

# **Kozlowski Floodprone Properties Assistance Program Letter of Map Revision**

## **Wittmann Area, Maricopa County**

### **Technical Data Notebook**

Contract Number: FCD 2010C027 Assignment #7

Prepared for:



**Flood Control District of Maricopa County**  
2801 W. Durango Street  
Phoenix, AZ 85009

Prepared by:



**WEST Consultants, Inc.**  
8950 S. 52<sup>nd</sup> Street, Suite 210  
Tempe, Arizona 85284

January 2012



# Flood Control District of Maricopa County

## INTEROFFICE MEMORANDUM

**Date:** October 20, 2011

**To:** Timothy S. Phillips, P.E., Chief Engineer and General Manager

**From:** John Hathaway, P.E., CFM

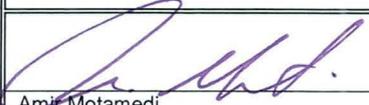
**Subject:** Kozlowski LOMR Request and Technical Data Notebook, Contract FCD 2010C027 – WA #7

The floodplain and floodway re-study for the Kozlowski LOMR is ready for use as the best available technical information. The study documentation will be sent to FEMA for review and incorporation into the County's FIRM panels.

The background for the study includes the following:

The re-study revises approximately 1.2 linear miles of pending Zone AE floodplain along Wash T4N-R32-S08W delineated as part of the 2006 Wittmann Phase 2 Zone AE Floodplain Delineation Study (FDS) for the Flood Control District. Physical changes occurred after the original topography was obtained in 2002 but before the FDS could be completed. The re-study is based on new 1-foot contour interval mapping in NAVD88 vertical datum by Cooper Aerial Surveys, Inc. The relevant portion of the study area was re-flown May 24, 2010. The study Consultant was WEST Consultants, Inc. The project manager for the Consultant was Brian Wahlin, P.E. The project manager for the District was John Hathaway, P.E., CFM.

Please concur and authorize below the use of this new study.

 Date: 10/20/11 John Hathaway, P.E., CFM Project Manager	 Date: 11/8/11 Timothy S. Phillips, P.E., Chief Engineer and General Manager
 Date: 10/26/11 Amir Motamedi Hydrology/Hydraulics Branch Manager	 Date: 10/27/11 Richard Harris, P.E., CFM Study Reviewer
 Date: 11/3/11 Kelli Sertich, AICP Floodplain Management & Services Division Manager	 Date: 11/1/11 Ed Raleigh, P.E. Engineering Division Manager
File Copies: 1. _____ 2. _____	YES <input type="checkbox"/> GIS Posted (Pending Floodplain Only)      Date: _____ N/A

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January 2012



Expires 3/31/2014

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# NATIONAL FLOOD INSURANCE PROGRAM

FEMA PRODUCTION AND TECHNICAL SERVICES CONTRACTOR

November 30, 2011

Mr. John Hathaway, P.E., CFM  
Project Manager  
Flood Control District of Maricopa County  
2801 West Durango Street  
Phoenix, AZ 85009

IN REPLY REFER TO:  
Case No.: 12-09-0405P  
Community: Maricopa County, AZ  
Community No.: 040037

316-AD

Dear Mr. Hathaway:

This responds to your request dated November 8, 2011, that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. Pertinent information about the request is listed below.

Identifier:	Kozlowski Floodprone Properties Assistance
Flooding Source:	Wash T4N-R3W-S08W
FIRM Panel(s) Affected:	04013C1105H

The data required to complete our review, which must be submitted within 90 days of the date of this letter, are listed on the enclosed summary.

If we do not receive the required data within 90 days, we will suspend our processing of your request. Any data submitted after 90 days will be treated as an original submittal and will be subject to all submittal/payment procedures, including the flat review and processing fee for requests of this type established by the current fee schedule. A copy of the notice summarizing the current fee schedule, which was published in the *Federal Register*, is available on the FEMA website at [http://www.fema.gov/plan/prevent/fhm/frm\\_fees.shtm](http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm) for your information.

FEMA receives a very large volume of requests and cannot maintain inactive requests for an indefinite period of time. Therefore, we are unable to grant extensions for the submission of required data/fee for revision requests. If a requester is informed by letter that additional data are required to complete our review of a request, the data/fee **must** be submitted within 90 days of the date of the letter. Any fees already paid will be forfeited for any request for which the requested data are not received within 90 days.

---

LOMC Clearinghouse, 7390 Coca Cola Drive, Suite 204, Hanover, MD 21076 PH: 1-877-FEMA MAP

BakerAECOM, under contract with the FEDERAL EMERGENCY MANAGEMENT AGENCY, is a  
Production and Technical Services Contractor for the National Flood Insurance Program

If you have general questions about your request, FEMA policy, or the National Flood Insurance Program, please call the FEMA Map Information eXchange (FMIX), toll free, at 1-877-FEMA MAP (1-877-336-2627). If you have specific questions concerning your request, please contact your case reviewer, Mr. James Lindsay, by e-mail at [JGLindsay@mbakercorp.com](mailto:JGLindsay@mbakercorp.com) or by telephone at 720-514-1122, or the Revisions Coordinator for your request, Mrs. Jaclyn Bloor, CFM, at [jbloor@mbakercorp.com](mailto:jbloor@mbakercorp.com) or at (720) 479-3160.

Sincerely,



Syed Qayum, CFM  
LOMR Technical Manager  
BakerAECOM

Enclosures

cc: Mr. Timothy S. Phillips, P.E.  
Chief Engineer and General Manager  
Flood Control District of Maricopa County

Mr. Brian Wahlin, Ph.D., P.E., D. WRE  
Project Engineer  
WEST Consultants, Inc.



**NATIONAL FLOOD INSURANCE PROGRAM**  
FEMA PRODUCTION AND TECHNICAL SERVICES CONTRACTOR

Summary of Additional Data Required to Support a  
Letter of Map Revision (LOMR)

Case No.: 12-09-0405P

Requester: Mr. John Hathaway, P.E., CFM

Community: Maricopa County, AZ

Community No.: 040037

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

1. Please remove the known water surface elevation boundary condition at the upstream end of Wash T4N-R3W-S08W in the existing conditions HEC-RAS hydraulic model.
2. The existing conditions HEC-RAS hydraulic model output shows a negative surcharge at Cross Section 2.476 of -0.01. Please revise the floodway analysis to eliminate all negative surcharges, or explain why this is not necessary.
3. An ineffective flow area is defined as the area of a cross section that will contain water that is not actively being conveyed. It is used to describe portions of a cross section in which water will pond, but the velocity in the downstream direction is close to zero. Our review of the submitted existing conditions model revealed that the levee option was used at Cross Section 1.604 along the revised reach of the Wash T4N-R3W-S08W to model the ineffective flow areas. However, the use of the ineffective flow area option may be more appropriate. Please provide documentation to support using the levee option, or make the appropriate changes.
4. The base (1-percent-annual-chance) floodplain top widths shown in the existing conditions HEC-RAS hydraulic analysis at cross sections 1.604, 1.803, 1.891, and 2.476 do not match the approximate base floodplain top widths shown on the submitted topographic work map entitled, "Wash T4N-R3W-S08W Kozlowski Floodprone Properties Assistance Program," prepared by WEST Consultants, Inc., dated September 2011. Please provide an explanation for these discrepancies, or make the appropriate changes.
5. The floodway top width shown in the existing conditions HEC-RAS hydraulic analysis at Cross Sections 2.476 does not match the approximate floodway top width shown on the above referenced topographic work map. Please provide an explanation for these discrepancies, or make the appropriate changes.

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

---

*LOMC Clearinghouse, 7390 Coca Cola Drive, Suite 204, Hanover, MD 21076 PH: 1-877-FEMA MAP*



## KOZLOWSKI FPAP LOMR

### TECHNICAL MEMORANDUM

Date: January 4, 2012  
To: Syed Qayum, LOMR Technical manager – BakerAECOM  
From: Brian Wahlin, Project Manager – WEST Consultants, Inc.  
Riley Asburry – WEST Consultants, Inc.  
Re: Response to Comments for the Kozlowski FPAP

#### RESPONSE TO COMMENTS FOR THE KOZLOWSKI FPAP NOVEMBER 8, 2011

Below are the responses to the review of the Kozlowski FPAP submitted November 30, 2011.

##### Case No.: 12-09-0405P

1. Please remove the known water surface elevation boundary condition at the upstream end of Wash T4N-R3W-S08W in the existing conditions HEC-RAS hydraulic model.  
**WEST Response: Known water surface elevation boundary condition has been removed from the existing conditions model.**
2. The existing conditions HEC-RAS hydraulic model output shows a negative surcharge at Cross Section 2.476 of -0.01. Please revise the floodway analysis to eliminate all negative surcharges, or explain why this is not necessary.  
**WEST Response: Negative surcharge has been removed. See response to comment 5 below.**
3. An ineffective flow area is defined as the area of a cross section that will contain water that is not actively being conveyed. It is used to describe portions of a cross section in which water will pond, but the velocity in the downstream direction is close to zero. Our review of the submitted existing conditions model revealed that the levee option was used at Cross Section 1.604 along the revised reach of the Wash T4N-R3W-S08W to model the ineffective flow areas. However, the use of the ineffective flow area option may be more appropriate. Please provide documentation to support using the levee option, or make the appropriate changes.  
**WEST Response: The levee option has been removed from this cross section and has been replaced with an ineffective flow area option.**
4. The base (1-percent-annual-chance) floodplain top widths shown in the existing conditions HEC-RAS hydraulic analysis at cross sections 1.604, 1.803, 1.891, and 2.476 do not match the approximate base floodplain top widths shown on the submitted topographic work map

entitled, "Wash T4N-R3w-S08W Kozlowski Floodprone Properties Assistance Program," prepared by WEST Consultants, Inc., dated September 2011. Please provide an explanation for these discrepancies, or make the appropriate changes.

**WEST Response:** The approximate base floodplain top width have been adjusted on the workmaps to more closely match the approximate base floodplain top widths shown in the hydraulic analysis.

5. The floodway top width shown in the existing conditions HEC-RAS hydraulic analysis at Cross Sections 2.476 does not match the approximate floodway top width shown on the above referenced topographic work map. Please provide an explanation for these discrepancies, or make the appropriate changes.

**WEST Response:** The floodway encroachment stations were accidentally deleted from this cross section in the HEC-RAS model prior to our previous submittal. This resulted in a negative surcharge at this cross section (see comment 2) and a discrepancy between the HEC-RAS model and the work map. The encroachment stations have been re-entered and the discrepancy and negative surcharge have been resolved.

## 1. Introduction

WEST Consultants Inc. (WEST) was retained by the Flood Control District of Maricopa County (District) to prepare a Letter of Map Revision (LOMR) on Wash T4N-R3W-S08W near the Kozlowski residence (parcel number APN 503-32-394A) in northeastern Maricopa County. This work was performed under Work Assignment Number 7 of Contract Number FCD 2010C027. The WEST project number was FCDM001007. The District project manager was Mr. John Hathaway, P.E. The WEST project manager was Dr. Brian Wahlin, P.E., D.WRE. Additionally, Mr. Chuck Davis, P.E., CFM, and Mr. Cameron Jenkins assisted with data collection and hydraulic modeling. This Technical Data Notebook (TDN) was assembled by Mr. Riley Asbury, P.E., CFM. Quality assurance was provided by Mr. David S. Smith, P.E., CFM, D.WRE.

The Kozlowski residence is located in the Wittmann, AZ area near Wash T4N-R3W-S08W just south of Patton Road (see Figure 1). This wash was studied and delineated as part of the Wittmann Phase 2 Zone AE Floodplain Delineation Study (DEA, 2006). However, the floodplains and floodways developed in the Wittmann Phase 2 study (DEA, 2006) have not been formally adopted by FEMA at the time of this report. Thus, there is no effective hydraulic model, hydrologic model, or floodplain delineation for Wash T4N-R3W-S08W. For clarification purposes, the pending Wittmann Phase 2 Zone AE Floodplain Delineation Study (DEA, 2006) will be referred to as the “pending effective” study in this report.

During the construction of the Kozlowski residence, which occurred prior to the pending effective floodplain delineation but after the development of the pending effective topography, Wash T4N-R3W-S08W was re-graded to flow around the newly constructed houses in the area. Thus, the pending effective floodplain and floodway developed for Wash T4N-R3W-S08W in the Wittmann Phase 2 study (DEA, 2006) does not reflect this new channel alignment. As a result, the Kozlowski residence will be located in the middle of a regulatory floodway (see Figure 2 below) once the floodplains become effective. The Kozlowski family has applied to the Floodprone Properties Assistance Program (FPAP) in an effort to have their house removed from the pending regulatory floodway. The purpose of this work assignment is to modify the hydraulic models developed in the Wittmann Phase 2 study (DEA, 2006) and to update the pending floodplain and floodway of Wash T4N-R3W-S08W near the Kozlowski residence.

The updated HEC-RAS model used newly flown (2010 flight date) 1-foot topography as well as the existing 2-foot topography that was used in the Wittmann Phase 2 study (DEA, 2006). A previous 2-dimensional study of Wash T4N-R3W-S08W indicated the actual flow path does flow around the Kozlowski residence since the re-grading of the wash (WEST, 2011). Thus, the pending effective HEC-RAS model from the Wittmann Phase 2 study (DEA, 2006) was modified to reflect updated topography. In addition, the pending effective steady-state hydrology from the Wittmann Phase 2 study (DEA, 2006) was used.

The results of this study indicate that the floodplain and floodway follow the wash, effectively removing the Kozlowski residence from the pending regulatory floodway.

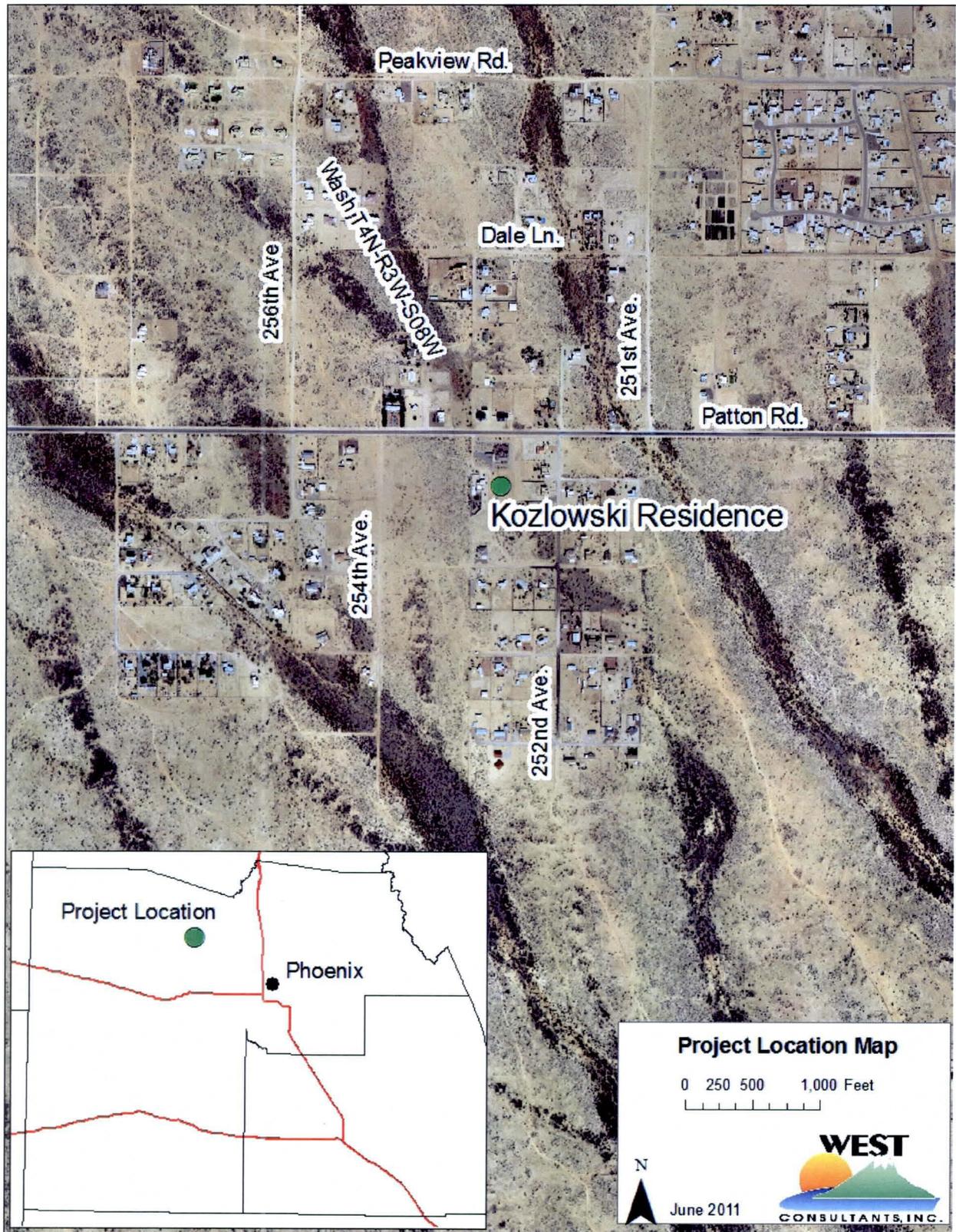


Figure 1. Project location map.



Figure 2. Pending regulatory FEMA floodplain (Zone AE) and floodway (Zone FW) for Wash T4N-R3W-S08W and existing flow path in relation to the Kozlowski residence.

## **2. ADWR/FEMA Forms**

### **2.1. Study Documentation Abstract for FEMA Submittals**

Information related to Sections 2.1.1 through 2.1.10 of the Arizona Department of Water Resources' State Standard Attachment SSA1-97 (ADWR 1997) is included with the necessary FEMA forms.

### **2.2. FEMA Forms**

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

<b>Study Documentation Abstract for FEMA Submittals</b>	<b>Initial Study</b>	<b>Restudy</b>	<b>CLOMR</b>	<b>LOMR</b>	<b>X</b>	<b>Other</b>
-----------------------------------------------------------------	--------------------------	----------------	--------------	-------------	----------	--------------

**Section 2.1: Study Documentation Abstract for FEMA Submittals**

2.1.1	Date Study Accepted	
2.1.2	Study Contractor Contact(s) Address Phone Internal Reference Number	WEST Consultants, Inc. Brian Wahlin, Ph.D, P.E., D.WRE 8950 S. 52 <sup>nd</sup> Street, Suite 210 Tempe, Arizona 85284 (480) 345-2155 FCDM001001
2.1.3	FEMA Technical Review Contractor Contact(s) Address Phone Internal Reference Number	
2.1.4	FEMA Regional Reviewer Phone	
2.1.5	State Technical Reviewer Phone	Arizona Department of Water Resources (602) 417-2400
2.1.6	Local Technical Reviewer Phone	John Hathaway, P.E., Flood Control District of Maricopa County (DISTRICT) (602) 506-0503
2.1.7	Reach Description	Wash T4N-R3W-S08W
2.1.8	USGS Quad Sheet(s) with original photo date & latest photo revision date	
2.1.9	Unique Conditions and Problems	
2.1.10	Coordination of Q's Discharges  (Agency, Date, Comments)	

**PAPERWORK BURDEN DISCLOSURE NOTICE**

Public reporting burden for this form is estimated to average 1 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless it displays a valid OMB control number. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington, VA 20958-3005, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

**PRIVACY ACT STATEMENT**

**AUTHORITY:** The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

**PRINCIPAL PURPOSE(S):** This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

**ROUTINE USE(S):** The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

**DISCLOSURE:** The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

**A. REQUESTED RESPONSE FROM DHS-FEMA**

This request is for a: (check one)

- CLOMR: A letter from DHS-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 DHS-FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway, or flood elevations. (See 44 CFR Ch. 1, Parts 60, 65 & 72).

**B. OVERVIEW**

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

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Ex: 480301 480287	City of Katy Harris County	TX TX	48473C 48201C	0005D 0220G	02/08/83 09/28/90
040037	Maricopa County, Arizona (and Incorporated Areas)	AZ	04013C	1105H	09/30/05

2. a. Flooding Source: Wash T4N-R3W-S08W  
 Riverine     Coastal     Shallow Flooding (e.g., Zones AO and AH)
- b. Types of Flooding:  Alluvial fan     Lakes     Other (Attach Description)
3. Project Name/Identifier: Kozlowski Floodprone Properties Assistance Program LOMR
4. FEMA Zone designations affected: X (Choices A, AH, AO, A1-A30, A99, AE, AR, V, V1-V30, VE, B, C, D, X)
5. Basis for Request and Type of Revision: New topography

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

- Physical Change     
  Improved Methodology/Data     
  Regulatory Floodway Revision     
  Base Map Changes  
 Coastal Analysis     
  Hydraulic Analysis     
  Hydrologic Analysis     
  Corrections  
 Weir-Dam Changes     
  Levee Certification     
  Alluvial Fan Analysis     
  Natural Changes  
 New Topographic Data     
  Other (attach Description)

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

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

- Structures:     
 Channelization     
 Levee/Floodwall     
 Bridge/Culvert  
 Dam     
 Fill     
 Other (Attach Description)

6.  Documentation of ESA compliance is submitted (required to initiate CLOMR review). Please refer to the instructions for more information

**C. REVIEW FEE**

Has the review fee for the appropriate request category been included?     
 Yes, Fee Amount: \$ \_\_\_\_\_  
 No, Attach Explanation

Please see the DHS-FEMA website at [http://fema.gov/plan/prevent/fhm/frm\\_fees.shtml](http://fema.gov/plan/prevent/fhm/frm_fees.shtml) for Fee Amounts and Exemptions.

**D. SIGNATURE**

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

Name John Hathaway, P.E.		Company Flood Control District of Maricopa County	
Mailing Address 2801 W. Durango Street Phoenix, AZ 85009		Daytime Telephone No. 602-506-0503	FAX No.
		EMAIL ADDRESS joh@mail.maricopa.gov	
Signature of Requester (Required)			Date 1/20/2011

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirement for when fill is placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. For conditional LOMR request, the applicant has documented Endangered Species Act (ESA) compliance to DHS/FEMA prior to DHS/FEMA's review of the Conditional LOMR application. For LOMR request, I acknowledge that compliance with sections 9 and 10 of the ESA has been achieved independently of DHS/FEMA's process. For actions authorized, funded, or being carried out by Federal or State agencies, documentation from the agency showing its compliance with Section 7(a)(2) of the ESA will be submitted. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44 CFR 65.2(c), and that we have available upon request by DHS/FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title Timothy S. Phillips, PE, Chief Engineer and General Manager		Community Name Maricopa County	
Mailing Address 2801 W. Durango Street Phoenix, AZ 85009		Daytime Telephone No. 602-506-4701	FAX No.
		EMAIL ADDRESS	
Community Official's signature (required)			Date 1/18/11

**CERTIFICATION BY REGISTRATION PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR**

This certification is to be signed and sealed by a licensed land surveyor, registered professional engineer, or architect authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.2(b) and as described in the MT-2 Forms instruction. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name Brian Wahlin, Ph.D., P.E., D.WRE		License No. 41980	Expiration Date 3/31/2014
Company Name WEST Consultants, Inc.		Telephone No. 480-345-2155	Fax No. 480-345-2156
Signature 	E-mail Address bwahlin@westconsultants.com	Date 9/29/11	

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

**Form name and (Number)**

**Required if....**

- |                                                                                   |                                                                                                                           |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> Riverine Hydrology & Hydraulics Form (Form 2) | New or revised discharges or water-surface elevations                                                                     |
| <input type="checkbox"/> Riverine Structures Form (Form 3)                        | Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam |
| <input type="checkbox"/> Coastal Analysis Form (Form 4)                           | New or revised coastal elevations                                                                                         |
| <input type="checkbox"/> Coastal Structures Form (Form 5)                         | Addition/revision of coastal structure                                                                                    |
| <input type="checkbox"/> Alluvial Fan Flooding Form (Form 6)                      | Flood control measures on alluvial fans                                                                                   |



**PAPERWORK BURDEN DISCLOSURE NOTICE**

Public reporting burden for this form is estimated to average 3.5 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington VA 20958-3005, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

**PRIVACY ACT STATEMENT**

**AUTHORITY:** The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

**PRINCIPAL PURPOSE(S):** This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

**ROUTINE USE(S):** The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

**DISCLOSURE:** The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a NFIP Flood Insurance Rate Maps (FIRM).

Flooding Source: Wash T4N-R3W-S08W

Note: Fill out one form for each flooding source studied.

**A. HYDROLOGY**

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

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

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

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

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

- Statistical Analysis of Gage Records     Precipitation/runoff Model    Specify Model \_\_\_\_\_  
 Regional Regression Equations     Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters), and documentation to support the new analysis.

4. Review/Approval of Analysis.

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

5. Impacts of Sediment Transport on Hydrology

Is the hydrology for the revised flooding source(s) affected by sediment transport?     Yes     No

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

B. HYDRAULICS

1. Reach to be Revised

Water-Surface Elevations (ft.)

	Description	Cross Section	Effective	Proposed/Revised
Downstream Limit	Wash T4N-R3W-S08W	1.408	N/A	1625.0
Upstream Limit	Wash T4N-R3W-S08W	2.573	N/A	1661.1

\* Proposed/Revised elevations must tie-into the Effective elevations within 0.5 foot at the downstream and upstream limits of revision.

2. Hydraulic Method/Model Used HEC-RAS

3. Pre-Submittal Review of Hydraulic Models

DHS/FEMA has developed two review programs, CHECK-2 and CHECK-RAS to aid in the review of HEC-2 and HEC-RAS hydraulic models, respectively. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS.

4. Models Submitted

	Natural Run		Floodway Run		Datum
Duplicate Effective Model*	File Name <u>T4N-R3W-S08W</u>	Plan Name <u>Duplicate Effective</u>	File Name <u>T4N-R3W-S</u>	Plan Name <u>Duplicate Effec</u>	
Corrective Effective Model*	File Name <u>T4N-R3W-S08W</u>	Plan Name <u>Corrected Effective</u>	File Name <u>T4N-R3W-S</u>	Plan Name <u>Corrected Effec</u>	
Existing or Pre-Project Conditions Model	File Name <u>T4N-R3W-S08W</u>	Plan Name <u>Existing Conditions</u>	File Name <u>T4N-R3W-S</u>	Plan Name <u>Existing Condi</u>	
Revised or Post-Project Conditions Model	File Name _____	Plan Name _____	File Name _____	Plan Name _____	
Other - (attach description)	File Name _____	Plan Name _____	File Name _____	Plan Name _____	

\* For details, refer to the corresponding section of the instructions.

Digital Models Submitted? (Required)

C. MAPPING REQUIREMENTS

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

Digital Mapping (GIS/CADD) Data Submitted

Topographic Information 1-foot topography with a map scale of 1" = 40', datum is NAVD 1988

Source Flood Control District of Maricopa County via Cooper Aerial Date 5/24/2010

Accuracy 1-foot

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

Annotated FIRM and/or FBFM (Required)

1. For LOMR/CLOMR Requests, do Base Flood Elevations (BFEs) Increase?  Yes  No

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

- The proposed project encroaches upon a regulatory floodway and would result in increases above 0.00 foot compared to pre-project conditions.
- The proposed project encroaches upon a SFHA with or without BFEs established and would result in increases above 1.00 foot compared to pre-project conditions.

b. Does this LOMR cause increase in the BFE and/or SFHA compared with the effective BFEs and/or SFHA?  Yes  No

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

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

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

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

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

4. For CLOMR requests, please submit documentation to FEMA and the community to show that you have complied with Sections 9 and 10 of the Endangered Species Act (ESA).

For actions authorized, funded, or being carried out by Federal or State agencies, please submit documentation from the agency showing its compliance with Section 7(a)(2) of the ESA. Please see MT-2-Instructions for more detail.

\* Not inclusive of all applicable regulatory requirements. For details, see 44 CFR parts 60 and 65.

### 3. Survey and Mapping Information

#### 3.1. Field Survey Information

1-foot and two-foot contour interval digital topographic data (NAVD 88 datum) for the site were obtained from the District (Figure 3). The combined data were used to create a five-foot raster within the ArcView Geographic Information System (GIS) program. A digital copy of this raster has been included on the data disk submitted with this TDN. A detailed field reconnaissance of the study area was conducted by Dr. Brian Wahlin (WEST), Mr. Chuck Davis (WEST), and Mr. John Hathaway (District) on February 23, 2011, to document field conditions and estimate model parameters. For the hydraulic modeling effort, floodplain roughness values were estimated and expected flow characteristics were observed.

#### 3.2. Mapping

Detailed aerial mapping and topographic mapping were performed by Cooper Aerial for the District, contract number FCD 2007C038-11. The mapping was performed on May 24, 2010 and the data were compiled by digital stereo methods using aerial photography. The topography was produced according to procedures that comply with national standards for spatial data accuracy (MSSDA) for a contour interval of 1-foot and a map scale of 1" = 40'. The new detailed topography was generated in a small area near the Kozlowski residence as indicated by the blue contour lines in Figure 3. The vertical datum used for this mapping is NAVD 1988.

The topography outside this area was generated by Stewart Geo Technologies (contract number FCD 01-21) for the District as part of the Wittmann Area Drainage Master Study. Flight dates were April 18, 2002, April 19, 2002 and April 23, 2002 at 1:7200 ratio and April 23, 2002 at 1:14400 ratio. The topography in this area consists of 2-foot contour-intervals as indicated by the yellow contour lines in Figure 3. The vertical datum used for this mapping is NAVD 1988, and the horizontal datum is Stateplane NAD83, Arizona Central, International Feet. The mapping was previously approved by the District as meeting FEMA mapping accuracy standards.

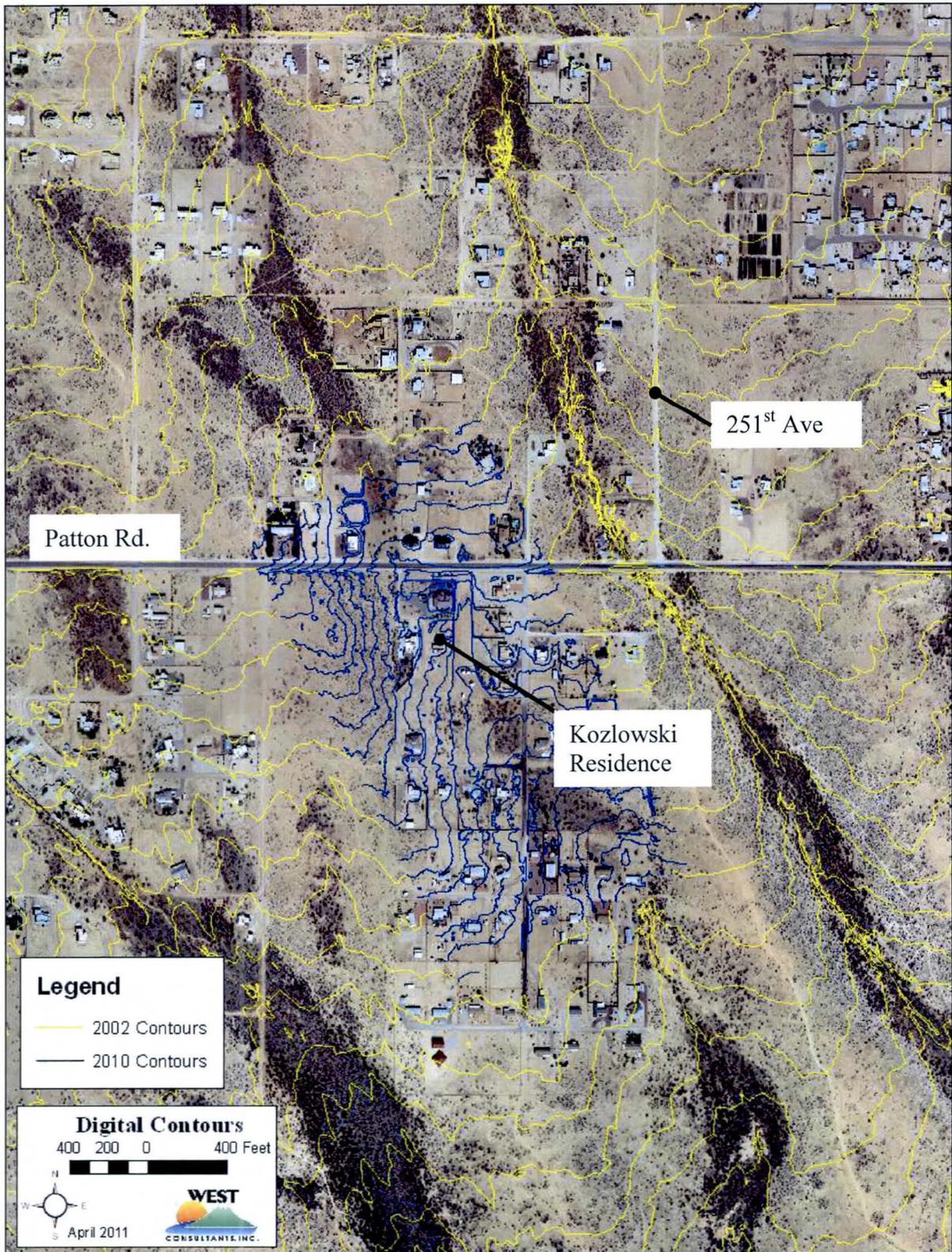


Figure 3. 1-foot and 2-foot contours.

## 4. Hydrology

No new hydrology was developed for this study. The pending effective hydrology developed as part of the floodplain delineation study completed by DEA (2006) as part of the Wittmann Phase 2 study (contract number FCD2004C066, FEMA Case Number 07-09-1887P) was used for this LOMR. Table 1 summarizes the flow data used.

Table 1. Summary of discharges for Wash T4N-R3W-S08W.

River	Cross-Section	100-Year Flow (cfs)
T4N-R3W-S08W	2.573	880
T4N-R3W-S08W	2.375	910
T4N-R3W-S08W	1.803	950

## 5. Hydraulics

### 5.1. Method Description

Two hydraulic models are included in this report: the pending effective model and the existing conditions model. Note that the existing conditions model was truncated to include only the study area near the Kozlowski residence. The existing conditions model contains three plans: the duplicate effective plan, the corrected effective plan, and the existing conditions plan. The pending effective model and plan is also included on the data disk and is titled "Original Model". The request for a LOMR through this study is based upon the existing conditions model and plan. This model and plan integrates the topographical changes and development that have occurred since the pending effective model and plan were created, and was run using the most current version of HEC-RAS.

#### 5.1.1. Pending Effective Model and Plan

The pending effective model and plan was created by DEA in 2006 for the Wittmann Phase 2 Zone AE Floodplain Delineation Study, Contract FCD2004C066 (DEA, 2006). The pending effective model and plan was created in HEC-RAS v. 3.1.3.

#### 5.1.2. Duplicate Pending Effective Plan (Part of the Existing Conditions Model)

The pending effective model and plan was run by WEST in the latest version of HEC-RAS (v. 4.1) to generate the duplicate effective plan. This plan is located in the existing conditions model. No changes were made to the model parameters.

#### 5.1.3. Corrected Pending Effective Plan (Part of the Existing Conditions Model)

WEST modified the duplicate pending effective HEC-RAS plan to include the updated 2010 topography that more accurately depicts the channelization in the vicinity of the Kozlowski residence. In addition, WEST added cross-sections to the corrected pending effective plan to better map the flow path of Wash T4N-R3W-S08W around the Kozlowski residence. Specifically, two cross-sections were added to the model just downstream of cross-section 2.573 and one more cross-section was added just

upstream of cross-section 1.987 in order to more accurately represent the new diversion channel. The flow path in the plan was adjusted to flow around the Kozlowski residence. This flow path modification slightly changed the river station from the pending effective model and plan.

#### 5.1.4. Existing Conditions Plan (Part of the Existing Conditions Model)

For the existing conditions plan, various houses were added to the HEC-RAS geometry using the blocked obstructions option. The pending effective model and plan already had many houses in the area modeled as blocked obstructions, so the same methodology was continued and new blocked obstructions were added to account for recent construction. The existing conditions plan was also truncated from the pending effective model to include only the region affected by the diversion channel. The upstream and downstream boundary conditions and flow data are all based the parameters at those locations in the pending effective model

## 5.2. Work Study Maps

The revised 100-year floodplain boundary is shown on the work study maps as a heavy solid line. The floodway boundary is shown as heavy dashed line. The thalweg (hydraulic baseline) of the channel is shown as a center line. Each cross-section is geo-referenced and labeled with final computed floodplain and floodway water surface elevations, and discharges. The 100-year FIRM panel floodplain limits are shown in the annotated FIRM maps included in the Exhibit Maps section.

## 5.3. Parameter Estimation

### 5.3.1. Roughness Coefficients

Estimation of the Manning's  $n$ -values for the Wash T4N-R3W-S08W was based on the pending effective FEMA model, field observations, District comments, and engineering judgment. The area of focus near the Kozlowski residence is between cross-section 2.573 and 1.987 in the pending effective model. In the corrected pending effective model, two cross-sections were added to the model downstream of cross-section 2.573 and one more cross-section was added just upstream of cross-section 1.987 in order to more accurately represent the correct channel alignment.

Manning's  $n$ -values for the main channel in this region of the pending effective model are approximately 0.04 to 0.047, which does not seem appropriate now due to recent changes in the channel. The most recent imagery and field visits in this area show less established vegetation in the channel than when the pending effective model was developed. Therefore, the channel Manning's  $n$ -values of 0.033 were used for the new cross-sections and surrounding area to account for the clear channel conditions. The channel bend in the vicinity of the Kozlowski residence was modeled with increased Manning's  $n$ -value based on a meander factor of 1.3 to represent a severe meander (Chow, 1959). Table 2 shows a comparison of the resulting Manning's  $n$ -values for this area in the pending effective and existing conditions models with the highlighted cells representing a change in Manning's  $n$ -value. Examples of project site roughness are shown in Figure 4 to Figure 6.

Table 2. Manning's  $n$ -values for Pending Effective and Existing Conditions models.

Pending Effective Model				Existing Conditions Model			
Cross-Section	Manning's $n$ -Value			Cross-Section	Manning's $n$ -Value		
	Left Overbank	Channel	Right Overbank		Left Overbank	Channel	Right Overbank
2.573	0.033	0.047	0.033	2.573	0.033	0.047	0.033
				2.552	0.033	0.033	0.033
				2.519	0.033	0.033	0.033
2.476	0.033	0.047	0.033	2.476	0.043*	0.043*	0.043*
2.375	0.033	0.04	0.04	2.375	0.043*	0.043*	0.043*
2.277	0.033	0.04	0.04	2.277	0.033	0.043*	0.033
2.181	0.033	0.042	0.033	2.181	0.033	0.043*	0.033
2.082	0.033	0.042	0.033	2.082	0.033	0.033	0.033
				2.044	0.033	0.033	0.033
1.987	0.033	0.042	0.033	1.987	0.033	0.042	0.033

\* Note that Manning's  $n$ -values are increased from the base value of 0.033 to account for the severe meander in this area.



Figure 4. Channelized portion and overbanks of Wash T4N-R3W-S08W ( $n = 0.033$ ).



Figure 5. Example of higher roughness north of Patton Road ( $n = 0.047$ ).



Figure 6. Channelized portion of Wash T4N-R3W-S08W ( $n = 0.033$ ).

## 5.4. Cross-Section Description

In the pending effective model, cross-sections were spaced at approximately 500-foot intervals, except where a more detailed analysis was required, and oriented to be perpendicular to the 100-year flow. Three cross-sections were added to the corrected pending effective model and others were modified to more accurately represent the existing terrain. Added cross-sections include 2.044 near the downstream end of the 2010 topography and cross-sections 2.519 and 2.552 near the upstream end of the topography. Bank stations for the new cross-sections were selected in a similar fashion as the pending effective model.

The existing conditions model was tied into the pending effective model at cross section 2.573 at the upstream end and cross section 1.408 at the downstream end. Table 3 summarizes the tie-in water surface elevation (WSE) information.

Table 3. Tie-in information.

	WSE at 2.573	WSE at 1.408
Pending Effective	1660.9 ft.	1625.0 ft.
Existing Conditions	1661.1 ft.	1625.0 ft.

## 5.5. Modeling Considerations

### 5.5.1. Hydraulic Jump and Drop Analysis

No hydraulic jumps or channel drops are modeled within the study area.

### 5.5.2. Bridges and Culverts

No bridges or culverts were modeled within the study area.

### 5.5.3. Levees and Dikes

No levees or dikes were modeled within the study area.

### 5.5.4. Islands and Flow Splits

There were no islands or flow splits identified on Wash T4N-R3W-S08W.

### 5.5.5. Ineffective Flow Areas

There were no modeled ineffective flow areas in the pending effective model. However, blocked obstructions were added to represent residential homes. Manning's *n*-values were not adjusted to account for the houses. Only the houses in or near the floodplain were accounted for and some houses were projected to the nearest cross-section. In the existing conditions model, additional blocked obstructions were added to account for recent home construction in the vicinity of the channel based on aerial photography.

#### 5.5.6. Supercritical Flow

There were no instances of supercritical flow in the model.

### 5.6. Floodway Modeling

The initial floodway encroachments were set using Method 4 in HEC-RAS, a maximum target of 1.0 foot was set along with equal conveyance. Adjustments were made as necessary to keep the surcharges between 0 and 1.0 foot and to provide smoother transitions along the floodway. Once the adjustments were completed, the Method 4 encroachments were converted to Method 1 and the floodway was mapped from the Method 1 encroachment values. This new encroachment analysis now reflects the modified channel near the Kozlowski residence. Table 6 presents the results of the floodway analysis.

### 5.7. Problems Encountered During the Study

#### 5.7.1. Special Problems and Solutions

The floodplain mapping for the study area is still pending approval based on the Wittmann Phase 2 Zone AE Floodplain Delineation Study (DEA, 2006), FEMA Case Number 07-09-1887P. Therefore, modifications to the floodplain and floodway lines are based on pending hydraulic and hydrologic models.

The proposed floodway near the Kozlowski residence has two 90° bends, which is not typical of floodways. To overcome this issue, the Manning's roughness values were increased in the area of the bends based on a meander factor of 1.3 to represent a severe meander (Chow, 1959).

At some cross-sections no geometry points existed where the bank lines needed to be, so geometry points were interpolated to add the bank points.

#### 5.7.2. Modeling Warning and Error Messages

HEC-RAS generated several warning messages along the study reach. In many places HEC-RAS reported that "the energy loss was greater than 1.0 ft between this cross-section and the previous cross-section. This may indicate the need for additional cross-sections." The cross-sectional spacing is adequate for this model and no additional cross-sections need to be added.

Another common warning reported that "the conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross-sections." The cross-sectional spacing is adequate for this model and no additional cross-sections need to be added.

#### 5.7.3. CHECK-RAS

A CHECK-RAS (2005) run was successfully completed. The output from the CHECK-RAS run can be found in Appendix E.5. Warnings from CHECK-RAS which apply to the modified region include:

- *Overbank n-values on some cross-sections are less than 0.035.* Based on field observations, the *n*-values less than 0.035 appear to be reasonable.
- *Overbank n-values on some cross-sections are the same as the channel n-values.* Based on field observations, the overbanks and channel sections have similar *n*-values.
- *Channel bank stations at several cross-sections may not be at right location.* Bank stations near the Kozlowski residence were verified during the field visit.

## 5.8. Calibration

Calibration of the hydraulic model was beyond the scope of this analysis.

## 5.9. Final Results

### 5.9.1. Hydraulic Analysis Results

A summary table of the existing conditions hydraulic results for Wash T4N-R3W-S08W is presented for the 100-year profile in Table 4. This table summarizes the following variables by cross-section: peak discharge, water surface elevation, critical water surface elevation, average channel velocity, top width, hydraulic depth, Froude number, and stations for left and right edges of water surface. The hydraulics results are also shown in Appendix E.5.

### 5.9.2. Verification of Results

The results generated by the hydraulic model are reasonable and expected.

## 6. Erosion and Sediment Transport

Erosion and sediment transport were not considered significant in the study reach.

Table 4. 100-year HEC-RAS output.

River Sta	Q Total	W.S. Elev	Crit W.S.	Vel Chnl	Top Width	Hydr Depth	Froude # Chl	Sta W.S. Lft	Sta W.S. Rgt
2.573	880	1661.09	1660.67	2.37	470.52	0.82	0.38	9744.48	10315.00
2.552	880	1659.15	1659.13	4.14	522.63	0.48	0.77	351.44	977.40
2.519	880	1657.85	1657.61	3.35	371.95	0.79	0.60	166.10	598.05
2.476	880	1656.58	1656.28	3.39	445.95	0.77	0.49	9548.86	10169.81
2.375	910	1653.81	1652.98	4.09	147.15	1.60	0.48	9762.85	9910.00
2.277	910	1651.47	1650.94	2.83	379.95	0.93	0.41	9721.76	10231.71
2.181	910	1648.14	1647.91	3.90	279.92	0.83	0.65	9740.00	10169.92
2.082	910	1645.34	1644.86	3.15	340.86	0.96	0.48	9672.55	10113.41
2.044	910	1644.13	1643.97	4.72	354.76	0.66	0.77	310.75	745.51
1.987	910	1642.39	1641.84	3.29	344.42	0.92	0.45	9774.38	10118.80
1.891	910	1639.44	1639.22	3.80	326.06	0.85	0.59	9827.45	10153.51
1.803	950	1636.70	1636.34	2.30	584.10	0.77	0.39	9755.08	10339.18
1.698	950	1634.02	1633.70	3.49	351.92	0.86	0.56	9842.97	10194.90
1.604	950	1631.20	1630.85	3.87	275.76	0.99	0.56	9859.18	10134.94
1.506	950	1628.19	1627.87	3.07	490.47	0.76	0.47	9740.03	10230.50
1.408	950	1625.00	1624.67	2.98	425.42	0.82	0.49	9795.52	10220.94

## 7. Draft FIS Report Data

### 7.1. Summary of Discharges

Table 5 summarizes the flows used in the HEC-RAS model for Wash T4N-R3W-S08W.

Table 5. Summary of discharges.

River	Cross-Section	100-year flow (cfs)
T4N-R3W-S08W	2.573	880
T4N-R3W-S08W	2.375	910
T4N-R3W-S08W	1.803	950

### 7.2. Floodway Data

The revised floodway data for Wash T4N-R3W-S08W are listed in Table 6. The table summarizes the following variables for the floodway for each cross-section present in the pending effective model: width, section area, and mean velocity. The table also lists the base flood water surface elevations for floodway and floodplain and the corresponding water surface elevation increase. The cross-sections highlighted in blue at the bottom of the table are the cross-sections affected by this study. It should be noted that the water surface elevations at the

beginning and end of the affected region tie in exactly with the pending effective model. A summary of the revised floodway data is also presented in Appendix E.5.

### 7.3. Annotated Flood Insurance Rate Maps

Copies of draft annotated Flood Insurance Rate Maps are included in the Exhibit Maps section following the Appendices. Two different versions of the annotated FIRM panel have been provided. The first is an annotated effective FIRM panel. This annotated FIRM panel shows that there are no effective studies in the area. The second annotated FIRM is an annotated version of the annotated FIRM from the pending study (DEA, 2006). This annotated version of the annotated FIRM shows that the updated portion does tie in at the upstream and downstream limits of the study. Based on the pending Flood Insurance Rate Map (DEA, 2006) it has been verified that no new structures were affected by the changes in water surface due to the channelization of flow.

### 7.4. Flood Profiles

A revised flood profile is included in the Exhibit Maps section following the Appendices.

Table 6. Revised floodway data for Wash T4N-R3W-S08W.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
T4N-R3W-S08W								
0.057	0.057	49	161	6.4	1,575.7	1,575.7	1,576.2	0.5
0.156	0.156	44	140	7.3	1,580.2	1,580.2	1,580.7	0.5
0.243	0.243	70	185	5.6	1,584.9	1,584.9	1,585.2	0.3
0.330	0.330	114	214	4.8	1,588.7	1,588.7	1,588.9	0.2
0.417	0.417	90	196	5.3	1,592.2	1,592.2	1,592.7	0.5
0.523	0.523	142	242	4.3	1,596.7	1,596.7	1,597.3	0.6
0.626	0.626	218	312	3.3	1,601.0	1,601.0	1,601.2	0.2
0.726	0.726	170	280	3.5	1,603.9	1,603.9	1,604.4	0.5
0.833	0.833	182	266	3.7	1,607.2	1,607.2	1,607.5	0.3
0.934	0.934	197	307	3.2	1,610.6	1,610.6	1,610.8	0.2
1.029	1.029	190	298	3.3	1,613.5	1,613.5	1,613.8	0.3
1.123	1.123	192	307	3.2	1,616.5	1,616.5	1,616.7	0.2
1.218	1.218	165	293	3.4	1,619.2	1,619.2	1,619.5	0.3
1.315	1.315	122	244	3.9	1,622.0	1,622.0	1,622.4	0.4
1.408	1.408	212	325	2.9	1,625.0	1,625.0	1,625.4	0.4
1.506	1.506	161	244	3.9	1,628.2	1,628.2	1,628.4	0.2
1.604	1.604	130	244	3.9	1,631.2	1,631.2	1,631.6	0.4
1.698	1.698	186	250	3.8	1,634.0	1,634.0	1,634.1	0.1
1.803	1.803	217	319	3.0	1,636.7	1,636.7	1,637.1	0.4
1.891	1.891	125	215	4.2	1,639.4	1,639.4	1,639.9	0.4
1.987	1.987	144	271	3.4	1,642.4	1,642.4	1,642.6	0.2
2.044	2.044	132	170	5.4	1,644.1	1,644.1	1,644.3	0.1
2.082	2.082	181	282	3.2	1,645.3	1,645.3	1,645.6	0.2
2.181	2.181	139	182	5.0	1,648.1	1,648.1	1,648.3	0.2
2.277	2.277	160	296	3.1	1,651.5	1,651.5	1,651.9	0.4
2.375	2.375	97	230	4.0	1,653.8	1,653.8	1,654.0	0.1
2.476	2.476	123	207	4.2	1,656.6	1,656.6	1,656.8	0.2
2.519	2.519	141	200	4.4	1,657.9	1,657.9	1,658.3	0.4
2.552	2.552	201	233	3.8	1,659.2	1,659.2	1,659.4	0.3
2.573	2.573	149	225	3.9	1,661.1	1,661.1	1,661.4	0.3
2.671	2.671	174	312	2.8	1,663.9	1,663.9	1,664.4	0.5
2.769	2.769	247	279	3.2	1,667.2	1,667.2	1,667.1	0.1
2.865	2.865	185	280	3.1	1,670.3	1,670.3	1,670.7	0.4
2.960	2.960	194	279	3.2	1,673.6	1,673.6	1,673.7	0.1
3.055	3.055	199	279	3.2	1,676.5	1,676.5	1,676.9	0.4
3.156	3.156	81	180	4.9	1,679.9	1,679.9	1,680.5	0.6

<sup>1</sup> Measured in miles upstream from the junction with Wash 3 West

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, ARIZONA  
(AND INCORPORATED AREAS)

FLOODWAY DATA  
WASH T4N-R3W-S08W

## A.1 Referenced Documents

## References

Arizona Department of Water Resources. (1997). *Instructions for Organizing and Submitting Technical Documentation for Flood Studies*, State Standard Attachment SSA1-97, Phoenix, AZ.

CHECK-RAS v.1.4 (2005). *HEC-RAS Automated Review Program*, Federal Emergency Management Agency.

HEC-RAS v.4.1.0. (2010). U.S. Army Corps of Engineers Hydraulic Engineering Center. Davis, CA.

WEST Consultants Inc. (2011). *Kozlowski FPAP LOMR – Phase 01*. Prepared for the Flood Control District of Maricopa County, Phoenix, AZ.

David Evans and Associates, Inc. (2006). *Wittmann Phase 2 Zone AE Floodplain Delineation Study*, Contract FCD 2004C066. Prepared for the Flood Control District of Maricopa County, Phoenix, AZ.

Chow, V.T. (1959). *Open-Channel Hydraulics*. New York: McGraw-Hill Publishing Company.

B.1 Special Problem Reports

*Not Applicable/Not Included*

B.2 Contact (Telephone) Reports

*Not Applicable/Not Included*

B.3 Meeting Minutes or Reports

*Not Applicable/Not Included*

## B.4 General Correspondence

**Date: 8/11/11**

**Subject: Kozlowski FPAP Draft Hydraulics Analysis and TDN Documentation**

Hi John,

I have reviewed the subject updated materials and offer the below comments. I am also returning the red-lined TDN report text to support the review comments. Not every red-lined remark is also a review comment. Therefore, please consider both types of materials for revisions. Please request that the consultant return the red-lined text and responses to my review comments as part of the next submittal package. The convention I have come up with for responding to my comments has been to insert textual responses below each of my comments.

If you have any questions or suggestions regarding the comments, please let me know at 64528.

Thanks,

Richard

## Modeling

Please provide the profiles in dxf on disk. Also please provide the cross section plots and Checkras output files on disk and/or in appendix E.5.

The improved channel @ the Kozlowski property adds length to the study reach so that the cross section ID's upstream of cross section 2.519 do not correspond to the distance any longer. If the submittal package is meant to include the modeling for the entire study reach, then the upstream cross section ID's would have to be revised and textual explanation provided. Additional study sheets may be required. This may not currently be in the Scope of this project. However, it could prove to be a significant issue in terms of FEMA acceptance (I have personally been involved with FEMA over such mapping discrepancies, and the resolution was lengthy). I have included a spread sheet that shows that the channel distance summed up to cross section 2.519 matches the distance. However with all cross sections included the distance amounts to 3.187 miles while the uppermost cross section is 3.156. Perhaps the best thing to do to **expedite FEMA approval/mapping** is to expand the study limit, while the easiest thing to do is truncate the model and draft FIS products. Let's discuss.

FYI, the current RAS model in this study does not go all the way up to the last DEA cross section 3.254. Please address.

## Report Contents

Until it is otherwise approved, please make sure all study materials are labeled "draft".

Please add tabbed dividers for all sections, appendices, and sub-appendices of the draft report.

A legal advertisement for Intent to Study is needed for the LOMR. Please provide a draft and send it back with the next submittal. An example from another study read:

### “ANNOUNCEMENT OF INTENT TO PERFORM A FLOODPLAIN REDELINEATION STUDY OF THE LUKE WASH WATERSHED

The Flood Control District of Maricopa County (FCDMC) has contracted with Wood, Patel & Associates, Inc. to perform a detailed Zone AE floodplain with floodway re-delineation study of selected watercourses within the Luke Wash Watershed. The study area is located in the western part of Maricopa County, roughly from the

371st Avenue alignment east to the Hassayampa River, and from the Gila River north to the CAP canal.

This study will examine and evaluate the flood hazard areas in the watershed to determine detailed floodplain and floodway limits. These limits will then be used to determine the flood insurance rates used by the Federal Emergency Management Agency (FEMA).

This announcement is intended to inform all interested persons and communities of the commencement of this study so that they may have an opportunity to bring any relevant technical information to the attention of the FCDMC/FEMA, to be considered during the course of this study. Your comments should be addressed to Mr. Richard P. Harris, P.E., at the Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, AZ 85009, (602) 506-4528."

I suggest that the Wittmann Survey report and any other Survey reports associated with the more recent 1' topographical mapping be placed on disk within appendix C. A copy of the Wittmann Survey report will be on a disk to be given to WEST after this review.

I suggest adding text or a table to section 5 of the draft report to describe the tie-ins to the upstream and downstream limits of study with respect to the pending effective information. It looks like there will not be any problems, but this could be a reviewer's request later and can be avoided with more information now.

I suggest that the draft report mention the assessor's parcel number of the lot for which the study is being done: APN 503-32-394A for Kozlowski. This should also be listed in the RAS model description. Please address.

Please check the spelling of "Kozlowski" on the draft MT-2 forms. Also, the box for "...fee..." is checked off. Has this payment been included in the Scope of Work/fees for WEST to cover, or how will this be paid for otherwise?

The draft MT-2 form 2 page 2 of 3 lists the effective and proposed WSELs at cross section 3.156. There is too much vertical discrepancy listed to meet FEMA tie-in criteria, and the value shown for proposed WSEL as 1679' does not agree with RAS model output at 1679.87'. The current study sheet shows the upstream limit of study to be much further south @ WEST cross section 2.519. It is probably wise to use this location in the MT-2 form, or, the study sheet(s) should be extended north to the listed cross section 3.156 (or further – the pending effective model goes up to cross section 3.254). Please address. FYI, the location of the WEST cross

section 2.519 visually compares on the study with the DEA cross section 2.476, and the vertical WSEL differences between the two studies at that location meet FEMA criteria.

## Plots

Based upon the RAS results, 1' contour mapping, and Floodplain (FP) boundary/BFE plots there appears an opportunity to re-plot and show that a home identified by assessor's parcel number 503-32-021D is so elevated as to be outside of the FP. I have made red-line remarks on the draft study sheet BFE western snap point, and related FP boundary plot. This is re-delineation result is also substantiated by the cross section plots of the corrected effective model @ cross sections 2.476 and 2.519. Please address.

The 1' contour mapping and the RAS results suggest that the FP boundary/BFE plots along the east portion of the Kozlowski property should be adjusted in such a way that the home itself is not plotted within the floodplain (see red-lined study sheets). This adjustment can be validated by identifying the related ground contour line for 1653' in relation to the home and the BFE. Please address.

On the draft study sheet, please add the word "photogrammetric" or "contour" in front of the "flight date" to better define it Other well documented studies include a label for the aerial photo date, also. Please address.

Please provide both a hard copy of the study sheet and save an electronic version at "true scale" sizes. My current plot shows 1" approximately equal to 220'.

The draft study sheet shows by label that there is "existing zone AE" and floodway both below and above the analysis, which isn't quite true YET (the Countywide FIS update hasn't become effective yet). To ensure the status of the FP mapping is understood, I suggest you add the word "pending" in front of those labels, as is done in the report text. Please address.

The draft FIS profile vertical axis reads NGVD 29, which is not what the topo mapping is based upon. Is this intended? If not, please rectify. Since the FIS is being updated to NAVD 88 datum, I suggest you submit in it, and provide a conversion factor to '29 on the study sheet.

## GIS

The GIS files in the next submittal should meet the District's specifications for data delivery. This means such things like a single file for both floodplain and floodway zones with codes such as AE

and FW, etc. per the District's specifications. We also will need the "project files as I call them: prj.shp, prjdat.dbf, dq.dbf. Please provide.



## KOZLOWSKI FPAP LOMR

### TECHNICAL MEMORANDUM

Date: August 23, 2011  
To: Richard Harris – FCDMC  
From: Brian Wahlin, Project Manager – WEST Consultants, Inc.  
Riley Asbury – WEST Consultants, Inc.  
Re: Response to Comments for the Kozlowski FPAP Draft

#### RESPONSE TO COMMENTS FOR THE KOZLOWSKI FPAP DRAFT AUGUST 11, 2011

Below are the responses to the review of the Kozlowski FPAP Draft submitted July 22, 2011.

#### Modeling

Please provide the profiles in dxf on disk. Also please provide the cross section plots and Checkras output files on disk and/or in appendix E.5.

**WEST Response: Will be provided.**

The improved channel @ the Kozlowski property adds length to the study reach so that the cross section ID's upstream of cross section 2.519 do not correspond to the distance any longer. If the submittal package is meant to include the modeling for the entire study reach, then the upstream cross section ID's would have to be revised and textual explanation provided. Additional study sheets may be required. This may not currently be in the Scope of this project. However, it could prove to be a significant issue in terms of FEMA acceptance (I have personally been involved with FEMA over such mapping discrepancies, and the resolution was lengthy). I have included a spread sheet that shows that the channel distance summed up to cross section 2.519 matches the distance. However with all cross sections included the distance amounts to 3.187 miles while the uppermost cross section is 3.156. Perhaps the best thing to do to **expedite FEMA approval/mapping** is to expand the study limit, while the easiest thing to do is truncate the model and draft FIS products. Let's discuss.

**WEST Response: The flood profile has been altered to only include the limit of study.**

FYI, the current RAS model in this study does not go all the way up to the last DEA cross section 3.254. Please address.

**WEST Response: Cross-section 3.254 was not included in the RAS model received by WEST and was not added since it is not affected by the change in the wash.**

#### Report Contents

Until it is otherwise approved, please make sure all study materials are labeled “draft”.

**WEST Response: Study material has been labeled “Draft”.**

Please add tabbed dividers for all sections, appendices, and sub-appendices of the draft report.

**WEST Response: Tabbed dividers added.**

A legal advertisement for Intent to Study is needed for the LOMR. Please provide a draft and send it back with the next submittal. An example from another study read:

“ANNOUNCEMENT OF INTENT TO PERFORM A FLOODPLAIN REDELINEATION  
STUDY OF THE LUKE WASH WATERSHED

The Flood Control District of Maricopa County (FCDMC) has contracted with Wood, Patel & Associates, Inc. to perform a detailed Zone AE floodplain with floodway re-delineation study of selected watercourses within the Luke Wash Watershed. The study area is located in the western part of Maricopa County, roughly from the 371st Avenue alignment east to the Hassayampa River, and from the Gila River north to the CAP canal.

This study will examine and evaluate the flood hazard areas in the watershed to determine detailed floodplain and floodway limits. These limits will then be used to determine the flood insurance rates used by the Federal Emergency Management Agency (FEMA).

This announcement is intended to inform all interested persons and communities of the commencement of this study so that they may have an opportunity to bring any relevant technical information to the attention of the FCDMC/FEMA, to be considered during the course of this study. Your comments should be addressed to Mr. Richard P. Harris, P.E., at the Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, AZ 85009, (602) 506-4528.”

**WEST Response: A version of this notice has been sent out and will be included in the appendices.**

I suggest that the Wittmann Survey report and any other Survey reports associated with the more recent 1’ topographical mapping be placed on disk within appendix C. A copy of the Wittmann Survey report will be on a disk to be given to WEST after this review.

**WEST Response: The survey reports have been included on the disk.**

I suggest adding text or a table to section 5 of the draft report to describe the tie-ins to the upstream and downstream limits of study with respect to the pending effective information. It looks like there will not be any problems, but this could be a reviewer's request later and can be avoided with more information now.

**WEST Response: Text and table have been added to section 5.**

I suggest that the draft report mention the assessor's parcel number of the lot for which the study is being done: APN 503-32-394A for Kozlowski. This should also be listed in the RAS model description. Please address.

**WEST Response: Parcel number has been added.**

Please check the spelling of "Kozlowski" on the draft MT-2 forms. Also, the box for "...fee..." is checked off. Has this payment been included in the Scope of Work/fees for WEST to cover, or how will this be paid for otherwise?

**WEST Response: "Kozlowski" has been spelled correctly and the box for "fee" has been unchecked.**

The draft MT-2 form 2 page 2 of 3 lists the effective and proposed WSELs at cross section 3.156. There is too much vertical discrepancy listed to meet FEMA tie-in criteria, and the value shown for proposed WSEL as 1679' does not agree with RAS model output at 1679.87'. The current study sheet shows the upstream limit of study to be much further south @ WEST cross section 2.519. It is probably wise to use this location in the MT-2 form, or, the study sheet(s) should be extended north to the listed cross section 3.156 (or further – the pending effective model goes up to cross section 3.254). Please address. FYI, the location of the WEST cross section 2.519 visually compares on the study with the DEA cross section 2.476, and the vertical WSEL differences between the two studies at that location meet FEMA criteria.

**WEST Response: WSE and cross section information has been corrected in the MT2 form.**

## Plots

Based upon the RAS results, 1' contour mapping, and Floodplain (FP) boundary/BFE plots there appears an opportunity to re-plot and show that a home identified by assessor's parcel number 503-32-021D is so elevated as to be outside of the FP. I have made red-line remarks on the draft study sheet BFE western snap point, and related FP boundary plot. This is re-delineation result is also substantiated by the cross section plots of the corrected effective model @ cross sections 2.476 and 2.519. Please address.

**WEST Response: The floodplain line has been adjusted accordingly.**

The 1' contour mapping and the RAS results suggest that the FP boundary/BFE plots along the east portion of the Kozlowski property should be adjusted in such a way that the home itself is not plotted within the floodplain (see red-lined study sheets). This adjustment can be validated by identifying the related ground contour line for 1653' in relation to the home and

the BFE. Please address.

**WEST Response:** The floodplain line has been adjusted accordingly.

On the draft study sheet, please add the word “photogrammetric” or “contour” in front of the “flight date” to better define it. Other well documented studies include a label for the aerial photo date, also. Please address.

**WEST Response:** The word “contour” has been added and a flight date has been added on the map to include both the 2002 and the 2010 topo which are differentiated on the map with a box outline.

Please provide both a hard copy of the study sheet and save an electronic version at “true scale” sizes. My current plot shows 1” approximately equal to 220’.

**WEST Response:** The scale issue has been resolved.

The draft study sheet shows by label that there is “existing zone AE” and floodway both below and above the analysis, which isn’t quite true YET (the Countywide FIS update hasn’t become effective yet). To ensure the status of the FP mapping is understood, I suggest you add the word “pending” in front of those labels, as is done in the report text. Please address.

**WEST Response:** “Pending” has been added to the study sheet in the appropriate locations.

The draft FIS profile vertical axis reads NGVD 29, which is not what the topo mapping is based upon. Is this intended? If not, please rectify. Since the FIS is being updated to NAVD 88 datum, I suggest you submit in it, and provide a conversion factor to ’29 on the study sheet.

**WEST Response:** Datum information has been corrected to show NAVD 88.

## GIS

The GIS files in the next submittal should meet the District’s specifications for data delivery. This means such things like a single file for both floodplain and floodway zones with codes such as AE and FW, etc. per the District’s specifications. We also will need the “project files as I call them: prj.shp, prjdat.dbf, dq.dbf. Please provide.

**WEST Response:** HIS data has been included.

**Date: 9/07/11**

**Subject: Kozlowski FPAP Revised Draft Hydraulics Analysis and TDN Documentation**

Hi Riley and Chuck,

I have reviewed the subject updated materials and offer the below comments. I am also returning the red-lined TDN report text to support the review comments. Not every red-lined remark is also a review comment. Therefore, please consider both types of materials for revisions. Please return the red-lined text and responses to my review comments as part of the next submittal package. The convention I have come up with for responding to my comments has been to insert textual responses below each of my comments.

If you have any questions or suggestions regarding the comments, please let me know at 64528.

Thanks,

Richard

## Modeling

Please provide the profiles in dxf on disk.

For clarity, it may be a good idea to save the "Existing" plan to include only those cross sections that fall within the Limit of Study since they will relate to the study sheets, cross section plots, etc. In doing so, the modeling option to use known WSEL at both ends should be used, and this would have to be explained in the TDN subsection 5.7. Please address.

Please add a description of the various plans to the model Description window.

## Report Contents

Tabbed dividers for all sections and appendices of the draft report are still needed. Sub-appendices may be separated by colored and labeled sheets. Please address.

Please add the contract number and date of submittal to the project disk.

The 2-d analysis should be placed on disk and the location of the disk should be referenced in the TDN (in case FEMA reviewers want to see it). Please address.

Currently in the TDN the ADWR and FEMA forms precede the text section 2. Normally the forms follow the text. Please consider re-arranging in the more conventional sequence and update the TOC accordingly.

As discussed, since the most significant change in the study area is the graded channel and the change in flow path related to it (updated topography is the basis of request), I suggest putting the DTM that was used to cut the cross sections and the contour mapping generated from it on disk and referenced in the TDN text. Please provide.

I have contacted the District's Joe Wagner to search for a Survey Report regarding the 1' contour mapping done by Cooper Aerial, for this project. He has contacted Cooper and can be called directly to obtain the documentation, if it is found to exist. Hi phone number is 602 506 2203. Once received it should be placed in the same general location as the Wittmann Survey report that is already in the TDN (on disk).

With regards to the "pending effective" data and tie-in elevations/changes in BFE's, etc. as noted on MT-2 form 2, pages 2 and 3, I suggest using asterisks and providing a note as shown on page 3 to clarify the relationship (see attached pdf of the MT-2 forms, with the comments package). This is because the reviewers dealing with the MT-2 forms may not be well-informed of the pending

effective status of the previous study. Otherwise the forms should be revised to read "N/A" or boxes checked "No" for changes in BFEs etc.

Currently the MT-2 form pages are out of correct sequence. Please make sure that all Form 1 pages are grouped together, etc.

For reference I suggest labeling a couple of roads and calling out the Kozlowski property on Figure 3.

As discussed I suggest revising the text in subsection 5.1 to list the four different plans within the single RAS model (see tracked TDN), and then explaining that the request for the LOMR through this report is based upon the Existing Conditions plan.

Table 6 still lists the Town of Wittmann – please remove the "Town of" from it.

In the list of references, sub appendix A.1, please add the contract # for the work done by David Evans and Associates.

#### Plots

1. Please check the cross section plots in appendix E.2. I couldn't find a plot for RS 2.573, and there are some plots without IDs. Please make sure all plots and their labels relate to the draft FIS data in Table 6.
2. A couple of the cross section plots show that interpolated point(s) were added. This sounds like something that should be explained in text subsection 5.7, or, otherwise removed. Also, there is a cross section label in the plots that says "levee added...". I believe what is intended is that an artificial levee was modeled, probably to account for ineffective flow areas outside of the main channel conveyance. If so this should also be explained in subsection 5.7. Please address.
3. Please sign/seal the TEDN and study sheet for the next submittal.
4. Limit of Study labels should be added at both ends of the draft profile. Please address.

#### GIS

The HIS files "DQ" and PRJDAT" are supposed to be only dbf files, not shape files. Please update the files accordingly.



## KOZLOWSKI FPAP LOMR

### TECHNICAL MEMORANDUM

Date: September 07, 2011  
To: Richard Harris – FCDMC  
From: Brian Wahlin, Project Manager – WEST Consultants, Inc.  
Riley Asbury – WEST Consultants, Inc.  
Re: Response to Comments for the Kozlowski FPAP Draft

#### RESPONSE TO COMMENTS FOR THE KOZLOWSKI FPAP DRAFT SEPTEMBER 07, 2011

Below are the responses to the review of the Kozlowski FPAP Draft submitted August 22, 2011.

#### Modeling

Please provide the profiles in dxf on disk.

**WEST Response:** Files have been provided in dxf format on the disk.

For clarity, it may be a good idea to save the “Existing” plan to include only those cross sections that fall within the Limit of Study since they will relate to the study sheets, cross section plots, etc. In doing so, the modeling option to use known WSEL at both ends should be used, and this would have to be explained in the TDN subsection 5.7. Please address.

**WEST Response:** A truncated Existing Conditions model has been created as specified. The full version of the existing conditions model has been left as a plan option in the model and the truncated version was simply added to the plans. A description of the truncated model has been added to the report in section 5.1.5 and 5.7.

Please add a description of the various plans to the model Description window.

**WEST Response:** Plan descriptions have been copied to the model description window.

#### Report Contents

Tabbed dividers for all sections and appendices of the draft report are still needed. Sub-appendices may be separated by colored and labeled sheets. Please address.

**WEST Response:** Tabbed dividers have been added.

Please add the contract number and date of submittal to the project disk.

**WEST Response:** Disk label has been changed to include date and contract number.

The 2-d analysis should be placed on disk and the location of the disk should be referenced in the TDN (in case FEMA reviewers want to see it). Please address.

**WEST Response: The 2-D Analysis has been included**

Currently in the TDN the ADWR and FEMA forms precede the text section 2. Normally the forms follow the text. Please consider re-arranging in the more conventional sequence and update the TOC accordingly.

**WEST Response: Order will be rearranged.**

As discussed, since the most significant change in the study area is the graded channel and the change in flow path related to it (updated topography is the basis of request), I suggest putting the DTM that was used to cut the cross sections and the contour mapping generated from it on disk and referenced in the TDN text. Please provide.

**WEST Response: The surface files have been included in the data disk in the supporting files folder.**

I have contacted the District's Joe Wagner to search for a Survey Report regarding the 1' contour mapping done by Cooper Aerial, for this project. He has contacted Cooper and can be called directly to obtain the documentation, if it is found to exist. Hi phone number is 602 506 2203. Once received it should be placed in the same general location as the Wittmann Survey report that is already in the TDN (on disk).

**WEST Response: Joe has been contacted and data has been received and will be placed on the disk.**

With regards to the "pending effective" data and tie-in elevations/changes in BFE's, etc. as noted on MT-2 form 2, pages 2 and 3, I suggest using asterisks and providing a note as shown on page 3 to clarify the relationship (see attached pdf of the MT-2 forms, with the comments package). This is because the reviewers dealing with the MT-2 forms may not be well-informed of the pending effective status of the previous study. Otherwise the forms should be revised to read "N/A" or boxes checked "No" for changes in BFEs etc.

**WEST Response: N/A has been added and corresponding boxes have been checked "No"**

Currently the MT-2 form pages are out of correct sequence. Please make sure that all Form 1 pages are grouped together, etc.

**WEST Response: Order will be rearranged**

For reference I suggest labeling a couple of roads and calling out the Kozlowski property on Figure 3.

**WEST Response: Labels have been added**

As discussed I suggest revising the text in subsection 5.1 to list the four different plans within the single RAS model (see tracked TDN), and then explaining that the request for the LOMR through this report is based upon the Existing Conditions plan.

**WEST Response: Text has been revised appropriately**

Table 6 still lists the Town of Wittmann – please remove the "Town of" from it.

**WEST Response: "Town of" has been removed**

In the list of references, sub appendix A.1, please add the contract # for the work done by David Evans and Associates.

**WEST Response: Contract # has been added**

## Plots

1. Please check the cross section plots in appendix E.2. I couldn't find a plot for RS 2.573, and there are some plots without IDs. Please make sure all plots and their labels relate to the draft FIS data in Table 6.

**WEST Response: Cross-section plots have been updated to include XS names and have been verified to include all applicable cross-sections.**

2. A couple of the cross section plots show that interpolated point(s) were added. This sounds like something that should be explained in text subsection 5.7, or, otherwise removed. Also, there is a cross section label in the plots that says "levee added....". I believe what is intended is that an artificial levee was modeled, probably to account for ineffective flow areas outside of the main channel conveyance. If so this should also be explained in subsection 5.7. Please address.

**WEST Response: The cross-section plots have been updated to remove cross-section descriptions and eliminate any confusion. A small comment was also added to section 5.7 to explain these two descriptions.**

3. Please sign/seal the TDN and study sheet for the next submittal.

**WEST Response: Will sign and seal**

4. Limit of Study labels should be added at both ends of the draft profile. Please address.

**WEST Response: Labels added as described**

## GIS

The HIS files "DQ" and PRJDAT" are supposed to be only dbf files, not shape files. Please update the files accordingly.

**WEST Response: The DQ and PRJDAT files have been corrected and are located in the HIS folder on the disk.**



January 4, 2012

**Arizona**

8950 S 52<sup>nd</sup> St.  
Suite 210  
Tempe, AZ 85284-1137

480-345-2155  
480-345-2156 FAX

**California**

11440 W. Bernardo Ct.  
Suite 360  
San Diego, CA 92127-1644

858-487-9378  
858-487-9448 FAX

101 Parkshore Dr.  
Folsom, CA 95630-4726

916-932-7402  
916-932-7408 FAX

**Oregon**

2601 25<sup>th</sup> Street SE  
Suite 450  
Salem, OR 97302-1286

503-485-5490  
503-485-5491 FAX

10300 SW Greenburg Road  
Suite 470  
Portland, OR 97223

503-946-8536  
503-946-8537 FAX

**Washington**

12509 Bel-Red Road  
Suite 100  
Bellevue, WA 98005-2525

425-646-8806  
425-646-0570 FAX

**River Measurement**

**A Division of WEST Consultants**  
811 NE 154<sup>th</sup> Street  
Vancouver, WA 98685

360.571.2290  
360.571.2291 Fax

[www.westconsultants.com](http://www.westconsultants.com)

LOMR Manager  
BakerAECOM  
LOMC Clearinghouse  
7390 Coca Cola Drive, Suite 204  
Hanover, MD 21076

Re: Summary of Additional Data Required to Support a LOMR  
Case No.: 12-09-0405P  
Requester: Mr. John Hathaway, P.E., CFM  
Community: Maricopa County, AZ  
Community No.: 040037

Dear LOMR Manager:

Below are the responses to the review of the Kozlowski FPAP submitted November 30, 2011.

1. Please remove the known water surface elevation boundary condition at the upstream end of Wash T4N-R3W-S08W in the existing conditions HEC-RAS hydraulic model.  
WEST Response: Known water surface elevation boundary condition has been removed from the existing conditions model.
2. The existing conditions HEC-RAS hydraulic model output shows a negative surcharge at Cross Section 2.476 of -0.01. Please revise the floodway analysis to eliminate all negative surcharges, or explain why this is not necessary.  
WEST Response: Negative surcharge has been removed. See response to comment 5 below.
3. An ineffective flow area is defined as the area of a cross section that will contain water that is not actively being conveyed. It is used to describe portions of a cross section in which water will pond, but the velocity in the downstream direction is close to zero. Our review of the submitted existing conditions model revealed that the levee option was used at Cross Section 1.604 along the revised reach of the Wash T4N-R3W-S08W to model the ineffective flow areas. However, the use of the ineffective flow area option may be more appropriate. Please provide documentation to support using the levee option, or make the appropriate changes.  
WEST Response: The levee option has been removed from this cross section and has been replaced with an ineffective flow area option.
4. The base (1-percent-annual-chance) floodplain top widths shown in the existing conditions HEC-RAS hydraulic analysis at cross sections 1.604, 1.803, 1.891, and 2.476 do not match the approximate base floodplain top widths shown on the submitted topographic work map entitled, "Wash T4N-R3W-S08W Kozlowski Floodprone Properties Assistance Program," prepared by WEST Consultants, Inc., dated September 2011. Please provide an explanation for these discrepancies, or make the appropriate changes.

WEST Response: The approximate base floodplain top width have been adjusted on the work maps to more closely match the approximate base floodplain top widths shown in the hydraulic analysis.

5. The floodway top width shown in the existing conditions HEC-RAS hydraulic analysis at Cross Sections 2.476 does not match the approximate floodway top width shown on the above referenced topographic work map. Please provide an explanation for these discrepancies, or make the appropriate changes.

WEST Response: The floodway encroachment stations were accidentally deleted from this cross section in the HEC-RAS model prior to our previous submittal. This resulted in a negative surcharge at this cross section (see comment 2) and a discrepancy between the HEC-RAS model and the work map. The encroachment stations have been re-entered and the discrepancy and negative surcharge have been resolved.

Updated HEC-RAS files, documentation, work maps, flood profiles, and annotated FIRM panels have been included in support of these responses.

Please let me know if you require any additional information.

Sincerely,



Brian Wahlin, Ph.D., P.E., D.WRE  
Office Manager/Senior Hydraulic Engineer

Enclosures

cc: Mr. John Hathaway, P.E., CFM  
Flood Control District of Maricopa County

Ms. Jaclyn Bloor, CFM  
BakerAECOM

B.5 Contract Documents



FLOOD CONTROL DISTRICT of Maricopa County  
 2801 West Durango Street  
 Phoenix, Arizona 85009  
 (602) 506-1501  
 Fax (602) 506-4601

LETTER OF TRANSMITTAL

TO: Brian Wahlin, Vice President  
 WEST Consultants, Inc.  
 8950 South 52nd Street, #210  
 Tempe, AZ 85284

May 20, 2011

SUBJECT: Contract No. 2010C027  
 Assignment No. 7  
 Kozlowski FPAP LOMR - Phase 2

WE ARE SENDING YOU THE FOLLOWING ITEMS:

( ) Enclosed ( ) Under separate cover

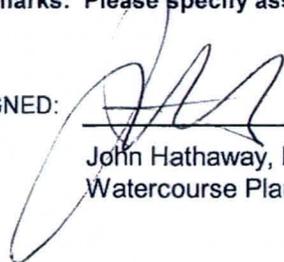
Shop Drawings	Prints	Legal Description	Samples
Specification	Change Order	Copy of Letter	Plans
X Notice to Proceed			
X Certificate of Performance			
X Scope of Work			

THESE ARE TRANSMITTED:

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

Remarks: Please specify assignment number on all correspondence.

SIGNED:

  
 John Hathaway, P.E.  
 Watercourse Planning Manager

# **SCOPE OF WORK**

## **CONTRACT FCD 2010C027 Work Assignment #7**

### **Kozlowski FPAP LOMR – Phase 2 P.C.N. 049.01.20**

#### **GENERAL SCOPE OF WORK**

The Floodprone Properties Assistance Program (FPAP) of the Flood Control District of Maricopa County (DISTRICT) is designed to provide funding for voluntary, non-structural mitigation measures to protect the public and reduce the occurrence of repetitive property damage. The FPAP includes floodproofing and acquisition of residential structures. Property owners apply for the FPAP voluntarily. After an application is received, the DISTRICT evaluates the application to determine its eligibility for the FPAP and the degree of flood hazard the residential structure is potentially subject to. Eligibility does not, however, guarantee floodproofing, acquisition, or inclusion into the program.

The Kozlowski residence is located in the Wittmann, AZ area near Wash T4N-R3W-S08W. This wash was studied and delineated as part of the Wittmann Phase 2 Zone AE Floodplain Delineation Study (FDS) in 2006. During the construction of the Kozlowski residence prior to the effective FEMA delineation, Wash T4N-R3W-S08W was re-graded to flow around the houses in the area. However, the floodplain and floodway developed for Wash T4N-R3W-S08W does not reflect this channel realignment. Thus, the Kozlowski residence is located in the middle of a regulatory floodway (see Figure 1 below). The Kozlowski family applied to FPAP to have their house acquired and demolished by the DISTRICT. On closer investigation, it was determined that grading and relocation of the wash was conducted by permit for the Kozlowski property and several contiguous properties after the date of the aerial mapping but before the completion of the floodplain delineation under the Wittmann FDS II study. This resulted in an erroneous floodway delineation across the Kozlowski property and several others. This was confirmed by Phase 1 of this project where the existing topography was modeled to determine the feasibility of revising the floodplain/floodway delineation.

The purpose of this work assignment is to refine the HEC-RAS model of Wash T4N-R3W-S08W developed in Phase 1 and to re-delineate the floodplain and floodway of Wash T4N-R3W-S08W from Patton Road (approximately cross-section 2.671) downstream to approximately cross-section 1.987. A Technical Data Notebook (TDN) and Letter of Map Revision (LOMR) application will be prepared in addition to work maps and an annotated FIRM panel.

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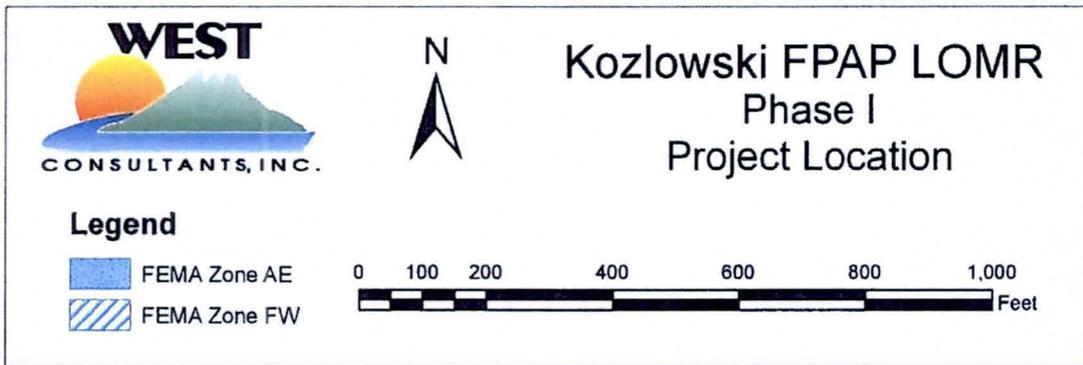
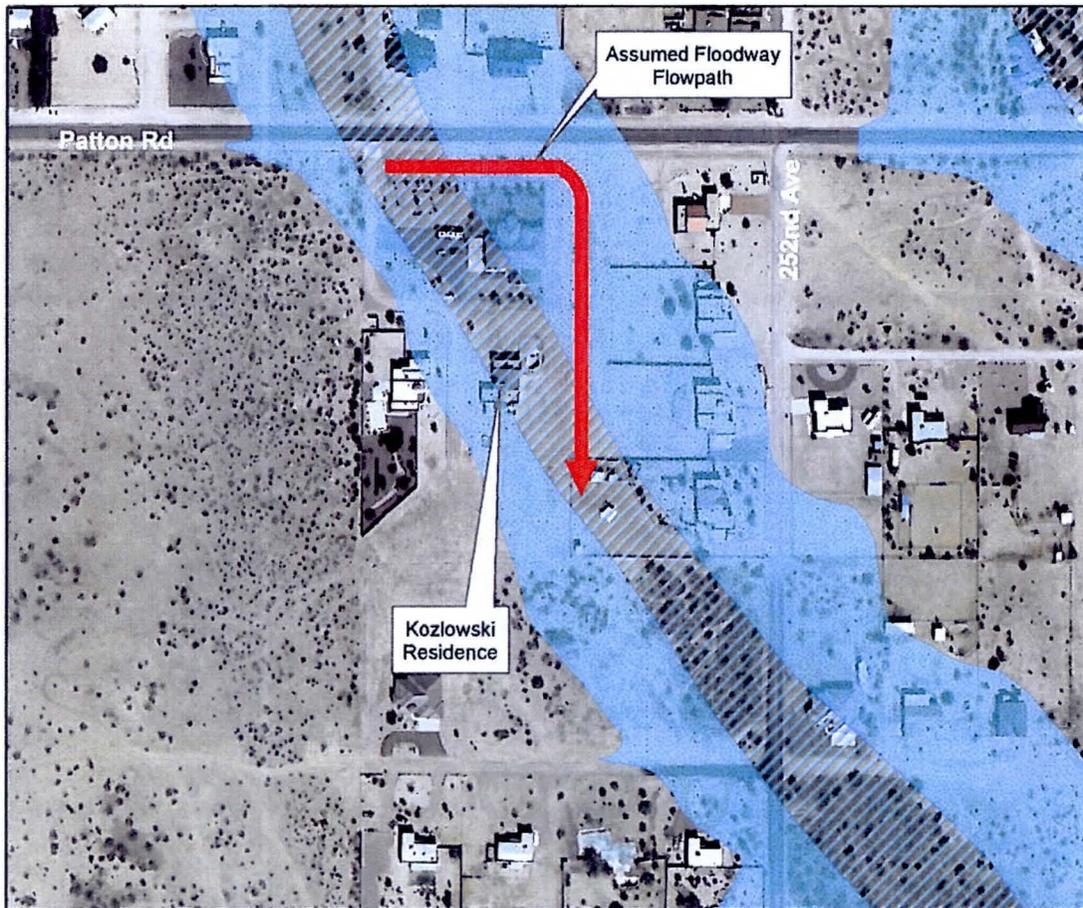


Figure 1. Regulatory FEMA floodway (Zone FW) and assumed floodway flow path in relation to the Kozlowski residence

All work under Work Assignment #7 (WA #7) must be completed within one hundred and eighty (180) calendar days from the Notice to Proceed (NTP). The end result will be a TDN for Wash T4N-R3W-S08W with updated floodplains and floodways.

### Work Assignment #7

#### **TASK 1 - COORDINATION**

- 1.1 The CONSULTANT will participate in three (3) coordination meetings with the DISTRICT during the life of the project. These coordination meetings can be by phone if pre-authorized by the DISTRICT. The CONSULTANT is responsible for the minutes of any meetings. Draft meeting minutes must be prepared and delivered to the DISTRICT within 4 working days of all meetings.
- 1.2 The CONSULTANT will attend one public meeting with the Kozlowskis and other residents in the area.
- 1.3 The CONSULTANT will submit brief monthly progress reports along with the monthly invoices.
- 1.4 Performance Evaluations will be performed by either the DISTRICT or the CONSULTANT at the completion of the project.

#### **TASK 2 – DATA COLLECTION**

- 2.1 All necessary data collection was performed in Phase 1 of the study.

#### **TASK 3 – HYDRAULIC MODELING**

- 3.1 The CONSULTANT will modify the existing HEC-RAS model for Wash T4N-R3W-S08W to reflect existing conditions. Modifications will include adjusting the flow path to account for the bend in the wash around the Kozlowski residence, updating Manning's  $n$ -values based on field observations from Phase 1, and adding additional blocked obstructions to model new houses in the area. Modeling split flows to adjacent washes, although not anticipated, are not included in this scope of work.
- 3.2 The CONSULTANT re-delineate the floodway along Wash T4N-R3W-S08W from approximately cross-section 2.671 to 1.987. If changes to the floodway in the downstream reach result in surcharges greater than one foot, the downstream limit of the floodway revision may need to be moved further upstream. At a minimum, the floodway will be re-delineated between cross-sections 2.671 and 1.987, which preliminary modeling suggests will be feasible. The floodway will be realigned to remove as many homes as possible, but there are known portions of the wash in which removing homes will not be possible.
- 3.3 The CONSULTANT will use the steady state, 100-year hydrology from the Wittmann Phase 2 Zone AE Floodplain Delineation Study as the hydrologic input.

#### **TASK 4 – FLOODPLAIN/FLOODWAY RE-DELINEATION**

- 4.1 The post-project conditions floodplain will be delineated for the 100-year flood event. A revised regulatory floodway will also be delineated. A certified floodplain work map and an annotated
-

Flood Insurance Rate Map will be prepared for the map revision submittal. A revised flood profile plot and output summary table will be prepared.

- 4.5 The CONSULTANT will make minor refinements to the modeling based on review of the model results by the DISTRICT, ADWR, FEMA, and FEMA's Technical Evaluation Contractor, if necessary.

#### **TASK 5 – LETTER OF MAP REVISION SUBMITTAL**

- 5.1 The findings of the floodplain delineation study will be presented in Section 4 of the Technical Data Notebook (TDN) and will be prepared in accordance with ADWR State Standards Attachment 1-97 (SSA 1-97). The report will be organized as specified by DISTRICT standards, following SSA 1-97 format.
- 5.2 The CONSULTANT will fill out all the forms required by FEMA for the submittal of a Letter of Map Revision (LOMR). The forms will be included in Section 2 of the TDN.
- 5.3 The CONSULTANT will make minor refinements to the TDN based on review by the DISTRICT, ADWR, FEMA, and FEMA's Technical Evaluation Contractor.

#### **TASK 6 – DIGITAL DATA**

- 6.1 Digital data will be delivered following either the HIS specifications (3.1), the CADD specifications (1.), or shape file specifications.
- 6.2 Hydraulics GIS/CADD submittal: It is recommended that the Hydraulics CADD deliverables be developed using the same digital files that the analysis is being performed with. Final submittal to the DISTRICT should be when Section 4 of the TDN is approved. The line work used to develop the floodplain work maps should be the basis for the GIS/CADD deliverables.

#### **TASK 7 – DELIVERABLES**

- 7.1 Prior to FEMA submittal: The DISTRICT will deliver the following items to the CONSULTANT for inclusion into the TDN before delivering the FEMA submittal package:
    - 7.1.1 Copies of the Original Affidavits of Publication of the legal advertisements to be included in the TDN.
    - 7.1.2 If bound separately from the TDN, three (3) copies of the field survey notes and office calculations.
    - 7.1.3 Submittal to local jurisdictions: Once the DISTRICT has approved the preliminary TDN, the CONSULTANT shall provide copies to the local jurisdiction for their review and comments. The CONSULTANT shall address the comments from the local jurisdictions through the DISTRICT.
  - 7.2 FEMA submittal: The CONSULTANT will submit the following items to the DISTRICT for review by FEMA and any other appropriate governmental agency. All the following products are considered deliverables for the FEMA submittal:
-

- 7.2.1 Two (2) complete sets of black line topographic base maps with floodplain delineations shown. All drawings will be signed and sealed by persons of appropriate professional registration. Each registrant will provide a specific statement as to what service they performed.
- 7.2.1 Two (2) complete sets of the TDN, including HEC-RAS input/output files on CD. The TDN will be prepared in accordance with ADWR State Standards Attachment 1-97 (SSA 1-97). The notebook will be organized as specified by the DISTRICT following SSA 1-97 format.
- 7.2.3 Two (2) sets of annotated FIRM panels showing the proposed delineation.
- 7.3 Final submittal: The following products are considered deliverables for the final submittal to the DISTRICT after FEMA approval is issued:
- 7.3.1 Four (4) complete sets of sealed black line topographic base maps with the floodplain delineations shown. All drawings will be signed and sealed by persons of appropriate professional registration. Each registrant will provide a specific statement as to what service they performed.
- 7.3.2 All remaining floodplain delineation data in conformance with the DISTRICT's HIS specifications.
- 7.3.3 Two (2) complete copies of the TDN including HEC-RAS input/output files on CD. The TDN will be prepared in accordance with ADWR State Standards Attachment 1-97 (SSA 1-97). The notebook will be organized as specified by the DISTRICT, following SSA 1-97 format. This submittal of the TDN shall include any correspondence and/or meeting minutes with the reviewing agencies and shall reflect any revisions required by those reviewing agencies. Revisions may include, but are not limited to, modifications to the delineation maps, the HEC-RAS model, and/or the final report.
- 7.3.4 Two (2) sets of CDs containing the complete TDN submittal in PDF format.
- 7.3.5 The CONSULTANT will submit the hydraulic HIS deliverables.
-

## B.6 Public Information

01

# Arizona Business Gazette

The business resource

PO BOX 194  
Phoenix, Arizona 85001-0194  
(602) 444-7315 FAX (602) 444-7364

**ANNOUNCEMENT OF INTENT TO REVISE THE FLOODPLAIN AND FLOODWAY ON WASH T4N-R3W-S08W NEAR THE COMMUNITY OF WITTMANN, ARIZONA**  
The Flood Control District of Maricopa County (FCDMC) has contracted with WEST Consultants to perform a detailed Zone AE Floodplain with floodway delineation study of a portion of Wash T4N-R3W-S08W. The location of the study is near Patton Road and 752nd Avenue. This study will examine and evaluate the flood hazards in the study area and determine the detailed floodplain and floodway limits. The floodplain and floodway will be modified to reflect the actual flow path of a channelized portion of the wash. This modification should remove two households from the regulatory floodway. The floodplain extent will be slightly modified and no additional homes will be included in the floodplain.  
This announcement is intended to inform all interested persons and communities of the commencement of this study so that they may have an opportunity to bring any relevant technical information to be considered during the course of this study to the attention of the FCDMC and Federal Emergency Management Agency (FEMA). Your comments should be addressed to Mr. John Halpin, P.E., at the Flood Control District of Maricopa County, 260 West Duran Street, Phoenix, AZ 85003 (602) 516-8510.  
Published: August 25, 2011

STATE OF ARIZONA }  
COUNTY OF MARICOPA } SS.

Mark Gilmore, being first duly sworn, upon oath deposes and says: That he is the Legal Ad Rep of the Arizona Business Gazette, a newspaper of general circulation in the county of Maricopa, State of Arizona, published weekly at Phoenix, Arizona, and that the copy hereto attached is a true copy of the advertisement published in the said paper on the dates indicated.

8/25/2011

*Mark Gilmore*

Sworn to before me this  
25TH day of  
AUGUST 2011

 **BRIAN BILLINGS**  
Notary Public - Arizona  
Maricopa County  
My Comm. Expires Jul 25, 2014

*Brian Billings*  
Notary Public

**ANNOUNCEMENT OF INTENT TO REVISE THE FLOODPLAIN AND FLOODWAY ON WASH T4N-R3W-S08W NEAR THE COMMUNITY OF WITTMANN**

The Flood Control District of Maricopa County (FCDMC) has contracted with WEST Consultants to perform a detailed Zone AE floodplain with floodway delineation study of a portion of Wash T4N-R3W-S08W. The location of the study is near Patton Road and 252<sup>nd</sup> Avenue.

This study will examine and evaluate the flood hazards in the study area and determine the detailed floodplain and floodway limits. The floodplain and floodway will be modified to reflect the actual flow path of a channelized portion of the wash. This modification should remove two households from the regulatory floodway. The floodplain extents will be slightly modified and no additional homes will be included in the floodplain.

This announcement is intended to inform all interested persons and communities of the commencement of this study so that they may have an opportunity to bring any relevant technical information to be considered during the course of this study to the attention of the FCDMC/FEMA. Your comments should be addressed to Mr. John Hathaway, P.E., at the Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, AZ 85009, (602) 506-0503.

## C.1 Survey Field Notes for Aerial Mapping and Control

Note: Digital survey data has been submitted via the disk included with this report in the folder titled 'Appendix'.

Kozlowski Mapping Blind Panels

Meta Data:

Vertical Datum: NAVD 88

Coordinate System: US State Plane 1983

Zone: Arizona Central 0202

Datum: NAD 1983 (NSRS 2007)

Geoid Model: Geoid09AZ

Point #	Northing	Easting	Elevation	Description
P 1	998090.6	490408.9	1661.953	PANEL
P 2	997300.4	489065.9	1666.011	PANEL
P 3	996446.3	489392.6	1658.798	PANEL
P 4	996330	491304.7	1649.664	PANEL
P 5	994750.6	490300.2	1645.41	PANEL
P 6	995410.5	491704.5	1643.659	PANEL



EXPIRES 6/30/2013

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The Flood Control District of Maricopa County  
DXF Metadata

---

This file contains the metadata information about the DXF file(s). The naming convention for all files, except contours, created from FCDMC projects is <filename>-<project id>.DXF. For example, the bridges are named BRIDGE-<project id>.DXF (ex: BRIDGE-6666.DXF). The project id number is used to link the DXF files to the metadata information about the project. Using the example, you would look for the project id assigned a value of 6666 in this file to find the metadata information about the data associated with this project.

The contours are named ELV-<project id>-<topo id>.DXF (ex: ELV-6666-100.DXF). Using this example, you would look for the project id assigned a value of 6666 in this file to find the metadata information about this project. Additionally, you would look for the topo id assigned a value of 100 within the project id to find the specific topographic information associated with the data. The contour text is delivered in a file named ELV-<project id>-TEXT.DXF. The project id is used in the same way as in the examples above.

---

Project ID.....1006  
Contract Number.....FCD 92-07  
Project Name.....Iona Wash FDS

Topo ID.....106  
Flight date.....11/13/1992  
Contour Interval...2'  
DTM Data.....No  
Vertical Datum.....NGVD29  
Horizontal Datum...Unknown/Uncertain

---

Project ID.....1209  
Contract Number.....FCD 01-21  
Project Name.....Wittmann Mapping

Topo ID.....600  
Flight date.....04/18/2002  
Contour Interval...2'  
DTM Data.....Yes  
Vertical Datum.....NAVD88  
Horizontal Datum...Stateplane NAD83, Arizona Central, International Feet

---

Date extracted: January 06, 2011

Detailed aerial mapping and topographic mapping were performed by Cooper Aerial for the District, contract number FCD 2007C038-11. The mapping was performed on May 24, 2010 and the data were compiled by digital stereo methods using aerial photography. The topography was produced according to procedures that comply with national standards for spatial data accuracy (MSSDA) for a contour interval of 1-foot and a map scale of 1" = 40'. The new detailed topography was generated in a small area near the Kozlowski residence as indicated by the blue contour lines in Figure 3. The vertical datum used for this mapping is NAVD 1988.

The topography outside this area was generated by Stewart Geo Technologies (contract number FCD 01-21) for the District as part of the Wittmann Area Drainage Master Study. Flight dates were April 18, 2002, April 19, 2002 and April 23, 2002 at 1:7200 ratio and April 23, 2002 at 1:14400 ratio. The topography in this area consists of 2-foot contour-intervals as indicated by the yellow contour lines in Figure 1. The vertical datum used for this mapping is NAVD 1988, and the horizontal datum is Stateplane NAD83, Arizona Central, International feet. The mapping was previously approved by the District as meeting FEMA mapping accuracy standards.

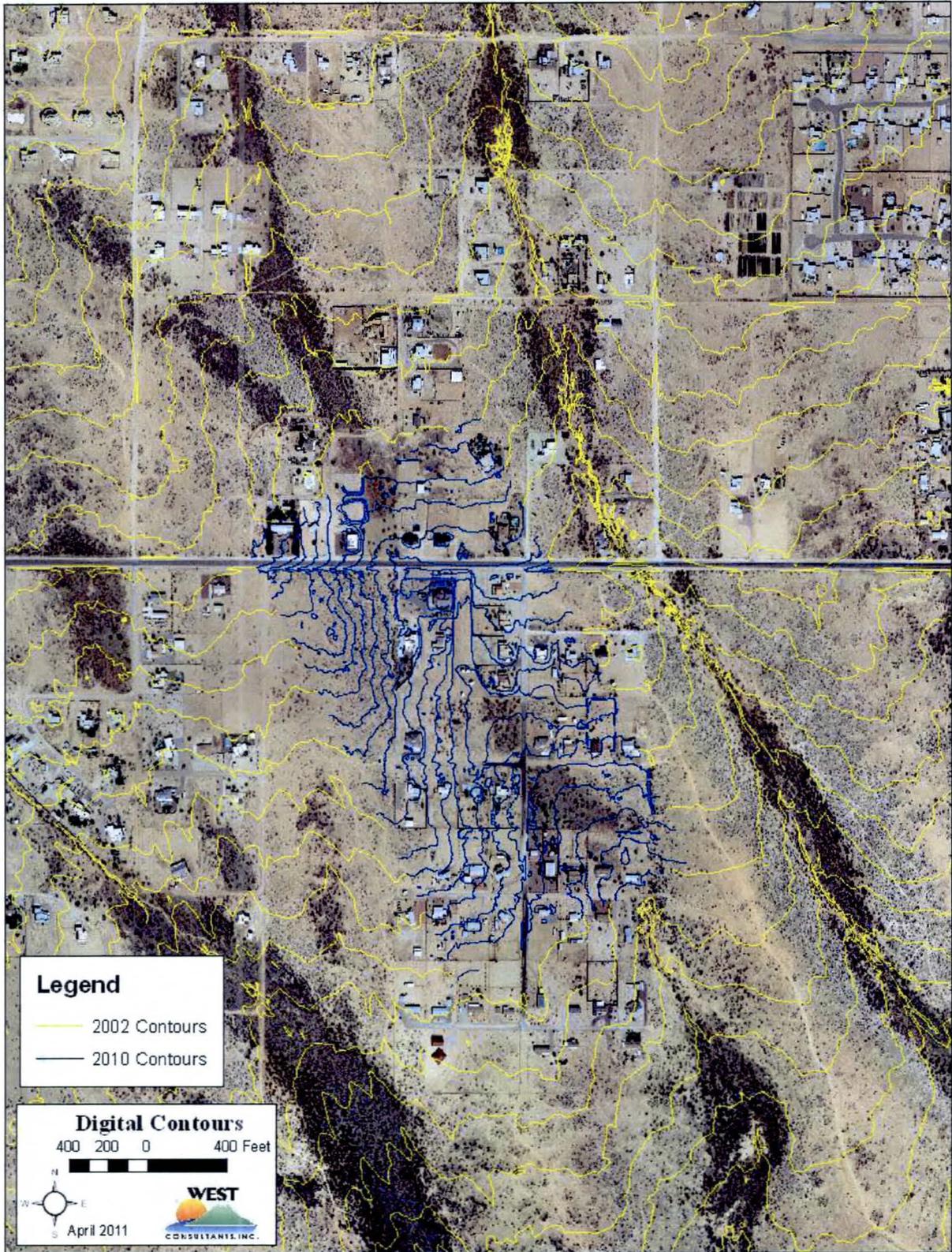


Figure 1. 1-foot and 2-foot contours.

## C.2 Survey Field Notes for Hydrologic Modeling

*None*

### C.3 Survey Field Notes for Hydraulic Modeling

*None*

## D.1 Precipitation Data

*none*

## D.2 Physical Parameter Calculations

*Not Applicable/Not Included*

### D.3 Hydrograph Routing Data

*Not Applicable/Not Included*

## D.4 Reservoir Routing Data

*Not Applicable/Not Included*

## D.5 Flow Splits and Diversions Data

*Not Applicable/Not Included*

## D.6 Hydrologic Calculations

*Not Applicable/Not Included*

## E.1 Roughness Coefficient Estimation

## Manning's *n* Values

Estimation of the Manning's *n*-values for the Wash T4N-R3W-S08W was based on the pending effective FEMA model, field observations, District comments, and engineering judgment. The area of focus near the Kozlowski residence is between cross-section 2.573 and 1.987 in the pending effective model. In the corrected pending effective model, two cross-sections were added to the model downstream of cross-section 2.573 and one more cross-section was added just upstream of cross-section 1.987 in order to more accurately represent the correct channel alignment.

Manning's *n*-values for the main channel in this region of the pending effective model are approximately 0.04 to 0.047, which does not seem appropriate now due to recent changes in the channel. The most recent imagery and field visits in this area show less established vegetation in the channel than when the pending effective model was developed. Therefore, the channel Manning's *n*-values of 0.033 were used for the new cross-sections and surrounding area to account for the clear channel conditions. The channel bend in the vicinity of the Kozlowski residence was modeled with increased Manning's *n*-value based on a meander factor of 1.3 to represent a severe meander (Chow, 1959). Table 2 shows a comparison of the resulting Manning's *n*-values for this area in the pending effective and existing conditions models with the highlighted cells representing a change in Manning's *n*-value. Examples of project site roughness are shown in Figure 4 to Figure 6.

Table 1. Manning's *n*-Values for Pending Effective and Existing Conditions Models

Pending Effective Model				Existing Conditions Model			
	Manning's <i>n</i> -Value				Manning's <i>n</i> -Value		
Cross-Section	Left Overbank	Channel	Right Overbank	Cross-Section	Left Overbank	Channel	Right Overbank
2.573	0.033	0.047	0.033	2.573	0.033	0.047	0.033
				2.552	0.033	0.033	0.033
				2.519	0.033	0.033	0.033
2.476	0.033	0.047	0.033	2.476	0.043*	0.043*	0.043*
2.375	0.033	0.04	0.04	2.375	0.043*	0.043*	0.043*
2.277	0.033	0.04	0.04	2.277	0.033	0.043*	0.033
2.181	0.033	0.042	0.033	2.181	0.033	0.043*	0.033
2.082	0.033	0.042	0.033	2.082	0.033	0.033	0.033
				2.044	0.033	0.033	0.033
1.987	0.033	0.042	0.033	1.987	0.033	0.042	0.033

\* Note that Manning's *n*-values are increased from the base value of 0.033 to account for the severe meander in this area.



Figure 1. Channelized Portion and Overbanks of Wash T4N-R3W-S08W ( $n = 0.033$ )

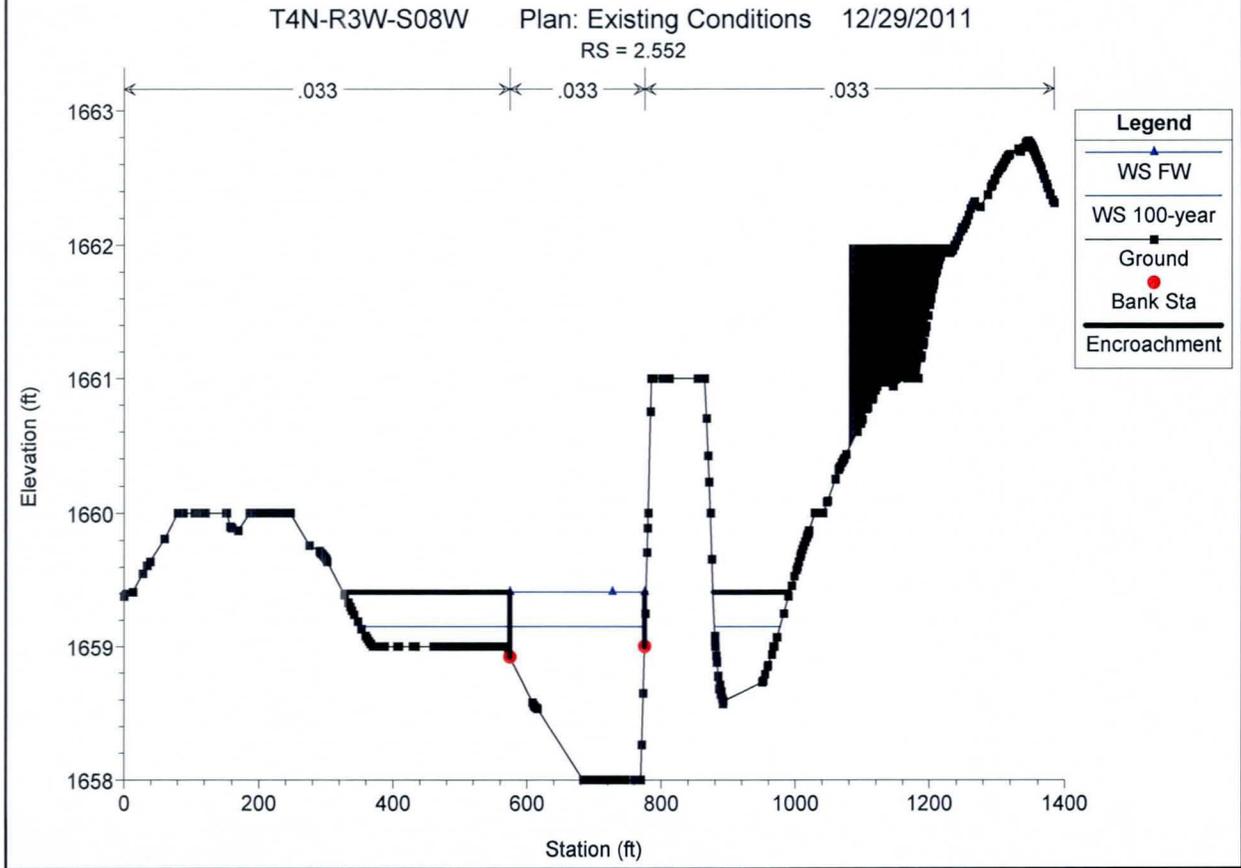
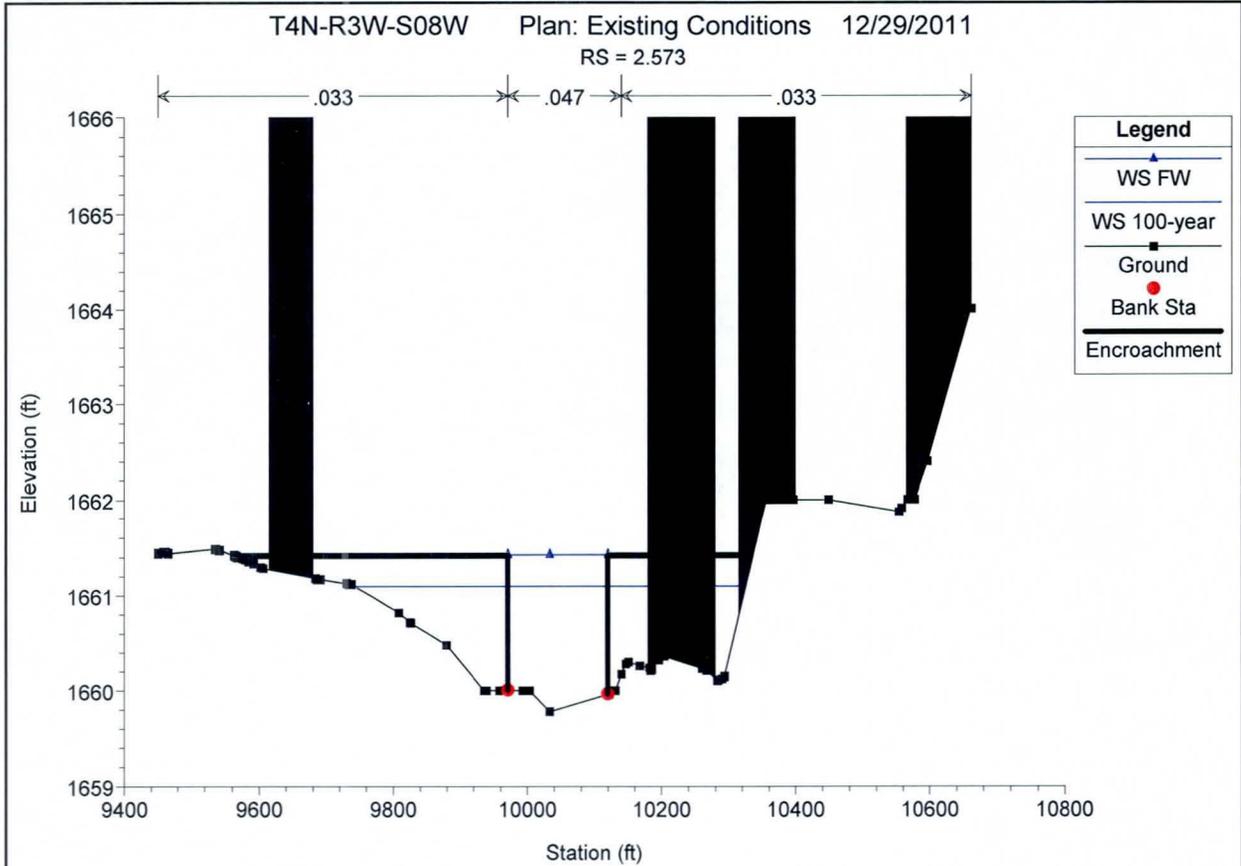


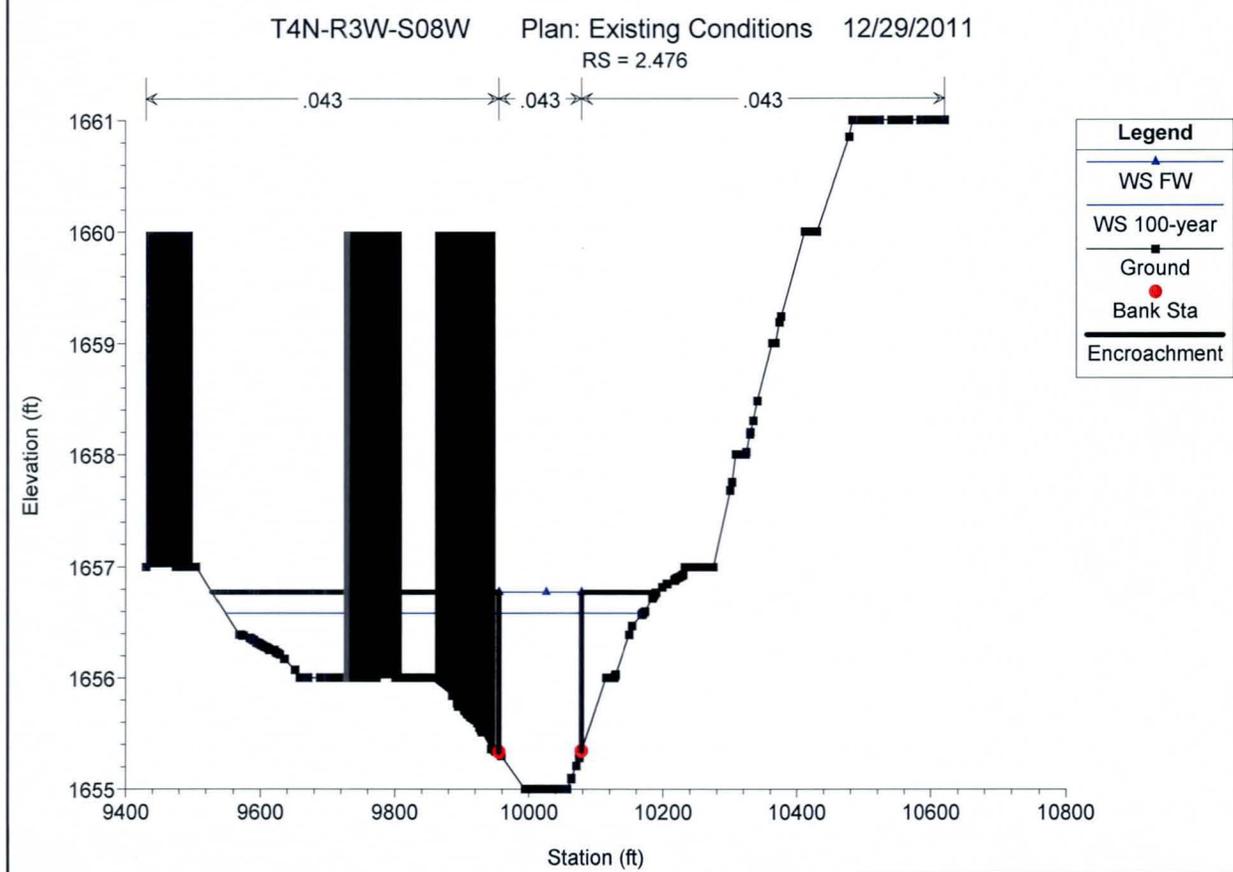
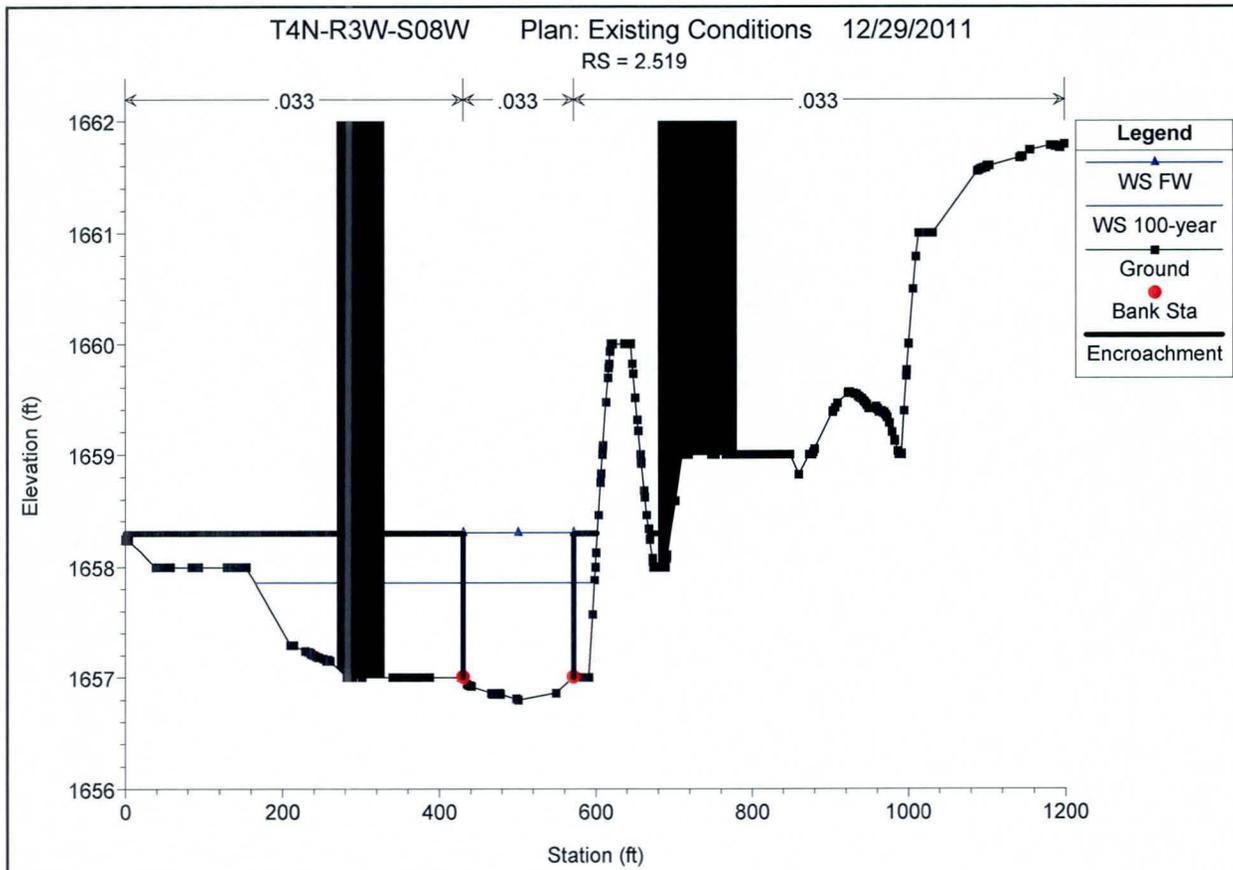
Figure 2. Example of Higher Roughness North of Patton Road ( $n = 0.047$ )

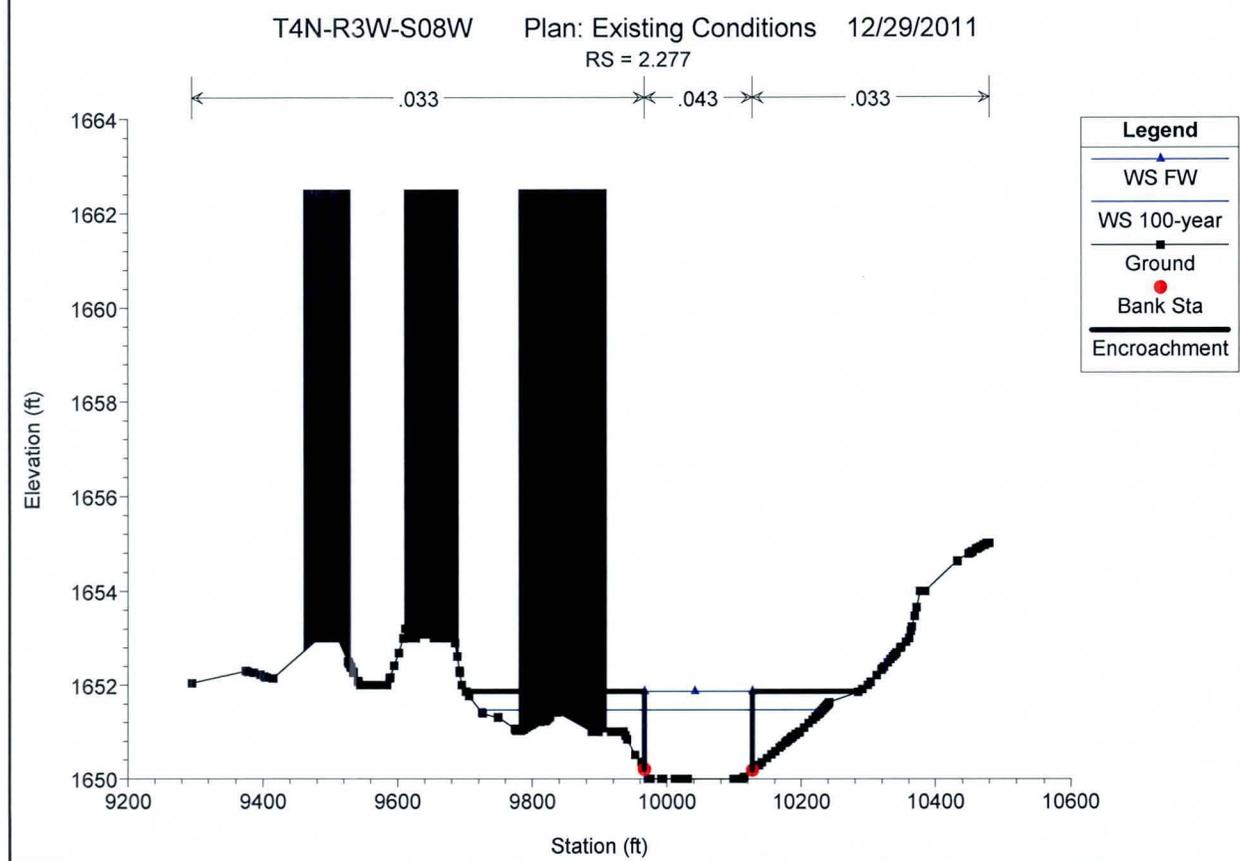
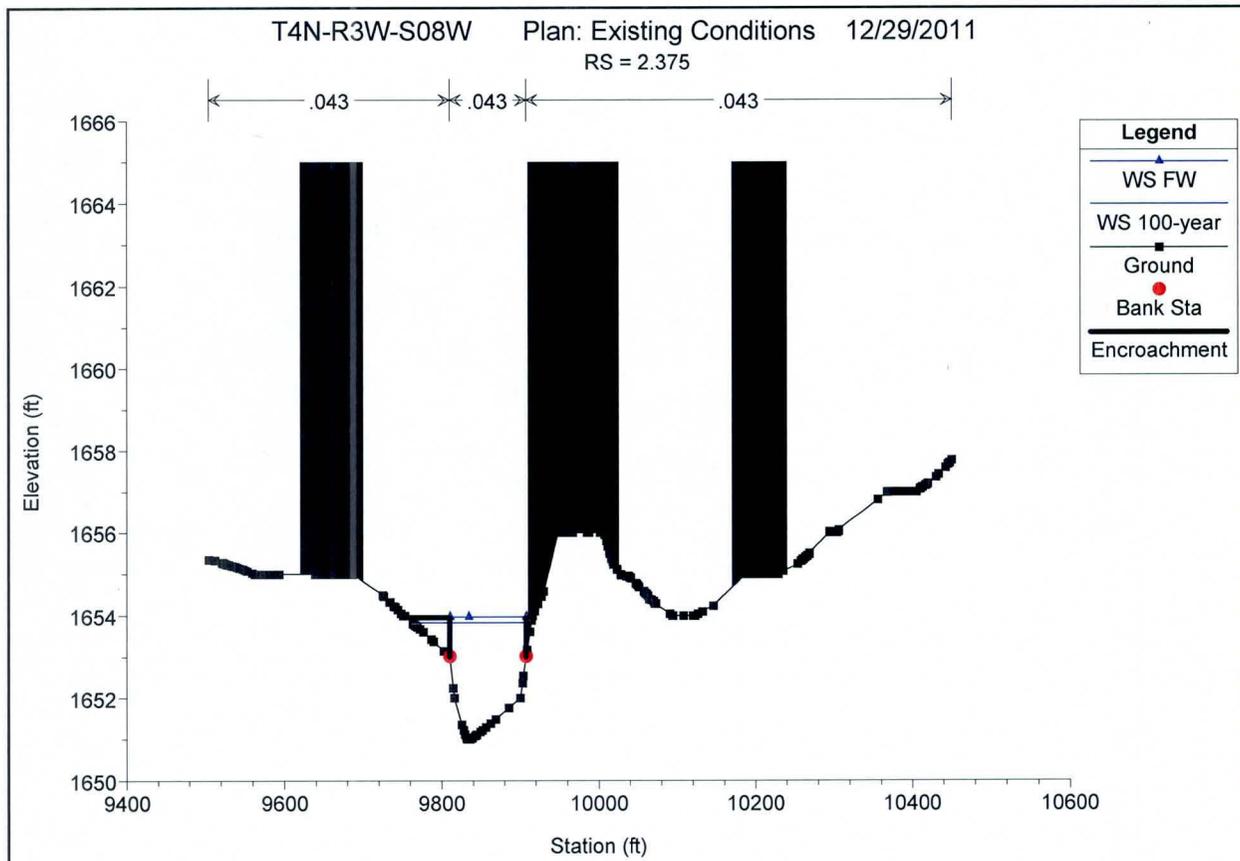


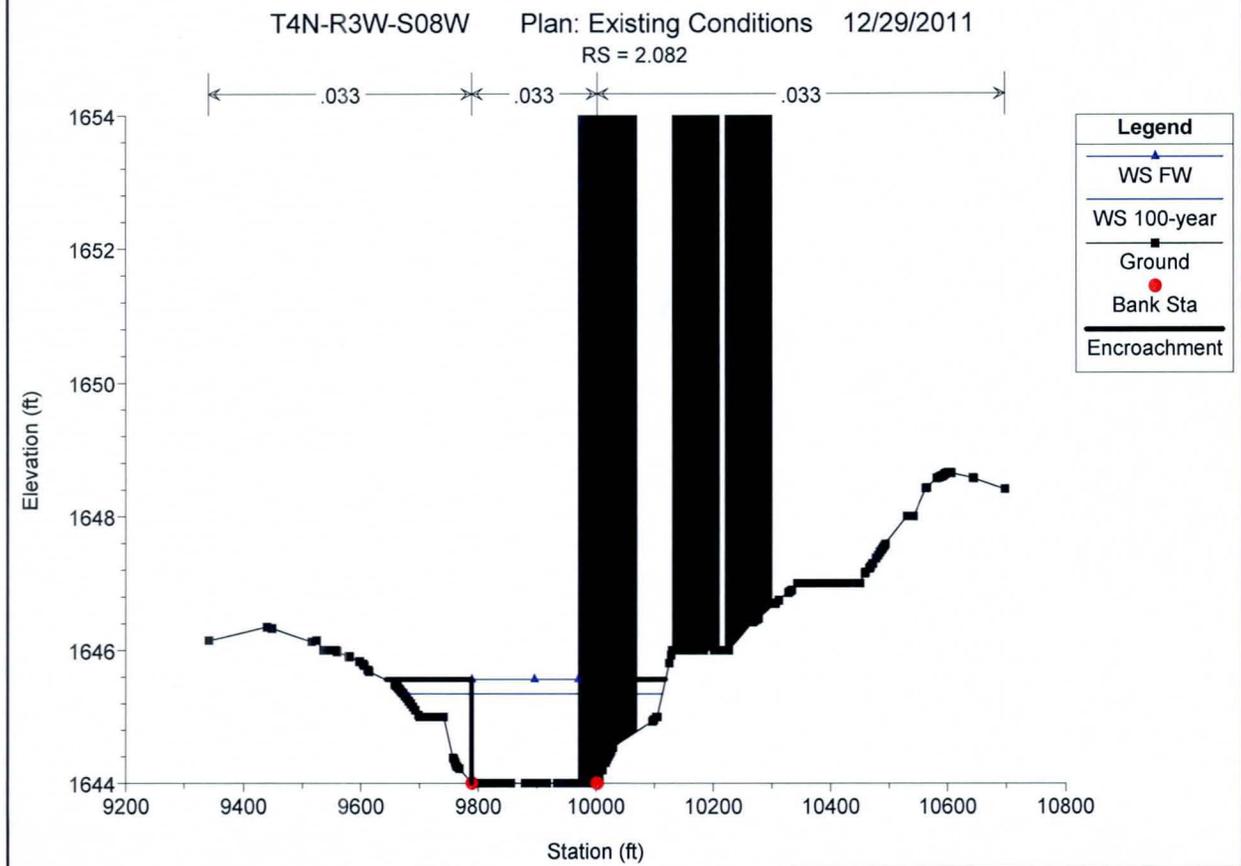
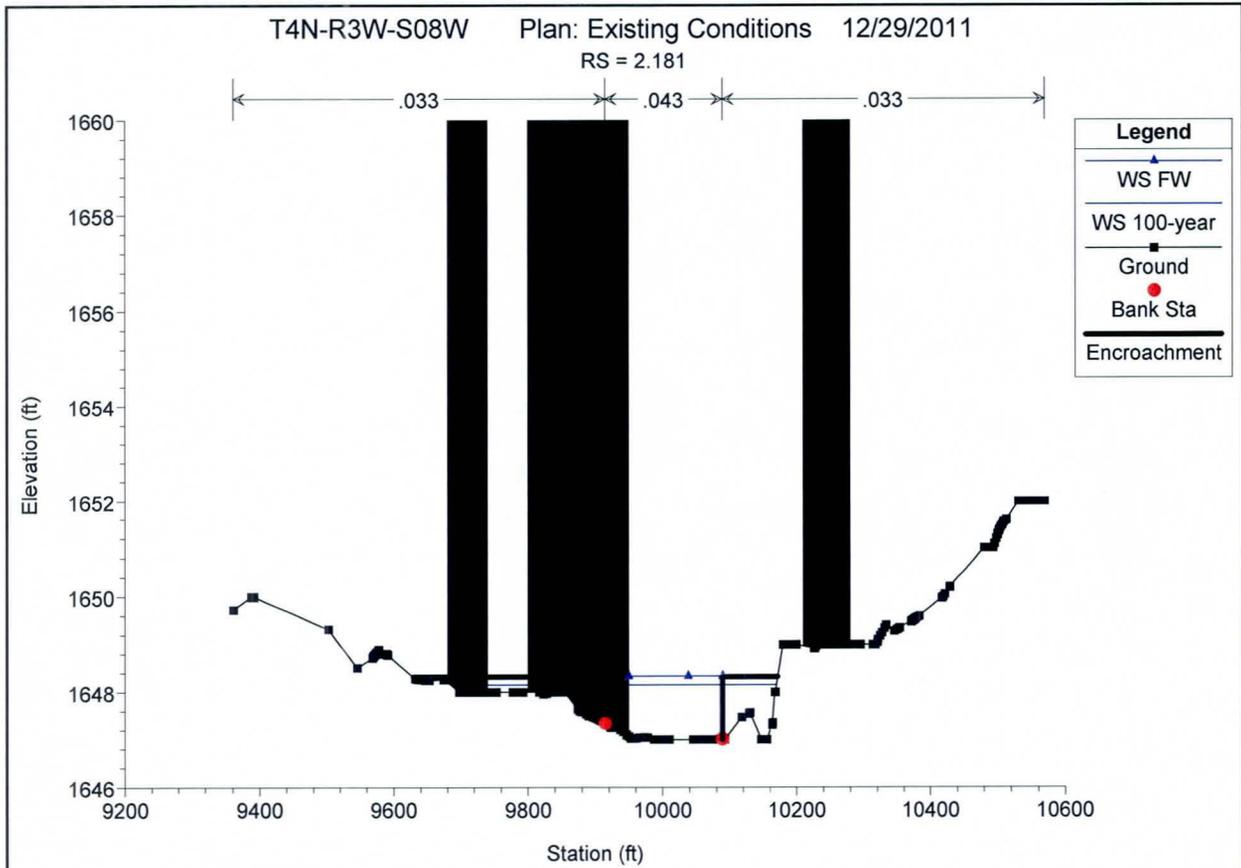
Figure 3. Channelized Portion of Wash T4N-R3W-S08W ( $n = 0.033$ )

## E.2 Cross Section Plots

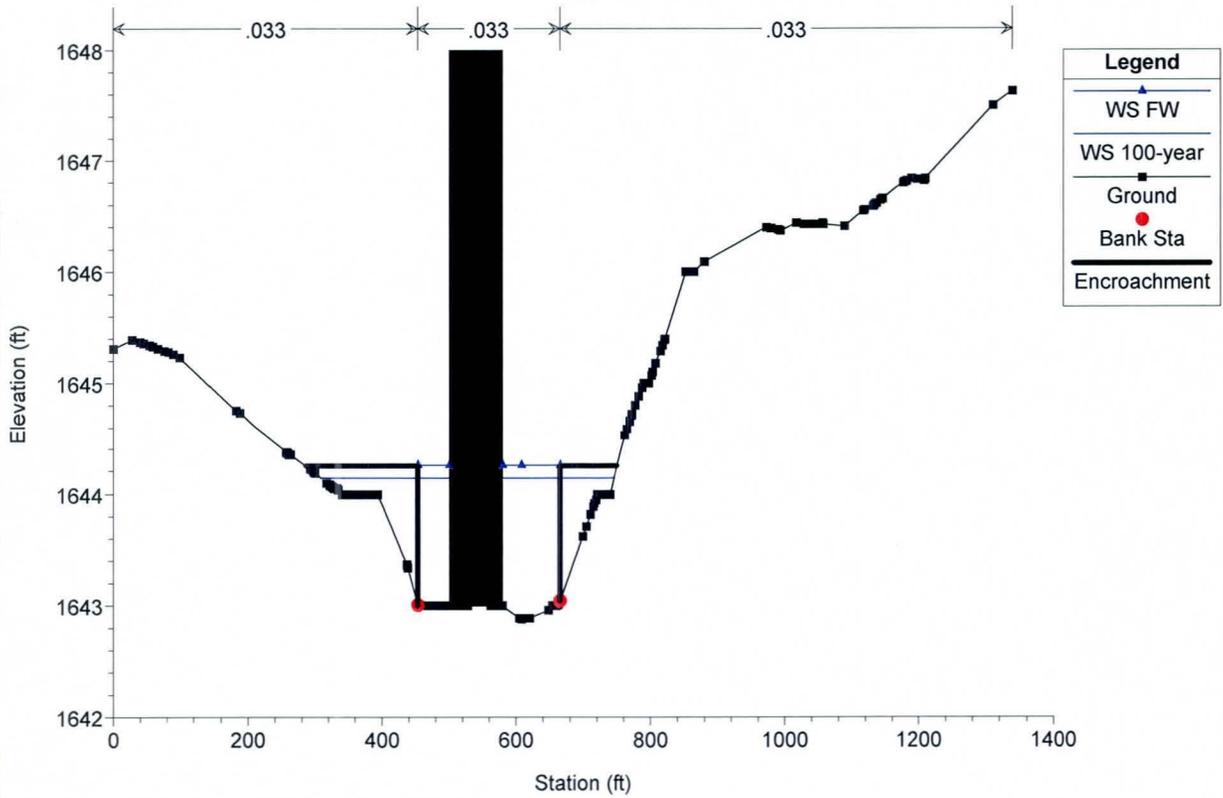




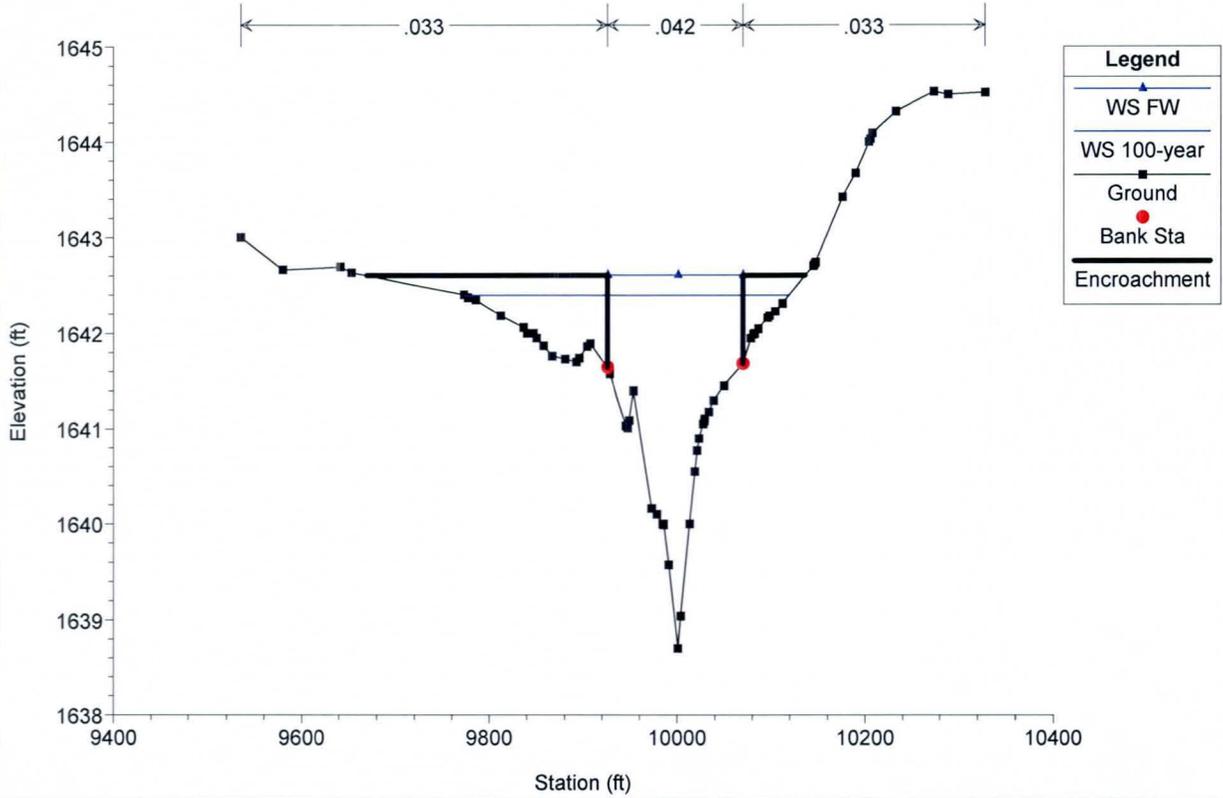




T4N-R3W-S08W Plan: Existing Conditions 12/29/2011  
RS = 2.044

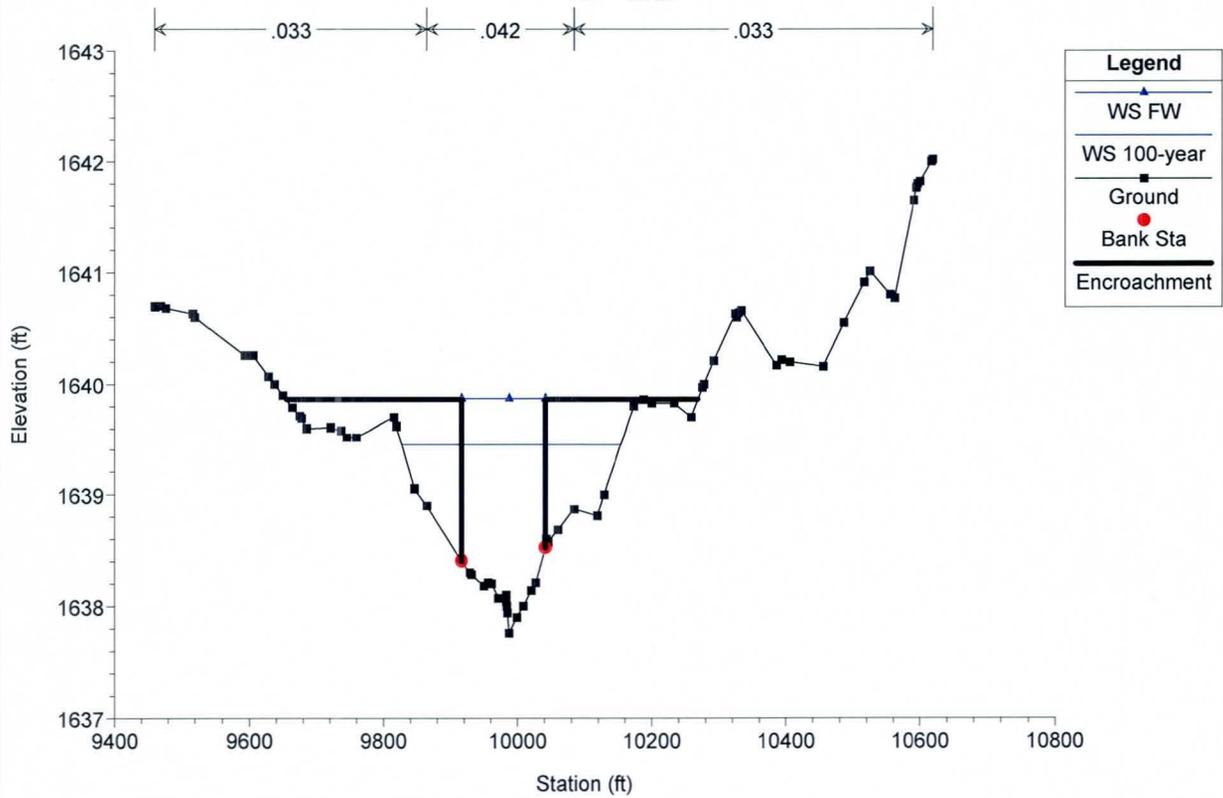


T4N-R3W-S08W Plan: Existing Conditions 12/29/2011  
RS = 1.987



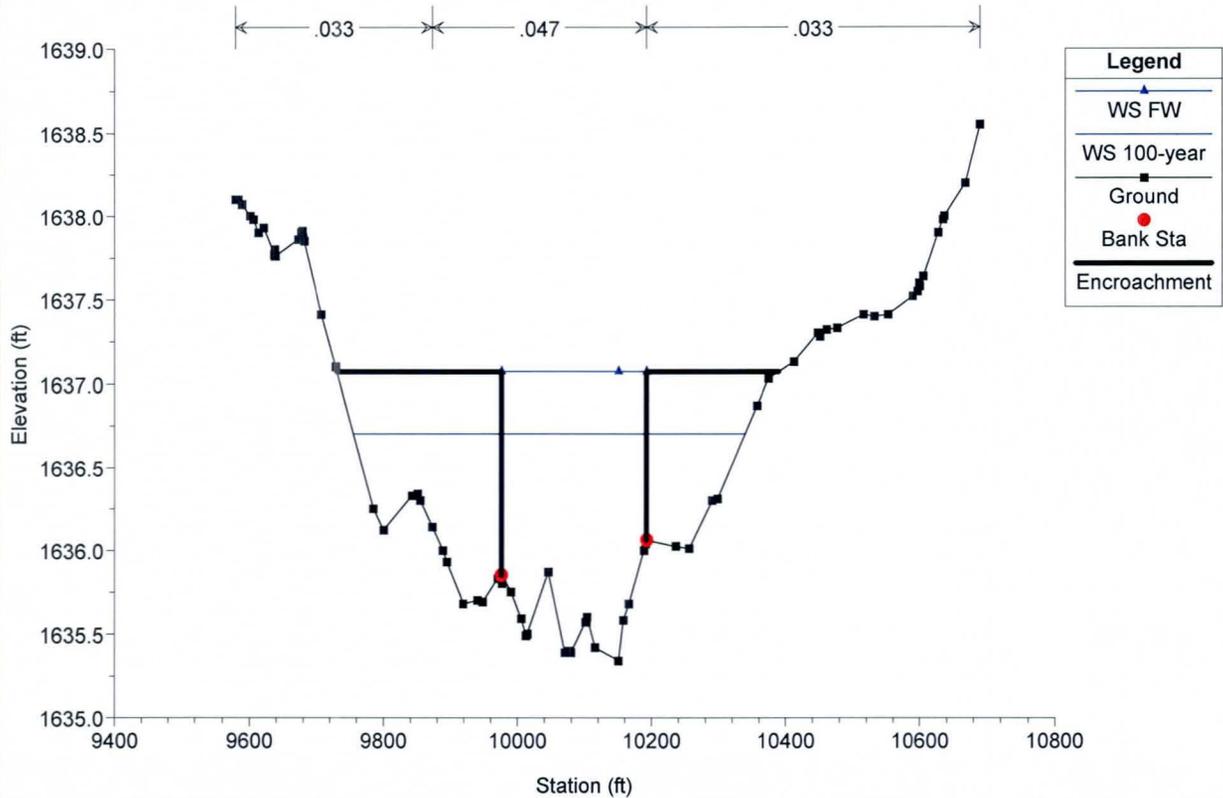
T4N-R3W-S08W Plan: Existing Conditions 12/29/2011

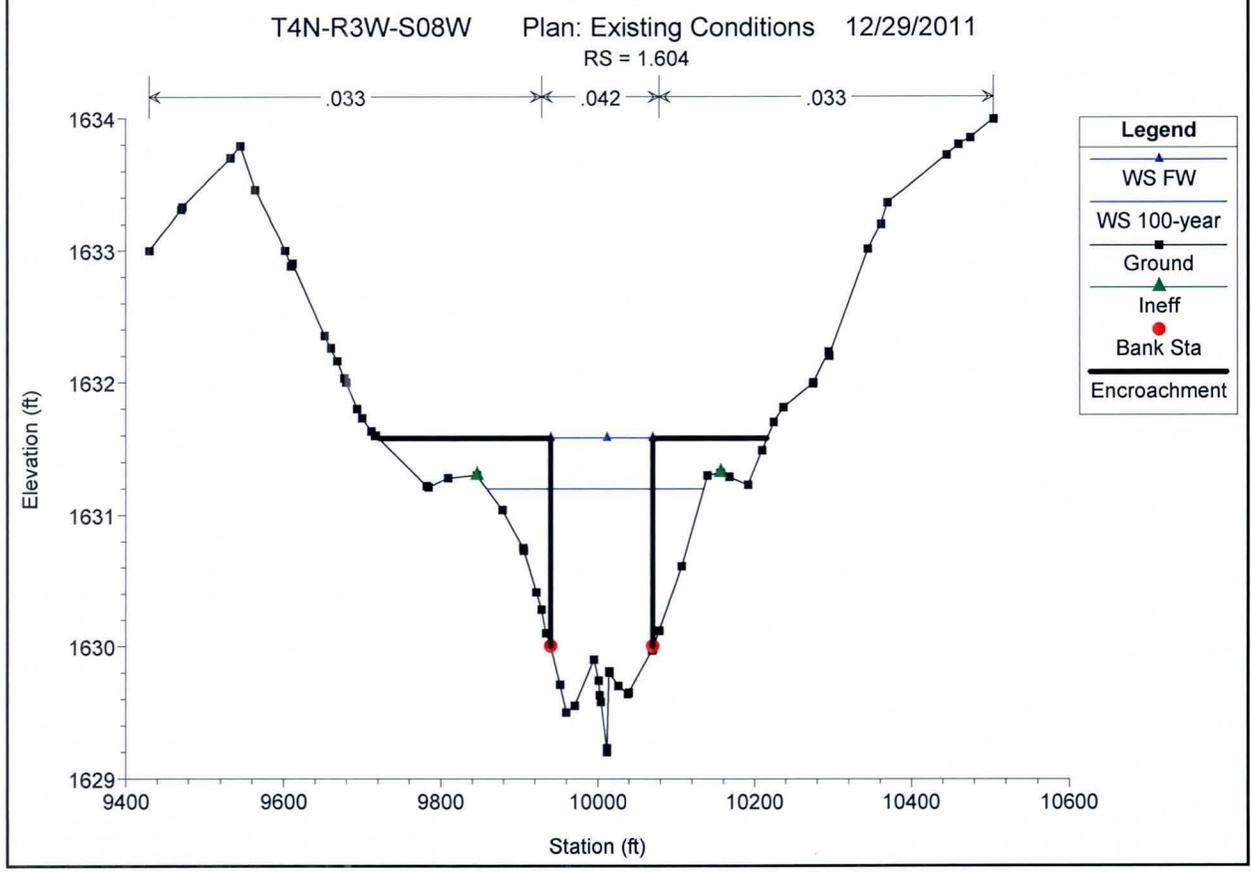
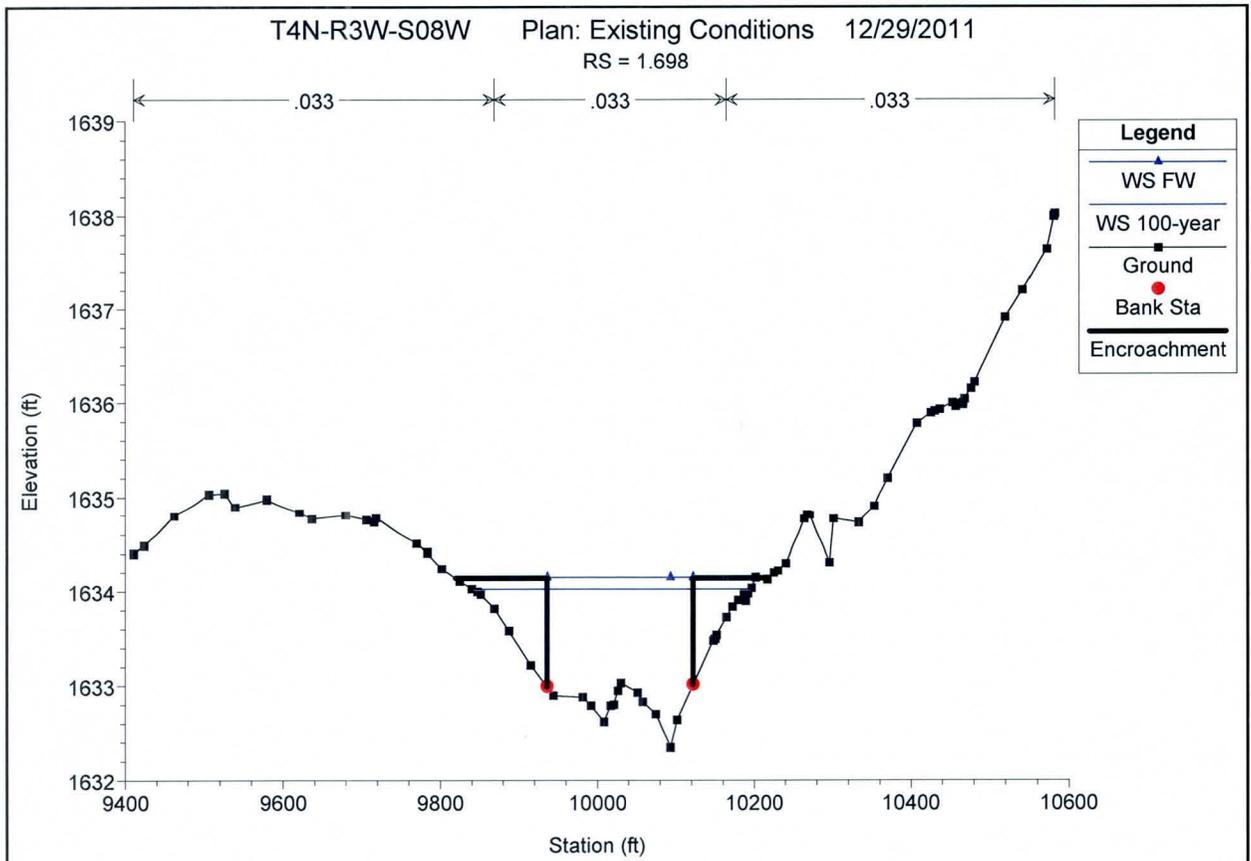
RS = 1.891

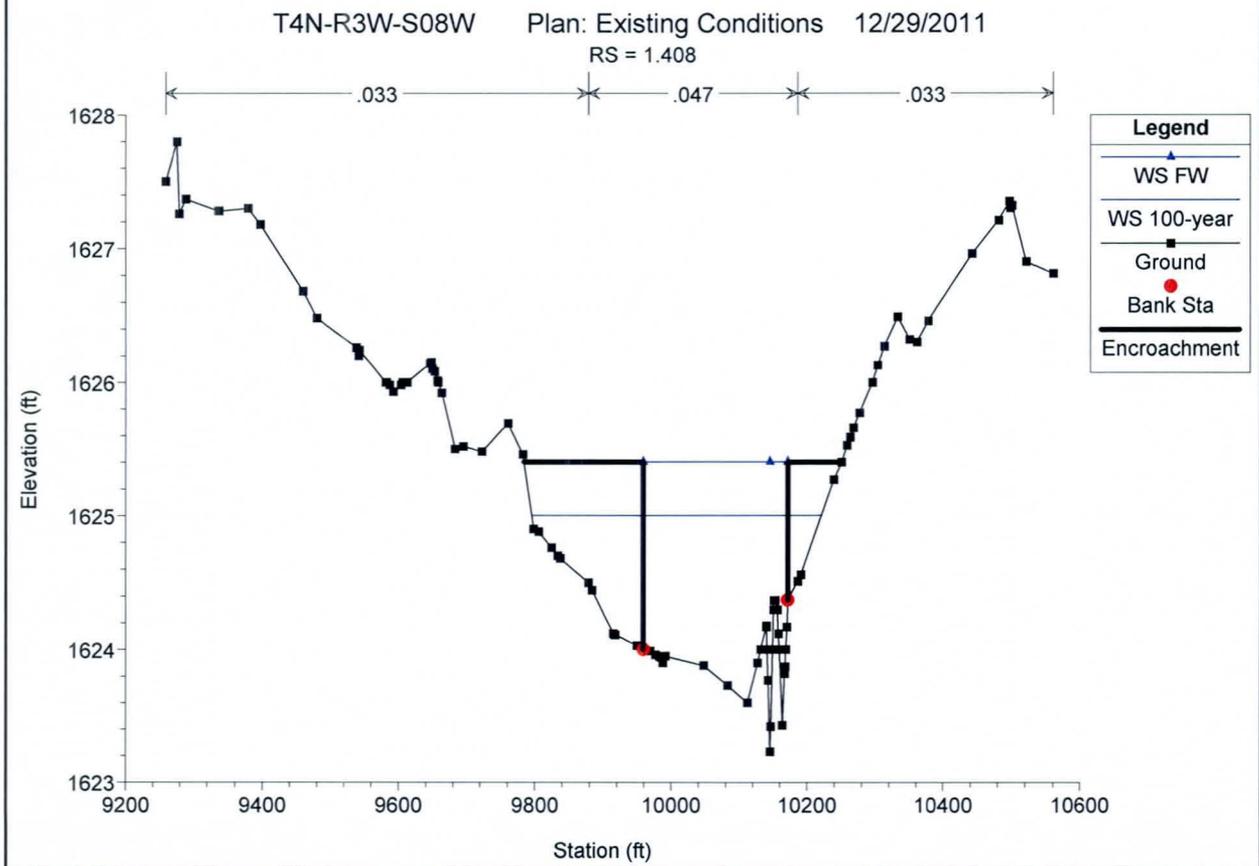
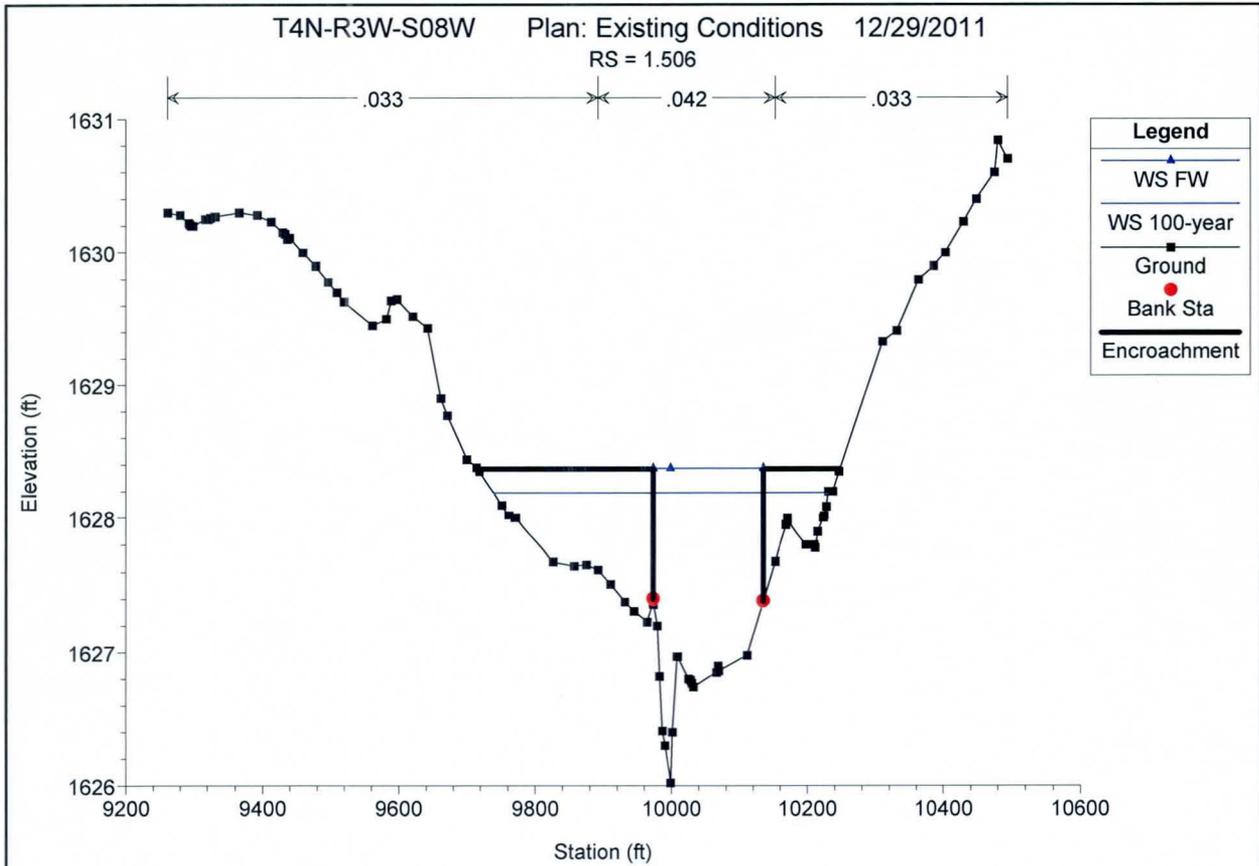


T4N-R3W-S08W Plan: Existing Conditions 12/29/2011

RS = 1.803







### E.3 Expansion and Contraction Coefficients

*Not Applicable/Not Included*

## E.4 Analysis of Structures

*Not Applicable/Not Included*

## E.5 Hydraulic Calculations

Note: The HEC RAS generated report has been submitted in electronic format only via the disk included with this report in order to greatly reduce the number of printed pages.

CHECK-RAS Program, XS Check  
Cross Section Location and Alignment Review

Project File: P:\FCDM001007 Kozlowski FPAP 02\Models\RAS\T4N-R3W-S08W\T4NR3WS08W.prj  
 Plan File: P:\FCDM001007 Kozlowski FPAP 02\Models\RAS\T4N-R3W-S08W\T4NR3WS08W.p03  
 Geometry File: P:\FCDM001007 Kozlowski FPAP 02\Models\RAS\T4N-R3W-S08W\T4NR3WS08W.g03  
 Flow File: P:\FCDM001007 Kozlowski FPAP 02\Models\RAS\T4N-R3W-S08W\T4NR3WS08W.f03  
 Report File: P:\FCDM001007 Kozlowski FPAP 02\Models\RAS\T4N-R3W-S08W\T4NR3WS08W.xls  
 Selected profiles: 100-year;FW  
 Date: 1/3/2012  
 Time: 10:43:26 AM

SECNO	Len Lob	Len Chl	Len Rob	TopWdthAct	Q Total	Flow Code
T4N-R3W-S08W, REACH-1						
2.573	274.26	280.59	286.95	470.52	880	D,B
2.552	224.34	174.85	182.05	522.63	880	D,B
2.519	245.51	223.4	172.96	371.95	880	D,B
2.476	468.08	505.84	519.35	445.95	880	D,B
2.375	497.27	549.02	568.54	147.15	910	B
2.277	509	506.1	501	379.95	910	D,B
2.181	513	520.95	508	279.92	910	D,B
2.082	203.58	200.79	198.01	340.86	910	D,B
2.044	309.5	302.46	289.24	354.76	910	D,B
1.987	481	503.55	510	344.42	910	
1.891	484	468	452	326.06	910	
1.803	655	552.38	377	584.1	950	
1.698	450	495.58	522	351.92	950	
1.604	493	519.86	509	275.76	950	
1.506	502	518.67	533	490.47	950	
1.408	957	1000.85	1037	425.42	950	

B=blocked obstruction XS SC 05  
 C=critical depth XS SC 03  
 D=divided flow XS SC 01  
 E=cross section extended XS SC 02  
 K=known water-surface XS SC 04

DISTANCE CHECK  
-----

SPACING CHECK  
-----

INEFFECTIVE FLOW CHECK  
-----

DISCHARGE CHECK  
-----

LOCATION CHECK  
-----

BOUNDARY CONDITION CHECK  
-----

XS BC 02 The name of the stream is T4N-R3W-S08W, REACH-1  
 Known WS = 1625 is specified as the downstream boundary

for profile 100-year

XS BC 02 The name of the stream is T4N-R3W-S08W, REACH-1  
Known WS = 1625.4 is specified as the downstream boundary  
for profile FW

XS BC 03 Maximum number of iterations is 0  
It should not be less than 20.

LATERAL WEIRS CHECK

-----

---END---

CHECK-RAS Program: NT Check  
Manning's n Value and Transition Loss Coefficient Review

Project File: P:\FCDM001007 Kozlowski FPAP 02\Models\RAS\T4N-R3W-S08W\T4NR3WS08W.prj  
 Plan File: P:\FCDM001007 Kozlowski FPAP 02\Models\RAS\T4N-R3W-S08W\T4NR3WS08W.p03  
 Geometry File: P:\FCDM001007 Kozlowski FPAP 02\Models\RAS\T4N-R3W-S08W\T4NR3WS08W.g03  
 Flow File: P:\FCDM001007 Kozlowski FPAP 02\Models\RAS\T4N-R3W-S08W\T4NR3WS08W.f03  
 Report File: P:\FCDM001007 Kozlowski FPAP 02\Models\RAS\T4N-R3W-S08W\T4NR3WS08W.nt  
 Selected profiles: 100-year;FW  
 Date: 1/3/2012  
 Time: 10:43:25 AM

SECNO	STRUCTURE	NLOB	NCHL	NROB	CNTR	EXP
-----						
T4N-R3W-S08W,REACH-1						
2.573		0.033	0.047	0.047	0.1	0.3
		-----	-----	0.033		
2.552		0.033	0.033	0.033	0.1	0.3
2.519		0.033	0.033	0.033	0.1	0.3
2.476		0.043	0.043	0.043	0.3	0.5
2.375		0.043	0.043	0.043	0.3	0.5
2.277		0.033	0.043	0.033	0.1	0.3
2.181		0.033	0.043	0.033	0.1	0.3
2.082		0.033	0.033	0.033	0.1	0.3
2.044		0.033	0.033	0.033	0.1	0.3
1.987		0.033	0.042	0.033	0.1	0.3
1.891		0.033	-----	-----	0.1	0.3
		0.042	-----	-----		
1.803		0.033	-----	-----	0.1	0.3
		0.047	-----	-----		
1.698		0.033	-----	-----	0.1	0.3
		0.033	-----	-----		
1.604		0.033	-----	-----	0.1	0.3
		0.042	-----	-----		
1.506		0.033	-----	-----	0.1	0.3
		0.042	-----	-----		
1.408		0.033	-----	0	0.1	0.3
		0.047	-----	0.033		
-----						

---Summary of Statistics---

	Minimum	Maximum
Left Overbank n Value:	0.033	0.047
Right Overbank n Value:	0	0.047
Channel n Value:	0.033	0.047
Contraction Coefficient:	0.1	0.3
Expansion Coefficient:	0.3	0.5

ROUGHNESS COEFFICIENT CHECK

-----

RS: 2.573  
 NT RC 01 Left overbank n value is less than 0.035  
 The n value for overbank is usually larger than 0.035.  
 The n value should be reevaluated.

RS: 2.552  
 NT RC 01 Left overbank n value is less than 0.035  
 The n value for overbank is usually larger than 0.035.  
 The n value should be reevaluated.

RS: 2.552  
 NT RC 01 Right overbank n value is less than 0.035  
 The n value for overbank is usually larger than 0.035.

The n value should be reevaluated.

RS: 2.552  
NT RC 05 The left overbank n value of 0.033 and the right overbank n value of 0.033 are less than or equal to the channel n value of 0.033  
The overbank n values should be reevaluated.

RS: 2.519  
NT RC 01 Left overbank n value is less than 0.035  
The n value for overbank is usually larger than 0.035.  
The n value should be reevaluated.

RS: 2.519  
NT RC 01 Right overbank n value is less than 0.035  
The n value for overbank is usually larger than 0.035.  
The n value should be reevaluated.

RS: 2.519  
NT RC 05 The left overbank n value of 0.033 and the right overbank n value of 0.033 are less than or equal to the channel n value of 0.033  
The overbank n values should be reevaluated.

RS: 2.476  
NT RC 05 The left overbank n value of 0.043 and the right overbank n value of 0.043 are less than or equal to the channel n value of 0.043  
The overbank n values should be reevaluated.

RS: 2.375  
NT RC 05 The left overbank n value of 0.043 and the right overbank n value of 0.043 are less than or equal to the channel n value of 0.043  
The overbank n values should be reevaluated.

RS: 2.277  
NT RC 01 Left overbank n value is less than 0.035  
The n value for overbank is usually larger than 0.035.  
The n value should be reevaluated.

RS: 2.277  
NT RC 01 Right overbank n value is less than 0.035  
The n value for overbank is usually larger than 0.035.  
The n value should be reevaluated.

RS: 2.277  
NT RC 05 The left overbank n value of 0.033 and the right overbank n value of 0.033 are less than or equal to the channel n value of 0.043  
The overbank n values should be reevaluated.

RS: 2.181  
NT RC 01 Left overbank n value is less than 0.035  
The n value for overbank is usually larger than 0.035.  
The n value should be reevaluated.

RS: 2.181  
NT RC 01 Right overbank n value is less than 0.035  
The n value for overbank is usually larger than 0.035.  
The n value should be reevaluated.

RS: 2.181  
NT RC 05 The left overbank n value of 0.033 and the right overbank n value of 0.033 are less than or equal to the channel n value of 0.043  
The overbank n values should be reevaluated.

RS: 2.082  
NT RC 01 Left overbank n value is less than 0.035  
The n value for overbank is usually larger than 0.035.  
The n value should be reevaluated.

RS: 2.082  
NT RC 01 Right overbank n value is less than 0.035  
The n value for overbank is usually larger than 0.035.  
The n value should be reevaluated.

RS: 2.082  
NT RC 05 The left overbank n value of 0.033 and the right overbank n value  
of 0.033 are less than or equal to the channel n value of 0.033  
The overbank n values should be reevaluated.

RS: 2.044  
NT RC 01 Left overbank n value is less than 0.035  
The n value for overbank is usually larger than 0.035.  
The n value should be reevaluated.

RS: 2.044  
NT RC 01 Right overbank n value is less than 0.035  
The n value for overbank is usually larger than 0.035.  
The n value should be reevaluated.

RS: 2.044  
NT RC 05 The left overbank n value of 0.033 and the right overbank n value  
of 0.033 are less than or equal to the channel n value of 0.033  
The overbank n values should be reevaluated.

RS: 1.987  
NT RC 01 Left overbank n value is less than 0.035  
The n value for overbank is usually larger than 0.035.  
The n value should be reevaluated.

RS: 1.987  
NT RC 01 Right overbank n value is less than 0.035  
The n value for overbank is usually larger than 0.035.  
The n value should be reevaluated.

RS: 1.987  
NT RC 05 The left overbank n value of 0.033 and the right overbank n value  
of 0.033 are less than or equal to the channel n value of 0.042  
The overbank n values should be reevaluated.

RS: 1.698  
NT RC 01 Left overbank n value is less than 0.035  
The n value for overbank is usually larger than 0.035.  
The n value should be reevaluated.

TRANSITION LOSS COEFFICIENT CHECK  
-----

RS: 2.476  
NT TL 02 Contraction and expansion loss coefficients are 0.3 and 0.5  
respectively. However, this cross section is not at the structure.  
They should be equal to 0.1 and 0.3.

RS: 2.375  
NT TL 02 Contraction and expansion loss coefficients are 0.3 and 0.5  
respectively. However, this cross section is not at the structure.  
They should be equal to 0.1 and 0.3.

ROUGHNESS COEFFICIENT AT STRUCTURES  
-----

---END---

CHECK-RAS Program: Floodway Check  
 Encroachment Method, Starting WSEL, Floodway Width, and Surcharge Review

Project File: P:\FCDM001007 Kozlowski FPAP 02\Models\RAS\T4N-R3W-S08W\T4NR3WS08W.prj  
 Plan File: P:\FCDM001007 Kozlowski FPAP 02\Models\RAS\T4N-R3W-S08W\T4NR3WS08W.p03  
 Geometry File: P:\FCDM001007 Kozlowski FPAP 02\Models\RAS\T4N-R3W-S08W\T4NR3WS08W.g03  
 Flow File: P:\FCDM001007 Kozlowski FPAP 02\Models\RAS\T4N-R3W-S08W\T4NR3WS08W.f03  
 Report File: P:\FCDM001007 Kozlowski FPAP 02\Models\RAS\T4N-R3W-S08W\T4NR3WS08W.fw  
 Selected profiles: 100-year;FW  
 Date: 1/3/2012  
 Time: 10:43:28 AM

SECNO	Method	Surcharge	EncStaL	EncStaR	LStaEff	RStaEff	Structure
T4N-R3W-S08W, REACH-1							
2.573					9744.48	10315	
2.573	19	0.32	9971.13	10119.69	9971.13	10119.69	
2.552					351.44	977.4	
2.552	1	0.26	574.5	775.5	574.5	775.5	
2.519					166.1	598.05	
2.519	1	0.44	430.17	571.47	430.17	571.47	
2.476					9548.86	10169.81	
2.476	19	0.19	9955.48	10078.17	9955.48	10078.17	
2.375					9762.85	9910	
2.375	19	0.15	9810.16	9907.53	9810.16	9907.53	
2.277					9721.76	10231.71	
2.277	19	0.39	9967.06	10127.32	9967.06	10127.32	
2.181					9740	10169.92	
2.181	19	0.18	9914.52	10089.24	9950	10089.24	
2.082					9672.55	10113.41	
2.082	19	0.22	9788.98	10002	9788.98	9970	
2.044					310.75	745.51	
2.044	1	0.12	453.63	665.47	453.63	665.47	
1.987					9774.38	10118.8	
1.987	19	0.21	9925.71	10069.59	9925.71	10069.59	
1.891					9827.45	10153.51	
1.891	19	0.42	9916.28	10041.33	9916.28	10041.33	
1.803					9755.08	10339.18	
1.803	19	0.37	9976.12	10192.68	9976.12	10192.68	
1.698					9842.97	10194.9	
1.698	19	0.13	9936.03	10122.27	9936.03	10122.27	
1.604					9859.18	10134.94	
1.604	19	0.38	9939.91	10070.33	9939.91	10070.33	
1.506					9740.03	10230.5	
1.506	19	0.18	9973.77	10135.22	9973.77	10135.22	
1.408					9795.52	10220.94	
1.408	19	0.4	9959.67	10171.91	9959.67	10171.91	

ENCROACHMENT METHOD CHECK

FLOODWAY WIDTH CHECK

RS: 2.552  
 FW FW 03 The right channel bank station may not be at the proper location.

RS: 2.519  
 FW FW 03 The right channel bank station may not be at the proper location.

RS: 2.476

FW FW 03 The right channel bank station may not be at the proper location.

RS: 2.375  
FW FW 03 The right channel bank station may not be at the proper location.

RS: 2.277  
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 2.277  
FW FW 03 The right channel bank station may not be at the proper location.

RS: 2.181  
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 2.181  
FW FW 03 The right channel bank station may not be at the proper location.

RS: 2.082  
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 2.082  
FW FW 03 The right channel bank station may not be at the proper location.

RS: 2.044  
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 2.044  
FW FW 03 The right channel bank station may not be at the proper location.

RS: 1.987  
FW FW 03 The right channel bank station may not be at the proper location.

RS: 1.891  
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 1.891  
FW FW 03 The right channel bank station may not be at the proper location.

RS: 1.803  
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 1.698  
FW FW 03 The right channel bank station may not be at the proper location.

RS: 1.604  
FW FW 03 The right channel bank station may not be at the proper location.

RS: 1.408  
FW FW 03 The Left channel bank station may not be at the proper location.

SURCHARGE CHECK

-----

DISCHARGE CHECK

-----

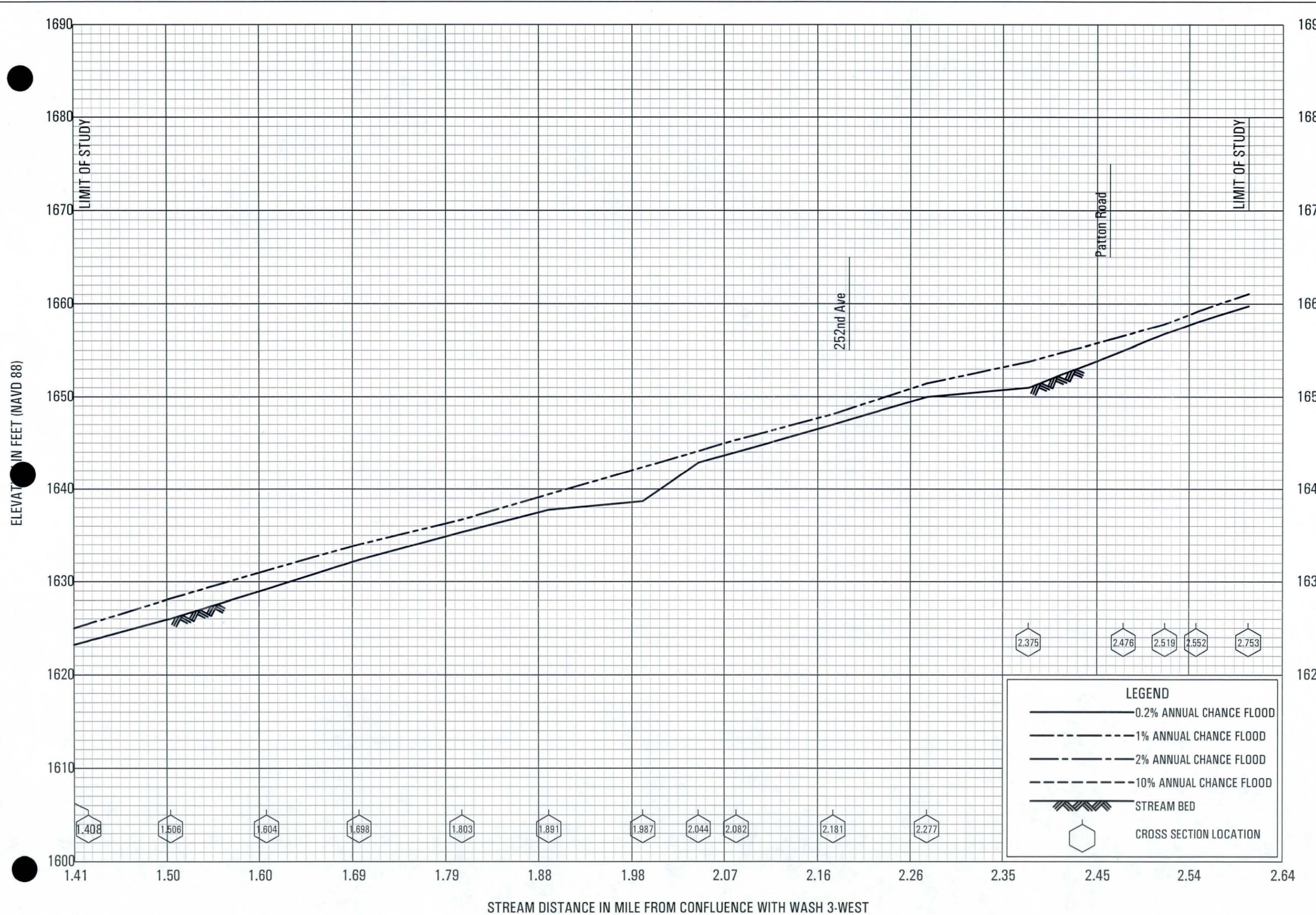
STARTING WATER-SURFACE ELEVATION CHECK

-----

---END---

F. Erosion and Sediment Transport Analysis Supporting  
Documentation

*Not Applicable/Not Included*

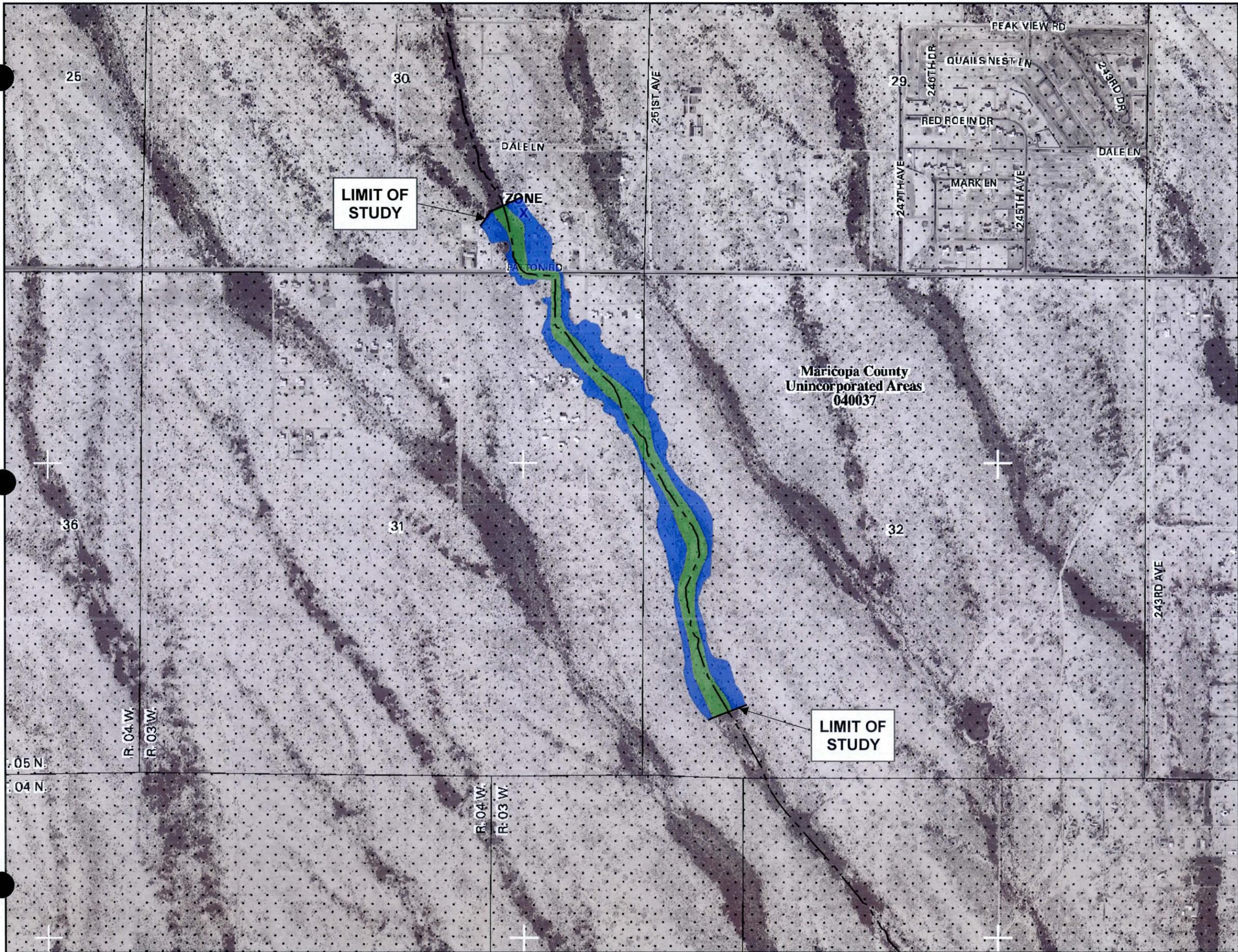


**FLOOD PROFILES**

T4N-R3W-S08W

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**MARICOPA COUNTY, AZ**  
 AND INCORPORATED AREAS

01P



**LEGEND**

-  PROFILE BASELINE
-  REVISED FLOODWAY
-  REVISED ZONE AE



**APPROXIMATE SCALE**



**NFIP** PANEL 1105H

**FIRM**  
FLOOD INSURANCE RATE MAP

**MARICOPA COUNTY, ARIZONA**  
(AND INCORPORATED AREAS)

ONLY PANEL PRINTED

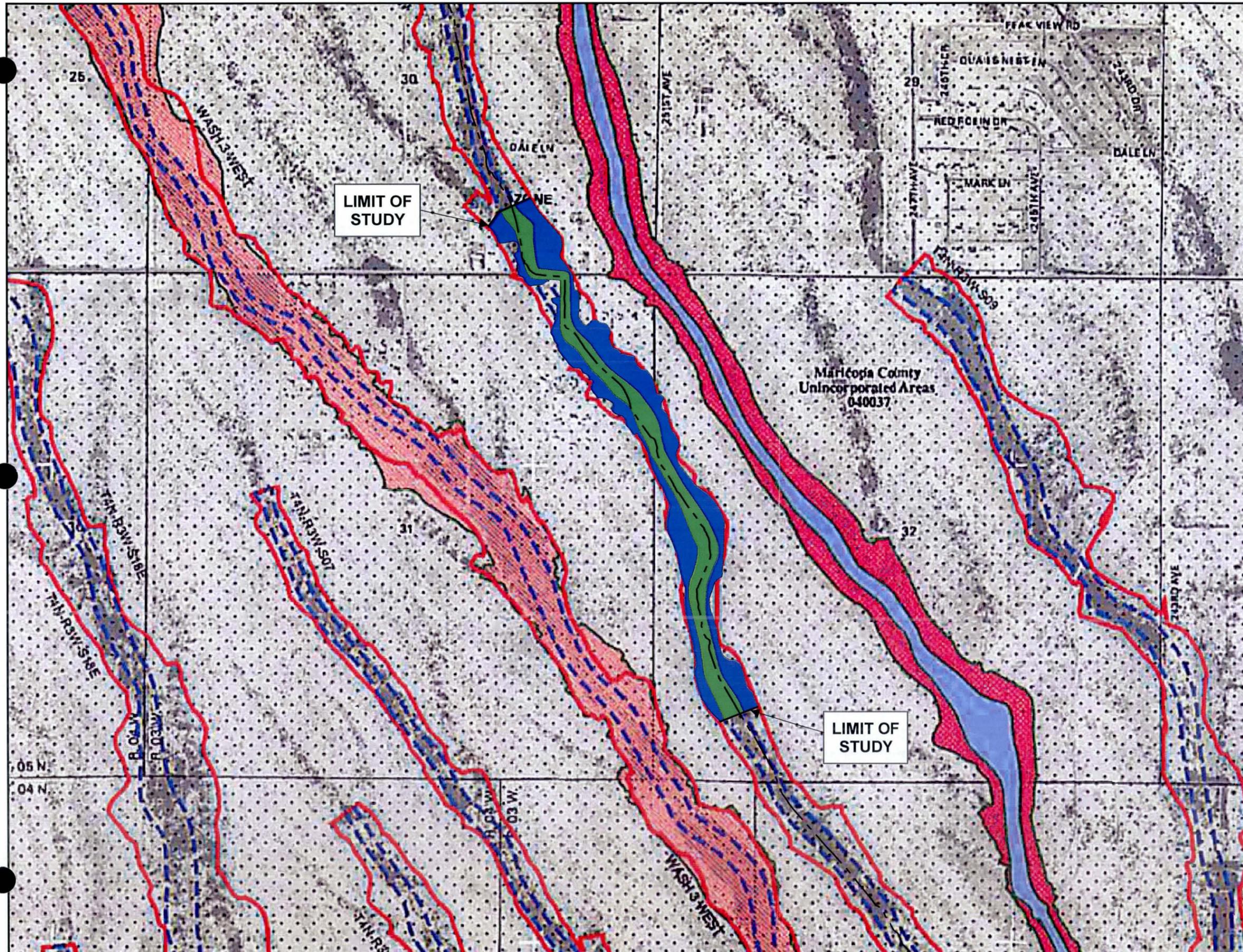
COMMUNITY-PANEL NUMBER  
04013C1105H

EFFECTIVE DATE  
SEPTEMBER 30, 2005



Federal Emergency Management Agency

**NATIONAL FLOOD INSURANCE PROGRAM**

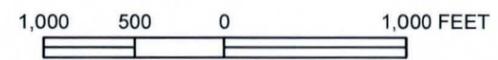


**LEGEND**

-  PROFILE BASELINE
-  REVISED FLOODWAY
-  REVISED ZONE AE



**APPROXIMATE SCALE**



PANEL 1105H

FIRM

FLOOD INSURANCE RATE MAP

**MARICOPA COUNTY,  
ARIZONA**  
(AND INCORPORATED AREAS)

ONLY PANEL PRINTED

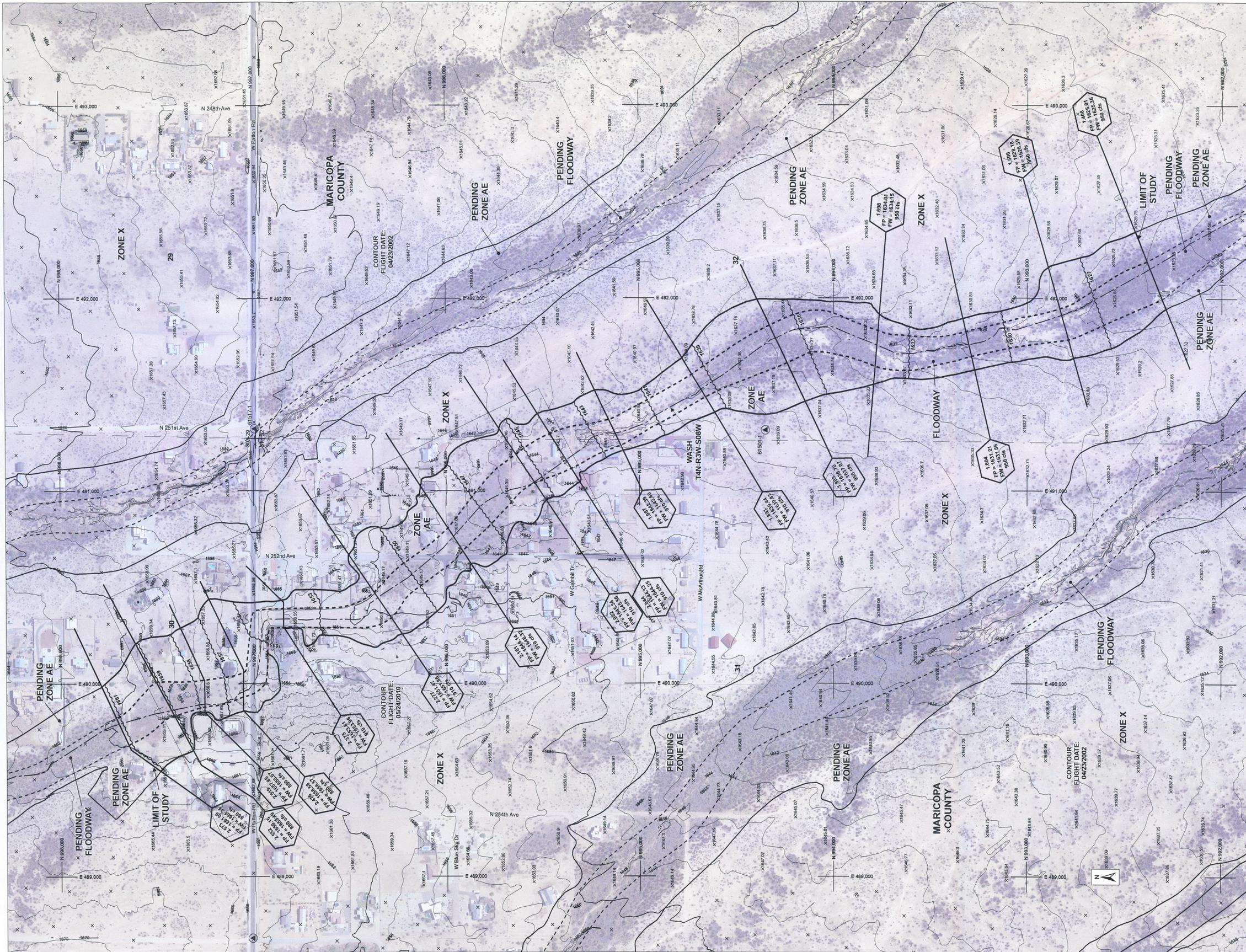
COMMUNITY-PANEL NUMBER  
04013C1105H

EFFECTIVE DATE  
SEPTEMBER 30, 2005



Federal Emergency Management Agency

NFP  
 NATIONAL FLOOD INSURANCE PROGRAM



**LEGEND**

- 1% ANNUAL CHANCE FLOOD BOUNDARY
- FLOODWAY BOUNDARY
- BASE FLOOD ELEVATION 1639
- Cross Section River Mile Designation
  - Floodplain Water Surface Elevation FP = 2222.33
  - Floodway Water Surface Elevation FW = 2222.33
  - 100-year Discharge 3333 cfs
- HYDRAULIC BASELINE
- ELEV. REFERENCE MARK
- SECTION LINE AND ID

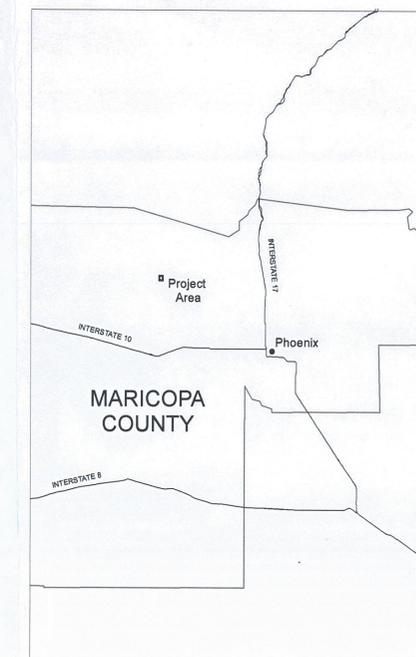
**ELEVATION REFERENCE MARKS**

NOTE: ALL ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988.  
ELEVATION CONVERSION FACTOR:  
NGVD29 ELEV. = NAVD88 ELEV. - 2.00 FT.

I.D. NUMBER	ELEV. (FT)	DESCRIPTION/LOCATION
61501-1	1639.2	FD 1" IP 0.4" UP W/ 2" BC STAMPED "S31 S32 E 1/4 LS 15919"
61517-1	1650.755	FD 2" BC FL STAMPED "S30 S29 S32 S31 LS 15919"

**NOTES**

- 1) ALL AREAS DESIGNATED ZONE X ARE UNSHADED ZONE X, EXCEPT WHERE NOTED.
- 2) AREA LOCATED IN TOWNSHIP 5N, RANGE 3W, SECTIONS 29-32.



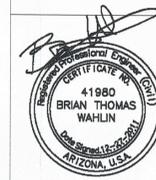
250 125 0 250 500

SCALE: 1" = 250 FEET  
CONTOUR INTERVAL = 1-2 FEET

CONTOUR FLIGHT DATES NOTED ON MAP

**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY**

**WASH T4N-R3W-S08W  
KOZLOWSKI FLOODPRONE PROPERTIES  
ASSISTANCE PROGRAM  
DRAFT**  
F.C.D. CONTRACT NUMBER 2010C027  
ASSIGNMENT NUMBER 7



WEST Consultants, Inc.

	BY	DATE
DESIGN	---	---
DESIGN CHECK	---	---
PLANS	SJV	1/12
PLANS CHECK	BTW	1/12