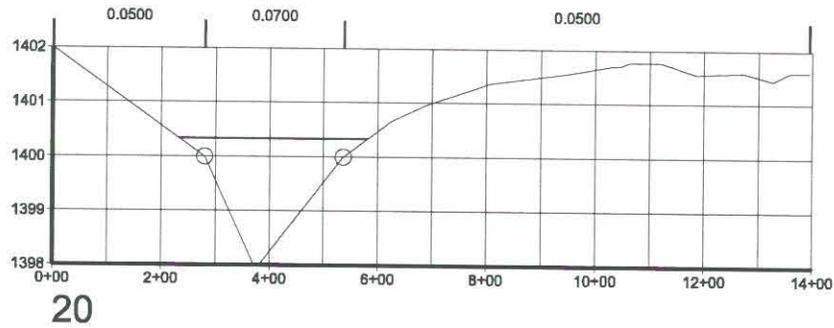


Normal Depth Results

Cross-Section:	10	
Elevation:	1389.04	ft MSL
Depth:	2.76	ft
Discharge:	780.00	cfs
Energy Gradient:	0.007	ft/ft
Froude Number:	0.2637	
Flow Regime:	Subcritical	
Flow Area:	313.63	sq ft
Average Velocity:	2.50	ft/s
Maximum Velocity:	2.54	ft/s
Composite n:	0.0677	
Hydraulic Radius:	1.56	ft
Wetted Perimeter:	201.55	ft
Wetted Top Width:	201.46	ft
Critical Slope:	0.1019	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S33-10



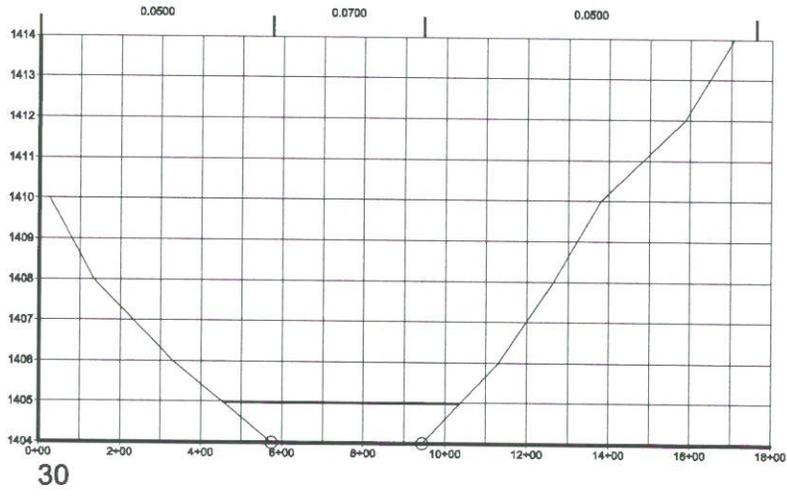


Normal Depth Results

Cross-Section:	20	
Elevation:	1400.33	ft MSL
Depth:	2.33	ft
Discharge:	780.00	cfs
Energy Gradient:	0.007	ft/ft
Froude Number:	0.2457	
Flow Regime:	Subcritical	
Flow Area:	366.47	sq ft
Average Velocity:	2.14	ft/s
Maximum Velocity:	2.20	ft/s
Composite n:	0.065	
Hydraulic Radius:	1.05	ft
Wetted Perimeter:	347.48	ft
Wetted Top Width:	347.44	ft
Critical Slope:	0.1331	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S33-20





Normal Depth Results

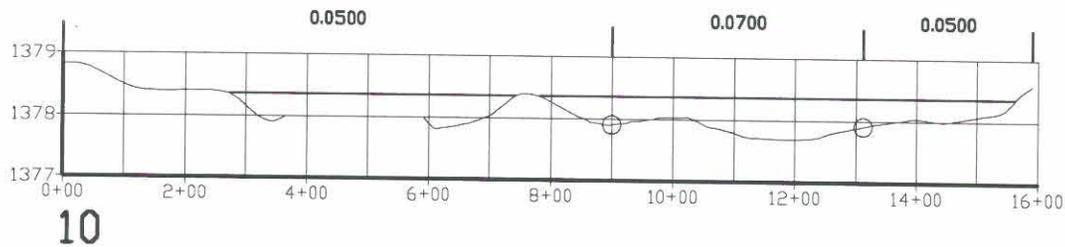
Cross-Section:	30	
Elevation:	1404.97	ft MSL
Depth:	0.97	ft
Discharge:	780.00	cfs
Energy Gradient:	0.007	ft/ft
Froude Number:	0.3044	
Flow Regime:	Subcritical	
Flow Area:	459.21	sq ft
Average Velocity:	1.70	ft/s
Maximum Velocity:	1.74	ft/s
Composite n:	0.0631	
Hydraulic Radius:	0.79	ft
Wetted Perimeter:	578.47	ft
Wetted Top Width:	578.46	ft
Critical Slope:	0.0761	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S33-30



E.2.4 Cross Section Plots
Wash T5N-R1E-S35

File: BORDERED-XS-T4N-R1E-S02E,02W,T5N-R1E-S36,S35.dwg Date: 11/28/00



Normal Depth Results

Cross-Section:	10	
Elevation:	1378.36	ft MSL
Depth:	0.67	ft
Discharge:	720.00	cfs
Energy Gradient:	0.011	ft/ft
Froude Number:	0.3156	
Flow Regime:	Subcritical	
Flow Area:	490.71	sq ft
Average Velocity:	1.47	ft/s
Maximum Velocity:	1.52	ft/s
Composite n:	0.0569	
Hydraulic Radius:	0.39	ft
Wetted Perimeter:	1253.35	ft
Wetted Top Width:	1253.35	ft
Critical Slope:	0.1102	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S35-10



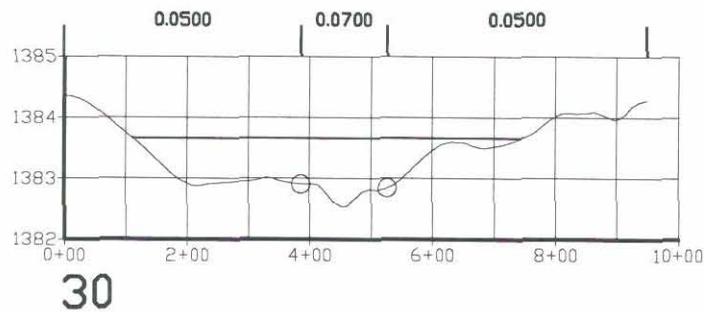


Normal Depth Results

Cross-Section:	20	
Elevation:	1382.04	ft MSL
Depth:	0.80	ft
Discharge:	720.00	cfs
Energy Gradient:	0.011	ft/ft
Froude Number:	0.2625	
Flow Regime:	Subcritical	
Flow Area:	542.27	sq ft
Average Velocity:	1.37	ft/s
Maximum Velocity:	1.43	ft/s
Composite n:	0.064	
Hydraulic Radius:	0.41	ft
Wetted Perimeter:	1332.30	ft
Wetted Top Width:	1332.29	ft
Critical Slope:	0.1565	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S35-20



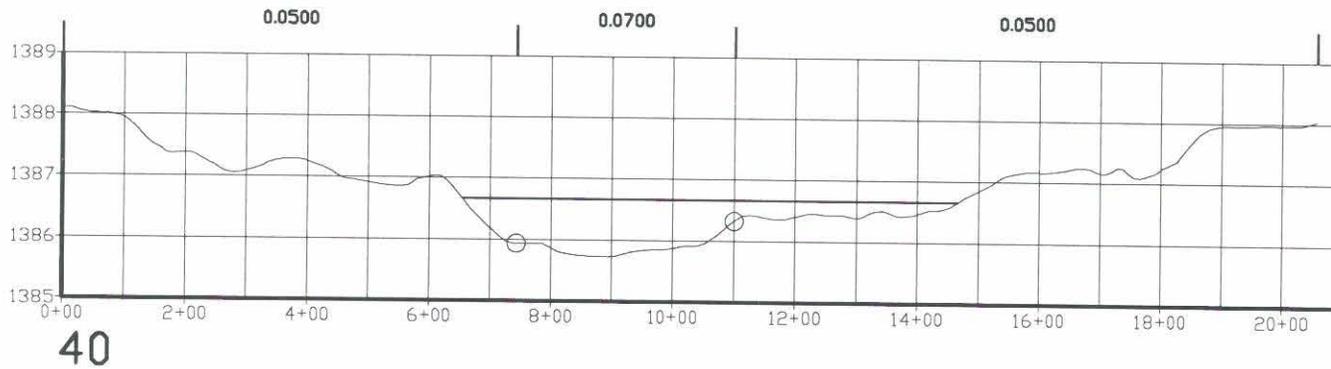


Normal Depth Results

Cross-Section:	30	
Elevation:	1383.67	ft MSL
Depth:	1.13	ft
Discharge:	720.00	cfs
Energy Gradient:	0.011	ft/ft
Froude Number:	0.3378	
Flow Regime:	Subcritical	
Flow Area:	353.68	sq ft
Average Velocity:	2.05	ft/s
Maximum Velocity:	2.27	ft/s
Composite n:	0.0547	
Hydraulic Radius:	0.56	ft
Wetted Perimeter:	636.61	ft
Wetted Top Width:	636.60	ft
Critical Slope:	0.1072	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S35-30



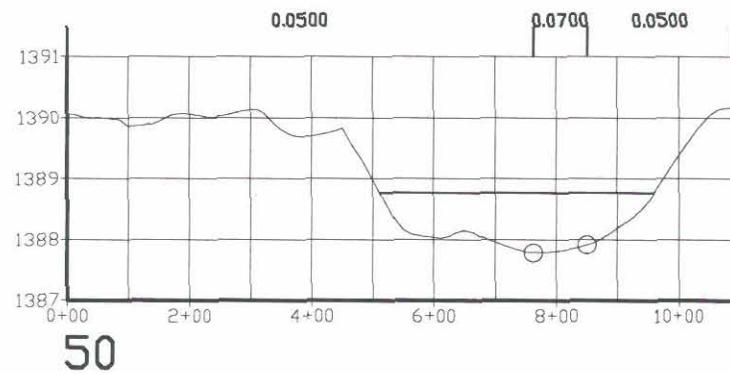


Normal Depth Results

Cross-Section:	40	
Elevation:	1386.67	ft MSL
Depth:	0.94	ft
Discharge:	720.00	cfs
Energy Gradient:	0.011	ft/ft
Froude Number:	0.3217	
Flow Regime:	Subcritical	
Flow Area:	405.99	sq ft
Average Velocity:	1.75	ft/s
Maximum Velocity:	1.92	ft/s
Composite n:	0.0592	
Hydraulic Radius:	0.5	ft
Wetted Perimeter:	812.87	ft
Wetted Top Width:	812.86	ft
Critical Slope:	0.121	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S35-40



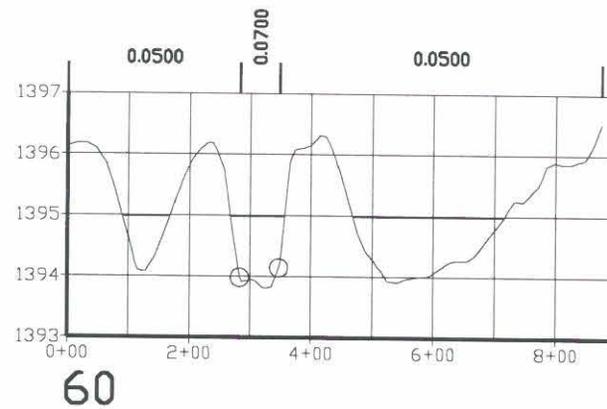


Normal Depth Results

Cross-Section:	50	
Elevation:	1388.76	ft MSL
Depth:	0.98	ft
Discharge:	720.00	cfs
Energy Gradient:	0.011	ft/ft
Froude Number:	0.4097	
Flow Regime:	Subcritical	
Flow Area:	312.48	sq ft
Average Velocity:	2.29	ft/s
Maximum Velocity:	2.45	ft/s
Composite n:	0.0541	
Hydraulic Radius:	0.7	ft
Wetted Perimeter:	447.65	ft
Wetted Top Width:	447.64	ft
Critical Slope:	0.0675	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1W-S35-50



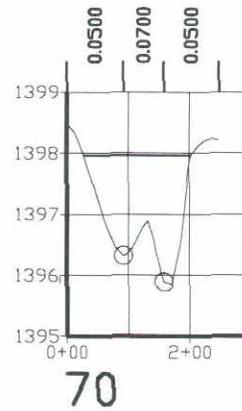


Normal Depth Results

Cross-Section:	60
Elevation:	1394.98 ft MSL
Depth:	1.17 ft
Discharge:	720.00 cfs
Energy Gradient:	0.011 ft/ft
Froude Number:	0.389
Flow Regime:	Subcritical
Flow Area:	301.75 sq ft
Average Velocity:	2.38 ft/s
Maximum Velocity:	2.48 ft/s
Composite n:	0.0533
Hydraulic Radius:	0.73 ft
Wetted Perimeter:	414.89 ft
Wetted Top Width:	414.77 ft
Critical Slope:	0.0737 ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S35-60



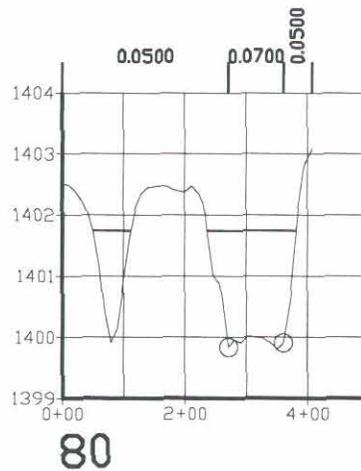


Normal Depth Results

Cross-Section:	70	
Elevation:	1397.97	ft MSL
Depth:	2.12	ft
Discharge:	720.00	cfs
Energy Gradient:	0.011	ft/ft
Froude Number:	0.3928	
Flow Regime:	Subcritical	
Flow Area:	222.17	sq ft
Average Velocity:	3.23	ft/s
Maximum Velocity:	3.98	ft/s
Composite n:	0.0579	
Hydraulic Radius:	1.27	ft
Wetted Perimeter:	175.39	ft
Wetted Top Width:	175.27	ft
Critical Slope:	0.0751	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S35-70



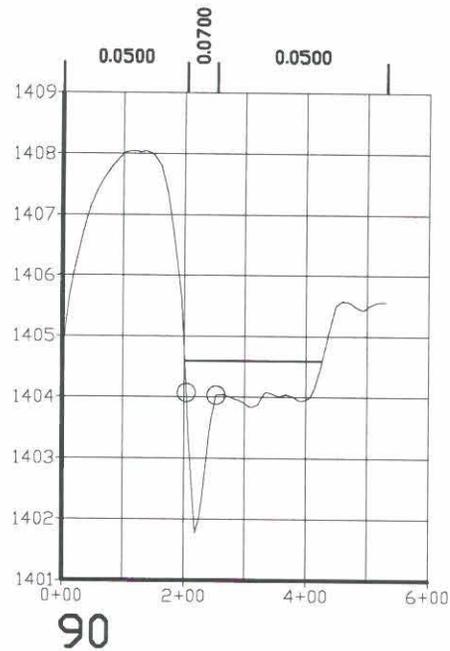


Normal Depth Results

Cross-Section:	80	
Elevation:	1401.74	ft MSL
Depth:	1.92	ft
Discharge:	890.00	cfs
Energy Gradient:	0.011	ft/ft
Froude Number:	0.4062	
Flow Regime:	Subcritical	
Flow Area:	278.42	sq ft
Average Velocity:	3.21	ft/s
Maximum Velocity:	3.31	ft/s
Composite n:	0.0589	
Hydraulic Radius:	1.33	ft
Wetted Perimeter:	209.07	ft
Wetted Top Width:	208.80	ft
Critical Slope:	0.0661	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S35-80



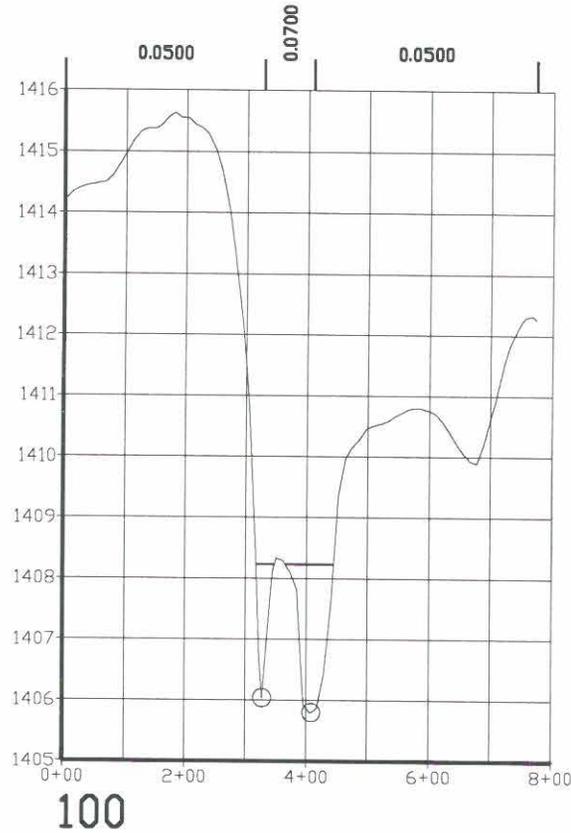


Normal Depth Results

Cross-Section:	90	
Elevation:	1404.58	ft MSL
Depth:	2.80	ft
Discharge:	660.00	cfs
Energy Gradient:	0.021	ft/ft
Froude Number:	0.3771	
Flow Regime:	Subcritical	
Flow Area:	184.27	sq ft
Average Velocity:	3.63	ft/s
Maximum Velocity:	4.42	ft/s
Composite n:	0.0548	
Hydraulic Radius:	0.82	ft
Wetted Perimeter:	225.31	ft
Wetted Top Width:	224.98	ft
Critical Slope:	0.1587	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S35-90



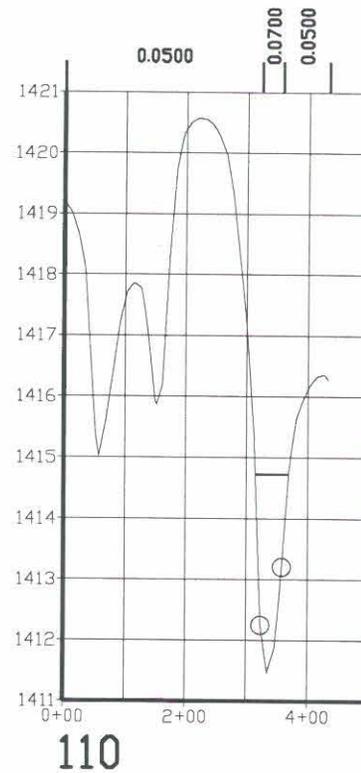


Normal Depth Results

Cross-Section:	100	
Elevation:	1408.23	ft MSL
Depth:	2.44	ft
Discharge:	660.00	cfs
Energy Gradient:	0.021	ft/ft
Froude Number:	0.5189	
Flow Regime:	Subcritical	
Flow Area:	143.45	sq ft
Average Velocity:	4.62	ft/s
Maximum Velocity:	6.10	ft/s
Composite n:	0.0619	
Hydraulic Radius:	1.29	ft
Wetted Perimeter:	111.46	ft
Wetted Top Width:	110.79	ft
Critical Slope:	0.097	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
 FIGURE E2 - WASH: T5N-R1E-S35-100



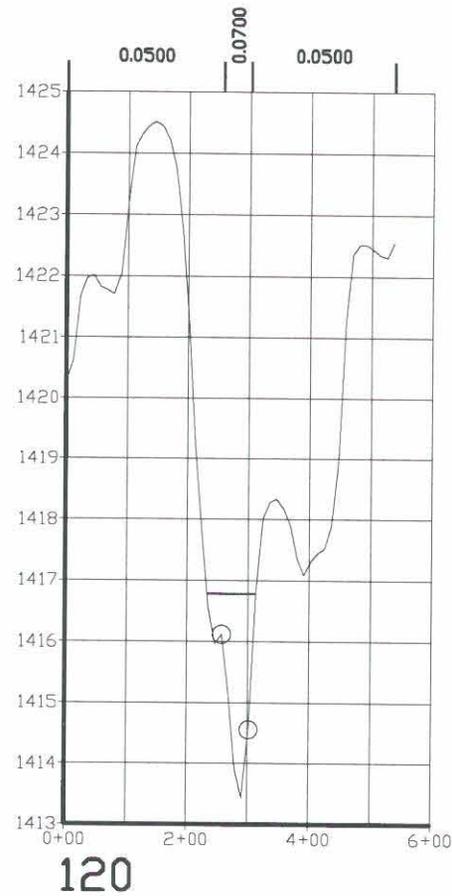


Normal Depth Results

Cross-Section:	110	
Elevation:	1414.74	ft MSL
Depth:	3.27	ft
Discharge:	660.00	cfs
Energy Gradient:	0.021	ft/ft
Froude Number:	0.5612	
Flow Regime:	Subcritical	
Flow Area:	114.69	sq ft
Average Velocity:	5.73	ft/s
Maximum Velocity:	6.02	ft/s
Composite n:	0.0629	
Hydraulic Radius:	2.07	ft
Wetted Perimeter:	55.50	ft
Wetted Top Width:	54.95	ft
Critical Slope:	0.0711	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S35-110



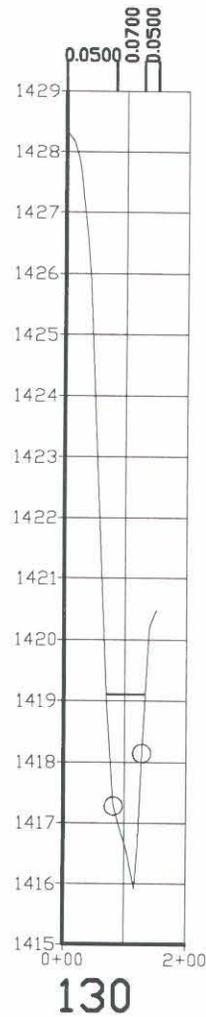


Normal Depth Results

Cross-Section:	120	
Elevation:	1416.78	ft MSL
Depth:	3.34	ft
Discharge:	660.00	cfs
Energy Gradient:	0.021	ft/ft
Froude Number:	0.4896	
Flow Regime:	Subcritical	
Flow Area:	130.07	sq ft
Average Velocity:	5.05	ft/s
Maximum Velocity:	5.39	ft/s
Composite n:	0.0615	
Hydraulic Radius:	1.62	ft
Wetted Perimeter:	80.49	ft
Wetted Top Width:	80.07	ft
Critical Slope:	0.0966	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S35-120



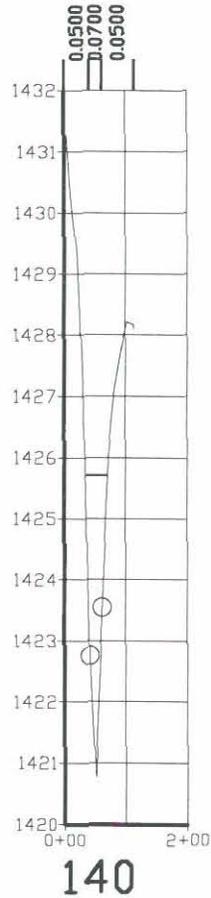


Normal Depth Results

Cross-Section:	130	
Elevation:	1419.10	ft MSL
Depth:	3.18	ft
Discharge:	660.00	cfs
Energy Gradient:	0.021	ft/ft
Froude Number:	0.5225	
Flow Regime:	Subcritical	
Flow Area:	124.79	sq ft
Average Velocity:	5.31	ft/s
Maximum Velocity:	5.50	ft/s
Composite n:	0.0647	
Hydraulic Radius:	1.94	ft
Wetted Perimeter:	64.31	ft
Wetted Top Width:	63.83	ft
Critical Slope:	0.0798	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S35-130



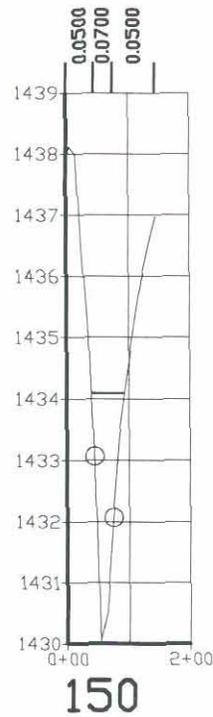


Normal Depth Results

Cross-Section:	140	
Elevation:	1425.72	ft MSL
Depth:	4.94	ft
Discharge:	660.00	cfs
Energy Gradient:	0.021	ft/ft
Froude Number:	0.5397	
Flow Regime:	Subcritical	
Flow Area:	97.05	sq ft
Average Velocity:	6.81	ft/s
Maximum Velocity:	7.31	ft/s
Composite n:	0.0615	
Hydraulic Radius:	2.56	ft
Wetted Perimeter:	37.89	ft
Wetted Top Width:	36.47	ft
Critical Slope:	0.0773	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S35-140





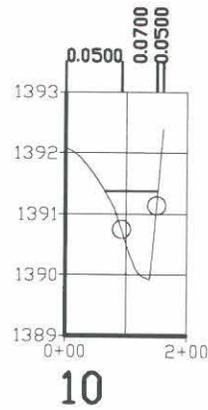
Normal Depth Results

Cross-Section:	150	
Elevation:	1434.09	ft MSL
Depth:	4.04	ft
Discharge:	660.00	cfs
Energy Gradient:	0.021	ft/ft
Froude Number:	0.5229	
Flow Regime:	Subcritical	
Flow Area:	110.65	sq ft
Average Velocity:	5.96	ft/s
Maximum Velocity:	6.41	ft/s
Composite n:	0.0616	
Hydraulic Radius:	2.03	ft
Wetted Perimeter:	54.46	ft
Wetted Top Width:	53.66	ft
Critical Slope:	0.0865	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S35-150



E.2.5 Cross Section Plots
Wash T5N-R1E-S36

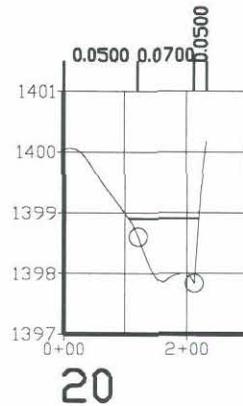


Normal Depth Results

Cross-Section:	10	
Elevation:	1391.38	ft MSL
Depth:	1.46	ft
Discharge:	170.00	cfs
Energy Gradient:	0.011	ft/ft
Froude Number:	0.3397	
Flow Regime:	Subcritical	
Flow Area:	73.05	sq ft
Average Velocity:	2.30	ft/s
Maximum Velocity:	2.42	ft/s
Composite n:	0.0635	
Hydraulic Radius:	0.83	ft
Wetted Perimeter:	87.62	ft
Wetted Top Width:	87.52	ft
Critical Slope:	0.1088	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S36-10



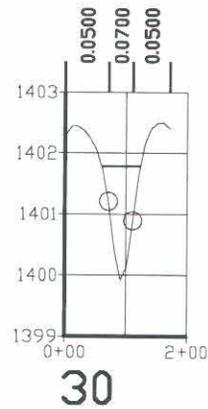


Normal Depth Results

Cross-Section:	20	
Elevation:	1398.90	ft MSL
Depth:	1.06	ft
Discharge:	170.00	cfs
Energy Gradient:	0.011	ft/ft
Froude Number:	0.3424	
Flow Regime:	Subcritical	
Flow Area:	84.85	sq ft
Average Velocity:	2.00	ft/s
Maximum Velocity:	2.04	ft/s
Composite n:	0.0661	
Hydraulic Radius:	0.74	ft
Wetted Perimeter:	114.21	ft
Wetted Top Width:	114.12	ft
Critical Slope:	0.1003	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S36-20





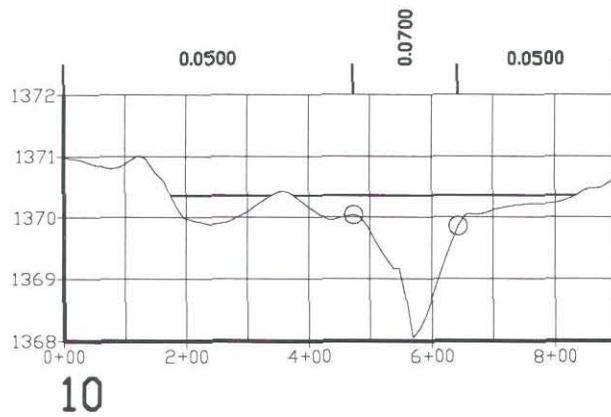
Normal Depth Results

Cross-Section:	30	
Elevation:	1401.78	ft MSL
Depth:	1.86	ft
Discharge:	170.00	cfs
Energy Gradient:	0.011	ft/ft
Froude Number:	0.3399	
Flow Regime:	Subcritical	
Flow Area:	64.66	sq ft
Average Velocity:	2.64	ft/s
Maximum Velocity:	2.80	ft/s
Composite n:	0.0629	
Hydraulic Radius:	1.01	ft
Wetted Perimeter:	63.95	ft
Wetted Top Width:	63.83	ft
Critical Slope:	0.1051	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T5N-R1E-S36-30



E.2.6 Cross Section Plots
Wash T4N-R1E-S02W

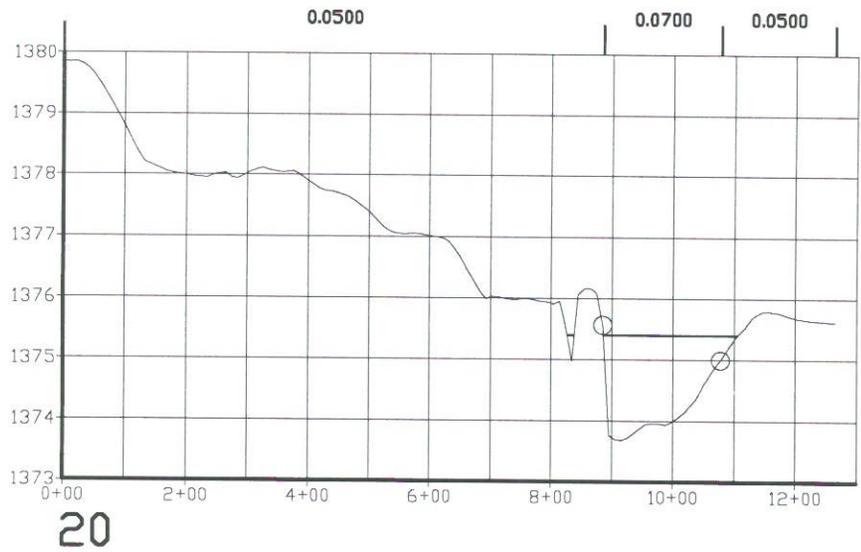


Normal Depth Results

Cross-Section:	10	
Elevation:	1370.36	ft MSL
Depth:	2.31	ft
Discharge:	680.00	cfs
Energy Gradient:	0.011	ft/ft
Froude Number:	0.2411	
Flow Regime:	Subcritical	
Flow Area:	317.74	sq ft
Average Velocity:	2.07	ft/s
Maximum Velocity:	2.51	ft/s
Composite n:	0.0558	
Hydraulic Radius:	0.51	ft
Wetted Perimeter:	621.86	ft
Wetted Top Width:	621.79	ft
Critical Slope:	0.2549	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02W-10



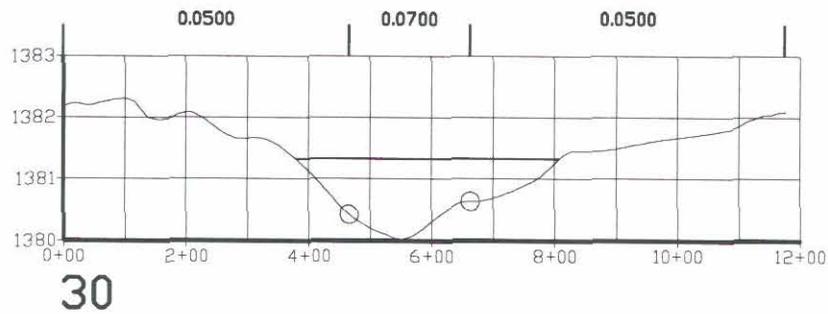


Normal Depth Results

Cross-Section:	20	
Elevation:	1375.41	ft MSL
Depth:	1.73	ft
Discharge:	660.00	cfs
Energy Gradient:	0.011	ft/ft
Froude Number:	0.349	
Flow Regime:	Subcritical	
Flow Area:	253.70	sq ft
Average Velocity:	2.58	ft/s
Maximum Velocity:	2.63	ft/s
Composite n:	0.0667	
Hydraulic Radius:	1.09	ft
Wetted Perimeter:	231.82	ft
Wetted Top Width:	231.63	ft
Critical Slope:	0.0989	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02W-20



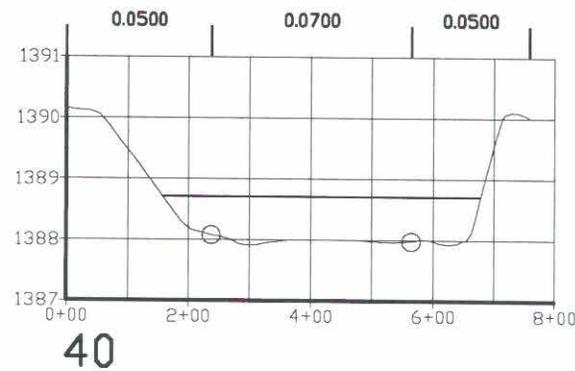


Normal Depth Results

Cross-Section:	30	
Elevation:	1381.33	ft MSL
Depth:	1.31	ft
Discharge:	660.00	cfs
Energy Gradient:	0.011	ft/ft
Froude Number:	0.3263	
Flow Regime:	Subcritical	
Flow Area:	311.81	sq ft
Average Velocity:	2.15	ft/s
Maximum Velocity:	2.30	ft/s
Composite n:	0.0596	
Hydraulic Radius:	0.73	ft
Wetted Perimeter:	429.13	ft
Wetted Top Width:	429.12	ft
Critical Slope:	0.1032	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02W-30



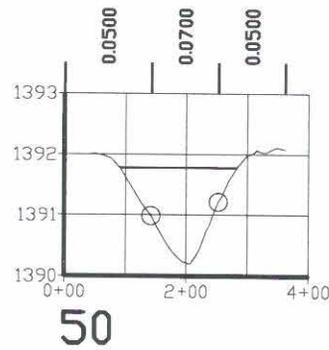


Normal Depth Results

Cross-Section:	40	
Elevation:	1388.71	ft MSL
Depth:	0.80	ft
Discharge:	660.00	cfs
Energy Gradient:	0.011	ft/ft
Froude Number:	0.3729	
Flow Regime:	Subcritical	
Flow Area:	348.28	sq ft
Average Velocity:	1.93	ft/s
Maximum Velocity:	2.41	ft/s
Composite n:	0.0629	
Hydraulic Radius:	0.67	ft
Wetted Perimeter:	520.54	ft
Wetted Top Width:	520.52	ft
Critical Slope:	0.0787	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02W-40



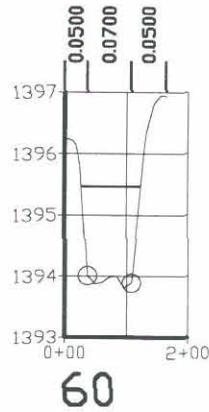


Normal Depth Results

Cross-Section:	50	
Elevation:	1391.78	ft MSL
Depth:	1.58	ft
Discharge:	490.00	cfs
Energy Gradient:	0.018	ft/ft
Froude Number:	0.4224	
Flow Regime:	Subcritical	
Flow Area:	162.89	sq ft
Average Velocity:	3.03	ft/s
Maximum Velocity:	3.25	ft/s
Composite n:	0.0619	
Hydraulic Radius:	0.85	ft
Wetted Perimeter:	192.03	ft
Wetted Top Width:	192.00	ft
Critical Slope:	0.109	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02W-50



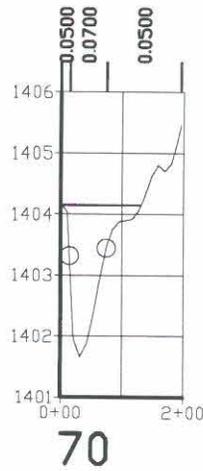


Normal Depth Results

Cross-Section:	60	
Elevation:	1395.47	ft MSL
Depth:	1.65	ft
Discharge:	490.00	cfs
Energy Gradient:	0.018	ft/ft
Froude Number:	0.5176	
Flow Regime:	Subcritical	
Flow Area:	130.05	sq ft
Average Velocity:	3.75	ft/s
Maximum Velocity:	3.82	ft/s
Composite n:	0.0651	
Hydraulic Radius:	1.35	ft
Wetted Perimeter:	96.68	ft
Wetted Top Width:	96.49	ft
Critical Slope:	0.0681	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02W-60



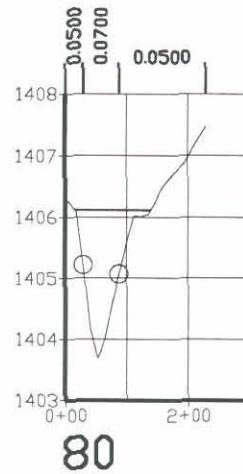


Normal Depth Results

Cross-Section:	70	
Elevation:	1404.15	ft MSL
Depth:	2.49	ft
Discharge:	490.00	cfs
Energy Gradient:	0.018	ft/ft
Froude Number:	0.4322	
Flow Regime:	Subcritical	
Flow Area:	126.65	sq ft
Average Velocity:	3.86	ft/s
Maximum Velocity:	4.23	ft/s
Composite n:	0.0597	
Hydraulic Radius:	0.98	ft
Wetted Perimeter:	129.04	ft
Wetted Top Width:	128.79	ft
Critical Slope:	0.1319	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02W-70



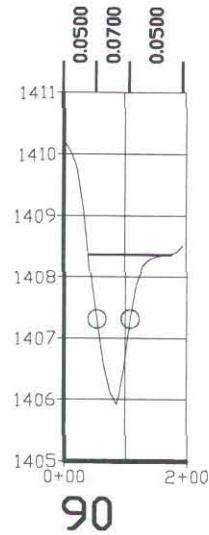


Normal Depth Results

Cross-Section:	80	
Elevation:	1406.12	ft MSL
Depth:	2.44	ft
Discharge:	490.00	cfs
Energy Gradient:	0.018	ft/ft
Froude Number:	0.4358	
Flow Regime:	Subcritical	
Flow Area:	126.96	sq ft
Average Velocity:	3.84	ft/s
Maximum Velocity:	4.23	ft/s
Composite n:	0.0598	
Hydraulic Radius:	1.02	ft
Wetted Perimeter:	124.66	ft
Wetted Top Width:	124.52	ft
Critical Slope:	0.1234	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02W-80





Normal Depth Results

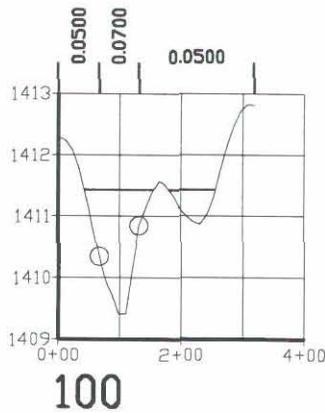
Cross-Section:	90	
Elevation:	1408.37	ft MSL
Depth:	2.45	ft
Discharge:	490.00	cfs
Energy Gradient:	0.018	ft/ft
Froude Number:	0.4435	
Flow Regime:	Subcritical	
Flow Area:	124.54	sq ft
Average Velocity:	3.92	ft/s
Maximum Velocity:	4.36	ft/s
Composite n:	0.0583	
Hydraulic Radius:	0.91	ft
Wetted Perimeter:	136.62	ft
Wetted Top Width:	136.48	ft
Critical Slope:	0.1365	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE

ZONE A FLOODPLAIN DELINEATION: FCD 99-44

FIGURE E2 - WASH: T4N-R1E-S02W-90



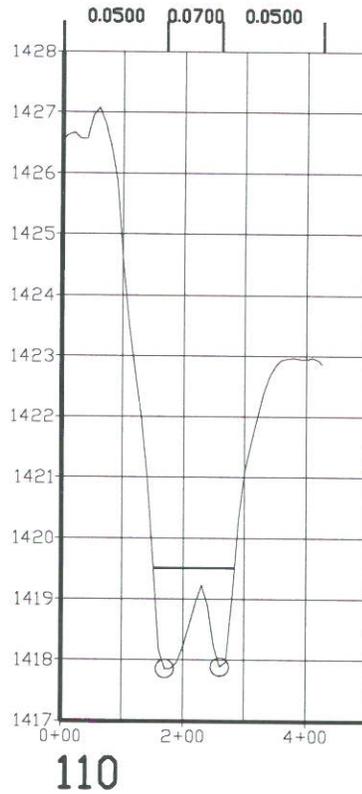


Normal Depth Results

Cross-Section:	100	
Elevation:	1411.43	ft MSL
Depth:	2.02	ft
Discharge:	490.00	cfs
Energy Gradient:	0.018	ft/ft
Froude Number:	0.4089	
Flow Regime:	Subcritical	
Flow Area:	148.47	sq ft
Average Velocity:	3.31	ft/s
Maximum Velocity:	3.85	ft/s
Composite n:	0.0573	
Hydraulic Radius:	0.78	ft
Wetted Perimeter:	189.39	ft
Wetted Top Width:	189.28	ft
Critical Slope:	0.1334	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02W-100





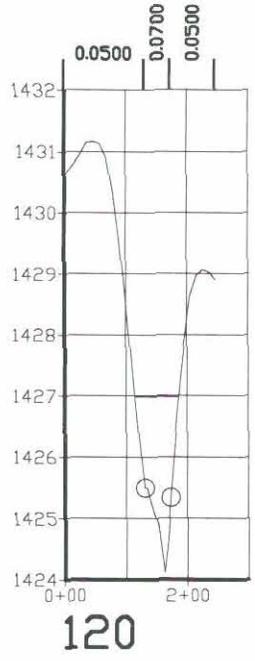
Normal Depth Results

Cross-Section:	110	
Elevation:	1419.50	ft MSL
Depth:	1.64	ft
Discharge:	490.00	cfs
Energy Gradient:	0.018	ft/ft
Froude Number:	0.466	
Flow Regime:	Subcritical	
Flow Area:	144.62	sq ft
Average Velocity:	3.42	ft/s
Maximum Velocity:	4.31	ft/s
Composite n:	0.0639	
Hydraulic Radius:	1.09	ft
Wetted Perimeter:	132.94	ft
Wetted Top Width:	132.70	ft
Critical Slope:	0.0868	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02W-110



File: BORDERED-XS-T4N-R1E-S02E_02W_T5N-R1E-S36_S35.dwg Date: 11/28/00

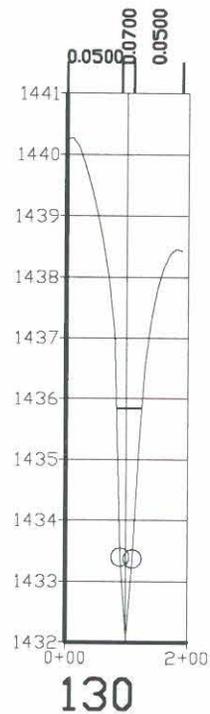


Normal Depth Results

Cross-Section:	120	
Elevation:	1426.99	ft MSL
Depth:	2.87	ft
Discharge:	490.00	cfs
Energy Gradient:	0.018	ft/ft
Froude Number:	0.4575	
Flow Regime:	Subcritical	
Flow Area:	111.37	sq ft
Average Velocity:	4.39	ft/s
Maximum Velocity:	4.65	ft/s
Composite n:	0.062	
Hydraulic Radius:	1.54	ft
Wetted Perimeter:	72.25	ft
Wetted Top Width:	71.97	ft
Critical Slope:	0.09	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02W-120



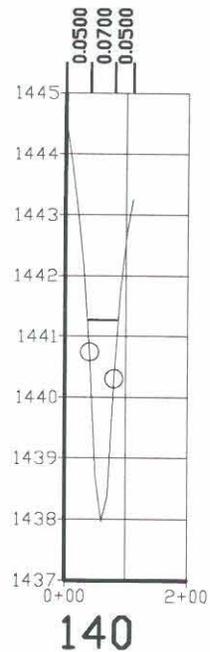


Normal Depth Results

Cross-Section:	130	
Elevation:	1435.83	ft MSL
Depth:	3.79	ft
Discharge:	490.00	cfs
Energy Gradient:	0.018	ft/ft
Froude Number:	0.5052	
Flow Regime:	Subcritical	
Flow Area:	87.79	sq ft
Average Velocity:	5.58	ft/s
Maximum Velocity:	6.06	ft/s
Composite n:	0.0599	
Hydraulic Radius:	2.08	ft
Wetted Perimeter:	42.29	ft
Wetted Top Width:	41.47	ft
Critical Slope:	0.0747	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02W-130



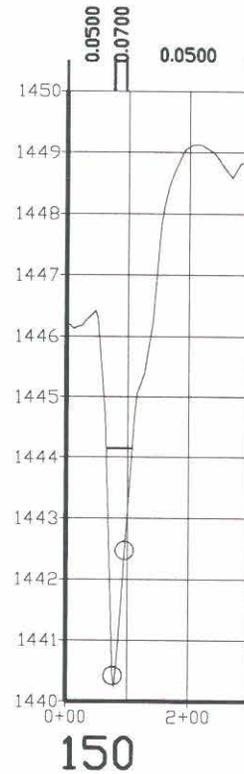


Normal Depth Results

Cross-Section:	140	
Elevation:	1441.27	ft MSL
Depth:	3.31	ft
Discharge:	490.00	cfs
Energy Gradient:	0.018	ft/ft
Froude Number:	0.4762	
Flow Regime:	Subcritical	
Flow Area:	99.78	sq ft
Average Velocity:	4.93	ft/s
Maximum Velocity:	5.05	ft/s
Composite n:	0.0661	
Hydraulic Radius:	1.95	ft
Wetted Perimeter:	51.22	ft
Wetted Top Width:	50.70	ft
Critical Slope:	0.0861	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02W-140



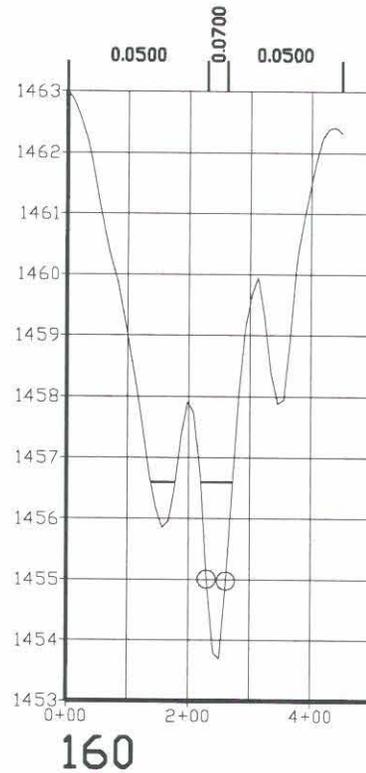


Normal Depth Results

Cross-Section:	150	
Elevation:	1444.15	ft MSL
Depth:	3.93	ft
Discharge:	490.00	cfs
Energy Gradient:	0.018	ft/ft
Froude Number:	0.4999	
Flow Regime:	Subcritical	
Flow Area:	87.17	sq ft
Average Velocity:	5.61	ft/s
Maximum Velocity:	5.89	ft/s
Composite n:	0.0591	
Hydraulic Radius:	2.03	ft
Wetted Perimeter:	43.03	ft
Wetted Top Width:	42.16	ft
Critical Slope:	0.0776	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02W-150





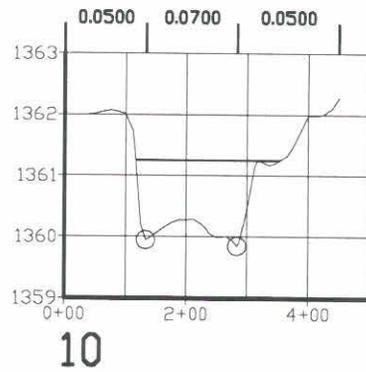
Normal Depth Results

Cross-Section:	160	
Elevation:	1456.60	ft MSL
Depth:	2.90	ft
Discharge:	490.00	cfs
Energy Gradient:	0.018	ft/ft
Froude Number:	0.4569	
Flow Regime:	Subcritical	
Flow Area:	111.03	sq ft
Average Velocity:	4.40	ft/s
Maximum Velocity:	5.13	ft/s
Composite n:	0.0572	
Hydraulic Radius:	1.2	ft
Wetted Perimeter:	92.48	ft
Wetted Top Width:	92.05	ft
Critical Slope:	0.1077	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02W-160



E.2.7 Cross Section Plots
Wash T4N-R1E-S02E

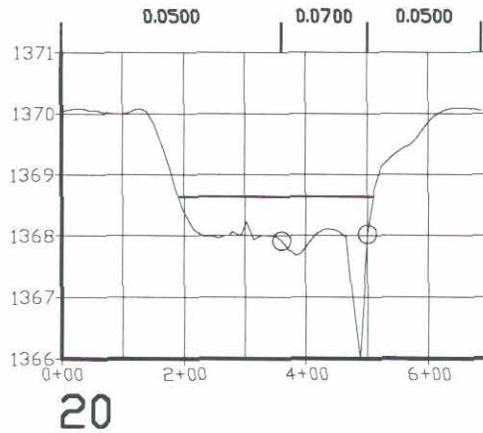


Normal Depth Results

Cross-Section:	10	
Elevation:	1361.25	ft MSL
Depth:	1.40	ft
Discharge:	500.00	cfs
Energy Gradient:	0.011	ft/ft
Froude Number:	0.3533	
Flow Regime:	Subcritical	
Flow Area:	210.48	sq ft
Average Velocity:	2.35	ft/s
Maximum Velocity:	2.80	ft/s
Composite n:	0.063	
Hydraulic Radius:	0.89	ft
Wetted Perimeter:	237.09	ft
Wetted Top Width:	236.98	ft
Critical Slope:	0.0947	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02E-10



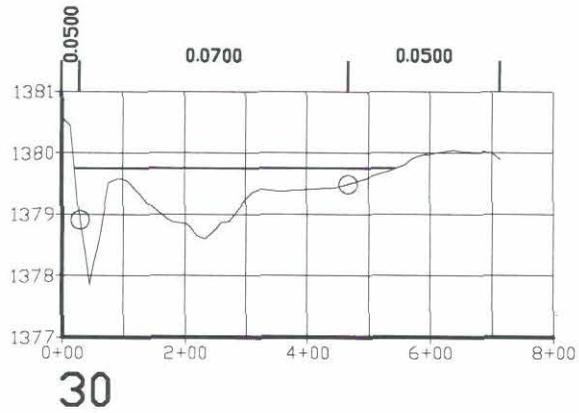


Normal Depth Results

Cross-Section:	20	
Elevation:	1368.65	ft MSL
Depth:	2.65	ft
Discharge:	500.00	cfs
Energy Gradient:	0.011	ft/ft
Froude Number:	0.2307	
Flow Regime:	Subcritical	
Flow Area:	234.84	sq ft
Average Velocity:	2.16	ft/s
Maximum Velocity:	2.18	ft/s
Composite n:	0.0591	
Hydraulic Radius:	0.74	ft
Wetted Perimeter:	319.49	ft
Wetted Top Width:	319.20	ft
Critical Slope:	0.2023	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02E-20



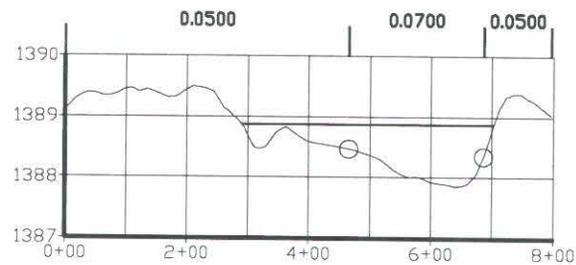


Normal Depth Results

Cross-Section:	30	
Elevation:	1379.75	ft MSL
Depth:	1.89	ft
Discharge:	500.00	cfs
Energy Gradient:	0.011	ft/ft
Froude Number:	0.2261	
Flow Regime:	Subcritical	
Flow Area:	283.76	sq ft
Average Velocity:	1.77	ft/s
Maximum Velocity:	1.91	ft/s
Composite n:	0.06	
Hydraulic Radius:	0.54	ft
Wetted Perimeter:	524.14	ft
Wetted Top Width:	524.01	ft
Critical Slope:	0.2231	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02E-30





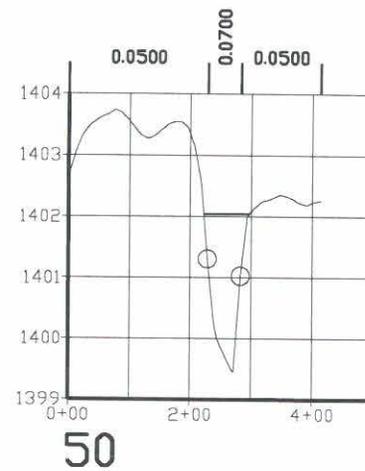
40

Normal Depth Results

Cross-Section:	40	
Elevation:	1388.88	ft MSL
Depth:	1.03	ft
Discharge:	440.00	cfs
Energy Gradient:	0.014	ft/ft
Froude Number:	0.3434	
Flow Regime:	Subcritical	
Flow Area:	223.01	sq ft
Average Velocity:	1.98	ft/s
Maximum Velocity:	2.14	ft/s
Composite n:	0.061	
Hydraulic Radius:	0.54	ft
Wetted Perimeter:	413.35	ft
Wetted Top Width:	413.33	ft
Critical Slope:	0.1263	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
 FIGURE E2 - WASH: T4N-R1E-S02E-40



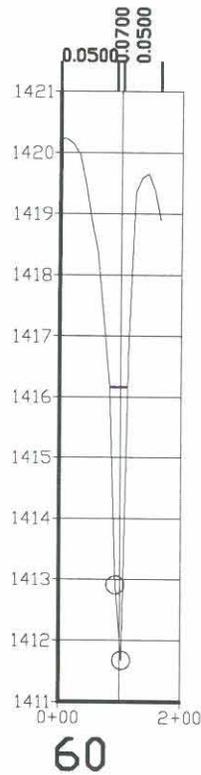


Normal Depth Results

Cross-Section:	50	
Elevation:	1402.05	ft MSL
Depth:	2.60	ft
Discharge:	440.00	cfs
Energy Gradient:	0.014	ft/ft
Froude Number:	0.4162	
Flow Regime:	Subcritical	
Flow Area:	115.68	sq ft
Average Velocity:	3.82	ft/s
Maximum Velocity:	3.96	ft/s
Composite n:	0.0647	
Hydraulic Radius:	1.53	ft
Wetted Perimeter:	75.53	ft
Wetted Top Width:	75.27	ft
Critical Slope:	0.0893	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02E-50



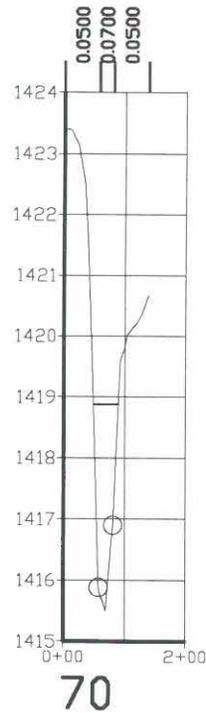


Normal Depth Results

Cross-Section:	60	
Elevation:	1416.16	ft MSL
Depth:	4.48	ft
Discharge:	440.00	cfs
Energy Gradient:	0.014	ft/ft
Froude Number:	0.4767	
Flow Regime:	Subcritical	
Flow Area:	76.85	sq ft
Average Velocity:	5.71	ft/s
Maximum Velocity:	6.18	ft/s
Composite n:	0.057	
Hydraulic Radius:	2.46	ft
Wetted Perimeter:	31.28	ft
Wetted Top Width:	29.65	ft
Critical Slope:	0.0637	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02E-60



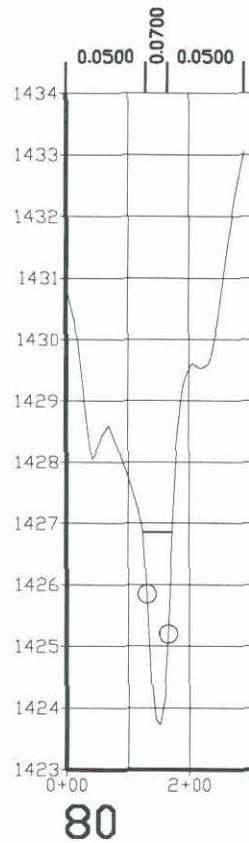


Normal Depth Results

Cross-Section:	70	
Elevation:	1418.88	ft MSL
Depth:	3.38	ft
Discharge:	440.00	cfs
Energy Gradient:	0.014	ft/ft
Froude Number:	0.4679	
Flow Regime:	Subcritical	
Flow Area:	90.11	sq ft
Average Velocity:	4.89	ft/s
Maximum Velocity:	5.16	ft/s
Composite n:	0.0616	
Hydraulic Radius:	2.17	ft
Wetted Perimeter:	41.52	ft
Wetted Top Width:	40.72	ft
Critical Slope:	0.0662	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02E-70





Normal Depth Results

Cross-Section:	80	
Elevation:	1426.86	ft MSL
Depth:	3.14	ft
Discharge:	440.00	cfs
Energy Gradient:	0.014	ft/ft
Froude Number:	0.4486	
Flow Regime:	Subcritical	
Flow Area:	97.59	sq ft
Average Velocity:	4.48	ft/s
Maximum Velocity:	4.65	ft/s
Composite n:	0.0649	
Hydraulic Radius:	2.01	ft
Wetted Perimeter:	48.49	ft
Wetted Top Width:	47.95	ft
Critical Slope:	0.0755	ft/ft

GLENDALE/ PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION: FCD 99-44
FIGURE E2 - WASH: T4N-R1E-S02E-80



TABLE E.2. HYDRAULIC/ HYDROLOGIC SUMMARY

Glendale/ Peoria Area Drainage Master Plan Update
 Zone A FloodPlain Delineation
 Hydrology/ Hydraulic Summary
 Table E.2.

* See Section D.6 for more explanation of Hydrology Modifications
 Hydrology information was referenced from the Glendale Peoria Area Drainage Master Plan Update- Hydrology- Volume HY

Wash ID	Reach	Location	Length [ft]	Mannings n bank,center,bank	Slope [ft/ft]	Peak 100yr/6hr Flow [cfs]	Cross Sections	Concentration Point	Comments
T4N-R1E-S07	1	Aqua Fria River Confluence	1000	.05,.07,.05	0.014	6790	-	CA11	Aqua Fria River Flow
	2	Happy Valley Rd. and 107 th Ave.	2425	.05,.07,.05	0.014	2820	10 - 30	CA11A*	RA11D Excluded
	3	Happy Valley Rd. and Lake Pleasant Rd.	3130	.05,.07,.05	0.013	2460	40 - 50	CX23*	RX22 Excluded
	4	3/8 Mile North of Happy Valley Rd. Alignment and 1/8 Mile East of Lake Pleasant Rd.	5320	.05,.07,.05	0.016	2110	60 - 100	CA11E*	RA11FN Diversion Excluded from CP
	5	1/2 Mile North of Jomax Rd. and 1/4 Mile East of Happy Valley Rd.	1160	.045,.055,.045	0.007	850	110 - 120	A11J*	Combine flow from A11J, A11M
T4N-R1E-S04	1	3/8 Mile North of Happy Valley Rd. and 1/4 Mile East of Lake Pleasant Rd.	4340	.04,.06,.04	0.0144	890	10 - 70	A11F	Runoff from basin A11F
T5N-R1E-S33	1	Aqua Fria River Confluence	600	.05,.07,.05	0.007	2020	-	CA11I	
	2	1/4 Mile North of Jomax Rd. and 1/4 Mile West of 91 st Ave. Alignment	1725	.05,.07,.05	0.007	780	10 - 30	A11K*	Combine flow from A11K,RA11N,RA11O
T5N-R1E-S35	1	New River Confluence, 1/4 Mile North of Jomax Rd., Upstream of flow split T5N-R1E-S36	2500	.05,.07,.05	0.021	890	80	CN27G*	
	2	New River Confluence, 1/4 Mile North of Jomax Rd., Downstream of flow split T5N-R1E-S36	400	.05,.07,.05	0.011	720	10 - 70	CN27E*	
	3	1/2 Mile North of Jomax Rd. and 74 th Ave. Alignment	2800	.05,.07,.05	0.011	650	90 - 140	N27F	Flow decreased by T5N-R1E-S36
T5N-R1E-S36	1	Split Flow from T5N-R1E-S35	900	.05,.07,.05	0.011	170	10 - 30	CN27E**	Old Wash, Now perched
T4N-R1E-S02W	1	New River Confluence at Jomax Rd. and 75 th Ave. Alignment, Downstream of T5N-R1E-S36	3200	.05,.07,.05	0.018	660	10 - 40	CN27E*	
	2	New River Confluence at Jomax Rd. and 75 th Ave. Alignment, Upstream of T5N-R1E-S36	2370	.05,.07,.05	0.011	490	50 - 160	N27G	Flow increased by T5N-R1E-S36
T4N-R1E-S02E	1	New River Confluence at 1/4 Mile South of Jomax Rd.	2500	.05,.07,.05	0.014	500	10 - 50	CN27C*	
	2	1/4 Mile North of Jomax Rd. and 69 th Ave. Alignment	4000	.05,.07,.05	0.011	440	60 - 80	N27H	

APPENDIX E. HYDRAULIC ANALYSIS SUPPORTING DOCUMENTATION

(Continued)

E.1. Roughness Coefficient Estimate

E.2. Cross Section Plots

E.3. Expansion and contraction coefficients

Expansion and contraction coefficients are not required under the approximate method.

E.4. Analysis of Structures

No significant structures exist within the study area.

E.5. Hydraulic Calculations

Normal depth calculations are located on the cross section plots. These are labeled **Figure E-2**, and are located in **Section E.2**. Four figures have been provided on the pages following, that summarize the estimated slopes and n values used for the hydraulic analysis.

Hydraulic calculations received from Coe & Van Loo Consultants Inc. have been included in **Section E.5-1**.

E.5. Hydraulic Calculations

LIST OF FIGURES

Figure E.5-1	Slope Summary/ Western Area.....	E-22
Figure E.5-2	Slope Summary/ Eastern Area.....	E-23
Figure E.5-3	Manning's Roughness Summary/ Western Area.....	E-24
Figure E.5-4	Manning's Roughness Summary/ Eastern Area.....	E-25

LEGEND

T2N-R5W-S04 WASH LD. LABEL

- ROADWAY CENTER LINE
- WASH BASELINE
- [Hatched Box] EXISTING FLOODPLAIN
- [Cross-hatched Box] EXISTING FLOODWAY

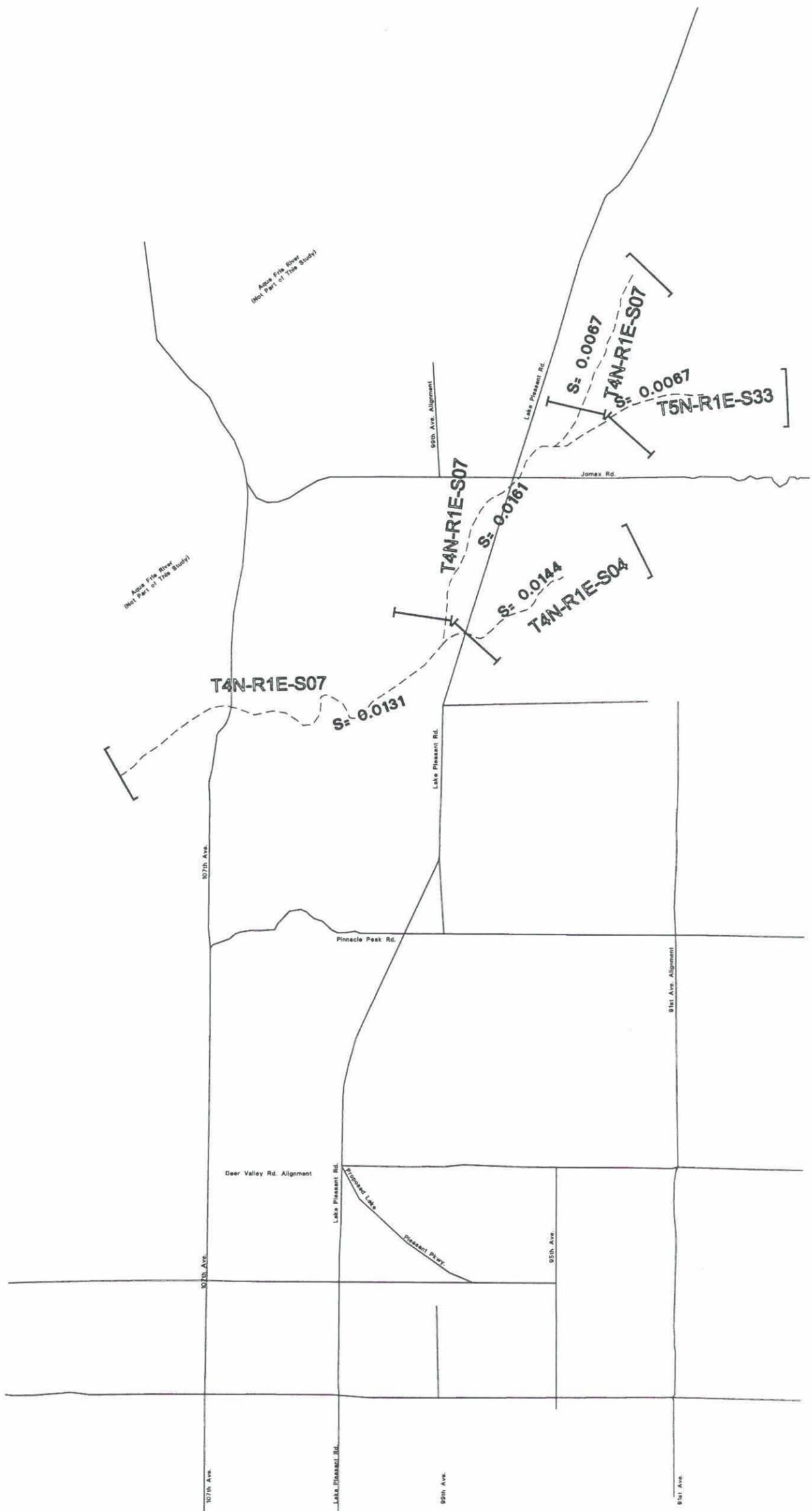


S= 0.0131 ESTIMATED SLOPE

SHEET INDEX



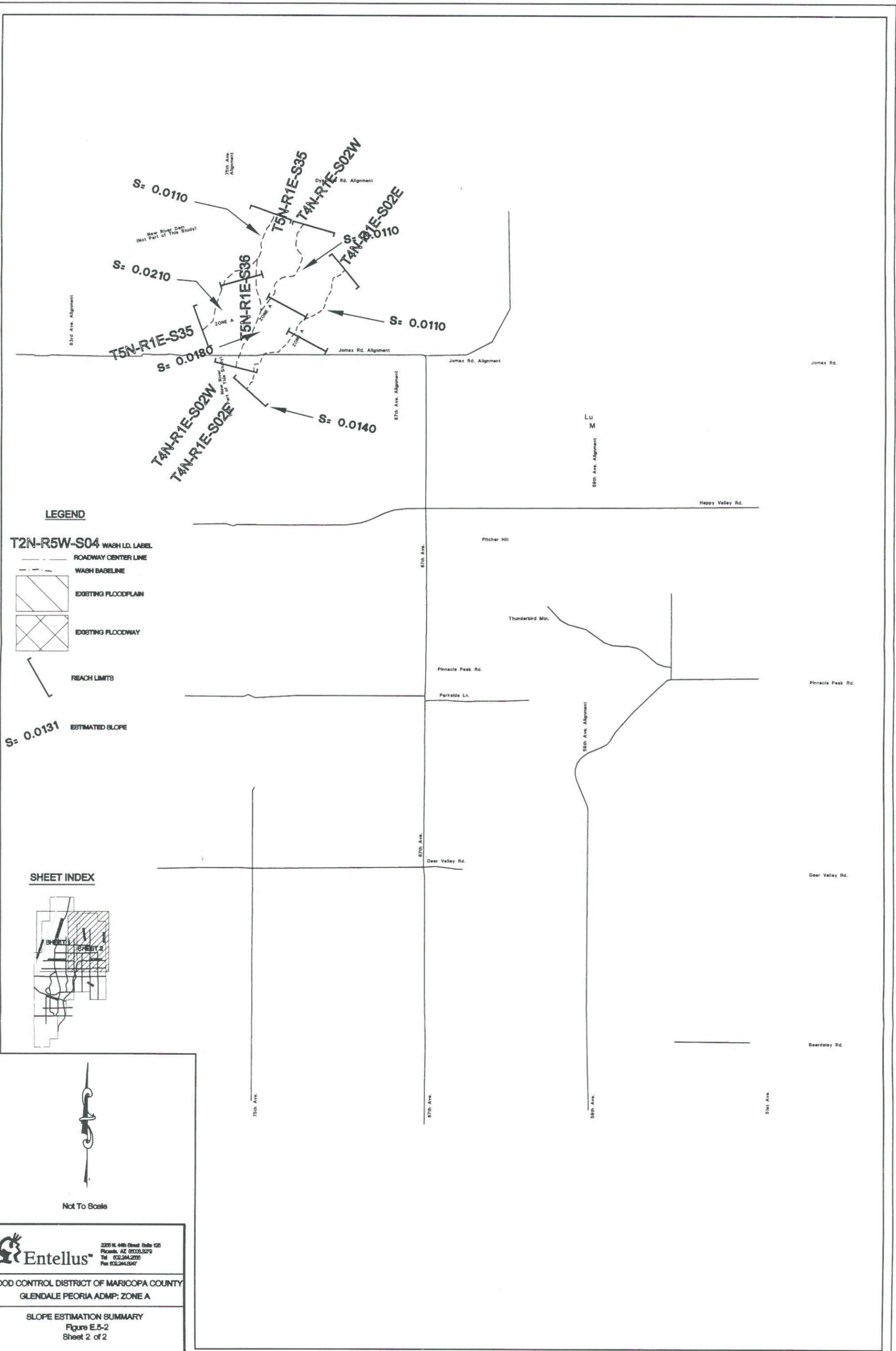
Not To Scale



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 Phoenix, AZ 85018-5270
 Tel: 602.244.2290
 Fax: 602.244.5247

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
 GLENDALE PEORIA ADMP: ZONE A

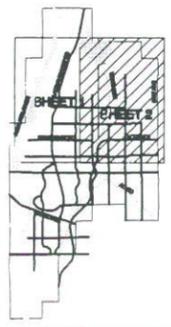
SLOPE ESTIMATION SUMMARY
 Figure E.5-1
 Sheet 1 of 2



LEGEND

- T2N-R5W-S04 WASH I.D. LABEL
- ROADWAY CENTER LINE
- WASH BASELINE
- EXISTING FLOODPLAIN
- EXISTING FLOODWAY
- REACH LIMITS
- S= 0.0131 ESTIMATED SLOPE

SHEET INDEX



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 GLENDALE PEORIA ADMP: ZONE A

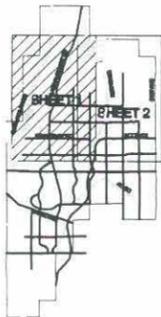
SLOPE ESTIMATION SUMMARY
 Figure E.5-2
 Sheet 2 of 2

LEGEND

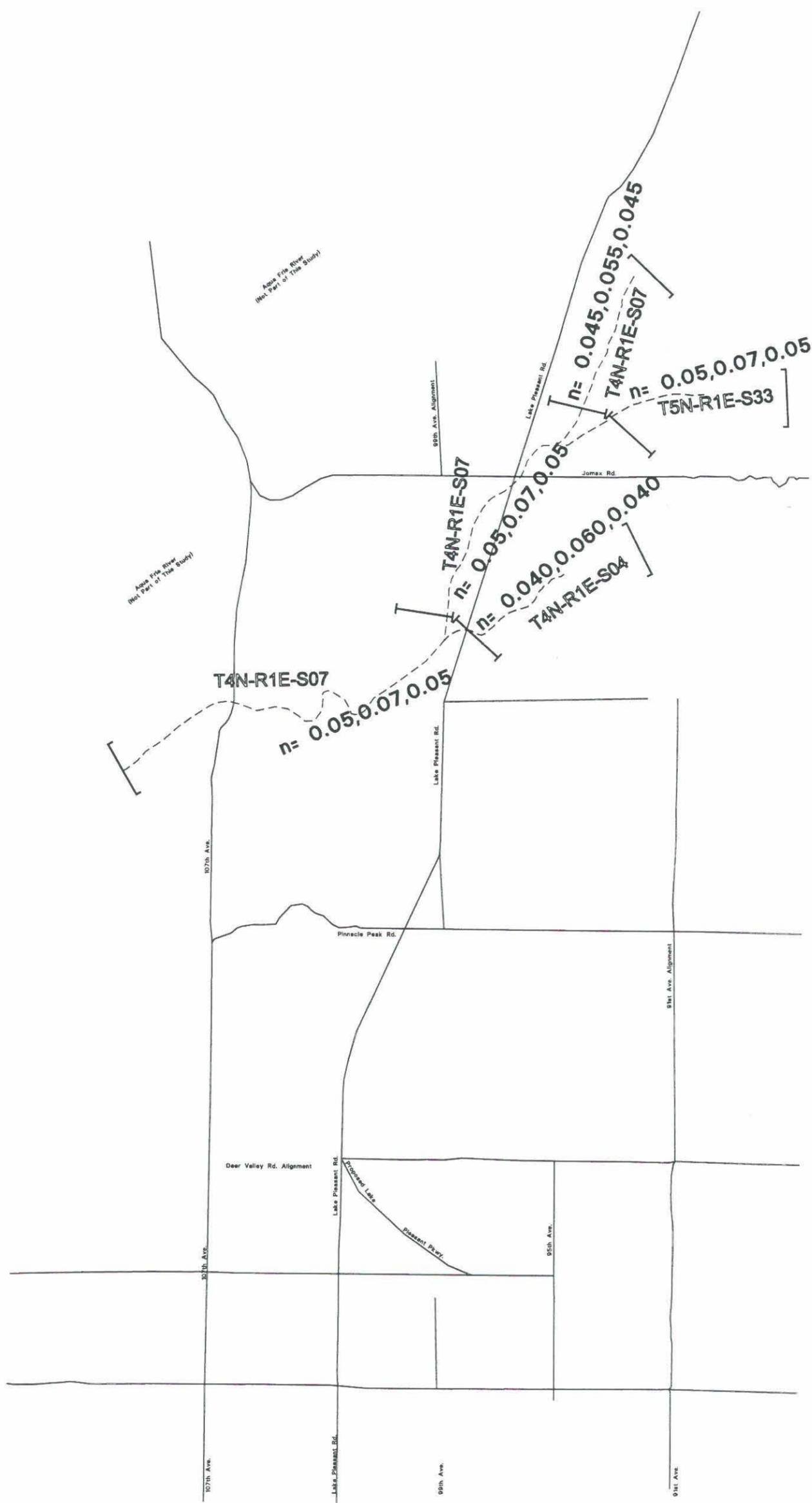
- T2N-R5W-S04 WASH ID. LABEL
- ROADWAY CENTER LINE
- WASH BASELINE
- EXISTING FLOODPLAIN
- EXISTING FLOODWAY
- REACH LIMITS
- MANNING'S ROUGHNESS COEFFICIENT - OVERBANK, CHANNEL, OVERBANK

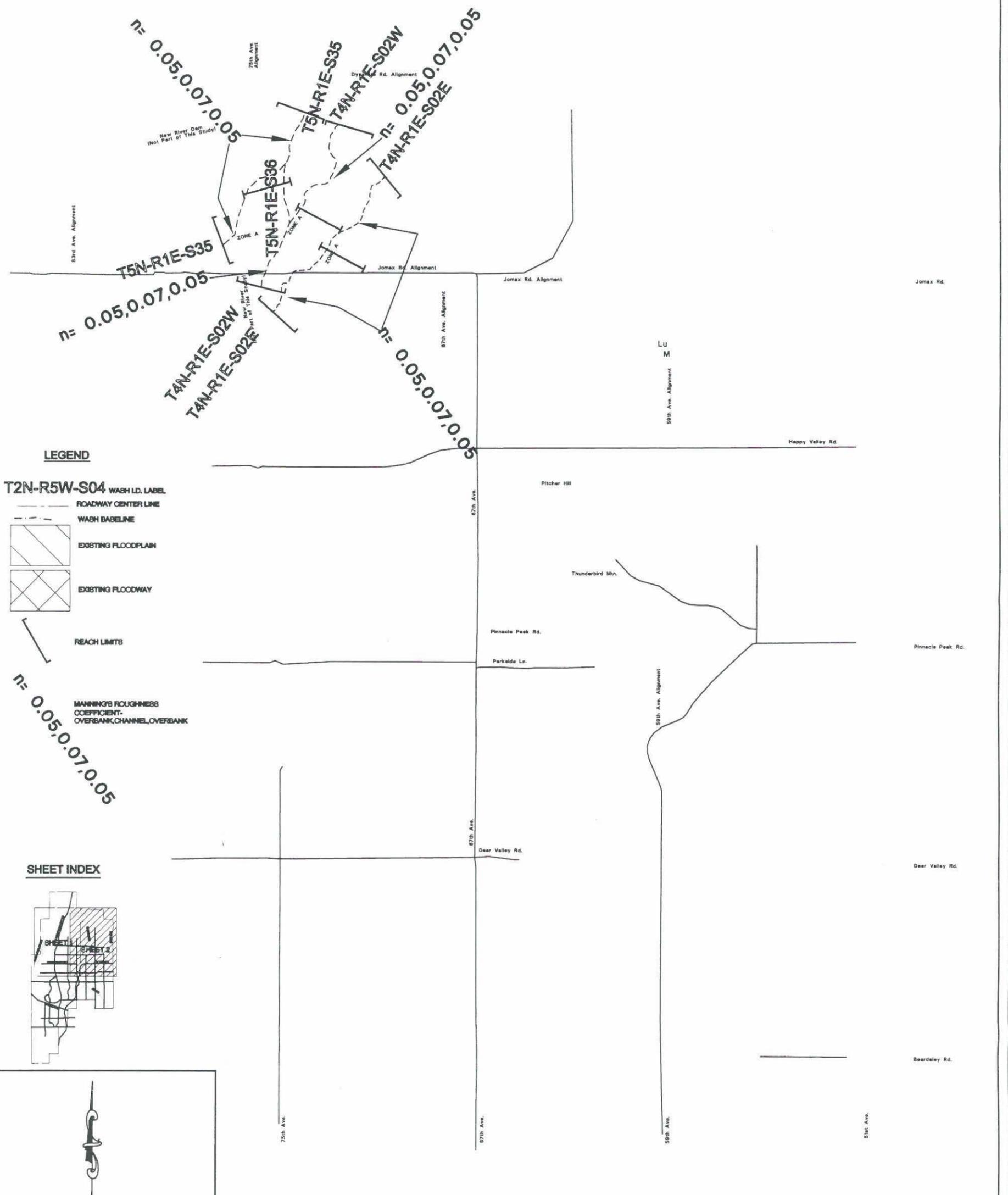
$n = 0.05, 0.07, 0.05$

SHEET INDEX



Not To Scale





LEGEND

- T2N-R5W-S04 WASH I.D. LABEL
- ROADWAY CENTER LINE
- WASH BASELINE
- EXISTING FLOODPLAIN
- EXISTING FLOODWAY
- REACH LIMITS
- MANNING'S ROUGHNESS COEFFICIENT - OVERBANK, CHANNEL, OVERBANK

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
 GLENDALE PEORIA ADMP: ZONE A

MANNING'S ROUGHNESS SUMMARY
 Figure E.6-4
 Sheet 2 of 2

E.5-1 Hydraulic Calculations for Channel Through Terramar

April 25, 2001

TERRAMAR - PARCEL 13

CVL Project #96-0043-07

The following pages are additional calculations that support the Zone A delineation for the wash south of Jomax Road designated as "T4N-R1E-S02E". Specifically, calculations are provided for:

- The roadside channel north of Jomax Road.
- The culvert crossings of Jomax Road.
- The weir flow over Jomax Road.
- The natural wash north of Terramar 13.
- The HEC-RAS for the graded trapezoidal channel at the north and west perimeter of Terramar 13 (excerpts from the Terramar – Parcel 13 Drainage Report).



**DRAINAGE REPORT
FOR
TERRAMAR - PARCEL 13
PEORIA, ARIZONA**

July 29, 1998

Prepared for:

**Richfield Investment Corporation
Napoleon Square
6001 Gulfton, Suite 200
Houston, TX 77081**

Prepared by:

**Coe & Van Loo Consultants, Inc.
4550 N. 12th Street
Phoenix, AZ 84014
(602) 264-6831**



Project No. 96-0043-07-181



THIS RUN EXECUTED 16OCT96

-2 WATER SURFACE PROFILES

ersion 4.6.0; February 1991

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

ER: NASIR RAZA DAT

ARY PRINTOUT TABLE 150

SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	LO
45.000	.00	.00	.00	1358.40	565.00	1362.38	.00	1362.75	50.03	5.08	128.48	79.
100.000	64.05	.00	.00	1358.70	565.00	1362.42	1362.42	1363.63	147.12	8.86	63.77	46.
178.000	68.32	.00	.00	1359.00	565.00	1364.24	1364.24	1364.86	64.59	6.95	110.06	70.
230.000	52.54	.00	.00	1359.38	565.00	1364.77	.00	1365.11	29.10	4.85	130.80	104.
291.000	60.64	.00	.00	1359.80	565.00	1364.91	.00	1365.29	27.35	5.50	126.52	108.
357.000	68.00	.00	.00	1360.70	565.00	1365.24	.00	1365.46	18.06	3.79	149.18	132.
410.000	53.00	.00	.00	1361.15	565.00	1365.31	.00	1365.59	27.06	4.30	131.32	108.
480.000	70.00	.00	.00	1361.75	565.00	1365.46	.00	1365.87	44.09	5.10	110.87	85.
550.000	70.00	.00	.00	1362.35	565.00	1365.74	.00	1366.27	63.61	5.83	96.99	70.
620.000	70.00	.00	.00	1362.95	565.00	1366.18	.00	1366.79	77.96	6.27	90.07	63.
648.000	28.00	.00	.00	1363.20	565.00	1366.38	.00	1367.02	83.24	6.42	87.95	61.
688.000	40.00	.00	.00	1363.54	565.00	1366.71	.00	1367.36	84.42	6.46	87.50	61.
728.000	40.00	.00	.00	1363.88	565.00	1367.05	.00	1367.70	84.03	6.45	87.65	61.
768.000	40.00	.00	.00	1364.22	565.00	1367.39	.00	1368.03	83.93	6.44	87.69	61.
800.000	40.00	.00	.00	1364.56	565.00	1367.72	.00	1368.37	84.39	6.46	87.51	61.
848.000	40.00	.00	.00	1364.90	565.00	1368.06	.00	1368.71	84.88	6.47	87.33	61.
884.000	36.00	.00	.00	1365.20	565.00	1368.35	.00	1369.00	78.68	6.55	91.62	63.

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16OCT96

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PAGE 8

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.C
*	933.000	50.00	.00	.00	1366.00	565.00	1368.94	1368.94	1369.81	160.24	7.50	75.37	44

DELLER: NASIR RAZA DAT

SUMMARY PRINTOUT TABLE 150

SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
45.000	565.00	1362.38	.00	.00	.88	98.91	.00
* 109.000	565.00	1362.42	.00	.03	.00	26.64	64.05
* 178.000	565.00	1364.24	.00	1.82	.00	105.30	68.32
* 230.000	565.00	1364.77	.00	.53	.00	62.18	52.54
291.000	565.00	1364.91	.00	.14	.00	62.19	60.64
357.000	565.00	1365.24	.00	.33	.00	47.00	68.00
410.000	565.00	1365.31	.00	.07	.00	47.00	53.00
480.000	565.00	1365.46	.00	.16	.00	44.71	70.00
550.000	565.00	1365.74	.00	.28	.00	42.15	70.00
620.000	565.00	1366.18	.00	.43	.00	40.82	70.00
648.000	565.00	1366.38	.00	.20	.00	40.40	28.00
688.000	565.00	1366.71	.00	.33	.00	40.31	40.00
728.000	565.00	1367.05	.00	.34	.00	40.34	40.00
768.000	565.00	1367.39	.00	.34	.00	40.35	40.00
808.000	565.00	1367.72	.00	.33	.00	40.31	40.00
848.000	565.00	1368.06	.00	.34	.00	40.28	40.00
884.000	565.00	1368.35	.00	.29	.00	61.76	36.00
* 933.000	565.00	1368.94	.00	.59	.00	45.04	50.00

OF ERRORS AND SPECIAL NOTES

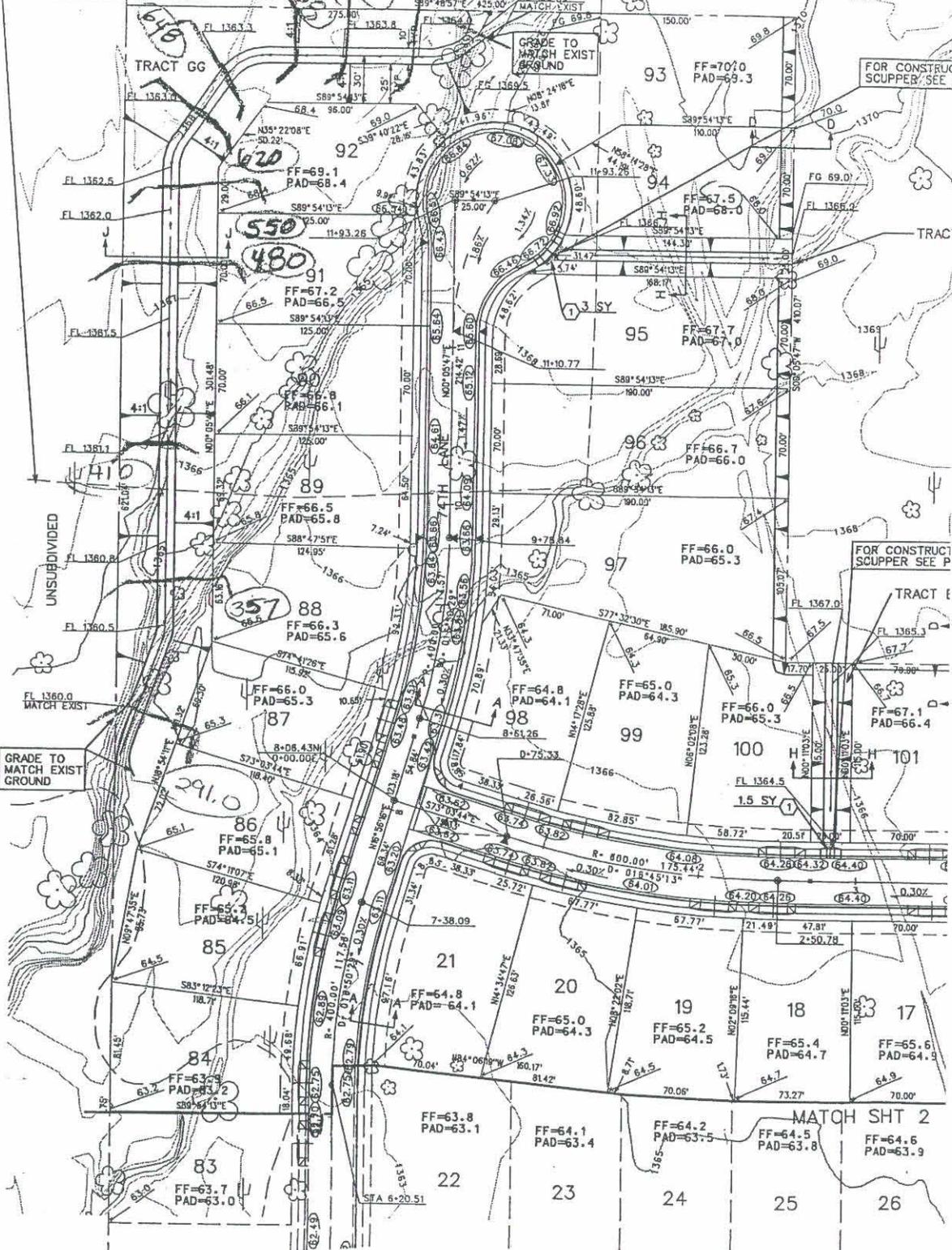
SECNO= 109.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
SECNO= 109.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

SECNO= 178.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
SECNO= 178.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
SECNO= 178.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

SECNO= 230.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

SECNO= 933.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
SECNO= 933.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
SECNO= 933.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

NOTE:
 CONTRACTOR TO USE CAUTION!!!
 WELL IN THIS AREA, EXACT LOCATION
 UNKNOWN, TO BE ABANDONED IF NOT
 ALREADY-ADWR REG. NO 55-640325

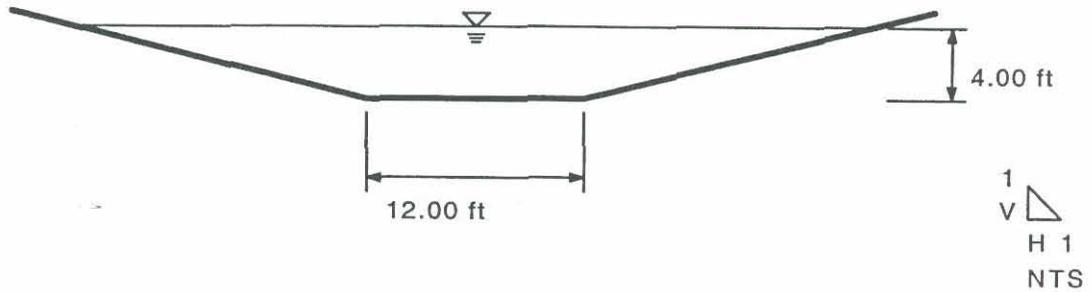


DATE: Aug. 28, 1998
 TIME: 10:06:29
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Cross Section CHANNEL 1
Cross Section for Trapezoidal Channel

Project Description	
Project File	m:\personal.dir\salvador\haestad\terramar.fm2
Worksheet	CHANNEL 1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Mannings Coefficient	0.025
Channel Slope	0.006000 ft/ft
Depth	4.00 ft
Left Side Slope	4.000000 H : V
Right Side Slope	4.000000 H : V
Bottom Width	12.00 ft
Discharge	947.22 cfs



Culvert Calculator Report 250

Solve For: Discharge

Culvert Summary

Allowable HW Elevation	1,373.00 ft	Headwater Depth/ Height	1.28
Computed Headwater Elevation	1,373.00 ft	Discharge	155.82 cfs
Inlet Control HW Elev	1,372.95 ft	Tailwater Elevation	1,370.00 ft
Outlet Control HW Elev	1,373.00 ft	Control Type	Outlet Control

Grades

Upstream Invert	1,369.15 ft	Downstream Invert	1,367.67 ft
Length	35.00 ft	Constructed Slope	0.042286 ft/ft

Hydraulic Profile

Profile	CompositeS1S2	Depth, Downstream	2.33 ft
Slope Type	Steep	Normal Depth	1.49 ft
Flow Regime	N/A	Critical Depth	2.10 ft
Velocity Downstream	7.93 ft/s	Critical Slope	0.017559 ft/ft

Section

Section Shape	Arch	Mannings Coefficient	0.024
Section Material	Concrete	Span	4.88 ft
Section Size	58.5 x 36.0 inch	Rise	3.00 ft
Number Sections	2		

Outlet Control Properties

Outlet Control HW Elev	1,373.00 ft	Upstream Velocity Head	1.17 ft
Ke	0.50	Entrance Loss	0.58 ft

Inlet Control Properties

Inlet Control HW Elev	1,372.95 ft	Flow Control	Transition
Inlet Type	Square edge w/headwall	Area Full	22.8 ft ²
K	0.00980	HDS 5 Chart	0
M	2.00000	HDS 5 Scale	0
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Calculator Report

261

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	1,373.00 ft	Headwater Depth/ Height	1.85
Computed Headwater Elevation	1,373.00 ft	Discharge	87.33 cfs
Inlet Control HW Elev	1,372.30 ft	Tailwater Elevation	1,370.00 ft
Outlet Control HW Elev	1,373.00 ft	Control Type	Outlet Control

Grades			
Upstream Invert	1,368.90 ft	Downstream Invert	1,368.43 ft
Length	70.00 ft	Constructed Slope	0.006714 ft/ft

Hydraulic Profile			
Profile	CompositeM2Pressure	Depth, Downstream	1.70 ft
Slope Type	Mild	Normal Depth	N/A ft
Flow Regime	Subcritical	Critical Depth	1.70 ft
Velocity Downstream	8.15 ft/s	Critical Slope	0.022653 ft/ft

Section			
Section Shape	Arch	Mannings Coefficient	0.024
Section Material	Concrete	Span	3.65 ft
Section Size	43.75 x 26.62 inch	Rise	2.22 ft
Number Sections	2		

Outlet Control Properties			
Outlet Control HW Elev	1,373.00 ft	Upstream Velocity Head	0.75 ft
Ke	0.50	Entrance Loss	0.37 ft

Inlet Control Properties			
Inlet Control HW Elev	1,372.30 ft	Flow Control	Submerged
Inlet Type	Square edge w/headwall	Area Full	12.6 ft ²
K	0.00980	HDS 5 Chart	0
M	2.00000	HDS 5 Scale	0
C	0.03980	Equation Form	1
Y	0.67000		

Project _____
Project No. _____
Sheet No. _____ of _____
Calculated by _____ Date _____

WEIR FLOW COMPUTATIONS

LOCATION/DESCRIPTION:

CROSS SECTION PARAMETERS:

FILENAME: sal.SEC

No. of Cross Section Points: 5 Bed Slope:0.00500 Max Elev.:1374.00
Bank Stations.....Left: 0.0 Right.....: 466.0 Min Elev.:1372.90
Encroachment Stations..Left: Right.....: Weir Coef: 2.700

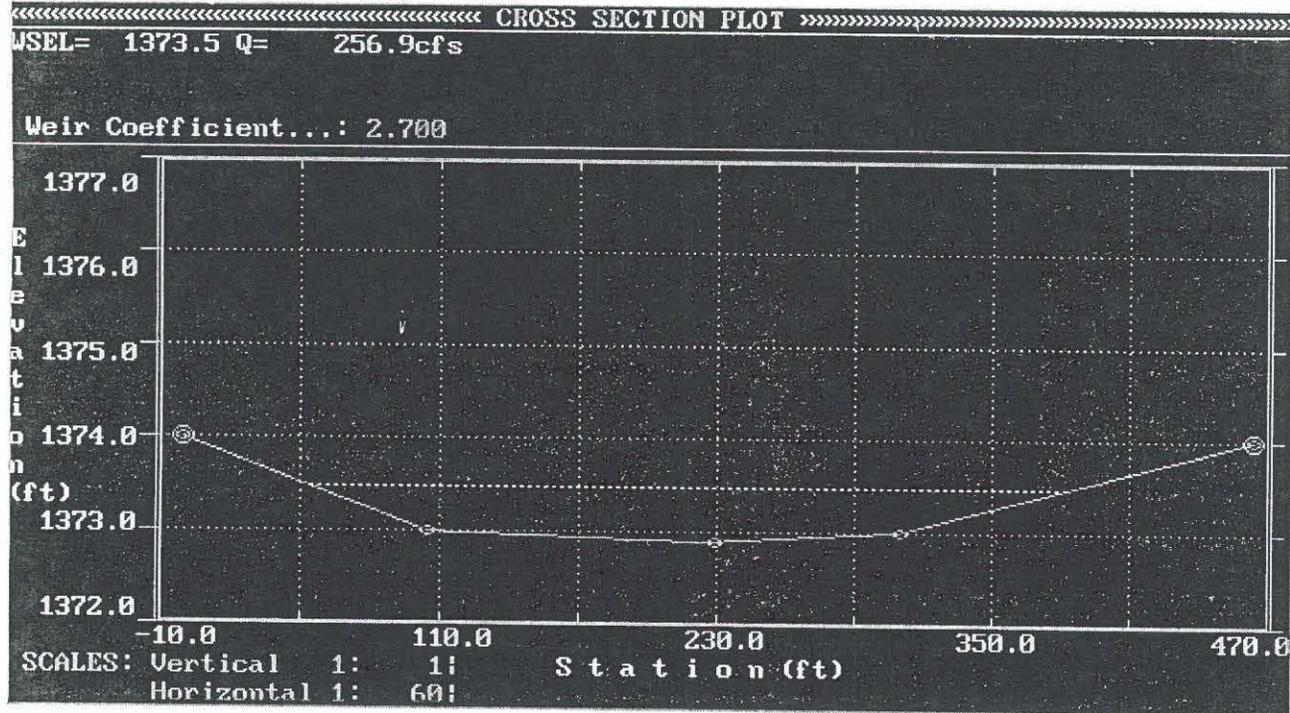
CROSS SECTION POINTS - Elevations & Stations in feet:

No.	Elev.	Sta.	No.	Elev.	Sta.	No.	Elev.	Sta.
1)	1374.00	0.00	2)	1373.00	105.00	3)	1372.90	230.00
4)	1373.00	311.00	5)	1374.00	466.00			

COMPUTED PARAMETERS:

WSEL(ft)	Q(cfs)	H:max(ft)	H:ave(ft)	TW(ft)	A(sf)
1373.48	256.9	0.58	0.42	329.9	138.0

NOTES:



$$\text{Weir flow} = \text{Flow} - \left[\text{Capacity (P.250)} - \text{Capacity (P.26A)} \right]$$

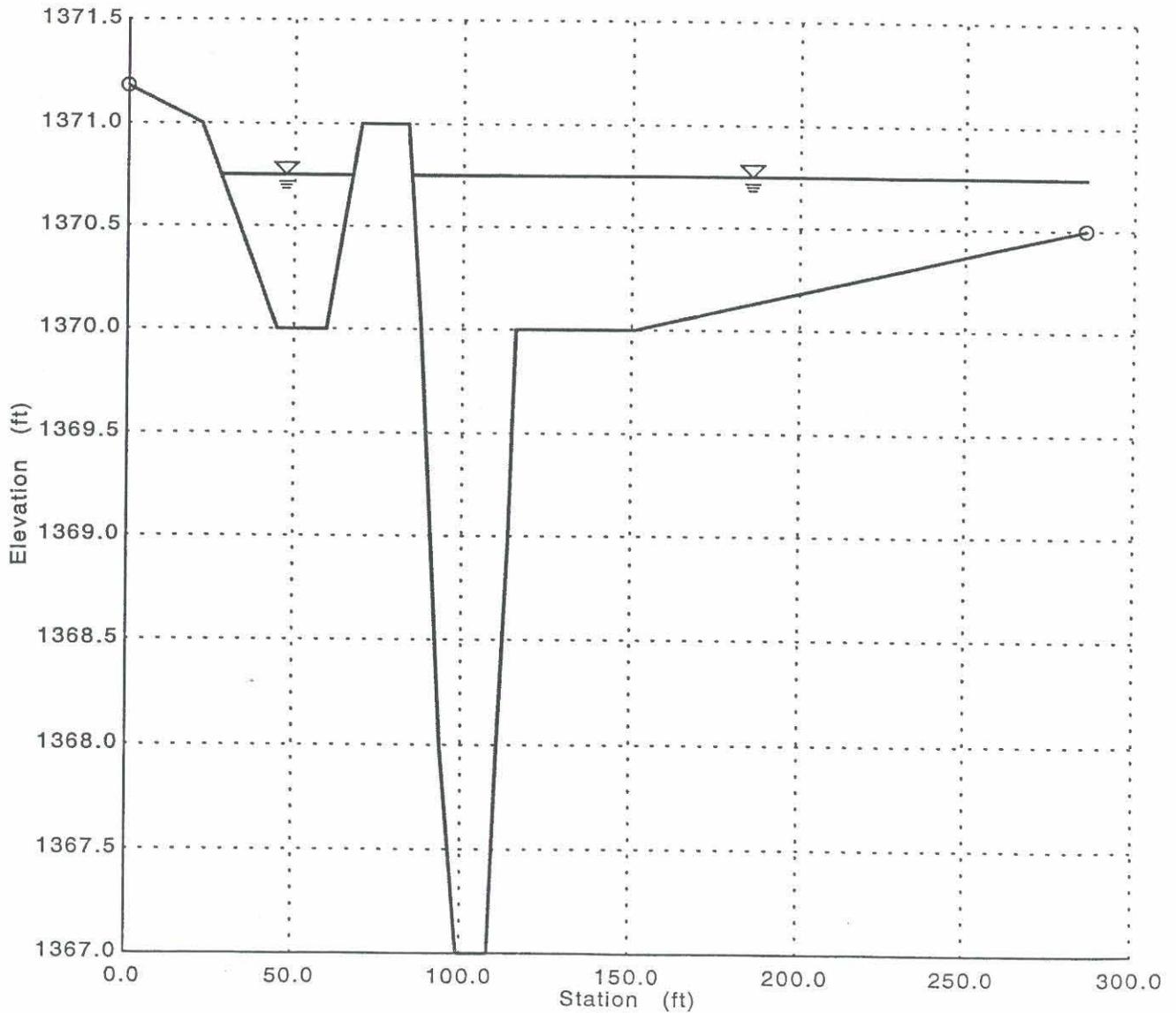
$$500 \text{ cfs} - (155.62 + 87.33)$$

$$\text{Weir flow} = 256.9$$

Cross Section WASH 1
 Cross Section for Irregular Channel
LOOKING DIS

Project Description	
Project File	untitled.fm2
Worksheet	wash 1
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data	
Wtd. Mannings Coefficient	0.035
Channel Slope	0.005000 ft/ft
Water Surface Elevation	1,370.74 ft
Discharge	500.00 cfs

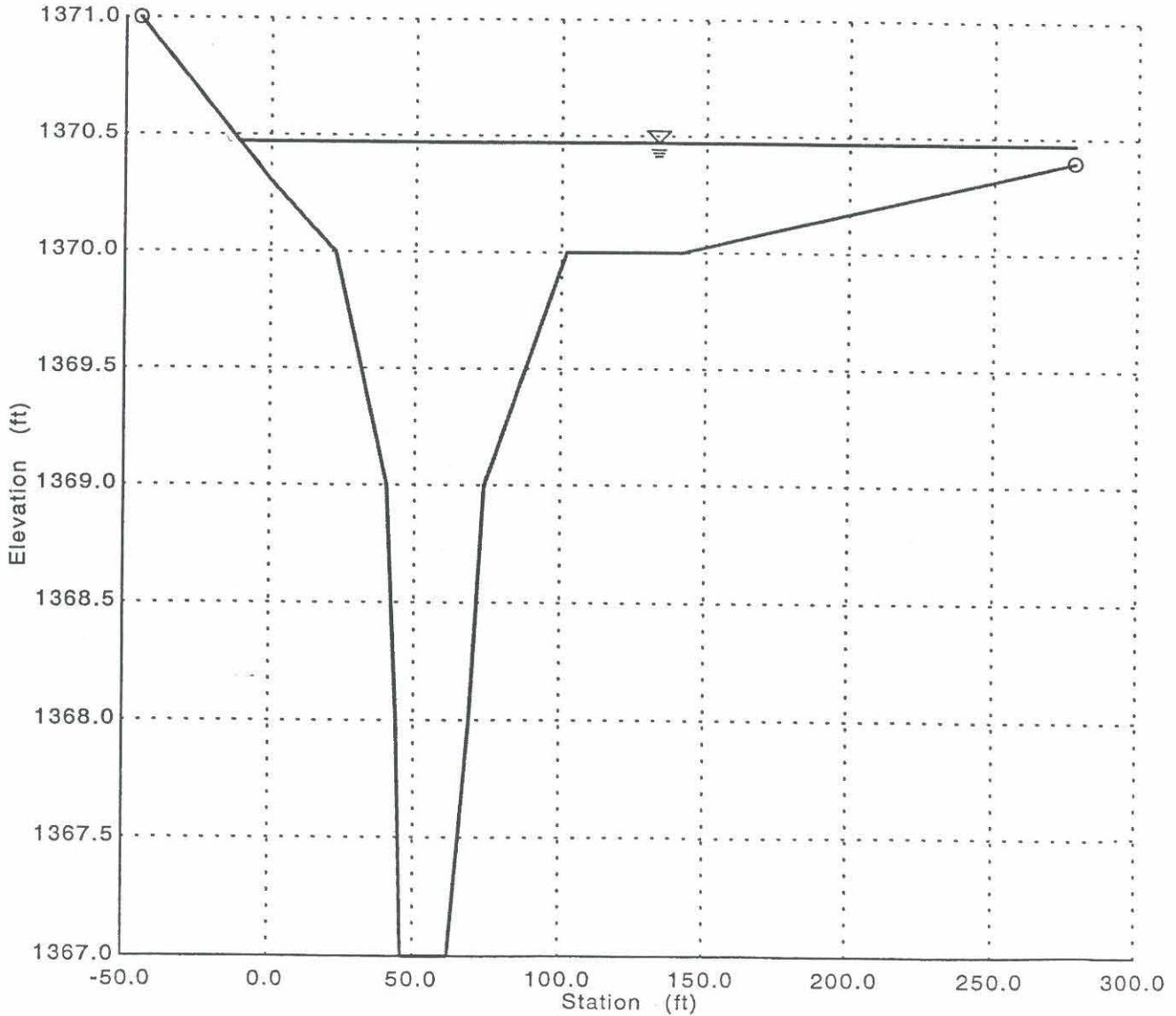


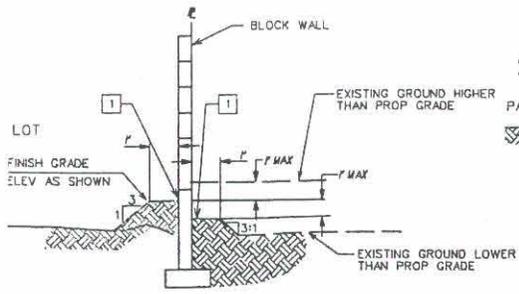
Cross Section WASH 2
 Cross Section for Irregular Channel

LOOKING D/S

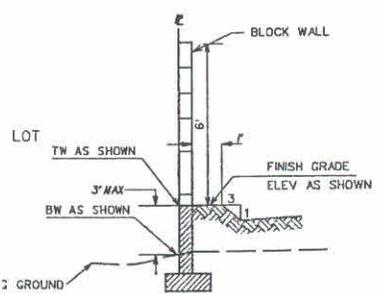
Project Description	
Project File	untitled.fm2
Worksheet	wash2
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.035	
Channel Slope	0.005000 ft/ft	
Water Surface Elevation	1,370.48	ft
Discharge	500.00	cfs

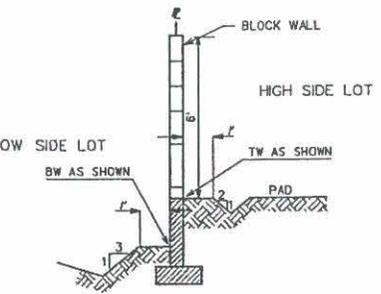




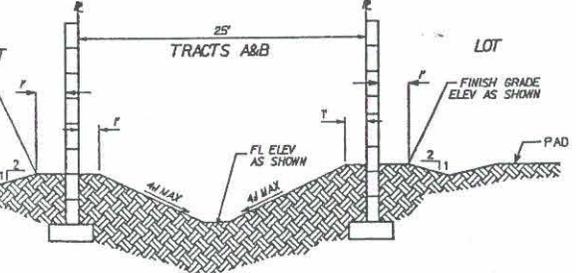
TYPICAL SECTION E-E
N.T.S.



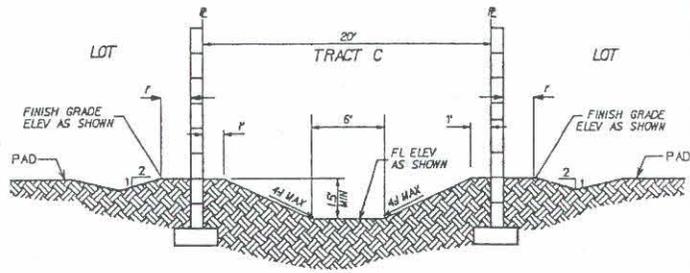
TYPICAL SECTION F-F
N.T.S.



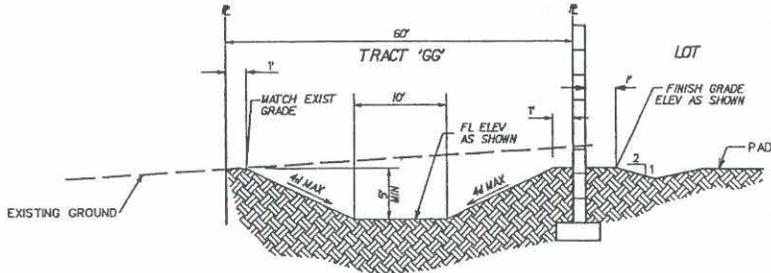
TYPICAL SECTION G-G
N.T.S.



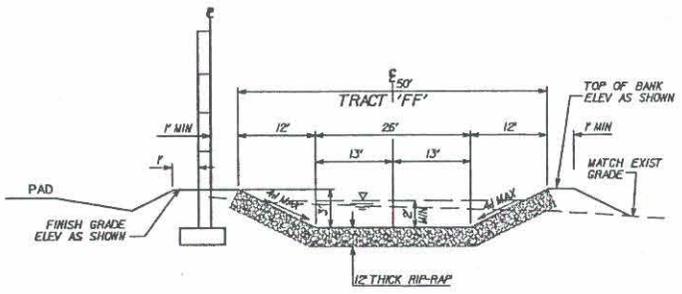
SECTION H-H
N.T.S.



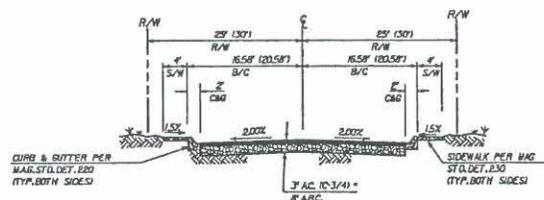
SECTION I-I
N.T.S.



SECTION J-J
N.T.S.



SECTION K-K
N.T.S.



TYPICAL INTERIOR SECTION
DIMENSIONS FOR 73rd DR. N.T.S.

TERRAMAR PARCEL 13

4550 NORTH 12TH STREET
PHOENIX, ARIZONA 85014
TELEPHONE (602) 264-6831

COE & VAN LOO
PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

DESIGNED	DATE	REVISIONS	DATE	BY
IA/DJ/RV				
MA/ST/DET				
CHECKED				
DATE				

GRADING PLANS

SHEET
5 OF 5
96-0043-07
PLAN CF

**FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY**
**GLENDALE/PEORIA AREA DRAINAGE
MASTER PLAN UPDATE**
ZONE A FLOODPLAIN DELINATION
F.C.D. CONTRACT NO. 99-44

LEGEND

100-YR APPROXIMATE ZONE A FLOODPLAIN BOUNDARY	
HYDRAULIC BASE LINE	
CROSS SECTION	
ELEVATION REFERENCE MARK	
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
LIMIT OF STUDY	
LIMIT OF THIS STUDY	
SECTION LINES	
SECTION CORNER	$\frac{29 \ 28}{32 \ 33}$
WASH I.D. LABEL	T4N-R1E-S07
EXISTING ZONE A	
EXISTING FLOOD PLAIN	
EXISTING FLOODWAY	
FLOW AT DOWNSTREAM CONC. POINT	$Q_{100} = 850 \text{ cfs}$

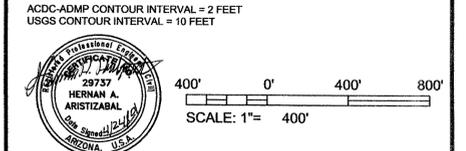
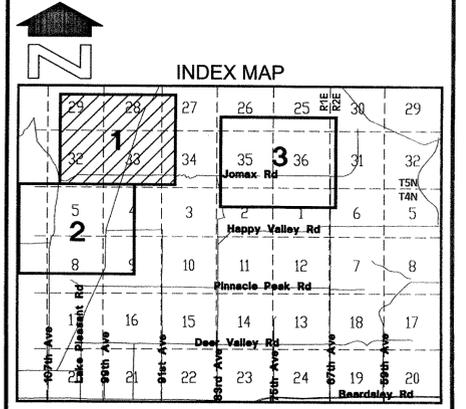
ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM 1929

I.D. NUMBER	ELEV. (FT)	DESCRIPTION/LOCATION
1	1396.80	FCDMC brass cap set in a ring of stones approx. 0.2 miles east of Lake Pleasant Road, 4 feet north of a 4-strand barbed wire fence.

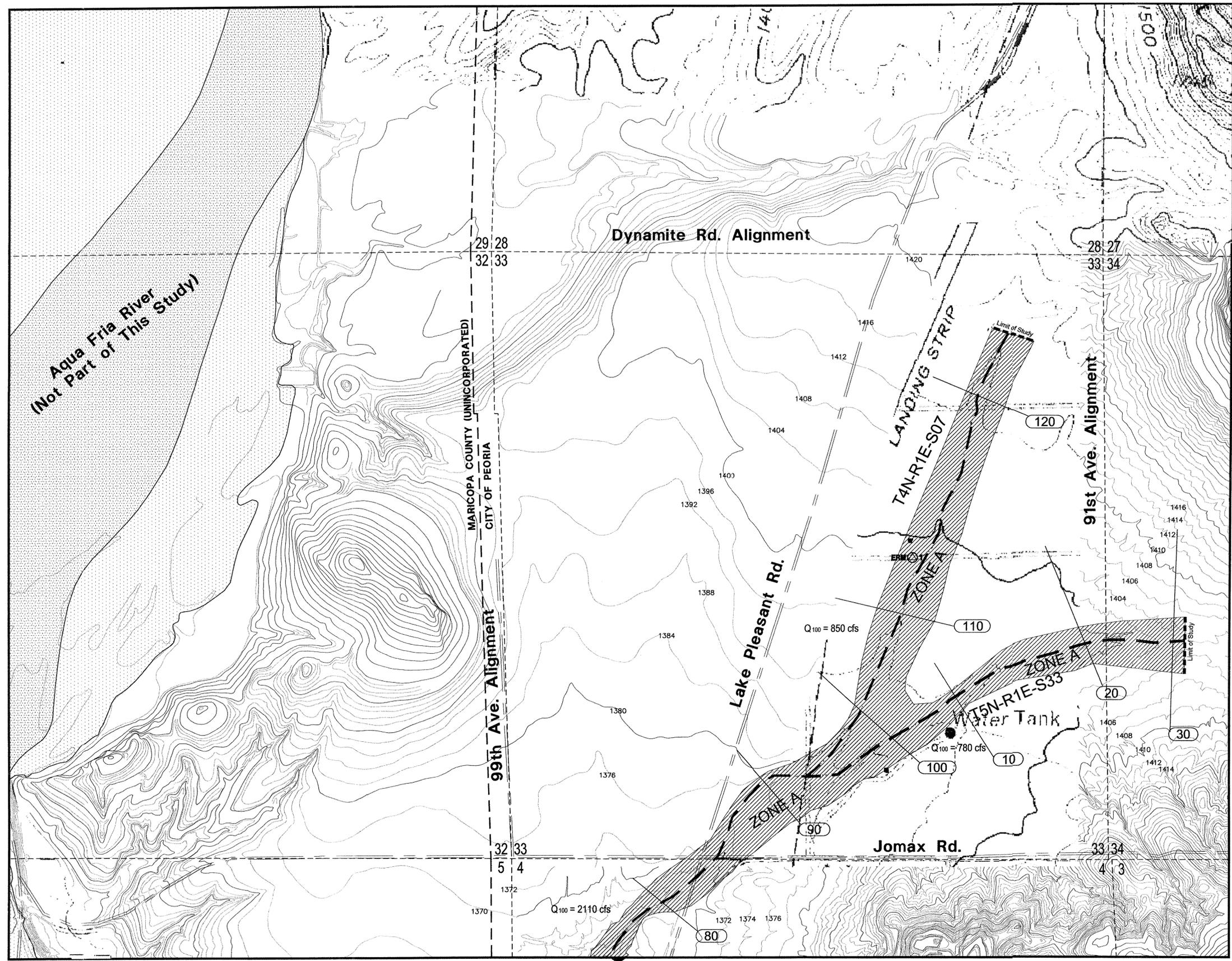
NOTES

NGVD 29 + 1.95 FEET = NAVD 88



Entellus
 2255 N. 44th Street Suite 125
 Phoenix, AZ 85008.3279
 Tel: 602.244.2566
 Fax: 602.244.8547
 E-mail: www.entellus.com

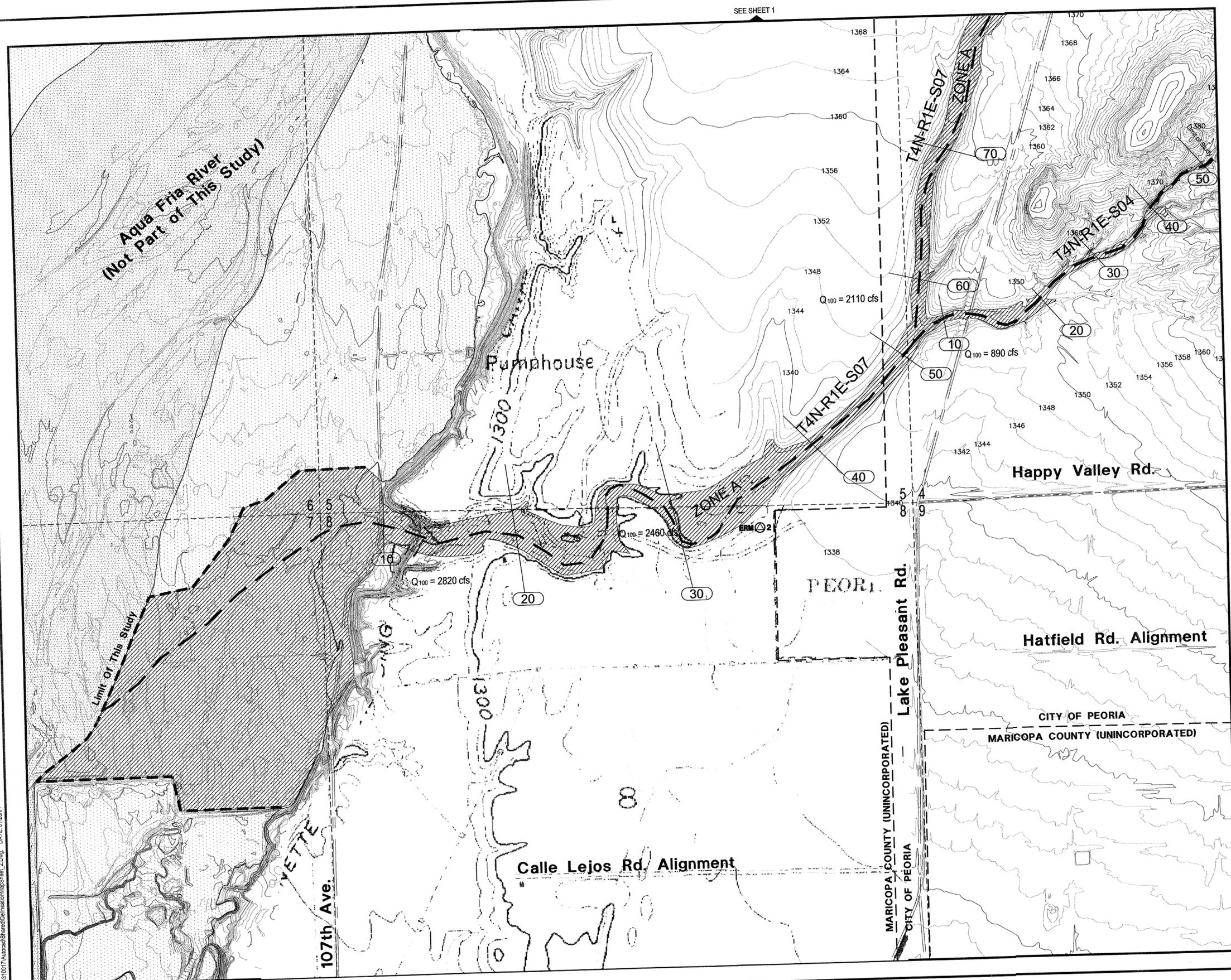
DESIGN	BY HAA/JCS	DATE 04/2001	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.	SEK	04/2001	
PLANS	RCS/JCS	04/2001	
PLANS CHK.	HAA	04/2001	
SUBMITTED BY:			
			RECOMMENDED BY: _____ DATE: _____
			APPROVED BY: _____ DATE: _____
			CHEF ENGINEER AND GENERAL MANAGER
			SHEET 1 OF 3



FILE: 310310017\Autocad\ZoneA\Report\Exhibits\DelinationMap\Sheet_1.Dwg. DATE: 01/26/01

Topographic Mapping: ACDC-ADMP Mapping with 2 ft. Contour Intervals or USGS 7.5 minute quadrangles with 10 ft. Contour Intervals

SEE SHEET 2



SEE SHEET 1

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
GLENDALE/PEORIA AREA DRAINAGE MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINEATION
F.C.D. CONTRACT NO. 99-44

LEGEND

100-YR APPROXIMATE ZONE A FLOODPLAIN BOUNDARY	
HYDRAULIC BASE LINE	
CROSS SECTION	
ELEVATION REFERENCE MARK	
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	Corporate Limits
LIMIT OF STUDY	Limit of Study
LIMIT OF THIS STUDY	
SECTION LINES	
SECTION CORNER	29:28 32:33 T4N-R1E-S07
WASH I.D. LABEL	
EXISTING ZONE A	
EXISTING FLOOD PLAIN	
EXISTING FLOODWAY	
FLOW AT DOWNSTREAM CONC. POINT	Q ₁₀₀ = 850 cfs

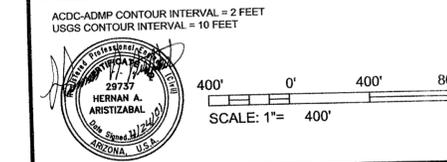
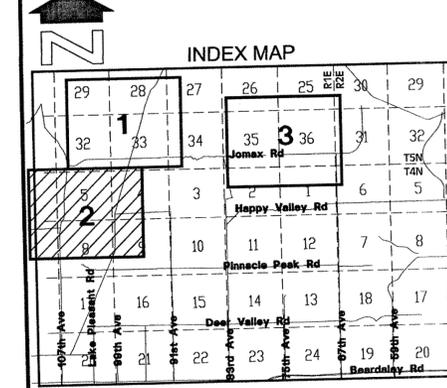
ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM 1929

I.D. NUMBER	ELEV. (FT)	DESCRIPTION/LOCATION
2	1332.49	FCDMC brass cap set in a ring of stones approx. 0.2 miles west of Lake Pleasant Road, on Happy Valley Road (left) and approx. 300 feet south of Happy Valley Road

NOTES

NGVD 29 + 1.95 FEET = NAVD 88



2255 N. 44th Street, Suite 125
 Phoenix, AZ 85008-3279
 Tel: 602.244.2556
 Fax: 602.244.8947
 E-mail: www.ertellus.com

DESIGN		BY	DATE	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK.	SEK	HAA/JCS	04/2001	
PLANS		BY <td>DATE <td rowspan="2">RECOMMENDED BY:</td> </td>	DATE <td rowspan="2">RECOMMENDED BY:</td>	RECOMMENDED BY:
PLANS CHK.	HAA	RCS/JCS	04/2001	
SUBMITTED BY:		DATE:	DATE:	APPROVED BY:
				CHIEF ENGINEER AND GENERAL MANAGER
				SHEET 2 OF 3

FILE: 310310017\Aupoad\Shred\Dimension\MapSheet_2.Dwg DATE: 01/26/01

Topographic Mapping: ACDC-ADMP Mapping with 2 ft. Contour Intervals or USGS 7.5 minute quadrangles with 10 ft. Contour Intervals

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
GLENDALE/PEORIA AREA DRAINAGE
MASTER PLAN UPDATE
ZONE A FLOODPLAIN DELINATION
F.C.D. CONTRACT NO. 99-44

LEGEND

100-YR APPROXIMATE ZONE A FLOODPLAIN BOUNDARY	
HYDRAULIC BASE LINE	
CROSS SECTION	
ELEVATION REFERENCE MARK	
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
LIMIT OF STUDY	
LIMIT OF THIS STUDY	
SECTION LINES	
SECTION CORNER	29:28 32:33
WASH I.D. LABEL	T4N-R1E-S07
EXISTING ZONE A	
EXISTING FLOOD PLAIN	
EXISTING FLOODWAY	
FLOW AT DOWNSTREAM CONC. POINT	Q ₁₀₀ = 850 cfs

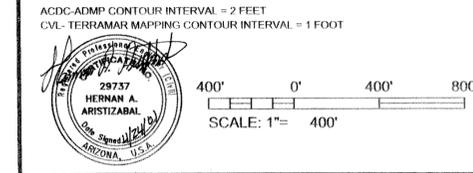
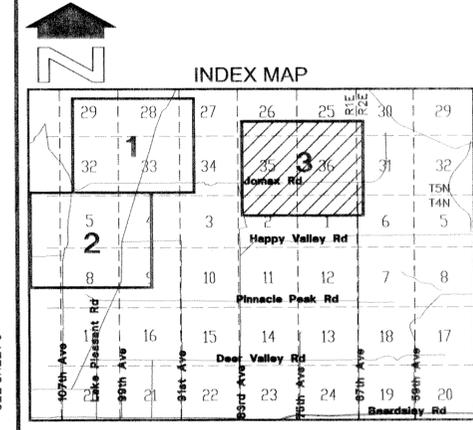
ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM 1929

I.D. NUMBER	ELEV. (FT)	DESCRIPTION/LOCATION
6	1371.02	Top of ADOT aluminum cap (BM 517-6) located at the northwest corner of section 2, Pleasant Road, on Happy Valley T4N-R1E-G&SRB&M. Also is DTM, Inc. aerial mapping control point.

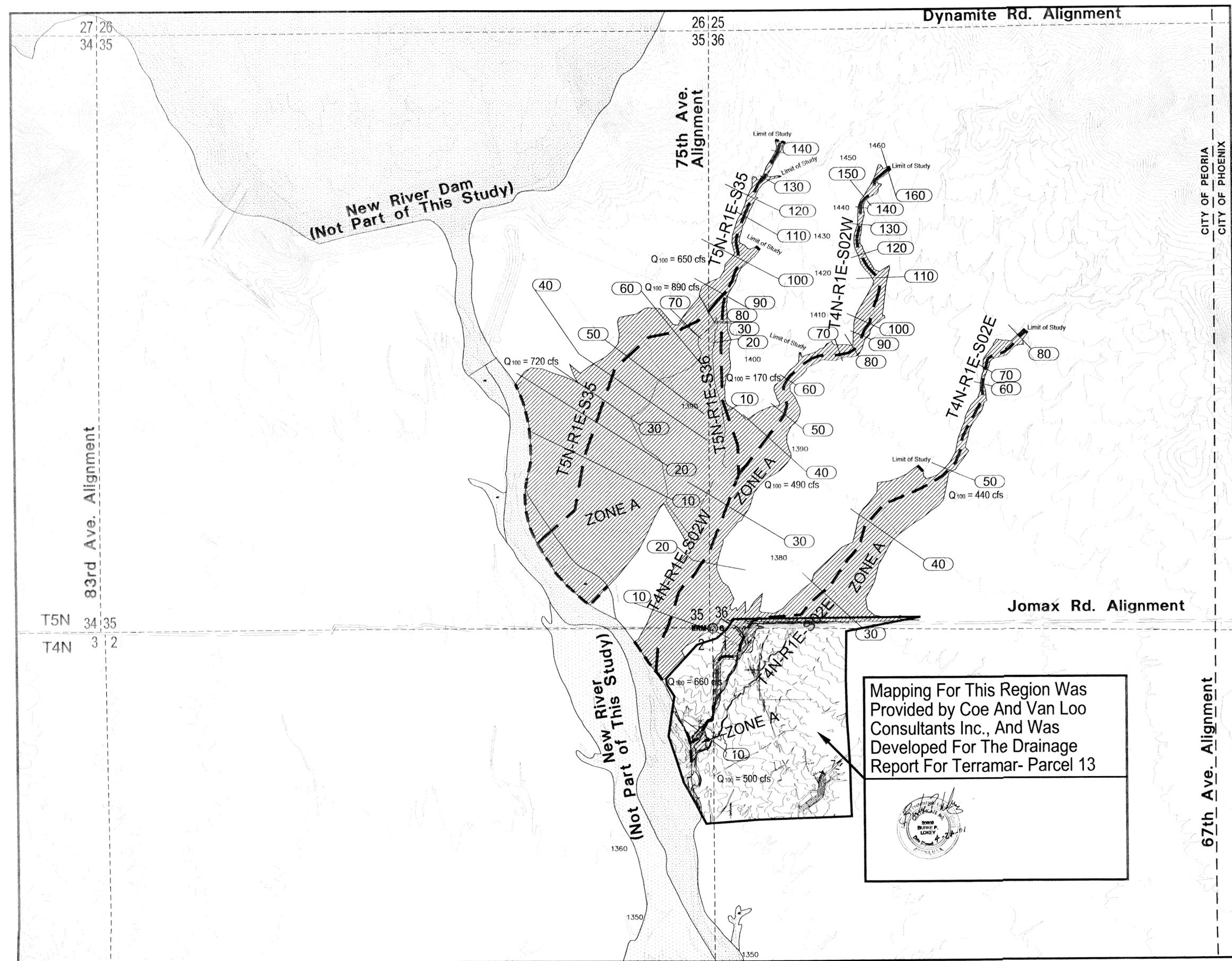
NOTES

NGVD 29 + 1.95 FEET = NAVD 88

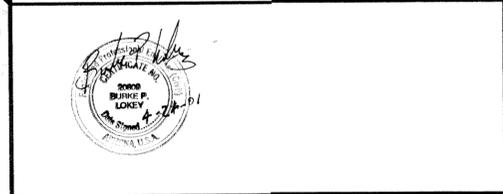


Entellus
2255 N. 44th Street, Suite 125
Phoenix, AZ 85008-3279
Tel: 602.244.2566
Fax: 602.244.8947
E-mail: www.entellus.com

DESIGN	BY HAA/JCS	DATE 04/2001	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DESIGN CHK	SEK	04/2001	RECOMMENDED BY:
PLANS	RCS/JCS	04/2001	APPROVED BY:
PLANS CHK.	HAA	04/2001	DATE:
SUBMITTED BY:	DATE:	SHEET 3 OF 3	CHIEF ENGINEER AND GENERAL MANAGER:



Mapping For This Region Was Provided by Coe And Van Loo Consultants Inc., And Was Developed For The Drainage Report For Terramar- Parcel 13



FILE: 310310017\Agenc\ZoneA\Report\Embld\Delination\MapSheet_4.Dwg DATE: 04/24/01

Topographic Mapping: ACDC- ADMP with 2 ft. Contour Intervals, and Supplemented With Mapping From Coe And Van Loo Consultants Inc. (1 foot Contour Intervals)