

**HASSAYAMPA RIVER  
US-93 INTERIM WICKENBURG BYPASS  
Arizona Department of Transportation**



**CLOMR PACKAGE FOR ZONE AE FLOODPLAIN  
& FLOODWAY ANALYSIS  
(FINAL)**

**Maricopa County**

Prepared for:

**JE JACOBS**

**Jacobs Engineering Group, Inc.**  
875 West Elliot Road, Suite 201  
Tempe, Arizona 85284

Prepared by:



**WEST Consultants, Inc.**  
960 West Elliot Road, Suite 201  
Tempe, Arizona 85284-1137

January 2006





# Federal Emergency Management Agency

Washington, D.C. 20472

JUL 03 2007

CERTIFIED MAIL  
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:  
Case No.: 07-09-0858R

The Honorable Ron Badowski  
Mayor, Town of Wickenburg  
155 North Tegner  
Wickenburg, AZ 85390

Community: Town of Wickenburg, AZ  
Community No.: 040056

104

Dear Mayor Badowski:

This responds to a request that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) comment on the effects that a proposed project would have on the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for Maricopa County, Arizona and Incorporated Areas (the effective FIRM and FIS report for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated February 16, 2007, Mr. Berwyn S. Wilbrink, P.E., Project Manager, Jacobs Civil Inc., requested that FEMA evaluate the effects that the proposed Hassayampa River Bridge, changes to the existing U.S. Highway 60 (US60) overpass, and a proposed levee, along with updated topographic information along the Hassayampa River from approximately 1,100 feet downstream to approximately 9,600 feet upstream of the existing US60 overpass, would have on the flood hazard information shown on the effective FIRM and FIS report.

This revision request also affects the unincorporated areas of Maricopa County on the left overbank of the Hassayampa River from approximately 5,320 feet upstream to approximately 9,600 feet upstream of the existing US60 overpass and on the right overbank of the Hassayampa River from approximately 8,500 feet upstream to approximately 9,600 feet upstream of the existing US60 overpass. Therefore, a separate Conditional Letter of Map Revision (CLOMR) for that community was issued on the same date as this CLOMR.

The proposed project will involve construction of the Hassayampa River Bridge, a new 500-foot, 5-span concrete bridge, that will serve as the new US60 and U.S. Highway 93 (US93) overpass. The existing US60 overpass will be altered as part of this project: the upstream (1936) bridge will be eliminated, and the downstream (1962) bridge will be elevated by 2 feet. The proposed project also will include construction north of the bridges of an elevated US93 roadway that will serve as a levee.

All data required to complete our review of this CLOMR request were submitted with letters from Mr. Wilbrink.

We reviewed the submitted data and the data used to prepare the effective FIRM for your community and determined that the proposed project meets the minimum floodplain management criteria of the NFIP. The submitted existing conditions HEC-RAS hydraulic computer model, dated December 7, 2005, based on updated topographic information, was used as the base conditions model in our review of the proposed conditions model for this CLOMR request. We believe that, if the proposed project is constructed as shown in the submitted report entitled "Hassayampa River US-93 Interim Wickenburg Bypass CLOMR Package for Zone AE Floodplain and Floodway Analysis (Final)," prepared by West Consultants, Inc., dated January 2006, and the data listed below are received, the floodplain boundaries of the base (1-percent-annual-chance) flood and the 0.2-percent-annual-chance flood will be delineated as shown on

the work maps entitled "U.S. 93 Interim Wickenburg Bypass," prepared by West Consultants, Inc., dated January 2006 and revised March 2007.

The existing conditions model was based on updated topographic information. Our comparison of existing conditions to the effective flood hazard information revealed that the Base Flood Elevations (BFEs) for the Hassayampa River increased in some areas and decreased in some areas. The maximum increase in BFE, 3.6 feet, occurred approximately 40 feet upstream of the existing US60 overpass. The maximum decrease in BFE, 1.2 feet, occurred approximately 5,660 feet upstream of the existing US60 overpass.

The proposed conditions model incorporated the proposed Hassayampa River Bridge, changes to the existing US60 overpass, and proposed US93 elevated roadway/levee. As a result of the proposed project, the BFEs for the Hassayampa River will increase in some areas and decrease in other areas compared to the existing conditions BFEs. The maximum increase in BFE, 0.7 foot, will occur approximately 5,660 feet upstream of the existing US60 overpass. The maximum decrease in BFE, 6.5 feet, will occur approximately 90 feet upstream of the existing US60 overpass.

As a result of the proposed project and updated topographic information, the BFEs for the Hassayampa River will increase in some areas and decrease in other areas compared to the effective BFEs. The maximum increase in BFE, 1.3 feet, will occur approximately 1,160 feet upstream of the existing US60 overpass. The maximum decrease in BFE, 2.7 feet, will occur approximately 90 feet upstream of the existing US60 overpass. The width of the Special Flood Hazard Area (SFHA), the area that would be inundated by the base flood, will increase in some areas and decrease in other areas compared to the effective SFHA width along the Hassayampa River. The maximum increase in SFHA width, approximately 70 feet, will occur approximately 8,330 feet upstream of the existing US60 overpass. The maximum decrease in SFHA width, approximately 570 feet, will occur approximately 3,410 feet upstream of the existing US60 overpass.

As a result of the proposed project and updated topographic information, the width of the regulatory floodway will increase in some areas and decrease in other areas compared to the effective floodway width along the Hassayampa River. The maximum increase in floodway width, approximately 90 feet, will occur approximately 4,130 feet upstream of the existing US60 overpass. The maximum decrease in floodway width, approximately 520 feet, will occur approximately 1,160 feet upstream of the existing US60 overpass.

Upon completion of the project, your community may submit the data listed below and request that we make a final determination on revising the effective FIRM and FIS report.

- Detailed application and certification forms, which were used in processing this request, must be used for requesting final revisions to the maps. Therefore, when the map revision request for the area covered by this letter is submitted, Form 1, entitled "Overview & Concurrence Form," must be included. (A copy of this form is enclosed.)
- The detailed application and certification forms listed below may be required if as-built conditions differ from the preliminary plans. If required, please submit new forms (copies of which are enclosed) or annotated copies of the previously submitted forms showing the revised information.

Form 2, entitled "Riverine Hydrology & Hydraulics Form"

Form 3, entitled "Riverine Structures Form"

Hydraulic analyses, for as-built conditions, of the base flood; the 10-percent-, 2-percent-, and 0.2-percent-annual-chance floods; and the regulatory floodway, together with a topographic work map showing the revised floodplain and floodway boundaries, must be submitted with Form 2.

- Effective October 30, 2005, FEMA revised the fee schedule for reviewing and processing requests for conditional and final modifications to published flood information and maps. In accordance with this schedule, the current fee for this map revision request is \$4,000 and must be received before we can begin processing the request. Please note, however, that the fee schedule is subject to change, and requesters are required to submit the fee in effect at the time of the submittal. Payment of this fee shall be made in the form of a check or money order, made payable in U.S. funds to the National Flood Insurance Program, or by credit card (Visa or MasterCard only). The payment, along with the revision application, must be forwarded to the following address:

FEMA National Service Provider  
3601 Eisenhower Avenue  
Alexandria, VA 22304-6425

- As-built plans, certified by a registered professional engineer, of all proposed project elements
- Community acknowledgment of the map revision request
- A copy of the public notice distributed by your community stating its intent to revise the regulatory floodway, or a statement by your community that it has notified all affected property owners and affected adjacent jurisdictions
- An officially adopted maintenance and operation plan for the Hassayampa River levee. This plan, which may be in the form of a written statement from the community Chief Executive Officer, an ordinance, or other legislation, must describe the nature of the maintenance activities, the frequency with which they will be performed, and the title of the local community official who will be responsible for ensuring that the maintenance activities are accomplished.
- Evidence of notification of all property owners who will be affected by any increases in width and/or shifting of the base floodplain and/or increases in BFE
- We currently are processing a CLOMR request, submitted January 30, 2007 (Case No. 07-09-0738R), that proposes to revise a reach of Sols Wash that influences the flooding in the revised reach for this CLOMR. Flood protection described in this CLOMR is incomplete without the proposed changes described in the submittal for Case No. 07-09-0738R. Therefore, the Letter of Map Revision that follows this CLOMR must also incorporate the changes described in Case No. 07-09-0738R for FEMA to revise the FIRM as described in this CLOMR.

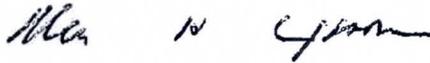
After receiving appropriate documentation to show that the project has been completed, FEMA will initiate a revision to the FIRM and FIS report. Because the BFEs would change as a result of the project, a 90-day appeal period would be initiated, during which community officials and interested persons may appeal the revised BFEs based on scientific or technical data.

This CLOMR is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development and for ensuring all necessary permits required by Federal or State law have been received. State, county, and community officials, based on

knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the Consultation Coordination Officer (CCO) for your community. Information on the CCO for your community may be obtained by calling the Director, Federal Insurance and Mitigation Division of FEMA in Oakland, California, at (510) 627-7175. If you have any questions regarding this CLOMR, please call our Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627).

Sincerely,



Max H. Yuan, P.E., Project Engineer  
Engineering Management Section  
Mitigation Division

For: William R. Blanton Jr., CFM, Chief  
Engineering Management Section  
Mitigation Division

Enclosures

cc: The Honorable Fulton Brock  
Chairman, Maricopa County  
Board of Supervisors

Mr. Lyle Murdock  
Floodplain Administrator  
Town of Wickenburg

Mr. Ted Collins, CFM  
Principal Floodplain Administrator  
Flood Control District of Maricopa County

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

Mr. Brian Cosson, CFM  
NFIP Coordinator  
Office of Dam Safety and Flood Mitigation  
Arizona Department of Water Resources

Mr. Berwyn S. Wilbrink, P.E.  
Project Manager  
Jacobs Civil Inc.

Brian Wahlin, Ph.D., P.E., D.WRE  
Senior Hydraulic Engineer  
West Consultants, Inc.



# NATIONAL FLOOD INSURANCE PROGRAM

FEMA NATIONAL SERVICE PROVIDER

March 29, 2006

FLOOD CONTROL DISTRICT RECEIVED	
APR 03 '06	
CH & GM	FINANCE
PIO	LANDS
ADMIN	C & M
<input checked="" type="checkbox"/> REG	P & PM
ENG	FILE
POLYGRAPHS	
RC	
TLC	

Brian Wahlin, Ph.D, P.E., D.WRE  
 Senior Hydraulic Engineer  
 West Consultants, Inc.  
 960 West Elliot Road, Suite 201  
 Tempe, AZ 85284-1137

IN REPLY REFER TO:  
 Case No.: 06-09-B575R  
 Communities: Town of Wickenburg and  
 Maricopa County, AZ  
 Community Nos.: 040056 and 040037

316-AD

Dear Dr. Wahlin:

This responds to your request dated March 15, 2006, that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a conditional revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. Pertinent information about the request is listed below.

Identifier:	U.S. 93 Interim Wickenburg Bypass
Flooding Source:	Hassayampa River
FIRM Panel(s) Affected:	04013C0251H and 0253H

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.

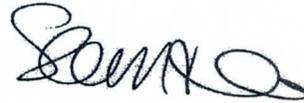
If we do not receive the required data within 90 days, we will suspend our processing of your request. Any data submitted after 90 days will be treated as an original submittal and will be subject to all submittal/payment procedures, including the flat review and processing fee for requests of this type established by the current fee schedule.

FEMA receives a very large volume of requests and cannot maintain inactive requests for an indefinite period of time. In addition, as a result of the aftermath of recent hurricanes, many FEMA employees have been deployed to assist in disaster relief efforts. 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.

We will continue to work expeditiously to review all submittals in accordance with National Flood Insurance Program (NFIP) regulations, and will aim to meet the regulatory timeframe for the review of all requests. However, requesters should be aware that delays may occur in the review process because of the current emergency situation. We appreciate the patience and cooperation of all requesters as FEMA assists in hurricane relief efforts.

If you have general questions about your request, FEMA policy, or the NFIP, please call the FEMA Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627). If you have specific questions concerning your request, please call the Revisions Coordinator for your State, Mr. Craig Kennedy, CFM, who may be reached at (703) 960-8800, ext. 3091.

Sincerely,



Sheila M. Norlin, CFM  
National LOMC Manager  
Michael Baker Jr., Inc.

Enclosures

cc: Mr. Lyle Murdock  
Floodplain Administrator  
Town of Wickenburg

Mr. Ted Collins, CFM  
Principal Floodplain Administrator  
Flood Control District of Maricopa County

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

Mr. Brian Cosson, CFM  
NFIP Coordinator  
Office of Dam Safety and Flood Mitigation  
Arizona Department of Water Resources

Mr. Berwyn S. Wilbrink, P.E.  
Jacobs Civil, Inc.



# NATIONAL FLOOD INSURANCE PROGRAM

## FEMA NATIONAL SERVICE PROVIDER

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

Case No.: 06-09-B575R

Requester: Brian Wahlin, Ph.D, P.E., D.WRE

Communities: Town of Wickenburg and  
Maricopa County, AZ

Community No.: 040056 and 040037

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

1. Our preliminary review revealed water-surface elevations (WSELs) higher than the end points of Cross Sections 51.601, 51.398, and 51.355 in the existing conditions HEC-RAS hydraulic model. Please extend the cross sections so that the end points of all cross sections are equal to or higher than the corresponding WSELs.
2. Our preliminary review revealed that the proposed-project conditions will affect the downstream portion of the Sols River. Please provide a hydraulic analysis for the Sols River to reflect the changes that result from the proposed-project conditions. In addition, if the Sols River will affect the proposed levee, please submit information concerning the effects the Sols River will have on the levee.

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

Effective October 30, 2005, FEMA revised the fee schedule for reviewing and processing requests for conditional and final modifications to published flood information and maps. A copy of the notice summarizing the current fee schedule, which was published in the *Federal Register*, is enclosed for your information. In accordance with this schedule, the fee for your request is \$5,000 and must be submitted before we can continue processing your request. Payment of this fee must be made in the form of a check or money order, payable in U.S. funds to the National Flood Insurance Program, or a credit card payment. For identification purposes, the case number referenced above must be included on the check or money order. We will not perform a detailed technical review of your request until we receive this payment.

Payment must be forwarded to one of the addresses listed below.

Using U.S. Postal Service:

Federal Emergency Management Agency  
Fee-Charge System Administrator  
P.O. Box 22787  
Alexandria, VA 22304

Using overnight service:

FEMA Fee-Charge System Administrator  
c/o Michael Baker Jr., Inc.  
3601 Eisenhower Avenue  
Alexandria, VA 22304



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

LETTER OF TRANSMITTAL

**TO:** Brian Wahlin  
WEST Consultants  
960 W Elliot Road, Suite 201  
Tempe, AZ 85284-1137

March 8, 2006

**SUBJECT:** US 93 Interim Wickenburg Bypass CLOMR

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

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

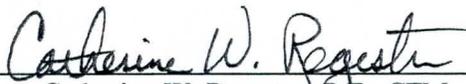
COPIES	DATE	NO.	DESCRIPTION
2	March 6, 2006		MT-2 Form 1, Page 2 of 2 signed by Tim Phillips for Unincorporated Maricopa County – only.

THESE ARE TRANSMITTED:

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

Remarks: **For submittal to FEMA.**

SIGNED:

  
Catherine W. Regester, P.E., CFM

Has the review fee for the appropriate request category been included?

Yes

Fee amount: \$ \_\_\_\_\_

No, Attach Explanation

Please see the FEMA Web site at [http://www.fema.gov/fhm/frm\\_fees.shtm](http://www.fema.gov/fhm/frm_fees.shtm) for Fee Amounts and Exemptions.

D. SIGNATURE

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

Name:		Company:	
Mailing Address:		Daytime Telephone No.:	Fax No.:
		E-Mail Address:	
Signature of Requester (required):			Date:

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

Community Official's Name and Title: Mr. Timothy S. Phillips, P.E.

CHIEF ENGINEER & GENERAL MANAGER

Telephone No.: 602-506-4701

Community Name: Maricopa County

(UNINCORPORATED COUNTY - ONLY)

Community Official's Signature (required):

Date:

3/6/06

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

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

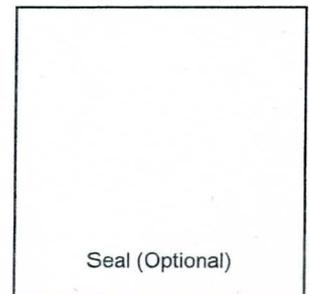
Certifier's Name:	License No.:	Expiration Date:
Company Name:	Telephone No.:	Fax No.:
Signature:		Date:

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

**Form Name and (Number)**

**Required if ...**

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





# Flood Control District of Maricopa County

## INTEROFFICE MEMORANDUM

**Date:** February 27, 2006

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

**From:** Catherine W. Register, P.E., CFM

**Subject:** CLOMR for ADOT's US 93 Interim Wickenburg Bypass along the Hassayampa River

ADOT's design consultant was Jacobs Engineering Group with WEST Consultants serving as a sub-consultant to Jacobs. WEST Consultants prepared the CLOMR package. The District's reviewer for the CLOMR was Cathy Register. The Town of Wickenburg or ADOT will be submitting the package to FEMA.

The CLOMR addresses the floodplain/floodway of the Hassayampa River from approximately 1000 ft downstream, to approximately 2 miles upstream of the existing US 93 bridge. The CLOMR shows the post-project conditions floodplain and floodway provided that the project is constructed according to the design plans. The majority of the impacted floodplain lies within the Town of Wickenburg which performs its own floodplain management. The District is signing the FEMA forms for only that portion of the floodplain within Unincorporated Maricopa County. The extents of the post-project floodplain within Unincorporated Maricopa County are very similar to those of the pre-project (FEMA effective) conditions. Differences are mostly attributable to more recent and more detailed topographic mapping (2 ft contour interval versus 4 ft for the effective) with some impacts due to fill within the effective floodplain. Generally, a Conditional Letter of Map Revision does not represent the "best available data". However, as many of the changes in water surface elevation are due to more detailed topographic mapping rather than the project, District personnel should compare the effective and CLOMR studies and inform any Floodplain Use Permit applicants of any potential increases in floodplain/floodway elevations reflected in the CLOMR.

Please concur and sign the attached FEMA forms for submittal of the CLOMR to FEMA.

<i>Catherine W. Register</i> 2/27/06	<i>TSP</i>	3/1/06
Technical Reviewer Date:	Timothy S. Phillips, P.E. Chief Engineer and General Manager	Date:
<i>Lynn M. Thomas</i> 2/27/06		
Floodplain Management Branch Principal Engineer Date:		
<i>Ted L. Collins CFM</i> 2/27/06		
Floodplain Management Branch Principal Floodplain Coordinator Date:		
<i>[Signature]</i> 2/28/06		
Hydrology/Hydraulics Branch Manager Date:		
<i>[Signature]</i> 2/28/06		
Engineering Division Manager Date:		
<i>[Signature]</i> 2/28/06	<input type="checkbox"/> GIS Posted (Pending Floodplain Only)	Date:
Regulatory Division Manager Date:	<input type="checkbox"/> No County Permits in this area	Date:



**HASSAYAMPA RIVER  
US-93 INTERIM WICKENBURG BYPASS  
Arizona Department of Transportation**



**CLOMR PACKAGE FOR ZONE AE FLOODPLAIN  
& FLOODWAY ANALYSIS  
(FINAL)**

**Maricopa County**

Prepared for:



**Jacobs Engineering Group, Inc.**  
875 West Elliot Road, Suite 201  
Tempe, Arizona 85284

Prepared by:



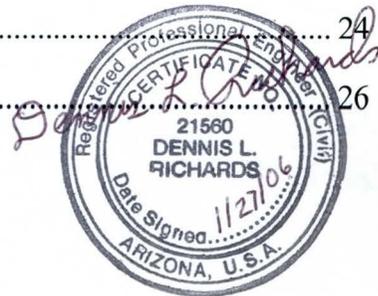
**WEST Consultants, Inc.**  
960 West Elliot Road, Suite 201  
Tempe, Arizona 85284-1137

January 2006



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- A.1 Data Collection Summary
- A.2 Referenced Documents

### **B General Documentation and Correspondence**

- B.1 Special Problem Reports
- B.2 Contact (telephone) Reports
- B.3 Meeting Minutes or Reports
- B.4 General Correspondence
- B.5 Contract Documents
- B.6 Public Notices

### **C Survey Field Notes**

- C.1 Survey Field Notes for Aerial Mapping
- C.2 Survey Field Notes for Hydrologic Modeling
- C.3 Survey Field Notes for Hydraulic Modeling

### **D Hydrologic Analysis Supporting Documentation**

- D.1 Precipitation Data
- D.2 Physical Parameter Calculations
- D.3 Hydrograph Routing Data
- D.4 Reservoir Routing Data
- D.5 Flow Splits and Diversions Data
- D.6 Hydrologic Calculations

### **E Hydraulic Analysis Supporting Documentation**

- E.1 Roughness Coefficient Estimation
- E.2 Cross-Section Plots
- E.3 Expansion and Contraction Coefficients
- E.4 Analysis of Structures
- E.5 Hydraulic Calculations

### **F Erosion and Sedimentation Transport Analysis Supporting Documentation**

## 1. Introduction

WEST Consultants Inc. (WEST) was retained by the Arizona Department of Transportation (ADOT) under subcontract to Jacobs Engineering Group, Inc. (Jacobs Engineering) to prepare a Conditional Letter of Map Revision (CLOMR) package in support of the proposed US-93 interim bypass roadway embankment design.

The CLOMR study focuses on the proposed US-93 Wickenburg bypass at Hassayampa River, the proposed US-60 Bridge over the Hassayampa River (which is part of the bypass), and the roadway embankment which will function as a levee. The Hassayampa River flows from north to south in the project reach. The hydraulic study limits along the Hassayampa River extend from about one-quarter (1/4) mile downstream to approximately one and one-half (1-1/2) miles upstream of the current US-60 bridge crossings. The project is within the Hassayampa River 100-year regulatory floodplain with nearly 40 percent of the proposed roadway length encroaching into the FEMA defined floodway. A vicinity map showing the location of the existing and proposed bridges, as well as the route of the proposed embankment, is shown in Figure 1-1.

The vertical datum of the existing Flood Insurance Study (FIS) HEC-2 model (Cella-Barr, 1988) is NGVD 1929 according to the published flood insurance profiles for the Hassayampa River and Sols Wash (FEMA, 2001). The new topography and all other elevations were also in the same vertical datum. The horizontal datum of the mapping was performed using a "ground" coordinate system established for this project. Ground coordinates were obtained by multiplying Arizona State Plane Central (NAD83, International Feet) by 1.00013938. Digital Terrain Models (DTMs) were prepared by the Surveying and Mapping Division of Wilson & Company Engineers and Architects. The topography was flown on June 23, 2003. A Triangulated Irregular Network (TIN) was generated using the DTMs in ArcView GIS. The TIN was used to cut channel cross-sections using the HEC-GeoRAS extension of ArcView GIS.

The hydrologic data (100-year event discharge) for this project were obtained from the FEMA Maricopa County Flood Insurance Study (FEMA, 2001). Water surface elevations in the upstream and downstream model limits were tied-in to those in the HEC-2 model developed by Cella-Barr (1988), which is the basis for the existing Flood Insurance Study.

Aerial photographs were used primarily to examine changes in vegetation. The photographs were also used to examine changes in the banklines in areas where the recent topography was not available. WEST obtained historical aerial photographs of the project reach for the years 1953, 1984, and 1991. A USGS digital orthographic quadrangle from May 24, 1997 was also available, which was used as the modern-day reference for regions beyond the limits of the 2003 aerial photography. GIS shapefiles for the existing floodplain and floodway were obtained from the Flood Control District of Maricopa County.

The purpose of the study was to delineate the 100-year floodplain and floodway of the Hassayampa River with the proposed bypass embankment and the proposed U.S. 60 Bridge in place, and prepare a CLOMR package. The work met the requirements of the Arizona Department of Water Resources State Standard Attachment SSA1-97 (ADWR, 1997).

<b>Study Documentation Abstract for FEMA Submittals</b>	<b>Initial Study</b>	<b>Restudy</b>	<b>CLOMR</b>	<b>X</b>	<b>LOMR</b>	<b>Other</b>
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**Section 2.1: Study Documentation Abstract for FEMA Submittals**

2.1.1	Date Study Accepted	
2.1.2	Study Contractor Contact(s) Address Phone Internal Reference Number	WEST Consultants, Inc. Dennis L. Richards, P.E. 960 W. Elliot Road, Suite 201 Tempe, Arizona 85284 (480) 345-2155 512A01
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	
2.1.6	Local Technical Reviewer Phone	Mr. Lyle Murdock, Town of Wickenburg  (928) 684-5451
2.1.7	Reach Description	Hassayampa River – FIRM Panel 255
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)	Hydrology was based on FEMA Flood Insurance Study for Maricopa County and unincorporated areas

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**OVERVIEW & CONCURRENCE FORM**

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

**PAPERWORK BURDEN DISCLOSURE NOTICE**

Public reporting burden for this form is estimated to average 1 hour per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, Paperwork Reduction Project (3067-0148). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

**A. REQUESTED RESPONSE FROM FEMA**

This request is for a (check one):

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

**B. OVERVIEW**

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

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Ex: 480301 480287	City of Katy Harris County	TX TX	480301 48201C	0005D 0220G	02/08/83 09/28/90
040037	Maricopa County	AZ	04013C	0255G	07/19/01
040056	Maricopa County	AZ	04013C	0255G	07/19/01

2. Flooding Source: Hassayampa River

3. Project Name/Identifier: U.S. 93 Interim Wickenburg Bypass

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

5. Basis for Request and Type of Revision:

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

- Physical Change  Improved Methodology/Data
- Regulatory Floodway Revision  Other (Attach Description)

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

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

- Types of Flooding:  Riverine  Coastal  Shallow Flooding (e.g., Zones AO and AH)
- Alluvial fan  Lakes  Other (Attach Description)
- Structures:  Channelization  Levee/Floodwall  Bridge/Culvert
- Dam  Fill  Other, Attach Description

**C. REVIEW FEE**

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

Please see the FEMA Web site at [http://www.fema.gov/fhm/frm\\_fees.shtml](http://www.fema.gov/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: Mr. Lyle Murdock	Company: Town of Wickenburg	
Mailing Address:	Daytime Telephone No.: 928-684-5451	Fax No.:
	E-Mail Address:	
Signature of Requester (required):	Date:	

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

Community Official's Name and Title: Mr. Lyle Murdock	Telephone No.: 928-684-5451	
Community Name: Town of Wickenburg	Community Official's Signature (required):	Date:

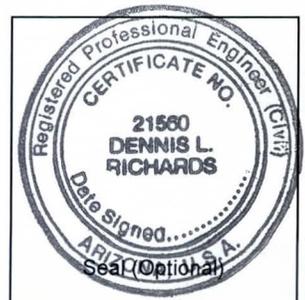
**CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR**

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

Certifier's Name: Dennis L. Richards, P.E.	License No.: 21560	Expiration Date: 03/31/2007
Company Name: WEST Consultants, Inc.	Telephone No.: 480-345-2155	Fax No.: 480-345-2156
Signature: <i>Dennis L. Richards</i>	Date: <i>1/27/06</i>	

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 and Hydraulics Form (Form 2)	New or revised discharges or water-surface elevations
<input checked="" 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



**C. REVIEW FEE**

Has the review fee for the appropriate request category been included?  Yes      Fee amount: \$\_\_\_\_\_

No, Attach Explanation

Please see the FEMA Web site at [http://www.fema.gov/fhm/frm\\_fees.shtm](http://www.fema.gov/fhm/frm_fees.shtm) for Fee Amounts and Exemptions.

**D. SIGNATURE**

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

Name:	Company:	
Mailing Address:	Daytime Telephone No.:	Fax No.:
	E-Mail Address:	
Signature of Requester (required):		Date:

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

Community Official's Name and Title:		Telephone No.:
Community Name:	Community Official's Signature (required):	Date:

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

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

Certifier's Name: Berwyn S. Wilbrink, P.E.	License No.: 25339	Expiration Date: 12/31/2007
Company Name: Jacobs Civil, Inc.	Telephone No.: 480-763-8609	Fax No.: 480-763-8601
Signature: <i>Berwyn S. Wilbrink</i>		Date: 1/27/06

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

<u>Form Name and (Number)</u>	<u>Required if ...</u>
<input type="checkbox"/> Riverine Hydrology and 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



FEDERAL EMERGENCY MANAGEMENT AGENCY  
**RIVERINE HYDROLOGY & HYDRAULICS FORM**

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

**PAPERWORK REDUCTION ACT**

Public reporting burden for this form is estimated to average 3 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, Paperwork Reduction Project (3067-0148). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

Flooding Source: Hassayampa River  
**Note:** Fill out one form for each flooding source studied

**A. HYDROLOGY**

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

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

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

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

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

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

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

4. Review/Approval of Analysis

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

5. Impacts of Sediment Transport on Hydrology

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

**B. HYDRAULICS**

1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevations (ft.)	
			Effective	Proposed/Revised
Downstream Limit	Downstream from 1962 U.S. 60 Bridge	51.130	2037.45	2037.45
Upstream Limit	0.6 miles upstream of Blue Tank Wash	53.160	2088.20	2088.32

2. Hydraulic Method Used

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

## B. HYDRAULICS (CONTINUED)

### 3. Pre-Submittal Review of Hydraulic Models

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

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

### 4. Models Submitted

Duplicate Effective Model*	Natural File Name: Wickenburg.p03	Floodway File Name:
Corrected Effective Model*	Natural File Name: Wickenburg.p04	Floodway File Name:
Existing or Pre-Project Conditions Model	Natural File Name: Wickenburg.p02	Floodway File Name:
Revised or Post-Project Conditions Model	Natural File Name: Wickenburg.p01	Floodway File Name: Wickenburg.p01
Other - (attach description)	Natural File Name:	Floodway File Name:

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

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

## C. MAPPING REQUIREMENTS

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

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

## D. COMMON REGULATORY REQUIREMENTS

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

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

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

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

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

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

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

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

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

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**RIVERINE STRUCTURES FORM**

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

**PAPERWORK REDUCTION ACT**

Public reporting burden for this form is estimated to average 7 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, Paperwork Reduction Project (3067-0148). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

Flooding Source: Hassayampa River  
**Note:** Fill out one form for each flooding source studied

**A. GENERAL**

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

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

Description Of Structure

**1. Name of Structure: Existing 1962 U.S. 60 Westbound Highway Bridge**

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

Location of Structure: Town of Wickenburg, Hassayampa River Crossing

Downstream Limit/Cross Section: 51.331

Upstream Limit/Cross Section: 51.338

**2. Name of Structure: Proposed Bridge on U.S. 60/U.S. 93 Highway**

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

Location of Structure: Town of Wickenburg, Hassayampa River Crossing

Downstream Limit/Cross Section: 51.355

Upstream Limit/Cross Section: 51.375

**3. Name of Structure: Road Embankment/Levee**

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

Location of Structure: West Bank of Hassayampa River in the Town of Wickenburg

Downstream Limit/Cross Section: 51.345

Upstream Limit/Cross Section: 52.228

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

## B. CHANNELIZATION

Flooding Source:

Name of Structure:

### 1. Accessory Structures

The channelization includes (check one):

- |  |  |
|--|--|
| <input type="checkbox"/> Levees [Attach Section E (Levee/Floodwall)] | <input type="checkbox"/> Drop structures                         |
| <input type="checkbox"/> Superelevated sections                      | <input type="checkbox"/> Transitions in cross sectional geometry |
| <input type="checkbox"/> Debris basin/detention basin                | <input type="checkbox"/> Energy dissipator                       |
| <input type="checkbox"/> Other (Describe):                           |  |

### 2. Drawing Checklist

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

### 3. Hydraulic Considerations

The channel was designed to carry \_\_\_\_\_ (cfs) and/or the \_\_\_\_\_ -year flood.

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

- Subcritical flow       Critical flow       Supercritical flow       Energy grade line

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

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

### 4. Sediment Transport Considerations

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

## C. BRIDGE/CULVERT

Flooding Source: Hassayampa River

Name of Structure: Existing U.S. 60 westbound Highway Bridge and proposed bridge on U.S. 60/U.S. 93 Highway

### 1. This revision reflects (check one):

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

### 2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8); HEC-RAS 3.1.2 If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

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

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> Dimensions (height, width, span, radius, length) | <input type="checkbox"/> Erosion Protection  |
| <input type="checkbox"/> Shape (culverts only)                                       | <input checked="" type="checkbox"/> Low Chord Elevations – Upstream and Downstream |
| <input type="checkbox"/> Material  | <input type="checkbox"/> Top of Road Elevations – Upstream and Downstream          |
| <input type="checkbox"/> Beveling or Rounding  | <input type="checkbox"/> Structure Invert Elevations – Upstream and Downstream     |
| <input checked="" type="checkbox"/> Wing Wall Angle                                  | <input type="checkbox"/> Stream Invert Elevations – Upstream and Downstream        |
| <input checked="" type="checkbox"/> Skew Angle                                       | <input type="checkbox"/> Cross-Section Locations                                   |
| <input type="checkbox"/> Distances Between Cross Sections                            |  |

### 4. Sediment Transport Considerations

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

D. DAM

Flooding Source:

Name of Structure:

1. This request is for (check one):  Existing dam  New dam  Modification of existing dam

2. The dam was designed by (check one):  Federal agency  State agency  Local government agency

Private organization Name of the agency or organization:

3. Does the project involve revised hydrology?  Yes  No

If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2).

4. Does the submittal include debris/sediment yield analysis?  Yes  No

If yes, then fill out Section F (Sediment Transport).

If No, then attach your explanation for why debris/sediment analysis was not considered.

5. Does the Base Flood Elevation behind the dam or downstream of the dam change?

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

Stillwater Elevation Behind the Dam

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

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

E. LEVEE/FLOODWALL

1. System Elements

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

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

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

- earthen embankment, dike, berm, etc. Station 51.345 to 52.228
- structural floodwall Station to
- Other (describe): Soil cement bank protection Station 51.345 to 52.228

c. Structural Type (check one):

- monolithic cast-in place reinforced concrete
- reinforced concrete masonry block
- sheet piling
- Other (describe): Earthen embankment with soil cement bank protection

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

- Yes  No

If Yes, by which agency?

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

- 1. Plan of the levee embankment and floodwall structures. Sheet Numbers: 74-81
- 2. A profile of the levee/floodwall system showing the Base Flood Elevation (BFE), levee and/or wall crest and foundation, and closure locations for the total levee system. Sheet Numbers: 6 sheets, not numbered
- 3. A profile of the BFE, closure opening outlet and inlet invert elevations, type and size of opening, and kind of closure. Sheet Numbers: N/A
- 4. A layout detail for the embankment protection measures. Sheet Numbers: 33-40
- 5. Location, layout, and size and shape of the levee embankment features, foundation treatment, floodwall structure, closure structures, and pump stations. Sheet Numbers: 74-81, 33-40

2. Freeboard

a. The minimum freeboard provided above the BFE is:

Riverine

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

Coastal

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

**E. LEVEE/FLOODWALL (CONTINUED)**

2. Freeboard (continued)

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

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

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

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

3. Closures

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

If opening exists, list all closures:

Channel Station	Left or Right Bank	Opening Type	Highest Elevation for Opening Invert	Type of Closure Device
51.350	Right	Culvert	2041.01	Flap gate
51.465	Right	Culvert	2055.60	None
51.465	Right	Culvert	2055.76	None
52.168	Right	Culvert	2067.84	None

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

Note: Geotechnical and geologic data

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

4. Embankment Protection

a. The maximum levee slope landside is: 4H:1V

b. The maximum levee slope floodside is: 1H:1V

c. The range of velocities along the levee during the base flood is: 5.7 (min.) to 14.2 (max.)

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

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

Reach	Sideslope	Flow Depth	Velocity	Curve or Straight	Stone Riprap			Depth of Toedown
					D <sub>100</sub>	D <sub>50</sub>	Thickness	
Sta to								
Sta to								
Sta to								
Sta to								
Sta to								
Sta to								

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

**E. LEVEE/FLOODWALL (CONTINUED)**

4. Embankment Protection (continued)

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

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

N/A

Attach engineering analysis to support construction plans.

5. Embankment And Foundation Stability

a. Identify locations and describe the basis for selection of critical location for analysis:  
Approximately RM 51.398

Overall height: Sta. ; height ft.

Limiting foundation soil strength:

Sta. 51.398, depth to

strength  $\phi = 33$  degrees,  $c = 0$  psf

slope: SS = 1.0 (h) to 1.0 (v)

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

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

Bishops Modified Method

c. Summary of stability analysis results:

Case	Loading Conditions	Critical Safety Factor	Criteria (Min.)
I	End of construction	2.36	1.3
II	Sudden drawdown	N/A, bank protection	1.0
III	Critical flood stage	2.69	1.4
IV	Steady seepage at flood stage	N/A, bank protection	1.4
VI	Earthquake (Case I)	2.10	1.0

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

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

If Yes, describe methodology used:

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

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

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

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

Attach engineering analysis to support construction plans.

**E. LEVEE/FLOODWALL (CONTINUED)**

4. Embankment Protection (continued)

- f. Is a bedding/filter analysis and design attached?  Yes  No
- g. Describe the analysis used for other kinds of protection used (include copies of the design analysis):

Attach engineering analysis to support construction plans.

5. Embankment And Foundation Stability

- a. Identify locations and describe the basis for selection of critical location for analysis:  
Approximately RM 52.228

Overall height: Sta. ; height ft.

Limiting foundation soil strength:

Sta. 52.228, depth to  
strength  $\phi = 33$  degrees,  $c = 0$  psf  
slope: SS = 1.5 (h) to 1.0 (v)

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

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

Bishops Modified Method

- c. Summary of stability analysis results:

Case	Loading Conditions	Critical Safety Factor	Criteria (Min.)
I	End of construction	1.86	1.3
II	Sudden drawdown	N/A, bank protection	1.0
III	Critical flood stage	1.86	1.4
IV	Steady seepage at flood stage	N/A, bank protection	1.4
VI	Earthquake (Case I)	1.69	1.0

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

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

If Yes, describe methodology used:

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

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

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

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

Attach engineering analysis to support construction plans.

**E. LEVEE/FLOODWALL (CONTINUED)**

6. Floodwall And Foundation Stability

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

UBC (1988) or  Other (specify):

b. Stability analysis submitted provides for:

Overturning  Sliding If not, explain:

c. Loading included in the analyses were:

Lateral earth @  $P_A =$  psf;  $P_p =$  psf

Surcharge-Slope @ ,  surface psf

Wind @  $P_w =$  psf

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

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

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

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

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

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

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

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

e. Foundation bearing strength for each soil type:

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

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

Attach engineering analysis to support construction plans.

E. LEVEE/FLOODWALL (CONTINUED)

7. Settlement

- a. Has anticipated potential settlement been determined and incorporated into the specified construction elevations to maintain the established freeboard margin?  Yes  No
- b. The computed range of settlement is 0.08 ft. to 0.17 ft.
- c. Settlement of the levee crest is determined to be primarily from :
  - Foundation consolidation
  - Embankment compression
  - Other (Describe):
- d. Differential settlement of floodwalls  has  has not been accommodated in the structural design and construction.  
Attach engineering analysis to support construction plans.

8. Interior Drainage

- a. Specify size of each interior watershed:  
Draining to pressure conduit:            acres  
Draining to ponding area:            acres
- b. Relationships Established
  - Ponding elevation vs. storage  Yes  No
  - Ponding elevation vs. gravity flow  Yes  No
  - Differential head vs. gravity flow  Yes  No
- c. The river flow duration curve is enclosed:  Yes  No
- d. Specify the discharge capacity of the head pressure conduit:            cfs
- e. Which flooding conditions were analyzed?
  - Gravity flow (Interior Watershed)  Yes  No
  - Common storm (River Watershed)  Yes  No
  - Historical ponding probability  Yes  No
  - Coastal wave overtopping  Yes  NoIf No for any of the above, attach explanation.
- f. Interior drainage has been analyzed based on joint probability of interior and exterior flooding and the capacities of pumping and outlet facilities to provide the established level of flood protection.  Yes  No  
If No, attach explanation.
- g. The rate of seepage through the levee system for the base flood is            cfs
- h. The length of levee system used to drive this seepage rate in item g:            ft.

**E. LEVEE/FLOODWALL (CONTINUED)**

8. Interior Drainage (continued)

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

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

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

Will the operation be automatic?  Yes  No

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

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

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

9. Other Design Criteria

a. The following items have been addressed as stated:

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

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

Attach supporting documentation

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

Attach supporting documentation

d. Sediment Transport Considerations:

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

### E. LEVEE/FLOODWALL (CONTINUED)

10. Operational Plan And Criteria

- a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations?  Yes  No
- b. Does the operation plan incorporate all the provisions for closure devices as required in Paragraph 65.10(c)(1) of the NFIP regulations?  
 Yes  No
- c. Does the operation plan incorporate all the provisions for interior drainage as required in Paragraph 65.10(c)(2) of the NFIP regulations?  
 Yes  No

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

11. Maintenance Plan

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

12. Operations and Maintenance Plan

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

### F. SEDIMENT TRANSPORT

Flooding Source: Hassayampa River

Name of Structure: Existing U.S. 60 westbound Highway Bridge and proposed bridge on U.S. 60/U.S. 93 Highway

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

Sediment load associated with the base flood discharge: Volume 781 acre-feet

Debris load associated with the base flood discharge: Volume 0 acre-feet

Sediment transport rate 0.55% (percent concentration by volume)

Method used to estimate sediment transport: 1-D HEC-6T Model: Sedimentation in Stream Networks

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

Method used to estimate scour and/or deposition: Yang's Stream Power in HEC-6T Model (also see Section 6 in CLOMR)

Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport:

Please note that bulked flows are used to evaluate the performance of a structure during the base flood; however, FEMA does not map BFEs based on bulked flows.

Since sediment model and historical records indicate degradation, no post-6T modeled.

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

## **E. Levee/Floodwall**

### **8. Interior Drainage**

A future project conducted by the Flood Control District of Maricopa County (FCDMC) called the "Wickenburg Downtown Flood Hazard Mitigation Project" (FCDMC project number FCD 2003C052) will create a levee system along Sols Wash which will prevent this backwater from inundating the area outside the Sols Wash Channel. The Sols Wash improvements include the interior drainage improvements immediately adjacent to and west of the Hassayampa River. However, this project has not been designed yet, and the locations of the levees and other details of the project are not currently available. Therefore the information on the interior drainage cannot be determined at this time. The Sols Wash improvements will be completed and the interior drainage will be addressed before the LOMR is submitted.

### **10. Operational Plans and Criteria**

c. The interior drainage is a completely separate package being developed and prepared by the FCDMC (see question 8 above). Once this package is complete, all provisions including any operational plans, if required, will be incorporated into our LOMR submittal. However, we have been working closely with the FCDMC throughout the development of the Sols Wash improvements and no modifications to any operations of the Hassayampa River system are anticipated.

### **12. Operations and Maintenance Plan.**

The primary elements of the levee being constructed by the Arizona Department of Transportation (ADOT) under this request include two bridges, a protected roadway embankment (the levee), and a drainage pipe that protrudes through the levee with a flap gate. The roadway embankment, bridges, and the soil cement bank protection, and the bridge abutment protection undergo routine maintenance and inspection by the ADOT. The current maintenance practices of ADOT are in accordance with the requirements of the National Flood Insurance Program (NFIP) Part 65.10.

The flap gate for the pipe protruding through the levee near the southern limits of these improvements is the responsibility of the Town of Wickenburg as it is located in their Right-of-Way and under their jurisdiction. The Town will be maintaining this gate, along with other similar gates in the adjacent Sols Wash, as part of their normal O&M of their drainage facilities. The Sols Wash improvements include the interior drainage improvements immediately adjacent to and west of the Hassayampa River improvements that are being completed by the Flood Control District of Maricopa County (FCDMC). Those improvements are being installed under the FCDMC's project "Sols Wash Downtown Wickenburg Flood Hazard Mitigation Project" (District project number FCD 2003C052).

All O&M is in compliance of the requirements of Part 65.10 of the NFIP.

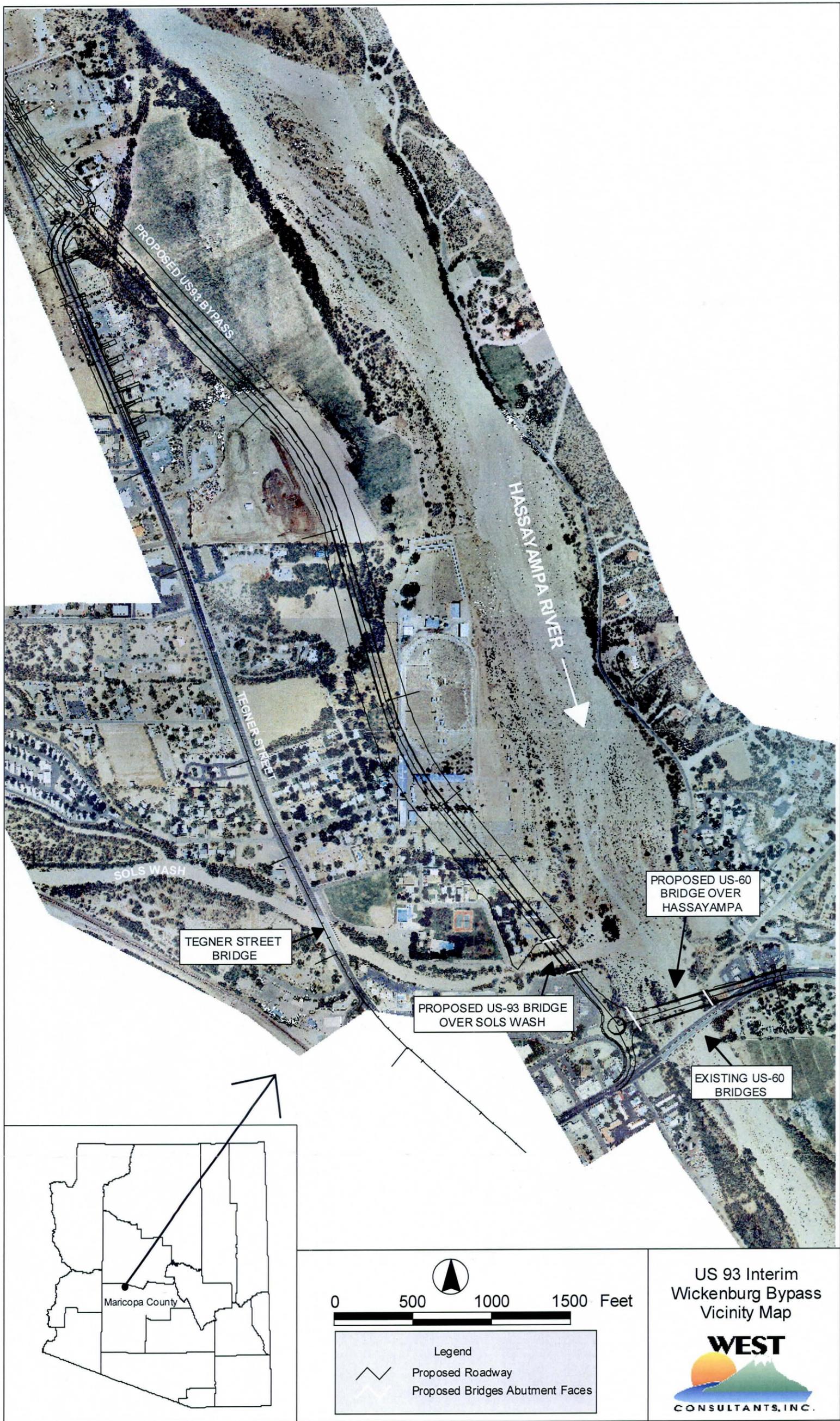


Figure 1-1 Project Location Map

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

### **2.1 Study Documentation Abstracts for ADWR Submittals**

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

### **2.2 FEMA Forms**

Forms required by FEMA are included in the text of this CLOMR following the ADWR forms. Note that the interior drainage section of the levee/floodwall portion of the riverine structures form will be addressed by a future Flood Control District of Maricopa County project called the "Wickenburg Downtown Flood Hazard Mitigation Project."

## **3. Surveying and Mapping Information**

### **3.1 Field Survey Information**

Field survey was conducted by Wilson & Company Engineers and Architects.

### **3.2 Mapping**

Digital Terrain Models (DTMs) consisting of breaklines and mass points were prepared by the Surveying and Mapping Division of Wilson & Company Engineers and Architects. The topography was flown on June 23, 2003 by Aerial Mapping Company of Phoenix, AZ. The new topography and all other elevations were in NGVD 1929 Vertical Datum. The DTM meets the National Map Accuracy Standards for 1 inch = 200 feet scale and 2-foot contour intervals.

There was a small portion of the topography that was provided by the Flood Control District of Maricopa County. This small area is located at the downstream end of the study reach on the right overbank. This topography was flown by Stewart Geo Technologies and the control points were set by A-Team. The topography meets the National Map Accuracy Standards for 1 inch = 200 feet scale and 2-foot contour intervals. This small area of topography is only used in cross-section 51.208 of the new HEC-RAS models. It does not have an impact on the hydraulic results because the area is assumed to be ineffective in cross-section 51.208. However, this additional topography does affect the way the floodplain is delineated at the Zone AH at elevation 2039.

## **4. Hydrology**

The current FEMA regulatory 100-year discharge for the Hassayampa River study reach is 71,000 cfs, with a drainage area of 711 square miles (FEMA, 2001). Cella-Barr's 1988 analysis of the 100-year flood for the Hassayampa River, which was largely based on flood frequency analysis, resulted in 100-year discharges somewhat lower than 71,000 cfs (Cella-Barr, 1988). In the current Flood Insurance Study, 71,000 cfs is used as the 100-year flood both upstream and downstream of the tributary Sols Wash (Figure 1-1). In the FEMA Wickenburg 1977 (FEMA, 1977) FIS study, which was revised in 1983, 71,000 cfs was reduced to 70,000 cfs at some point downstream of Sols Wash. This flow

reduction does not appear in the most recent (FEMA, 2001) FIS and was not adopted for this CLOMR study.

Table 4-1 lists the discharges at flow change locations for the existing and the proposed condition HEC-RAS models. The reduction of flow from cross section 51.418 to 51.303 was due to flow split onto the left and right overbank areas for the existing conditions model. Detailed discussion on the flow reduction procedure applied can be found in the hydraulics and floodway analysis sections of this report.

**Table 4-1 Discharges Used in the Main Channel of the Hydraulic Model**

Flow Change Location (HEC-RAS Cross-Section ID Number)	Existing Condition Discharge (cfs)	Proposed Condition Discharge (cfs)
52.410	71,000	71,000
51.418	67,100	71,000
51.398	65,340	71,000
51.303	69,240	71,000
51.208	71,000	71,000

## 5. Hydraulics

### 5.1 Method Description

Five hydraulic models for the Hassayampa River are mentioned in this report. The first model is the Flood Insurance Study (FIS) HEC-2 model (Cella-Barr, 1988); the other models were developed by WEST using HEC-RAS version 3.1.2 (U.S. Army Corps of Engineers, 2002). There are two existing parallel bridges over the Hassayampa River on U.S.-60 Highway. The westbound (upstream) bridge was built in 1936. The eastbound (downstream) bridge was built in 1962. Following is a brief description of the hydraulic models mentioned in this report:

1. Effective Model. The existing Cella-Barr FIS HEC-2 model.
2. Duplicate Effective Model. A version of the existing FIS HEC-2 model, but in HEC-RAS. Modifications were made to the HEC-RAS to duplicate the hydraulics and water surface elevations of the HEC-2 model. An encroached version of this model was also created.
3. Corrected Effective Model. The duplicate effective model with corrections made to some parameters and to the elevation of the bridges, when those parameters appeared to be incorrect in the effective model. An encroached version of this model was created.
4. Existing Conditions Model. A hydraulic model using the 2003 aerial topography.

5. Proposed Conditions Model. A hydraulic model with the proposed roadway embankment and bridge in place. This was constructed using the most recent topography, plus the design plans of the proposed bridge and roadway embankment.

A comparison between of the water surface elevations obtained using all five models can be seen in Table 5-3. The first three models were created to comply with FEMA requirements for this CLOMR. The existing conditions model was used to establish the current hydraulics. The proposed conditions model established the future hydraulics. The most relevant comparisons were between the proposed conditions and the existing conditions models, since the differences show the impacts of the project. Comparison of surcharges between the existing and the proposed conditions encroached models was conducted for floodway analysis. This was done to verify the effect of the proposed embankment on surcharge. Detailed description of the floodway analysis is given in Section 5.6.

The vertical datum of the FIS model (Cella-Barr, 1988) was NGVD 1929 according to the published flood insurance profiles for the Hassayampa and Sols Wash (FEMA, 2002). The new topography and all other elevations were also in the same vertical datum.

#### Effective Model

The effective flood insurance model of the Hassayampa River was based on nine HEC-2 models, each consisting of a reach of the river. The most upstream reach with the US-60 Bridge was found in the ninth model. The original HEC-2 files have the names HASS.R9 (unencroached profile) and HASS.F9 (encroached profile). Since the Hassayampa River also extends upstream into Yavapai County, separate models used to delineate the floodplain in Yavapai County were available. However, those reaches were not needed for this study. The 100-year water surface elevations obtained from the effective model can be seen in Table 5-3.

#### Duplicate Effective Model

A duplicate effective model was created for the ninth reach of the effective model by first importing the HEC-2 model geometry into HEC-RAS. The import process copied the cross-section geometries, bridge geometries, Manning's  $n$ -values, and bank stations. In addition to the imported geometry, the following steps were taken to ensure that the HEC-RAS model would match the HEC-2 model:

- The downstream boundary condition at cross-section 49.04, the downstream limit of reach 9, was transferred from HEC-2 to the HEC-RAS model. For the unencroached profile, the water surface elevation was 1982.65 feet, while for the encroached profile it was 1983.05 feet.
- The discharges were set per the HEC-2 model: 71,000 cfs at cross-section 50.46 and upstream, and 67,635 cfs at cross-section 50.40 and downstream. The 67,635 cfs in the downstream reach is not mentioned in the published FIS report. The encroachment stations were copied from the HEC-2 model

to the HEC-RAS model.

- The conveyance calculation option in HEC-RAS was changed to the HEC-2 method, where conveyance is calculated separately between each cross-section point on the overbanks.
- The internal bridge cross-sections for the US-60 Bridge between cross-sections 51.33 and 51.34 (HEC-RAS assigned the bridge to section 51.335 on importation from HEC-2) were modified. HEC-RAS uses the bounding cross-sections to establish the geometry under the bridge. In the HEC-2 model, the bridge was coded as a special bridge (SB), and the area under the bridge appeared in Field 7 of the SB card. The area was coded as 4,650 square feet. Because the bounding cross-sections for the bridge resulted in an area lower than this, the internal bridge cross-sections in the duplicate effective model needed to be modified. The internal cross-sections were modified to be rectangular sections such that the area under the bridge low chord, excluding piers, was 4,650 square feet.
- The contraction and expansion coefficients at cross-sections 50.40, 50.46, 50.56, and 50.65 were set a 0.2 and 0.4, respectively. These were the coefficients used in the FIS HEC-2 model for these sections. At all other cross sections the contraction and expansion coefficients were set at 0.1 and 0.3, respectively, as in the HEC-2 model.

With these modifications, the water surface elevations for the HEC-RAS unencroached duplicate effective model was within 0.01 feet of the HEC-2 model elevations at every cross-section.

For the encroached HEC-RAS duplicate effective model, the water surface profile was within 0.01 feet at most cross-sections. However, for the cross-sections upstream of the existing bridges and the next few cross-sections, the duplicate effective model had more than 1.0 feet of surcharge. The reason was that the encroached HEC-2 model neglected the encroachment at the bridge section, and, as a result, erroneously allowed for conveyance in the right overbank at the bridge section of the encroached model. In HEC-RAS, the encroachment stations at the upstream and downstream bounding bridge cross-sections section automatically caused the bridge to be encroached as well. The 100-

#### Corrected Effective Model

The following modifications were made to the duplicate effective model to develop the corrected effective model:

- The bridge low chord elevations were modified. In the effective model, the bridge was shown having a uniform low chord of 2043.3 feet. A field survey (March 2004) was conducted to verify the low chord elevations, and the results are summarized in Table 5-1. For the corrected effective model, the elevations from the 1936 Bridge, which is the lower of the two bridges, were used.

- The bridge was changed from having a single 40-foot wide pier (as it was represented in the HEC-2 model) to having 5 piers, each 4 feet wide at the top, widening at a ratio of 1:24 on each side. This is the pier configuration of the 1936 Bridge, which has wider piers than the 1962 Bridge and provides the larger obstruction to flow.
- An ineffective flow area was added at cross-section 51.40. This cross-section was 300 feet upstream of the face of the bridge. A large portion of this cross-section was in the “hydraulic shadow” of a plateau on the left side of the channel. Flow in this portion of the cross-section would be ineffective. The location of this cross-section can be seen on Cella-Barr’s (1988) work maps, which have been included in the Exhibit Maps section following the Appendices.
- An ineffective flow area was added at cross-section 51.29, which is downstream of the bridge. The leftmost 580 feet of the cross-section inside the floodway was in the “hydraulic shadow” of the bridge and should not have been considered effective flow. The location of this cross-section can be seen on Cella-Barr’s (1988) work maps, which have been included in the Exhibit Maps section following the Appendices.
- Expansion and contraction coefficients upstream and downstream of the bridges were changed to 0.5 and 0.3, respectively.

**Table 5-1 Low Chord Elevations for Existing Bridges (March 2004 Survey)**

	At East Abutment (ft)	Center (ft)	At West Abutment (ft)
1936 Bridge (westbound)	2044.62	2045.47	2044.62
1962 Bridge (eastbound)	2046.79	2047.42	2046.75

Existing and Proposed Conditions Models

Under existing conditions, there are two bridges across the Hassayampa River: the 1962 Bridge on the downstream side and the 1936 Bridge on the upstream side. Because the two bridges are adjacent, they were modeled as one bridge in the existing conditions model. The difference in water surface elevations between the existing conditions model and the effective model are shown in Table 5-2. The differences in water surface elevations between the two models can be explained by the new and more up-to-date topography used in the existing conditions model, the much more closely spaced cross-sections in the existing conditions model, the corrections made to the effective model as

explained in the Corrected Effective Model section. The largest increase in water surface elevation between the existing conditions model and the effect model is 3.56 feet, occurring at cross-section 51.345. The largest decrease in water surface elevation is -1.23 feet, occurring at cross-section 52.410.

**Table 5-2 Increase in Water Surface Elevations between Existing Conditions Model and Effective Model**

Existing Conditions Cross-Section	Equivalent FIS Cross-Section	Existing Conditions Water Surface Elevations (ft)	Effective FIS Water Surface Elevations (ft)	Existing Conditions Minus Effective (ft)
53.160	53.16	2088.32	2088.39	-0.07
53.063	53.06	2085.86	2085.30	0.56
52.881	52.87	2082.72	2081.92	0.80
52.410	52.40	2068.64	2069.87	-1.23
52.316	52.30	2066.92	2068.09	-1.17
52.224	52.21	2064.87	2065.22	-0.35
51.854	51.83	2055.62	2056.04	-0.42
51.757	51.74	2054.63	2052.45	2.18
51.656	51.64	2054.42	2051.68	2.74
51.558	51.55	2054.12	2051.06	3.06
51.453	51.45	2053.69	2050.73	2.96
51.398	51.40	2053.42	2050.41	3.01
51.345	51.34	2052.57	2049.01	3.56
51.331	51.33	2045.22	2044.95	0.27
51.208	51.20	2039.39	2039.38	0.01
51.130	51.13	2037.45	2037.45	0.00

In the proposed conditions model, the 1936 Bridge was removed and the 1962 Bridge was left in place. The proposed bridge on the bypass over the Hassayampa River will be constructed as well as the new roadway embankment. The purpose in leaving the 1962 Bridge in place was so that it can be used to run gas lines across the Hassayampa River. Because the 1962 Bridge has a higher low chord and narrower piers than the 1936 Bridge, the removal of the 1936 Bridge allows for more conveyance in the proposed conditions than in the existing conditions model. Furthermore, the 1962 Bridge will be physically raised 2.0 feet for the proposed conditions.

The most downstream cross-section, 51.13, was from the corrected effective model. All other cross-sections were taken from the DTM. The water surface elevation was tied in at cross-section 53.16 at the upstream limit of the model. One section shown in the layout, cross-section 51.338, is in the proposed conditions model only and was not present in the existing conditions model.

The hydraulic ineffective flow areas caused by the existing abutments were accounted for in HEC-RAS with a 1:1 contraction rate upstream of the existing bridges and a 2:1 expansion rate downstream of the existing bridges.

Cross-section spacing of 90 to 130 feet between was typical for the first few thousand feet upstream of the existing and proposed bridges over the Hassayampa River. The close spacing was justified by the detailed topography that was available for the channel.

Table 5-3 shows the 100-year water surface profiles for five different models. The last column in Table 5-3 shows the increase in water surface elevation between the proposed and existing conditions models. As mentioned earlier, the main differences between the proposed and the existing conditions model is the removal of the 1936 Bridge and the addition of an embankment along the west bank of the river. Table 5-3 shows that the removal of the bridge drops the water surface elevations significantly when compared to the existing conditions model. This drop in water surface elevation can be seen from cross-section 51.854 to cross-section 51.331. From cross-section 52.606 to cross-section 51.895, the squeezing effect of the new embankment becomes dominant and the water surface elevations in the proposed conditions are higher than they are in the existing conditions. The largest increasing in water surface elevation is 0.70 feet, occurring at cross-sections 52.440 and 52.410. Upstream of cross-section 51.895, the embankment has no effect and the water surface elevations for the proposed and existing conditions models are the same. A plot of the annotated flood profiles showing the proposed conditions water surface elevations are shown in the Exhibit Maps section following the Appendices.

**Table 5-3 Hassayampa River 100-Year Water Surface Profiles (NGVD 1929)**

Cross-Section	Equivalent FIS Section	Effective Model (ft)	Corrected Effective Model (ft)	Existing Conditions Model (ft)	Proposed Conditions Model (ft)	Proposed Minus Existing (ft)
53.160	53.16	2088.39	2088.4	2088.32	2088.32	0.00
53.130				2087.53	2087.53	0.00
53.097				2086.77	2086.77	0.00
53.063	53.06	2085.3	2085.3	2085.86	2085.86	0.00
53.026				2084.90	2084.9	0.00
52.986				2084.15	2084.15	0.00
52.949				2083.58	2083.58	0.00
52.916				2083.17	2083.17	0.00
52.881	52.87	2081.92	2081.93	2082.72	2082.72	0.00
52.847				2081.61	2081.61	0.00
52.813				2080.24	2080.24	0.00
52.778				2079.22	2079.22	0.00
52.740				2077.87	2077.87	0.00
52.693				2076.28	2076.28	0.00
52.650				2074.31	2074.31	0.00
52.606				2072.81	2072.9	0.09
52.558				2071.68	2071.97	0.29
52.508				2070.48	2071.09	0.61
52.467				2069.67	2070.29	0.62
52.440				2069.10	2069.8	0.70

Cross-Section	Equivalent FIS Section	Effective Model (ft)	Corrected Effective Model (ft)	Existing Conditions Model (ft)	Proposed Conditions Model (ft)	Proposed Minus Existing (ft)
52.410	52.4	2069.87	2069.87	2068.64	2069.34	0.70
52.384				2068.23	2068.89	0.66
52.345				2067.58	2068.22	0.64
52.316	52.3	2068.09	2068.09	2066.92	2067.60	0.68
52.284				2066.41	2066.88	0.47
52.250				2065.80	2066.1	0.30
52.224	52.21	2065.22	2065.22	2064.87	2065.48	0.61
52.196				2064.20	2064.8	0.60
52.170				2063.26	2063.7	0.44
52.147				2062.62	2063.08	0.46
52.121				2061.70	2062.02	0.32
52.100				2060.82	2061.11	0.29
52.078				2060.05	2060.5	0.45
52.054				2059.72	2059.91	0.19
52.029				2059.06	2059.18	0.12
52.006				2058.70	2058.79	0.09
51.983				2058.10	2058.18	0.08
51.957				2057.69	2057.75	0.06
51.932				2057.26	2057.33	0.07
51.895				2056.30	2056.53	0.23
51.854	51.83	2056.04	2056.01	2055.62	2055.51	-0.11
51.829				2055.31	2055.03	-0.28
51.807				2055.10	2054.42	-0.68
51.782				2054.87	2054	-0.87
51.757	51.74	2052.45	2052.51	2054.63	2053.61	-1.02
51.734				2054.57	2053.4	-1.17
51.709				2054.51	2053.17	-1.34
51.682				2054.46	2053.01	-1.45
51.656	51.64	2051.68	2051.8	2054.42	2052.94	-1.48
51.638				2054.38	2052.87	-1.51
51.618				2054.36	2052.83	-1.53
51.601				2054.26	2052.64	-1.62
51.581				2054.20	2052.49	-1.71
51.558	51.55	2051.06	2051.2	2054.12	2052.39	-1.73
51.536				2054.09	2052.28	-1.81
51.516				2054.09	2052.19	-1.90
51.497				2054.01	2051.96	-2.05
51.477				2053.93	2051.9	-2.03
51.453	51.45	2050.73	2050.89	2053.69	2051.43	-2.26
51.436				2053.60	2051.11	-2.49
51.418				2053.58	2051.01	-2.57
51.398	51.4	2050.41	2050.37	2053.42	2050.36	-3.06
51.375				2053.21	2048.84	-4.37
51.355				2053.15	2046.62	-6.53
51.345	51.34	2049.01	2048.85	2052.57	2046.59	-5.98
51.338					2046.46	
51.331	51.33	2044.95	2045.75	2045.22	2044.17	-1.05
51.303				2042.82	2042.97	0.15
51.275				2041.36	2041.4	0.04
51.208	51.2	2039.38	2039.4	2039.39	2039.39	0.00
51.130	51.13	2037.45	2037.47	2037.45	2037.45	0.00

## 5.2 Work Study Maps

The proposed conditions study area is shown in three work study maps. The full-size 24" by 36" plots, at 1" = 200' scale, are included in the Exhibit Maps section following the Appendices. For comparison, the work maps generated by Cella-Barr (1988) have also been included.

The proposed conditions 100-year floodplain boundary is shown on the work study maps as a heavy solid line. The proposed conditions floodway boundary is shown as heavy dashed line. The thalweg (hydraulic baseline) of the channel is shown as a thin center line. Each cross-section is geo-referenced and labeled with final computed floodplain and floodway water surface elevations and discharges. Major roads, such as U.S.-60 Highway and Tegner Street, are shown on the map. The work maps also show the Zone AE floodplain, and Zone AH ponding areas. The 100-year FIRM panel floodplain limits are shown in the 8-1/2" by 11" annotated FIRM maps included in the Exhibit Maps section.

## 5.3 Parameter Estimation

### 5.3.1 Roughness Coefficients (Existing and Proposed Conditions)

For the river reach that was modeled in the existing and proposed conditions models, the Manning's  $n$ -values were based on those found in the Flood Insurance Study HEC-2 model. The channel  $n$ -values were 0.035 throughout the reach. The overbank  $n$ -values in the effective model were generally 0.04 at cross-section 51.64 and upstream, and the overbank  $n$ -values were generally 0.045 at cross-section 51.55 and downstream. These same channel and overbank  $n$ -values were applied to the existing and proposed conditions model, except that some areas in the effective (Flood Insurance Study) model where the  $n$ -values were set at 0.13 or 1.0. Each exception was examined and addressed in the existing and proposed conditions models. The width of the channel to which the 0.035  $n$ -value applied for each cross-section were based on visual determination of the limits of the sand bed channel based on overlaid aerial photographs and topography. These widths approximately correspond to the channel widths in the FIS HEC-2 model.

In the discussion below, the term "inside" an encroachment indicates the side of the encroachment toward the center of the channel, while the term "outside" of an encroachment indicates the side of the encroachment toward the overbank of the channel. All encroachments referenced in the discussion of  $n$ -values are for the effective FIS encroachments.

- Cross-Section 51.64 (effective model): From the left limit to 196 feet outside of the existing left encroachment,  $n = 1.0$  in the effective model. This area was in the "hydraulic shadow" of a hill, and flow in this region would be ineffective. This was addressed in the existing and proposed conditions models with an ineffective area in this region. In the new model, the ineffective region extends from the left limit to about 180 feet from the left encroachment.

- Cross-Section 51.55 (effective model): From 457 to 25 feet outside of the existing left encroachment,  $n = 0.13$  in the effective model. This area is suburban housing. In the existing and proposed model, this was taken into account by designating a polygon in HEC-GeoRAS to have  $n = 0.13$ . For this cross-section in the existing conditions and proposed conditions models, the  $n = 0.13$  region extends from the left limit of the cross-section to about 25 feet outside of the existing left encroachment.
- Cross-Section 51.45 (effective model): The entire left overbank was shown at  $n = 0.045$  in the effective model. However, aerial photographs indicated suburban housing from the left limit of the cross-section to about 20 feet outside of the existing left encroachment. The region with suburban housing was assigned an  $n$ -value of 0.13.
- Cross-Section 51.45 (effective model): The entire right overbank is shown at  $n = 0.045$  in the effective model. However, aerial photographs indicated buildings on the right overbank. The right most approximately 500 feet of the cross-section was assigned  $n = 0.13$  in the existing and proposed conditions models.
- Cross-Section 51.40 (effective model): From the left limit to 125 feet inside of the left encroachment,  $n = 0.13$  in the effective model. There is heavy brush inside the left encroachment and suburban housing on the outside (the left overbank). In the existing and proposed conditions models, the  $n = 0.13$  region goes from the left limit of the cross-section to about 170 feet inside of the left encroachment. From the right limit to 399 feet outside of the right encroachment, Manning's  $n$  was 0.13 in the effective model. There are some buildings in this region. The buildings were taken into account in the existing and proposed conditions models, although the region was smaller based on the aerial photographs.
- Cross-Section 51.29 (effective model): In the effective model, the region from the left limit to about 20 feet inside of the left encroachment had  $n = 1.0$ . This region was apparently assigned the high  $n$ -value because it is in the "hydraulic shadow" of the U.S.-60 Highway's left embankment, which is not overtopped, and because there are houses in the area. In the existing and proposed conditions models, these regions were taken into account using ineffective flow areas. In addition, parts of the right overbank were assigned  $n = 0.13$  because there are buildings in the area.

For most cross-sections, the bank stations were set at the boundaries of the 0.035  $n$ -values. Exceptions were made in the interior cross-sections of the existing bridge and the first few cross-sections downstream of the existing bridge. For these cross-sections, there is some vegetation in the channel (e.g., underneath the existing bridge on the left side of the cross-section) and on both the left and right side of the cross-section in some of the cross-sections downstream of the existing bridge.

Rather than moving the bank stations for these cross-sections, an  $n$ -value of 0.045 was used for those parts of the channel that contained the vegetation.

The proposed condition model was verified using the CHECK-RAS program. CHECK-RAS sets limits on channel and overbank Manning's  $n$ -values. However, it does not restrict use of Manning's  $n$  based on field conditions.

### 5.3.2 Expansion and Contraction Coefficients

Contraction and expansion coefficients of 0.1 and 0.3, respectively, were used in the final proposed conditions model along the study reach except adjacent to the bridges from cross-section 51.558 to 51.208 (these cross-sections bound the bridges) where contraction and expansion coefficients of 0.3 and 0.5 were used, respectively. CHECK-RAS noted the used the aforementioned coefficients although they were not necessarily at structure locations. However, due to gradual contraction and expansion over a long reach length, the use of the higher coefficients was hydraulically justified.

## 5.4 Cross-Section Descriptions

The final proposed conditions HEC-RAS model for the Hassayampa River had seventy-one (71) new geo-referenced cross-sections plus one (1) cross-section (51.13) borrowed from the Cella-Barr (1988) FIS HEC-2 effective model. All cross-sections were cut using HEC-GeoRAS extension of ArcView GIS. Figure 5-1 shows the cross-section alignments in the main channel and the left overbank adjacent to the proposed bridge where flow diversion was modeled. Figure 5-2 is a zoomed view of the cross-sections near the existing and proposed bridges. The left overbank cross-sections (shown in green) overlapping with the main channel cross-sections are not shown in the figures. A CHECK-RAS run was successfully completed.

## 5.5 Modeling Considerations

### 5.5.1 Hydraulic Jump and Drop Analysis

None identified.

### 5.5.2 Bridges and Culverts

Information on existing and proposed conditions bridges is provided in Table 5-4.

In the effective FIS HEC-2 model, the existing bridges over the Hassayampa were not sufficiently high for the 100-year flood to pass underneath with freeboard. The low chord elevation for the bridge given in the effective FIS model (2043.3 feet) is incorrect. The actual bridges are higher than this as shown in Table 5-1 (the low chords were surveyed in March 2004). Nevertheless, even when the bridges were raised to the correct elevation, the 100-year flood did not pass under the bridge with freeboard in either the corrected effective or in the existing conditions model, and a pressure flow situation developed.



	<p style="text-align: center;">Legend</p> <ul style="list-style-type: none"> <li> Proposed Bridges Abutment Faces</li> <li> Cross-Sections</li> <li> Hydraulic Baseline</li> <li> Road Stations</li> <li> Proposed Roadway and Embankment</li> </ul>	<p style="text-align: center;">US 93 Interim Wickenburg Bypass</p>
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**Figure 5-1 Proposed Conditions Cross-Sections and Proposed Roadway Alignment**



**Figure 5-2 Proposed Conditions Cross-Sections and Proposed Roadway Alignment (Zoomed in View)**

**Table 5-4 Bridge Data: Hassayampa River at Wickenburg**

Bridge ID	Highway	Mile Post	Structure No.	Bridge Type	Agency
1936 Westbound Bridge	U.S. 60	110.53	161	Steel Girder	ADOT
1962 Eastbound Bridge	U.S. 60	110.53	737	Steel Girder	ADOT
Proposed Bridge	U.S. 60/ U.S. 93	110.53	2818	Reinforced Concrete Box Girder/Beam	ADOT

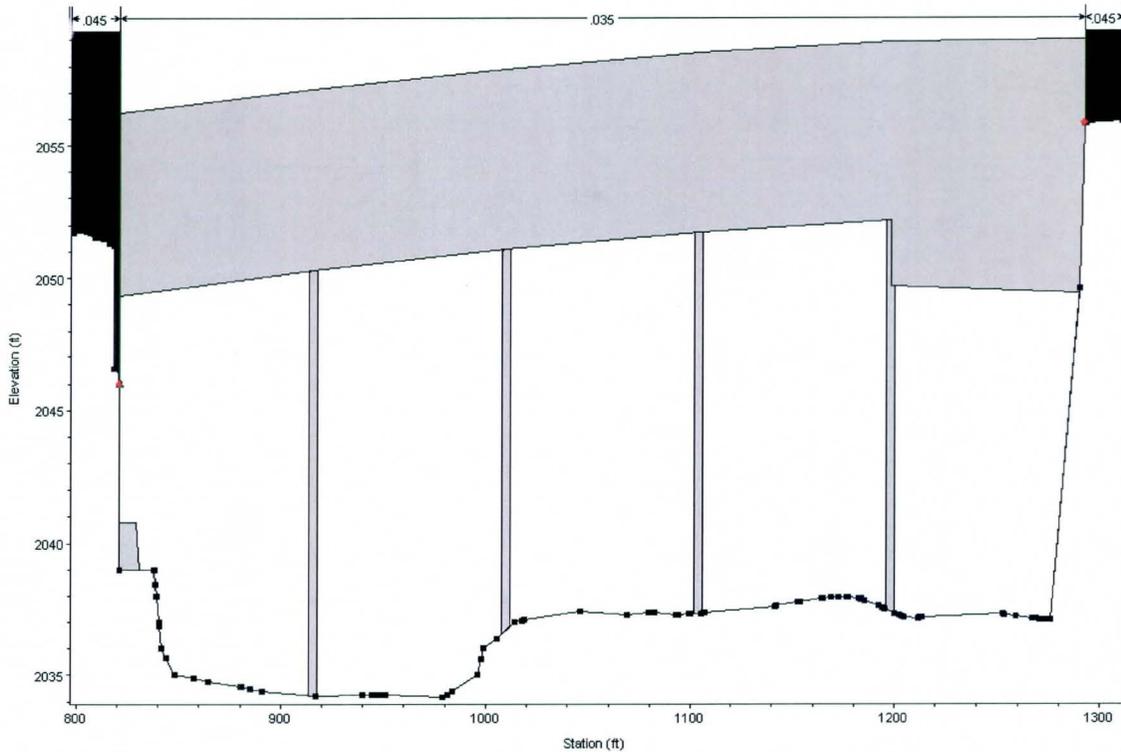
Under the proposed conditions, the 1936 Bridge, which is the lower of the two existing bridges, was removed. The 1962 Bridge low chords, as surveyed in March of 2004, were 2046.79 on the west side, 2047.42 in the center, and 2046.74 on the east side (as shown in Table 5-1). To prevent pressurization in the HEC-RAS proposed conditions model, the bridge was raised by 2.00 feet since the 1962 Bridge will be physically raised under the proposed conditions. The existing and proposed conditions low chord elevations for the 1962 Bridge are shown in Table 5-5.

**Table 5-5 Existing and Proposed Low Chord Elevations for the 1962 Bridge**

Location at Bridge	Existing Low Chord	Proposed Low Chord
East Abutment	2046.74	2048.74
Center Pier (high point)	2047.42	2049.42
West Abutment	2046.79	2048.79

The proposed low chord elevations shown in the rightmost column of Table 5-5 were the minimum heights for the low chord after the bridge was raised. After the bridge was raised, the center of the bridge was 0.31 feet higher than the energy grade line which was at 2049.11 feet. The 1962 Bridge also had 2048.74 – 2046.46 = 2.28 feet of freeboard from the 100-year water surface elevation. The upstream cross-section of the proposed Bridge is shown in Figure 5-3. Table 5-6 shows the freeboard for the 100-year water surface profile at the proposed and 1962 Bridges

under the proposed conditions model. A CHECK-RAS run was completed successfully for the bridges.



**Figure 5-3 Proposed Bridge Upstream Cross-Section (from the HEC-RAS Proposed Conditions Model)**

**Table 5-6 Freeboard at Bridges for 100-Year Profile (Proposed Conditions)**

Cross-Section	Description	Water Surface Elevation	Low Chord Bridge Elevation	Freeboard (ft)
51.375	Proposed bridge, upstream face	2048.84	2049.30 (lowest low chord elevation)	0.46
			2052.18 (highest low chord elevation)	3.34
51.338	1962 Bridge, upstream face	2046.46	2048.74 (future lowest low chord elevation)	2.28
			2049.42 (future highest low chord elevation)	2.96

There are no culverts that were modeled in HEC-RAS. However, there are three culverts along the road embankment/levee system. Culvert 101 is located just downstream of the proposed bridge at cross-section 51.350. The upstream invert elevation of this culvert is 2041.01 feet. A flap gate is going to be installed on this culvert because without one, everything to the west of the culvert would flood to an elevation of 2046.6 feet. A drawing of this flap gate is shown in Appendix E.4.

Culvert 401/402 is located just upstream of the proposed bridge at cross-section 51.465. This culvert is designed to take runoff from the roadway and dump it into the Hassayampa River. This single culvert is not a traditional culvert in that it has two drop inlets (pipe 401 and pipe 402) from the roadway. The lowest elevation of the grate for pipe 401 is 2055.60 feet while the lowest elevation for the grate for pipe 402 is 2055.76 feet. A flap gate will not be installed on this culvert.

Culvert 430 is located at the upstream limit of the levee at cross-section 52.168. This culvert is designed to take runoff from the roadway and dump it into the Hassayampa River. The lowest elevation of the grate for the drop inlet of culvert 430 is 2067.84 feet. A flap gate will not be installed on this culvert.

### 5.5.3 Levees and Dikes

Most, but not all, of the road embankment was designed to function as a levee. The portion of the road embankment from the upstream limit to approximately road station 154+50 will not function as a levee. There is a roadside dike on the west side of the embankment at road station 154+27 at elevation 2070 feet which prevents flow of any backwater from north of the dike to the south. The dike elevation of 2070 feet is more than 4 feet higher than the 100-year water surface elevation of the Hassayampa River at road station 154+27.

The remainder of the road embankment, from downstream of road station 154+50 until the proposed Hassayampa River Bridge, is designed to function as a levee (except for the opening at the Sols Wash tributary). The freeboard to top of the embankment was in excess of 3 feet along the entire embankment as shown in Table 5-7 for the levee upstream of Sols Wash and in Table 5-8 for the levee downstream of Sols Wash. At the upstream limit of the embankment, the freeboard to the top of the embankment was in excess of 15 feet. The soil cement bank protection was designed with a minimum of 3 feet of freeboard south (downstream) of road station 147+20, and to be at or above the 100-year water surface elevation for road stations north (upstream) of 147+20. Anticipated settlement of 2 inches was considered by ensuring that all freeboards were 0.17 feet greater than the nominal freeboard (i.e., 3.17 feet). All of the freeboards shown in Table 5-7 are greater than 3.17 feet with the exception for the freeboard at cross-section 51.558 (at road station 119+52.76). The freeboard to the center of the road is slightly below 3.0 feet plus 0.17 feet for settlement for a short reach. However, the top of the soil cement exceeds 3.17 feet of freeboard for this reach as shown in Table 5-7.

On the west bank, for the first 100 feet upstream of the proposed bridge of the Hassayampa River until the downstream limit of the soil cement, freeboard to the top of soil cement (or other concrete bank protection in the transition regions near the bridge) was set at a minimum of 4 feet plus the anticipated settlement of 0.17 feet. Concrete walls will be built adjacent to the bridge abutment to provide more than 4.17 feet of freeboard near the abutments (see 6 sheets of Levee Improvement Plans in Appendix E.4 Analysis of Structures. In the area under the proposed bridge over the Hassayampa River, the soil cement height was set per ADOT criterion on the east side of the bridge which is that the top of soil cement should be at least as high as the 50-year flood.

For all of the bank protection along the road embankment and through the proposed Hassayampa River bridge on the right (west) abutment, the toe-down elevations of the bank protection were designed to withstand scour from the 100-year event.

The opening at the Sols Wash Bridge will allow flow from the Hassayampa River to flow up into Sols Wash. A future project conducted by the Flood Control District of Maricopa County (FCDMC) called the "Wickenburg Downtown Flood Hazard Mitigation Project" will create a levee system along Sols Wash which will prevent this backwater from inundating the area outside the Sols Wash Channel. However, this project has not been designed yet, and the locations of the levees and other details of the project are not currently available. Therefore the floodplain on the west side of the embankment, which would result from backwater in the Hassayampa River, cannot be delineated currently. This area remains to be delineated by FCDMC once the Sols Wash levees are designed.

An embankment stability analysis was performed by Ninyo & Moore. Their analysis indicates that the proposed embankment slopes are globally stable. A copy of Ninyo & Moore's report is shown in Appendix E.4 Analysis of Structures.

**Table 5-7 Freeboard along the Levee and Road Embankment for 100-Year Profile  
Upstream of Sols Wash (Proposed Conditions)**

Cross-Section	Road Station	Road Elevation	Top of Soil Cement Elevation	Water Surface Elevation	Freeboard to Top of Road	Freeboard to Top of Soil Cement	Comments
	171+00.00	2093.87	2073.00	2072.82	21.05	0.18	No flood protection. There are culverts without closure devices in this reach.
52.558	169+40.08	2091.49	2072.21	2071.97	19.52	0.24	
52.508	167+62.82	2088.18	2071.35	2071.09	17.09	0.26	
52.467	166+08.55	2085.16	2070.68	2070.29	14.87	0.39	
52.440	164+57.58	2082.46	2070.10	2069.80	12.66	0.3	
52.410	163+31.31	2080.40	2069.69	2069.34	11.06	0.35	
52.384	162+00.67	2078.46	2069.18	2068.89	9.57	0.29	
52.345	160+03.42	2075.91	2068.42	2068.22	7.69	0.20	
52.316	158+54.00	2074.27	2067.83	2067.60	6.67	0.23	
52.284	157+06.17	2072.91	2067.26	2066.88	6.03	0.38	
52.250	155+55.29	2071.66	2066.52	2066.10	5.56	0.42	
52.224	154+32.16	2070.65	2065.76	2065.48	5.17	0.28	
52.196	153+19.67	2069.77	2065.40	2064.80	4.97	0.60	
52.170	151+92.63	2068.85	2065.00	2063.70	5.15	1.30	
52.147	150+90.68	2068.16	2064.68	2063.08	5.08	1.60	
52.121	149+88.29	2067.52	2064.36	2062.02	5.50	2.34	
52.100	148+75.63	2066.86	2064.01	2061.11	5.75	2.90	
52.078	147+67.05	2066.27	2063.67	2060.50	5.77	3.17	
52.054	146+27.95	2065.60	2063.15	2059.91	5.69	3.24	
52.029	144+91.44	2065.01	2062.51	2059.18	5.83	3.33	
52.006	14+398.9	2064.64	2062.08	2058.79	5.85	3.29	
51.983	142+97.00	2064.24	2061.60	2058.18	6.06	3.42	
51.957	141+93.19	2063.82	2061.12	2057.75	6.07	3.37	
51.932	140+85.45	2063.39	2060.62	2057.33	6.06	3.29	
51.895	139+02.32	2062.66	2059.74	2056.53	6.13	3.21	
51.854	137+30.86	2061.97	2058.86	2055.51	6.46	3.35	
51.829	136+08.02	2061.48	2058.23	2055.03	6.45	3.20	
51.807	134+81.17	2060.97	2057.78	2054.42	6.55	3.36	
51.782	133+37.72	2060.40	2057.49	2054.00	6.40	3.49	
51.757	132+02.92	2059.86	2057.23	2053.61	6.25	3.62	
51.734	130+59.33	2059.28	2056.95	2053.40	5.88	3.55	
51.709	128+73.98	2058.54	2056.58	2053.17	5.37	3.41	
51.682	126+91.40	2057.81	2056.33	2053.01	4.80	3.32	
51.656	125+44.81	2057.22	2056.22	2052.94	4.28	3.28	
51.638	124+27.15	2056.75	2056.13	2052.87	3.88	3.26	
51.618	123+10.04	2056.29	2056.04	2052.83	3.46	3.21	
51.601	122+11.84	2055.98	2055.97	2052.64	3.34	3.33	
51.581	120+93.57	2055.71	2055.88	2052.49	3.22	3.39	
51.558	119+52.76	2055.54	2055.74	2052.39	3.15	3.35	
51.536	118+22.95	2055.53	2055.55	2052.28	3.25	3.27	
51.516	117+04.78	2055.63	2055.37	2052.19	3.44	3.18	
	116+75.00	2055.67	2055.33	2052.12	3.55	3.21	Near north end of Sols Wash bridge

**Table 5-8 Freeboard to Top of Soil Cement for 100-Year Profile Downstream of Sols Wash (Proposed Conditions)**

Cross-Section	Location of intersection of cross-section and top of soil cement		Top of Soil Cement Elevation	Water Surface Elevation	Freeboard to Top of Soil Cement	Comments
	Easting	Northing				
	453,881.6	1,082,301.8	2055.10	2051.68	3.42	Just downstream of Sols Wash bridge opening
51.453	453,943.3	1,082,246.1	2055.10	2051.43	3.67	
51.436	454,010.9	1,082,185.0	2055.10	2051.11	3.99	
51.418	454,088.1	1,082,115.3	2055.10	2051.01	4.09	
	454,106.7	1,082,098.5	2055.10	2050.87	4.23	100 feet upstream of proposed bridge
51.398	454,169.2	1,082,032.5	2055.10	2050.36	4.74	Freeboard is to top of wall
51.375	454,179.4	1,082,017.3	2055.10	2048.84	6.26	Upstream bounding section; Freeboard is top of wall
51.355	454,237.4	1,081,931.2	2051.00	2046.62	4.38	Downstream bounding section of bridge, freeboard is to top of wall
51.345	454,327.3	1,081,774.5	2051.00	2046.59	4.41	
	454,330.0	1,081,769.9	2051.00	2046.57	4.43	Downstream limit of soil cement

#### 5.5.4 Islands and Split Flows

Separate hydraulic models were developed in HEC-RAS to model the overbank flow around the bridges over the Hassayampa River under existing conditions. In the existing conditions model, the overbank flow bypasses the 1936 and 1962 Bridge on both the left and right sides. Two additional hydraulic models were developed: one for the left overbank under the existing conditions and one for the right overbank under existing conditions.

The cross-sections for each of these additional models were cut from the existing topography using HEC-GeoRAS extension of ArcView GIS. The overbank areas consisted primarily of vegetation, streets, buildings, and parking lots. It is also possible that during flood events, cars and semi trailers could be encountered along the streets and parking lots. The wide variety of terrain led to some uncertainty in the roughness value. In order not to underestimate the Manning's  $n$ -value, it was deemed appropriate to use a uniform Manning  $n$ -value of 0.05 for the overbank areas for the existing conditions overbank models.

Using the aerial photographs, ineffective flow areas were drawn around the structures to simulate the fact that flow would have to go around the structures rather than through them. Other areas that appeared to convey little flow were also identified as ineffective areas by examining the aerial photographs. These structures obstructed a considerable amount of the flow area, especially in the right overbank.

For the right overbank existing condition model, the downstream boundary condition was set equal to the water surface elevation at cross-section 51.13 in the main model (2037.45 feet). For the existing conditions left overbank model, the downstream boundary condition was set equal to the water surface elevation at cross-section 51.303 in the main Hassayampa River model (2042.85 feet). Because both overbank models went through critical depth near their downstream limits, the downstream boundary condition became hydraulically isolated from the rest of the model. Within reasonable variations of the downstream boundary condition, that boundary condition did not impact the results of the overbank models.

At the upstream end of both overbank models, the flow rate was adjusted until the energy grade line elevation at the most upstream cross-section matched the energy grade line at the nearest cross-section of the main Hassayampa River model. For the left overbank model, the flow rate entering the system was adjusted until the energy grade line matched the energy grade line from cross-section 51.418 in the main Hassayampa River model (within a tolerance of 0.04 feet). The existing condition right overbank model tied into cross-section 51.398 on the upstream side.

Flow that entered the overbanks in the existing conditions overbank models was subtracted from the main existing conditions Hassayampa River model. Thus, the three existing conditions models (the main Hassayampa River model, the right overbank model, and the left overbank model) were simultaneously adjusted to match the energy grade lines and to balance the discharges in each model. A summary of the flow rates in the overbanks is shown in Table 5-9.

No overbank models were necessary under the proposed conditions. It was assumed that the future improvement/levees at the Sols Wash (created under the future FCDMC "Wickenburg Downtown Flood Hazard Mitigation Project") would be high enough to restrain the 100-year Hassayampa River flood on the right bank. Therefore, the 100-year Hassayampa River flood would be contained on the right overbank by the proposed Hassayampa River levees as well as the future Sols Wash levees, and no flooding on the right overbank at the Hassayampa River Bridge will occur. On the left overbank, the elevation of the road is high enough that it should prevent overtopping under the proposed conditions scenario.

**Table 5-9 Overbank Discharges (in cfs) at Hassayampa River Bridges under Existing Conditions (Without Encroachment)**

	Existing Conditions
Left Overbank	3,900
Right Overbank	1,760

#### 5.5.5 Ineffective Flow Areas

For both existing and proposed conditions models, ineffective flow limits were placed downstream of the 1962 Bridge. The ineffective flow areas were assumed to expand at a ratio of 2:1. This ratio was set based upon guidelines in the Appendix B of the HEC-RAS *Hydraulic Reference Manual* (HEC-RAS, 2001). In Table B.2 of that Appendix, the closest entry to the project conditions is given by the entry where overbank Manning *n*-value equals channel Manning *n*-value, the stream slope is about 0.002, and the bridge opening width is 25% of the floodplain width. For this table entry, the suggested expansion ratios are 1.5 to 2.0 to 1. The more conservative value of 2.0 was used. An additional permanent ineffective flow area was added near the right side of the downstream bounding cross-section of the 1962 Bridge to represent a rock which protrudes just downstream of the bridge abutment. For the existing conditions model, a contraction ratio of 1:1 upstream of the 1936 Bridge was used. The protrusion of a bluff upstream of the 1936 Bridge, on the left bank, was also considered in determining the placement of the ineffective flow limits.

Because a significant amount of flow goes over the overbanks in the existing conditions models, the cross-sections upstream of these breakout cross-sections do not have ineffective flow limits due to the bridge; this area was assumed to flow effectively because it breaks out onto the overbanks. Additional ineffective flow limits were added on the left bank at and near cross-section 51.618 because of a ponding area on the left bank. A 2:1 expansion ratio was used. Additional ineffective limits were added on the right side of the cross-sections near river mile 53.000 to isolate areas where water will not flow. Starting at cross-section 52.740, ineffective flow limits were added on the left side of the cross-sections to represent the “hydraulic shadow” of protruding bluff. A 2:1 expansion ratio was used for these ineffective flow limits.

For the proposed conditions model, a contraction ratio of 1:1 upstream of the proposed bridge was used. Upstream of the proposed bridge on the right side of the cross-sections, the soil cement bank protection comes in nearly parallel to the river, so no right ineffective flow limits are needed near the bridge. Ineffective flow limits near and downstream of river mile 53.000 on the right side were set as in the existing conditions model.

#### 5.5.6 Supercritical Flow

Subcritical flow regime was modeled in HEC-RAS. No supercritical condition was allowed.

#### 5.6 Floodway Modeling

The original floodway was laid out by Cella-Barr (1988) so that the encroached water surface elevations would not be more than one foot higher than the unencroached elevations, per FEMA regulations.

In the FEMA Q3 polygons, the floodway and floodplain where they crossed tributary washes (such as Sols Wash) were combinations of the floodways/floodplains of the Hassayampa River and the tributaries. To isolate the Hassayampa floodplain/floodway, the boundaries across the tributaries were traced (in GIS) from scans of the work maps which had been rectified to ground coordinates.

The floodway polygon was overlaid on the cross-sections for the hydraulic model. The corresponding encroachment stations were coded in the HEC-RAS model. For cross-sections 51.130, copied from the effective model, the encroachment stations were taken from FIS HEC-2 model.

In order to verify that the placement of the proposed roadway embankment will not cause excessive surcharge, a comparison of the encroached proposed conditions water surface elevations with those for the existing conditions was conducted. The increase in the encroached proposed conditions water surface elevations compared to the existing conditions was less than or equal to one foot everywhere in the project reach. A summary of the floodway water surface profiles for the various models can be seen in Table 5-10.

Just downstream of the proposed bridge (from cross-section 51.331 to cross-section 51.275), the new floodway limit extends beyond the effective floodway limit on the left bank. Most of this area is either under the proposed bridge or land that was recently purchased by the Arizona Department of Transportation. However, a small portion of the new floodway lies in the field of a private landowner. The landowner has been notified by the Town of Wickenburg regarding the proposed floodway change. A copy of this public notice from the Town of Wickenburg is provided in Appendix B.6.

**Table 5-10 Summary of Floodway (Encroached) Water Surface Profiles**

Cross-Section	Existing Conditions Model (ft)	Proposed Conditions Model (ft)	Effective (FIS) Encroached Profile (ft)	Encroached Existing Conditions (with existing floodway) (ft)	Encroached Existing Conditions (with proposed floodway) (ft)	Encroached Proposed Conditions (with proposed floodway) (ft)	Encroached Proposed Minus Base Flood Proposed (ft)
53.160	2088.32	2088.32	2089.13	2089.11	2089.11	2089.11	0.79
53.130	2087.53	2087.53		2088.45	2088.45	2088.45	0.92
53.097	2086.77	2086.77		2087.64	2087.65	2087.65	0.88
53.063	2085.86	2085.86	2086.18	2086.79	2086.8	2086.8	0.94
53.026	2084.90	2084.9		2085.55	2085.63	2085.63	0.73
52.986	2084.15	2084.15		2084.56	2084.67	2084.67	0.52
52.949	2083.58	2083.58		2083.79	2083.92	2083.92	0.34
52.916	2083.17	2083.17		2083.16	2083.33	2083.33	0.16
52.881	2082.72	2082.72	2081.95	2082.66	2082.83	2082.83	0.11
52.847	2081.61	2081.61		2081.55	2081.68	2081.68	0.07
52.813	2080.24	2080.24		2080.3	2080.41	2080.41	0.17
52.778	2079.22	2079.22		2079.37	2079.28	2079.28	0.06
52.740	2077.87	2077.87		2078.02	2078.04	2078.04	0.17
52.693	2076.28	2076.28		2076.22	2076.33	2076.33	0.05
52.650	2074.31	2074.3		2074.3	2074.32	2074.32	0.01
52.606	2072.81	2072.9		2073.03	2072.94	2072.97	0.07
52.558	2071.68	2071.97		2072.26	2072.09	2072.16	0.19
52.508	2070.49	2071.1		2071.47	2071.13	2071.27	0.18
52.467	2069.67	2070.29		2070.75	2070.37	2070.52	0.23
52.440	2069.09	2069.8		2070.25	2069.91	2070.03	0.23
52.410	2068.63	2069.34	2070.75	2069.79	2069.52	2069.56	0.22
52.384	2068.21	2068.87		2069.19	2069.03	2068.98	0.09
52.345	2067.59	2068.22		2068.53	2068.27	2068.32	0.10
52.316	2066.92	2067.59	2068.78	2067.95	2067.79	2067.72	0.12
52.284	2066.41	2066.88		2067.08	2066.9	2066.87	-0.01
52.250	2065.80	2066.1		2066.42	2066.16	2066.14	0.04
52.224	2064.87	2065.48	2065.78	2065.87	2065.55	2065.56	0.08
52.196	2064.20	2064.8		2065.18	2064.88	2064.87	0.07
52.170	2063.26	2063.7		2063.94	2063.76	2063.77	0.07
52.147	2062.62	2063.08		2063.37	2063.16	2063.16	0.08
52.121	2061.70	2062.02		2062.2	2062.23	2062.22	0.20
52.100	2060.82	2061.11		2061.46	2061.5	2061.48	0.37
52.078	2060.05	2060.5		2060.99	2061.08	2061.04	0.54
52.054	2059.72	2059.91		2060.51	2060.64	2060.57	0.66
52.029	2059.06	2059.18		2059.86	2059.98	2059.86	0.68
52.006	2058.70	2058.79		2059.4	2059.57	2059.4	0.61
51.983	2058.10	2058.18		2058.62	2058.99	2058.62	0.44
51.957	2057.69	2057.75		2058.12	2058.64	2058.12	0.37
51.932	2057.26	2057.33		2057.66	2058.33	2057.66	0.33
51.895	2056.30	2056.53		2056.6	2057.82	2056.64	0.11
51.854	2055.62	2055.51	2056.05	2055.47	2057.44	2055.56	0.05
51.829	2055.31	2055.02		2054.91	2057.3	2055.02	-0.01
51.807	2055.10	2054.42		2054.42	2057.16	2054.49	0.07
51.782	2054.87	2054		2054.09	2057.1	2054.12	0.12
51.757	2054.63	2053.61	2052.77	2053.8	2057.04	2053.8	0.19
51.734	2054.57	2053.4		2053.66	2057	2053.58	

0.18

Cross-Section	Existing Conditions Model (ft)	Proposed Conditions Model (ft)	Effective (FIS) Encroached Profile (ft)	Encroached Existing Conditions (with existing floodway) (ft)	Encroached Existing Conditions (with proposed floodway) (ft)	Encroached Proposed Conditions (with proposed floodway) (ft)	Encroached Proposed Minus Base Flood Proposed (ft)
51.709	2054.51	2053.17		2053.56	2056.95	2053.38	0.21
51.682	2054.46	2053.01		2053.47	2056.91	2053.22	0.21
51.656	2054.42	2052.94	2052.2	2053.42	2056.88	2053.12	0.18
51.638	2054.38	2052.87		2053.34	2056.86	2053.04	0.17
51.618	2054.36	2052.83		2053.29	2056.83	2052.97	0.14
51.601	2054.26	2052.64		2053.15	2056.77	2052.8	0.16
51.581	2054.20	2052.49		2053.08	2056.7	2052.64	0.15
51.558	2054.12	2052.39	2051.64	2052.93	2056.63	2052.49	0.10
51.536	2054.09	2052.28		2052.86	2056.58	2052.36	0.08
51.516	2054.09	2052.19		2052.82	2056.54	2052.25	0.06
51.497	2054.01	2051.96		2052.79	2056.45	2052.02	0.06
51.477	2053.93	2051.9		2052.66	2056.43	2051.97	0.07
51.453	2053.69	2051.43	2051.23	2052.13	2056.24	2051.43	0.00
51.436	2053.60	2051.11		2052.02	2056.14	2051.18	0.07
51.418	2053.58	2051.01		2051.93	2056.07	2051.11	0.10
51.398	2053.42	2050.36	2050.82	2051.59	2055.71	2050.46	0.10
51.375	2053.21	2048.84		2050.74	2054.98	2048.88	0.04
51.355	2053.15	2046.62		2050.52	2054.91	2046.57	-0.05
51.345	2052.57	2046.59	2049.75	2050.41	2055	2046.59	0.00
51.338		2046.46				2046.46	0.00
51.331	2045.22	2044.17	2045.72	2045.58	2044.97	2044.97	0.80
51.303	2042.82	2042.97		2043.18	2043.1	2043.1	0.13
51.275	2041.36	2041.4		2041.98	2041.98	2041.98	0.58
51.208	2039.39	2039.39	2040.17	2040.17	2040.17	2040.17	0.78
51.130	2037.45	2037.45	2037.62	2037.62	2037.62	2037.62	0.17

## 5.7 Problems Encountered During the Study

### 5.7.1 Special Problems and Solutions

None identified.

### 5.7.2 Modeling Warning and Error Messages

HEC-RAS generated several warning messages along the study reach of the proposed conditions model. Divided flow was computed at all cross-sections from 53.160 and 52.650 and at cross-sections 52.170 and 52.029. These results were indicative of local high points created by berms and natural high bank areas notable in the upstream areas of the reach. These were not true split flow phenomena.

Model tolerances were slightly exceeded at a few cross-section locations for conveyance ratio, changes in velocity head, or changes in energy losses. The cross-sections are already quite closely spaced. The final location and frequency of cross-sections were agreed upon by the clients and WEST. Additional cross-sections would not have avoided them these warnings. Because the model tolerances were just slightly exceeded, the hydraulic computations are acceptable and these warnings are not a source of concern.

At cross section 51.303, the energy equation could not be balanced, and the program defaulted to critical depth. This is due to a relatively steep slope downstream of the existing 1962 Bridge. That the water surface would approach critical depth as it approached a break in bed slope is not unreasonable.

## 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 proposed condition (without floodway encroachment) hydraulic results for the 100-year event is presented in Table 5-11. The 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. For comparative purposes, the floodplain and floodway elevations of the effective models and those calculated for this analysis are presented in graphical form in Figure 5-4.

### 5.9.2 Verification of Results

The results generated by the hydraulic models were reasonable and within expected parameters.

**Table 5-11 HEC-RAS Output (Proposed Conditions)**

River	River Sta	Q Total (cfs)	W.S. Elev (ft)	Crit W.S. (ft)	Vel Chnl (ft/s)	Top Width (ft)	Hydr Depth (ft)	Froude # Chl	Sta W.S. Lft (ft)	Sta W.S. Rgt (ft)
Hassayampa	53.16	71000	2088.32	2087.7	10.05	2506.09	3.74	0.78	1653.73	4178.82
Hassayampa	53.13	71000	2087.53	2086.5	8.84	2428.95	4.06	0.69	420.03	2874.91
Hassayampa	53.097	71000	2086.77	2085.74	8.49	2714.9	4.06	0.66	98.56	2850.59
Hassayampa	53.063	71000	2085.86	2084.81	8.88	2465.56	4.23	0.7	115.37	2742.21
Hassayampa	53.026	71000	2084.9	2083.77	8.6	2122.85	4.48	0.69	127.15	2309.52
Hassayampa	52.986	71000	2084.15	2082.38	7.34	2334.09	5.12	0.57	117.32	2451.4
Hassayampa	52.949	71000	2083.58	2081.7	7.58	2163.39	5.42	0.55	107.85	2365.42
Hassayampa	52.916	71000	2083.17	2081.11	7.55	1975.56	5.57	0.52	33.67	2009.23
Hassayampa	52.881	71000	2082.72	2080.36	7.59	1744.42	6.22	0.5	96.07	1840.49
Hassayampa	52.847	71000	2081.61	2080.36	10.08	1529.41	5.53	0.67	106.71	1666.31
Hassayampa	52.813	71000	2080.24	2079.65	11.92	1413.58	5.15	0.81	119.49	1569.04
Hassayampa	52.778	71000	2079.22	2078.36	11.4	1389.28	5.47	0.75	130.33	1546.42
Hassayampa	52.74	71000	2077.87	2077.17	12.02	1339.17	5.38	0.81	140.95	1507.54
Hassayampa	52.693	71000	2076.28	2075.83	12.27	1540.66	4.88	0.86	140.2	1689.92
Hassayampa	52.65	71000	2074.31	2074.14	12.72	1689.71	4.43	0.97	179.73	1891.18
Hassayampa	52.606	71000	2072.9	2071.96	9.76	1893.48	4.78	0.77	217.91	2142.34
Hassayampa	52.558	71000	2071.97	2070.65	8.88	1857.13	5.05	0.68	203.74	2060.87
Hassayampa	52.508	71000	2071.09	2069.33	8.18	1806.54	5.49	0.59	245.42	2234.28
Hassayampa	52.467	71000	2070.29	2068.64	8.63	1742	5.56	0.61	145.68	2055.61
Hassayampa	52.44	71000	2069.8	2068.09	8.55	1781.1	5.61	0.6	66.66	2010.74
Hassayampa	52.41	71000	2069.34	2067.46	8.36	1746.83	5.99	0.56	259.38	2153.49
Hassayampa	52.384	71000	2068.89	2067.09	8.58	1830.98	5.86	0.57	168.82	2141.38
Hassayampa	52.345	71000	2068.22	2066.24	8.67	1686.23	5.97	0.58	125.67	1951.54
Hassayampa	52.316	71000	2067.6	2065.88	9.3	1501.76	6.31	0.59	289.05	1922.22
Hassayampa	52.284	71000	2066.88	2065.64	10.26	1804.42	5.74	0.64	85.32	2019.42
Hassayampa	52.25	71000	2066.1	2064.8	10.84	1429.62	6.17	0.67	229.15	1786.14
Hassayampa	52.224	71000	2065.48	2064.22	11.19	1306.59	6.2	0.69	171.03	1609.5
Hassayampa	52.196	71000	2064.8	2063.67	11.29	1353.97	5.83	0.71	134.88	1618.01
Hassayampa	52.17	71000	2063.7	2063.05	12.52	1296.02	5.51	0.82	144.67	1601.65
Hassayampa	52.147	71000	2063.08	2062.27	12.02	1297.23	5.72	0.78	186.98	1612.82
Hassayampa	52.121	71000	2062.02	2061.63	12.89	1301.44	5.33	0.86	192.91	1624.96
Hassayampa	52.1	71000	2061.11	2060.86	12.98	1324.07	5.13	0.89	181.59	1637.43
Hassayampa	52.078	71000	2060.5	2059.99	12.1	1347.88	5.28	0.83	180.96	1660.29
Hassayampa	52.054	71000	2059.91	2058.92	10.88	1619.13	5.5	0.75	153.88	1905.38
Hassayampa	52.029	71000	2059.18	2058.32	10.97	1665.96	5.33	0.77	116.88	1916.09
Hassayampa	52.006	71000	2058.79	2057.44	9.92	1886.58	5.66	0.69	108.11	2206.29
Hassayampa	51.983	71000	2058.18	2057.05	10.24	1961.51	5.45	0.72	132.74	2227.16
Hassayampa	51.957	71000	2057.75	2056.14	9.41	1943.12	5.91	0.64	162.52	2243.61
Hassayampa	51.932	71000	2057.33	2055.56	9.16	1813.19	6.11	0.61	116.96	2066.9
Hassayampa	51.895	71000	2056.53	2054.98	9.82	1640.43	6.09	0.63	103.05	1884.84
Hassayampa	51.854	71000	2055.51	2054.25	10.71	1553.05	5.98	0.68	195.05	1877.68
Hassayampa	51.829	71000	2055.03	2053.55	10.34	1447	6.27	0.66	79.98	1659.04
Hassayampa	51.807	71000	2054.42	2053.09	10.64	1548.57	6.17	0.69	204.42	2019.63

River	River Sta	Q Total (cfs)	W.S. Elev (ft)	Crit W.S. (ft)	Vel Chnl (ft/s)	Top Width (ft)	Hydr Depth (ft)	Froude # Chl	Sta W.S. Lft (ft)	Sta W.S. Rgt (ft)
Hassayampa	51.782	71000	2054	2052.28	9.93	1439.09	6.5	0.63	210.78	1785.5
Hassayampa	51.757	71000	2053.61	2051.73	9.58	1437.61	6.58	0.6	213.09	1787.39
Hassayampa	51.734	71000	2053.4	2051.06	8.62	1623.94	6.6	0.52	55.86	1816.44
Hassayampa	51.709	71000	2053.17	2050.33	7.91	1623.43	7.4	0.47	117.57	1876.37
Hassayampa	51.682	71000	2053.01	2049.57	7.18	1888.58	7.93	0.42	58.73	2078.06
Hassayampa	51.656	71000	2052.94	2048.77	6.37	2021.42	8.38	0.36	167.02	2312.22
Hassayampa	51.638	71000	2052.87	2048.36	6.08	2064.36	8.69	0.34	212.69	2397.56
Hassayampa	51.618	71000	2052.83	2047.68	5.67	2267.1	9.22	0.31	212.61	3074.76
Hassayampa	51.601	71000	2052.64	2047.66	6.29	2265.79	8.8	0.34	234.57	3071.47
Hassayampa	51.581	71000	2052.49	2047.32	6.61	2286.41	9.31	0.35	113.44	2941.49
Hassayampa	51.558	71000	2052.39	2046.92	6.65	2137.67	9.74	0.35	217.43	2820.36
Hassayampa	51.536	71000	2052.28	2046.44	6.68	2334.2	10.3	0.34	245.56	2692.32
Hassayampa	51.516	71000	2052.19	2046.08	6.63	2096.53	10.75	0.33	279.91	2489.48
Hassayampa	51.497	71000	2051.96	2046.58	7.36	1849.42	10.62	0.36	312.38	2240.29
Hassayampa	51.477	71000	2051.9	2045.4	6.92	1861.4	11.67	0.33	261.04	2200.94
Hassayampa	51.453	71000	2051.43	2046.01	7.91	1813.95	10.78	0.38	257.85	2183.01
Hassayampa	51.436	71000	2051.11	2046.1	8.54	1782.95	11.07	0.41	244.85	2155.92
Hassayampa	51.418	71000	2051.01	2045.12	8.24	1650.5	12.69	0.39	269.35	2101.43
Hassayampa	51.398	71000	2050.36	2045.11	9.67	1470.97	12.9	0.46	257.66	1858.15
Hassayampa	51.375	71000	2048.84	2045.42	12.2	470.76	12.36	0.61	821.39	1292.15
Hassayampa	51.37	Proposed Bridge								
Hassayampa	51.355	71000	2046.62	2044.89	14.18	470.76	10.63	0.77	821.39	1292.15
Hassayampa	51.345	71000	2046.59	2043.92	13.16	459.33	11.75	0.68	1086.27	1545.6
Hassayampa	51.338	71000	2046.46	2043.67	13.06	462.6	11.75	0.67	1083	1545.6
Hassayampa	51.335	1962 Bridge								
Hassayampa	51.331	71000	2044.17	2043.91	16.51	462.6	9.29	0.95	1083	1545.6
Hassayampa	51.303	71000	2042.97	2042.97	16.73	1288.1	8.13	0.95	258.16	1549.87
Hassayampa	51.275	71000	2041.4	2041.4	16.3	1378	7.67	0.95	264.89	2208.05
Hassayampa	51.208	71000	2039.39	2038.95	14.56	1878.2	6.48	0.85	1358.32	3315.63
Hassayampa	51.13	71000	2037.45	2036.61	12.31	1622.71	5.04	0.79	1425.3	3048

### Comparison of Effective vs. WEST Water Surface Elevation along Hassayampa River

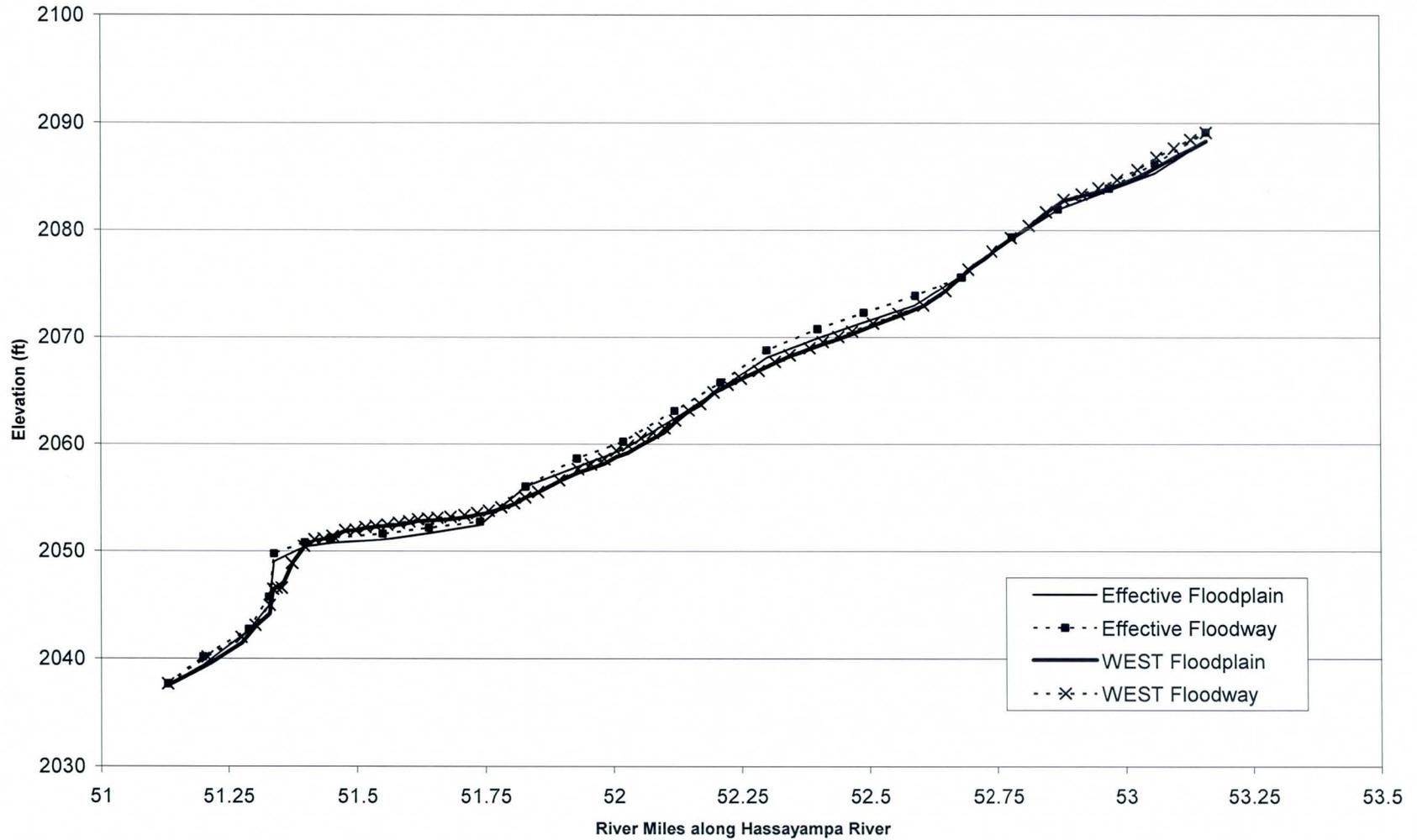


Figure 5-4 Water Surface Elevation Comparison along the Hassayampa River

## 6. Erosion and Sediment Transport

The main function of the Hassayampa River Sediment Transport model using HEC-6T (Thomas, 2002) was to predict long term changes in the bed profile. Factors considered include the presence of the proposed roadway embankment and the construction of the new abutments for the proposed bridge.

### 6.1 Method Description

#### 6.1.1 Hydrology

To run the sediment transport model (HEC-6T) simulations, a series of hydrographs needed to be developed. Simulated future hydrographs were required to determine whether the project is likely to have a significant impact on the deposition or degradation in the reach. The objective was to correctly simulate both the peak and general hydrograph shape which would correspond to actual hydrographs that the reach might experience.

The historical record was used to generate the simulated future hydrographs. Ideally, the actual hydrographs of historical events should be used for the sediment model. Although there were years of data of hydrograph peaks, data on the shape and duration was difficult to obtain. There was no known hydrologic model for this basin. Detailed hydrographs were available only since the 1990's, when numerous gages were installed by both the USGS and the Flood Control District of Maricopa County (FCDMC).

The FCDMC pressure transducer gages have been in operation since March 1994 at the US-60 Highway and since May 1996 at Morristown. Another FCDMC gage at Box Canyon has been in operation since 1991.

Significant differences in the peak discharge for a particular event between gages were noted. The January 1993 event exemplifies this: in January 1993, the Box Canyon gage (USGS) registered almost no flow, while the Morristown gage recorded a peak of 26,300 cfs. For the September 1997 event, the Box Canyon gage peak was 3,421 cfs, the US-60 peak was 15,367 cfs, and the Morristown peak was 9,095 cfs.

The flow volumes calculated from the hydrographs were also significantly different, even from the US-60 gage to the Morristown gage downstream. For the September 1997 event, integrated hydrograph showed that about 185 million cubic feet passed the US-60 gage. For the Morristown gage downstream, for the same event, only 51 million cubic feet passed the gage. Either there was some error in one of the two rating curves, or measurement error, or most of the discharge was lost through infiltration between the two locations.

The largest event for which a hydrograph was available is the January 1993 event at the Morristown gage. This event had a peak flow of 26,300 cfs. Based on the USGS hydrograph, the total volume of flow for this event is in just over 1 billion cubic feet. This volume is considerably larger than that for the September 1997

event (185 million cubic feet). The ratio of volumes between the two events is about 5:1 while the ratio of peaks is about 3:1. This is because the January 1993 flood had a longer duration—so the hydrograph is not only taller (peak discharge), but is wider (longer duration).

The following data were used to develop the hydrographs for the Hassayampa River HEC-6T sediment transport model:

- 48 annual peak flow records for the USGS Morristown gage near the Hassayampa River. These peak flow records were from 1939 to 1947 and from 1964 through 2003 (with 1 year missing). This gage was about 8 miles downstream of the US-60 Highway.
- Detailed hydrographs for all flood events, from FCDMD, for all dates since 3/14/1994 at the US-60 gage.
- A 15-minute interval hydrograph obtained from the USGS, at the Morristown gage, for the event of 1/6-10/1993. This event had a peak of 26,300 cfs, the third largest peak on record for this gage.
- The flow-frequency curve based on the FEMA floods (both from the current and 1977 study).
- For dates after 3/14/1994, the FCDMC detailed real-time gage record was used to model the historical record. For 1993 and prior, when a peak flow was available from the Morristown gage, a simulated hydrograph was created using the following procedure:
  - Using the flow-frequency relationship from the FFA analysis of Morristown, the exceedance interval of each flood was established. For example, the October 1984 flood of 26,700 cfs at Morristown is equivalent to the 5.3% (or 18.8 year) exceedance event.
  - That exceedance interval was used to “look up” the corresponding flood peak at the US-60, using the flow-frequency curve from the FIS-specified floods. For example, the 18.8 year event at the US-60 is 24,070 cfs.
  - The detailed hydrograph with the closest peak was identified (either one of the FCDMC hydrograph since 1994 or the 1993 Morristown hydrograph). For example, for a peak of 24,070 cfs, the detailed hydrograph with the nearest peak was the January 1993 hydrograph from Morristown.
  - The detailed hydrograph ordinates (flows) were all scaled up or down to make the peak of the hydrograph match the peak estimated from the second step above. For example to obtain a peak flood of

24,070 cfs, the discharges on the 1993 Morristown hydrograph were all multiplied by  $24,070 / 26,300 = 0.915$ , resulting in the simulated 1984 hydrograph at the US-60 gage.

The end result for each year's peak flow was a simulated hydrograph with the same peak flow.

Combining these simulated hydrographs with the 1994 and more recent gage records from the FCD gage led to a series of hydrographs that simulates about 48 years of gage record. It should be noted that the highest simulated peak flow from this combined series of events is 54,984 cfs, which comes from the simulated hydrograph of 9/5/1970 for Morristown. The Morristown peak on this date was 47,500 cfs, which interpolates as the 64.6-year flood at Morristown. Looking up the 64.6 year flood on the Hassayampa Flood Frequency curve yields a peak of 54,984 cfs.

In addition to a 48-year simulation, another hydrograph using the 100-year peak flow of 71,000 cfs was added to the end of the simulated flow record. This series of hydrograph was labeled as the "long-term" flow HEC-6T simulation.

## 6.2 Parameter Estimation

### 6.2.1 Boundary Condition

Using normal flow conditions, an elevation-discharge rating curve based on the HEC-2 models were developed to establish the downstream boundary conditions.

### 6.2.2 Manning's Roughness

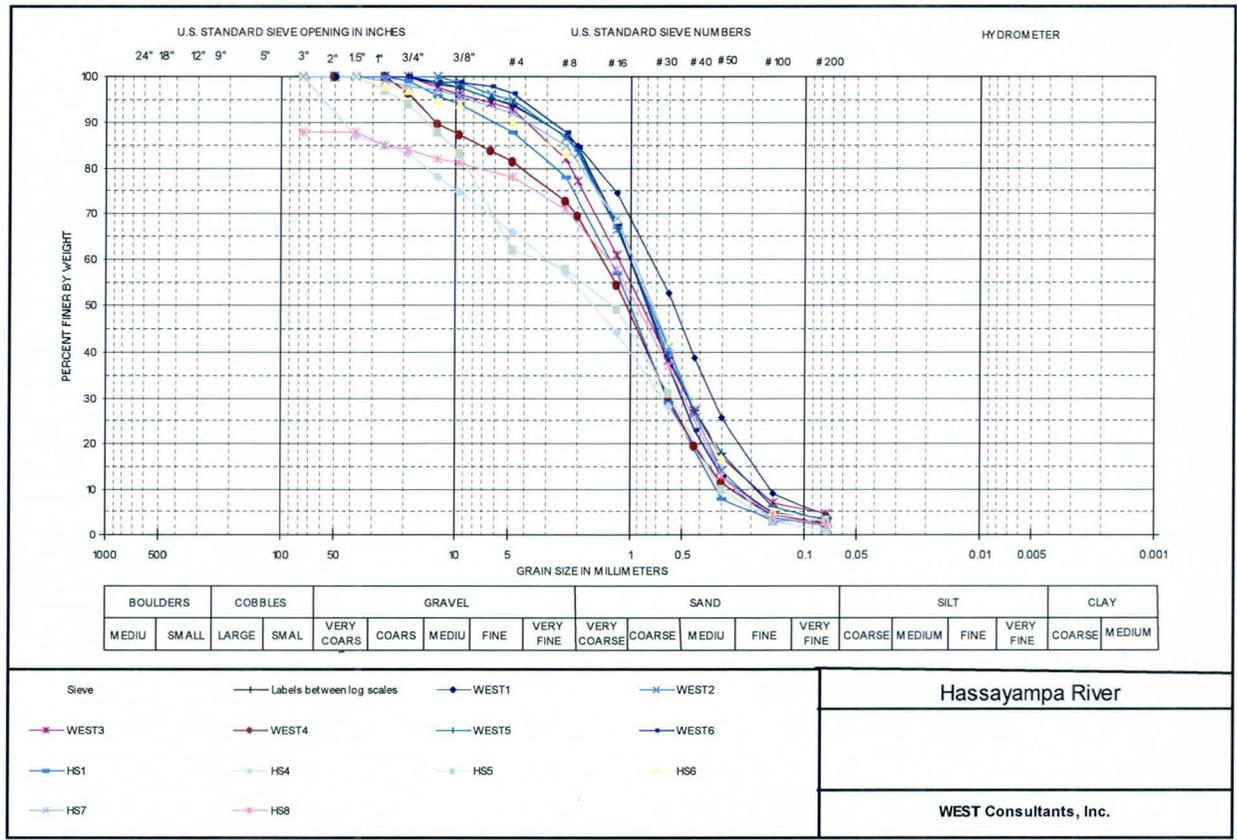
To arrive at conservative estimate for the sediment transport analysis the Manning's  $n$ -values were lowered to 0.025 in the channel and 0.035 on the overbanks. The lowered Manning's  $n$ -values resulted in increased erosion resulting in lower values of average bed and thalweg elevations. This, in turn, provided a conservative (higher) estimate for the scour depth.

## 6.3 Modeling Considerations

The decisive factor in selecting the proper sediment transport function was based on available bed gradation and maximum grain size. Bed material in the project location was comprised of sand and gravel, making it necessary to use an appropriate transport function. The transport function used in the study was based on Yang's Stream Power (Thomas, 2002). This function accounts for sand and gravel, giving a higher, realistic measure of total sediment concentration (and thus total sediment load).

### 6.3.1 Bed Sediment Characteristics

The sediment gradation curves for various samples are presented in Figure 6-1.



**Figure 6-1 Sediment Gradations at Various Locations along the Hassayampa River**

Different gradations were used in the sediment model, assigned by location to the appropriate cross sections in the sediment transport model. As can be seen in Figure 6-1, the  $D_{50}$  ranges from just over 0.5 mm to just over 1 mm. The median  $D_{50}$  of the different samples is about 0.8 mm. Sieve analysis was performed by Ninyo & Moore. The gradation curves provided by Ninyo & Moore are included in Appendix F.

### 6.3.2 Inflowing Sediment Load

The sediment transport model could not be directly calibrated to historical conditions because detailed historical bed elevation data were not available. The HEC-6T model requires input of the bed material load at the upstream limit of the project reach for the entire range of discharges. For this purpose, the HEC6-T model developed was run with the recirculation option (\$RE card, see Thomas, 2002). The recirculation of sediment load was applied in the upstream part of the study reach until convergence in sediment fractions was achieved. The values obtained in this manner were input into the HEC-6T model at the upstream most cross-section located at 53.72. Notable, to achieve a steady state condition within study reach of concern in this CLOMR, the HEC-6T model reach was extended

upstream beyond the water surface tie-in cross-section 53.16 shown on Sheet 3 of the work study map.

### 6.3.3 Movable Bed and Erosion Limits

In general, sediment dynamics tend to be more significant within the active channel, where the bed can either degrade or aggrade in response to erosion or deposition. The overbank areas tend to be more stable and normally are free of erosion, but can experience deposition. HD records were used to specify a bed sediment depth of 25 feet for all cross sections. Movable bed limits were identified at the boundary of the main channel in HD records. The movable bed limits extend beyond the defined bank stations. During high flows, significant deposition and scour was expected to occur within the movable bed limits but not expected to extend to the overbank areas.

Average bed elevations were generated using movable bed limits. This allowed wetting of the movable bed cross sections and provide an average elevation across the cross-section.

## 6.4 Sediment Transport Results

The HEC-6T model simulations were performed to predict the long-term degradation. Simulations were performed for the following scenarios: a) existing conditions, and b) proposed conditions.

The proposed conditions HEC6-T model was developed using the existing conditions model as the base and by incorporating the new bank alignment as encroachments. The rest of the model was identical to the existing conditions model.

The results are presented in Figures 6-2 and 6-3 which show the changes in the thalweg and the average bed elevations, respectively. Notable, average bed elevations dropped by about 3 to 4 feet while the thalweg dropped by 4 to 5 feet. These results indicate a conservative estimate due to lowered Manning's  $n$ -values used in the computations.

The results indicated that the average bed is lowered by 1 to 2 feet near the bridge location while the thalweg is lowered by an additional foot. The influence of the proposed conditions was not very significant in the reach downstream of the bridge. This was noted by comparing the results of the existing and the proposed conditions. A difference of less than a foot was observed which is probably close to the order of numerical accuracy of the computations performed.

The model was not extended further upstream because it would extend the model beyond the confluence with Martinez Wash, and the distribution of flows between the Martinez Wash and the Hassayampa River were not known and could not be estimated reasonably without a detailed hydrologic model.

Wickenburg - Hassayampa River  
Thalweg Change From Initial Condition- Long Term HEC-6T Simulation

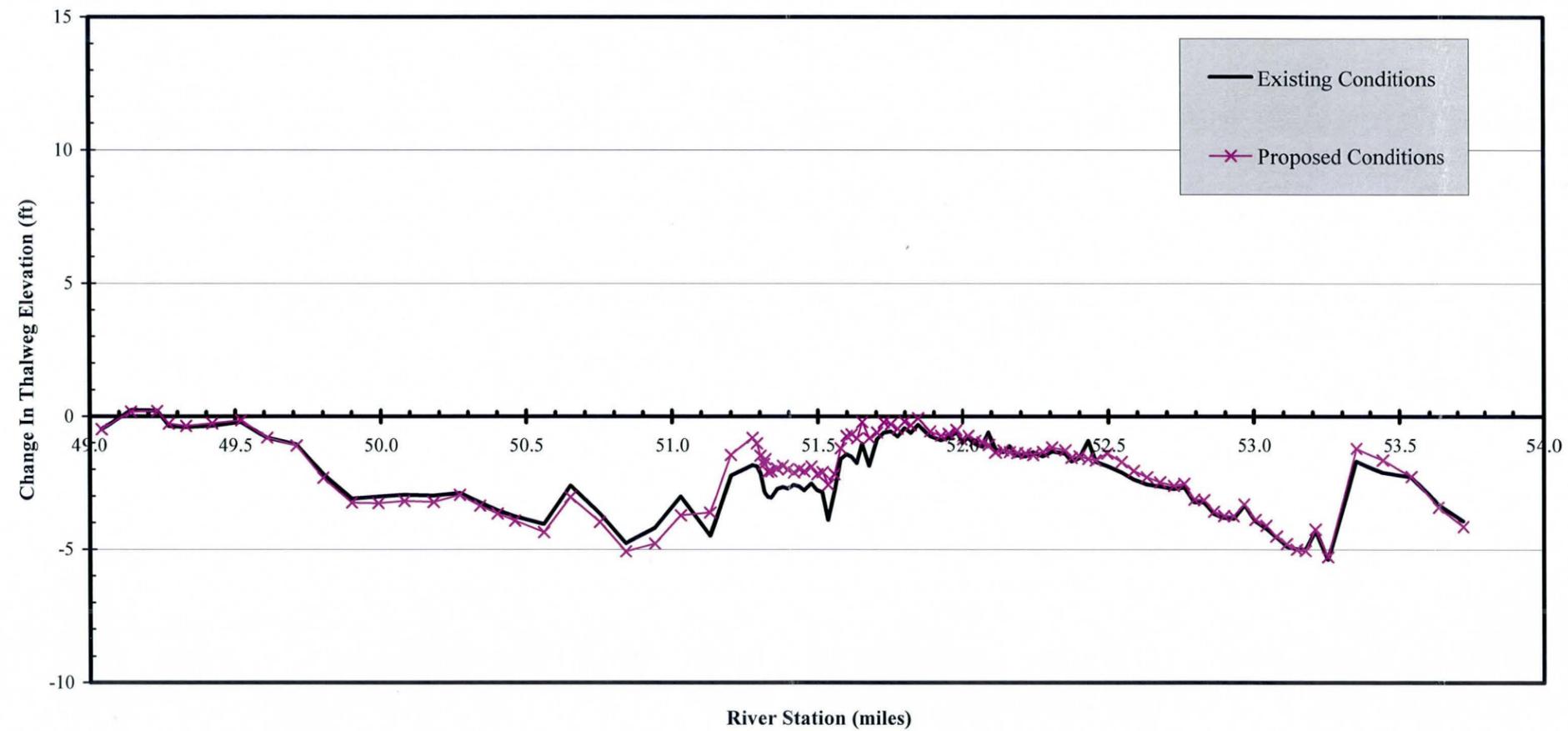
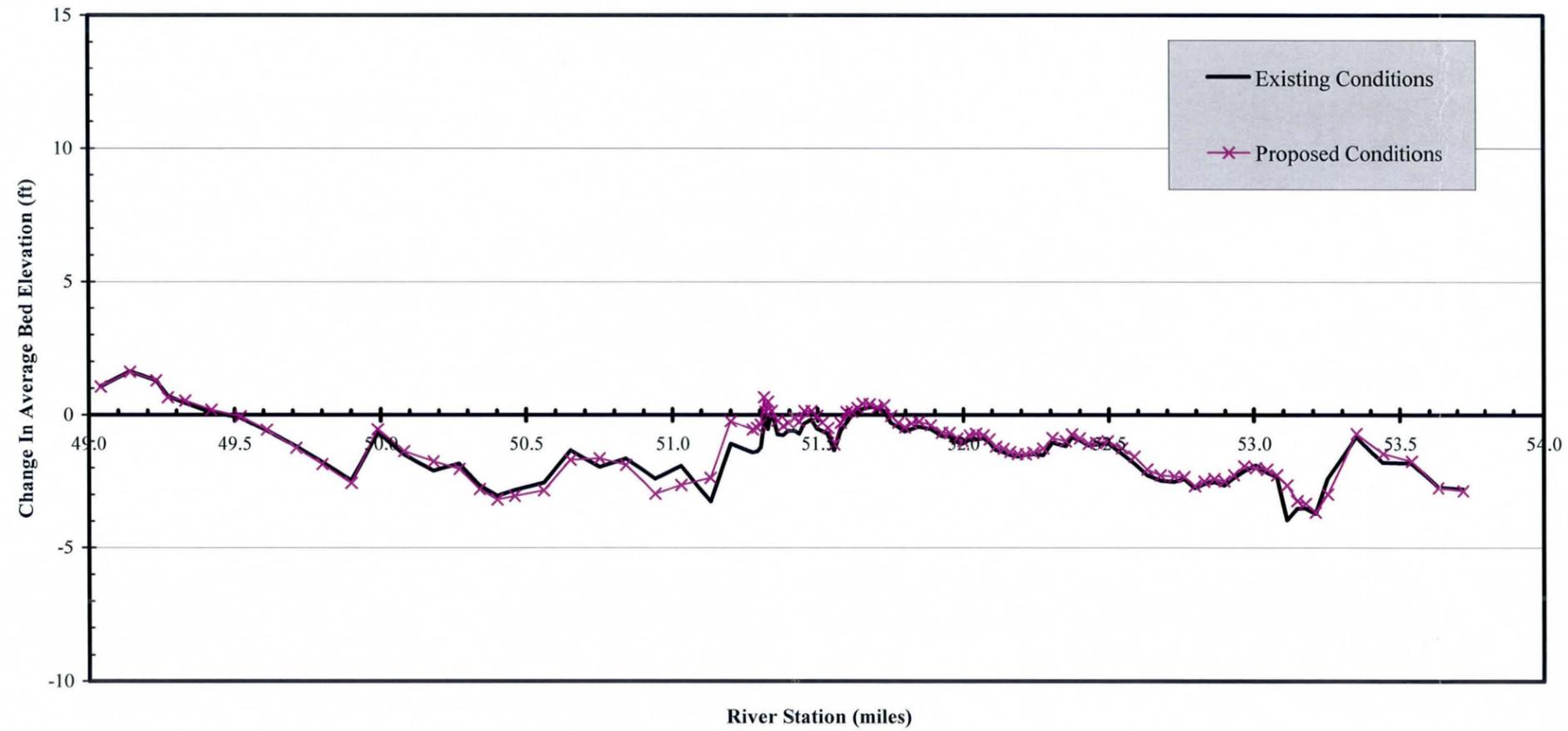


Figure 6-2 Thalweg Profile for 100-year Event Sediment Transport Model

**Wickenburg - Hassayampa River**  
**Average Bed Change from Initial Condition- Long Term HEC-6T Simulation**



**Figure 6-3 Average Bed Elevation Profile for 100-year Event Sediment Transport Model**

## 7. Draft FIS Report Data

### 7.1 Summary of Discharges

Table 7-1 summarizes the discharges used for the existing and proposed conditions.

**Table 7-1 Summary of Discharges**

Flow Change Location (HEC-RAS Cross-Section ID Number)	Existing Conditions Discharge (cfs)	Proposed Conditions Discharge (cfs)
52.410	71,000	71,000
51.418	67,100*	71,000
51.398	65,340*	71,000
51.303	69,240*	71,000
51.208	71,000	71,000

\* Flow breaks out into left and right overbanks

### 7.2 Floodway Data

The draft floodway data are listed in Table 7-2. The table summarizes the following variables for the floodway by cross-section: width, section area, and mean velocity. The table also lists by cross-section the base flood water surface elevations for floodway and floodplain, and the corresponding water surface elevation increase.

### 7.3 Annotated Flood Insurance Rate Maps

A copy of draft annotated Flood Insurance Rate Map is included in the Exhibit Maps section following the Appendices.

### 7.4 Flood Profiles

Draft flood profiles are included in the Exhibit Maps section following the Appendices. Draft annotated flood profiles are also included in the Exhibit Maps section following the Appendices.

**Table 7-2 Floodway Data**

Flooding Source	Floodway			Base Flood Water Surface Elevation <sup>1</sup>		
	Cross-Section	Width (ft)	Section Area (sq ft)	Mean Velocity (ft/s)	Floodway <sup>2</sup> (ft)	Floodplain <sup>2</sup> (ft)
53.160	1701.96	8567.5	8.3	2089.11	2088.32	0.80
53.130	1640.7	8961.4	7.9	2088.45	2087.53	0.93
53.097	1512.5	8525.8	8.3	2087.65	2086.77	0.88
53.063	1446.9	8136.9	8.7	2086.80	2085.86	0.94
53.026	1411.1	7635.5	9.3	2085.63	2084.90	0.73
52.986	1507.7	8326.9	8.5	2084.67	2084.15	0.52
52.949	1519.6	8642.6	8.2	2083.92	2083.58	0.34
52.916	1514.8	8856.8	8.0	2083.33	2083.17	0.16
52.881	1490.3	9371.1	7.6	2082.83	2082.72	0.10
52.847	1365.7	7850.2	9.0	2081.68	2081.61	0.07
52.813	1281.1	7084.0	10.0	2080.41	2080.24	0.17
52.778	1270.3	7189.7	9.9	2079.28	2079.22	0.06
52.740	1238.8	7061.8	10.1	2078.04	2077.87	0.17
52.693	1344.8	6906.2	10.3	2076.33	2076.28	0.05
52.650	1471.6	6583.0	10.8	2074.32	2074.31	0.01
52.606	1641.4	8106.4	8.8	2072.97	2072.90	0.07
52.558	1692.1	9071.0	7.8	2072.16	2071.97	0.19
52.508	1660.6	9439.1	7.5	2071.27	2071.09	0.18
52.467	1594.2	9295.8	7.6	2070.52	2070.29	0.23
52.440	1570.7	9324.0	7.6	2070.03	2069.80	0.23
52.410	1529.0	9464.2	7.5	2069.56	2069.34	0.22
52.384	1483.1	8961.7	7.9	2068.98	2068.89	0.09
52.345	1414.0	8986.9	7.9	2068.32	2068.22	0.10
52.316	1363.7	8759.8	8.1	2067.72	2067.60	0.12
52.284	1314.3	8056.2	8.8	2066.87	2066.88	0.00
52.250	1265.7	7983.4	8.9	2066.14	2066.10	0.04
52.224	1238.1	7936.4	9.0	2065.56	2065.48	0.08
52.196	1214.3	7659.9	9.3	2064.87	2064.80	0.07
52.170	1159.4	6842.6	10.4	2063.77	2063.70	0.07
52.147	1179.0	7105.6	10.0	2063.16	2063.08	0.08
52.121	1187.1	6773.8	10.5	2062.22	2062.02	0.20
52.100	1184.3	6742.0	10.5	2061.48	2061.11	0.36
52.078	1212.2	7279.6	9.8	2061.04	2060.50	0.54
52.054	1217.5	7777.1	9.1	2060.57	2059.91	0.66
52.029	1228.5	7538.6	9.4	2059.86	2059.18	0.69
52.006	1239.0	7770.6	9.1	2059.40	2058.79	0.61
51.983	1244.4	7286.6	9.7	2058.62	2058.18	0.44
51.957	1234.4	7754.6	9.2	2058.12	2057.75	0.37
51.932	1241.0	8079.4	8.8	2057.66	2057.33	0.33
51.895	1220.8	7645.2	9.3	2056.64	2056.53	0.11
51.854	1189.3	7405.1	9.6	2055.56	2055.51	0.05
51.829	1200.3	7609.1	9.3	2055.02	2055.03	0.00

Flooding Source	Floodway			Base Flood Water Surface Elevation <sup>1</sup>		
	Cross-Section	Width (ft)	Section Area (sq ft)	Mean Velocity (ft/s)	Floodway <sup>2</sup> (ft)	Floodplain <sup>2</sup> (ft)
51.807	1215.6	7687.9	9.2	2054.49	2054.42	0.07
51.782	1264.1	8430.3	8.4	2054.12	2054.00	0.12
51.757	1332.2	9037.0	7.9	2053.80	2053.61	0.19
51.734	1372.1	9860.5	7.2	2053.58	2053.40	0.18
51.709	1358.1	10505.7	6.8	2053.38	2053.17	0.21
51.682	1350.3	11289.3	6.3	2053.22	2053.01	0.21
51.656	1356.3	12218.0	5.8	2053.12	2052.94	0.18
51.638	1337.7	12499.3	5.7	2053.04	2052.87	0.17
51.618	1292.4	12991.1	5.5	2052.97	2052.83	0.14
51.601	1238.1	12210.8	5.8	2052.80	2052.64	0.16
51.581	1154.2	12081.0	5.9	2052.64	2052.49	0.15
51.558	1060.5	11668.6	6.1	2052.49	2052.39	0.10
51.536	999.2	11553.8	6.2	2052.36	2052.28	0.08
51.516	965.9	11472.7	6.2	2052.25	2052.19	0.07
51.497	958.2	10937.7	6.5	2052.02	2051.96	0.06
51.477	938.1	11689.8	6.1	2051.97	2051.90	0.07
51.453	877.4	9826.9	7.2	2051.43	2051.43	0.00
51.436	804.3	9202.9	7.7	2051.18	2051.11	0.07
51.418	737.3	9438.6	7.5	2051.11	2051.01	0.10
51.398	607.4	7896.6	9.0	2050.46	2050.36	0.10
51.375	463.9	5763.4	12.3	2048.88	2048.84	0.03
51.370	Proposed Bridge					
51.355	463.9	4934.3	14.4	2046.57	2046.62	0.00
51.345	459.3	5396.3	13.2	2046.59	2046.59	0.00
51.338	462.6	5435.1	13.1	2046.46	2046.46	0.00
51.335	1962 Bridge					
51.331	462.6	4734.5	15.2	2044.97	2044.17	0.79
51.303	525.6	4513.5	15.7	2043.10	2042.97	0.13
51.275	539.6	4697.7	15.1	2041.98	2041.40	0.58
51.208	722.3	5833.6	12.2	2040.17	2039.39	0.78
51.130	935.0	6087.6	11.7	2037.62	2037.45	0.17

<sup>1</sup>Vertical Datum: NGVD 1929

<sup>2</sup> As reported by HEC-RAS except that negative surcharges were converted to zero surcharge. The difference between the floodway and floodplain elevations may differ from surcharge due to rounding errors.



## **A.1 Data Collection Summary**

*Not Applicable / Not Included*

## **A.2 Referenced Documents**

## References

1. ArcView GIS, v. 3.2a (2000). Environmental Systems Research Institute, Inc.
2. ADWR (1997). Instructions for Organizing and Submitting Technical Documentation for Flood Studies. Arizona Department of Water Resources State Standard Attachment SSA 1-97.
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4. CHECK-RAS v.1.4 (2005). HEC-RAS Automated Review Program. Federal Emergency Management Agency, Washington D.C.
5. FEMA (2001). Flood Insurance Study. Maricopa County, Arizona, and Unincorporated Areas.
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8. HEC-RAS, v. 3.1.2 (2004). "River Analysis System." Hydrologic Engineering Center, Davis, CA.
9. HEC-RAS, River Analysis System (2001). "User's Manual." Hydrologic Engineering Center, Davis, CA.
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11. Thomas, W.A. (2002) HEC-6T v.5.13, "Sedimentation in Stream Networks," Mobile Boundary Hydraulics (MBH), Clinton, MS.



## **B.1 Special Problem Reports**

*Not Applicable / Not Included*

## **B.2 Contact (telephone) Reports**

*Not Applicable / Not Included*

### **B.3 Meeting Minutes or Reports**

Meeting Minutes  
Wickenburg Interim Bypass  
November 18, 2003  
Wickenburg Town Council Chambers

Meeting opened by George Wallace (GW), JCI Project Manager, who thanked everyone for coming to the meeting and thanked Mayor Lon McDermott for the gracious use of the council chambers. GW asked attendees to introduce themselves and their role in the project. There were also several members of the Mayors transportation oversight committee in attendance as observers. Agendas were distributed and an attendance list circulated. (copies attached)

GW gave a brief overview of the project. Survey work is essentially complete and final mapping products will be delivered on November 24. Ninyo & Moore (Steve Nowaczyk) provided copies of their proposed Geotechnical investigation plan to be forwarded to ADOT R/W to acquire rights of entry.

**Topics of Discussion:**

*Intergovernmental Agreements-* District Engineer Tom Foster (TF) stated that he would like an all-encompassing IGA instead of several separate ones (mayor agreed). Issues to be included include raising the profile to provide 100-year flood protection, turnback of the portion of Tegner Street from US 60 up to the reconnection to the bypass, a proposed improvement project on US 60 to the south of our project (outside of Jacobs scope), reestablishment of downtown parking, extension of Town sewer to ADOT maintenance yard and gateway treatments. Mayor Lon McDermott (LM) wants the language related to the Towns potential borrow source included in the agreement. Larry Doescher (LD) noted that the borrow site could be addressed by an Access Agreement and wouldn't need to be included in IGA. Discussions on this issue will continue between town and ADOT.

*Town issues (see attached letter)-* The Town provided a letter that included items that they wished to be considered in the US 93 design.

*Wishing Well park area-* Concepts to improve the area adjacent to the wishing well where the existing road will be obliterated are included in our scope and will be provided later in the design process. Town desires an attractive treatment. This issue was noted in the SHPO letter.

*Trail access under Sols Wash and Hassayampa River bridges-* Adequate clearance under both bridges should be available to accommodate equestrians and other recreational users similar to the conditions that exist today. Previous discussions had also indicated Town desire to have access under connector roadway to Community Center. This will be looked at as part of the design effort.

*US 93 SB one way access to Tegner-* TF suggested that looking at a lane add for the one way road with a single SB lane on the connector to the bypass might be an option. Concern about speed on this connection and proximity to new Monte Vista Ranch access. Typically ADOT has been eliminating these types of connections. Jacobs will provide additional input.

*Connection from Bypass to Tegner-* Larry Doescher (LD) feels this is a local circulation issue and not part of this project. Possible Town project still out 5-10 years. District suggested right in/right out as possibility. Issue will not be pursued at this point.

*Raise roadway elevation to protect from 100 year event-* Everyone is in agreement that this should be pursued. LD needs to take to ADOT management (PRB & PPAC) for concurrence. *Sols Wash flood control west of bypass to west of Tegner crossing-* Greg Jones (GJ) of the FCDMC advised that they were negotiating a contract with Inca Engrg. to do a study on the portion of Sols Wash upstream of the bypass alignment to identify a concept for 100 year protection in that area and to ensure compatibility between any future FCD project and the bypass. Study area also extend south of the Hassayampa Bridge to investigate "wrap around" impacts on property south of Wickenburg Way. He expects that study to be complete by March 4. Inca contact is Jeff Ford.

*Entryway treatment at east end of bridge-* Town envisions a gateway statement possibly with flags. Treatment also was discussed in SHPO letter, which is included in Final EA. Town concerned about how you would deal with pedestrians. Possible access path under the river bridge should be considered.

*Entry treatment at north end of project-* Town envisions creating features identifying entrance to downtown and business district. Provision to develop possible concepts in scope of work. Possible SB access could affect potential treatments.

*Noise walls north of Sols Wash-* With the potential profile change due to the raise in profile for 100-year protection, noise impacts will need to be reevaluated. TF pointed out that project will have rubberized asphalt. Suggestion was made to consider paving bridge decks with same. No real objection noted from Bridge Reps. It was noted that inclusion of Rubberized AC in the noise evaluation was not taken into account when the original study was done, but is now allowed. (as a follow-up, while there were some impacts to adjacent properties, the eligibility criteria of ADOT's noise policy was not met, therefore no mitigation was considered)

*Treatment of Apache Street dead end-* Town will be providing some options they would like to see considered.

*Consideration of roundabout at south entryway-* Don Smith (DS) noted that Jacobs had looked at a possible roundabout early on and that it had been eliminated as a possibility. (upon review of our project files and discussion with staff, it was determined that it had been discussed but no analysis had been done.)

*Consultation on project signage-* Town will be provided the opportunity for input. The Town also reiterated its previous concerns about the remaining segment of US 93 from the north end of the bypass tie-in to SR 89 where the Wickenburg-Santa Maria R. DCR picks up.

*Right of Way-* Rights of entry are needed to secure access for Geotechnical investigations. N&M provided boring plan, which will be forwarded to ADOT right of way group. It was noted that preliminary right of way plans and results of survey had been prepared by ADOT and provided to Jacobs. Jerry Stricklin requested an electronic version of this information. (provided 11/19)

*Borrow source/ Flood control issues-* Discussed Towns proposed borrow source in the river bottom and any potential issues that may arise from its use. Since it is within the Town limits, the Town's authority supercedes that of FCD. GJ noted that the excavation should not exceed 10 feet or else the evaluation criteria changes and would include sediment transport and lateral migration analysis. The edge of the excavated area needs to be kept 100' from adjacent property. A rough estimate of the area needed to provide 500,000 CY of material was 31 acres. Discussion ensued regarding the need for a LOMR/CLOMR if this site is used. GJ stated that none may be needed. Dennis Richards will follow up on this. GJ stated they would provide review comments even

though the site may be out of their jurisdiction. As noted above, Town wants the borrow source discussion included in the IGA. Jacobs will prepare a cost estimate to provide environmental clearance, Geotechnical investigation and additional mapping (if needed) for the Town site. May be able to get waiver from ADEQ on revegetation requirements if the property owner (Town) agrees.

*Schedule-* A proposed schedule was distributed (attached) Completion of 100% plans currently scheduled for late March 2005. Comments were requested on the schedule. Bridge Group acknowledged that they would be able to meet the dates.

*Future meeting dates/ location-* It was proposed that the morning of the 3<sup>rd</sup> Tuesday of the month be set for the monthly progress meetings. All agreed. **The next meeting will be December 16 at a location to be determined.** GJ offered FCD facilities if an ADOT conference room was not available.

*Open discussion-* Henry Sung (Bridge Group) asked if there would be lighting on the new bridges. The location of the new lights will need to be provided to him so they can be accommodated in the structure design.

Attachments:

- Sign in sheets
- Schedule
- Town letter

# MEETING MINUTES

Jacobs Civil Inc.



US 93: Wickenburg Interim Bypass

Date: September 9, 2005

**LOCATION** ADOT  
**AND DATE:** Location Section Conference Room  
January 20, 2004

**PARTICIPANTS:** See attached.

**SUBJECT:** Contract No. 03-05  
US 93: Wickenburg Interim Bypass  
Project No. W7X73400  
TRACS No. 093 MA 198 H5825 01D  
Monthly Progress Meeting

## SUMMARY:

Meeting opened by George Wallace (GW), JCI Project Manager, who thanked everyone for coming to the meeting. GW asked attendees to introduce themselves and their role in the project. Agendas were distributed and an attendance list circulated. (copies attached)

## PROJECT STATUS:

Survey and Mapping- Survey work is essentially complete. Due to the change in scope to include pavement preservation of Tegner from the US60/ US93 intersection up to the portion included in the current project for reconstruction, some additional mapping work is required. Our sub has the necessary information and has been requested to proceed with the additional effort.

Geotech. - Field investigation work has not started. Environmental clearance for work on the proposed alignment has been received. Awaiting rights of entry.

Drainage- WEST has been primarily doing data gathering. Copy of mapping and alignment file provided to them.

Right of Way- 15 Rights of Entry requests were sent to Acquisition January 14. Best guess is at least 30 days turnaround. It was noted that some property owners might be reluctant to agree. ADOT can't condemn for RoE. Alternative would be to revise boring plan to miss uncooperative property owners. Mayor suggested that we coordinate for the support of the City if there are problems with any of the property owners. A plot of the proposed alignment was provided to Martha Harrell of R/W for their use in determining potential total takes. (After meeting, request was made to send files electronically. Mapping file too big but alignment file was provided).

Structures- Work has not started. Copy of mapping and alignment file provided to them. Bridge group previously noted that they would like to keep utilities off the bridge if possible. However, as discussed during the meeting, it may be cost prohibitive to keep all utilities out of the bridge

prism. We will continue coordination with the utilities to verify current utilities within the existing bridge crossing for further evaluation with the Bridge Group.

Utilities- Jacobs is meeting with Arizona Public Service (APS) representatives on January 22<sup>nd</sup> at their office in Wickenburg to discuss impacts to their facilities.

Roundabout Analysis- Alvin Stump reported that Leif Ourston has been conducting a feasibility analysis to determine whether a roundabout would be an alternative solution at the new US60/US93 intersection. Preliminary results should be available by the end of this week to determine if this solution is feasible. District believes the roundabout will provide a superior level of service for a longer period of time, prolonging the need for additional improvements. Then up to ADOT to decide whether to proceed with this as design. If they proceed will be added to Jacobs contract. Right of way will be a concern. Alvin noted that ADOT will be considering their use on the Red Mountain Freeway. The Town is supportive of the concept and wants it fully investigated and would like additional information. May also require additional coordination with SHPO and some additional environmental activities. Alvin will be making a presentation to the Chamber of Commerce January 21st on the roundabout concept in general.

Roadway design- Jacobs held 15% review with Larry Doescher(LD) on January 14. Design progressing toward 30%. Profile has been adjusted to provide 100-year protection, which was agreed to by ADOT management. Design of the southern intersection progressing following the original DCR concept, while awaiting decision on roundabout.

## **PROJECT ISSUES**

Access control- There was a discussion about the merits of acquiring access rights. GW noted that some of the design features (profile, parallel drainage channels, etc) could naturally preclude access. District and right of way both feel very strongly that acquiring access rights eliminates many possible future problems. Acquisition of access control will be pursued by right of way.

Private Access- Discussion on alternate types of driveway access at Rancho del Rio discussed. Dennis Crandall noted that proposed concept with the driveway protruding perpendicular from the mainline into the floodplain would act like a dike and have potential undesirable hydraulic effects in the river. Jacobs will investigate alternative alignments including a parallel drive similar to a channel access ramp to provide access as well as location of drive into the property.

McDonalds property- Dave Edwards had previously expressed concern that there might be a 'take' from the McDonald's restaurant, where the owners could claim potential damages i.e. lost profits. Current plans show no take on their property. It appears that the drive through roadway for the restaurant is on Exxon property. There may be a need to modify one of their driveways but the improvements would be within ADOT right of way.

PRB Update- LD gave the team an update from his presentation to the Project Review Board on January 6. ADOT management supported the profile change to provide a 100-year storm protection with 3 feet of freeboard. The Town would be required to provide the cost difference (estimated to be \$1M) in form of material from Town owned property in the river bottom, subject to it being determined suitable for use. It was noted that without improvements to Sols Wash, the protection of the park and adjacent properties would not be complete. Roundabout feasibility analysis currently underway. Determination of feasibility should be forthcoming by the end of this week. (a subsequent conversation GW had with Leif Ourston on 1/20 indicated that it was likely a roundabout application would work, he expected to have analysis done this week). The

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utility extension on US 60 south of the project limits to the ADOT maintenance yard desired by the District will not be included with this project or in the IGA. ADOT management is still opposed to the 'flying wye' concept that was suggested by the Town. A concern about the speed of cars entering Tegner is the primary issue. Getting pedestrians across a high speed, free flow movement is also an issue. As an alternative, providing a free right turn at the Tegner/ bypass intersection was proposed. A raised median/pedestrian island would be provided to direct turning vehicles into the outside lane. NB to WB traffic as well as the crossing frontage road traffic would be directed to the inside lane. Adequate signage directing motorists to the business district would be provided. This appears to be a compromise that will satisfy most of the concerns. Town on record as still desiring the 'wye'.

Braille connection- Any additional connection of a local circulation road to the bypass is not supported due to the potential degradation of the operation of the bypass. Would also have the potential to delay the project due to the reopening of the environmental process. Mayor McDermott reiterated, "all we want is a nice two lane road".

FCDMC activities- Analysis of Sols Wash is underway. FCD has also included Hospital Wash, a contributing stream to Sols, in its evaluation. This wash has caused some flooding problems in the past. They are preparing a Candidate Access Report (CAR). Their analysis could affect the discharge at our crossing. They are using the FEMA discharge of 15,000 cfs. ADOT is using 24,000 cfs. Does not appear that this will be an issue as far as the structure design.

Right of Way acquisition- After the meeting GW and Martha agreed to set up meeting next week to discuss possible total takes.

#### Design Issues

Tegner widening- Existing roadway typical section south of the reconstruction is 64' wide vs. the ADOT standard 68'. Tom Foster(TF) desires the reconstruction be built to 68' with a transition back to 64' where the pavement preservation begins.

Design criteria- Question is whether ADOT has adopted the new 2001 AASHTO green book and the 2003 MUTCD. LD will check on this. Oliver Antony noted that the Roadway Design Guidelines (RDG) are being updated. Chapters 100 and 200 are currently being reviewed internally but are not available outside the design section. TF wants all radii designed for WB-67 turning vehicle, including the frontage road. This would also apply to the roundabout if designed.

Cattleguards- TF would like to see cattleguards at frontage road and Rancho del Rio turnout. Would like to have pavement on both sides of the cattleguards.

Pavement at US60/ US93 intersection- Existing intersection is concrete pavement for about 100' north of the radius return on Tegner. Per District and Town desires, pavement preservation will end at the beginning of the concrete with no overlay of the concrete. District would like to see the existing Sols bridge overlaid with the AR-ACFC. (after meeting Dennis Crandall pointed out that there are already concerns with overtopping the existing bridge and the addition of a ½-¾" overlay could exacerbate the problem. Bridge won't be overlaid. Town indicated a desire to obtain the millings. District agreed. Town will need to identify waste site for inclusion in specs.

#### CONTRACT MODIFICATION

Jacobs is continuing to work on cost of additional design effort dealing with the pavement preservation and the Town borrow site evaluation.

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## **IGA STATUS**

The Town has not seen a copy of the document as yet. LD is working on a draft. The frontage road at the north end of the project will need to be included in the agreement for turnback.

## **PROJECT SCHEDULE**

Current schedule has 30% submittal in late March. Pending a decision on the roundabout, the submittal will contain the intersection concept shown in the DCR with a note stating the intersection is being reevaluated.

## **OPEN DISCUSSION**

Mayor McDermott discussed items from his letter sent in November. Specific areas discussed were the trail under Sols Wash bridge (advised that there will be sufficient vertical clearance to accommodate equestrians), Park and entryway features (advised that there was effort in LSD scope to provide concept drawings for the Town to review). The noise analysis done during the DCR phase will need to be redone due to the profile change agreed to by ADOT. Other items from the list were discussed during the project issues portion. Regarding the south intersection, Mayor and District both desired that it be concrete. North intersection could stay AC. The new Sols bridge should be overlaid with AR-ACFC for noise mitigation. Jacobs will need to verify the side road names on the mapping. Apparently there is some discrepancy.

## **NEXT MEETING**

The next monthly progress meeting will be held on February 17<sup>th</sup> at 9:30 AM in the Wickenburg Town Council chambers. A utility coordination meeting will be held the same day in the afternoon.

These minutes reflect the notes taken by Jacobs Civil Inc. during the meeting. If any corrections are needed, please provide those recommendations within two weeks of receipt of these minutes.

Prepared by

**JACOBS CIVIL INC.**

S/

George Wallace, PE  
Project Manager

Attachments:

Sign in sheets  
Agenda

Distribution

Team members (e-mail)  
Mayor McDermott (mail)

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# MEETING MINUTES

Jacobs Civil Inc.



US 93: Wickenburg Interim Bypass

Date: September 9, 2005

**LOCATION** Town of Wickenburg  
**AND DATE:** Town Council Chambers  
February 17, 2004

**PARTICIPANTS:** See attached.

**SUBJECT:** Contract No. 03-05  
US 93: Wickenburg Interim Bypass  
Project No. W7X73400  
TRACS No. 093 MA 198 H5825 01D  
Monthly Progress Meeting

## SUMMARY:

Meeting opened by George Wallace (GW), JCI Project Manager, who thanked everyone for coming to the meeting. GW asked attendees to introduce themselves and their role in the project. Agendas were distributed and an attendance list circulated. (copies attached)

## PROJECT STATUS:

Survey and Mapping- Survey work is complete.

Geotech. - Field investigation work has not started. Environmental clearance for work on the proposed alignment has been received. Awaiting rights of entry.

Drainage- WEST has essentially completed their data gathering. They requested copies of the Existing Hassayampa Bridge plans. Jacobs will provide.

Right of Way- 15 Rights of Entry requests were sent to Acquisition January 14. 11 of the 15 have been notified regarding the temporary entry needs. ADOT was not able to contact the remaining four by phone or personal contact so letters have been sent to those owners. Two property owners have signed. Town Council scheduled to take action to approve on their parcel (Community Center) at this evenings Council meeting. Mayor McDermott asked for ADOT to provide the names of the four who haven't been contacted; they may be able to help on a local level.

Five parcels have been identified as total acquisitions. Delineation packages have been completed and appraisals have been ordered. Appraisals will take approximately 90 days to complete.

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Structures- Have begun initial layout work on the Hassayampa R. bridge. They are having problems meeting the freeboard requirements on the lower (eastern) end of the bridge. Need to have water surface elevation for 100- year storm for both structure crossings for both washes in order to help them set their profile requirements. They need to know where the banks/ bank protection will be located. Would like some Geotech. information by the end of the month or they will have difficulty meeting mid-March submittal date. They need geometric information on the sidewalks on the west end to define bridge flare. Jacobs can provide information based on current concept but that may change if roundabout concept moves forward. Copy of mapping and alignment file provided to them.

Utilities- Jacobs met with Arizona Public Service (APS) representatives on January 22<sup>nd</sup> at their office in Wickenburg to discuss impacts to their facilities. Tegner Street tie-in at north end has been modified (shifted about 100' north) to avoid corner of substation and to miss distribution pole immediately to the north. Will still have a potential vertical clearance problem. Noted to group that a separate utilities coordination meeting was being held later in the afternoon.

Roundabout Analysis- Preliminary analysis of the roundabout concept at the US60/US93 intersection showed that an acceptable LOS A could be achieved using this concept. Circle would have a 165' diameter (curb to curb). This option would not require a bypass lane for NB traffic, although the bypass concept is supported by the District and the Town. Town is supportive of the roundabout concept in general. Preliminary concepts will need to be prepared and discussed with the SHPO to determine the impacts of this concept on the mitigation measures that were negotiated. It would be preferable to keep the roundabout off the bridge. Tom Foster also requested that a roundabout concept be looked at at the Tegner/ US93 intersection at the north end of the project. Jacobs need to begin discussions with Mr. Ourston to get him under contract to provide additional effort on this process.

Roadway design- Design continuing toward 30%. Submittal scheduled for March 17. Roundabout concept will not be included. Note will be added to plans indicating that the concept is under evaluation. Value Analysis tentatively scheduled for week of March 29. Pavement preservation project to mill & replace 1/2" wearing course from the Denny's restaurant north to the SR 89 junction currently advertised for bids. Bid opening mid-March. As noted above, District wants the roundabout concept evaluated at the north intersection also. Where the roadway will be reconstructed from two to 5 lanes, District would like specs. to require milling the existing pavement prior to the reconstruction, with the millings to be salvaged for the District or the Town. District and Town need to work together on stockpile site.

## **PROJECT ISSUES**

Access control- The District is still desirous to acquire access control for the roadway between the two new intersections. District and right of way both feel very strongly that acquiring access rights eliminates many possible future problems. Right of way still pursuing.

McDonalds property- Jacobs' staff met with representatives of McDonalds corporation on February 3. McDonalds has plans to upgrade their existing restaurant at the south end of the project and expressed interest in the Exxon parcel immediately to their west. Current plans show no take on their property. If ADOT acquires Exxon as total take, remainder of property not used for the project would be disposed of as excess land in accordance with current guidelines. Some of their landscaping will be impacted and there will likely be a need for TCE for driveway improvements. All businesses will have access during construction.

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FCDMC activities- Analysis of Sols Wash is underway. FCD has also included Hospital Wash, a contributing stream to Sols, in its evaluation. Current model in approved CLOMR indicates an overtopping of Tegner St. north of Sols that was not accounted for in the original drainage analysis done during the DCR phase. The FEMA model used during the study did not show any breakout. This will need further evaluation as design progresses. A copy of the mapping used for this analysis was provided to WEST. It was also noted that bank protection south of the Hassayampa bridge on the west bank will be needed to prevent flooding of properties south of Wickebnburg Way. Approximately 1900' will be needed. Consultant report expected to be complete by July 2004.

Right of Way acquisition- See above discussion.

#### Design Issues

Tegner widening- As previously noted, District has requested that pavement be milled from reconstruction portion and stockpiled for future use.

Design criteria- Previous discussion related to ADOT adoption of 2001 AASHTO Green Book. ADOT has not yet adopted.

#### **CONTRACT MODIFICATION**

Jacobs is continuing to work on cost of additional design effort dealing with the pavement preservation and the Town borrow site evaluation.

#### **IGA STATUS**

Information for the IGA has been submitted to Joint Project Administration. Response from JPA has been slow.

#### **PROJECT SCHEDULE**

Current schedule has 30% submittal in mid March. Pending a decision on the roundabout, the submittal will contain the intersection concept shown in the DCR with a note stating the intersection is being reevaluated.

#### **OPEN DISCUSSION**

Mayor McDermott reiterated Town desire for a connection between Tegner and the Bypass. Would not necessarily need to be Braillier alignment. It was noted that inclusion of any cross connection would most likely require reopening of environmental process and the risk of possible delays to the project.

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## **NEXT MEETING**

The next monthly progress meeting will be held on March 23rd at 9:30 AM in Phoenix. Specific location to be determined.

These minutes reflect the notes taken by Jacobs Civil Inc. during the meeting. If any corrections are needed, please provide those recommendations within two weeks of receipt of these minutes.

Prepared by

**JACOBS CIVIL INC.**

S/

George Wallace, PE  
Project Manager

Attachments:

Sign in sheets  
Agenda

Distribution

Team members (e-mail)  
Utility Meeting Attendees  
Mayor McDermott (mail)

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# MEETING MINUTES

Jacobs Civil Inc.



US 93: Wickenburg Interim Bypass

Date: September 9, 2005

**LOCATION** ADOT  
**AND DATE:** SPMG Conference Room  
March 23, 2004

**PARTICIPANTS:** See attached.

**SUBJECT:** Contract No. 03-05  
US 93: Wickenburg Interim Bypass  
Project No. W7X73400  
TRACS No. 093 MA 198 H5825 01D  
Monthly Progress Meeting

## SUMMARY:

Meeting opened by George Wallace (GW), JCI Project Manager, who thanked everyone for coming to the meeting. GW asked attendees to introduce themselves and their role in the project. Agendas were distributed and an attendance list circulated. (copies attached)

## PROJECT STATUS:

Survey and Mapping- Survey work is complete.

Geotech. - Field investigation work has not started. Environmental clearance for work on the proposed alignment has been received. Graphics identifying areas where rights of entry have been received will be provided to N&M on 3/25. N&M will need to prepare exploration plan for work on Tegner Street for the pavement preservation portion of the project. This will be submitted to ADOT EEG for approval. N&M will begin exploration in those areas where rights of entry have been secured.

Drainage- WEST has essentially completed their data gathering. Have developed water surface elevations for 50 and 100-year storms. This will require some modification of the current roadway profile from north of Sols wash bridge about 1300' and a slight profile raise over Hassayampa River to meet the 50 year plus 3 feet criteria. The amount of change is dependent on structure type selected. Box beam structure would be thinner than AASHTO girder bridge, requiring less profile adjustment, but would also be more expensive.

Right of Way- Rights of Entry have been received from all but two property owners, Ringwood and Underdown, who between them control 7 parcels. R/W has been sent language for agreement from Underdown attorney.

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Town Manager Dille expressed concern about possible relocations of businesses impacted by the project, specifically the U-Haul located at Kerkes. They are not the underlying fee owner of the property and the Town is concerned about potential economic impact to the community if relocation within Town limits is not considered. This parcel is potentially a total take. GW will discuss issue with ADOT R/W.

Structures- Initial layouts for the two structures were supplemental addition to 30% submittal. Hassayampa is currently shown as AASHTO girder structure with CIP west span due to flares to accommodate intersection with Wickenburg Way. Based on drainage discussion, roadway profile will need to be raised and using a thinner structural section such as a precast box beam will be considered to minimize the profile adjustment and still meet freeboard requirements. Utilities are currently shown as being accommodated in the center portion of the structure over the Hassayampa. This concept would work with either structure type alternative. Sols Wash structure is proposed to be a "superbox". Height of cell opening will be adequate to accommodate equestrians.

Utilities- 30% plans were distributed to each of the utilities identified as having facilities within the project limits. ADOT's utility locating consultant is currently identifying existing utilities for inclusion on the plans and to help identify any potential conflicts. APS expressed their desire to have a longitudinal encroachment along the west side of the new roadway within ADOT R/W. As noted above, utilities across the Hassayampa bridge are proposed to be accommodated in a cell located under the deck along the roadway centerline. Some conduit will be required in the bridge barrier to allow for the lighting that is to be carried across the bridge. Question was brought up as to whether the entire bypass is to be lit. At this point in time it is not intended to light the bypass except across the Hassayampa bridge and at the intersection with Tegner St. at the north end of the project.

Roundabout Analysis- Jacobs has begun discussions with Mr. Ourston to get him under contract to provide additional effort on this process. Conceptual drawings need to be prepared in order to begin discussions with the SHPO to determine the impacts of this concept on the mitigation measures that were negotiated. Town expressed a desire to participate in the SHPO meeting. Town would also like to see them at both ends.

Roadway design- Design is at 30%. Submittal was made March 18. Roundabout concept was not included. Note was added to plans indicating that the concept is under evaluation. Value Analysis workshop of the project is scheduled for March 29-31 at ADOT with presentation of findings at 2:00 PM March 31<sup>st</sup> in the ADOT auditorium.

## **PROJECT ISSUES**

Access control- No new discussion.

McDonalds property- No new discussion.

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FCDMC activities- Jeff Ford of Aztec (now at j2 Engineering) gave the team an update of their activities. They are continuing the analysis of Sols Wash and Hospital Wash. Consultant report expected to be complete by July 2004. Some discussion about how we are going to deal with the breakout flow getting it into our drainage swale and eventually into Sols while still removing the property west of the new roadway from the floodplain once FCD improvements are made. This will become clearer as the Sols water surface elevation is determined. Coordination will continue between Aztec and our design team.

WQARF Remediation Site- All excavation of contaminated material is completed. Remaining work consists of capping the pile and installing landscaping features. Completion 2-3 months off pending resolution of some issues with property owner. Contractor currently placing riprap for bank protection. Discussed whether there would be opportunity to remove and reuse as part of our project. Riprap is part of the two feet cap and there might be some concerns about safely removing without intruding too far into the pile. Will keep open for consideration.

Right of Way acquisition- See above discussion.

#### Design Issues

Turning Radii- Discussed concern about trying to have Semis turning left onto Wickenburg Way in parallel. RDG does not specifically address how this is handled. Current concept will not accommodate this. Will need some clarification from Roadway group on this.

Design criteria- No additional discussion.

### **CONTRACT MODIFICATION**

Jacobs is continuing to work on cost of additional design effort dealing with the pavement preservation and the Town borrow site evaluation.

### **IGA STATUS**

Several team members met with the Joint Project's group earlier this month to discuss particular language to go into the IGA relative to turnback of Tegner to the Town upon completion of the bypass. The current draft version has been sent to the Attorney General's office for review. The AG will probably make a site visit prior to providing comments. Document will then go to Town for their review. Discussed need for IGA with ADEQ relative to the WQARF site and issues of liability. Several items that had been discussed previously during the study phase are no longer issues.

### **PROJECT SCHEDULE**

30% submittal made on March 18. Comments due back to Jacobs on April 12. The submittal contained the intersection concept shown in the DCR with a note stating the intersection(s) are being reevaluated.

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## OPEN DISCUSSION

Mayor McDermott reiterated Town desire for a connection between Tegner and the Bypass. Also asked if noise analysis reevaluation had been done. It has not but will be done prior to next submittal. Relative to the IGA, the Town expressed desire to discuss potential landscape improvements.

## NEXT MEETING

The next monthly progress meeting will be held on **April 20th at 9:30 AM in Phoenix in the Location Section conference room on the Second floor of the old MVD building at 1739 West Jackson.**

These minutes reflect the notes taken by Jacobs Civil Inc. during the meeting. If any corrections are needed, please provide those recommendations within two weeks of receipt of these minutes.

Prepared by

**JACOBS CIVIL INC.**

S/

George Wallace, PE  
Project Manager

Attachments:

Sign in sheets  
Agenda

Distribution

Team members (e-mail)  
Utility Meeting Attendees  
Mayor McDermott (mail)

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# MEETING MINUTES



Jacobs Civil Inc.

US 93: Wickenburg Interim Bypass

Date: September 9, 2005

**LOCATION** ADOT  
**AND DATE:** Location Section Conference Room  
April 20, 2004

**PARTICIPANTS:** See attached.

**SUBJECT:** Contract No. 03-05  
US 93: Wickenburg Interim Bypass  
Project No. W7X73400  
TRACS No. 093 MA 198 H5825 01D  
Monthly Progress Meeting

## SUMMARY:

Meeting opened by George Wallace (GW), JCI Project Manager, who thanked everyone for coming to the meeting. GW asked attendees to introduce themselves and their role in the project. Agendas were distributed and an attendance list circulated. (copies attached)

## PROJECT STATUS:

Survey and Mapping- Survey work is complete. Sub has been asked to expand coverage along river to provide additional mapping for use by drainage consultant for additional analysis. This should be complete within two weeks.

Geotech. - Field investigation work began last week in areas where right of entry has been provided. Expect to be up there for 2-3 weeks. Still need RoE from Underdown and Ringwood to proceed with investigations in center 1/3<sup>rd</sup> of alignment.

Drainage- WEST has defined the 100 year water surface elevation for use in finalizing the roadway and bridge profile. Elevations are controlled by flows in the Hassayampa R. Information has been sent to ADOT bridge group. In order to minimize the profile impact, it appears that the box girder alternative will be the structure type for the Hassayampa crossing. A 100 year flow in the Hassayampa will pond behind the embankment in the area east of the Town Park(backwater under the Sols bridge). (As a clarification to a statement made by Leo where he referred to the fact that the 100 year flood does not pass under the bridge, the reference made was to the existing Hassayampa bridges, not the Sols Wash bridge).

Right of Way- Rights of Entry have been received from all but two property owners, Ringwood and Underdown, who between them control 7 parcels. Revisions to the language in the standard ADOT entry agreement were sent to AG office by Ringwood attorney. AG office will not accept the suggested changes. The concern is regarding indemnification language for both Ringwood and Underdown. Mr. Ringwood expects one of his parcels (Rancho del Rio) to be a total take. He would be amenable to shifting the alignment further to the east (this will not work because of the

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impact on the Hassayampa water surface elevation). It was noted that several parcels at the north end of the project in the vicinity of the frontage road were recently rezoned as commercial. It was noted that Right of Way has determined that the Exxon parcel will be a total take. Letter received from the U-Haul owner concerned about the potential relocation of his business. (subsequent to meeting a letter was received from Stotz Towing, which shares the same property) Both letters forwarded to ADOT R/W.

The proposed borrow source (Parcel 7-10156) will be defined on an aerial photo and sent to R/W to be submitted with the Right of Entry agreement to the Town. Request needs to be to Town by May 7 in order to be on May 17 council agenda for approval. Town would like to be involved in the coordination of access to the site. They would prefer to use Rincon Road instead of Jack Burden to minimize impacts to residents.

Structures- Due to the need to keep the roadway profile as low as possible while still providing an adequate waterway opening, the Hassayampa bridge will be a precast box girder type structure. The westmost span will be cast in place due to the flares in the roadway (this will be the case whether the current intersection design or a roundabout is used). Pending results of the geotechnical testing, a superbox structure is still the presumed option for Sols Wash.

Utilities- Jacobs has received utility base mapping from ADOT's utility consultant. These have been added to the base mapping file. A quarterly utilities meeting will be held next month in Wickenburg.

Roundabout Analysis- Jacobs is continuing discussions with Mr. Ourston to get him under contract to provide additional effort on this process. Conceptual drawings need to be prepared in order to begin discussions with the SHPO to determine the impacts of this concept on the mitigation measures that were negotiated. (subsequent to meeting spoke with Mr. Ourston about proceeding at risk with the conceptual drawings. He is unwilling to pursue under this option. We are continuing our efforts to get agreement on the contract language and to get him to provide a written cost proposal to us.)

Roadway design- Design is continuing toward 60%. We have received very few comments to date on the submittal made March 18. (subsequent to meeting comments received from District and from Roadway Design) Value Analysis workshop of the project was held March 29-31. Numerous recommendations were made by the panel. Jacobs will be preparing response to the report.

## **PROJECT ISSUES**

Access control- No new discussion.

McDonalds property- No new discussion.

FCDMC activities- Update on the status of the ongoing Sols Wash study was presented. They are modeling with and without the new alignment to evaluate the impacts. The analysis will be complete by the end of May (draft report) with a final report expected by the end of June. The current proposed concept being considered provides for gabion protection along the north side of the wash and concrete lining on the south side with a natural bottom. Noted that the breakout over Tegner will need to be dealt with by this project. Town manager Dille expressed concern over potential problems with the breakout flows and the possibility of flows going over the existing Sols bridge on Tegner (as it relates to the pending turnback of Tegner to the Town). It was noted that a major event on Sols will flood areas behind the new roadway embankment if there is no

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protection in place (Mr. Dille noted that this was unacceptable to the Town). Town would still like to see these improvements done as a single project with the bypass. FCD noted that there were no funds programmed for construction and no time frame identified for construction

WQARF Remediation Site- No additional discussion.

Right of Way acquisition- See above discussion.

Design Issues

Nothing new specifically discussed.

### **CONTRACT MODIFICATION**

Jacobs is continuing to work on cost of additional design effort dealing with the pavement preservation, the Town borrow site evaluation and the addition of a subconsultant for the roundabout.

### **IGA STATUS**

Attorney General's office still working on draft version. They made a site visit.

### **PROJECT SCHEDULE**

30% submittal made on March 18. Comments were due back to Jacobs on April 12. As noted above very few responses were received.

### **OPEN DISCUSSION**

Mayor McDermott reiterated Town desire for a connection between Tegner and the Bypass. Town expressed desire to be involved in development of gateway concepts when work on that activity begins.

### **NEXT MEETING**

The next monthly progress meeting will be held on **May 18 at 9:30 am in Wickenburg in the Town council chambers, 155 N. Tegner St. A utilities coordination meeting will be held the same day beginning at 1:15 pm in the Council chambers.**

These minutes reflect the notes taken by Jacobs Civil Inc. during the meeting. If any corrections are needed, please provide those recommendations within two weeks of receipt of these minutes.

Prepared by

**JACOBS CIVIL INC.**

George E. Wallace, PE  
Project Manager

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Attachments:  
Sign in sheets  
Agenda

Distribution  
Team members (e-mail)  
Utility Meeting Attendees  
Mayor McDermott (mail)

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# **MEETING MINUTES**



Jacobs Civil Inc.

US 93: Wickenburg Interim Bypass

Date: September 9, 2005

**LOCATION** Town of Wickenburg  
**AND DATE:** Town Council Chambers  
May 18, 2004

**PARTICIPANTS:** See attached.

**SUBJECT:** Contract No. 03-05  
US 93: Wickenburg Interim Bypass  
Project No. W7X73400  
TRACS No. 093 MA 198 H5825 01D  
Monthly Progress Meeting

## **SUMMARY:**

Meeting opened by George Wallace (GW), JCI Project Manager, who thanked everyone for coming to the meeting. GW asked attendees to introduce themselves and their role in the project. Agendas were distributed and an attendance list circulated. (copies attached)

## **PROJECT STATUS:**

Survey and Mapping- Survey work is complete.

Geotech. - Field investigation work continuing in areas where right of entry has been provided. Will be doing pavement coring on Tegner next week. Still need RoE from Underdown and Ringwood to proceed with investigations in center 1/3<sup>rd</sup> of alignment. Preliminary information for the bridge locations will be available near the end of the month.

Drainage- WEST has defined the 100 year water surface elevation for use in finalizing the roadway and bridge profile. Information has been sent to ADOT bridge group. In order to minimize the profile impact, it appears that the box girder alternative will be the structure type for the Hassayampa crossing. Sols Wash runoff will create a flooded area behind the roadway embankment. WEST is evaluating the impacts. Accurate evaluation to identify potential liability to Department will require 2-D modeling of the area.

Potential impacts caused by the use of the Town owned property for a borrow source need to be evaluated. The impacts could result in additional scour at the new Hassayampa crossing, headcutting upstream of the excavated area and

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possibly a shift in the river alignment. These impacts have the potential to go outside the property owned by the Town. WEST will be submitting contract modification to address these two issues.

Right of Way- No progress in acquiring the rights of entry from Underdown and Ringwood. Town Council approved RoE for the potential borrow site at May 17 meeting. Restrictions on access will be required. ADOT is continuing process of identifying total takes and have begun the appraisal/ acquisition process of those previously identified. Jacobs is continuing the right of way refinement and should be complete later this week. Question was brought up as to when the property owners would need to be off their property. The response was that property needs to be acquired by the State and vacated by the owners prior to bid advertisement (currently July 2005).

Structures- The Hassayampa bridge location has been adjusted slightly to the south and is using a 4' narrower typical section. Bridge will be precast box beam with the west span being cast in place. Information is needed for the northwest corner for how the sidewalk will tie in. This won't be provided until a determination is made regarding the roundabout concept. Geotechnical information is needed for both structure locations to complete Structure Selection Reports. Larry Altuna noted that the Bridge Group is considering using a box beam type structure for Sols Wash. Final determination will be made in Selection Report. Preliminary report should be done 2-3 weeks after receipt of geotechnical information.

Utilities- We are going to impact about 4 poles going north out of the substation. Undergrounding them would be approximately 10 times more expensive than relocating overhead. A quarterly utilities meeting will be held later today.

Roundabout Analysis- Jacobs is continuing discussions with Mr. Ourston to get him under contract to provide additional effort on this process. Wayne Colebank (LSD) stated that they could provide some preliminary conceptual drawings that could be used to initiate discussions with SHPO. We are continuing our efforts to get agreement on the contract language. He has provided a written cost proposal to us. Conversation with Mr. Ourston indicated that based on the traffic numbers provided to him, a roundabout would also function well at the north end of the project.

Roadway design- We received a minimal number of comments on the 30% submittal. Response to comments has been drafted and provided to Larry Doescher for review. Design is continuing toward 60% with a target date of August 25<sup>th</sup>. This may be revised pending decision on roundabout. Driveway profiles have been designed and on site drainage improvements are being developed. Response to Value Analysis report has been prepared and Submitted to Larry for review.

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## **PROJECT ISSUES**

Access control- No new discussion. Town would still like to have connection to Tegner. This is still considered a safety issue and would lessen the length of time the bypass would be able to effectively serve regional traffic.

McDonald's property- No new discussion.

FCDMC activities- Update on the status of the ongoing Sols Wash study was presented. Draft report to be available next week. Cost estimate in about a month. FCD was asked to provide a copy to ADOT, WEST and Jacobs. Jacobs still needs to deal with the breakout over Tegner in their design since there is no funding available to finance needed improvements. Town position is that FCD and ADOT need to get together to try to resolve funding issue to get some if not all the needed improvements built concurrently. Hospital wash improvements would deal with the breakover flow.

WQARF Remediation Site- Russ Slotnick of ADEQ provided an update on their activities. Construction of containment pile nearly complete, putting final cover on pile. Riprap along river side is in place. Remaining activities have to do with irrigation, landscaping and fencing. Irrigation construction could push completion into July. As built will be provided within 30days of completion of the project. Jacobs will need to coordinate with ADEQ to ensure that any trees planted will not need to be removed by our project. The pile is slightly lower (3') in elevation at the southern end than originally shown on the plans. A portion of the right of way that the site occupies is being transferred from Mr. Ringwood to Mr. Underdown so Mr. Underdown will have ownership of the entire containment site. ADOT will need to place a portion of its roadway embankment on the pile, so right of way will need to be acquired. There should be coordination with Ed Green of Environmental Planning to discuss the implication of having a portion of the roadway on the Hazmat site.

Right of Way acquisition- See above discussion.

### **Design Issues**

Sidewalk back slopes- Discussed possibility of using City of Phoenix detail that provides for somewhat steeper slope at the back of the sidewalk. This would be used in a few isolated areas to avoid taking a thin strip of right of way. We will prepare graphic to show impacts using normal slopes vs. Phoenix alternative. Town would like opportunity to review.

## **CONTRACT MODIFICATION**

Jacobs has prepared a draft modification for the cost of additional design effort dealing with the pavement preservation, the Town borrow site evaluation and the

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addition of a subconsultant for the roundabout. Modification has been submitted to Larry for review.

### **IGA STATUS**

Agreement between Town and ADOT is still at AG's office. ADOT and ADEQ need to get together to discuss Agreement relative to impacts and liability of crossing portion of WQARF site with the roadway.

### **PROJECT SCHEDULE**

60% submittal currently scheduled for August 25<sup>th</sup>. Could be affected if decision on roundabout is delayed.

### **OPEN DISCUSSION**

Mayor McDermott reiterated Town desire for a connection between Tegner and the Bypass as noted above. LSD is meeting with Town representatives later today to discuss gateway options. Town expressed desire to be involved in development of signing concepts when work on that activity begins. Mayor expressed Towns concern over the potential impact to the Community Center property and their desire to keep them to the minimum needed.

### **NEXT MEETING**

Due to the unavailability of the Location Section conference room in the Old MVD Building, the next monthly progress meeting will be held on **June 15 at 1:30 pm in Phoenix in the ADOT Board Room, 206 S. 17<sup>th</sup> Ave (the ADOT Administration Building). The Board room is on the north hallway. The July Progress meeting will be held on July 13 at 1:30 pm in Phoenix in the Arizona Room in the ADOT Engineering Building, 205 S. 17<sup>th</sup> Ave, 1<sup>st</sup> floor.**

These minutes reflect the notes taken by Jacobs Civil Inc. during the meeting. If any corrections are needed, please provide those recommendations within two weeks of receipt of these minutes.

Prepared by

**JACOBS CIVIL INC.**

George E. Wallace, PE  
Project Manager

Attachments:

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Sign in sheets  
Agenda  
Utility meeting minutes

Distribution

Team members (e-mail)  
Utility Meeting Attendees  
Mayor McDermott (mail)

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# MEETING MINUTES



Jacobs Civil Inc.

US 93: Wickenburg Interim Bypass

Date: September 9, 2005

**LOCATION** ADOT  
**AND DATE:** Transportation Board Room  
June 15, 2004

**PARTICIPANTS:** See attached.

**SUBJECT:** Contract No. 03-05  
US 93: Wickenburg Interim Bypass  
Project No. W7X73400  
TRACS No. 093 MA 198 H5825 01D  
Monthly Progress Meeting

## SUMMARY:

Berwyn Wilbrink, substituting for JCI Project Manager George Wallace, opened the meeting at 1:30pm by thanking everyone for coming. Attendees introduced themselves and their role in the project. Agendas were distributed and an attendance list circulated (copies attached).

## PROJECT STATUS:

**Survey and Mapping** – Nothing new from the previous monthly review meeting.

**Geotech** – Ninyo & Moore completed the geotech analysis for the Hassayampa River Bridge and Tegner Street. Soil parameters have been submitted to the ADOT Bridge Group. Access for geotech investigations has not been approved for the Underdown and Ringwood properties in center 1/3<sup>rd</sup> of the alignment.

Lon McDermott volunteered to work with ADOT in approaching Ringwood about accessing his property for geotech investigation. Access has been petitioned for ADOT work crews to take on the task of material testing in the test pit borrow area.

**Drainage** – Leo Kreymborg with WEST indicated that the 2-D modeling of the Sols Wash area will be complete next week. Modeling of the borrow pit will also be available next week provided Jacobs supplies WEST with additional cross sections upstream every 400' to Martinez Wash (approximately a ½ mile).

The flood control district distributed copies of the drainage report for Sols Wash.

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Currently no one from ADOT Drainage Group has been assigned to this project since Dennis Crandall retired from ADOT.

**Right-of-Way** – Berwyn suggested setting up a subsequent meeting with Martha Harrell and someone in acquisitions to get rough estimates on total takes of certain properties. Martha informed the group that the typical process takes 60-90 days for property appraisal, followed by another 60-90 days for condemnation if necessary. It was suggested to purchase the strip of property in Sols Wash owned by Underdown.

Berwyn gave a heads up to ADOT Right of Way that more right-of-way will be required than shown in the 30% submittal for a drainage channel west of the new roadway embankment on US 93.

**Structures** – Larry Altuna stated that the Structure Selection Reports will be complete next week. ADOT Bridge Group has selected a Super Box for the Sols Wash crossing, where the top of the box will be used as the roadway surface. The approximate dimensions will be (7)-35' wide spans. The invert will be located approximately 2 feet below the existing grade as to not have any detrimental affects on the hydrology of the wash.

The Hassayampa Bridge will consist of 4 spans of a precast box beam with the fifth (western) span being cast in place. A roundabout alternative could reduce the width of the bridge from 5 lanes to 4.

**Utilities** – APS and Qwest have not received the full size plans of the 30% submittal. Jacobs will FedEx those plans this week.

The Hassayampa Bridge will have a 2' wide by 4' deep cavity in the center of the structure designated for utilities. Due to Homeland Security concerns, utilities that could be potential "targets" are not allowed on structures of major transportation routes. As a result, Southwest Gas will need to be rerouted below the scour depth in the wash or mounted on a grade control structure upstream or downstream of the new Hassayampa Bridge.

All "dry" utilities (electric, fiber optic, cable) can be attached within the box cells. It was discussed in the meeting that the existing 6" waterline (that may become 12") and the 4" sewer force main can be placed in sleeves and fit within the 2'x4' cavity. However, further investigation is needed.

**Roundabout Analysis** – There was some concern that the roundabout alternative was not the original concept that was approved in the Environmental Assessment by SHPO. However, the roundabout does not change the angle into the community of Wickenburg. Wayne Colebank (LSD) stated that they could provide some preliminary conceptual drawings of the gateway aesthetic

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treatments that could be used to initiate discussions with SHPO as soon as a decision is made for either the roundabout or the original intersection concept shown in the Environmental Assessment. Jacobs will schedule a follow-up meeting for the discussion of approaching SHPO with the new roundabout concepts.

Wayne summarized the discussions of the gateway meeting that was held earlier in the month. Issues that were discussed in that meeting included creating a gateway with an authentic western theme, placing an amphitheater near the existing abutment of the Hassayampa Bridge, adding more parking spaces, and building a new restroom. The overall intent is to make the gateways on both sides of the project as enticing as possible to encourage people toward the downtown area.

Another topic that was brought up during the meeting was the potential artwork and landscaping within the roundabout circles. ADOT's policy does not allow non-roadway related items within ADOT right-of-way. Therefore, the roundabout circle would have to be turned back to the Town of Wickenburg for maintenance and liability.

A question was raised about the costs involved with the aesthetic enhancements, such as the interpretative sign at the old bridge abutment, parking, landscaping, artwork, etc. Wayne said he will look into the construction costs of the 2 gateways recently built for the town of Camp Verde as a comparison.

**Roadway design** – Tom Foster raised the question about adding a right turn deceleration lane on Tegner Street into the APS Substation. There was no consensus about that issue in the meeting. It was noted that no other driveway on that street has a deceleration lane, and it is a two-lane roadway with a dual left turn lane for vehicles to maneuver around a truck turning into the substation.

Driveway profiles have been designed and on site drainage improvements are being developed.

## **PROJECT ISSUES**

**Access control** – Excess right-of-way will be abandoned after the project. Previous owners will have the first opportunity to repurchase their property, followed by a property auction.

**Rights of Entry** – See discussions earlier in Right-of-Way section.

**FCDMC activities** – No new information was presented.

**WQARF Remediation Site** – No new information was presented.

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## **Design Issues**

Sidewalk / Slopes – The Town of Wickenburg was given a City of Phoenix detail regarding the slopes at the back of the sidewalk and safety railing requirements. This would be used in a few isolated areas to avoid taking a thin strip of right-of-way. The Town also received a graphic showing the impacts using normal slopes vs. the Phoenix detail slopes. Since the Phoenix detail has more stringent criterion than the ADA requirements, the Town approved using that detail for the sidewalk slope treatments.

Gateway Treatments – See earlier discussions under roundabout analysis section.

Driveway Profiles – All driveway profiles have been designed except for the driveways to Monte Vista. Jacobs is still trying to obtain information from Kimley Horn on the Monte Vista driveways. The current design grades on most of the Tegner Street driveways are very steep (14%-15%) in order to lessen impacts on the properties. Larry Doescher was presented with some graphics that compared the impacts that the current design has on the properties, and the impacts that would occur if the existing grade for each driveway was used as the design grade. The driveways will have to be looked at on a case by case basis to determine profile grades and property impacts that are acceptable. It was suggested that we meet with each individual property owner to determine their preference for the driveway on their property.

Construction Phasing – Design has started on construction phasing plan sheets and signing and marking plan sheets. Both of these items would be impacted by the addition of roundabouts. The first phase of construction will include the new Hassayampa River Bridge and the demolition of the existing bridge. The second phase of construction will include the construction of the fill section along US 93. The third phase of construction will include the tie-ins at the north and south ends of the project and the pavement preservation on Tegner Street.

## **CONTRACT MODIFICATION**

In George Wallace's absence, contract modifications were not discussed.

## **IGA STATUS**

The IGA agreement between the Town and ADOT is still under review at AG's office.

## **PROJECT SCHEDULE**

The 60% plan submittal is currently scheduled for August 25<sup>th</sup>. This could be affected if the decision on a roundabout is delayed.

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## OPEN DISCUSSION

No additional issues were discussed.

## NEXT MEETING

Due to the unavailability of the Location Section conference room in the Old MVD Building, the next monthly progress meeting will be held on **July 13 at 1:30 pm** in **Phoenix in the Arizona Room in the ADOT Engineering Building, 205 S. 17<sup>th</sup> Ave, 1<sup>st</sup> floor.**

These minutes reflect the notes taken by Jacobs Civil Inc. during the meeting. If any corrections are needed, please provide those recommendations within two weeks of receipt of these minutes.

Prepared by

**JACOBS CIVIL INC.**

George E. Wallace, PE  
Project Manager

### Attachments:

- Sign in sheets
- Agenda
- Utility meeting minutes

### Distribution

- Team members (e-mail)
- Utility Meeting Attendees
- Mayor McDermott (mail)

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# MEETING MINUTES



Jacobs Civil Inc.

US 93: Wickenburg Interim Bypass

Date: September 9, 2005

**LOCATION** ADOT, Arizona Room  
**AND DATE:** July 13, 2004

**PARTICIPANTS:** See attached.

**SUBJECT:** Contract No. 03-05  
US 93: Wickenburg Interim Bypass  
Project No. W7X73400  
TRACS No. 093 MA 198 H5825 01D  
Monthly Progress Meeting

## SUMMARY:

George Wallace opened the meeting at 1:30pm with attendees introducing themselves. In general, the project is advancing towards the 60% plans stage, scheduled for August 25, although some of the progress continues to be hampered as a result of waiting for resolution on roundabout issues. Specific discipline issues are summarized below. Agendas were distributed and an attendance list circulated (copies attached).

## PROJECT STATUS:

**Survey and Mapping** – Survey work is complete to date. As part of the drainage evaluation of the Hassayampa borrow site upstream of the project, WEST Consultants has requested additional river cross sections (400-ft intervals for 2400-ft upstream of the borrow site). Jacobs has requested PEC to provide this and some other spot specific information related to on site drainage. They were also asked to stake the boundary of the proposed borrow site area. The surveyors should be out the end of this week to obtain this information.

**Geotech** – Data has been provided to ADOT Bridge Group for their use in designing the drilled shafts for the piers. A scour depth of 41' has been estimated. Based on the specific design parameters of the bridge piers and subsequent discussion in the meeting this number may be reduced. Access for geotech investigations has not been approved for the Underdown and Ringwood properties in center 1/3<sup>rd</sup> of the alignment. ADOT R/W contacted Mr. Ringwood again recently and was told to discuss the issue with his attorney.

Additional geotechnical analysis for the Town's borrow source in the River will be completed by ADOT Geotech using their own forces.

**Drainage** – George gave an update on the status of the onsite drainage design being done by Jacobs. The design is nearly complete with some details yet to be completed. Discussed possible option of extending the Tegner connection pipe about 200' south and backfilling the area to provide opportunity for APS to relocate their fence, which would allow more room to provide an adequate driveway into their substation. Greg Jones noted the possibility of the channel being jurisdictional waters and also questioned the need to design for 100 year flow. (Review of COE

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approved delineation indicates that it is not JW). Greg also noted that an analysis of the existing vs. design Q going through the CBC at the Denny's should be done.

The Flood Control District noted that they held a comment resolution on their draft Sols Wash Candidate Assessment Report. Now proceeding towards the final report with draft final due to Greg Jones on July 15<sup>th</sup>.

Brief discussion on the type of bank protection. District prefers soil cement over gabions due to less maintenance requirements. FCD has recommended gabions on the south side of Sols Wash and soil cement on the north. Our project will proceed with the soil cement option. Possible source of material could be the Town borrow site.

**Right-of-Way** – Updated Right of way information was provided to right of way plans last month. Some revisions were needed to accommodate drainage improvements. Martha noted that there were seven parcels identified as total acquisitions and that offers had been made on three of the properties. Second appraisals have been requested on the Exxon and U-Haul parcels. Impacts of the roundabout design may affect a few parcels at the north end, but the extent won't be known until design concepts are received in about two weeks. Ownership of the existing right of way along the current river bridges is being researched.

**Structures** – The preliminary Structure Selection Reports have been completed. Larry D. will forward electronic version to George for distribution to the team. Jacobs will also add the reports to the US 93 website. A Super Box has been selected for the Sols Wash crossing, where the top of the box will be used as the roadway surface.

The Hassayampa Bridge will consist of 4 spans of a 6' deep precast box beam with the fifth (western) span being cast in place. A roundabout alternative could reduce the width of the bridge from 5 lanes to 4. The roundabout consultant has been directed not to impact the second span from the west with his design.

**Utilities** – All utilities have received updated full size plans of the 30% submittal. Jacobs has been contacting the utilities to get some definitive information regarding impacts and adjustments and has spoken with all of them. They are reviewing the plans and were asked to provide relocation information and prior rights documentation as soon as possible. Requests to upsize existing facilities or to add new facilities should be provided in writing. George will draft letter for Peggy to send out. A determination must also be made regarding the design of any relocations, whether the owner or Jacobs will prepare the plans. If potholing to determine exact location/depth of facilities in conflict is needed, we should notify Peggy as soon as possible so her on call consultant can obtain the information.

**Roundabout Analysis** – The roundabout design subconsultant is now under contract and is preparing conceptual drawings for both intersections, which should be provided to Jacobs this Friday (July 16). He expressed some concern about the frontage road at the north end, noting that if it remains in its current location, NB semis who might be exiting the frontage road would have to go completely around the circle. An option would be to swing the frontage road out from the roundabout to make a more direct approach but this may have right of way implications.

**Roadway design** – A strip map showing the current proposed design was provided. George gave an update on the various features currently under development. Discussion on the APS driveway on the north end of the substation. APS desires a 5% grade which can't be accommodated based on the current fence location. As an option to provide more flat area to the east of their current fence location which would allow the fence to be moved to provide some additional room for the driveway, we are evaluating extending the drainage pipe under the Tegner connection and filling in the area between the roadway embankment and the substation. Right of Way has been given a copy of the concept for consideration of possible right of way savings.

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## **PROJECT ISSUES**

**Gateway/ Aesthetic Treatments** – Wayne Colebank and Jackie Keller gave an extended presentation on the treatments they have been evaluating at the south entry into Wickenburg using input they received at the Wickenburg Task Force 2006 meeting. Options were depicted with both the current design and a conceptual roundabout design. Variations included use of portions of the Exxon and U-Haul property and the use of the new bridge as the gateway as suggested by the SHPO. They showed some features provided to them by the Town depicting what the Town feels is important in the aesthetics and gateway treatments. Discussed where we go from here. We need to get more refined drawings together to prepare a package to be sent to SHPO prior to attempting to make a presentation.

**Access control** – Excess right-of-way will be abandoned after the project. Previous owners will have the first opportunity to repurchase their property, followed by a property auction.

**Rights of Entry** – See discussions earlier in Right-of-Way section.

**FCDMC activities** – See discussions earlier in Drainage section.

**WQARF Remediation Site** – Russ Slotnick gave update on the project. Work is essentially done except for the irrigation design and construction. They are currently reviewing options for a water source for the irrigation.

### **Design Issues**

Gateway Treatments – See earlier discussions under project issues.

Driveway Profiles – All driveway profiles have been designed except for the driveways to Monte Vista. Additional survey information has been requested to allow Jacobs to tie in the MVR design plans.

Construction Phasing – Design is continuing on the construction phasing plan sheets and signing and marking plan sheets.

Hazardous Materials – There is a strong possibility that there is lead based paint on the steel superstructure of the Hassayampa bridge as well as asbestos in the concrete. A request for testing has been submitted to EEG with a requested completion date of July 28. This could affect how we salvage a portion of the old bridge for use in the interpretive site and will require additional restrictions on the contractor during demolition.

## **CONTRACT MODIFICATION**

A modification for additional work related to the Town borrow source and the roundabout has been submitted to Larry Doescher.

## **IGA STATUS**

Comments have been received from the AG's office. The agreement has been revised and resubmitted.

## **PROJECT SCHEDULE**

The 60% plan submittal is currently scheduled for August 25<sup>th</sup>. This could be affected if the decision on a roundabout is delayed.

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## **OPEN DISCUSSION**

Mr. Dille mentioned the letter that had been sent to Tom Foster by Lon McDermott regarding the progress of the project. It was noted that a response had been sent out to Lon by the District.

The Exxon parcel and the Stotz/ Uhaul site will both need to be reviewed for possible hazardous material contamination.

## **NEXT MEETING**

The next monthly progress meeting will be held on August 17<sup>th</sup> at 9:30 AM in the Wickenburg Town Council Chambers, 155 N. Tegner St. A quarterly Utilities coordination meeting will be held that afternoon, also in the Council Chambers.

These minutes reflect the notes taken by Jacobs Civil Inc. during the meeting. If any corrections are needed, please provide those recommendations within two weeks of receipt of these minutes.

Prepared by

## **JACOBS CIVIL INC.**

George E. Wallace, PE  
Project Manager

Attachments:  
Sign in sheets  
Agenda

Distribution  
Team members (e-mail)

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# MEETING MINUTES



Jacobs Civil Inc.

US 93: Wickenburg Interim Bypass

Date: September 9, 2005

**LOCATION** Town of Wickenburg, Council Chambers  
**AND DATE:** August 17, 2004

**PARTICIPANTS:** See attached.

**SUBJECT:** Contract No. 03-05  
US 93: Wickenburg Interim Bypass  
Project No. W7X73400  
TRACS No. 093 MA 198 H5825 01D  
Monthly Progress Meeting

## SUMMARY:

George Wallace opened the meeting at 9:30pm with attendees introducing themselves. In general, the project is advancing towards the 60% plans stage, scheduled for August 25, although some of the progress continues to be hampered as a result of waiting for resolution on roundabout issues. Specific discipline issues are summarized below. Agendas were distributed and an attendance list circulated (copies attached).

**Gateway/ Aesthetic Treatments** – Members of the Wickenburg Task Force 2006 had been invited to view the gateway concepts being prepared by Logan, Simpson Design. Wayne Colebank gave a presentation on the treatments they have been evaluating at the south entry into Wickenburg using input they received at a previous Wickenburg Task Force 2006 meeting. Options were presented that showed the gateway at the eastern end of the new Hassayampa bridge with a gateway spanning over the roadway as well as along the existing alignment. A third option showed a flagpole treatment that directed the viewers attention to the existing alignment. One option provided for a pedestrian overpass connecting the Stotz (U-Haul) property, which could be used as a parking facility, over to the future interpretive/ wishing well park site. Another option showed a landscaped area between the sidewalk and the retaining wall along the outside of the roundabout. This would require setting the wall back about 10', further encroaching into the Community Center parking lot. Wayne also suggested moving the Wickenburg Way retaining wall to line up with the new and existing west abutments to provide additional space for landscaping. The Town indicated they were pleased with the progress. Town also noted that no response had been received to letter sent to SHPO on August 4 indicating Town

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support of roundabout concept. Prior to concepts being presented to SHPO, need to meet with EEG and Roadside to discuss concepts. **Larry D. to set up meeting.** LSD could have package ready for SHPO presentation in about two weeks.

## **PROJECT STATUS:**

**Survey and Mapping** – Additional survey cross sections requested by WEST to provide additional data upstream of the Town property being considered for a material source has been provided to WEST. Site area boundary has also been staked.

**Geotech** – No additional information available this month. Still need right of entry to three large parcels in middle 1/3<sup>rd</sup> of project. ADOT Geotech awaiting cultural resource clearance prior to testing Town property using their own forces.

**Drainage** – The onsite drainage design is nearly complete with some details yet to be completed. Plans will show possible option of extending the Tegner connection pipe about 200' south and backfilling the area to provide opportunity for APS to relocate their fence, which would allow more room to provide an adequate driveway into their substation. Still need concurrence from APS.

WEST is continuing their evaluation of the impacts of the material source on areas downstream from the source. Scour calculations were submitted to ADOT by WEST and comments received back. Scour depth could be revised if Hassayampa bridge width is reduced if roundabout option is used. Total takes of Rancho del Rio and Tavros parcels noted below may reduce length of channel on east side of roadway prism along those parcels. These changes will be reflected in the next submittal.

**Right-of-Way** – Rancho del Rio, the Armenta property and the Tavros Trust parcel #1 (immediately north of RdR) will be acquired as total takes. There are existing wells on the RdR property that will need to be addressed. 11 appraisals have been ordered along with 5 TCE's. Partial takes will not be evaluated until after 60% submittal. Regarding the issue of abandonment of the existing Hassayampa bridge right of way that was brought up last month, ADOT owns the bridge and it is presumed the current property owner owns the river bottom. Access control needs to be shown on the right of way plans.

**Structures** – Bridge Group has been continuing design of the two structures. Drawings will be provided to Jacobs on August 19 for inclusion in the 60% submittal. Question came up as to whether we could eliminate the separation barrier on the bridge (it was not shown on LSD graphics). Structure currently has a flush sidewalk and removing the barrier would require sidewalk to be raised. Bridge Group will investigate feasibility of removing due to the low posted speed (25 MPH) and the improved aesthetics. Implementation of the roundabout

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concept could result in the elimination of one lane on the bridge. This could also affect the pier column spacing.

**Utilities** – We have received input from all utilities regarding impacts to their facilities, especially those needing relocation from the existing bridges. APS has indicated desire to increase the number of conduits they would like in the bridge. Bridge Group has increased the available opening in the center of the bridge to 2'-6". Gas line will not be shown as being accommodated on the new bridge. Pothole requests have been made to ADOT. Information expected back early September. Utility coordination meeting to be held this afternoon. Information regarding the routing of the utilities after they leave the bridge needs to be provided.

**Roundabout Analysis** – An updated roundabout concept for the south intersection was received from our subconsultant and circulated to ADOT for review. The concept was also provided to LSD for development of the gateway concepts. Preliminary concepts for the north intersection were received and circulated to ADOT for comment. Main concern with the north intersection is the access road proximity to UE 93 and the ability of large vehicles to turn to go north from the access road. WB-67 vehicle will be accommodated.

**Roadway design** – George gave an update on the various features currently under development.

The 60% submittal is due next week. Traffic control plans, signing and marking plans, special provisions and cost estimate for the submittal are nearly complete. Drainage design is nearly complete. A critical time of construction will be when both bridges are in place prior to removal of the existing structures in the event of a major flow in the river. Contractor may be able to combine phases but will be taking on liability.

## **PROJECT ISSUES**

**Access control** – Access Control needs to be added to the right of way plans.

**Rights of Entry** – No movement on the access to the Ringwood and Underdown properties.

**FCDMC activities** – The Flood Control District noted that the Candidate Assessment Report for the Sols Wash has been completed. The report will be submitted to the Town. ADOT and Jacobs requested a copy of the report. The Town has requested that the project be included in FCD's Capital Improvement Program. Greg Jones questioned the status of the development of the 2D model for evaluating drainage west of the new alignment. It was noted that the request was in to ADOT for review. Larry will set up meeting with Dennis Crandall to discuss. Modeling would take 3-4 weeks.

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**WQARF Remediation Site** – Russ Slotnick gave update on the project. They are looking to put a new well on the site, the existing wells do not produce enough water. George asked if there was any updated as built information on the site since the information we were using is from the original construction plans. Russ asked us to provide date of information we are using.

## **DESIGN ISSUES**

Construction Phasing/ Constructability – a brief description of the construction phasing was given. Hassayampa bridge and tie-ins need to be constructed first, with the old bridges being removed after traffic shifted but prior to the main roadway embankment being constructed. The Tegner Street work will begin after the bypass is open to traffic. It was suggested that the reconstruction portion at the north end be closed to thru traffic. Town expressed concern about this approach and also for continued access for emergency vehicles through the work area. It was also noted that on street parking at the south end of Tegner would need to be restricted during work periods in order to shift traffic. Town suggested nighttime work in this area should be considered.

Hazardous Materials – Testing report on lead paint and asbestos investigation on the existing Hassayampa bridges was received August 13. Asbestos materials were not identified in any of the samples taken. Lead based paint concentrations in excess of acceptable levels were detected in both the handrails and the cross beams. Necessary precautions will have to be taken during construction. ADOT will provide language for the Special Provisions regarding procedures to be followed during demolition. This will affect how we salvage a portion of the old bridge for use in the interpretive site.

## **CONTRACT MODIFICATION**

Larry Doescher is reviewing the contract modification submitted last month.

## **IGA STATUS**

Comments have been received from the AG's office and other ADOT reviewers. An updated version was given to the Town.

## **PROJECT SCHEDULE**

The 60% plan submittal is currently scheduled for August 25<sup>th</sup>.

## **OPEN DISCUSSION**

Mr. Rome Glover expressed concern about access to the Hospital for emergency vehicles and suggested a connection from the bypass to Tegner in the vicinity of Brallier by considered. Larry Doescher noted that this connection is not being

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considered by ADOT. Town suggested that this could aid in traffic control if a closure at the north end for the reconstruction was implemented.

A+B bidding – George asked District representatives if they would like to consider A+B bidding. District will discuss. (Subsequent conversation with Tom Foster indicated no real apparent need to go that route).

Monte Vista right turn lane- It was noted that the pavement widening previously place for SB right turns at Monte Vista Ranch had been removed and is it really necessary to have a right turn lane once a five lane section is developed. (Subsequent conversation with Tom Foster indicated that left and right turn lanes were part of developers permit and would be constructed next month. The right turn lane will need to be reconstructed as part of our project. **This will require additional survey to accurately locate the new improvements and to allow for redesign of the driveway, curb returns and drainage in the area.)**

Julie Brooks asked whether the 60% plans could be put on the US 93 website. (Plans were added August 26<sup>th</sup>.) Julie also asked if we had an updated plot of the entire project area. We will provide one.

#### **NEXT MEETING**

The next monthly progress meeting will be held on September 21st at 9:30 AM in the ADOT Statewide Project Management large conference room on the second floor of the Engineering building.

These minutes reflect the notes taken by Jacobs Civil Inc. during the meeting. If any corrections are needed, please provide those recommendations within two weeks of receipt of these minutes.

Prepared by

**JACOBS CIVIL INC.**

George E. Wallace, PE  
Project Manager

Attachments:

Sign in sheets  
Agenda

Distribution

Team members (e-mail)

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# MEETING MINUTES



Jacobs Civil Inc.

US 93: Wickenburg Interim Bypass

Date: September 9, 2005

**LOCATION** ADOT, SPMG Conference Room  
**AND DATE:** September 21, 2004

**PARTICIPANTS:** See attached.

**SUBJECT:** Contract No. 03-05  
US 93: Wickenburg Interim Bypass  
Project No. W7X73400  
TRACS No. 093 MA 198 H5825 01D  
Monthly Progress Meeting

## SUMMARY:

George Wallace opened the meeting at 9:30am with attendees introducing themselves. The 60% plans were submitted last month and the majority of the design has been on hold until comments are received. Specific discipline issues are summarized below. Agendas were distributed and an attendance list circulated (copies attached).

## PROJECT STATUS:

**Survey and Mapping** – Additional survey will be required at the entrance to Monte Vista Ranch. Additional cross sections downstream of the existing Hassayampa River bridges may be necessary for West Consultants to complete modeling that includes the existing 1962 bridge.

**Geotech** – No additional information available this month. Still need right of entry to three large parcels in middle 1/3<sup>rd</sup> of project. Jacobs has received a clearance letter from ADOT for the borrow pit site.

**Drainage** – Jacobs submitted the drainage report last week. West Consultants are nearly complete with the modeling at the borrow pit site. The modeling will be complete in two weeks and scour depths will be provided for the bank protection. West Consultants have also begun to run the 2D models for Sols Wash.

**Right-of-Way** – Jacobs will provide ADOT Right-of-Way with limits for access control by tomorrow.

If the north roundabout is incorporated into the design two properties will be affected to a greater degree by the "button hook" alignment that is required on the Access Road to accommodate WB-67 turning movements than with the current design.

George Wallace mentioned that additional TCE's will be required at Monte Vista Ranch and at the driveways into the Best Western.

FCDMC is looking into buying out several properties near Sols Wash and there needs to be coordination with ADOT to determine if ADOT is buying some of the same properties. There may

be an opportunity for a cost sharing of acquisition of these properties. It was stated that it would be easier if ADOT buys the property and FCDMC reimburses ADOT for the property rather than FCDMC buying the property and ADOT buying it from FCDMC. A graphic from FCDMC was provided to Martha Harrell.

**Structures** – Details are currently being worked on that will not be affected by any changes due to conversion of intersection to a roundabout.

**Utilities** – Larry Doescher updated the group on a meeting that took place with Southwest Gas. They looked at three alternatives for the relocation of the gas line:

1. Bury the gas line in a grade control structure or under the scour depth.
2. Accommodate the gas line on the side of the bridge under the sidewalk. This would not cause as much of a liability on the bridge. ADOT's policy is to not have gas on the bridge. This is the least desirable alternative from ADOT's perspective.
3. Design a dual utility/pedestrian bridge that could carry all the utilities. An advantage of the utility bridge would be that the relocation of the utilities would not be as far. Facilities would also be more accessible for maintenance. Cost would be shared by all the utility companies.

Leo Kreymborg mentioned that it would be worth considering moving the utilities from the existing 1935 bridge to the existing 1962 bridge. The 1936 bridge would still need to be removed, but a drainage analysis would need to be done to determine if keeping the 1962 bridge would be an alternative. Larry Doescher said that he would like West Consultants to run a model with the new bridge and the 1962 bridge to determine the affects on drainage. The model would be used to determine if the 1962 bridge would be able to pass the 50 year storm and 3' of freeboard and the 100 year storm. The model would also look at the impact that the 1962 bridge has on the new bridge. Another model would be run with the new Hassayampa River bridge and a new 2 or 3 span utility/pedestrian bridge. Leo said that they could have the models done by Friday morning. Additional survey cross sections may be required downstream of the existing bridges to assist the modeling. George Wallace stated that since we are now past 60% we must not make any changes to the profile of US 93. Therefore, any additional drainage impacts would infringe on the 3' of freeboard requirement. Dennis Crandall said that ADOT would consider relaxing the 3' of freeboard requirement depending on how much it was infringed upon. (Analysis by WEST indicated the 1962 structure could remain in place. The water surface elevation would go up about 0.1')

If Southwest Gas does not use a structure for the gas line they will bury the line 44' below the existing ground to be under the scour depth. Leo said that the scour depth would be much less than 44' downstream of the new bridge. Southwest Gas would prefer to not use a grade control structure. They noted it would take several years to get CoE permit. It was suggested they could piggy back on to permit ADOT will be acquiring to work in the river. They may be able to work within area previously cleared environmentally for this project.

Jacobs will not be able to proceed with the relocation design of the sanitary sewer in the Community Center parking lot until it is determined which type of intersection we are using.

APS is satisfied with the design of the north driveway to the substation that Jacobs sent to them. Access to the south driveway is still going to be a problem. APS wants ADOT to allow them to run a 12KV line longitudinally along US 93 within ADOT's Right-of-Way. ADOT's typically does not allow this. APS will need to submit a letter to Peggy Havins of ADOT Utilities & RR requesting a longitudinal encroachment.

Peggy mentioned that a federal safety fund has been set up for bridges based upon the events of September 11<sup>th</sup>. This fund may include bridges that carry utilities. Peggy will get information on the website for this fund.

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**Roadway design** – Jacobs has done some corrections in the plans since the 60% submittal. The majority of the design has been put on hold until comments are received and decisions on the roundabouts are made.

## **PROJECT ISSUES**

**Rights of Entry/ Right of Way Acquisition** – There has been no change since the last progress meeting.

**FCDMC activities** – FCDMC provided the final CAR for Sols Wash.

**ADEQ/WQARF Site activities**– Ringwood is deeding a portion of his property at the WQARF site to Underdown. The site will then all be under one owner. Survey work has been done at the WQARF site. A well site has been dug and it needs to be determined if the capacity is adequate.

## **Design Issues**

Roundabout Design/Decision on north intersection – It has been decided that design will proceed with the north roundabout. The design will be based on Alternative #1 which includes a "button hook" alignment along the Access Rd.

Borrow Source, status of cultural report/ future testing – Jacobs has received clearance from ADOT Environmental to proceed with geotechnical investigation.

Landscape nursery – Jackie Keller did a plant inventory at the borrow source location. There are several plants that are viable and could be replanted at the borrow source or used for landscaping on the project. A location for a landscape nursery needs to be established for the plants that are being salvaged. It needs to be determined if we can place the nursery in the floodplain. The advantage to having the nursery within the floodplain is that there is access to wells. The Town would be willing to donate more property near the borrow source for the use of the nursery. This additional property would need to be culturally surveyed.

Status of SHPO Meeting on Roundabout concept – The following issues will need to be worked out before a meeting with SHPO will be established:

1. The preliminary design of the north roundabout. Jacobs will have Ourston Roundabout Engineering start the design.
2. If a piece of the existing bridge needs to be incorporated into the gateway treatment, such as a girder, there is an issue with lead paint.
3. If the 1962 bridge is retained for utilities this is a change in concept from what SHPO has previously approved.
4. If a new utility/pedestrian bridge is built this is a change in concept from what SHPO has previously approved.

Utility Relocations – See Notes Above

Kerkes/ Apache cul de sac – George Wallace sent Harry Parsi an e-mail asking for some input on the location and design of the cul de sac. Jacobs will locate the cul de sac where it is least intrusive to adjacent properties.

Possibility of ending the street directly into Community Center parking lot should be considered.

Aesthetics/ Gateway Treatments – A meeting was held with Joe Salazar last week and he made some suggestions for aesthetics. Lon McDermott said that he was in favor of the idea of having an 8'-10' strip of streetscape around the outside of the south roundabout. This would push the retaining wall further from the roadway, further infringing on Community Center parking area.

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West side basin aesthetics – The Town will discuss this at the next meeting with the Wickenburg Task Force 2006.

#### **CONTRACT MODIFICATION**

Contract modification was approved by Bob Miller and is currently in ECS with Diane Miller.

#### **IGA STATUS**

The Town of Wickenburg and the ADOT Prescott District met last week and marked up some suggestions. The current version needs to be updated with these changes. Meeting scheduled Sept. 30 to discuss (since changed to Oct. 5).

#### **PROJECT SCHEDULE**

The 95% submittal is scheduled for January.

#### **OPEN DISCUSSION**

Lon McDermott supports the idea of eliminating the pedestrian undercrossing (6'x7' box culvert) at Wickenburg Way. Jacobs stated that for drainage requirements a 48" pipe would be sufficient. The Town needs to submit this request in writing to Jacobs.

The District wants a right turn lane into Monte Vista Ranch. The construction of the right turn lane will be done by ADOT and it will be paid for by Monte Vista Ranch. Jacobs will provide a separate cost estimate for Monte Vista Ranch. Jacobs will have to give ADOT Right-of-Way the requirements for new right-of-way and TCE at this location. Additional survey will be required in this area to determine impacts to drainage and driveway.

#### **NEXT MEETING**

The next monthly progress meeting will be held on October 19<sup>th</sup> at **1:30 PM** in Phoenix in the **ADOT Board Room (Room 145)** located in the north hall of the Administration Building. You will have to enter the building from the parking lot access on the south side of the building. Jacobs will look into scheduling future meetings in the afternoon of the third Tuesday if a larger conference room is consistently available.

These minutes reflect the notes taken by Jacobs Civil Inc. during the meeting. If any corrections are needed, please provide those recommendations within two weeks of receipt of these minutes.

Prepared by

#### **JACOBS CIVIL INC.**

George E. Wallace, PE  
Project Manager

Attachments:  
Sign in sheets  
Agenda

Distribution  
Team members (e-mail)

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# MEETING MINUTES



Jacobs Civil Inc.

US 93: Wickenburg Interim Bypass

Date: September 9, 2005

**LOCATION AND DATE:** ADOT, Transportation Board Room  
October 19, 2004

**PARTICIPANTS:** See attached.

**SUBJECT:** Contract No. 03-05  
US 93: Wickenburg Interim Bypass  
Project No. W7X73400  
TRACS No. 093 MA 198 H5825 01D  
Monthly Progress Meeting

## SUMMARY:

George Wallace opened the meeting at 1:30pm with attendees introducing themselves. Specific discipline issues are summarized below. Agendas were distributed and an attendance list circulated (copies attached).

## PROJECT STATUS:

**Survey and Mapping** – Jacobs requires additional survey at Monte Vista Ranch, along Wickenburg Way near the Best Western driveways, and along Apache Street.

**Geotech** – No additional information available this month. Still need right of entry to three large parcels in middle 1/3<sup>rd</sup> of project.

**Drainage** – West Consultants stated that there is a potential for downcutting downstream of the borrow pit of approximately 3'. West Consultants analyzed leaving the EB existing 1962 bridge in place, removing the 1936 bridge, and having the new Hassayampa River Bridge in place. It was determined that both the 1962 bridge and the new bridge will still pass the 50 year storm. West also looked into the shifting of thalweg and toe-down elevations established upstream of Sols Wash. Additional work from Sols to the bridge opening needs to be done. West is using Flood Control's criteria for scour. A meeting will be set up with West, Larry Doescher, Dennis Crandall, George Wallace, etc. to determine if Flood Control's criteria is too conservative. West will be turning in drainage documents within two weeks. West is making progress on the 2d model and will have it done by early November.

**Right-of-Way** – Ringwood has not signed the temporary easement. Martha Harrell stated that seven appraisals had been ordered and that the appraisals at the intersections still needed to be ordered. The last appraisals are due on December 15<sup>th</sup>. A breakdown of right-of-way costs will be provided to Larry Doescher on October 20<sup>th</sup>.

**Structures** – The Bridge Group is waiting for a final decision on the roundabout before they proceed with their 95% design. Pier column spacing on the Hassayampa River Bridge can possibly be reduced. The bank protection at the Sols Wash Bridge will have to be coordinated with the Bridge Group. A detail for the retaining wall at Sols Wash Bridge will have to be designed. George Wallace said that the retaining wall could act in lieu of a wingwall.

**Utilities** – Tom Foster stated that the 1962 Hassayampa River Bridge could cause drainage problems for the new Hassayampa River Bridge if the Town doesn't clean the debris on the 1962

bridge after a storm. The Town is amenable to taking ownership of the 1962 bridge subject to some conditions.

The consensus is that the intent is to place the utilities on the 1962 bridge.

Qwest, APS, and Southwest Gas are requesting as-builts for the 1962 bridge. Jacobs will provide the utility companies with these as-builts.

Scott Hildebrand of APS will coordinate having all the dry utility companies working together to come up with a design of how their lines will hang on the 1962 bridge. Southwest Gas will be responsible for coordinating how all the wet utilities will be hung on the bridge. Southwest Gas stated that they could place their gas line on the same hanger as the water and sewer lines if necessary.

Scott Hildebrand said that APS is no longer pursuing the longitudinal encroachment along the US 93 west embankment.

**Roadway Design** – Jacobs is currently reviewing and addressing the 60% comments.

## **PROJECT ISSUES**

**Rights of Entry/ Right of Way Acquisition** – See notes above.

**FCDMC activities** – No activity since the last meeting. The Town will be meeting with FCDMC on October 27.

**ADEQ/WQARF Site activities**– The well has been completed and tested. The work starting on the fine pile grading will probably start this week.

## **Design Issues**

Roundabout Design/Decision on north intersection – Design of the South Roundabout is almost done. The design of the North Roundabout is preliminary. Jacobs will provide LSD with electronic files of both Roundabouts so they can finish the Roundabout displays that will be presented to the SHPO. The District wants to have 2 lanes EB for the South Roundabout and therefore the Wickenburg Way right turn would yield to the traffic within the roundabout.

Borrow Source, status of cultural report/ future testing – See notes below in Open Discussion.

Landscape nursery – See notes below in Open Discussion.

Status of SHPO Meeting on Roundabout concept – When the graphics for the North Roundabout are completed a meeting with the SHPO will be set up.

Utility Relocations – See Notes Above

Aesthetics/ Gateway Treatments – LSD will be provided electronic file of north roundabout to develop graphics similar to those prepared for the south.

West side basin aesthetics – The Parks and Recreation Department favors the abandonment of River Street, which would be used as an extension of the park. It is proposed that River Street will end at Chestnut and either a cul de sac or a small parking lot would be placed at the end. It is possible that this would qualify for enhancement money, but currently there are no funds available. The basin/park is to be maintained by the Town in a separate IGA.

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Public Meeting – There is a general desire to have a public meeting on the roundabouts before a public meeting on 89 North. Tom Foster does not agree with this. Coordination with the Town needs to be done to assure that a meeting can take place in the community center.

#### **IGA STATUS**

There was a meeting in early October and several issues were discussed. George received comments from Lon. The Community Center parking was discussed. Lon wanted it to be clear that the Town did not suggest the roundabout. The Town is in favor of the roundabout, but it is ADOT's design.

#### **Contract Modification**

Jacobs will be working on a contract modification for the public meeting on the roundabouts and for the design of the right turn lane into Monte Vista Ranch.

#### **PROJECT SCHEDULE**

The 95% submittal is scheduled for the end of January. The job is expected to be advertised by the end of June.

#### **OPEN DISCUSSION**

It needs to be established in the construction phasing that the contractor will not be allowed to build the US 93 embankment while both of the existing bridges and the new bridge is in place.

The duration of the project will be approximately 16 months. ADOT could put a reasonable fixed completion date on the project.

The borrow pit will be identified as a potential soil source. ADOT would like to have contractor do the testing and be responsible for the pit. Since ADOT does not own the borrow pit property they do not want to assume the liability associated with the borrow pit. There will need to be more discussions on this topic. Sam Maroufkhani supports the concept of the Town supplying the source of material for raising the profile of US 93. The presentation of how the borrow pit information will be shown in the plans will be further discussed with ADOT management.

#### **NEXT MEETING**

The next monthly progress meeting will be held on November 16<sup>th</sup> at **9:30 AM** in the Wickenburg Town Council Chambers. A utility meeting will be held the same day in the afternoon.

These minutes reflect the notes taken by Jacobs Civil Inc. during the meeting. If any corrections are needed, please provide those recommendations within two weeks of receipt of these minutes.

Prepared by

**JACOBS CIVIL INC.**

George E. Wallace, PE  
Project Manager

Attachments:

Sign in sheets

Agenda

Distribution: Team members (e-mail)

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# MEETING MINUTES

Jacobs Civil Inc.



US 93: Wickenburg Interim Bypass

Date: September 9, 2005

**LOCATION AND DATE:** Town of Wickenburg, Council Chambers  
November 16, 2004

**PARTICIPANTS:** See attached.

**SUBJECT:** Contract No. 03-05  
US 93: Wickenburg Interim Bypass  
Project No. W7X73400  
TRACS No. 093 MA 198 H5825 01D  
Monthly Progress Meeting

## SUMMARY:

Berwyn Wilbrink opened the meeting at 9:30am, introducing himself as the new Project Manager for this design effort on behalf of Jacobs. George Wallace will no longer be participating on the project since he has moved back to ADOT as a design project manager in the Flagstaff District. Agendas were distributed and an attendance list circulated (copies attached).

## PROJECT STATUS:

In general, the project is approximately 60% complete as Jacobs is incorporating the roundabout concepts into the previously distributed 60% plans. While no formal resubmittal of the 60% package will be made, copies of the new plan sheets showing the roundabout improvements will be distributed at the December coordination meeting. In addition, Jacobs will be submitting responses to the comments received to date on the package review.

**Survey and Mapping** – While most of the survey is complete, some driveway and transition points are currently being collected at Monte Vista Ranch, the driveways along Wickenburg Way, the driveways along Tegner Street, and the north and south tie-ins of US 93. This data is expected to be completed by the end of November.

**Geotech/Materials memo** – The pavement cores along Tegner Street have been completed and have been sent to ADOT Materials Section. Roadway borings have been completed, except for 10 holes still required along Ringwood properties. An environmental clearance still needs to be done for the soil investigation at the borrow site.

Initial borings for the Hassayampa River Bridge were extracted, with data given to ADOT Bridge Group. Sieve analyses for the Hassayampa River were also completed, with the results provided to Leo Kreyborg (West Consultants). A copy will also be provided to Dennis Crandall.

The final borings for the bridge have not been completed, and were pending resolution of the final roadway/bridge configuration, and information on the scour depth. With respect to scour, Leo projected it to be 52' at the east abutment for a superflood. At pier #4, the scour is 36' for a 50 year storm and 46' for a superflood. Larry Altuna said that the pier spacing of the Hassayampa River Bridge will not change if the roundabout is adopted since the horizontal alignment across the bridge won't change. The location of the abutments also will not change, but the width of the west abutment will be different. It was concluded that the River borings could be completed with the information available, and should be started as soon as possible so that the Bridge Group can complete their plans for the 95% submittal. Ninyo & Moore will attempt to gather the geotech information in early December.

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**Drainage** – Leo Kreymborg of West Consultants has submitted the Hassayampa River Hydraulics report to ADOT (Crandall) for review. Lon McDermott said that he wanted the Flood Control District to evaluate the report as well, as they will be evaluating leaving the 1962 Hassayampa River Bridge in place since they are acting as the Town's drainage engineers. A drainage meeting needs to be set up with Leo Kreymborg, Dennis Crandall, Berwyn Wilbrink, and Larry Doescher. After issues are resolved at that meeting, a second meeting would be set up with the Flood Control District to get all issues pertaining to hydraulics to be settled as quickly as possible.

Leo stated that after their evaluation of the hydraulics, a sliver of land downstream of the Hassayampa River Bridge east abutment would have to be added to the floodplain.

**Right-of-Way** – Martha stated that they are still waiting to find out the effects that the roundabouts have on right-of-way. There are about 7-8 parcels that will be effected by the roundabouts. Jacobs Civil will send Martha final footprints of the roundabouts as soon as they become available. Jacobs will also check to see if the retaining wall at Sols Wash Bridge requires a TCE.

Lon asked who he should refer property owners to who have questions about the acquisition of their properties. Martha said that they could call her.

There was a discussion of the status of the Stotz property. Martha said that ADOT had relocated the property owners. ADOT does not yet own the property although an offer has been made to the property owners.

**Structures** – The Bridge Group is waiting for a final decision on the roundabout and whether there will be sidewalks on each side of the Hassayampa River Bridge before they proceed with their 95% design. A meeting with Regional Traffic would need to be set up to discuss how the pedestrian traffic will be handled.

**Utilities** – Jacobs will check with Peggy Havins to see if a letter from APS regarding prior rights has been received by her. APS still needs information from ADOT as to where the new US 93 alignment is in order to relocate their 69 KV line.

**Roadway Design** – The US 93 vertical alignment has been raised about 0.1' in the vicinity of the bridges to meet the requirements of the new high water elevations which were calculated based on keeping the 1962 Hassayampa River bridge. Jacobs will provide ADOT Bridge Group with the new vertical alignment profile. The Tegner Street profile has been adjusted in order to better match the hard survey points which are more accurate than the digital terrain model. Jacobs is currently waiting to receive survey information that should be available by the end of the week. After the survey information is received Jacobs will finish the design of the driveways to Best Western, the driveways to Monte Vista Ranch, and the right-turn lane into Monte Vista Ranch. Jacobs will provide a separate cost estimate for the work at Monte Vista Ranch including the right-turn lane.

## **PROJECT ISSUES**

**Rights of Entry/ Right of Way Acquisition** – See notes above.

**FCDMC activities** – No activity since the last meeting.

**ADEQ/WQARF Site activities**– A discussion needs to take place with Dennis Crandall regarding how we handle the drainage from the riprap embankment which lies on top of the WQARF site embankment slope. Ed Green will also need to be informed of the current designs near the WQARF site and of any possible issues in this area.

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## Design Issues

Roundabout Design status – Design of the plan view of the South Roundabout is almost done. The design of the North Roundabout is preliminary. Profiles have not currently been designed for either roundabout.

Borrow Source – According to Larry Doescher, Sam Maroufkhani had a discussion with Barry ????????? and they have worked out an agreement regarding the issue of referring to the borrow pit site as recommended by ADOT. Larry Doescher will verify this. Jim Skonhovd again advised that ADOT could get themselves in trouble with the contractor by suggesting a borrow pit site if the material does not meet their expectations. Jacobs Civil will be working on the environmental clearance for the borrow pit. Berwyn will coordinate this work with Laura Gerbis. Shane Dille said that ADOT claimed that they could not get their rigs into the borrow pit site and that they needed some areas to be cleared. Larry Doescher said that this was not the Town's responsibility and that he would handle the situation.

Landscape nursery –

Status of SHPO Meeting on Roundabout concept – Larry Lindner said that we need to have the public meeting to discuss the roundabout concepts prior to meeting with SHPO so that any questions or comments from the public could be evaluated. Issues that will be discussed during the SHPO meeting include the roundabouts, landscaping on Tegner Street, gateway treatments, and the retention of the 1962 Bridge. Jackie Keller said that there may not be enough space at the interpretive site to have a piece of the bridge. Larry Lindner said that if a kiosk format were to be suggested to the SHPO instead of keeping a piece of the 1962 bridge that explanations such as a lack of area would have to be given. Larry Lindner will determine how long it will take to set up a meeting with the SHPO.

Utility Relocations/ Retention of EB Bridge – See Notes Above

Kerkes/ Apache cul de sac - The Town would like to see Apache Street end after the driveway into the Community Center. Larry Doescher mentioned that there would be a change in scope for Jacobs' design requirements with the addition of the design of a parking area in the Stotz property.

Aesthetics/ Gateway Treatments – Jackie Keller presented three different concepts for the gateway treatments at the north intersection. Two of the concepts incorporated aesthetics that are similar to that of the Monte Vista Ranch area. Berwyn was concerned that the berm features shown in the concepts would require a lot of borrow material and therefore would increase the price of the project. Berwyn also had a concern about the proximity of the period lighting to the roadway. The lighting would need to be placed outside of the roadway "clear zone".

West side basin aesthetics – The Town is meeting with the Flood Control District to talk about the improvements to Coffinger Park. The plans currently do not show a TCE for this area. The current scope of ADOT's involvement would be to obliterate and seed River Street.

Public Meeting –The public meeting will include the roundabout concepts and the concept of keeping the existing 1962 Bridge. The meeting will be scheduled for December 14 from 6:00 pm to 8:00 pm at the Community Center. The Town's paper publishes public meeting announcements on Wednesdays. The Town would need to be advised of a need for a published announcement on the previous Monday of the week. A press release could also be done through the local radio station. This could be coordinated with Julie Brooks.

## IGA STATUS

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The IGA is currently being reviewed by Peggy Davis and Larry Doescher. A copy is being sent to Sam Maroufkhani. The IGA includes information that was discussed during the last JPA meeting.

### **Contract Modification**

A contract modification was submitted for the survey work that is currently being done. A discussion of a contract modification for the parking lot on Apache Street will need to be discussed.

### **PROJECT SCHEDULE**

Due to the potential implementation of the roundabouts the 95% submittal had been moved to the end of February. The 100% submittal would be made near the beginning of April.

### **OPEN DISCUSSION**

It was agreed that the project team needs to proceed as if the roundabouts will be accepted. This is required to be done in order to meet the project deadlines. The general consensus is that the roundabouts will be approved by SHPO.

Prior to the meeting with SHPO a cost estimate of the north and south gateway treatments needs to be done. The cost estimate would determine if the treatments need to be scaled back. Lon liked the idea of the south gateway and Larry Doescher agreed. Lon stated that maybe the north gateway treatment could be done at a smaller magnitude.

Larry Doescher said that more funding would need to be asked for due to increasing project costs. Right-of-way costs are of the most significant increase from an initial estimate of \$5 million to a current estimate of \$15 million. The costs of the gateway treatments could raise the amount of funds that need to be requested. Jim Skonhovd suggested coming up with a dollar amount that was acceptable for funding the gateway treatments. Larry Doescher and Rusty Gant are going to discuss the funding for the project.

### **NEXT MEETING**

The next monthly progress meeting will be held on December 21<sup>th</sup> at **1:30 PM** in the ADOT Board Room.

These minutes reflect the notes taken by Jacobs Civil Inc. during the meeting. If any corrections are needed, please provide those recommendations within two weeks of receipt of these minutes.

Prepared by

### **JACOBS CIVIL INC.**

Berwyn S. Wilbrink, PE  
Project Manager

#### Attachments:

Sign in sheets

Agenda

Distribution: Team members (e-mail)

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# MEETING MINUTES



Jacobs Civil Inc.

US 93: Wickenburg Interim Bypass

Date: September 9, 2005

**LOCATION AND DATE:** ADOT, Transportation Board Room  
December 21, 2004

**PARTICIPANTS:** See attached.

**SUBJECT:** Contract No. 03-05  
US 93: Wickenburg Interim Bypass  
Project No. W7X73400  
TRACS No. 093 MA 198 H5825 01D  
Monthly Progress Meeting

## SUMMARY:

Berwyn Wilbrink of Jacobs opened the meeting at 1:30pm. Agendas were distributed and an attendance list circulated (copies attached). Color aerial exhibits showing the north and south roundabouts, and an entire project exhibit showing the proposed roundabouts similar to those used at the Dec 14 public meeting were also distributed.

## PROJECT STATUS:

Berwyn updated the group on the public meeting held in Wickenburg on Tuesday, December 14. Jacobs gave a presentation on the implementation of roundabouts at the two project intersections as an alternative to using traffic signals. The presentation included both an ADOT video that explained how roundabouts are used in general, and specific models developed by Jacobs for both locations showing how the primary traffic movements would occur. The presentation also included general discussions on the drainage concepts, the gateway entrances, and pedestrian access at the south end of the project. Public comments were collected and are being responded to by Jacobs.

The general consensus was that the majority of the public seemed to be in support of the roundabouts. The majority of the discussion was centered on the pedestrian access. The two predominant issues were to avoid pedestrian activity at the roundabout, and avoid "tunnels" to cross under the roadway (an existing box culvert is used under Wickenburg Way elsewhere in town, and the site is not well used). The gateway concepts appeared well accepted.

**Survey and Mapping** – The survey requested by Jacobs for Monte Vista Ranch, and the driveways along Tegner Street and Wickenburg Way is complete.

To complete the flood plain analysis around the Sols Wash and Hassayampa floodways, the Flood Control District will supply West Consultants with a DTM of the area south of Wickenburg Way and west of the Hassayampa River. This survey was recently developed for the FCD and should be sufficient for the modeling effort.

**Geotech/Materials Memo** – Ninyo and Moore are still working on the bridge borings. There has been a delay due to down time with their drill rig. Other geotech companies are being used to complete the rock borings, and should be initiated the first week of January. With the effort completed thus far, the rock in the river was found to be "softer" than originally anticipated, resulting in deeper foundation/pier borings.

Larry Altuna said that ADOT Bridge Group could proceed with their structure design, but they need the boring information by the end of January to be able to meet the 95% submittal date.

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Geotech access has now been granted for the Ringwood properties. ADOT Right-of-Way has faxed copies of the agreement to Ninyo and Moore. The borings on the Ringwood property should be completed next week, as they are not completed with the same equipment as the bridge borings. John Niedzielski of Ninyo and Moore requested an aerial plot showing the locations of the borings that are still required to aide in locating the sites.

Additional borings will not be required due to the use of roundabouts, as the general alignment and area covered by the original intersections are sufficient for the geotechnical design.

ADOT will test the potential borrow pit site after all environmental clearances have been processed. The cultural survey for the borrow pit has been completed. The biological survey is still pending. The biologist has completed the field work, but his report has not been sent to Jacobs. It is anticipated that the biological survey will be completed in early January.

Pavement structural sections cannot be finalized until R values are received for the material being used for the roadway embankment. Ninyo and Moore can provide ADOT Materials Section with soil information that could help in determining R values for the roadway embankment material. While ADOT Geotech had some reservations on making recommendations without an understanding of where the embankment material was coming from, they were encouraged to make educated assumptions based on past projects in the area and nearby sources as there was no guarantee that the contractor will be using the possible pit site. Like most of ADOT's projects of late, no designated source will be provided.

Jim Skonhovd discussed not showing the borrow pit information in the plans. The information will be made available to the contractor by the Town of Wickenburg. If the contractor wishes to use a site other than the one cleared by ADOT, the contractor must realize that the process of getting clearance through the Department of Agriculture takes approximately 60 days. No matter what site they use, the contractor will be held responsible for meeting state, federal and town requirements for the erosion control and revegetation of the borrow pit. The conceptual plans for using the Town's sight will be made available to the contractor through the town, and not as part of the project plans.

**Drainage** – An issue on the Hassayampa River that has yet to be resolved is whether the 1962 bridge can remain in place as a utility/pedestrian bridge. The Flood Control District of Maricopa County is currently reviewing the methods that West Consultants used to model the 1962 bridge. FCDMC is going to determine if the energy grade line should be used versus the water surface elevation and will have an answer within a few weeks. If it is determined that the energy grade line is the controlling elevation, then the bridge will need to be raised.

The Town of Wickenburg acts as their own floodplain and drainage administrators. Therefore all floodplain information should be submitted to the Town. FCDMC will likely provide a courtesy review of the information on behalf on the Town. After the Town's approval of the information, it will be forwarded to FEMA.

The ultimate plan for the interim bypass is to have US 93 act as a levy for a 100 year flood event, which would protect the properties west of US 93 from flooding of the Hassayampa River. If constructed as a solid section, the new embankment causes the water surface elevation created by a Sols Wash 100 year storm to rise behind the embankment. This would negatively impact properties that are currently outside of the proposed ADOT right-of-way. As the State does not wish to impact these upstream properties, the following are being evaluated for mitigating this impact:

1. Continue with the current design incorporating a superbox structure at Sols Wash and a channel on the west roadway embankment. ADOT would purchase the property to mitigate the damages of the higher water surface during the 100-year event.
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2. Improvements along Sols Wash proposed by the FCDMC (additional channelization and bank protection or levees) would create protection from a Sols Wash 100 year storm event. To install these improvements concurrent with the Interim Bypass Project, ADOT would have to help with funding of those improvements.
3. ADOT will place culverts through the roadway embankment to alleviate impacts to properties. These crossings would allow the water that currently crosses over these properties to pass under the embankment. ADOT would be responsible to acquire either an easement, or the property of a few parcels that would still be negatively impacted by the 100 year event. After FCDMC finished the Sols Wash improvements the culverts would be blocked/plugged, providing for 100 year protection from a Hassayampa River event.

As a fourth alternative, Jacobs provided West Consultants with a modified 3D model of Sols Wash, regarding the wash to create a wider waterway. During the meeting it was agreed that regrading Sols Wash would present 4(f) issues and other mitigation issues, and was therefore not considered a viable option.

Shane Dille of the Town stated that he would rather see the money spent on the new R/W, installing the culverts, and the plugging of the culverts be used towards FCDMC's improvements of Sols Wash. ADOT would only provide this compensation if they were indemnified from any responsibility for adversely effecting properties should a flood event occur. The Town and ADOT will set up a meeting to discuss if this would be a possibility.

**Right-of-Way** Jacobs will provide Martha Harrell with an estimate of the limits of the flood effected properties proposed in Option 3 above, and will also provide the final footprints of the roundabouts. Discussions of total takes in addition to these project requirements will be completed to determine if access points to smaller parcels is necessary.

The District has requested that a full, additional right-turn lane be made to the Monte Vista Ranch property. As a result, Lon McDermott stated that Monte Vista Ranch has been told to move their entrance previously agreed to by ADOT. The owners of the Monte Vista Ranch entrance should contact ADOT District Permits if they have any questions regarding this issue, but the final location is still being negotiated with the District.

Shane Dille requested that the right-of-way limits within the community center parking lot be identified. Berwyn said that Jacobs would paint the limits on the parking lot pavement.

In addition, it appears the property at the southeast corner of the Hassayampa River Bridge will need to be purchased if the existing bridge is retained for utility purposes, as it impacts the water surface elevation of the design flood event.

**Structures** – ADOT Bridge Group has not received the final geometry for the bridges. While the geometry for the Sols Wash Bridge will not change from that shown in the 60% plans, the revised geometry showing the roundabouts will be provided the first week of January.

It has not been decided if there will be sidewalk on the Hassayampa River Bridge. Pedestrian traffic accessing the south side of the improvements will continue to use the "old bridge". To provide access to these walking on the north side of the roadway, the following options have been developed for pedestrian traffic that travels from the east side of the river to the west:

1. Provide sidewalk on the north side of the new bridge. Pedestrians would cross US 93 on the northwest portion of the roundabout. Many people expressed concern at the public meeting about encouraging pedestrians to cross at the roundabout. People were most concerned about crossing the higher speed bypass lane. The roundabout designers have also expressed this same concern.
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2. Provide an ADA compliant sidewalk that goes under the new Hassayampa River Bridge and the existing 1962 bridge. Pedestrians would cross the river over the 1962 bridge. The Town was not in favor of this option, as they have a history of pedestrians not using a tunneled crossing. While this crossing is not a tunnel, the remote and "hidden" nature of the crossing under the existing roadway would still discourage some from using it.
3. Provide a pedestrian crossing on the east approach slab of the proposed new bridge, and have flashing lights approaching the crossing to alert drivers on US 93 that there is a pedestrian crossing. ADOT District opposes this option as this type of crossing may constitute a mid-block crossing, and ADOT would have liability issues.

Jacobs will set up a meeting with the District and ADOT Management to resolve the sidewalk issue.

The 60% design did not include AR-ACFC on top of the bridges. As the Prescott District typically requests that all bridges have the wearing course applied to the final structures, Jacobs inquired if this should occur on these two bridges as well. It was suggested that AR-ACFC be considered for the surface of the bridges, but to coordinate the discussion with Materials, Bridge, and the District following the meeting.

**Utilities** – If FCDMC decides that the drainage modeling for the 1962 bridge is incorrect, then the bridge will need to be raised. ADOT will continue to evaluate how to resolve this utility crossing, but that the utilities should continue to assume using a bridge crossing at the '62 bridge alignment. The crossing will either be the current structure, a raised existing structure, or a new utility structure on this alignment.

Qwest will have to move facilities that are parallel to Tegner Street which will be covered by the proposed Tegner Street widening and new sidewalk. Qwest is determining whether they have prior rights at this location.

**Roadway Design** – Roadway design will proceed now that survey data has been received. Roundabout geometrics should be finalized soon.

## PROJECT ISSUES

**ADEQ/WQARF Site Activities** – No outstanding issues

### Design Issues

Roundabout Design status – SHPO compliance is still required for the roundabouts. Larry Lindner said that he can get started on a letter that will be sent to SHPO. If SHPO does not agree with the letter then a meeting will need to be set up between ADOT and SHPO.

The use of PCCP or asphalt in the roundabouts needs to be determined. A discussion between Jacobs, the District, and ADOT Materials Section will determine which surface will be used.

Landscape nursery – The general consensus of the meeting attendees was that a designated nursery was not required and that it would not be shown in the plans as the volume of salvaged plants is negligible. If the contractor ops to use the Town's material source, they will need to develop a way to salvage and re-use the plants from that site.

Logan Simpson Design will inventory the plants at the potential borrow pit to determine how many plants could be relocated in the gateway areas.

LSD requested that Jacobs identify the limits of the borrow pit in the field since the area is very dense with vegetation.

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Kerkes/ Apache cul de sac – Jacobs developed initial concepts for the parking areas on the Stotz property. These concepts will be discussed further with the Town.

Aesthetics/ Gateway Treatments – Basic landscaping will be done in the middle of the roundabouts. If the Town wants to have a sculpture or other “non-roadway” elements in the middle of the roundabout there will need to be a discussion with ADOT regarding right-of-way and maintenance.

LSD will create a 3d concept of the wishing well area.

The Town, ADOT, and LSD will need to set up a meeting to determine the north gateway treatments. The previous concepts created by LSD were considered too expensive, and are not the responsibility of ADOT. LSD has developed some less expensive alternatives for the Town to evaluate and consider implementing.

West side basin aesthetics – The west basin will be seeded with a standard ADOT rural seed mix.

#### **IGA STATUS**

The IGA is currently under review, but it does not include the roundabouts. Further changes will need to be made to include the roundabouts.

#### **PROJECT SCHEDULE**

The 95% submittal is scheduled for the end of February.

#### **OPEN DISCUSSION**

The meeting was deemed long enough and all participants were too tired to talk anymore!

#### **NEXT MEETING**

The next monthly progress meeting will be held on January 18<sup>th</sup> at the ADOT Transportation Board Room at 1:30 pm.

These minutes reflect the notes taken by Jacobs Civil Inc. during the meeting. If any corrections are needed, please provide those recommendations within two weeks of receipt of these minutes.

Prepared by

#### **JACOBS CIVIL INC.**

Berwyn S. Wilbrink, PE  
Project Manager

#### **Attachments:**

Sign in sheets

Agenda

Distribution: Team members (e-mail)

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# MEETING MINUTES



Jacobs Civil Inc.

US 93: Wickenburg Interim Bypass

Date: September 9, 2005

**LOCATION AND DATE:** ADOT, Transportation Board Room  
January 18, 2005

**PARTICIPANTS:** See attached.

**SUBJECT:** Contract No. 03-05  
US 93: Wickenburg Interim Bypass  
Project No. W7X73400  
TRACS No. 093 MA 198 H5825 01D  
Monthly Progress Meeting

## SUMMARY:

Berwyn Wilbrink of Jacobs opened the meeting at 1:30pm. Agendas were distributed and an attendance list circulated (copies attached). Berwyn discussed the several issues that were resolved during the January 3<sup>rd</sup> meeting with ADOT management. These issues included:

### 1) Drainage

As a result of creating a 2D drainage model of the area north of Sols Wash, west of the Hassayampa, and east of Tegner, it was concluded that construction of the embankment for the new US 93 roadway would result in higher backwater elevations onto private property than without any roadway improvement. To mitigate for this, two options were ultimately proposed:

1. Flood Control District's improvements of Sols Wash and Hospital Wash would need to occur in advance of the Wickenburg Interim Bypass project to contain this drainage.
2. Several box culverts would need to be constructed under the US 93 roadway embankment. The box culverts would later be sealed when the Flood Control District's Sols Wash and Hospital Wash improvement project was completed.

Lon McDermott indicated that he had spoken with FCD in the morning and that they were exploring the opportunity of constructing the Sols Wash improvement project simultaneously with the Wickenburg Interim Bypass project. The FCD needs to be sent information on ADOT's construction schedule in order to make a decision on whether they can meet this schedule with the Sols Wash improvement project.

Unless the FCD can construct their needed improvements in conjunction with the ADOT work, the box culvert manifold would be necessary to protect ADOT from liability.

### 2) Disposition of the 1962 River Bridge

West Consultants provided their evaluation of the river hydraulics and the effects of leaving the 62 bridge in place to the FCD for review. The FCD will give their comments on the recommendations by January 21.

If it is concluded that the bridge must be above the hydraulic energy grade line, the bridge may need to be raised approximately 2 to 2.5 feet. It would still be used for utilities and pedestrian access for the town in either event.

### 3) Pedestrian Sidewalk

In lieu of constructing a pedestrian crossing within the roundabout, a grade separated crossing will be constructed under the east end of the new and existing bridges. The proposed sidewalk will cross the highway under the new Hassayampa River bridge and the 1962 bridge along the east embankment, providing an 8-ft sidewalk with 8-ft of clearance and would be above the 10-year hydraulic event of the river. The sidewalk has a switchback on the south side of the 1962 bridge to exceed ADA requirements for grade throughout.

### 4) AR-ACFC

AR-ACFC will be placed on the entire project including the bridges. Both the north and the south roundabout will have PCCP structural sections with AR-ACFC overlays.

### 5) Material Source

The Town has provided a site for the contractor to extract material for embankment borrow. After much discussion, it was concluded that the site will be made available to the contractors for use, but will not be tested by ADOT for the quality or analysis of the material. ADOT will clear the site environmentally so no delays will be experienced if the contractor should propose to use it. The trees at the borrow pit site are very dense, therefore the clearing and grubbing effort on this site will be significant. In addition to providing the necessary erosion and flood control requirements for building the borrow pit, the contractor would need to restore the site to the town's specifications. Information will be provided for the contractor that includes regulations on erosion control and landscaping.

### 6) Lighting

The Town has asked for lighting along Tegner Street from the existing subdivisions north of the Sols Wash to the new intersection of US 93. This will be discussed during the next JPA meeting.

### 7) Parking

The new parking lot will not be shown as part of the Wickenburg Interim Bypass plans. The parking lot will be part of a cost to cure agreement provided by ADOT to the Town to compensate for the lost parking.

### 8) Apache Street

Apache Street will be terminated after the community center driveway. The Town has expressed that they do not want a cul de sac at the end of Apache Street and that the driveway into the community center is adequate to allow emergency vehicles to turn around. For the purposes of our plans, the pavement on Apache will be removed, and the drainage collected from the street directed to the inlet of the pipe culvert proposed to drain the area.

### 9) Slip Ramp at North Roundabout

The slip ramp was requested at the north roundabout to allow SB US 93 traffic to freely flow onto Tegner. After review of the traffic operations, there was a concern over problems that may occur due to the weaving movements required by drivers going into the Monte Vista Ranch turnout. After much discussion internally and externally with the design team and ADOT management, it was concluded that the safest configuration was

to retain a single lane from the roundabout that transitions to either a through lane or a right turn lane into Monte Vista Ranch.

### **SURVEY & MAPPING**

West Consultants requires additional mapping of areas beyond the current mapping. This will be provided to them by FCD as a result of recent area mapping collected for a drainage study.

### **GEOTECH/MATERIALS**

Borings for the Hassayampa River bridge are in progress. Not having access to pier #1 and pier #2 due to rain and heavy river runoff, borings at these locations have been delayed. The depth to rock in the river is at approximately 50' to 70'. Arrangements have been made to drill on the Ringwood property and the borings should be done this week.

Ninyo and Moore will send a preliminary report to ADOT Bridge Group once the information is available. They will also send boring information gathered from the Hassayampa River to ADOT Materials Section.

PCCP will be used as part of the structural section for both roundabouts and will be overlaid with AR-ACFC.

### **DRAINAGE**

Seven double barrel 6'x10' box culverts are required under the US 93 embankment north of Sols Wash to mitigate damage that could be caused by a Sols Wash event. The current floodway is not adequate and will be widened. Leo Kreymborg asked if it would be allowable to plug only the upstream end of the box culverts. This would allow the US 93 roadway catch basins to utilize the box culverts instead of requiring separate pipes. As these facilities may not be constructed pending FCD efforts in Sols Wash, no other roadway elements will tie into these structures.

Jacobs will check if there is a cost savings for using box culverts that are 5' in height instead of 6'. The 5'x10' box culverts would meet drainage requirements. The 6' tall box culverts are typically required by ADOT for maintenance purposes, but it is believed that these culverts would not be in use long enough to justify a higher initial cost.

### **RIGHT-OF-WAY**

ADOT Right-of-Way will provide Jacobs with locations of total takes. Jacobs has proceeded with design assuming that the first two properties on the Access Road will be total takes and no driveways will be designed for those properties. Martha Harrell said that the third property will probably be a total take as well.

### **STRUCTURES**

ADOT Bridge Design has given Jacobs the current wingwall design for the Sols Wash Bridge. There may need to be some coordination with Jacobs on the design of soil cement in conjunction with the wingwalls.

ADOT Bridge Design will not be able to meet a 95% submittal date by the end of February. If they receive the geotechnical information soon they will be able to be done with 95% bridge plans by the end of March. An incomplete set of bridge plans could be turned in at the end of February with the roadway plans to provide a basis for the 95% cost estimate.

## **UTILITIES**

Jacobs requires the horizontal relocations of the utilities by the second week in February. Qwest is going to submit prior rights information along Tegner Street to Peggy Havins. Paul Balch and Berwyn Wilbrink will talk to Peggy Havins regarding the costs of utility relocations. There will be discussions about the sewer relocation in the Community Center parking lot at the next JPA meeting.

## **ROADWAY DESIGN**

Jacobs will be receiving the signing and marking design for both roundabouts from Leif Ourston (the roundabout consultant). Jacobs does not recommend adding a bypass lane at the north roundabout for traffic traveling from southbound US 93 to Tegner Street. There is a concern that the weaving movements along Tegner Street could create traffic and safety problems since the turnout to Monte Vista Ranch is only 500 feet from the roundabout.

The current concept of the sidewalk path is being incorporated in the roadway plans (see notes above on Pedestrian Sidewalk).

Tom Foster expressed that he would rather have barrier wall attached to the ends of the bridges instead of guardrail, however, from an aesthetics standpoint, the town would rather have W-rail using weathered steel. The design will be discussed with the Town as either solution provides the necessary protection to both the vehicles and pedestrians.

## **ENVIRONMENTAL**

ADOT Environmental Planning will initiate a consultation with SHPO. A letter is currently being drafted to send to SHPO.

The CE for the borrow pit is progressing. The biology field work is complete and agency coordination has been initiated. The CE along Tegner Street has not been started because the scope of work has not been resolved. Lighting along Tegner Street is one issue that has yet to be resolved.

## **LANDSCAPE/AESTHETICS**

To finish the design of the gateways Logan Simpson Design needs a determination by SHPO as to whether a portion of the 1936 bridge needs to be retained. LSD also needs to know if the 1962 bridge will be raised before they can finish the design of the south gateway. A meeting will be set up to determine the extent of landscaping required on Tegner Street.

## **IGA STATUS**

An IGA meeting will be scheduled for the end of January or the beginning of February.

## **PROJECT SCHEDULE**

The 95% submittal is scheduled for the end of February.

## **OPEN DISCUSSION**

Laura Gerbis recommended sending a mailer to the public to explain the changes that have been adopted for the 95% submittal since the public meeting that was held to discuss roundabouts.

**NEXT MEETING**

The next monthly progress meeting will be held on February 15<sup>th</sup> in the Wickenburg Town Council Chambers at 9:30 am.

These minutes reflect the notes taken by Jacobs Civil Inc. during the meeting. If any corrections are needed, please provide those recommendations within two weeks of receipt of these minutes.

Prepared by

**JACOBS CIVIL INC.**

Berwyn S. Wilbrink, PE  
Project Manager

Attachments:

Sign in sheets

Agenda

Distribution: Team members (e-mail)

**MEETING MINUTES**

Jacobs Civil Inc.

US 93: Wickenburg Interim Bypass

Date: September 9, 2005

**LOCATION AND DATE:** Wickenburg Town Council Chambers  
February 15, 2005

**PARTICIPANTS:** See attached.

**SUBJECT:** Contract No. 03-05  
US 93: Wickenburg Interim Bypass  
Project No. W7X73400  
TRACS No. 093 MA 198 H5825 01D  
Monthly Progress Meeting

**SUMMARY:**

Berwyn Wilbrink of Jacobs opened the meeting at 1:30pm. Agendas were distributed and an attendance list circulated (copies attached). Current plan sheets were passed out to meeting participants. Berwyn updated the group about the progress of the 90% plans. Plans, quantities, and estimate will be completed by the end of the month. The bridge plans will not be at a 90% level because of the delay in receiving geotechnical information. Preliminary design for the raising of the existing 1962 Hassayampa River Bridge will be included in the next submittal. Erosion control will be included in the 90% plans. There will also be work associated with the relocated utilities after the 90% submittal.

**GEOTECH/MATERIALS**

The borings on the Ringwood property have been completed and the lab work will be performed within the week.

Most of the borings have been performed at the Hassayampa River Bridge. Access was not available to pier #1 and pier #2 due to flows in the river. One boring at pier #1 and two borings at pier #2 still need to be performed.

At the north end of the west abutment there was an 18' depth to rock and at the south end of the west abutment there was a 70' depth to rock.

Ninyo & Moore are currently working on foundation reports. The reports will be completed next week, but will be lacking the three borings that have not been performed yet.

The surface water elevation was found to be at 2036 which is approximately 13'-14' below the existing surface.

West Consultants will send Ninyo & Moore information on new scour depths for the east abutment.

ADOT Materials Section requested that we use a structural section 7" AC over 8" AB on US 93. The AC will be ¾" mix and will be placed in three lifts. The structural section used for the roundabouts will be 12" PCCP on 4" AB. There will be no AR-ACFC used on Tegner Street. The mill and overlay on Tegner Street will consist of milling the pavement 2" and replacing it with 2" of AR-AC. ADOT Materials Section will investigate the possibility of using a 1" AR-ACFC overlay instead of a ½" overlay over the PCCP on the bridges and the roundabouts.

The joint layout for the roundabouts should not conflict with the roadway striping.

## **DRAINAGE**

Flood Control District will be making improvements to Sols Wash. The schedule for this work has yet to be determined. The 90% plans will not show the pipe manifolds with the assumption that the Flood Control District project will be done in conjunction with the Wickenburg Interim Bypass project. All catch basin inlets will be designed and shown on the 90% plans.

Leo Kreymborg said that the 1962 bridge will be raised 2.5' to be above the EGL. There will be more than 2' of freeboard for the 100 year storm at the low point of the Hassayampa River Bridge. West Consultants will evaluate the minimum requirements for freeboard according to FEMA.

Jacobs is currently designing inlets at the sag points of the roundabouts and the inlet locations will be included in the 90% plan submittal.

## **RIGHT-OF-WAY**

The house downstream of the existing Hassayampa River Bridges will be taken.

Eight appraisals still need to be done and these appraisals are about 60 days out.

## **STRUCTURES**

The design of the structures will not be up to a 90% level for the next submittal.

Jacobs will provide sheets that will show the 1962 Hassayampa River Bridge being raised in the 90% plans. The railing on the north side of the 1962 bridge will be designed to meet pedestrian safety requirements. The rail on the north side of the 1936 bridge may be used as pedestrian railing for the 1962 bridge.

Larry Altuna said that the ADOT standards for the length of barrier transition walls are 19', but the wingwalls for the Sols Wash Bridge are only 15' long. Aryan Lirange will evaluate the detail of the barrier transitions for the Sols Wash Bridge.

ADOT Bridge Group will need to be given the locations of the lighting for the bridge. The lighting on the 1962 bridge will remain. Shane Dille asked if there was a possibility of turning the existing 1962 bridge lighting 90 degrees so there would be better lighting. Electrical boxes, transformers, and conduits may need to be placed on the 1962 bridge. Jacobs will evaluate the possibility of placing a 2" conduit (for lighting) through the new Hassayampa River Bridge barrier.

Jacobs gave Larry Altuna an updated drawing of the location of the overhead sign structure. The 17 degree skew for the sign structure on the Hassayampa River Bridge may not be allowable.

It was noted that a catch basin is located near the joint of the Hassayampa River Bridge. Jacobs will evaluate the location of the catch basin.

## **UTILITIES**

The proposed relocations of the utilities will be shown in the 90% plans. Utility drawings are currently being created that will show relocations and removals of existing utilities.

The manhole on Wickenburg Way needs to be adjusted to the elevation of the new sidewalk.

## **ROADWAY DESIGN**

Half barrier will be used between the Hassayampa River Bridge and the Sols Wash Bridge instead of guardrail. There will be guardrail on both sides of US 60 on the east side of the Hassayampa River Bridge.

Details for the staking diagrams and the joints details for the roundabouts have been completed. The issue of discrepancies between striping and the joint details for the roundabout was discussed. This issue is not a concern since the finished surface will be AR-ACFC and the joints will not be seen.

The design of the sidewalk pathway under the new Hassayampa River Bridge and the existing 1962 bridge will not be complete for the 90% submittal. Additional design will need to be performed to avoid an impact to the existing sheet pile wall under the existing bridges.

Lighting locations have been determined, but a meeting with SHPO still needs to occur. The type of lights will be determined. Lighting plans will not be included in the 90% submittal.

Tourist signs will not be included on the project. The Town has suggested that signs that signify a historic district should be placed on the new Hassayampa River Bridge. Aryan Lirange will find out about registering for Historic Downtown Wickenburg signs.

## **ENVIRONMENTAL**

A clearance checklist for the materials source has been sent to Larry Lindner. Jacobs is not aware of any issues regarding the materials source.

The NEPA re-evaluation memo has proceeded. A draft letter for SHPO consultation has been sent to Larry Lindner. The letter should be resubmitted soon. Larry Lindner is requesting graphics from Logan Simpson Design.

There is additional cultural survey being performed on the North Roundabout and will be completed by the end of the week. The report will be completed in about 2 weeks.

## **LANDSCAPE/AESTHETICS**

Wayne Colebank displayed several aesthetic concepts.

The costs for landscaping the South Roundabout are approximately \$400,000. This cost doesn't include lighting on the 1962 bridge.

The Town's committee will take a look at the Logan Simpson Design concepts tomorrow.

Jacobs is awaiting a decision from Flood Control District on the Sols Wash improvements before giving the public any more information about the project.

Impacts of 401 and 404 permits will have to be evaluated.

## **IGA STATUS**

The IGA is currently under review.

## **PROJECT SCHEDULE**

The 90% submittal will be made in the beginning of March.

## **NEXT MEETING**

The next monthly progress meeting will be held on April 19<sup>th</sup> at the ADOT Transportation Board Room at 1:30 pm.

These minutes reflect the notes taken by Jacobs Civil Inc. during the meeting. If any corrections are needed, please provide those recommendations within two weeks of receipt of these minutes.

Prepared by

**JACOBS CIVIL INC.**

Berwyn S. Wilbrink, PE  
Project Manager

### Attachments:

Sign in sheets

Agenda

Distribution: Team members (e-mail)

**MEETING MINUTES**

Jacobs Civil Inc.

US 93: Wickenburg Interim Bypass

Date: September 9, 2005

**LOCATION AND DATE:** ADOT, Transportation Board Room  
April 19, 2005

**PARTICIPANTS:** See attached.

**SUBJECT:** Contract No. 03-05  
US 93: Wickenburg Interim Bypass  
Project No. W7X73400  
TRACS No. 093 MA 198 H5825 01D  
Monthly Progress Meeting

**SUMMARY:**

Berwyn Wilbrink of Jacobs opened the meeting at 1:30pm. Agendas were distributed and an attendance list circulated (copies attached). Exhibits of the current design with the aerial image and the initial responses to 90% review comments were distributed. Berwyn explained the format used for the initial responses to the 90% comments. The group was informed that the 90% submittal only included the plan set.

As part of the 95% submittal, Jacobs will incorporate the 90% review comments and submit the specifications, estimate, and plans. Berwyn gave an update from the meeting between Jacobs, the Town of Wickenburg, and the Flood Control District of Maricopa County held prior to the monthly review meeting. Based on the discussions in that meeting it was determined that the Wickenburg Interim Bypass project bid advertisement will probably be delayed by a year. FCD needs time to complete a design concept, hold public meetings, acquire property, initiate final design, and advertise the Sols Wash Improvement Project. The Wickenburg Interim Bypass project needs to be advertised by the end of the next fiscal year. Next year the design progress of the Sols Wash Improvement project will be evaluated to determine if it has been developed adequately for the Wickenburg Interim Bypass project to proceed. If necessary the bid advertisement for the Wickenburg Interim Bypass project will be postponed to allow FCD to finish their plans. There will need to be coordination between the Sols Wash Improvement project and the Wickenburg Interim Bypass project in the vicinity of the Sols Wash Bridge to ensure that the two projects are consistent. The construction of the soil cement and roadway embankment for US 93 will need to be coordinated with the FCD Sols Wash Improvements project to avoid flooding issues during construction. The construction sequencing and the roadway improvements shown in the 90% plans will not be affected by the Sols Wash Improvement project.

A meeting will be scheduled between Jacobs, Jim Skonhovd, and Sam Maroufkhani to discuss the construction schedule that was included in the 90% submittal.

The 95% submittal is scheduled for the end of May or the beginning of June 2005. The project will then be shelved for about a year.

**GEOTECH/MATERIALS**

The draft geotechnical report has been completed and the roadway borings are included in the report. Ninyo & Moore recommend overexcavation in the vicinity of US 93 station 163+45, the north roundabout, and at Sols Wash Bridge.

Ninyo & Moore has not completed three borings for the new bridge footings in the Hassayampa River due to issues with accessibility while the river is flowing.

FCD has requested a copy of the draft geotechnical report. ADOT Materials Group has received the draft geotechnical report from Ninyo & Moore and can proceed with the materials memo.

The shrink factor is unknown for the Town's borrow pit site. The borrow pit will be made available to the contractor, but will not be shown in the plans. The contractor will be required to do the geotechnical testing of the materials at the borrow pit site. It has been determined that the Town's borrow pit site has enough material to construct the project. There is approximately 375,000 cubic yards of borrow required for the project and the borrow pit site will supply approximately 450,000 cubic yards of material.

ADOT Bridge Group has requested another boring at the west abutment of the Hassayampa River Bridge. The difference in depth to bedrock between the 2 borings at the west abutment is approximately 50'. Ninyo & Moore will drill another boring at the middle of the abutment between the two borings that have been completed.

## **DRAINAGE**

There are two issues that have been impeding the progress of finishing the CLOMR.

- 1.) West Consultants requires the updated design of the sidewalk under the Hassayampa River Bridge. Jacobs will provide West Consultants with this information within the next 2 weeks.
- 2.) The bank height and location of the future Sols Wash improvements are not known. It was decided that this information was not necessary to complete the CLOMR for this project. A separate CLOMR will be developed by FCD for the Sols Wash Improvement project. The floodplain delineation for the Wickenburg Interim Bypass project will stop at the Sols Wash Bridge. It will be noted to refer to the FCD CLOMR for the Sols Wash improvements.

## **RIGHT-OF-WAY**

The current status of right-of-way acquisitions: 6 closes of escrows, 5 appraisals are being developed based on the roundabout design, 6 appraisals are under review, and 2 properties are going to condemnation. There are 41 parcels (including TCE's) that are being affected.

## **STRUCTURES**

Due to collapsible materials in Sols Wash, Ninyo & Moore has recommended that there be 3' of overexcavation for the Sols Wash Bridge abutment foundations.

CK Engineering (Jacobs' lighting subconsultant) will provide ADOT Bridge Group with the locations of lights and conduits on the new Hassayampa River Bridge. Logan Simpson Design will coordinate the aesthetics of the lights with CK Engineering.

ADOT Bridge Group should not be affected by the redesign of the sidewalk under the Hassayampa River Bridge. The alignment of the sidewalk will change from that shown in the 90% plans, but the location of this change will be under the existing Hassayampa River Bridges and not the new bridge.

The 90% plans included a new overhead sign on the Hassayampa River Bridge that is 324 square feet in surface area. The tubular frame sign structure supports for that sign are too large to be supported at the edge of the deck/barriers. If the overhead sign can be reduced to 200

square feet, a tapered tube sign structure can be used. A meeting will be initiated with ADOT Traffic Group to determine whether the size of the overhead sign can be reduced.

The Hassayampa River Bridge will be painted on the outside face of the bridge. Jackie Keller will work with Lon McDermott and Shane Dille to determine a color for the bridge.

The cross slope of the sidewalk south of Sols Wash Bridge will transition behind the curb and gutter to match the sidewalk on the Sols Wash Bridge. The height of the sidewalk will transition 6" in elevation through the approach slab to match the Sols Wash Bridge sidewalk.

The Town of Wickenburg was concerned about structures that remain on the properties acquired by the State. The issue is that these structures would be an attraction to transients and for graffiti. The time frame is 90 days for the structures to be removed once the State has taken possession of the property. There is an additional 30 days if there are tenants occupying the property.

## **UTILITIES**

Paul Balch gave an update from the utility coordination held on April 7 meeting. Jacobs has been coordinating the relocation of the existing utilities to the raised 1962 bridge with the utility companies and the Town of Wickenburg. A project construction schedule and a preliminary layout for the relocated utilities through the existing Hassayampa River Bridge have been distributed to the utility companies.

The 1962 Hassayampa River Bridge will be raised 2 feet for hydrologic reasons. Once the 1962 bridge is raised, all the utilities can be relocated from the 1936 bridge. The 1936 bridge will then be demolished except for the abutments. Traffic will be on the new Hassayampa River Bridge for those phases of construction.

Jacobs will be responsible for the structural design required to reinforce and raise the 1962 bridge, which includes providing the sleeves and conduit needed to punch through the east and west abutments for new utilities. The roadway construction contractor will also be responsible for hanging the empty duct banks, conduit, and sleeves below the bridge once it has been raised.

As part of the utility agreements, each utility company will be responsible for reimbursing the duct bank or sleeve installation cost as none of the utility companies have prior rights. The special provisions will provide a window of time for each utility company to install the new conduit or pipe and reconnect to existing facilities.

The existing utilities on the 1936 bridge only need to be relocated once to their final location on the 1962 bridge. The existing sewer line and water line on the 1962 bridge will need to be temporarily relocated to the 1936 bridge to allow for the 1962 bridge to be raised. Those utilities will then be permanently relocated back on the 1962 bridge after the bridge is raised.

The Town requested a sleeve to accommodate a future 12" water line under Tegner Street near the North Roundabout.

## **ROADWAY DESIGN**

The majority of the roadway design and details are done for the project. Based on a review comment from the FHWA, the roundabout subconsultants will look at the entry paths for the roundabouts to determine if there is any safety concerns.

There will be one type of handrail utilized on the project. The aesthetic design of the handrail has yet to be determined.

## **ENVIRONMENTAL**

There have been no changes since the last progress meeting.

The potential borrow pit site has been environmentally cleared culturally. The biological clearance is pending coordination with Arizona Game and Fish.

A draft letter has been prepared to submit to SHPO, but ADOT Environmental Group is waiting for the IGA to be signed between ADOT and the Town of Wickenburg before proceeding. The draft letter will be sent to SHPO soon.

## **LANDSCAPE/AESTHETICS**

Logan Simpson Design will hold off on their final design of the gateway treatments until after SHPO has reviewed the concepts.

## **IGA STATUS**

There are a few minor revisions required, but the IGA is expected to be completed and signed soon.

## **PROJECT SCHEDULE**

The 95% submittal is scheduled for the end of May or the beginning of June 2005. The project will then be delayed for about a year during which time the FCD will complete the design of the Sols Wash improvements.

## **NEXT MEETING**

The next monthly progress meeting will be held on May 17<sup>th</sup> at the Wickenburg Town Council Chambers at 9:30 am.

These minutes reflect the notes taken by Jacobs Civil Inc. during the meeting. If any corrections are needed, please provide those recommendations within two weeks of receipt of these minutes.

Prepared by

**JACOBS CIVIL INC.**

Berwyn S. Wilbrink, PE  
Project Manager

### Attachments:

Sign in sheets

Agenda

Distribution: Team members (e-mail)

**MEETING MINUTES****Jacobs Civil Inc.**

US 93: Wickenburg Interim Bypass

Date: September 9, 2005

**LOCATION AND DATE:** Town of Wickenburg, Council Chambers  
May 17, 2005

**PARTICIPANTS:** See attached.

**SUBJECT:** Contract No. 03-05  
US 93: Wickenburg Interim Bypass  
Project No. W7X73400  
TRACS No. 093 MA 198 H5825 01D  
Monthly Progress Meeting

**SUMMARY:**

Berwyn Wilbrink of Jacobs opened the meeting at 9:30am with attendees introducing themselves. Draft meeting minutes from the April monthly progress meeting and agendas were distributed and an attendance list circulated (copies attached).

**GEOTECH/MATERIALS**

ADOT Materials Section has not completed the materials memo. Jacobs is currently using a 15" structural section (7" AC, 8" AB) on US 93 and US 60, and a 16" section (12" PCCP, 4" AB) for the South and North Roundabouts. A ½" AR-ACFC overlay will be applied to both structural sections on US 93 and US 60. On Tegner Street, a structural section of 15" (7" AC, 8" AB) with a top lift of AR-AC was shown in the 90% plans. The portion of Tegner Street that is being rehabilitated will consist of a 2" milling and replacement of the existing pavement with 2" AR-AC.

Jacobs will contact Ninyo and Moore to determine the status of the bridge borings that had not been completed at the time of the April monthly progress meeting.

**DRAINAGE**

Leo Kreyborg provided drainage modeling calculations to the Flood Control District for review and comments. FCD had some concerns about erosion on the east bank of the Hassayampa River. Drainage calculations were performed in the vicinity of the east bank and the information was sent to FCD.

FCD is continuing with the predesign of the Sols Wash Improvement project and a public meeting will be held on May 26<sup>th</sup> at the Community Center to discuss the project.

Jacobs will determine if a proposed ditch on Mr. Underdown's property can be relocated to avoid the acquisition of his barn. The ditch captures runoff drainage from the Vulture Mine WQARF site. The location of the current outlet structure that drains the WQARF site is in conflict with the proposed US 93 embankment. Jacobs will design drainage features to intercept the WQARF site drainage and direct the water into the aforementioned ditch. Jacobs design will be coordinated with ADEQ.

Potholing is currently underway in Sols Wash for the FCD project.

A question was raised by the Town of Wickenburg:  
Can we avoid removing existing trees along River Street?

The current design of the channel east of River Street to contain the 50-year storm event for Sols Wash requires the removal of the trees. The FCD Sols Wash Improvement project may impact the size and configuration of the channel, which may allow the trees to remain. Coordination will continue between Jacobs and the FCD with respect to Sols Wash.

## **RIGHT-OF-WAY**

A few proposed right-of-way lines may be adjusted to avoid existing wells. The proximity of a right-of-way line and a well will need to be determined to provide room for maintenance and operation of the well. These requirements will be discussed with ADEQ.

The houses along River Street that have been acquired by ADOT will be demolished within 90 days. ADOT Right-of-Way will provide the Habitat for Humanity representative with the name of the demolition contractor. A request was made to salvage appliances, cabinets, etc. of the homes that are being demolished.

There are two properties that are being condemned and they will receive an "order of possession" by the end of the month.

The Town of Wickenburg has requested that the weeds on the Stotz property be removed and that the writing on the windows be cleaned off. The Town also asked if the clean-up and demolition of the Exxon\Mobil property could be prioritized.

Berwyn asked if the abandonment of right-of-way at the existing Hassayampa River bridge needs to be displayed on the roadway plans. Martha Harrell will check with Henri Verdugo, but assumed those issues will be covered in the final right-of-way plans.

## **STRUCTURES**

ADOT Bridge Group has not received any information regarding details for street light supports. Logan Simpson Design is designing the decorative lighting. Geotechnical information from the outstanding Hassayampa River borings is still required to finalize the bridge design.

The overhead sign structure on the new Hassayampa River Bridge will be changed from a tubular frame to a tapered tube sign structure. The directional sign will be much smaller than what was shown in the 90% submittal. Jacobs is finalizing the signing design and will send a copy to ADOT Bridge Group when it is complete. ADOT Bridge Group will use that information for the sign structure foundation design.

All raised medians will consist of stamped concrete, including the medians on the Hassayampa River Bridge.

Larry Altuna suggested that the sidewalk transition at the south side of Sols Wash Bridge occur within the anchor slab limits. Jacobs will investigate if a transition in the anchor slab is feasible.

The Town wants to have input into the color of the Hassayampa River Bridge. The Town suggests using an adobe color on the bridge. A suggested color will be shown in the specifications. During construction, ADOT District and the Town will determine the color to be used on the bridge.

## UTILITIES

Jacobs has not received any of the preferred locations for the relocated utilities from the utility companies. This information will be necessary in determining if there are any potential conflicts with the proposed utility relocations and the construction of the roadway and bridges.

The roadway plans will show the new utility duct banks. The actual connections to existing facilities will be constructed by the utility companies. ADOT's contractor will construct a utility shoo-fly, but it will be paid for by the utility companies.

The construction cost of raising the 1962 bridge 2' will be ADOT's responsibility. The utility companies will be responsible for the cost of relocating the utilities to the raised bridge, which will be covered in the individual utility agreements.

Jacobs will need to get estimates for utility relocation durations from the utility companies. Currently, there are no utility agreements for costs, schedule, and responsibility. Those agreements will be developed by ADOT Utilities.

## ROADWAY DESIGN

There will be driveways that will be redesigned to avoid existing property features at Monte Vista Ranch and Cooper Tires. Additional survey is required at the Monte Vista Ranch entrance.

Aryan Lirange had concerns at the last monthly meeting about vehicle path overlap for some of the approach legs at the South Roundabout. SRM Associates have provided exhibits that explain the horizontal design of the roundabouts. This information was given to Aryan Lirange for his review. SRM Associates believe that the current geometric configuration of the roundabouts is well designed and safe.

Shane Dille will research the desire to name the Access Road "North Tegner" and coordinate with Jacobs when a determination has been made.

There has been an ongoing discussion for naming the roundabouts to establish them as landmarks. Currently this issue has not been resolved.

Jacobs will send ADOT's requirements for historic district signing to Lon McDermott. ADOT does not use historic district signing until a property, town, etc. has been designated as a historic site. Berwyn will also research the requirements for Business District signs. A request was also made to include a "Tourist Information 1 Mile Ahead" sign south of the beginning of the Wickenburg Interim Bypass project.

## ENVIRONMENTAL

ADOT is coordinating the biological clearance for the borrow source with the Game and Fish Department.

ADOT is waiting for the IGA details to be completed and signed before approaching SHPO with the roundabouts and gateway concepts. The Town would prefer to have the meeting with SHPO before signing the IGA. Lon McDermott will not recommend that the IGA be approved by the Town Council until SHPO has approved the roundabout concepts. Larry Doescher will continue discussions with Sam Maroufkhani, Rick Duarte, and the Town on this issue.

## **LANDSCAPE/AESTHETICS**

The design of the landscaping and aesthetics for the gateway treatments cannot proceed until SHPO approves the current concept.

Logan Simpson Design has sent conceptual sketches of the North and South Roundabouts to the Town of Wickenburg. ADOT is not contractually responsible for gateway treatments at the North Roundabout.

## **IGA STATUS**

The IGA has been in the AG's office and comments have been received. There has been a concern as to the net value of the borrow site. Jim Skonhovd provided calculations for the unit prices of borrow material from both the potential borrow site and a borrow pit 10 miles away.

## **PROJECT SCHEDULE**

A few issues need to be resolved to submit the 95% plans, specifications, and estimate. These issues include: lighting requirements will have to be resolved, and geotechnical information will need to be supplied to finish the bridge design and utility relocation design. The 95% plans will not be submitted until ADOT Bridge Group has finished their design.

Jacobs will meet with the Flood Control District in May 2006 to determine the status of FCD's Sols Wash Improvement project. This meeting will help to determine if FCD's project is on schedule to proceed with the bid advertisement of ADOT's Wickenburg Interim Bypass project.

## **OPEN DISCUSSION**

The special provisions will require the contractor to follow all state, federal, FCD, and SWPPP regulations related to the potential borrow site during construction and upon completion of the project.

The 1936 and 1962 bridges will need to be tested for lead paint. The demolition cost of the 1936 structure will be dependent on the type of paint that was used.

## **NEXT MEETING**

Since the project will be put on hold for a year, Berwyn suggested that we cancel the June monthly progress meeting. The next monthly progress meeting will be held on July 19<sup>th</sup> at the ADOT Transportation Board Room at 1:30 pm.

These minutes reflect the notes taken by Jacobs Civil Inc. during the meeting. If any corrections are needed, please provide those recommendations within two weeks of receipt of these minutes.

Prepared by

## **JACOBS CIVIL INC.**

Berwyn S. Wilbrink, PE  
Project Manager

Attachments:

Sign in sheets

Agenda

Distribution: Team members (e-mail)

# MEETING MINUTES



Jacobs Civil Inc.

US 93: Wickenburg Interim Bypass

Date: September 9, 2005

**LOCATION AND DATE:** ADOT, Transportation Board Room  
July 19, 2005

**PARTICIPANTS:** See attached.

**SUBJECT:** Contract No. 03-05  
US 93: Wickenburg Interim Bypass  
Project No. W7X73400  
TRACS No. 093 MA 198 H5825 01D  
Monthly Progress Meeting

## SUMMARY:

Berwyn Wilbrink of Jacobs opened the meeting at 1:30pm with attendees introducing themselves. Meeting minutes from the May monthly progress meeting and the utility coordination meeting were distributed. Agendas were passed out and an attendance list circulated (see attachment).

The bid advertisement for the Wickenburg Interim Bypass Project has been postponed until June 2006 to facilitate the design and construction of the Sols Wash Improvement Project by the Flood Control District.

## GEOTECH/MATERIALS

ADOT Materials Section has not issued the materials memo. Jacobs is currently using a 15" structural section (7" AC, 8" AB) on US 93 and US 60, and a 16" section (12" PCCP, 4" AB) for the South and North Roundabouts. A ½" AR-ACFC overlay will be applied to both structural sections on US 93 and US 60, including the new bridges. On Tegner Street, a structural section of 15" (7" AC, 8" AB) with a top lift of AR-AC was shown in the 90% plans for the reconstruction limits. The portion of Tegner Street that is being rehabilitated will consist of a 2" milling and replacement of the existing pavement with 2" AR-AC.

The draft geotechnical report has been submitted. However, there are four remaining borings at the new Hassayampa River Bridge abutments that need to be completed. Ninyo and Moore is currently trying to locate a driller, with the anticipation of completing the outstanding borings within the next two weeks.

A potential borrow pit has been cleared environmentally and will be made available to the contractor. Mr. Diddy, a private land owner, has informed the Town of Wickenburg that his property could be available as a materials source for this project.

## DRAINAGE

West Consultants anticipates completing the final hydrologic model for the project in August. Leo Kreymborg has concerns informing FEMA about the negative surcharge in the model. FEMA has had issues in the past with floodway changes that raise the downstream velocities and lower the hydrologic grade line. The negative surcharge in the hydrologic model for the Hassayampa River results from the new US 93 embankment constricting the floodway.

The final model and report will be submitted to FEMA for review, and a Conditional Letter of Map Revision (CLOMR) will be issued upon approval.

Jacobs will be issuing an addendum to the Final Drainage Report since it was completed prior to changing the "T"-Intersections to roundabouts.

There was concern that the scope of the Sols Wash Improvement Project was being scaled back due to budget constraints. However, it was stated that any changes to the scope of the project will not affect the requirement to contain the 100-year storm event.

There will be a joint public meeting on August 18 between the Flood Control District and the Town of Wickenburg to inform the public about the Sols Wash Improvement Project.

## **RIGHT-OF-WAY**

The first round of building demolitions has been delayed due to the need for asbestos testing. The Town has expressed its desire to prioritize the demolition of the abandoned U-Haul building on Wickenburg Way.

The right-of-way has been modified in a few locations since the 90% submittal. The new right-of-way has been reduced along the Access Road to avoid an existing well. The TCE will be revised at the entrance to Monte Vista Ranch to avoid the existing retaining walls. Other changes to right-of-way include shifting the Vulture Mill drainage outfall location, avoiding the "infamous" blue barn, and shifting the north driveway location for Cooper Tires.

## **STRUCTURES**

ADOT Bridge Group is awaiting the outstanding borings at the abutments from geotech to finalize the Hassayampa River Bridge design. Jacobs will provide details of the new Hassayampa River Bridge overhead sign structure to Larry Altuna so a foundation support can be included in the bridge design.

Larry also needs information on the streetlights that will be placed along the new bridge, including size, spacing, foundation types, etc. The Town of Wickenburg will provide the manufacturer information since they have recently replaced some of the existing streetlights. Jacobs will provide the spacing, locations, and streetlight specifications from the manufacturer to ADOT Bridge Group.

The structural design for the Hassayampa River Bridge will include provisions for rustification details. The rustification details (patterns, materials, colors, etc.) will be designed by LSD.

The bridge railings will be consistent between the new Hassayampa River Bridge and the raised 1962 bridge.

Jacobs will give ADOT Bridge Group a copy of the plans for the raising of the 1962 bridge for review.

T-clip testing indicated that lead is present on both of the existing bridges. The paint will be stripped on the 1962 bridge by approved methods when lead is present. The bridge will be repainted to match the new Hassayampa River Bridge.

## **UTILITIES**

The structural design of the reinforcement needed to raise the 1962 bridge is being completed by Jacobs. Upon completion, Jacobs will send electronic cross sections of the abutments and expansion joints to all of the utility companies that will have their facilities relocated under the bridge.

Jacobs would like feedback from the utility companies regarding the preliminary ductbank and utility layout that was sent via email in April.

Andy Roth suggested using intermediate PVC expansion joints for the conduit under the bridge. During a recent construction project on SR 260, the conduit that was attached under the bridge broke as a result of the structure expanding. Expansion joints through the abutment are required in the specifications, but intermediate expansion joints are not.

APS is reviewing their relocation design internally and will provide Jacobs with that information upon completion. A subsequent meeting will be set up with the utility companies to further coordinate the relocation efforts.

An existing APS power line (12KV) crosses the Hassayampa River directly out of the APS substation. It will have to be raised for clearance of construction equipment and for traffic on the new US 93. After the existing power line crosses the river east of the substation, it turns south along Jack Burden Road, and then crosses the Hassayampa River again where the new bridge will be located. That second crossing will also need to be relocated to allow for the construction of the new bridge.

APS raised a question about eliminating the two river crossings with a lateral facility along the new US 93. APS proposed placing conduit in the west embankment of the new US 93 from their substation to the connection point near the South Roundabout. To avoid conflicts with the roadway construction equipment, APS would have to trench and install their conduits in the newly constructed roadway embankment. However, that alternative presents numerous problems. The embankment cannot be constructed until after the new Hassayampa River Bridge is completed and the 1962 bridge has been raised 2'. That will be at least a year, according to the proposed construction schedule. As mentioned previously, the existing river crossings of the power lines will have to be relocated and/or raised prior to construction of the bridge or embankment.

Another challenge would be getting the conduit across the new Sols Wash Bridge. There are no provisions in the concrete barrier on the bridge for the 2-5" conduits required by APS. The conduit would have to transition from the roadway embankment to under the bottom of the box bridge, which is a 16' elevation difference. The portion of the conduit in Sols Wash would have to be in place prior to the construction of the bridge. Installing the conduit through the WQARF site also presents a challenge. The mitigation through the WQARF site does not allow any excavation of material below existing ground. Achieving the APS requirement of placing their facility 4'-5' below grade will be challenging with the restrictions at the WQARF site. Other issues would be mitigating with the elevated South Roundabout, the retaining walls, and the relocated sewer line. There will be further discussion on this subject.

On Wickenburg Way, the service waterline to the abandoned UHaul building and other demolished properties will be cut by the Town of Wickenburg. One night is sufficient for that activity. To avoid sawcutting the new pavement, coordination will be required between the contractor and the Town to complete those disconnections prior to the new reconstruction of Wickenburg Way. Similar to the waterline activities, the gas relocation in Kerkes Street should occur before the final pavement is constructed.

## **ROADWAY DESIGN**

The roadway design is complete except for the following issues: finalizing the sidewalk under the new bridges, detailing the sidewalk transition from the new Sols Wash Bridge sidewalk to the typical roadway sidewalk, and revising the Monte Vista Ranch entrance based on new survey information.

## **ENVIRONMENTAL**

ADOT has completed the consultation re-initiation letter to SHPO but still needs a few footprint dimensions and areas that have changed due to the incorporation of the roundabouts, which

Jacobs will provide to ADOT. ADOT plans to initiate SHPO consultation after receiving this information.

ADOT EEG staff has raised a question as to the coverage of the cultural/architectural survey of the structures to be demolished. Although the residences that are cleared for demolition have been determined not to be significant from a cultural resources standpoint, outbuildings, such as a bomb shelter that was observed in the field, were not evaluated. ADOT's Historic Preservation Team will be meeting tomorrow to determine what, if any, additional survey or data recovery is needed prior to demolition.

#### **LANDSCAPE/AESTHETICS**

LSD is waiting to design the details for the gateway treatment until approval from SHPO has been received.

Lon McDermott stated the Town's desire to provide a gateway treatment for the North Roundabout. The original mitigation for the two "T"-intersections was only a gateway treatment near the Hassayampa River Bridge. Larry Doescher will approach Sam Maroufkhani again to discuss a possible gateway treatment at the North Roundabout.

#### **IGA STATUS**

The Town and ADOT are very close to finalizing the IGA. Submitting the letter to SHPO for approval is not contingent on having a signed IGA.

#### **PROJECT SCHEDULE**

The bid advertisement for the Wickenburg Interim Bypass Project will be in June 2006, but is contingent upon the status of the Sols Wash Improvement Project.

It is anticipated that the "official" 95% plans, specifications, and estimate for the Wickenburg Interim Bypass Project will be submitted in January.

#### **OPEN DISCUSSION**

Jacobs has provided responses to the review comments that were received from the 90% submittal. Comments that received the "Will Comply" designation will be updated for the 95% submittal.

#### **NEXT MEETING**

The next monthly progress meeting will be held on August 16<sup>th</sup> at the ADOT Transportation Board Room at 1:30 pm.

These minutes reflect the notes taken by Jacobs Civil Inc. during the meeting. If any corrections are needed, please provide those recommendations within two weeks of receipt of these minutes.

Prepared by

#### **JACOBS CIVIL INC.**

Berwyn S. Wilbrink, PE  
Project Manager

Attachments:  
Sign-in sheet

Agenda

Distribution: Team members (e-mail)

**MEETING MINUTES****Jacobs Civil Inc.**

US 93: Wickenburg Interim Bypass

Date: September 9, 2005

**LOCATION AND DATE:** ADOT, Transportation Board Room  
August 16, 2005

**PARTICIPANTS:** See attached.

**SUBJECT:** Contract No. 03-05  
US 93: Wickenburg Interim Bypass  
Project No. W7X73400  
TRACS No. 093 MA 198 H5825 01D  
Monthly Progress Meeting

**SUMMARY:**

Berwyn Wilbrink of Jacobs opened the meeting at 2:30pm with attendees introducing themselves. Meeting minutes from the July monthly progress meeting and were distributed. Agendas were passed out and an attendance list circulated (see attachment).

**GEOTECH/MATERIALS**

Ninyo & Moore will finish the final borings in the Hassayampa River after Larry Doescher approves the cost estimate for completing the work.

**DRAINAGE**

West Consultants requires geotechnical information on stability analysis and bank protection from Jacobs to finalize the CLOMR. In the previous meeting Leo Kreymborg had concerns about the negative surcharge in the model since FEMA has had issues in the past with floodway changes that raise the downstream velocities and lower the hydrologic grade line. Since the last meeting, West Consultants has worked on eliminating the majority of the negative surcharge.

West Consultants will use their best engineering judgment to model Sols Wash since the design of the Sols Wash Improvement project is not complete. The final model and report will be submitted to FEMA for review, and a Conditional Letter of Map Revision (CLOMR) will be issued upon approval. The process for FEMA to review the CLOMR may take about 3 months. The CLOMR will then be reviewed by FCD and the Town for their concurrence.

FCD is concerned about erosion that may occur on the east bank of the Hassayampa River Bridge will increase the velocities on the east bank of the river which has caused FCD to be concerned about erosion. FCD wants a written response explaining the reason that increased velocities on the east bank of the Hassayampa River are not a concern. Jack Burden Road has been shifted to the east and the bank has been lined upstream of the Hassayampa River Bridge following the flooding that eroded the bank in February. These changes, which should decrease the velocities on the east bank, were not incorporated into the drainage model.

FCD is concerned that the capacity of the Sols Wash basin is not adequate. The retention area will not drain during a Sols Wash event. The roadway embankment could be steepened from 4:1 to 3:1 on the west side of US 93 near Sols Wash. FCD will inform Jacobs if changing the embankment to 3:1 will significantly increase the capacity of the basin. Material excavated to construct the basin can be made available to the Wickenburg Interim Bypass project. The material would not be a designated borrow source and the contractor would be responsible for testing the material.

The design of the Sols Wash Improvement project includes two 48" pipes with flap gates under the US 93 roadway embankment.

#### **RIGHT-OF-WAY**

Jacobs will revise the design of the Monte Vista Ranch entrance to avoid walls and other decorative features.

ADOT has received approval to test asbestos in the four buildings that were surveyed (See Environment Section).

After asbestos testing commences the demolition effort will take approximately 60 to 90 days to complete.

Jacobs will send Martha information regarding the location of the driveway on the Access Road nearest the North Roundabout. ADOT will determine if access will be granted for this driveway.

A meeting has been set up next week with APS to discuss any outstanding right-of-way acquisition issues.

#### **STRUCTURES**

ADOT Bridge Group has received signing information from Jacobs and has revised the sign blisters based on this information.

Jacobs is designing the handrail for the 1962 bridge and the approach slab that will tie the raised bridge to the proposed sidewalk.

Jacobs will provide Lon McDermott with the locations of the street lights.

#### **UTILITIES**

A meeting will be scheduled with APS to determine if a new power line can be placed in the US 93 roadway embankment.

Jacobs is designing "punching" the utilities through the 1962 bridge abutments and the hangers for the utilities.

#### **ROADWAY DESIGN**

The roadway design is complete except for the following issues: finalizing the sidewalk under the new bridges, detailing the sidewalk transition from the new Sols Wash Bridge sidewalk to the typical roadway sidewalk, and revising the Monte Vista Ranch entrance to avoid walls and other features.

## **ENVIRONMENTAL**

Four buildings were deemed to require additional survey. The survey has been completed and no significant findings were made. A memo will be sent to ADOT to explain the survey and allow ADOT to proceed with demolition.

Jacobs will work on the NEPA re-evaluation memo.

The letter that has been written for SHPO regarding the incorporation of roundabouts into the Wickenburg Interim Bypass project was sent to FHWA in July.

The Town wants the lead paint on the 1962 bridge to be removed before ownership is transferred. Prior to demolition, the 1936 bridge will require spot cleaning of lead paint at cut locations.

Jim Skonhovd raised the question whether the removal of lead paint was a separate bid item or paid for as lump sum.

## **LANDSCAPE/AESTHETICS**

LSD is waiting to design the details for the gateway treatment until approval from SHPO has been received.

Lon McDermott stated the Town's desire to provide a gateway treatment for the North Roundabout. The original mitigation for the two "T"-intersections was only a gateway treatment near the Hassayampa River Bridge. Larry Doescher will approach Sam Maroufkhani again to discuss a possible gateway treatment at the North Roundabout.

## **IGA STATUS**

The Town and ADOT are very close to finalizing the IGA. ADOT has received comments from the AG's office.

## **PROJECT SCHEDULE**

The bid advertisement for the Wickenburg Interim Bypass Project will be in June 2006, but is contingent upon the status of the Sols Wash Improvement Project.

It is anticipated that the "official" 95% plans, specifications, and estimate for the Wickenburg Interim Bypass Project will be submitted in January. In addition the SHPO letter and the CLOMR will be submitted prior to the 95% plans submittal.

## **NEXT MEETING**

The next monthly progress meeting will be held on September 20<sup>th</sup> at the ADOT Transportation Board Room at 1:30 pm.

These minutes reflect the notes taken by Jacobs Civil Inc. during the meeting. If any corrections are needed, please provide those recommendations within two weeks of receipt of these minutes.

Prepared by

**JACOBS CIVIL INC.**

Berwyn S. Wilbrink, PE  
Project Manager

Attachments:  
Sign-in sheet  
Agenda

Distribution: Team members (e-mail)

## **B.4 General Correspondence**

*Not Applicable / Not Included*

## **B.5 Contract Documents**

## Scope of Work

### Design of the US 93: Interim Wickenburg Bypass Hydraulic and Scour Analyses

WEST Consultants, Inc. (WEST) will be responsible for the hydraulic and scour analyses for the design of the US 93 Interim Wickenburg Bypass. The project is located within the Hassayampa River / Sols Wash 100-year regulatory floodplain with nearly 40 percent of the roadway length encroaching into the FEMA defined floodway. Hydraulic and sediment transport analyses will be performed to: 1) evaluate potential impacts of the highway embankment on upstream and downstream conditions; 2) develop bank protection design parameters for the roadway embankment; 3) establish hydraulic conditions and scour depths for the Hassayampa River Bridge and the Sols Wash Bridge; and 4) prepare a Conditional Letter of Map Revision (CLOMR) for the project.

The hydraulic study limits along the Hassayampa River extends from one-half (1/2) mile downstream to approximately one and one-half (1-1/2) miles upstream of the US 93 bridge crossing. The study limits along Sols Wash extends from the confluence with the Hassayampa River to upstream of North Tegner Street. In order to complete the hydraulic and scour analyses, WEST has identified the following tasks.

**Task 1. Data Collection/Field Reconnaissance.** Collect and review the available hydrologic, hydraulic, sediment transport, geomorphologic, and topographic information for the study reach of the Hassayampa River and Sols Wash. This will include, but not be limited to: hydrographs for various flood frequencies within the project reach; historical flow data; sediment size distributions; profile and cross-sectional data; aerial photography (current and historic); flood insurance studies and recent or proposed letters of map revision; flood hazard reports; sediment transport studies; river stability studies, and other pertinent information available from ADOT, U.S. Army Corps of Engineers, Flood Control District of Maricopa County, and the Town of Wickenburg.

Two (2) field reconnaissance trips of the project area will be conducted to verify collected information, supplement available data, become familiar with the physical environment of the study reach, and identify locations for sediment samples. Observations will be made of channel conditions, hydraulic roughness, hydraulic structures, geologic characteristics, and sediment characteristics along the project reach.

It is assumed that the following data will be furnished to WEST by Jacobs:

- 1) A DTM for the study reach of the Hassayampa River and the study reach of Sols Wash.
- 2) Topographic mapping and orthophotos for the project reach. It is our understanding that the mapping will be at a scale 1 inch = 50 feet with 1 foot contour intervals.

- 3) Sediment gradations for a minimum of six (6) sediment samples obtained along the Hassayampa River and two (2) sediment samples obtained along Sols Wash.
- 4) Historic aerial photos of the study available from ADOT or other government agencies.
- 5) Hassayampa River and Sols Wash Flood Insurance Studies (FIS's) for the current effective regulatory conditions.

**Task 2. Coordination/Meetings.** Coordination and meetings will be maintained throughout the design project with Jacobs, ADOT, the Flood Control District, and the Town of Wickenburg. Coordination may also be necessary with government agencies such as the Federal Emergency Management Agency (FEMA) and the Corps of Engineers regulatory section. The following meetings are to be incorporated into the project effort:

- 1) Twelve (12) monthly project meetings. It is assumed that WEST will participate in each monthly project meeting held during the period hydraulic analyses are ongoing and every other month (on the average) for the duration of the project design. It is assumed that three (3) meetings will be held in Wickenburg and nine (9) meetings will be held at ADOT.
- 2) Two (2) coordination meetings with ADOT structures regarding bridge hydraulics and scour analyses.
- 3) Two (2) coordination meetings with the Flood Control District and/or Town of Wickenburg regarding river hydraulics and sediment transport, embankment/bank protection design, and FEMA requirements.

**Task 3. Qualitative Geomorphic Analysis.** Perform qualitative analysis of historical changes to river morphology through analysis of available aerial photographs. Review and quantify changes to profile gradient, historical channel pattern, flow regime, and bank stability if sufficient data exists for each analysis. Estimate short and long-term channel stability trends of the river system along the project reach by the application of geomorphic relationships and the review of historical aerial photographs to identify historical banklines, low flow channel locations, and sediment aggradation/degradation potential and evaluate the potential for lateral migration.

**Task 4. Hydraulic Analysis.** Hydraulic analyses will be conducted to establish water surface profiles, flow velocities, and flow distribution within the floodplain for both pre-project (existing) conditions and post-project conditions. The hydraulic analysis will be performed using the US Army Corps of Engineers computer model HEC-RAS, and the topographic mapping and DTM provided by Jacobs. The study reach for the Hassayampa River will extend from one-half mile downstream to approximately one and one-half miles upstream of the existing US 93 river crossing, and the study reach for Sols Wash will extend from the confluence with the Hassayampa River to immediately upstream of the North Tegner Street crossing. In any case, the hydraulic modeling will extend far enough to ensure that the 100-year water-surface profiles for project conditions tie into the 100-year water-surface elevations of the current FEMA model.

HEC-RAS models will be developed for the original FEMA effective model, pre-project conditions, and post-project conditions utilizing the new topographic mapping. The purpose of the duplicate effective model of the original FEMA effective floodplain model is to assure the baseline is accurate and the post-project model will tie back into the effective model upstream of the project reach. Discharges to be used will be the FEMA 10-year, 50-year, and 100-year discharges according to FEMA guidelines. The pre-project (existing) conditions hydraulic model reflects conditions prior to the construction of the roadway embankment and serves to document changes that have occurred following the FEMA regulatory study. This model will be used as a baseline to evaluate the effects of the proposed project on floodplain conditions. The analysis will evaluate floodplain impacts both upstream and downstream of the proposed project as well as impacts along the opposite bank of the Hassayampa River.

The post-project conditions model will consist of the proposed US 93 roadway alignment recommended by the DCR, and bridge lengths, pier shape and orientation, span lengths, and abutment details provided by ADOT structures. Several iterations of the hydraulic analysis will be required to address aggradation/degradation within the study reach as well as optimize the bank alignment and bridge hydraulics. This scope of work and cost estimate is based on a maximum of three iterations. The results of the hydraulic analysis will establish the roadway profile and bridge low chord elevations, hydraulic parameters for the bridge scour analysis, and design parameters for the bank protection measures along the Hassayampa River and Sols Wash.

Hydraulic analyses will be conducted for the 10-year, 50-year, and 100-year frequency flow events. The 10-year event is required for evaluating simultaneous events for Sols Wash and the Hassayampa River, the 50-year event is the design event for the roadway embankment, and the 100-year event is required for FEMA. In addition, the bridge scour analysis will require water surface profiles and flow velocities to be generated for the "superflood" or 500-year frequency flow event. The 100-year discharges for the Hassayampa River and Sols Wash will be the FEMA Flood Insurance Study (FIS) discharge. The 10-year and 50-year discharges will be based on evaluating existing stream gage data as well as previous hydrologic and hydraulic studies conducted for the Hassayampa River and Sols Wash. The 10-year and 50-year discharges will be selected in consultation with ADOT. This SOW does not include hydrologic modeling (i.e., HEC-1 or HEC-HMS) to establish 10-year and 50-year discharges for the Hassayampa River and Sols Wash.

The bridge scour analysis will include an evaluation of hydraulic impacts due to debris build-up on the piers and incorporate ADOT's bridge pier debris and stream force criteria. Low-chord elevations for the bridges will be established to meet the minimum freeboard requirements as specified by ADOT or other regulatory agencies.

**Task 5. Sediment Transport Analysis.** Sediment transport models for the Hassayampa River and Sols Wash study reaches will be developed to evaluate hydraulic design elements and define maximum aggradation/degradation and scour potential along the

project reach. HEC-6T, an enhanced version of the US Army Corps of Engineers HEC-6 model will be used for the sediment transport analysis. Design hydrographs will be developed to simulate flows along the study reaches and an appropriate sediment transport formula selected for the Hassayampa River and Sols Wash. The model will extend upstream of the proposed project limit to ensure appropriate consideration of upstream sediment supply conditions and extend far enough downstream to define potential downstream impacts of the proposed project.

**Task 6. Scour Analysis.** Scour depths for the various scour components will be estimated to establish the recommended toe-down depths for the roadway embankment bank protection measures and bridge scour depths using the hydraulic and sediment transport parameters established above. The scour analysis will investigate the magnitude of the contribution from each of the following components: local scour; aggradation/degradation; general scour; bedforms, low-flow incisement, and bend scour. The toe-down depth for the bank protection and bridge scour depths will be established based on the total scour depth, which is the sum of the individual scour components.

The potential for lateral migration of the Hassayampa River in this reach will also be evaluated. This will be accomplished by reviewing available historical aerial photos and original survey data for the reach as well as the available geomorphic data.

**Task 7. Hydraulic Design Report.** An initial and final hydraulic design report will be prepared documenting the results of the hydraulic and scour analyses. The hydraulic design report will present a thorough discussion of the design criteria, assumptions, and engineering methodologies used in the analysis. It will document the hydraulics and scour analyses for the new Hassayampa River Bridge and the Sols Wash Bridge, and the hydraulic and scour analyses for the roadway embankment and protection measures. The report will document the recommended bank protection toe-down and top-of-bank elevations. It will also provide a basis of design for the configuration and location of upstream and downstream bank protection tie-ins.

For the Hassayampa River Bridge and the Sols Wash Bridge, the report will document findings and make recommendations with respect to total scour at the piers and abutments, low-chord elevation of the bridge superstructure, freeboard requirements, and abutment protection measures. For the roadway embankment, the report will document the findings and present recommendations regarding the water surface profiles for the design event, bank protection requirements, and toe-down depths for recommended protection measures. It will summarize the hydraulic and erosion/sedimentation features along the project reach; and identify the potential hydraulic and channel stability impacts on the upstream and downstream reaches as well as on the opposite bank of the Hassayampa River.

**Task 8. CLOMR Application.** Prepare a Conditional Letter of Map Revision (CLOMR) for submittal to FEMA. The CLOMR documents the changes due to the longitudinal encroachment of the roadway embankment on the Hassayampa River and

Sols Wash floodplain and floodway. Hydraulic and sediment transport information developed in the above tasks will be summarized for use in the preparation of a Technical Data Notebook (TDN) and an application to FEMA for a CLOMR. Any differences between the original FEMA effective floodplain model and the duplicate effective model must be documented in the TDN along with post-project floodplain and floodway delineations. The application submittal to FEMA includes preparation of the required FEMA forms and revised maps. WEST will prepare and submit the package to Jacobs, ADOT, the Town of Wickenburg, and the Flood Control District of Maricopa County for review and submittal to FEMA.

The CLOMR will be formatted according to the FEMA's requirements and ADWR's technical guidance document. WEST will prepare all necessary maps, exhibits, floodplain/floodway delineations, hydraulic analyses, figures, and completed forms as backup support for the CLOMR. The report shall include a CD containing all input data files of final runs of the standard computer programs used for the project.

WEST will respond to technical questions and comments by FEMA during the review phase of the CLOMR.

**B.6 Public Notices**



# Arizona Department of Transportation

## Intermodal Transportation Division

206 South Seventeenth Avenue Phoenix, Arizona 85007-3213

Janet Napolitano  
Governor

Victor M. Mendez  
Director

Sam Elters  
State Engineer

January 27, 2006

Property Owners  
South of US 60 Bridge  
Wickenburg, Arizona 85390

Re: Hassayampa River improvements associated with the  
US 93: Wickenburg Bypass

Dear Property Owner:

As you may be aware, the Arizona Department of Transportation (ADOT), the Town of Wickenburg, and the Flood Control District of Maricopa County are working together to improve transportation facilities and flood protection within the project vicinity (US 93, Interim Wickenburg Bypass). These improvements include building a new roadway along the western banks of the Hassayampa, and a new US 60 bridged crossing of the river just north of the existing bridge crossing.

The existing bridges that cross over the river cannot adequately accommodate a major flood event without water backing up on the bridge itself. To better provide for the necessary flood capacity, the lowest portion of the existing bridges is being removed, and the balance that will be left will be raised to provide for adequate clearance. The new roadway bridge will also be wider and higher than the existing structures to pass these storm events as well. Associated with these improvements, ADOT is submitting a Conditional Letter of Map Revision to Federal Emergency Management Agency (FEMA) documenting all of the improvements and any changes to the current floodplain and floodways.

In preparing this floodplain investigation, we have modeled how the river will respond during a flood event. Using better surveys and more detailed mapping than was provided in the past, we have been able to more accurately delineate the limits of the floodplain throughout the project limits. In the vicinity of your property downstream of the bridge crossing, our model indicates these improvements will lower the ultimate water surface over your property when a major flood occurs, but requires that the floodway delineation be increased slightly near the existing river bank. Currently, during a major 100-year flood event, the majority of the property located below the ridge west of the highway would be inundated. This situation will be improved slightly with these improvements, but not significantly. With the removal of the house currently in the floodway immediately south of the bridge, the floodway will be slightly widened, as shown on the attached exhibit.



2001 Award Recipient

The State wants to make you aware of these changes, which should have no effect on your current use of the property, and will actually result in less water over the property in a major event. Should you desire to develop this property in the future, please be advised that no permanent construction can occur within the limits of the floodway of a river.

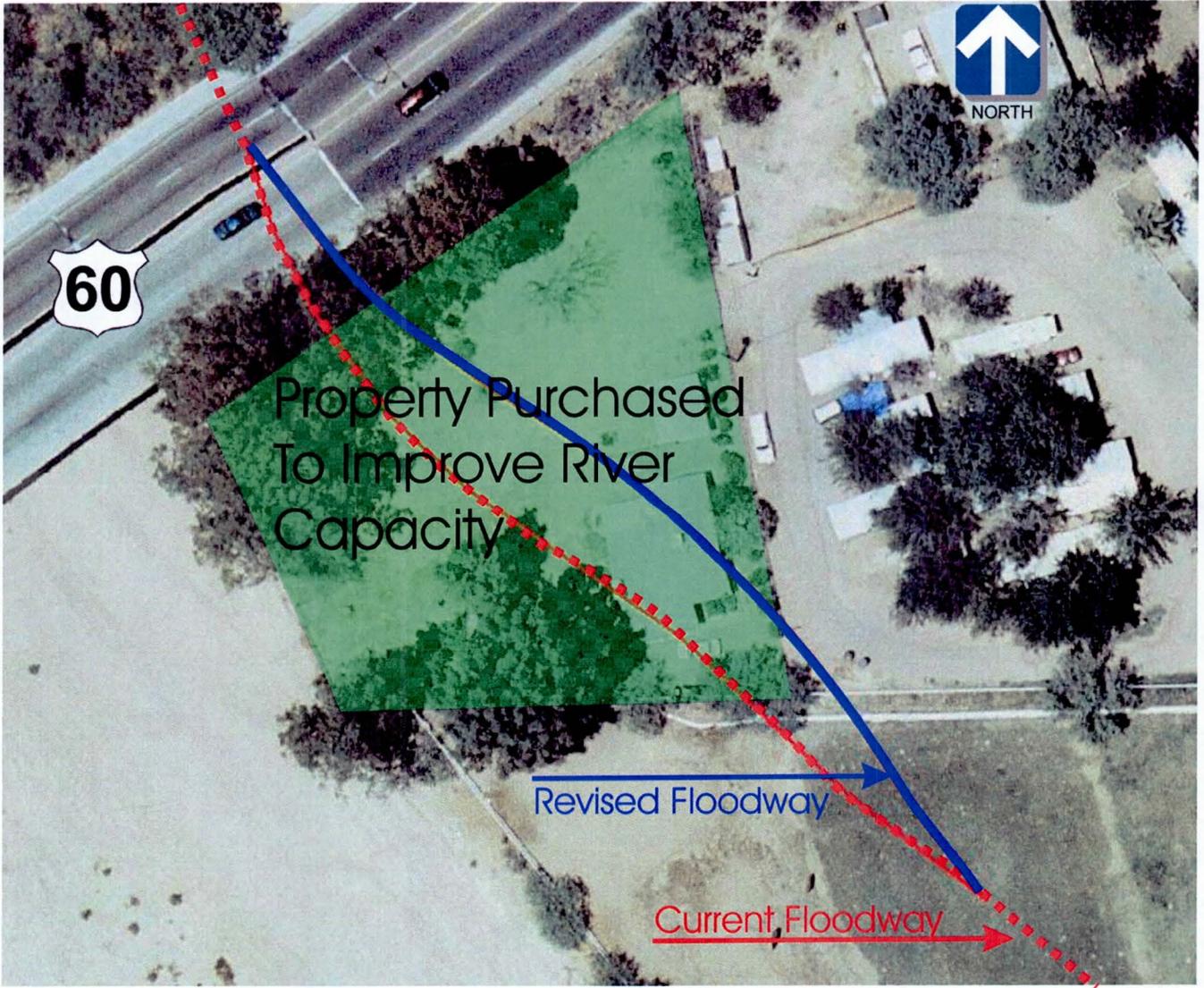
If you have any questions about this change, please feel free to contact the roadway project manager, Larry Doescher, at ADOT's Statewide Project Management Group at 602.712.7545.

Sincerely,

Henri Verdugo  
Right of Way Management  
Arizona Department of Transportation



2001 Award Recipient



Proposed Change in Floodway





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

*See Appendix C.3*

## **C.2 Survey Field Notes for Hydrologic Modeling**

*Not Applicable / Not Included*

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

3728 Wickenburg Panel					
Establish vertical control					
for aerial targets					
stadia	thread	mean	stadia	thread	mean
108	9.11				
108	8.19	8.19			
216	7.27				
			102	3.29	
			101	2.27	2.273
			253	1.26	
101	3.00				
102	1.99	1.987			
253	0.97				
			92	3.81	
			91	7.89	7.893
			183	6.93	
End Loop					

90's sunny

6-19-03

Survey notes

①

M. Jennings

P. G. G. G.

EL	Desc.
2065.45	PK nail Mohave/Jefferson (PT 3075)
2071.367	BCF @ Adams/Mohave Panel 10011
2065.461	PK nail; Mohave/Jefferson
closure ± 0.011	

3023 Wickenburg Parcel					
stadia	Thread	Mean	stadia	Thread	Mean
122	8.43				
122	7.21	7.21			
244	5.99				
			133	8.40	
			132	7.07	7.07
			265	5.75	
108	4.84				
107	3.76	3.763			
215	2.69				
			102	8.44	
			103	7.42	7.417
			205	6.39	
36	1.95				
35	1.59	1.593			
71	1.24				
			72	7.75	
			72	7.03	7.03
			144	6.31	
72	8.06				
72	7.34	7.34			
144	6.62				

90's sunny

6-19-03

M. Jennings

P. Grand

EL DESC  
2067.149 ADOT BCHH, US 93 north of Yavapai  
(PT 3077)

2067.817 Turn PT #1

2064.163 Turn PT #2

2058.726 PK nail; Panel 10012

3023	Wickenburg	Panel			
stadia	Thread	Mean	stadia	Thread	Mean
			36	2.26	
			36	1.90	1.90
			72	1.54	
103	8.42				
102	7.39	7.393			
205	6.37				
			108	4.82	
			108	3.74	3.74
			216	2.66	
131	8.44				
132	7.13	7.127			
263	5.91				
			123	8.49	
			122	7.26	7.263
			245	6.04	
		End Loop			

SAME	
EL.	DESC
2064.166	Turn Pt # 2
2067.819	Turn Pt # 1
2067.653	ADOT BENCH US 93 north YAVAPAI
	closure + 0.003

3029 Wickenburg Parcel

10001 1/2" rebar w/ cap

10002 " " " on Jack Burden Rd

10003 " " " 800'± east of Jack

10004 " " "

10005 " " "

10006 " " "

10007 " " "

10008 BCF @ Rose Ln / Villa Serena Dr

10009 1/2" rebar w/ cap

10010 1/2" rebar

10011 BCF @ Mohave / Adams

10012 PK nail

10013 1/2" rebar w/ cap

10014 1/2" rebar w/ cap

10015 BCF @ Jackson St / Monte Cristo

10016 BCF @ Park St / Jefferson St

10017 1/2" rebar w/ cap

10018 1/2" rebar w/ cap in vacant lot west

10019 PK nail on Tanager St

10020 1/2" rebar w/ cap

10021 PK nail in west shoulder of US 93

6-19-03

M. Jennings

P. Grand

2.5± miles north of US 60  
 Burden Rd 2.0± miles north US 60

RLS 24514

of Kentucky Fried chicken on US 60

200'± north of Rincon

SITE	UNIT	HI (m)	TIME ON	TIME OFF
3028	WICKENBURG	PANELS		
4012	A	1.920	9:39	1:29
4NJ1	ROVER	1.817	10:40	1:43
10020	EXTREME	2.14	5 mins	
10018	"	"	5 mins	
10014	"	"	5 mins	
10010	"	"	5 mins	
10006 <sup>2</sup>	"	"	5 mins	
10003	"	"	5 mins	
10001	"	"	5 mins	
10006	-	-	-	-

90's sunny

6-20-03

M. Jennings

B. HUNTSMAN

D. SHUMLOCK

DESC

1/2" Rebar w/ cap

Session "B"

3028 Wickenburg Panels			
SITE	UNIT	HI (m)	TIME ON TIME OFF
4012	"A"	1.817	6:36 12:13
4NJ1	Boxer	1.872	7:03 12:29
93-255-35	"3"	1.911	7:23 12:39
10018	EXTREME	2.14	10 mins
10006	"	"	5 mins
111	"	"	"
10011	"	"	"
109	"	"	"
10013	"	"	"
10007	"	"	"
10008	"	"	"
113	"	"	"
10009	"	"	"
10005	"	"	"
10004	"	"	"
10000	"	"	"
5000	"	"	"
5001	"	"	"
5002	"	"	"
5003	"	"	"
5004	"	"	"
10002	"	"	15 mins

80' sunny

10-23-03

M. Jennings

P. Grand

D. Shumway

DESC
NGS (AJ3905) metal rod in HH
NGS (AJ3999) metal rod in HH
NGS (ET0969) ALUM CAP IN CONC MONUMENT
1/2" REBAR w/ CAP
1/2" Rebar w/ CAP
BCF US 19317 1/4 SI/SIA
BCF @ Adams / Mohave
PK nail @ Mohave / Jefferson (ALSO PT 3075)
1/2" REBAR w/ CAP
1/2" rebar w/ CAP BRILLIAR / Poppy ST
BCF @ ROSE / Villa Serena DR
1" PIPE @ SW CORNER OF US 93 / ROSE LN
1/2" Rebar w/ CAP
1/2" Rebar w/ CAP
1/2" Rebar w/ CAP
PK nail
CP # 10 Cotton Picker Spindle
CP # 11 " " "
CP # 12 PK nail
CP # 13 1/2" Rebar
CP # 14 PK nail
SEE PAGE 5

6

3022 Wickburg Panels

Bench Loop TD # 10005 6/23/03  
J Ross  
G Ankrum

BM	+	HI	-	ELEV
				2098.81
Q.P. #12 SEE ROSS NOTES	1.27	2100.08		
TP			4.56	2095.52
	3.33	2098.95		
PANEL 10005			3.33	2095.52
	3.40	2098.92		
			3.40	2095.52
	4.50	2100.02		
VCP #12			1.21	2098.81

TOP CONTROL #12 PENAK

REBAR W/CAP PANEL 10005

✓ checked in

## Session "C"

3028 Wickenburg Panels

SITE	Unit	HI(m)	Time ON	Time OFF
4012	"A"	1.718	6:46	12:10
41NJL	Rover	2.053	7:13	11:50
93 2553S	"3"	1.800	7:39	11:42
10000	Extreme	2.14	10 mins	
5005	"	"	5 mins	
104	"	"	"	
10015	"	"	"	
10016	"	"	"	
10019	"	"	"	
103	"	"	"	
10017	"	"	"	
5006	"	"	1 min	
5007	"	"	"	
5008	"	"	"	
	"	"	"	
5009	"	"	"	
5010	"	"	"	
5011	"	"	"	
5012	"	"	"	
5013	"	"	"	
5014	"	"	"	
5015	"	"	"	
10008	"	"	10 min	

80's sunny

6-24-03

M. Jennings

P. Grand

D. Shumway

~~RESTARTED BASE~~ wrong HI entered @ 4012

NEW HI 1.142 NEW START TIME 8:52

SEE PAGE 6

CP # 15 PK nail

BLM BC S 11, 12, 13 and 14

BCF @ JACKSON / Monte Cristo RLS 24514

BCF @ Jefferson St / Park St

PK nail on TELEVER ST

- BLM BC S 12, 13 and 18

1/2" REBAR w/ CAP in HASSAVAMPA RIVER

ADOT BC R/W

1.5 AC RLS 24514

1/2" Iron Pipe

Angle IRON

ADOT BC R/W

ADOT BC R/W

ADOT BC R/W

Angle IRON

ADOT BC R/W

ADOT BC R/W

ADOT BC R/W STA 898+17.25

3023	Wickenburg Parais			
	9.90			
3075	9.39	9.390		
	8.88			
3076	9.49		9.54	
	8.98	8.980	9.03	9.030
	8.47		8.52	
	12.32		1.985	
TP1	11.93	11.930	1.830	1.832
	11.54		1.620	
	10.64		1.26	
TP2	10.30	10.302	1.15	1.153
	9.965		1.05	
	7.32		1.50	
TP3	6.64	6.640	1.31	1.307
	5.96		1.11	
	7.57		7.66	
62004	6.86	6.863	6.94	6.943
	6.16		6.23	

100's clear, calm

6-20-03

TOPCON #8

P. Miluski

9

ADJ.

J. Maldonado

TEL

DESC

2065AS0 PL NAIL 15.78' NE OF BCF@

INT-X JEFFERSON & MOHAVE

2065.807 BCF INT-X JEFFERSON & MOHAVE

2092.415 BCF INT-X JEFFERSON & SANTA CRUZ

3028 Wickenburg Parcel				
	2.34		7.26	
TP3	2.15	2.153	6.56	6.563
	1.97		5.87	
TP2	1.70		11.49	
	1.575	1.575	11.14	11.140
	1.45		10.79	
	1.64		12.715	
TP1	1.46	1.457	12.34	12.342
	1.27		11.97	
			9.44	
3075			8.96	8.960
			8.48	
RAW CLOSURE	+0.02			
LOOP DIST.	1440.5'			
ADJ/FOOT	1.39 E-05			

6/20/03

⑩

ASST  
ELEV.

2005.450 P.O.B SEE PAGE ⑨

3029 Wickenburg Panel

11











3029	Wickenburg	Panels			
Stadia	Thread	Mean	Stadia	Thread	Mean
118	5.74				
118	4.56	4.54			
236	3.38				
			1.105	2.29	
			1.105	1.275	1.275
			221	0.26	
118	10.38				
117	9.26	9.203			
235	8.03				
			.515	3.23	
			.515	2.715	2.715
			103	2.20	
725	6.56				
725	5.835	5.835			
145	5.11				
			.71	3.90	
			.71	3.19	3.19
			142	2.48	
128	8.10				
127	6.82	6.823			
255	5.55				
			112	6.67	
			111	5.55	5.553
			223	4.44	

90s

12-25-03

M. Jennings

(17)

EL	DESC	P. Grand
2050.32	BM #116 AND BC in top of hwy curb north of US 60, east of Jack Burden Rd. MKD AND 1958. POC 3205.1	

TP # 1 2053.605

TP # 2 2060.093

TP # 3 RB - CAD - PANEL # 10018  
2062.738

TP # 4 2064.008



3028 Wickenburg Panels					
Stadia	Thread	Mean	Stadia	Thread	Mean
110	6.61				
111	5.51	5.507			
221	4.40				
			129	8.06	
			128	6.77	6.777
			257	5.49	
.705	3.89				
.695	3.185	3.188			
140	2.49				
			74	6.57	
			73	5.83	5.833
			147	5.10	
.75	2.00				
.75	1.25	1.25			
150	0.50				
			91	8.64	
			91	7.73	7.73
			182	6.82	
97	2.79				
22	1.82	1.82			
194	0.85				
			123	6.33	
			122	5.10	5.103
			245	3.88	

SAME

19

TP # 3 RB-CAP-PANEL # 10018  
2062.775

TP # 2 2060.13

TP # 1 2053.65

BM # 116 2050.367

CLOSURE + 0.047

3028

## WICKENBERG PANELS

STADIA	+THREAD	MEAN	STADIA	-THREAD	MEAN
98	12.17				
99	11.19	11.187			
	10.20				
			118	3.08	
			118	1.90	1.90
				0.72	
119	2.82				
118	1.63	1.633			
	0.45				
			98	11.90	
			98	10.92	10.92
				7.94	

SAME

(20)

ELEV =

2089.24 Bm # 3111 AND BC IN CATTLE  
GUARD IN HDWL @ LINCOLN RD

TP # 1 PKN # PANEL # 10000  
2098.527

Bm # 3111  
2089.24

CLOSURE  $\phi$



3028 WICKENBURG PANELS				
	4.95		5.39	
62010	4.46	4.457	5.15	5.150
	3.96		4.91	
	1.71		7.29	
TP11	1.23	1.233	6.53	6.533
	0.76		5.78	
	0.98		6.93	
62012	0.53	0.530	6.75	6.750
	0.08		6.57	
	2.79		12.26	
TP13	2.56	2.560	11.76	11.763
	2.33		11.27	
	5.83		6.08	
10016	5.62	5.680	5.93	
	5.53		5.775	
	12.35		2.55	
TP13	11.865	11.865	2.31	2.313
	11.38		2.08	

9/20/03

2075.525	BCE INT-X JEFFERSON d WICKENBURG WAY			
2067.930	BCE INT-X JEFFERSON d HENDERSON (?1663?)			
2053.332	BCE INT-X JEFFERSON d PARCE			

## 3028 WICKENBURGH PANELS

	8.23		1.11	
62012	8.49	8.487	0.64	0.637
	8.14		0.16	
	6.25		3.26	
TP11	6.22	6.223	2.97	2.967
	5.60		2.67	
	5.52		4.77	
62010	5.30	5.297	4.15	4.147
	5.07		3.52	
	10.69		4.22	
TP9	9.99	9.990	3.79	3.790
	9.29		3.36	
	8.15		3.245	
62008	7.34	7.343	2.645	2.643
	6.54		2.04	
	7.75		3.66	
TP7	7.06	7.060	3.00	3.003
	6.37		2.35	

0/20/03

SEE PAGE (22)

SEE PAGE (27)

SEE PAGE (21)

6/20/03

3028	WICKEN BURGH PANELS			
	4.66		3.70	
TP6	4.13	4.133	2.99	2.990
	3.61		2.28	
	6.76		7.66	
62005	6.23	6.230	6.98	6.983
	5.70		6.31	
			4.39	
62004			3.75	3.753
			3.12	

RAW LOSURE - 0.003  
 LOOP DIST 4168  
 1: 1,250,400  
 -8.00 E-07 ASD/FOOT

SEE PAGE (21)

P.O.B. SEE PAGE (21)

## 3028 WICKENBURG PANELS

	3.640			
10016	2.710	2.700		
	1.750			
	5.700		4.020	
62401	5.210	5.207	3.130	3.133
	4.710		2.250	
	10.670		5.240	
6.2402	9.660	9.657	4.830	4.830
	8.640		4.420	
	6.660		3.580	
TP3	5.840	5.840	2.750	2.750
	5.020		1.920	
	7.940		2.810	
TP4	7.570	7.573	2.370	2.373
	7.210		1.940	
	2.800		3.270	
62405	2.130	2.127	3.030	3.030
	1.450		2.790	

6/24/03

(25)

D. MILUSICH  
ST. MALDONADO2053.332 BCF JEFFERSON & PARK  
SEE PG. (22)2052.905 BCF E. PARK EAST OF  
JEFFERSON2053.286 BCF - INT-X PARK &  
MESQUITE2008.195 BCF - INT-X MADISON &  
CENTER

(7.1057?)

6/24/03

3028 WICKENBURGH PANELS

	9.700		4.750	
62406	9.310	9.310	3.630	3.630
	8.920		2.510	

	12.900		13.50	
TP7	12.570	12.570	1.210	1.210
	12.240		1.070	

	12.330		2.630	
TP8	12.000	12.000	2.465	2.465
	11.670		2.300	

	5.045		1.420	
TP9	4.500	4.502	1.260	1.260
	3.960		1.100	

	12.65		4.090	
TP10	12.120	12.118	3.340	3.343
	11.585		2.600	

	7.080		1.810	
62411	6.440	6.442	1.540	1.540
	5.805		1.270	

20619.691 BCF INT-X CENTER-A  
 JACKSON  
 (7,10027)

2107.374 BCF PT JACKSON

## 3028 WICKENBURG PANELS

	9.155		7.085	
62412	8.575	8.577	6.450	6.448
	8.000		5.810	
	7.360		7.540	
10015	6.610	6.613	6.800	6.797
	5.870		6.050	
	6.450		8.975	
62412	5.890	5.890	8.400	8.398
	5.330		7.820	
	0.820		6.580	
62411	0.460	0.460	5.870	5.867
	0.100		5.150	
	3.880		11.495	
TP 10	3.200	3.200	11.050	11.048
	2.520		10.600	
	1.325		4.950	
TP 09	1.155	1.155	4.350	4.350
	0.985		3.750	

6/24/03

27

2107.360 BCF RT. JACKSON

2109.142 BCF INT-X JACKSON &  
MONTE CRISTO

2107.360 SEE ABOVE

2107.374 SEE PG. 26

3028 WICKENBURG PANELS

	2.260		12.210	
TP08	2.080	2.082	11.890	11.890
	1.905		11.570	
	1.650		12.500	
TP 7	1.510	1.510	12.190	12.190
	1.370		11.880	
	4.440		10.005	
62406	3.560	3.563	9.615	9.613
	2.690		9.220	
	2.855		2.980	
62405	2.525	2.525	2.060	2.060
	2.195		1.140	
	3.140		7.350	
TP 4	2.760	2.760	7.070	7.073
	2.380		6.800	
	3.660		7.120	
TP 3	2.850	2.853	6.230	6.227
	2.050		5.330	

6/24/03

29

2066.6970

SEE PG. 36

2068.195

SEE PG. 35

3028

5.550 10.780

62402 5.025 5.027 9.740 9.740

4.505 8.700

3.950 5.790

62401 3.180 3.180 5.410 5.410

2.410 5.030

3.800

10016 2.760 2.760

1.720

0.003 RAW closure

5773 LOOP DIST.

1:1,731,900

5.77E-07 ADJ./ft.

6/24/03

29

2053.286 see pg. 25

2052.905 see pg. 25

2053.332 P.O.B. see pg. 25

32028	WICKENBURG PANELS			
	6.430			
63014	5.930	5.930		
	5.430			
	9.840		2.090	
TP1	9.220	9.220	7.550	7.557
	8.600		7.030	
	10.200		1.070	
TP2	10.010	10.010	0.800	0.800
	9.820		0.530	
	10.070		3.260	
TP3	9.640	9.643	3.070	3.070
	9.220		2.880	
	4.310		2.660	
TP4	3.660	3.660	2.220	2.220
	3.010		1.780	
	2.230		9.730	
TP5	1.340	1.343	9.090	9.087
	0.460		8.440	

7/01/03

(30)

2073.212

S22PGA

G. ANKUM

D. SHUMWAY



7/01/03

32

## 3028 WICKENBURG PANELS

	8.190		3.030	
TP12	7.810	7.807	2.080	2.073
	7.420		1.110	
	3.720		3.960	
70113	3.380	3.380	3.640	3.643
	3.040		3.330	
	3.170		7.920	
TP12	2.210	2.213	7.540	7.540
	1.260		7.160	
	4.380		9.200	
TP11	3.590	3.593	8.250	8.257
	2.810		7.320	
	5.310		8.150	
TP10	4.610	4.617	7.380	7.380
	3.93		6.610	
	5.720		7.160	
TP9	4.870	4.873	6.420	6.423
	4.030		5.690	

2094.590

GOOD NAIL/W HICKETS 10"  
FACE BORDEN: RD.

## 3028 WICKENBURGH PANELS

	6.220		3.830	
TP8	5.510	5.507	2.770	2.770
	4.790		1.710	

	11.200		1.520	
TP7	10.370	10.370	0.810	0.810
	9.540		0.100	

	1.820		7.310	
TP6	1.130	1.130	6.500	6.493
	0.440		5.670	

	9.110		2.330	
TP5	8.480	8.480	1.570	1.570
	7.850		0.810	

	2.200		3.690	
TP4	1.740	1.743	3.050	3.053
	1.290		2.420	

	2.950		9.570	
TP3	2.740	2.740	9.150	9.150
	2.530		8.730	

7/01/03

33

3028 WICKENBURG FANEA

	0.920		9.850	
TP 2	0.550	0.553	9.670	9.670
	0.190		9.490	

	8.450		9.480	
TP 1	7.930	7.930	8.970	8.970
	7.410		8.460	

			6.810	
63014			6.300	
			5.800	

0.057 RAW CLOSURE

6594 LOOP DIST

1: 116, 188

8.61E-06 adi/ft.

7/01/03

34

3028 WICKERBURG PANELS

	8.835			
70113	8.070	8.072		
	7.310			
	7.550		2.020	
TP1	7.190	7.187	1.19	1.187
	6.820		0.350	
	6.760		3.970	
TP2	6.440	6.438	3.550	3.550
	6.115		3.130	
	6.615		2.650	
TP3	6.280	6.282	1.890	1.890
	5.950		1.130	
	6.130			
TP4	5.905	5.907		
	5.625			
	6.615		3.175	
TP5	6.490	6.490	2.905	2.903
	6.365		2.630	

7/01/03

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209A.500 see pg 32

D. MILUSKI

B. HUNTSMAN

M. MALDONADO

3028	WICKENBURG PANELS			
	5.230		5.150	
10003	5.160	5.160	5.080	5.082
	5.090		5.015	
	3.160		6.695	
TP6	2.900	2.900	6.570	6.572
	2.640		6.450	
	4.145		6.180	
TP7	3.840	3.838	5.940	5.942
	3.530		5.705	
	3.250		7.920	
TP8	2.760	2.760	7.305	7.305
	2.270		6.690	
	4.225		6.830	
TP9	3.970	3.968	6.445	6.445
	3.710		6.060	
	3.240		8.790	
TP10	2.730	2.730	8.200	8.200
	2.220		7.610	

7/01/03

30

2110, 265	TREBAC w/ CONTROL CAP			
	INITIATIVE			

3028 WICKENBURG PANELS

	4.525		7.910	
TP11	4.365	4.363	7.360	7.357
	4.200		6.800	

			5.840	
70113			5.680	5.680
			5.520	

0.032 RAW CLOSURE

1897 LOOP DIST

1:59,889

-1.67 E-05 adj/ft.

7/01/03

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P.O.B. SEC. PG. 32

3028 WICKENBURG PANELS

	5.265			
70113	4.585	4.585		
	3.905			
	4.870		8.245	
TP12	4.650	4.648	7.390	7.393
	4.425		6.545	
	6.400		6.480	
10002	6.020	6.018	6.100	6.100
	5.635		5.720	
	7.830		4.790	
TP12	7.230	7.230	4.570	4.570
	6.630		4.350	
	5.820		5.305	
TP13	5.535	5.537	4.805	4.803
	5.255		4.300	
			5.320	
70113			5.165	5.165
			5.010	

7-1-03

P. MILUSKI

B. HUNTSMAN

J. MUKAWADO

2094.500 SLEEP (BZ)

2090.247 ZEBAR w/CONTROL CAP. ON  
 JACK BORDEN RD.  
 (PUNCHED THROUGH BY  
 TRAFFIC)

P.O.B. SEASIDE



## **D.1 Precipitation Data**

*Not Applicable / Not Included*

## **D.2 Physical Parameter Calculations**

*Not Applicable / Not Included*

### **D.3 Hydrograph Routing Data**

*Not Applicable / Not Included*

## **D.4 Reservoir Routing Data**

*Not Applicable / Not Included*

## **D.5 Flow Splits and Diversion Data**

*Not Applicable / Not Included*

## **D.6 Hydrologic Calculations**

Table 3. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs)			
		10-Year	50-Year	100-Year	500-Year
<b>Andora Hills Wash</b>					
Above confluence with Cave Creek	2.8	1,450	2,280	2,590	3,550
Above School House Road	1.6	1,070	1,620	1,820	2,500
Below Scottsdale Road	0.6	420	640	720	980
<b>Galloway Wash</b>					
At Spur Cross Road	20.5	10,870	16,920	19,180	26,400
Below confluence with Grapevine Wash	14.6	7,470	11,800	13,430	18,700
1.4 miles above confluence with Grapevine Wash	0.4	170	290	330	490
4070 feet downstream of confluence of Middle Branch and Lower Branch	-- <sup>1</sup>	N/A	N/A	4,375	N/A
2,300 feet downstream of confluence of Middle Branch and Lower Branch	6.2	N/A	N/A	3,096	N/A
1,320 feet downstream of confluence of Middle Branch and Lower Branch	5.8	N/A	N/A	2,903	N/A
Immediately downstream of confluence of Middle Branch and Lower Branch	5.1	N/A	N/A	2,466	N/A
<b>Hassayampa River</b>					
At confluence with the Gila River	1,504	N/A	N/A	72,966	N/A
At Stream Gage Station 95170 (Arlington, Old U.S. Highway 80)	1,470	N/A	N/A	73,500	N/A
At Interstate 10	1,450	N/A	N/A	75,164	N/A
At confluence with Jack Rabbit Wash	1,362	N/A	N/A	76,120	N/A
Just above confluence with Jack Rabbit Wash	1,010	N/A	N/A	55,980	N/A
At Granite Reef Aqueduct	930	N/A	N/A	57,854	N/A
At Stream Gage Station 95165 (Morristown)	774	N/A	N/A	61,600	N/A
At Town of Wickenburg	711	N/A	N/A	71,000	N/A

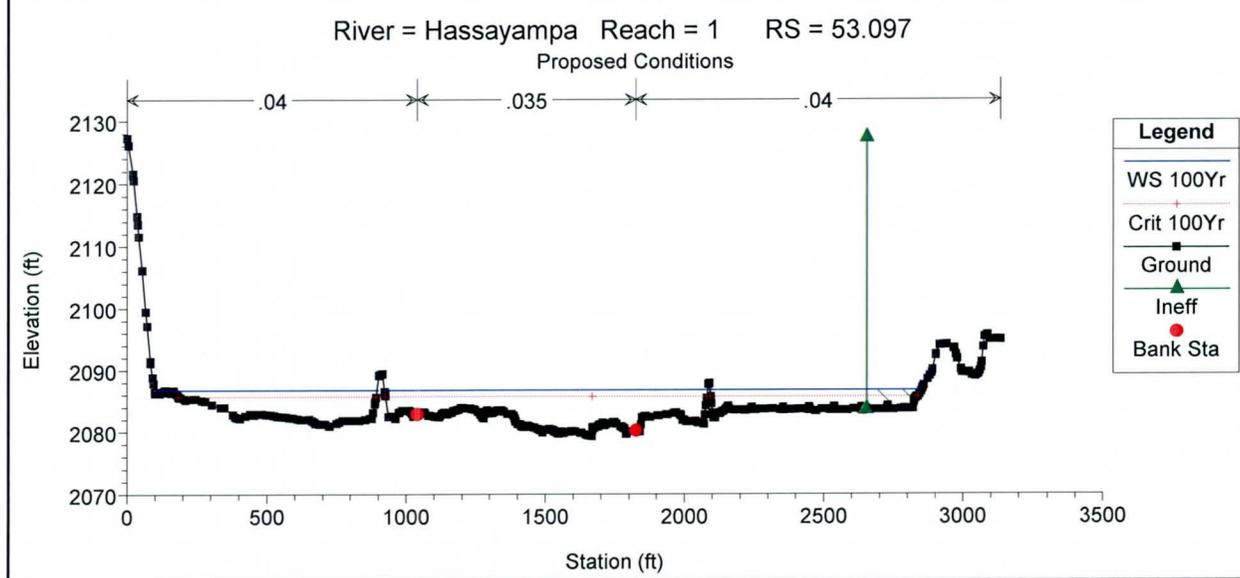
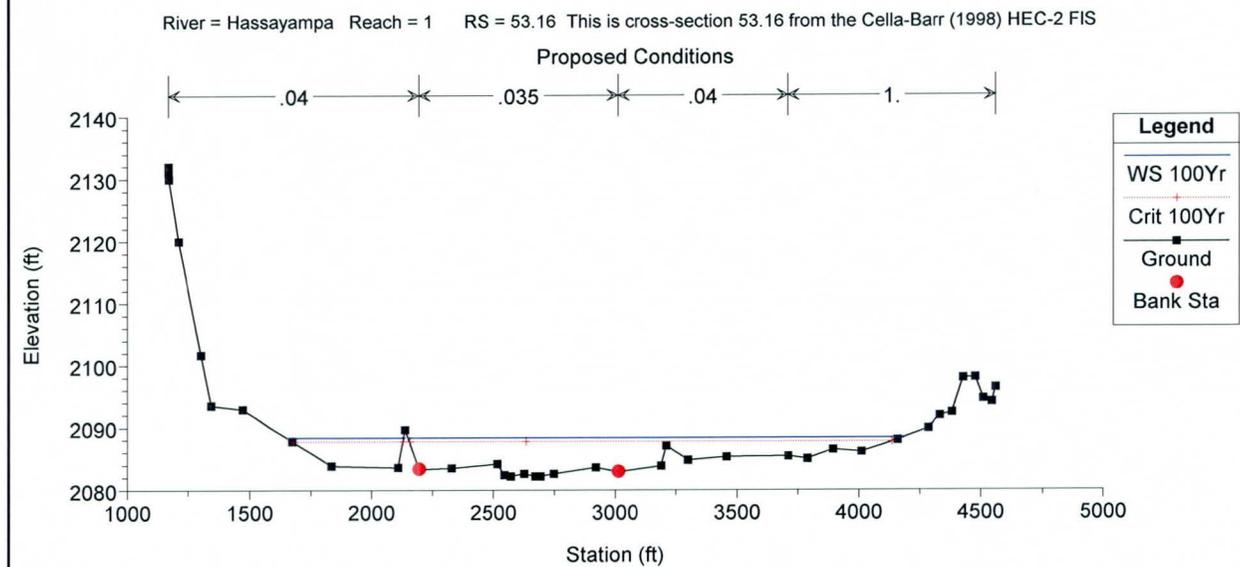
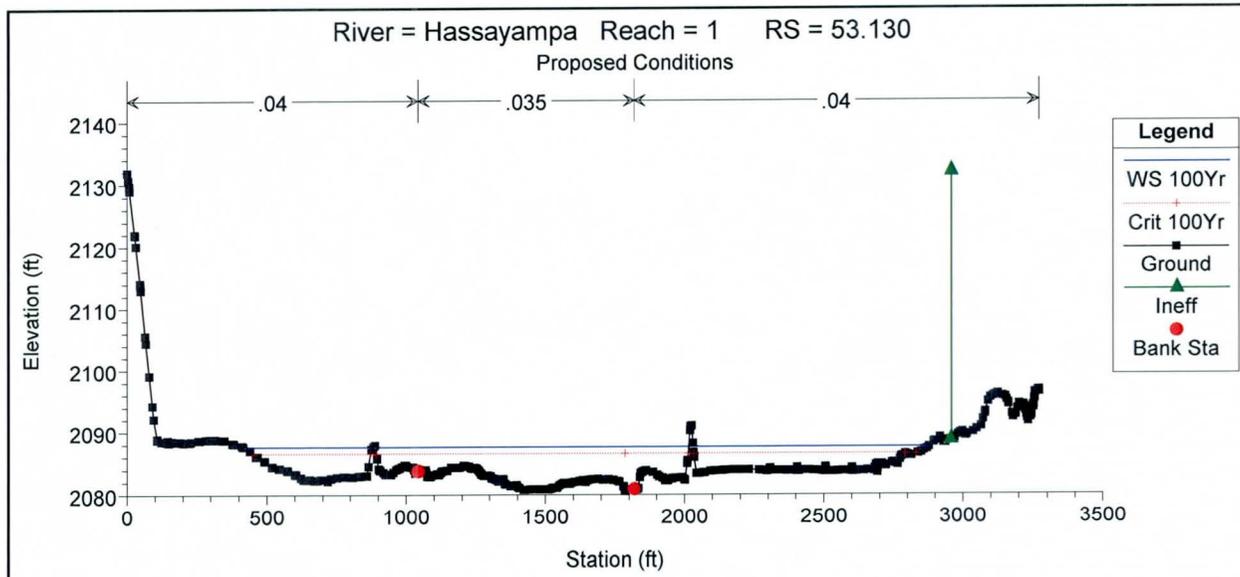
<sup>1</sup>Values Taken from Previously Adopted Flood Insurance Study



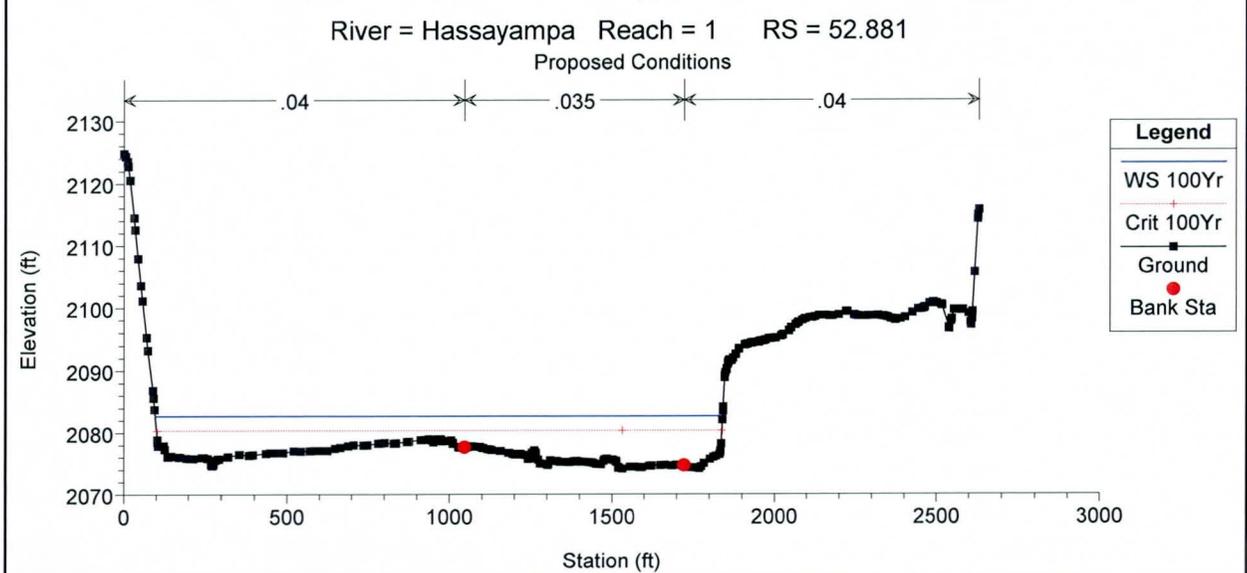
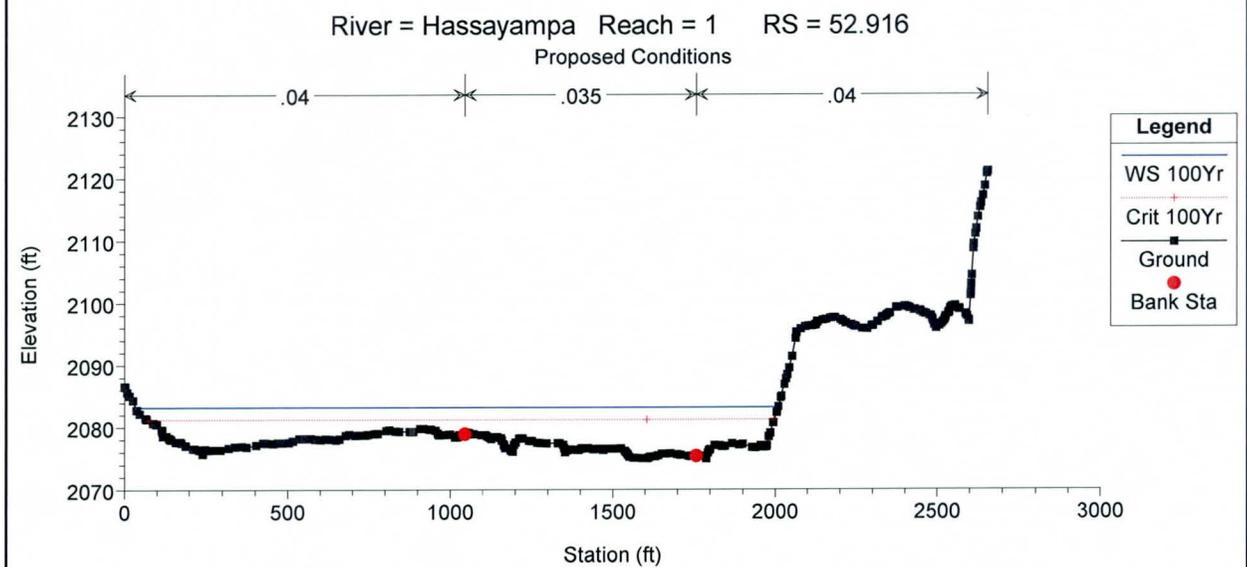
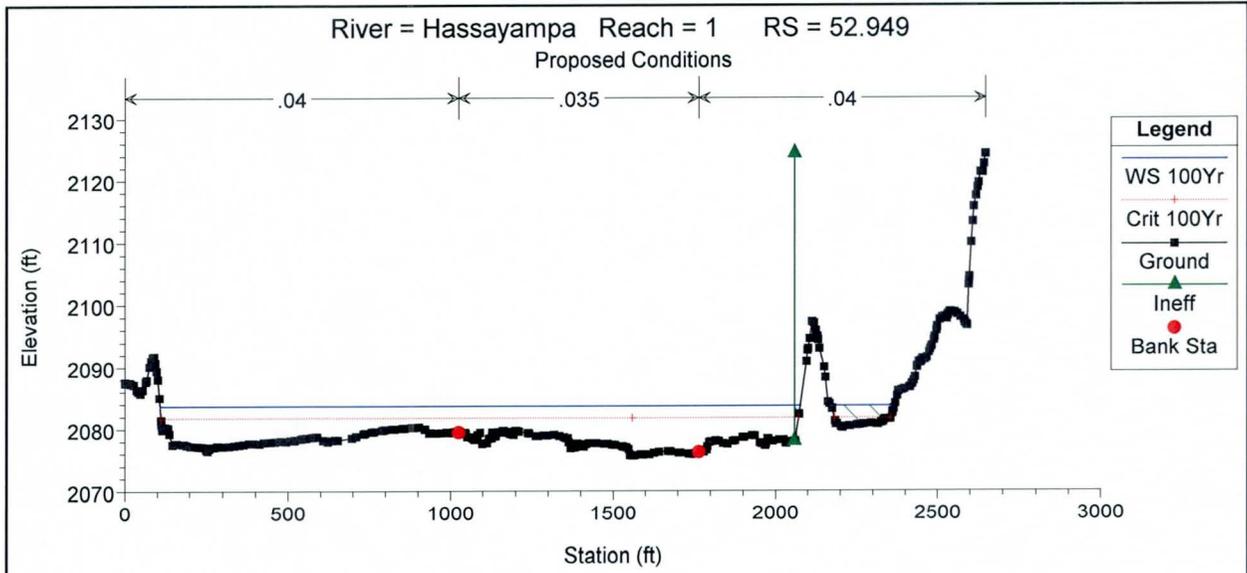
## **E.1 Roughness Coefficient Estimation**

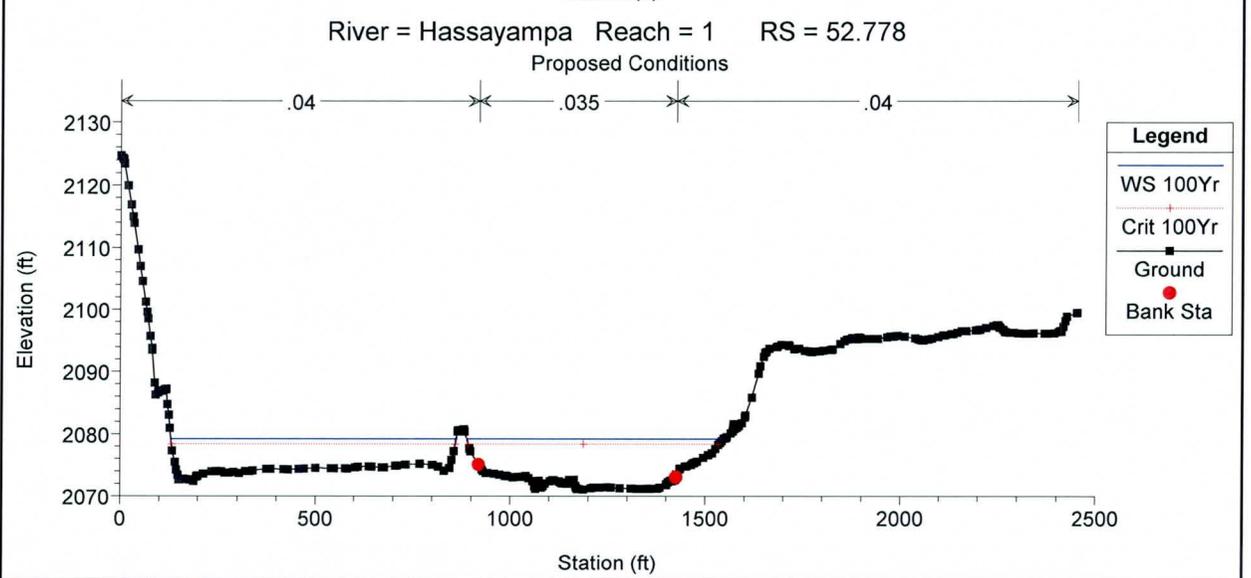
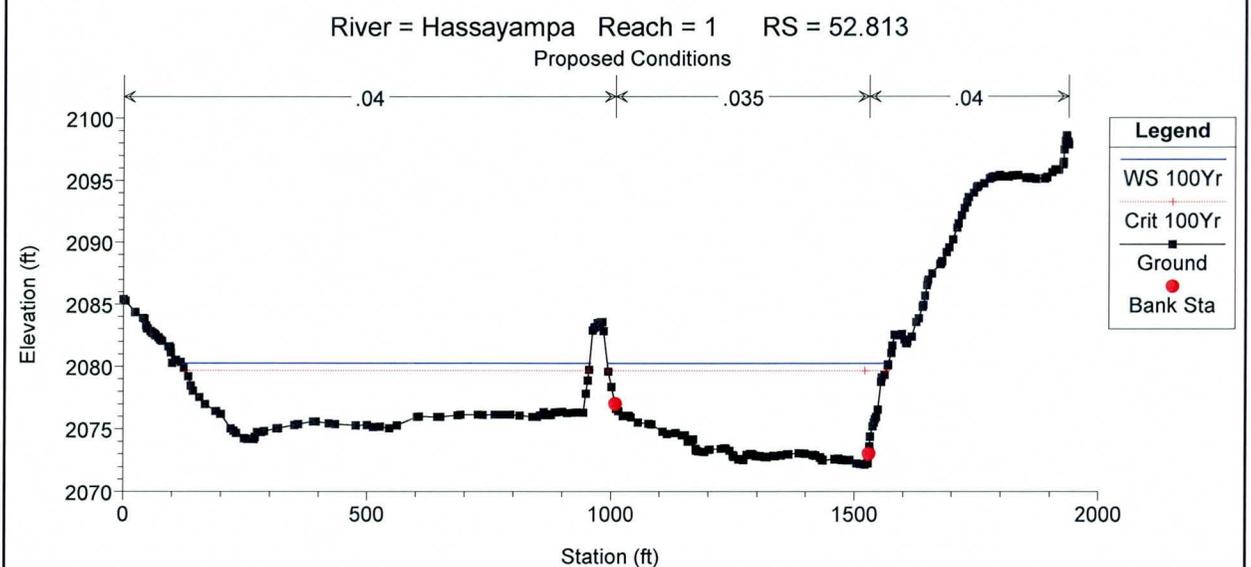
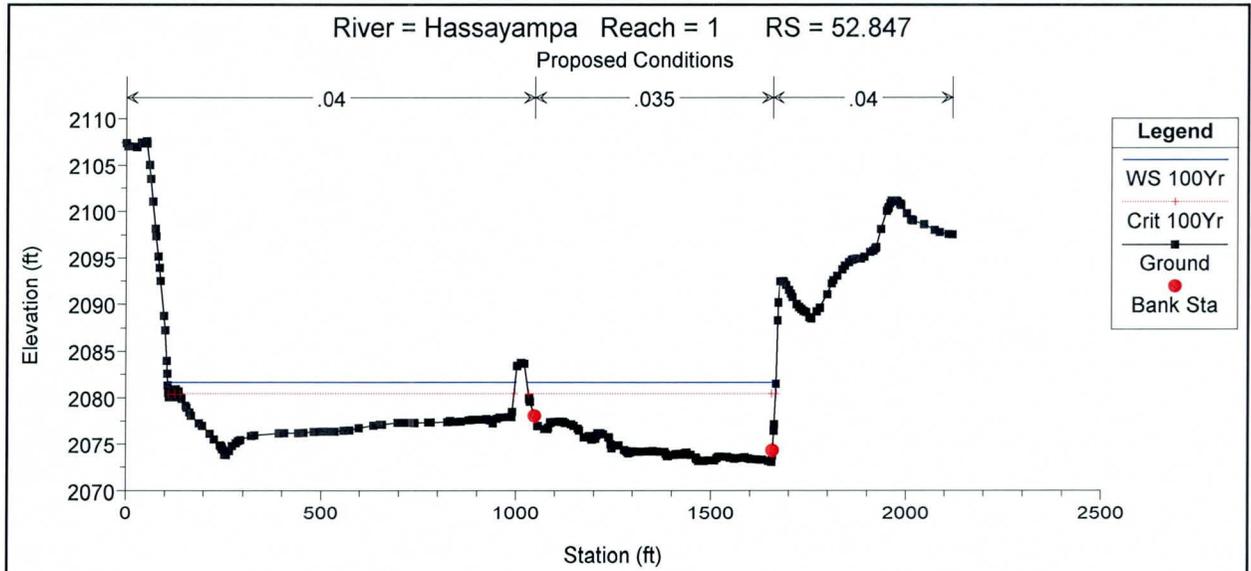
*Not Applicable / Not Included*

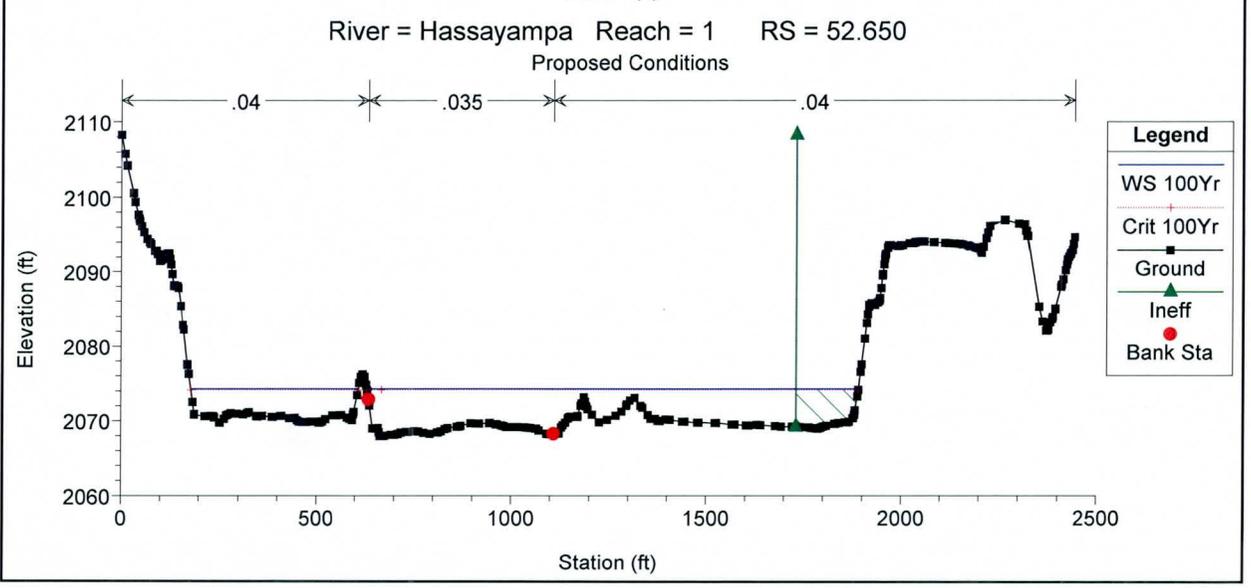
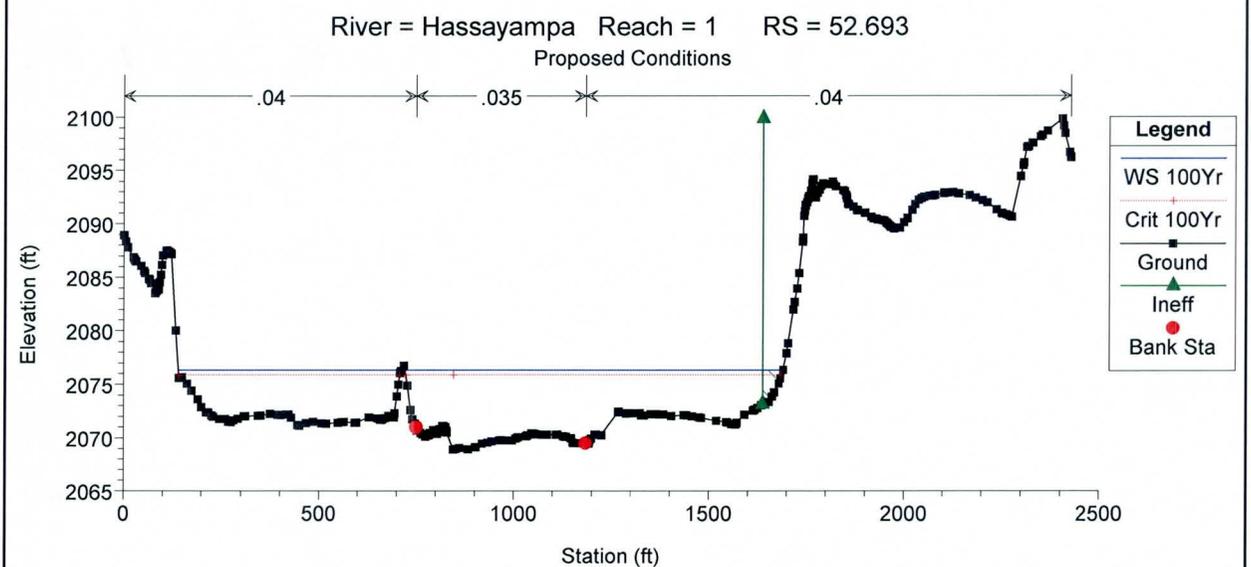
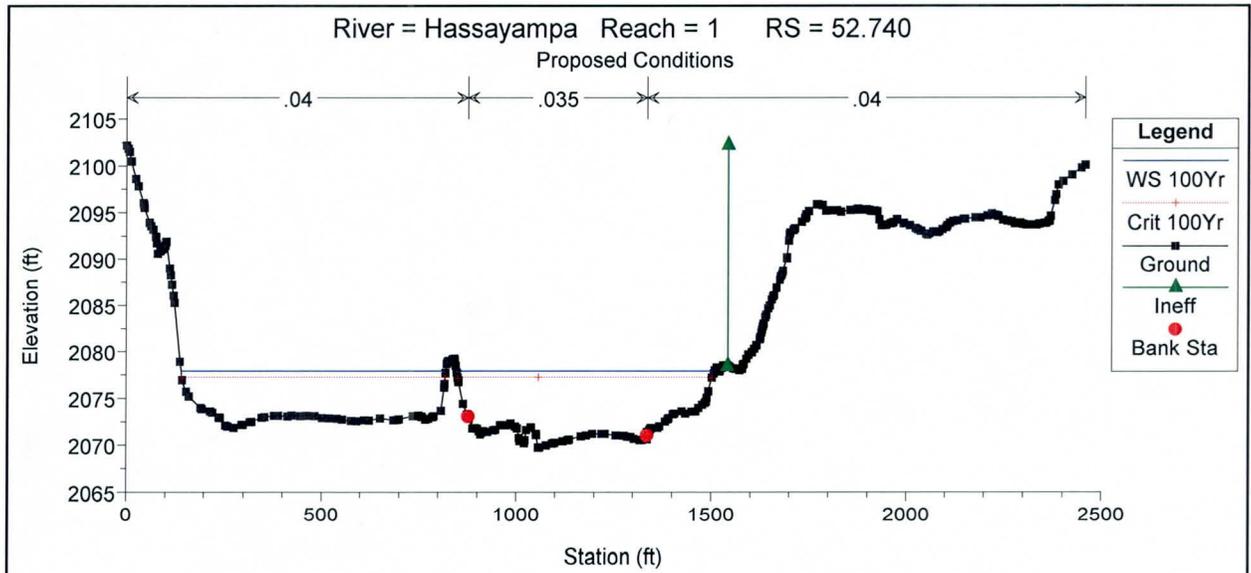
## **E.2 Cross Section Plots**

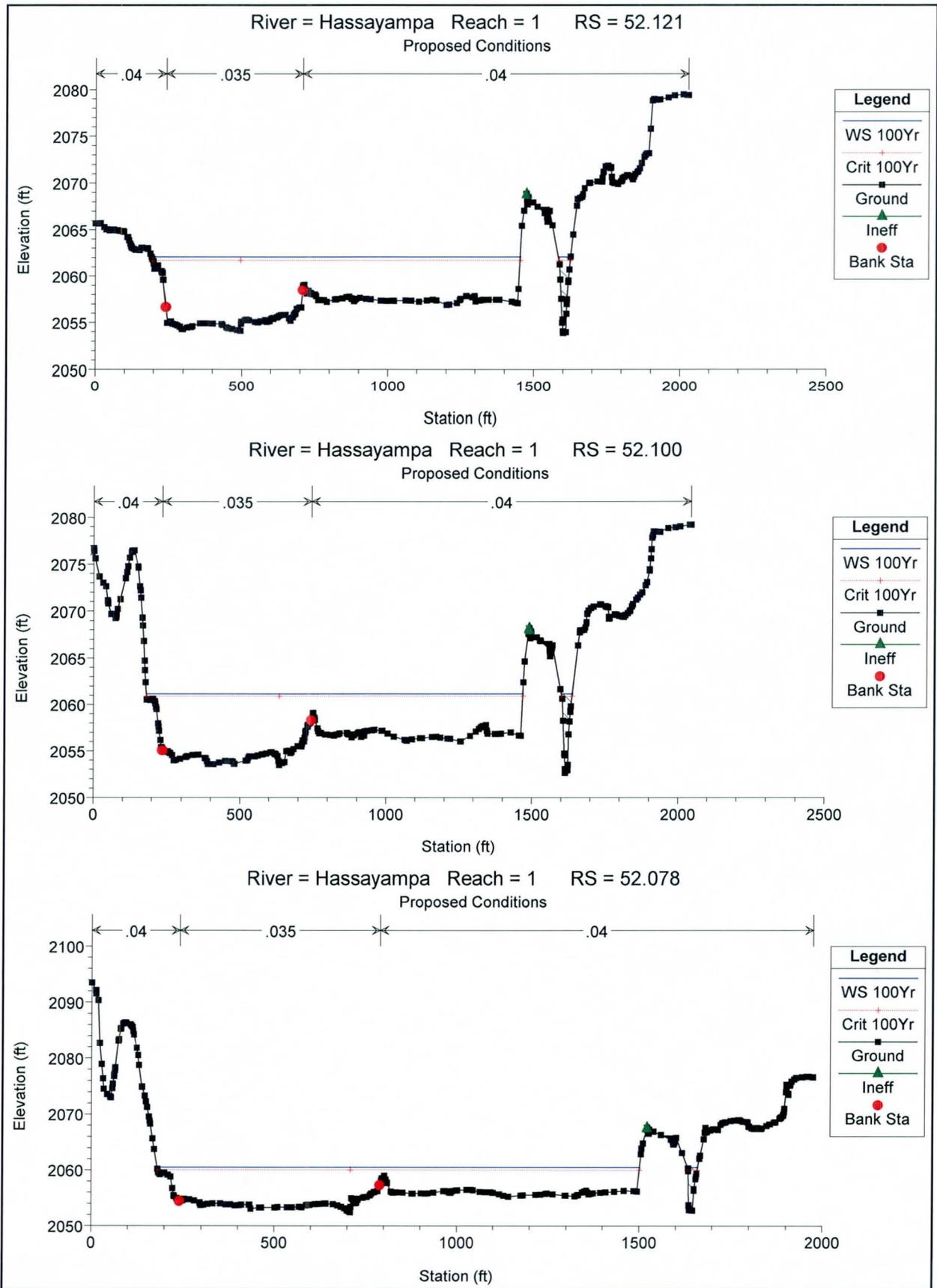


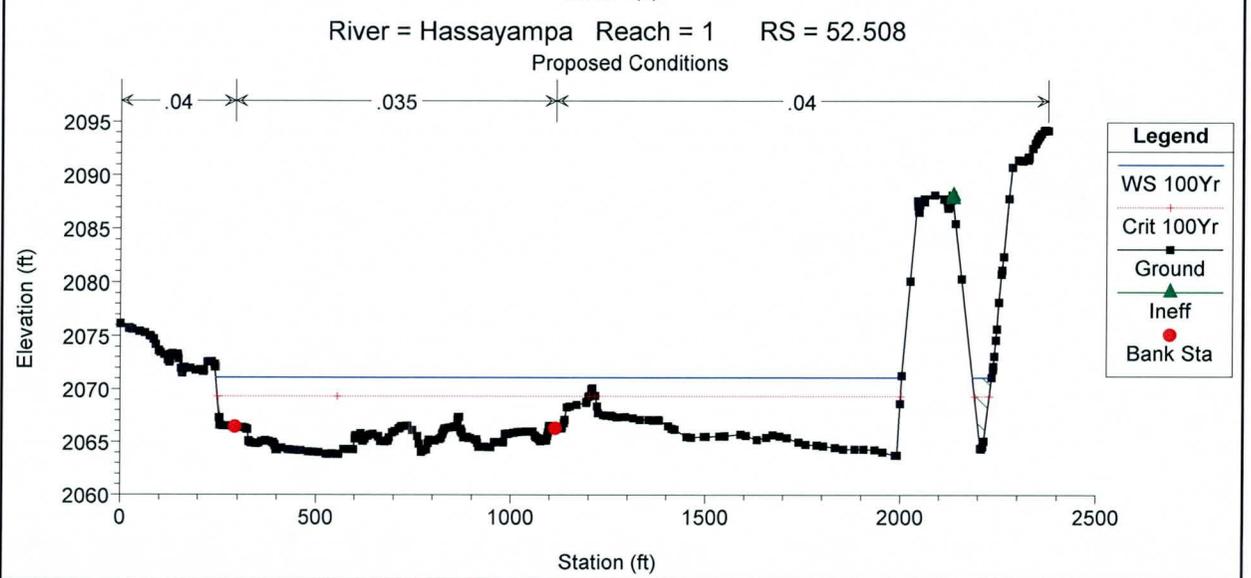
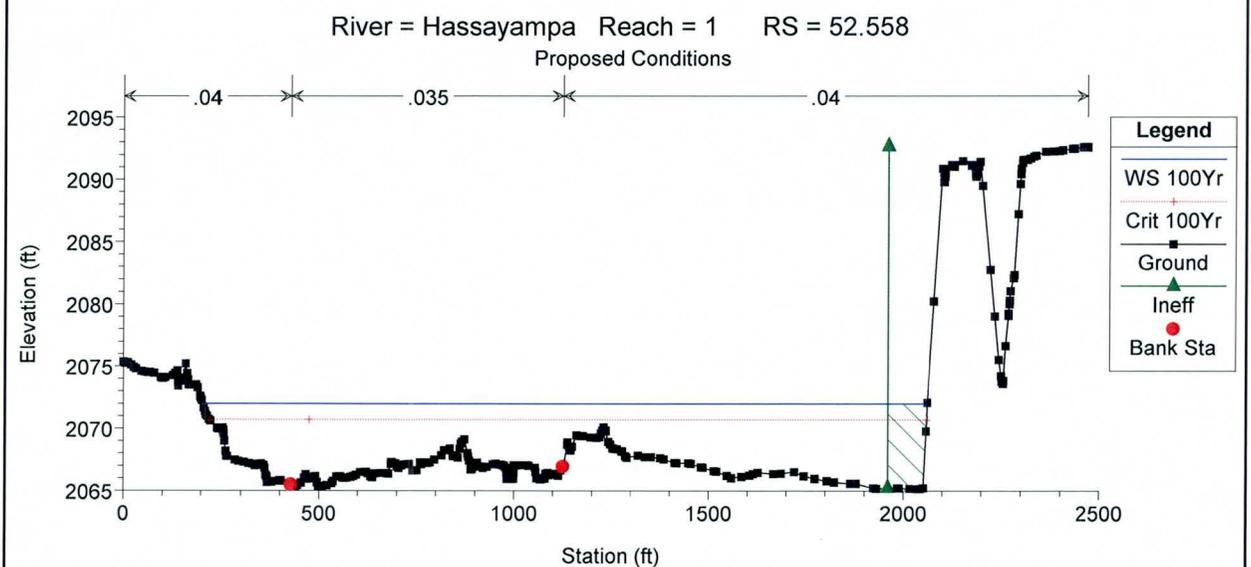
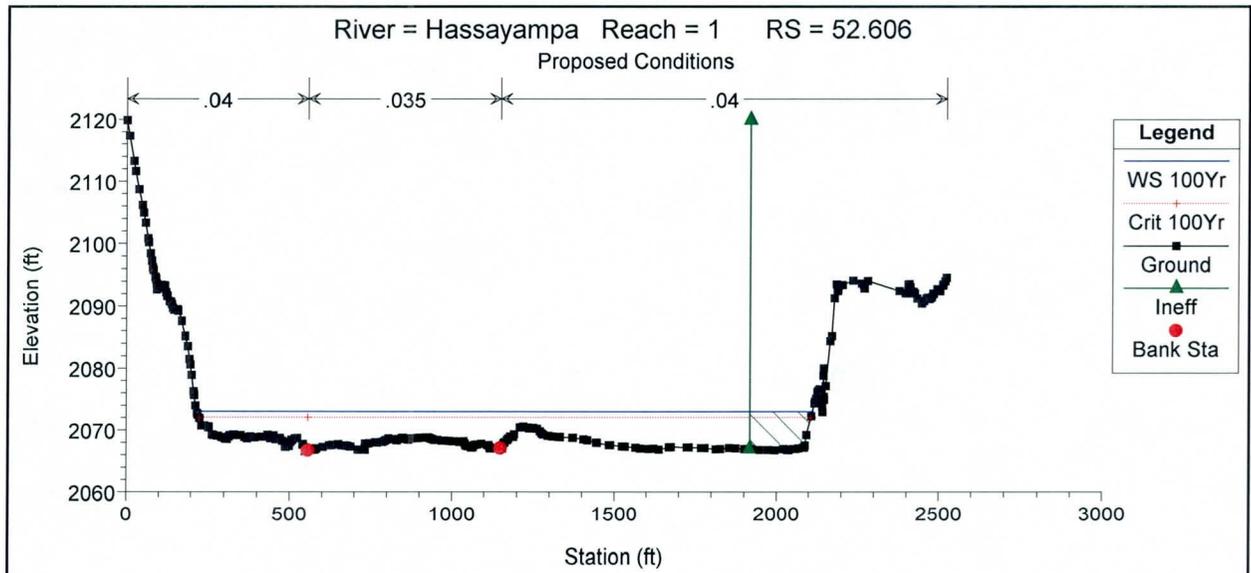


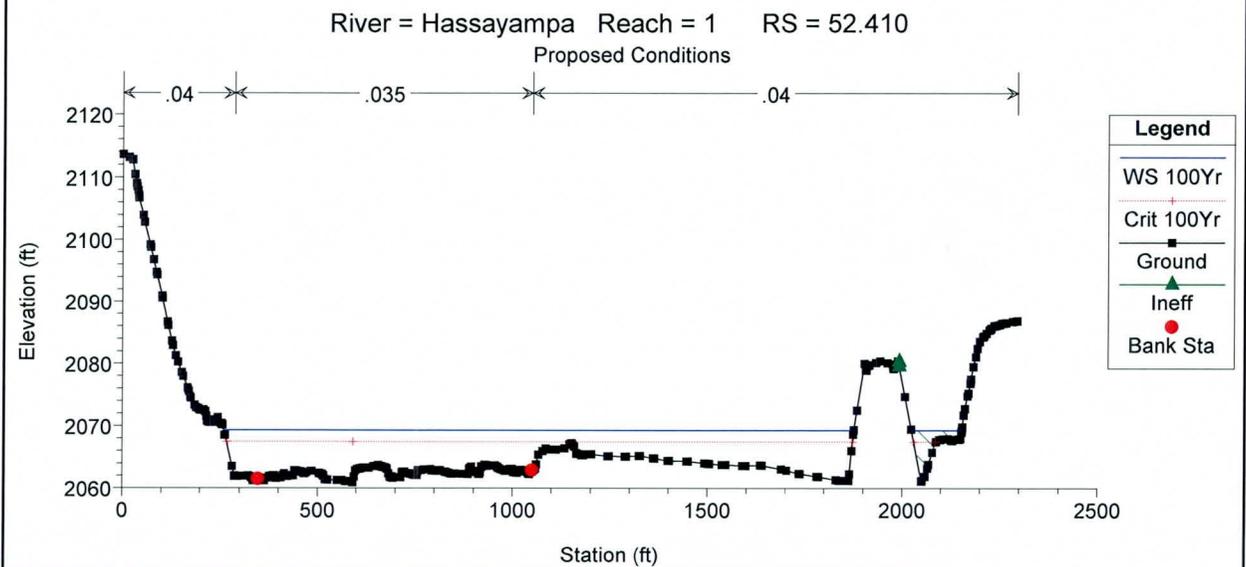
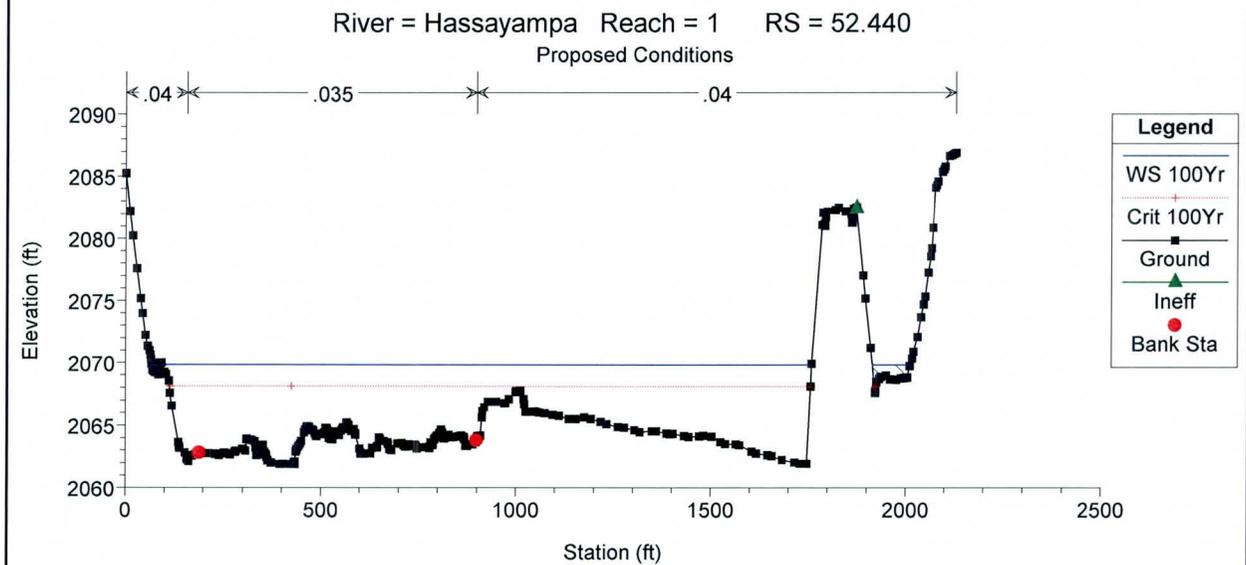
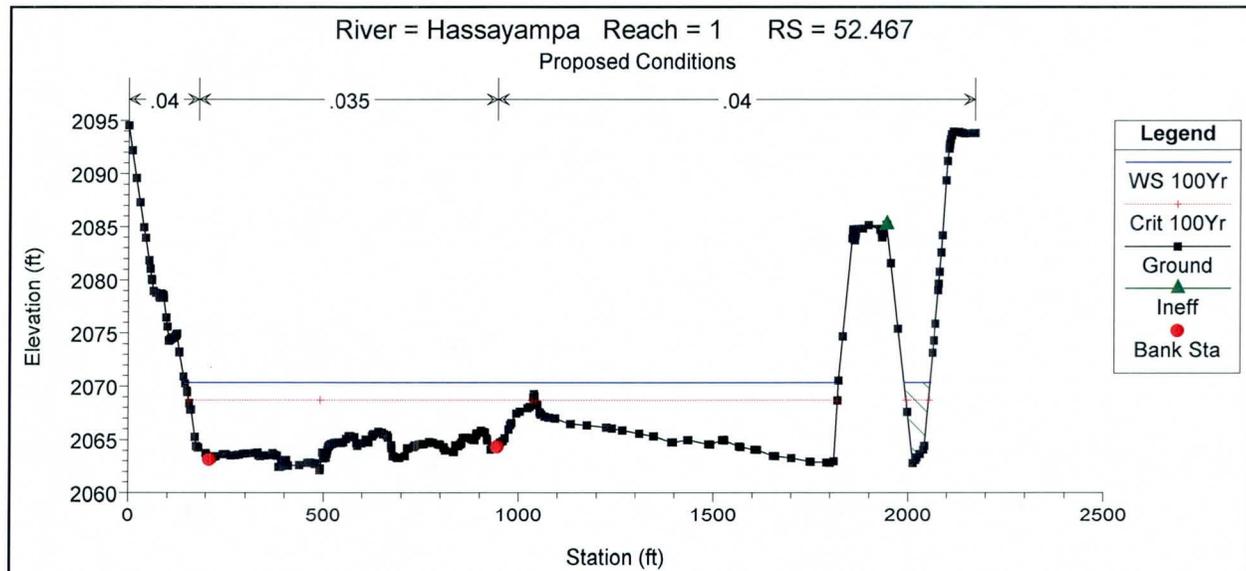


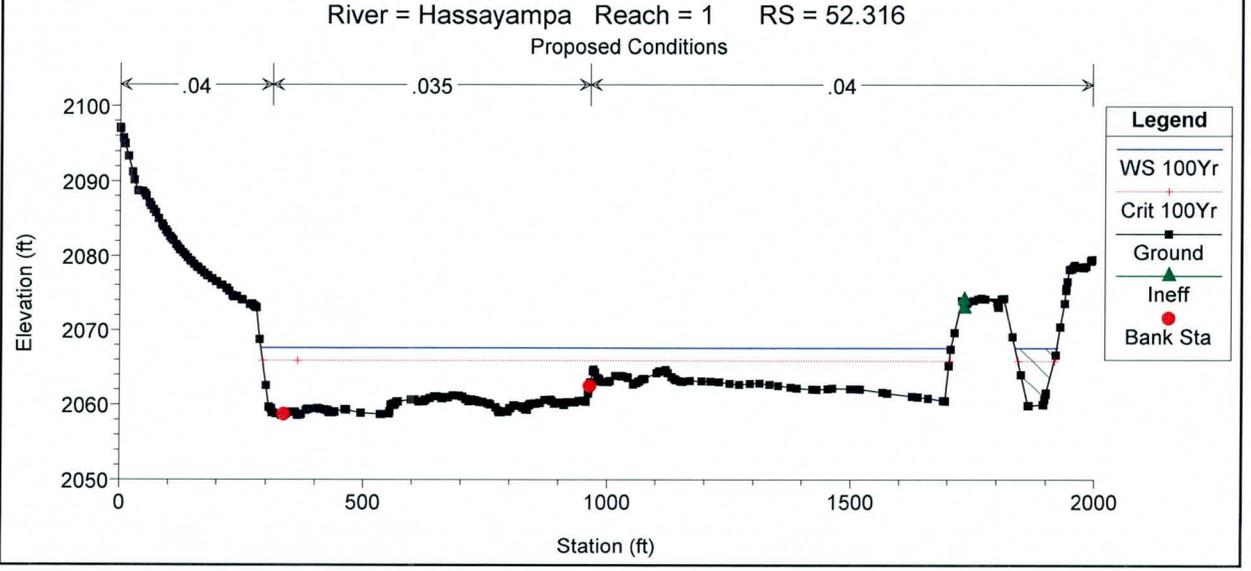
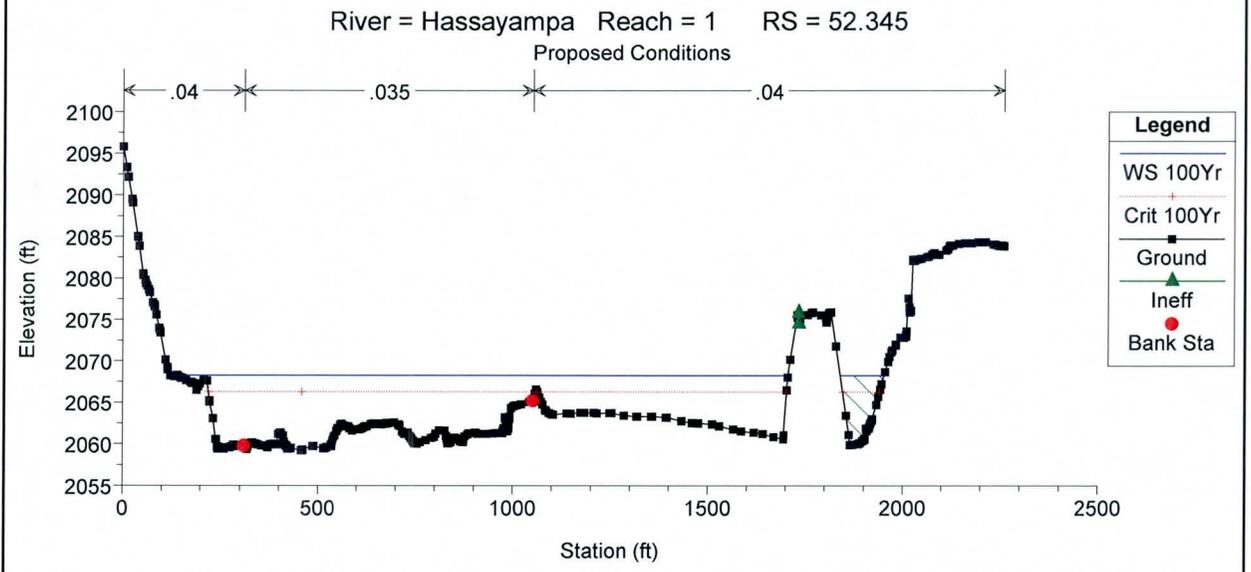
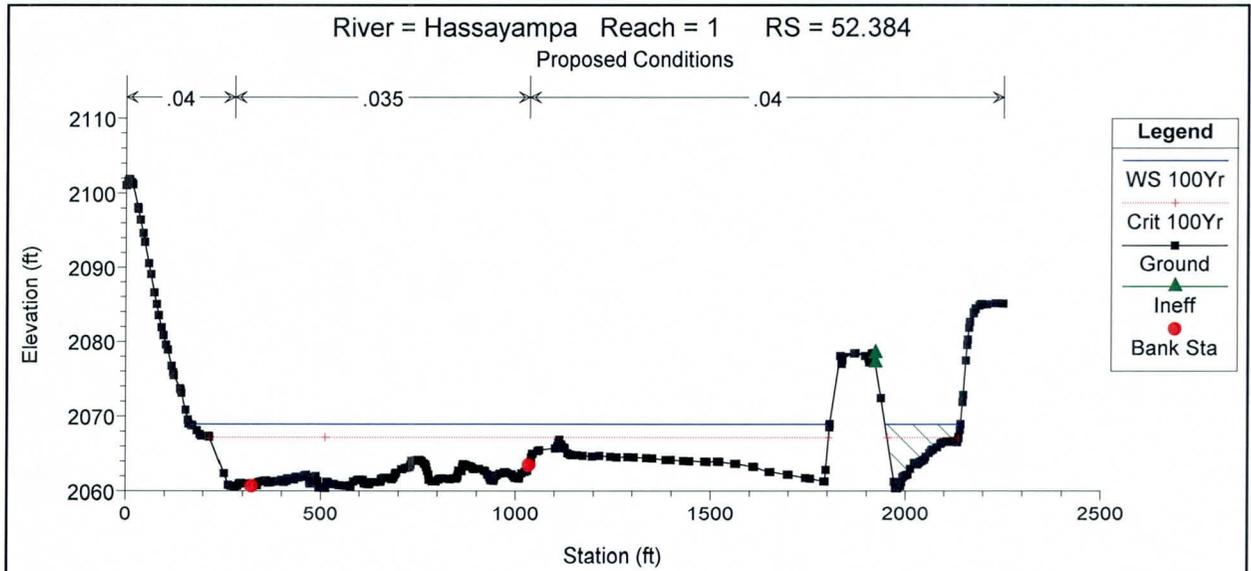


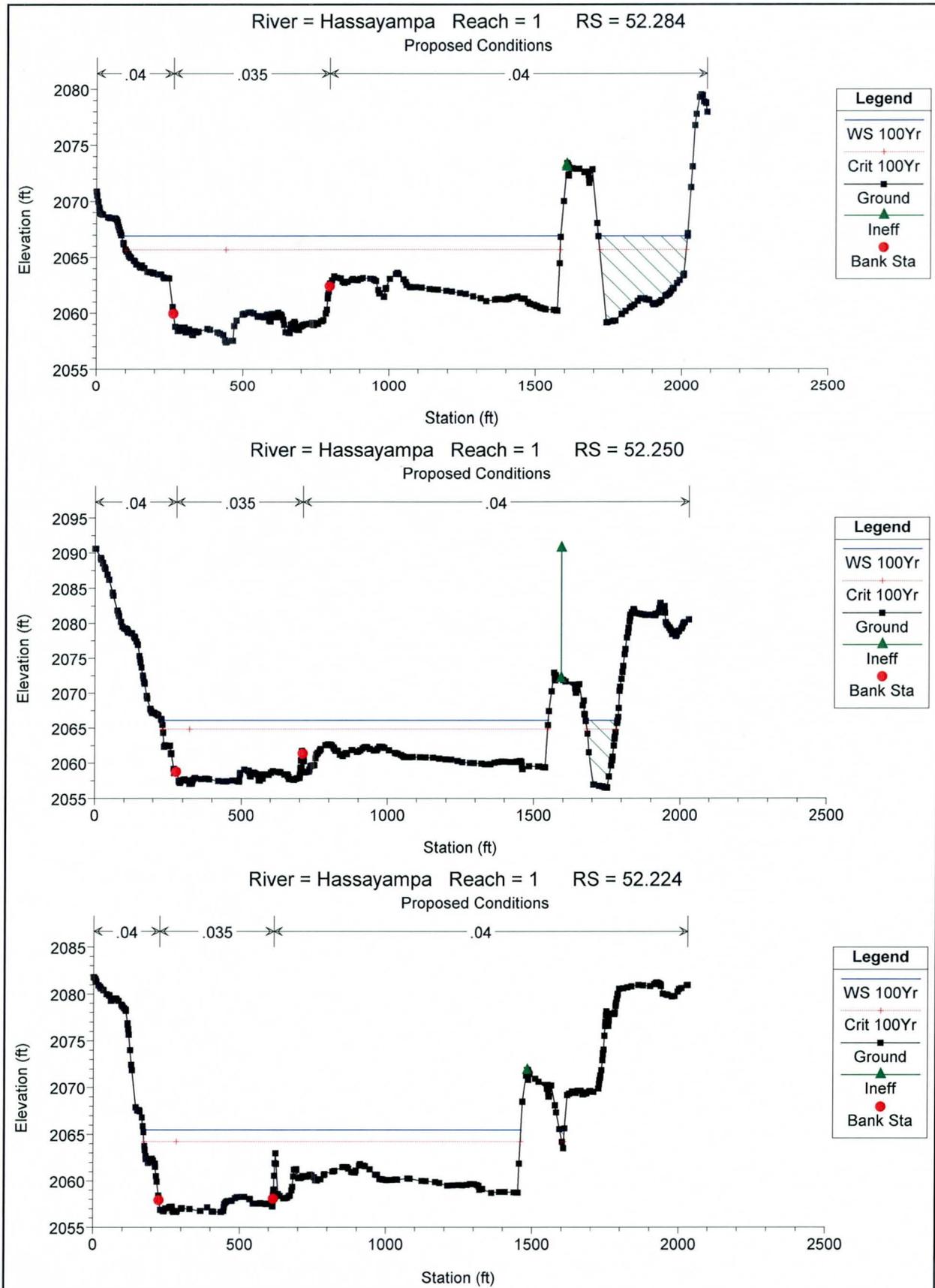


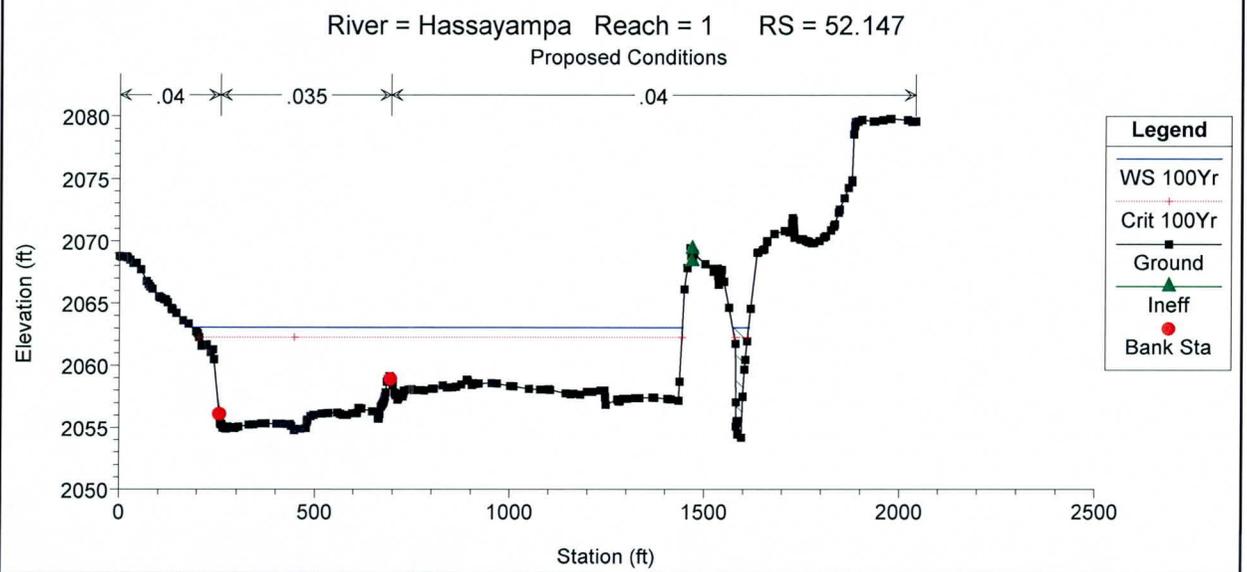
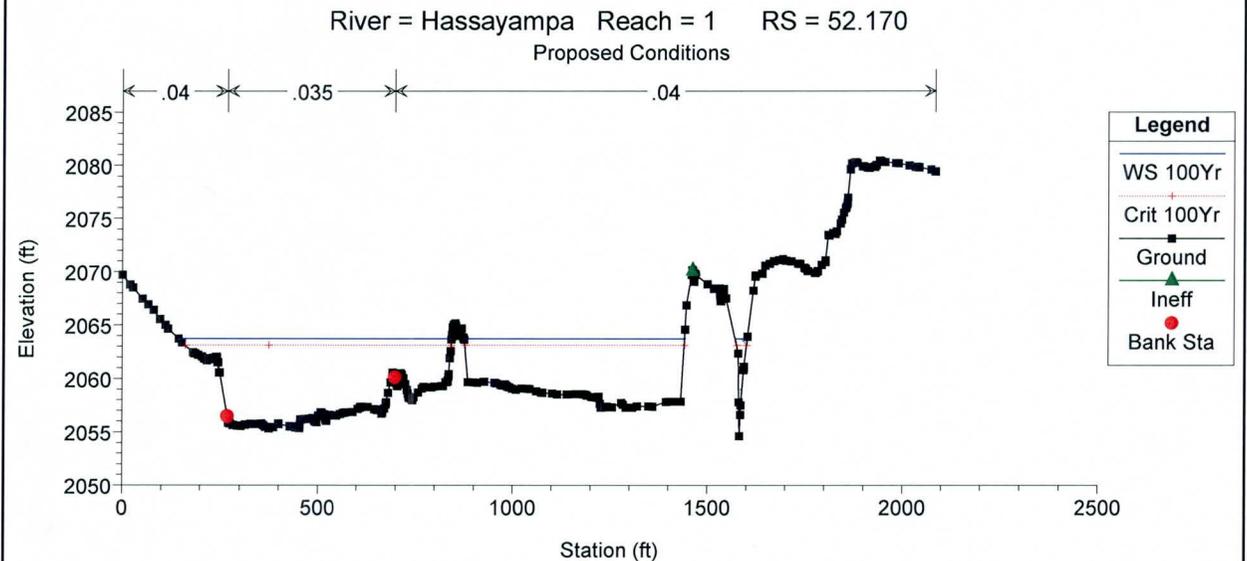
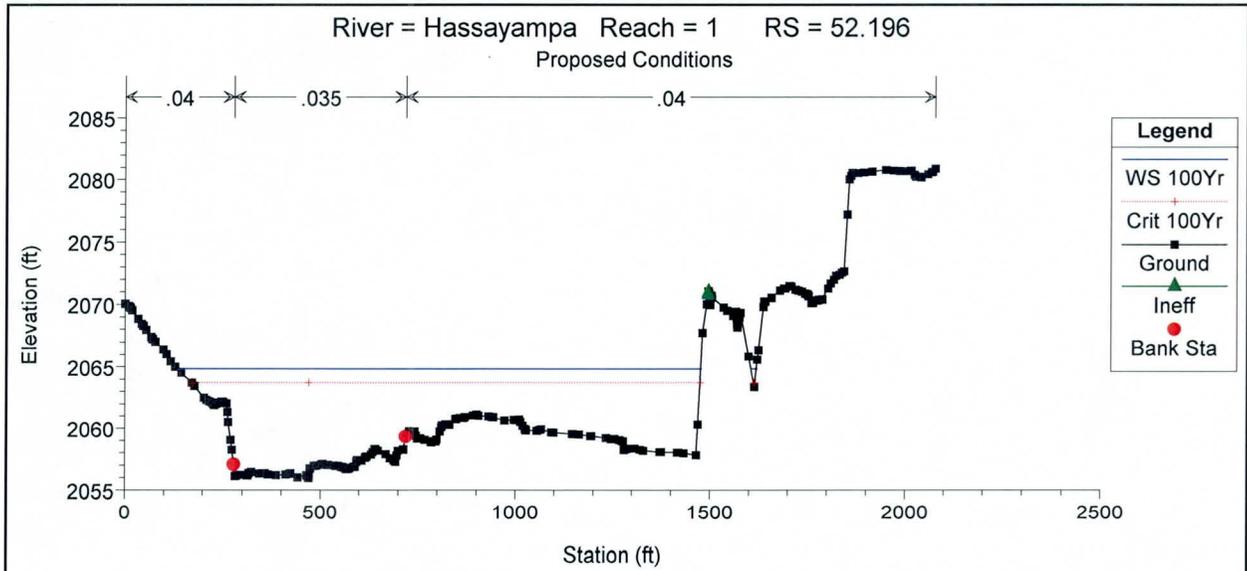


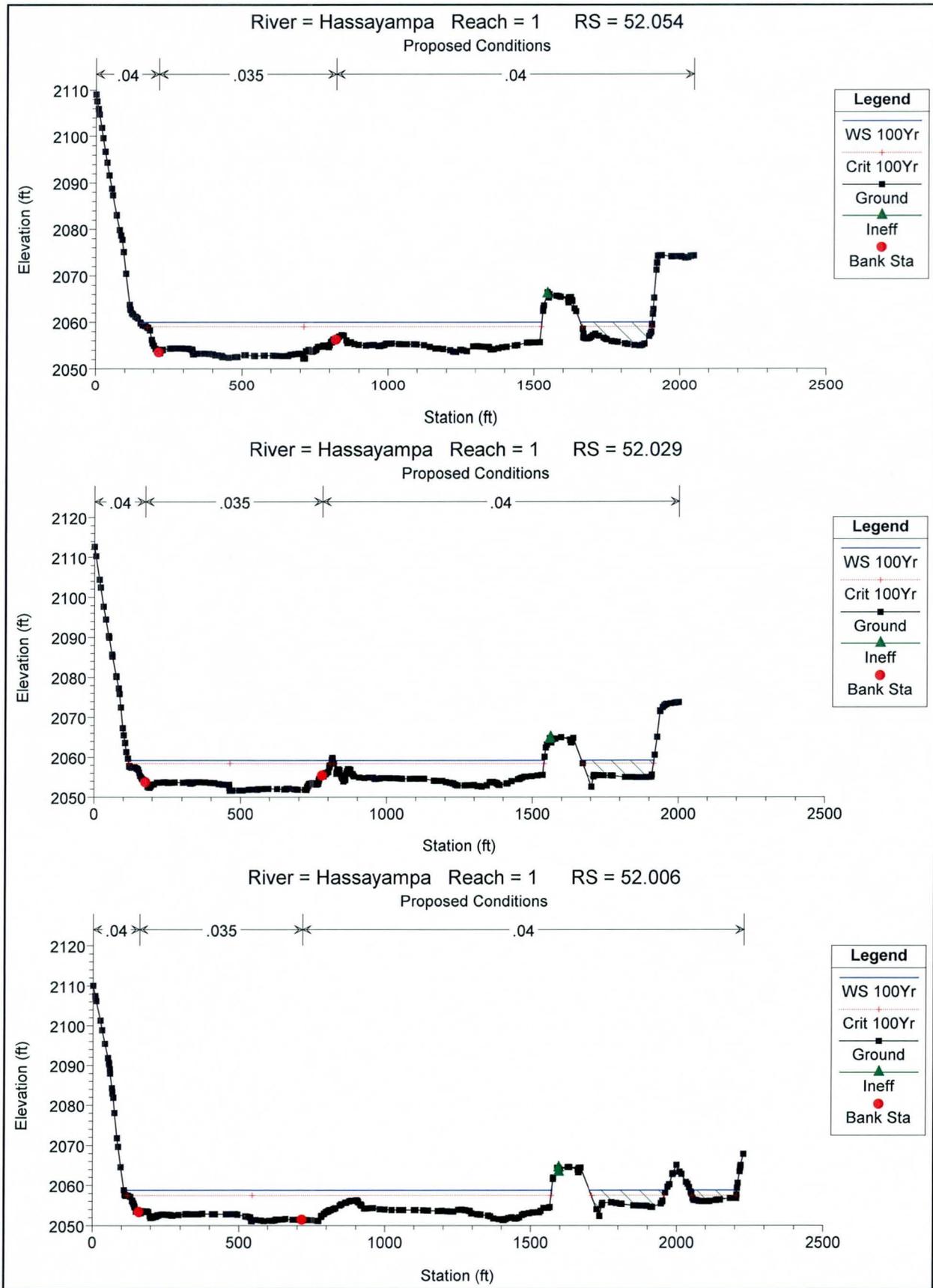


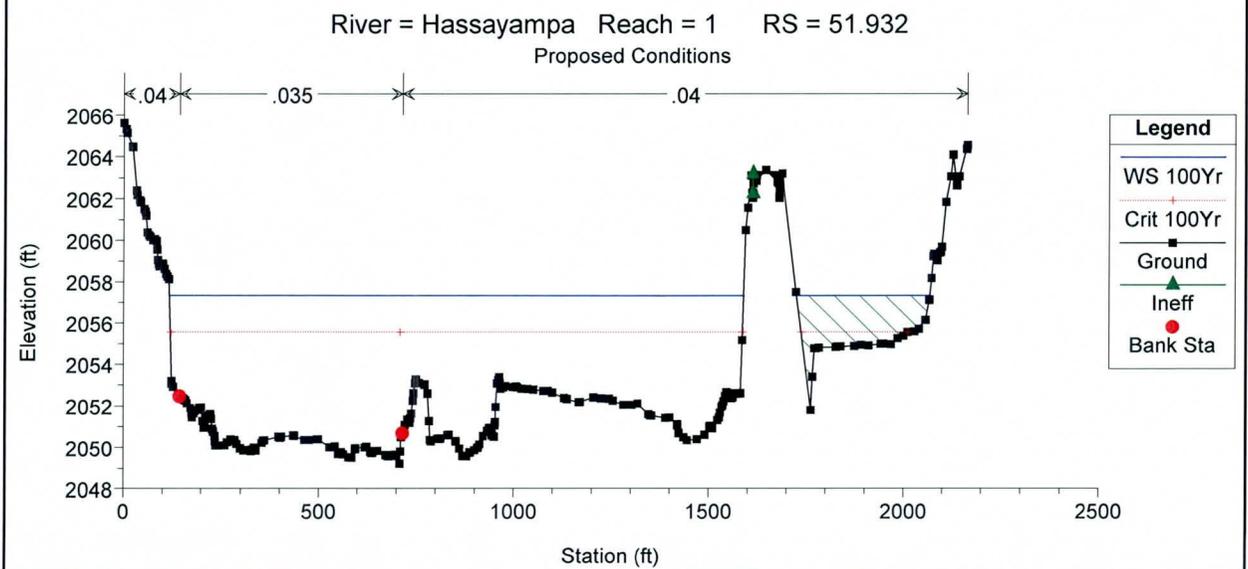
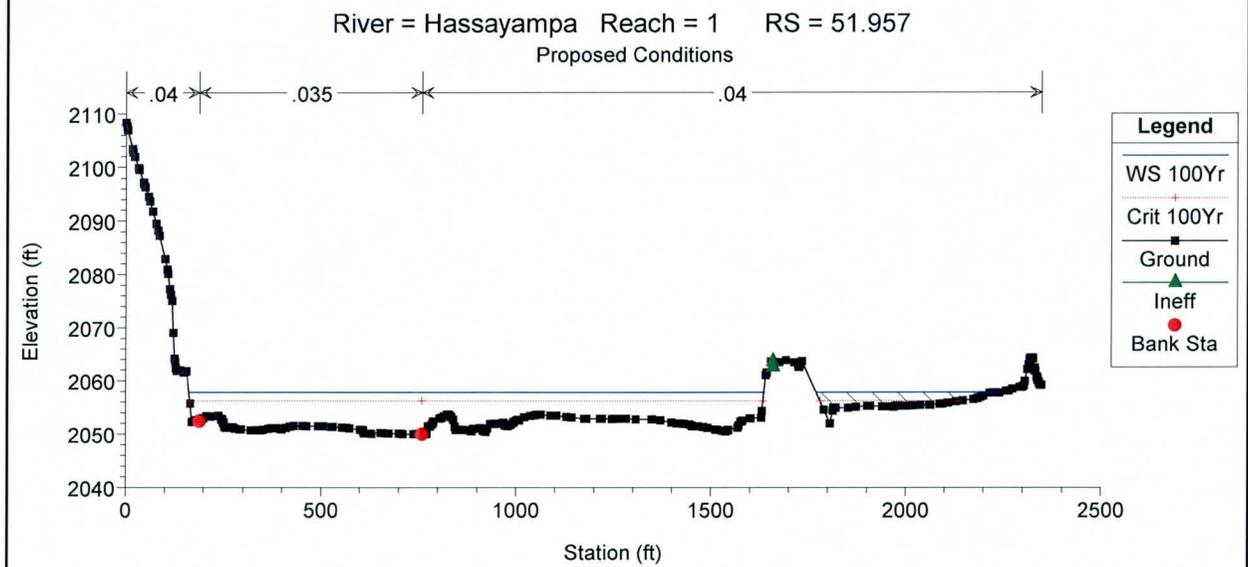
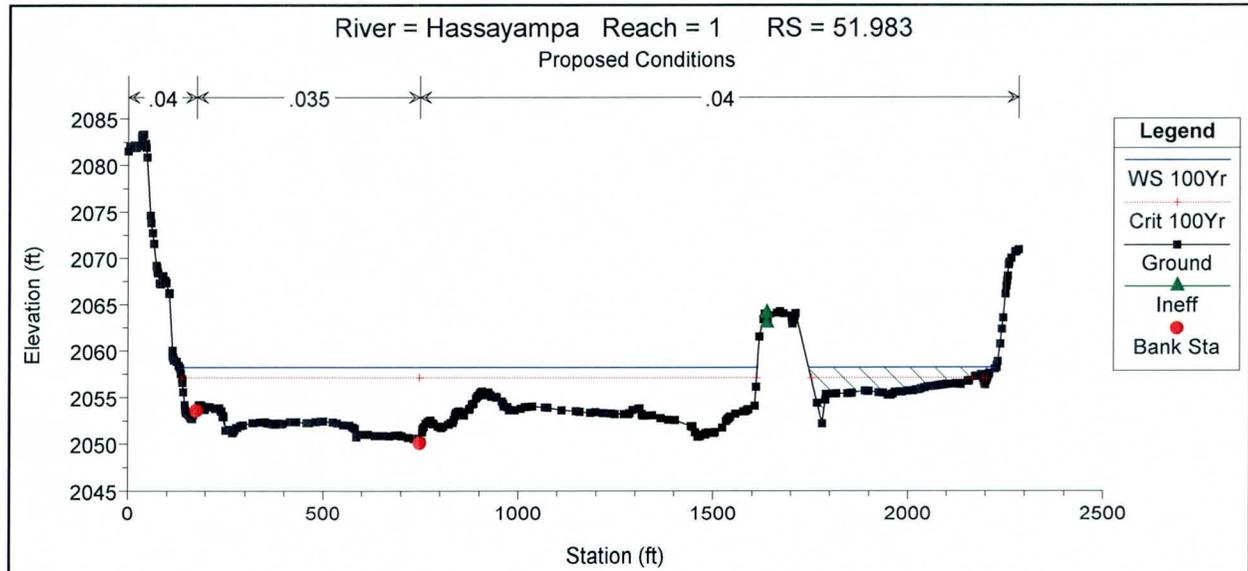


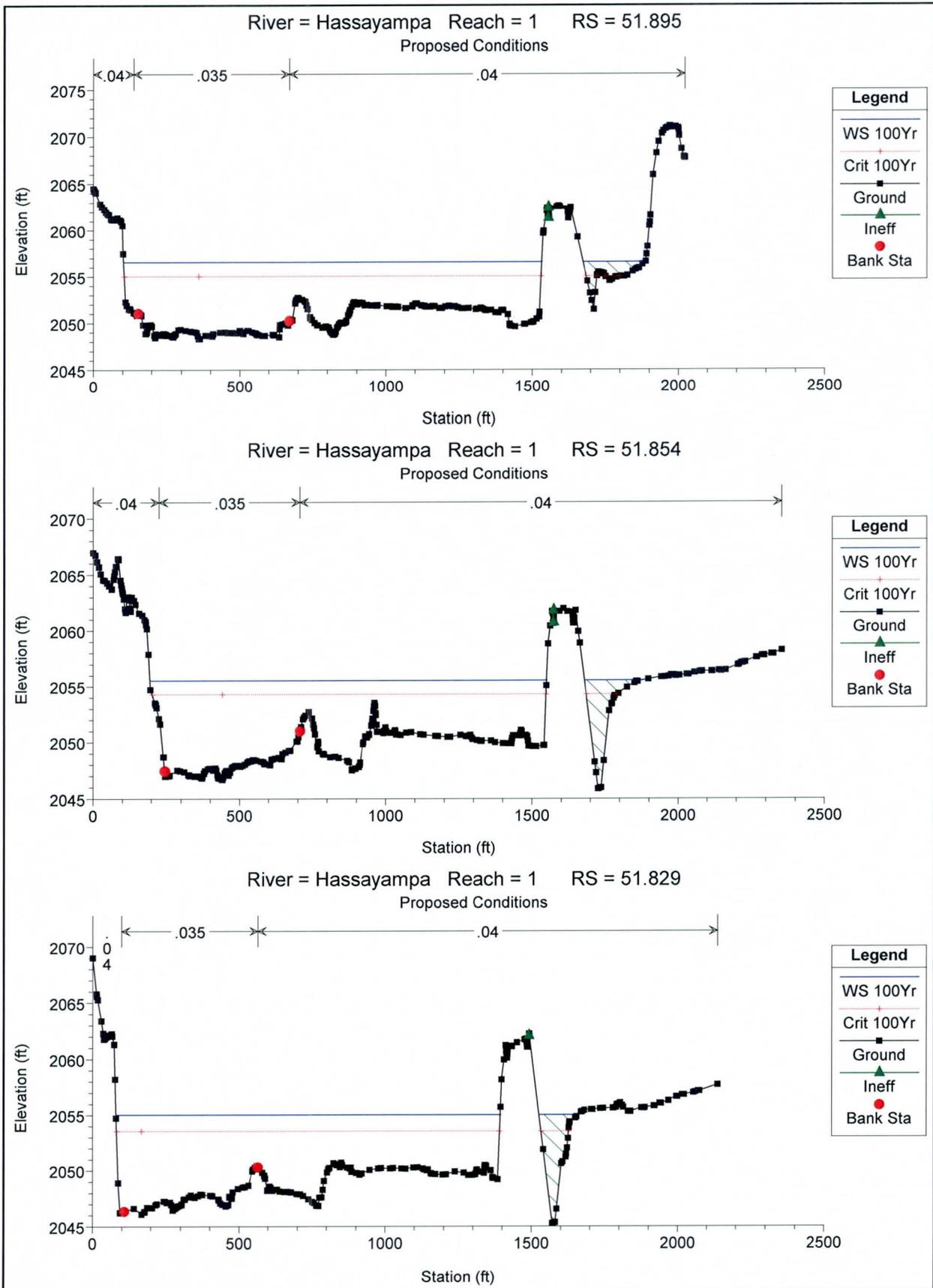


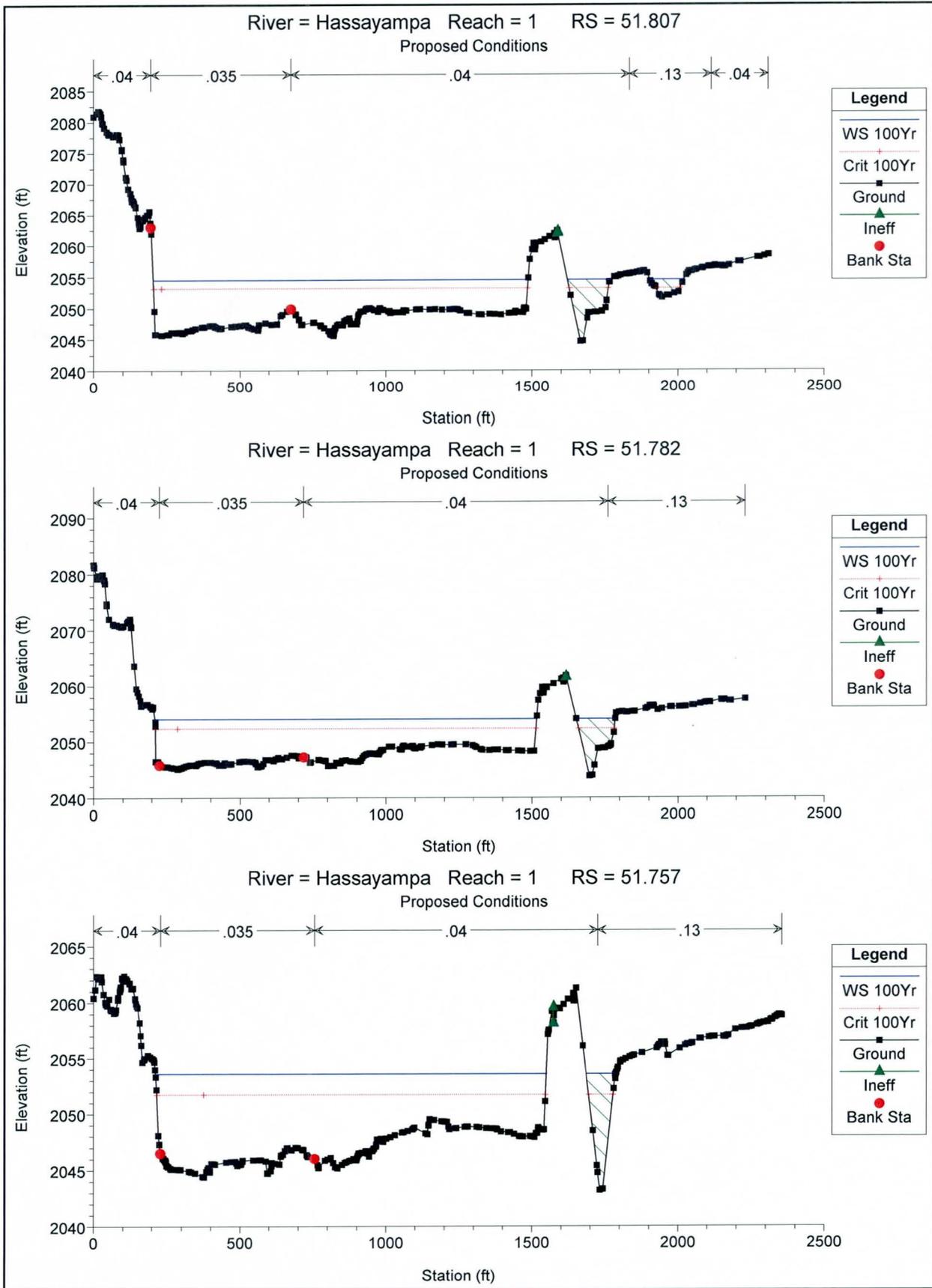


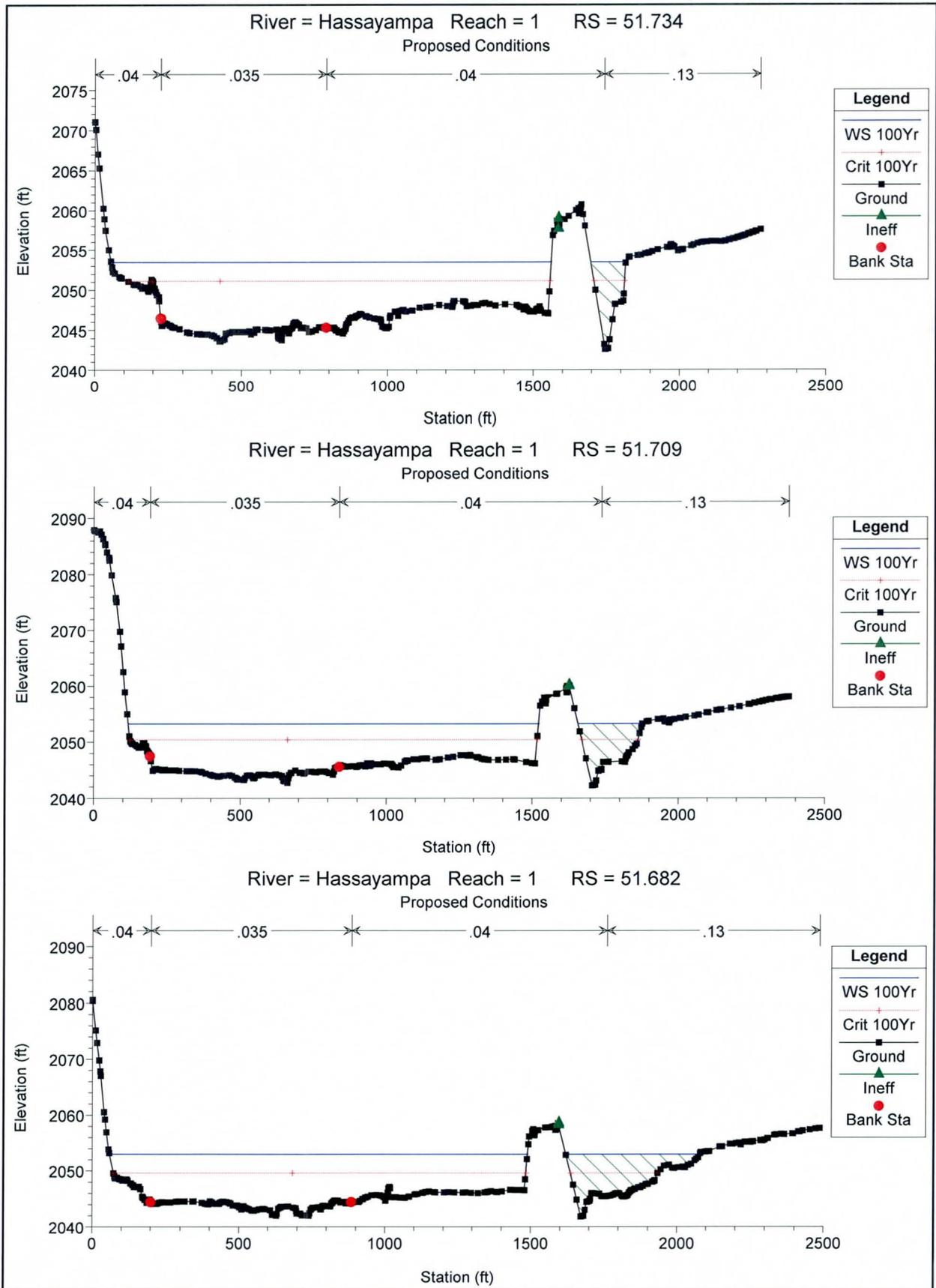


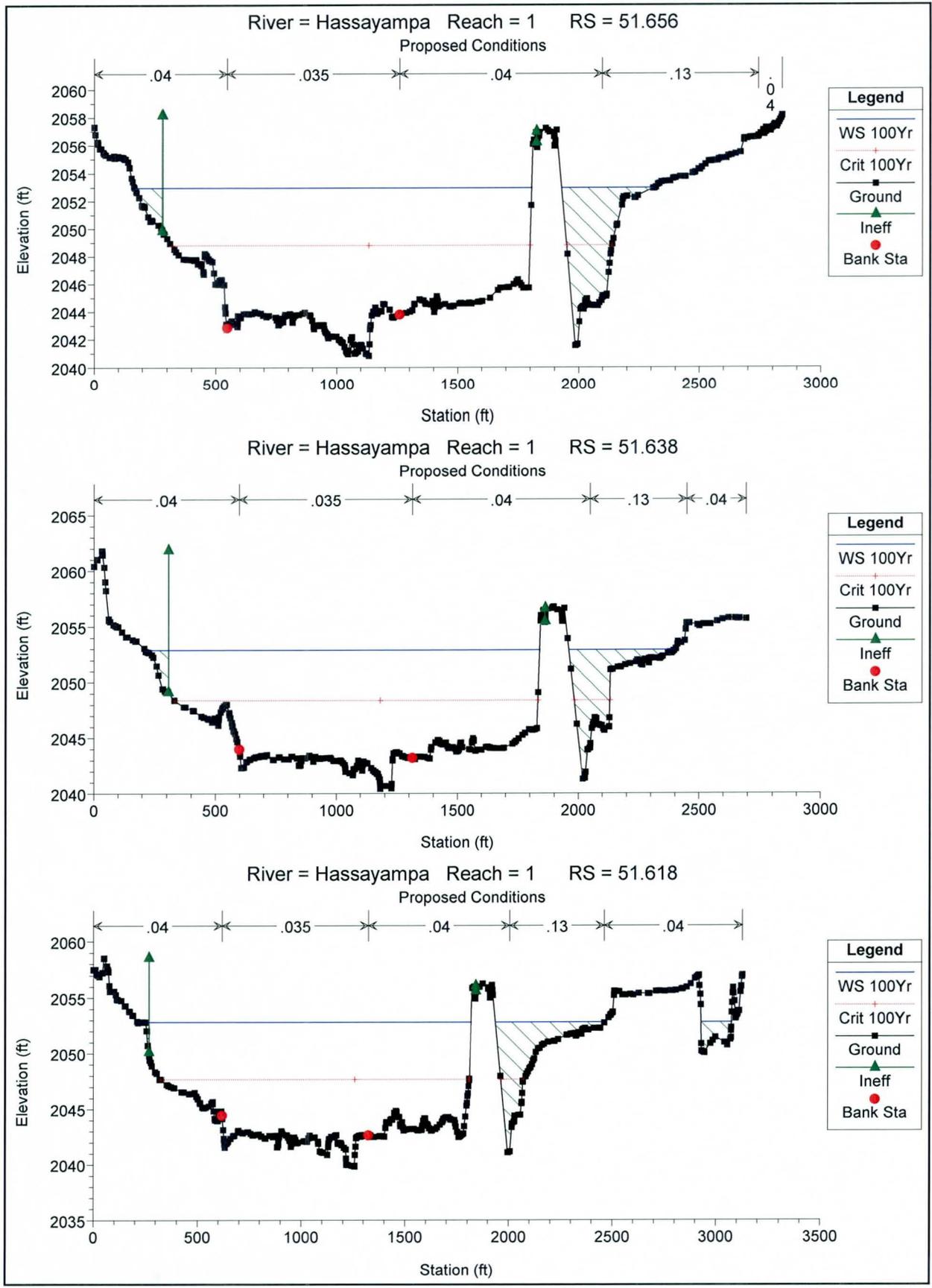


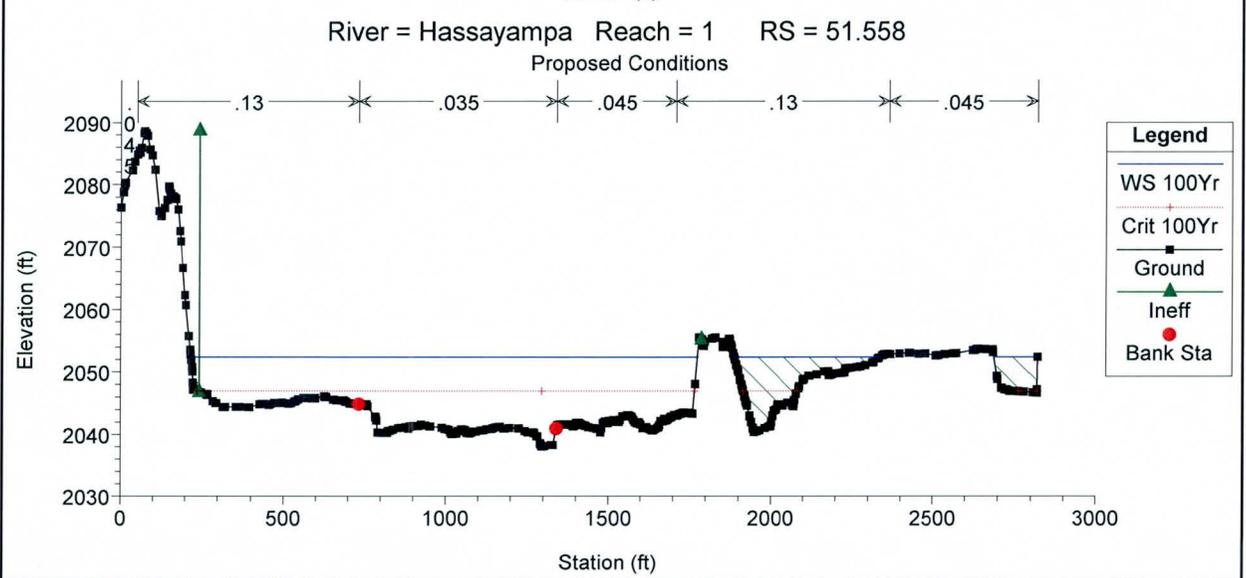
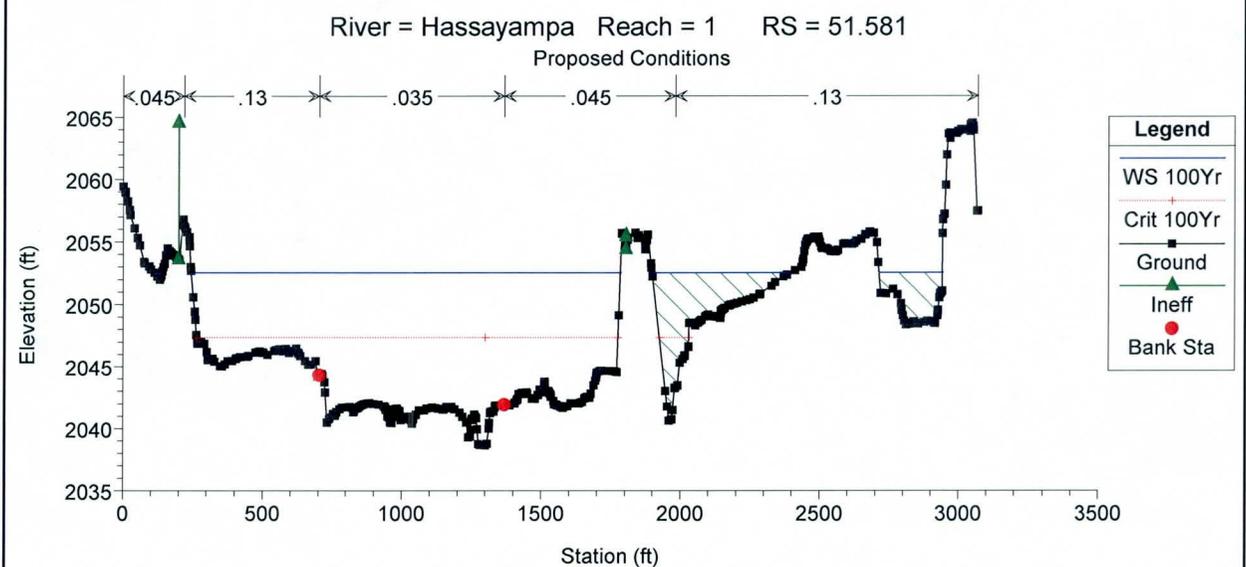
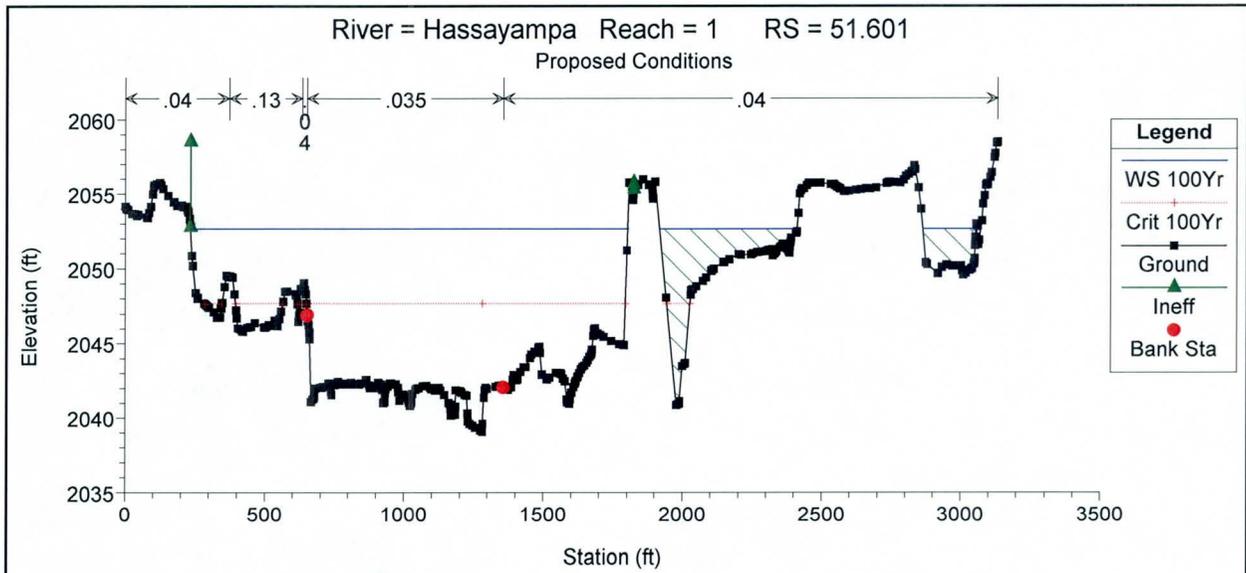


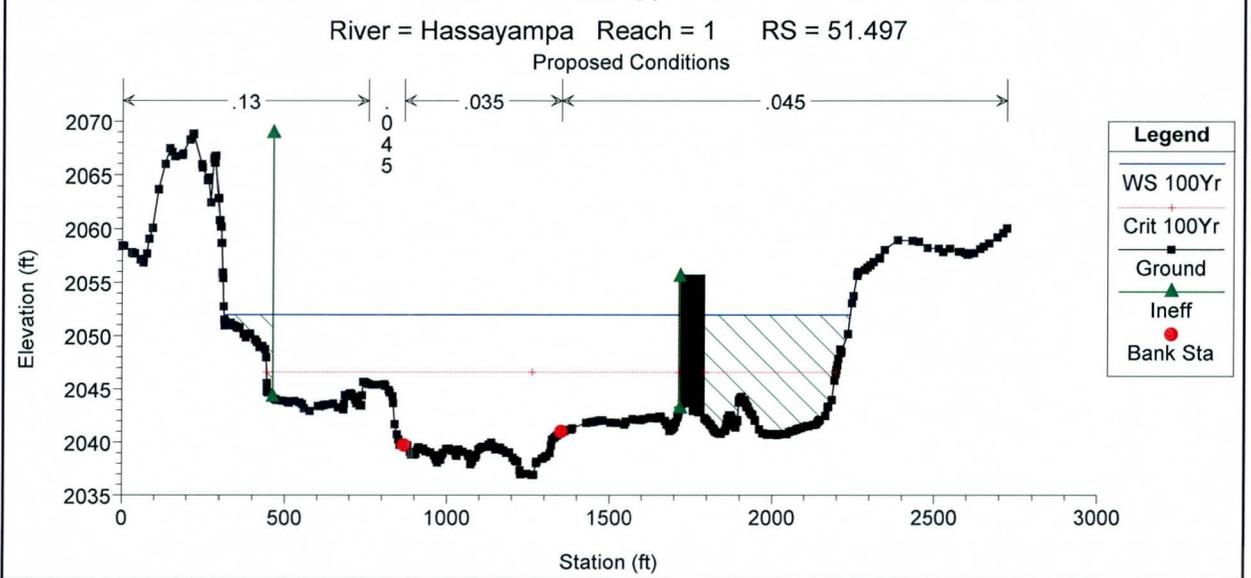
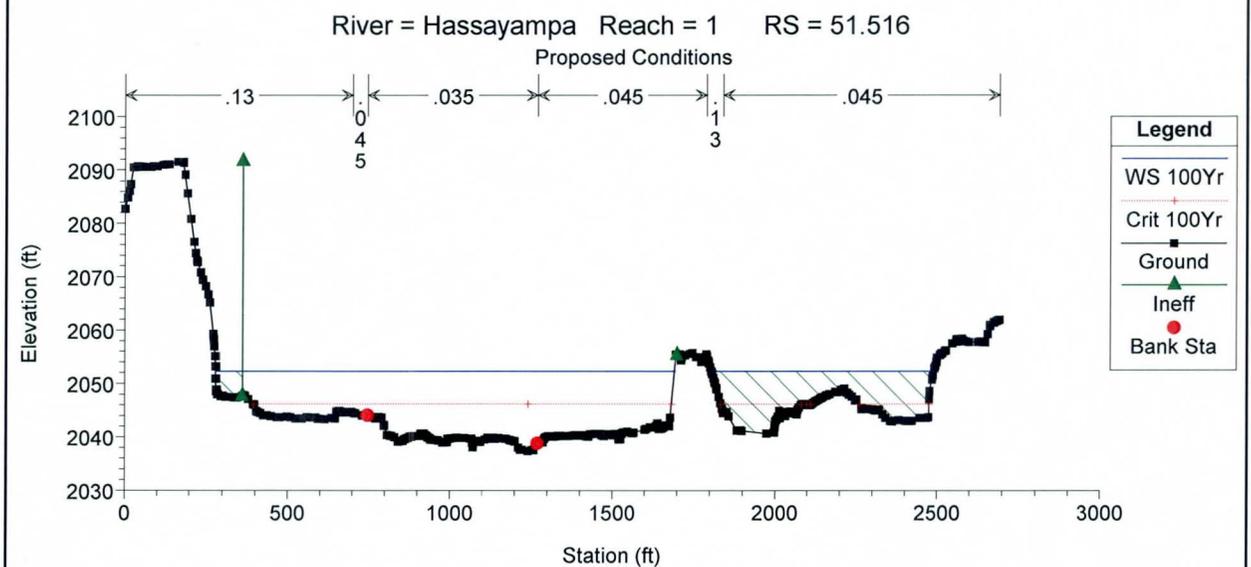
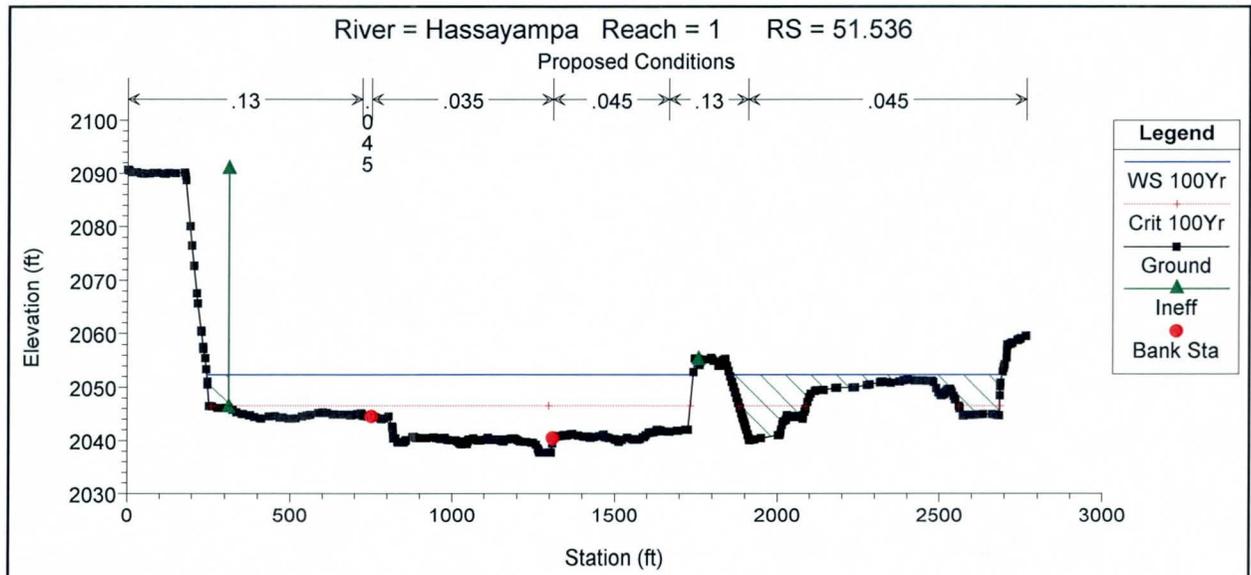


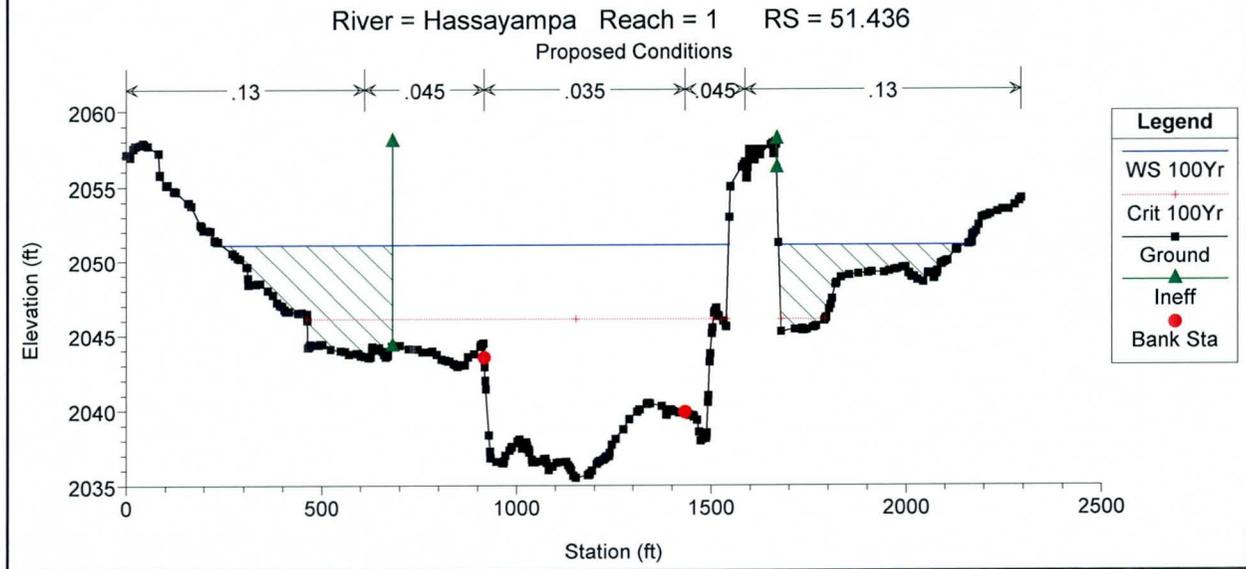
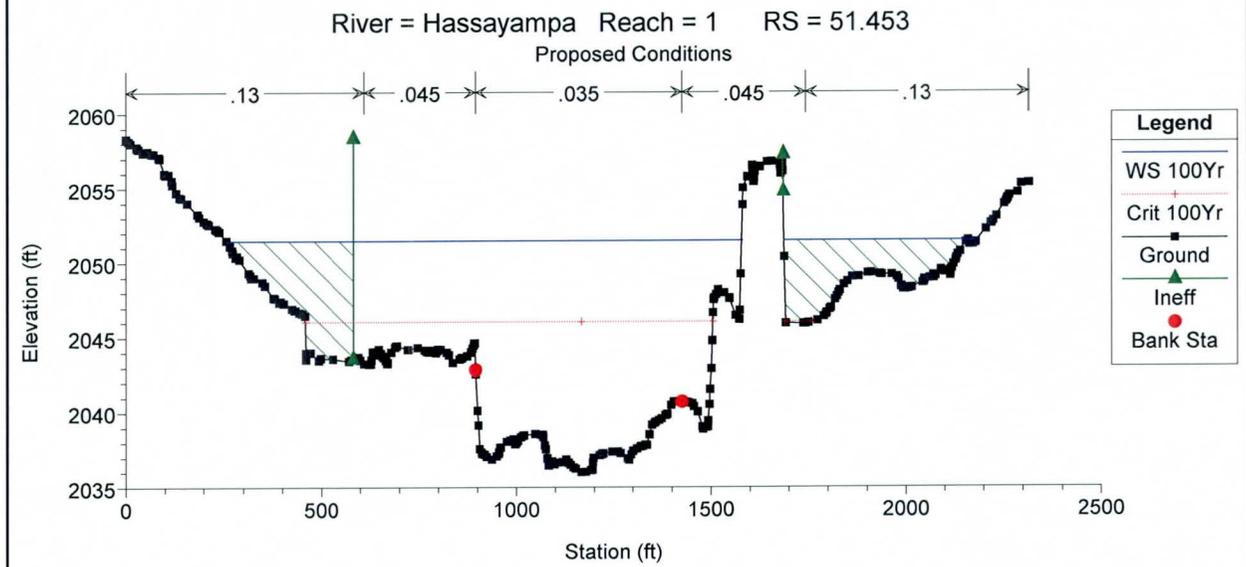
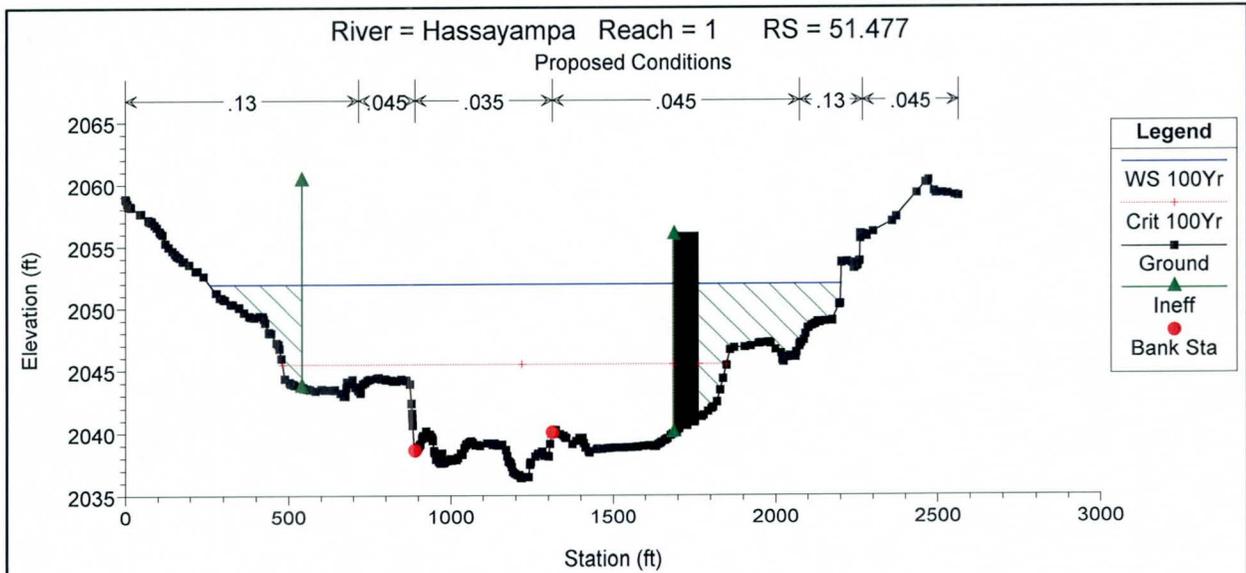


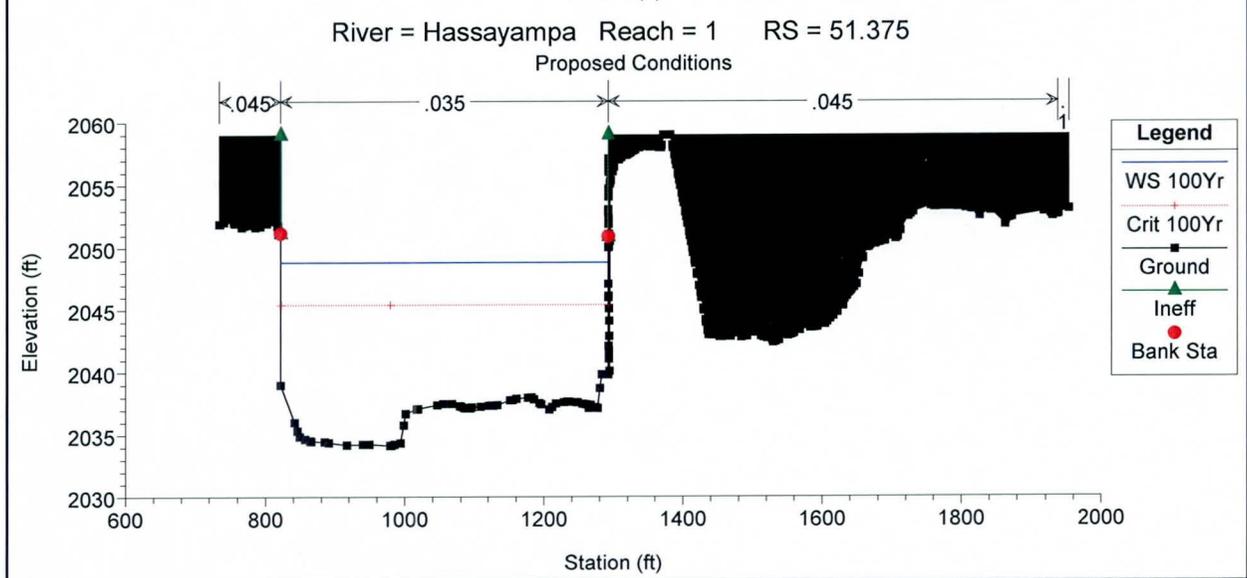
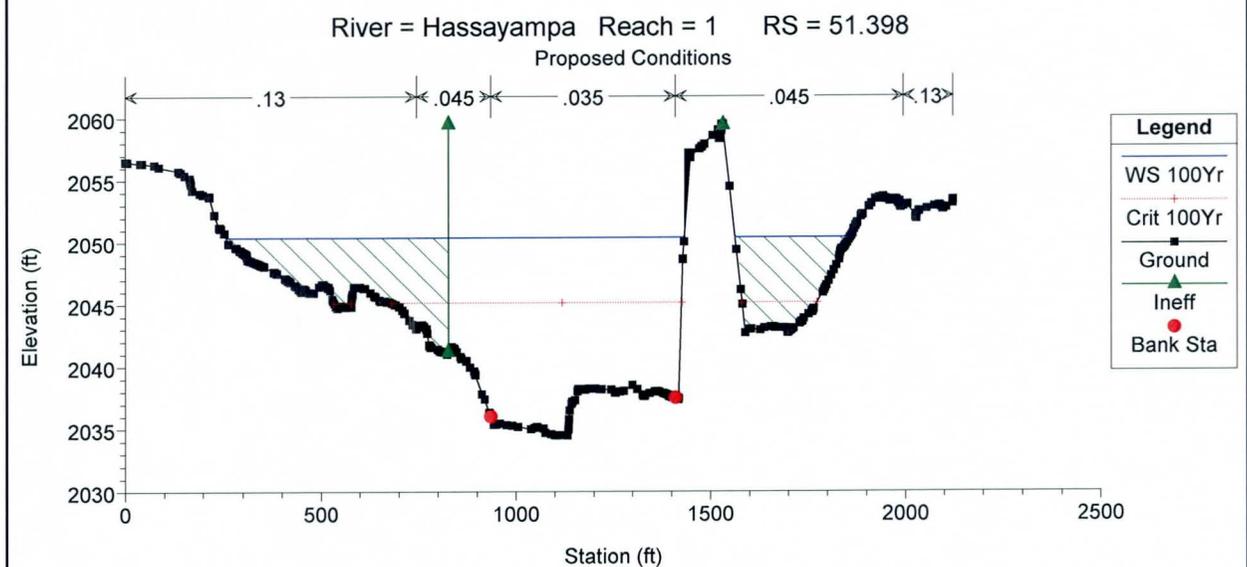
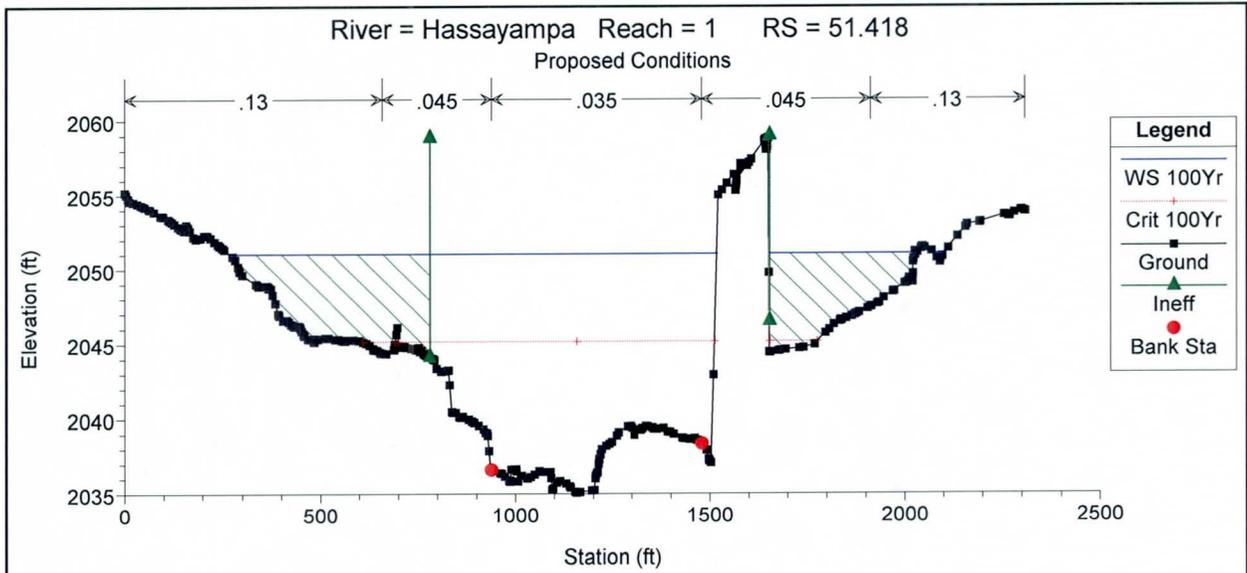


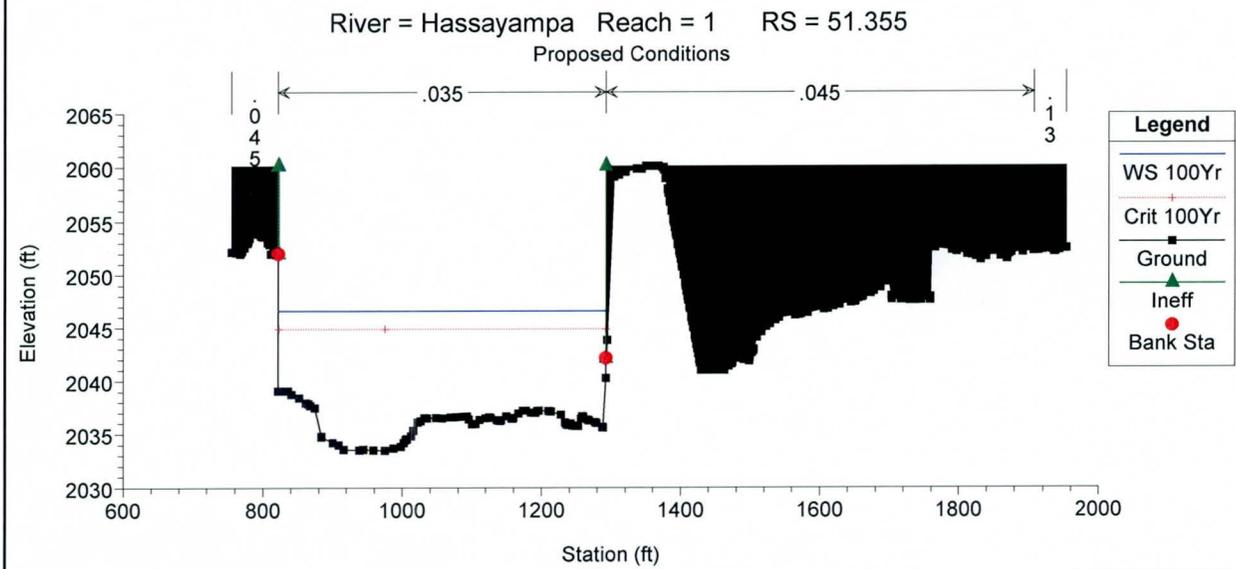
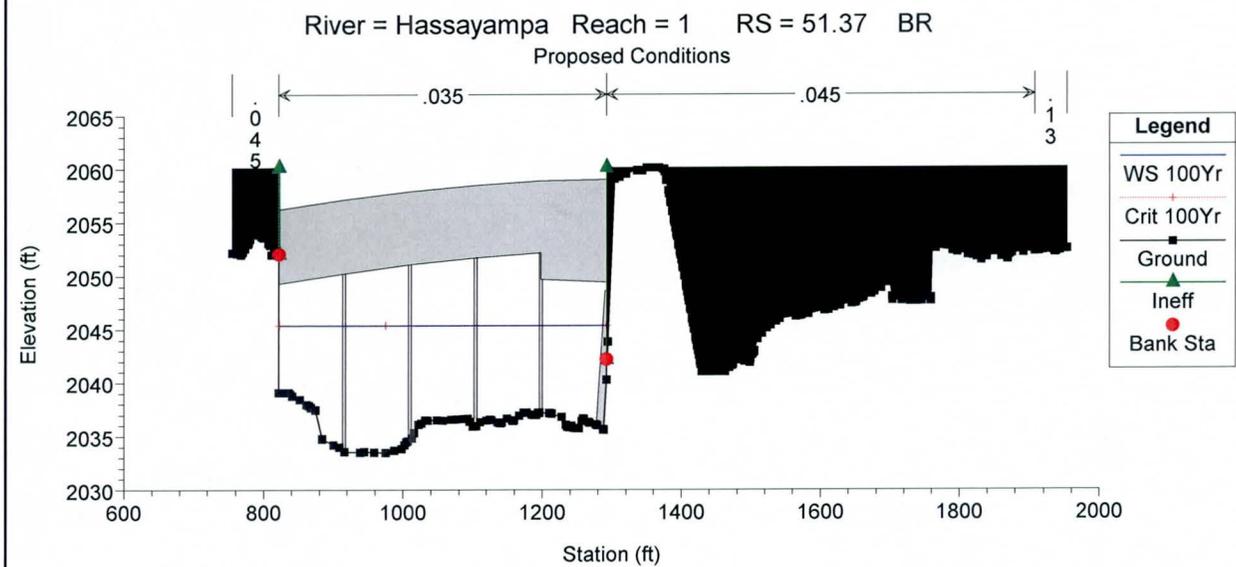
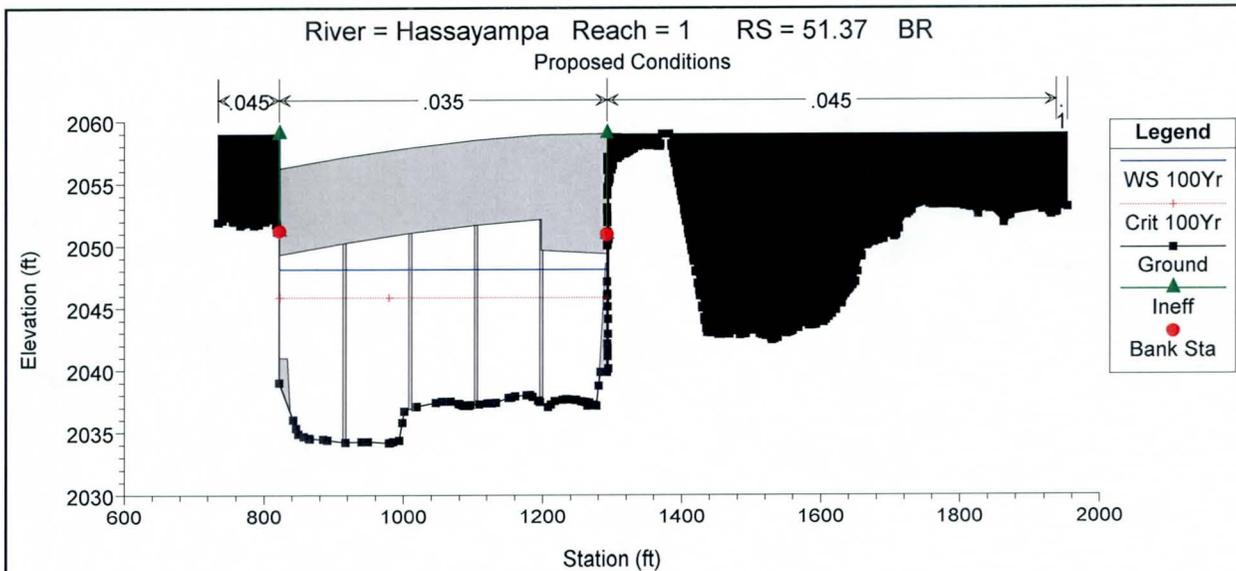


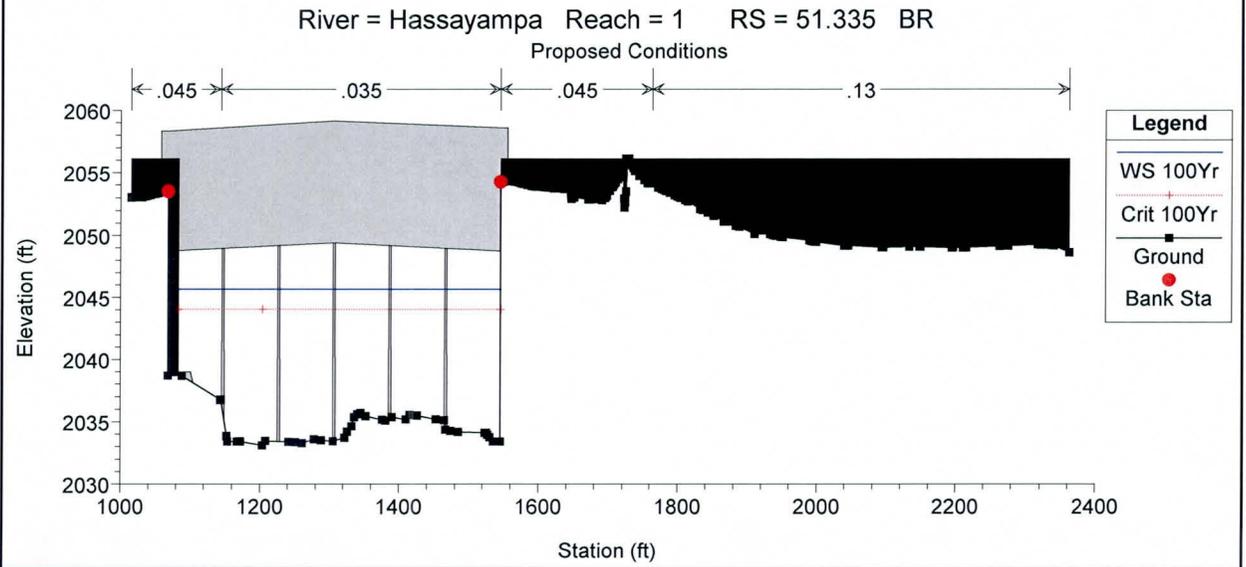
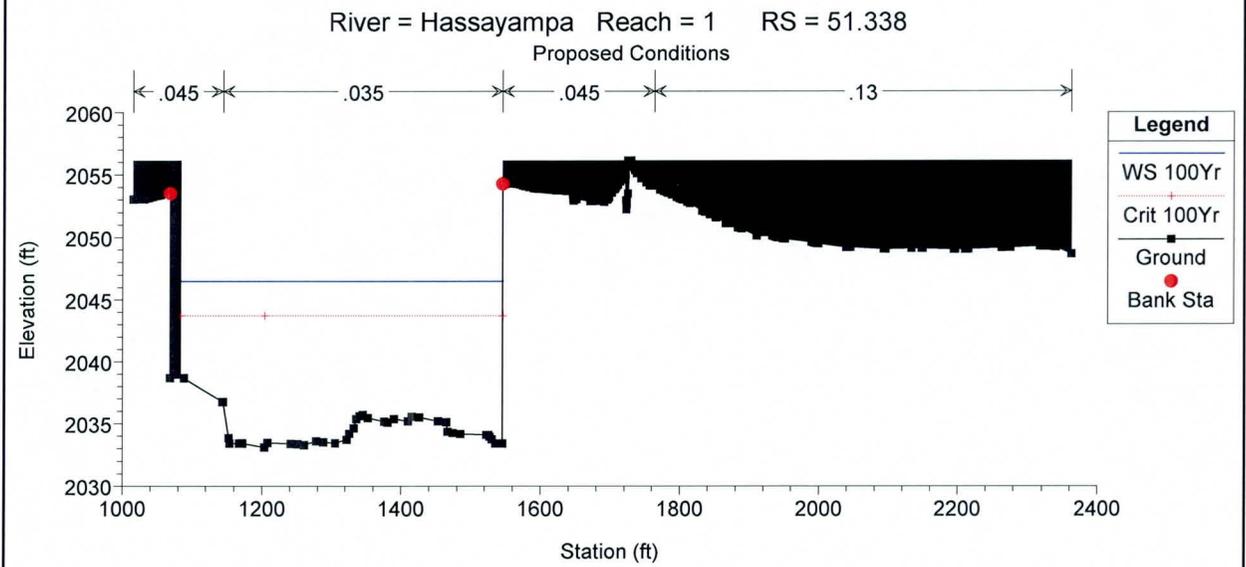
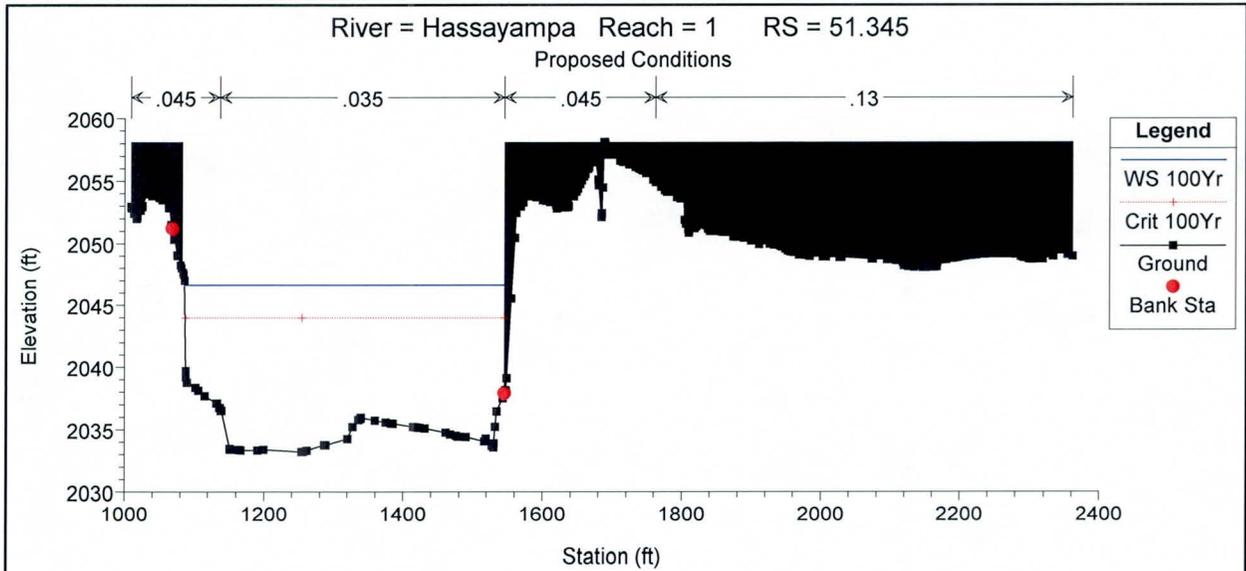


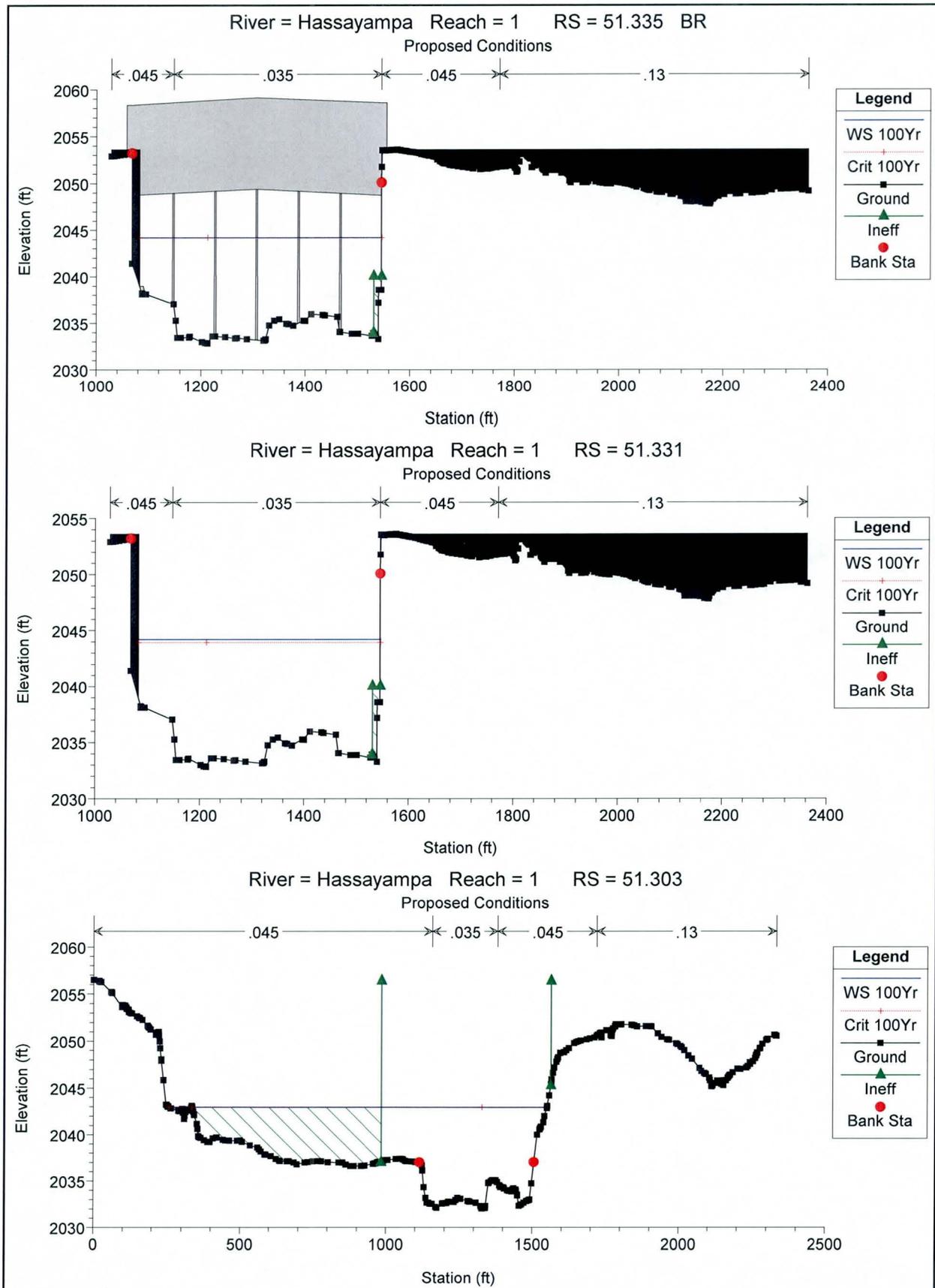


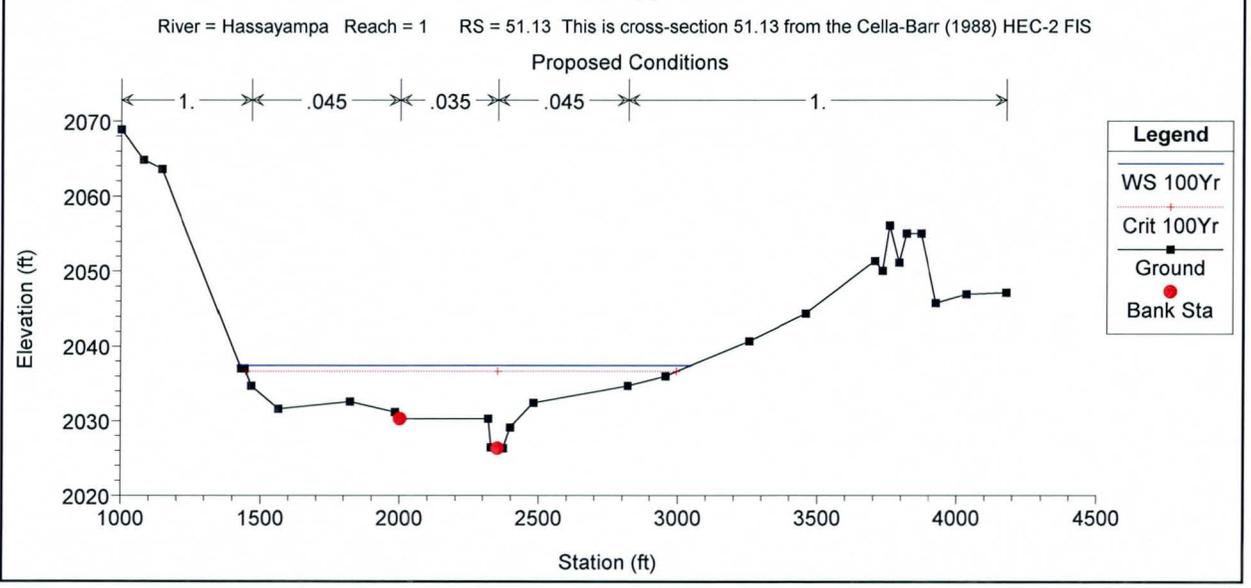
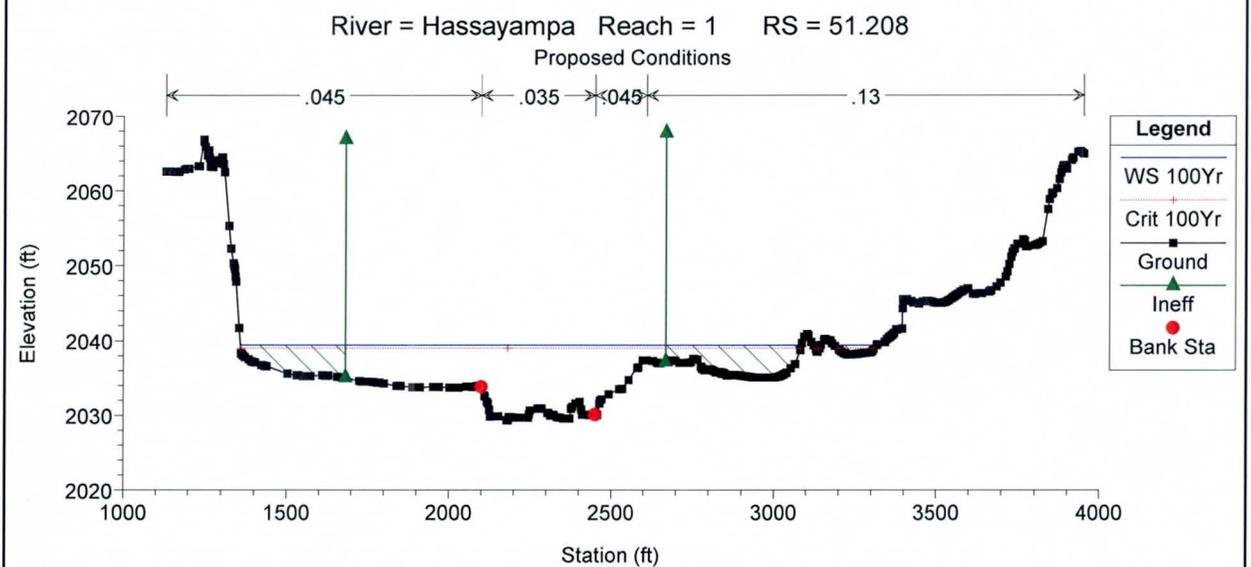
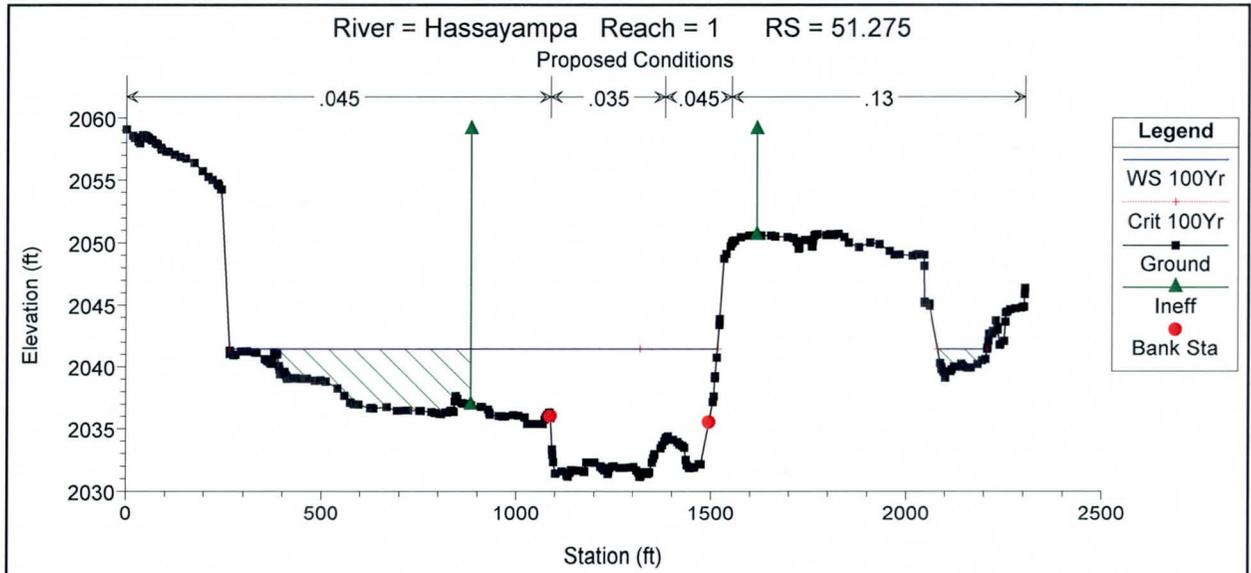


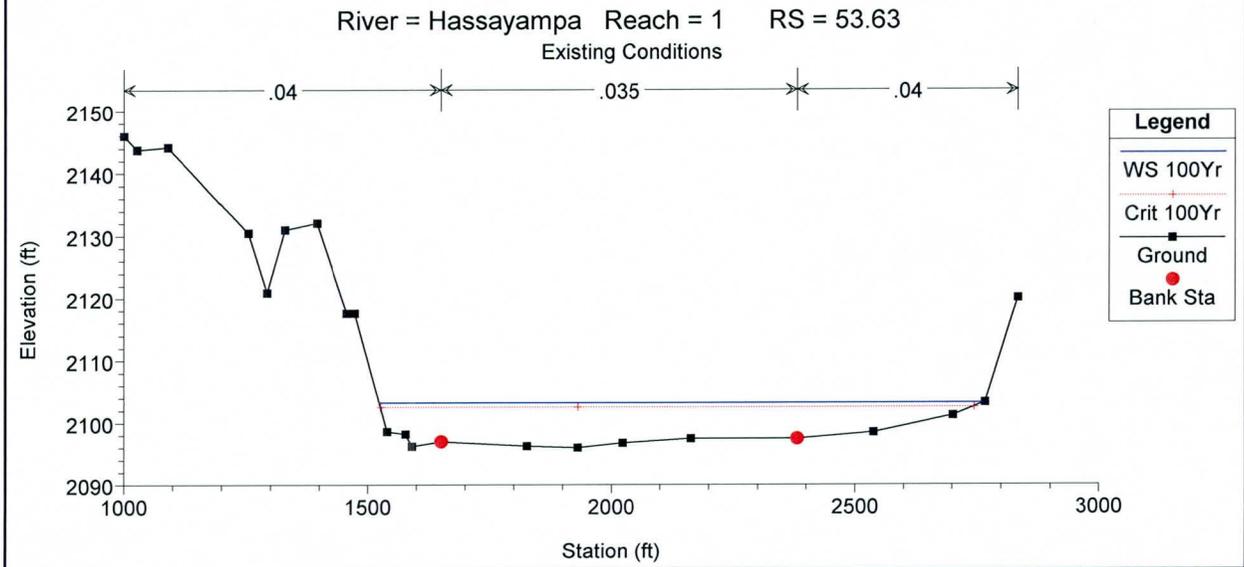
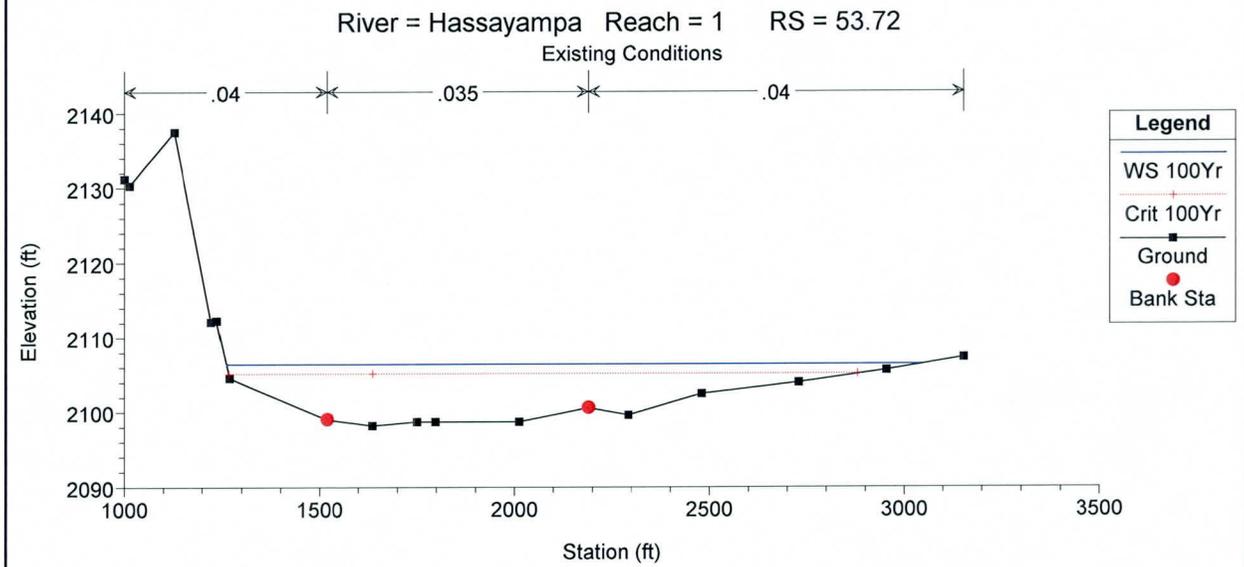
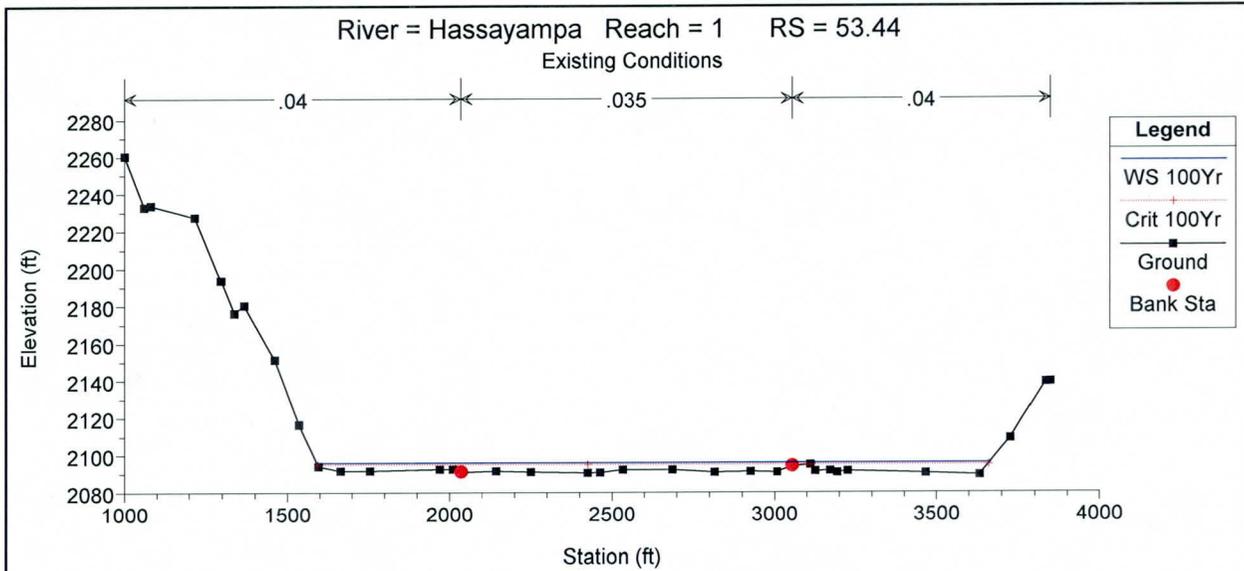


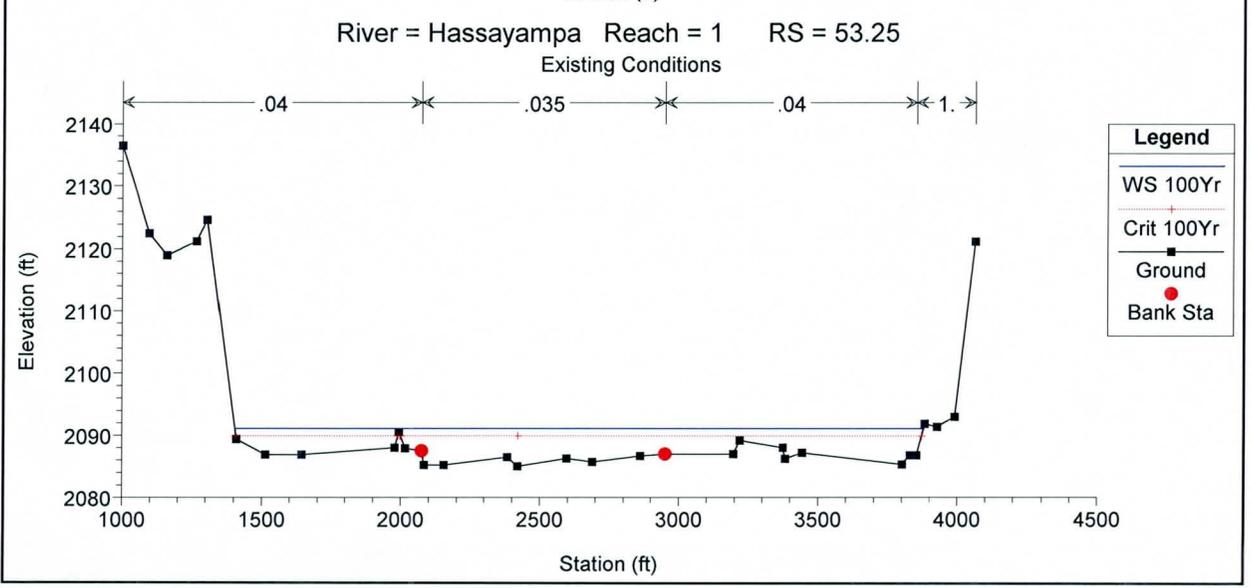
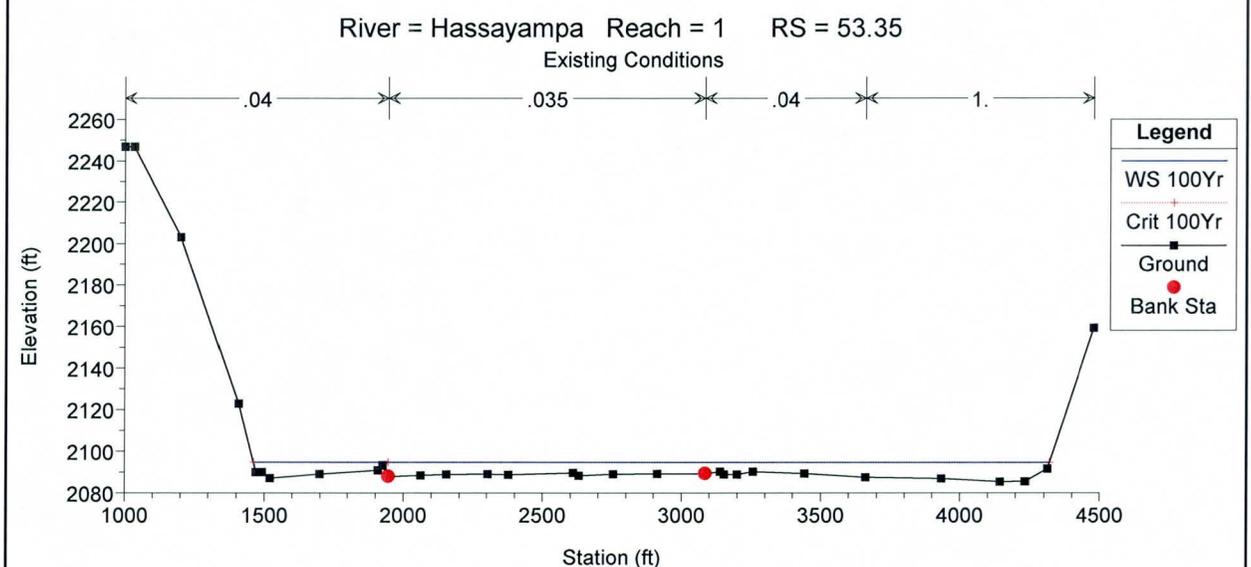
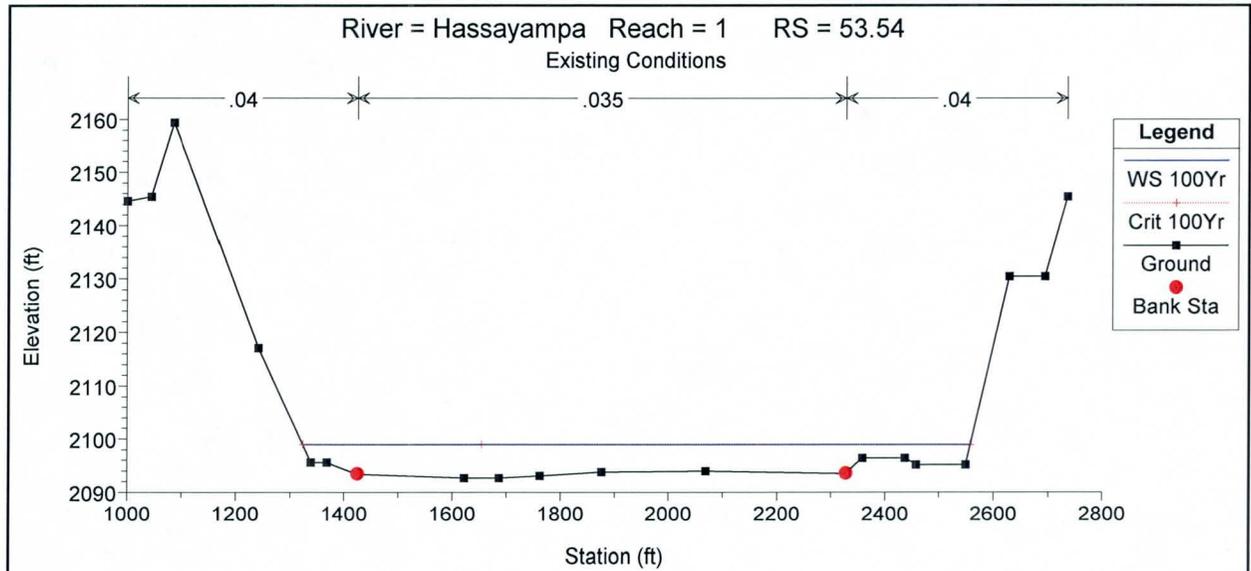


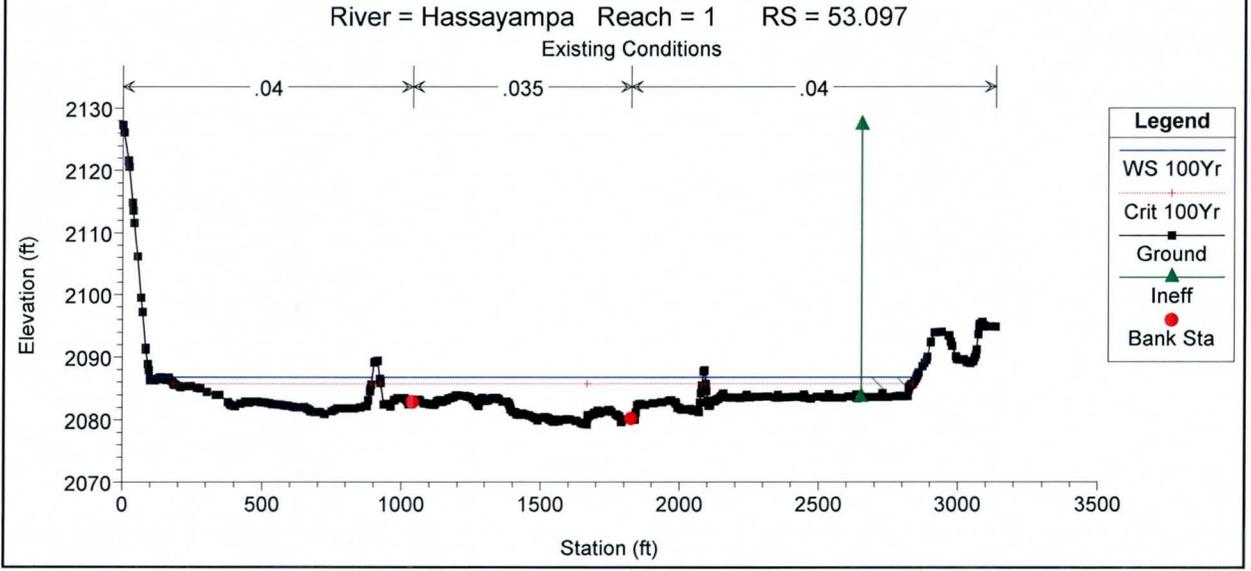
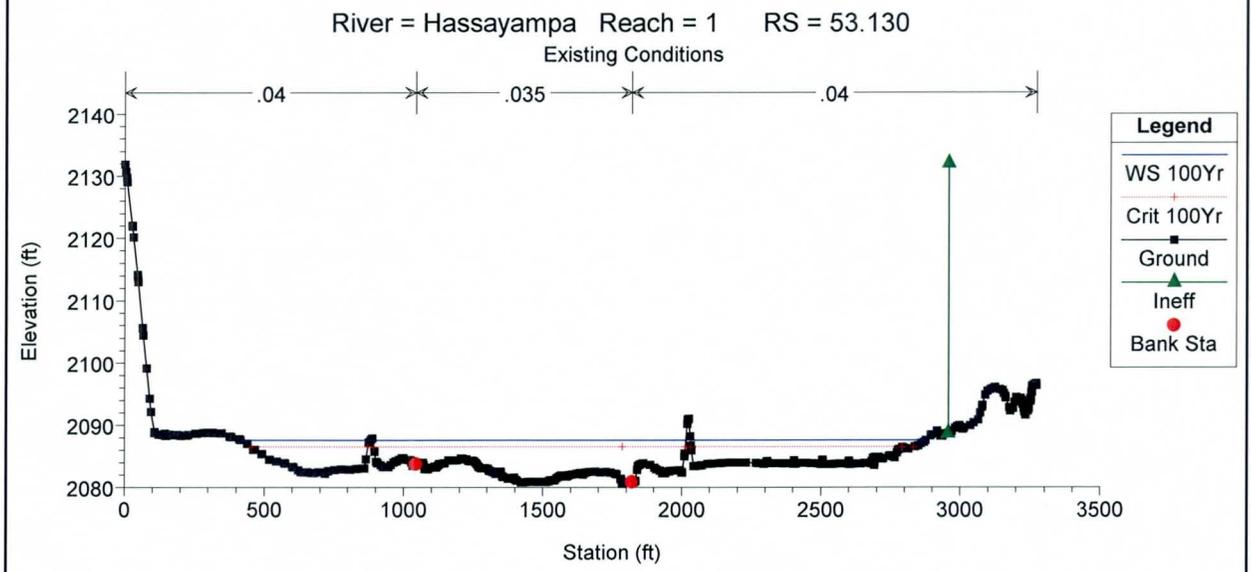
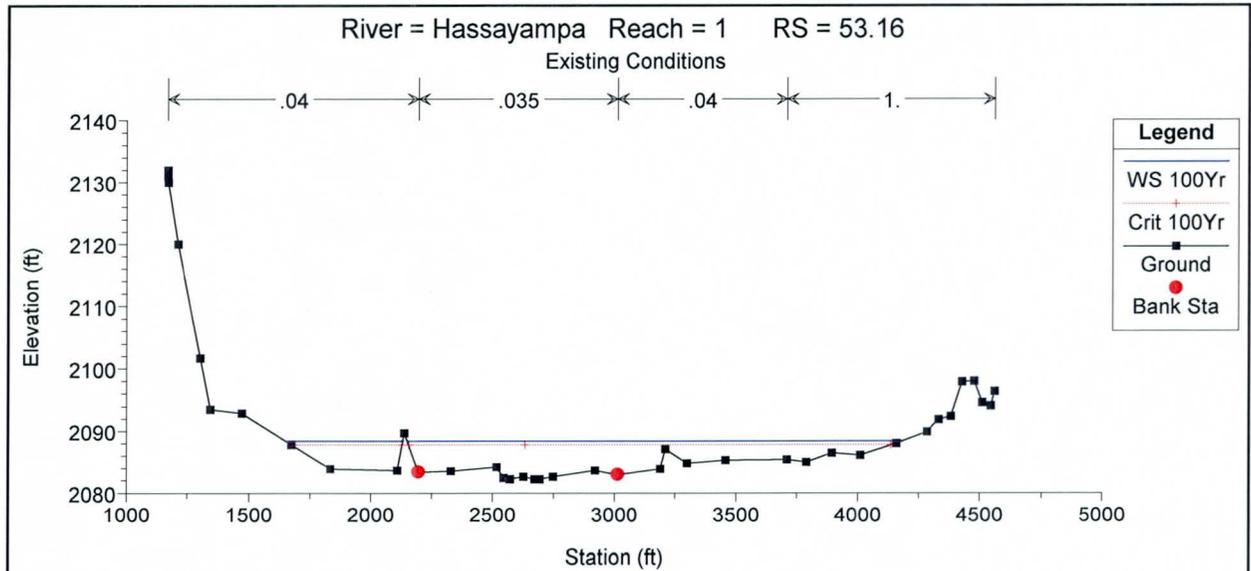


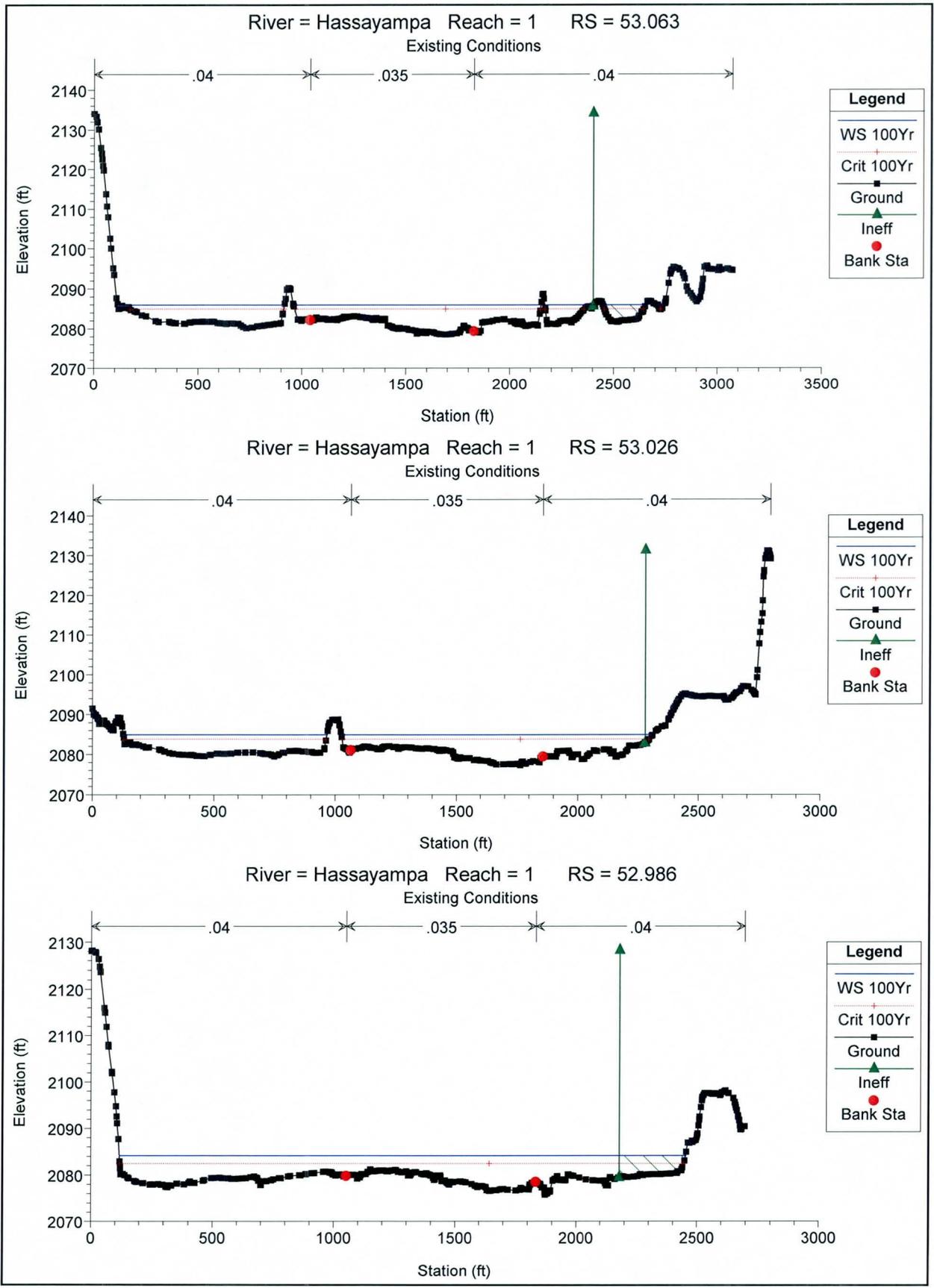


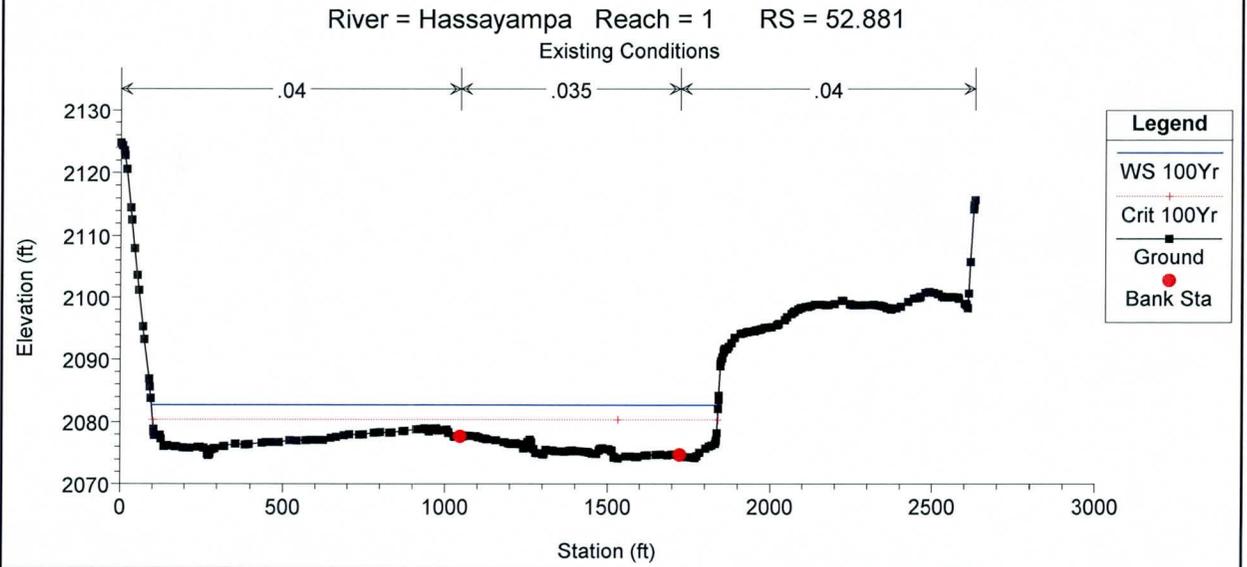
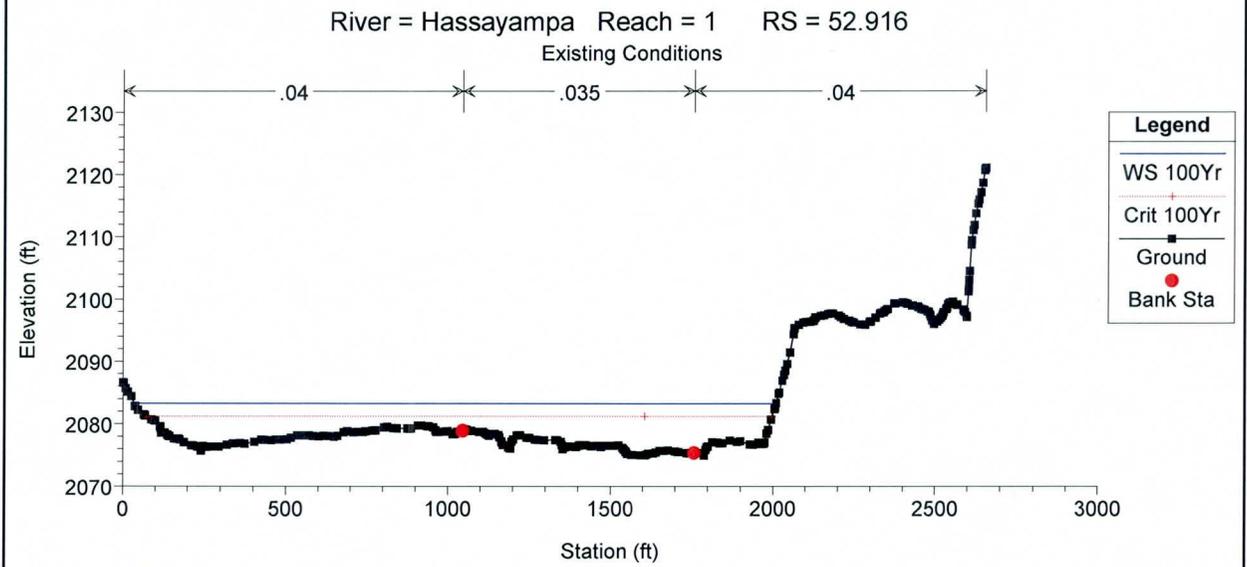
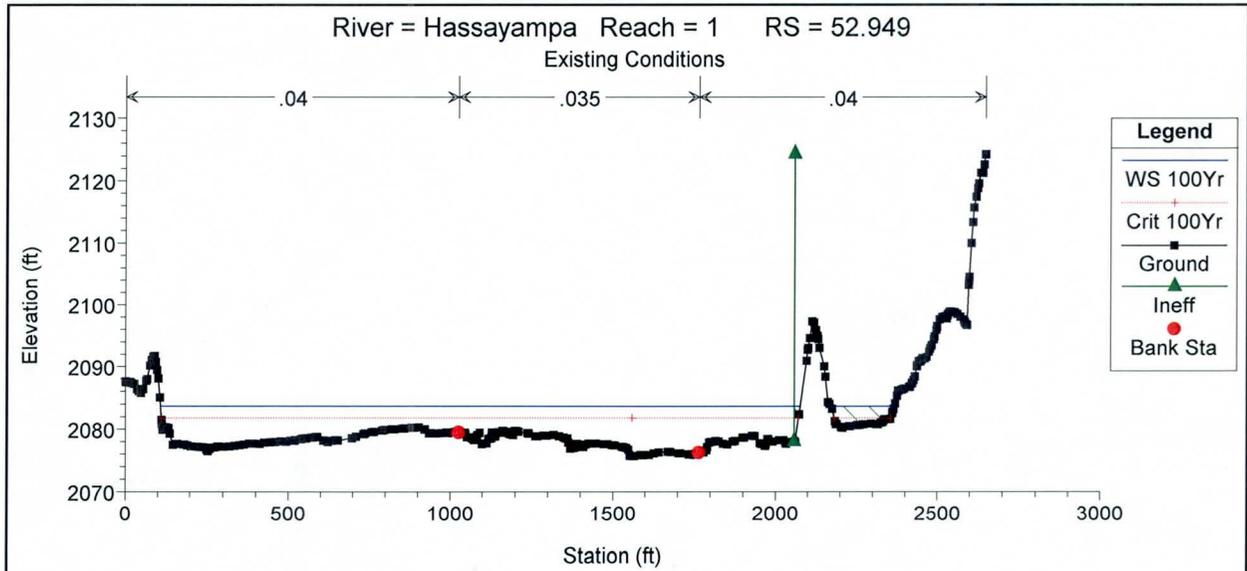


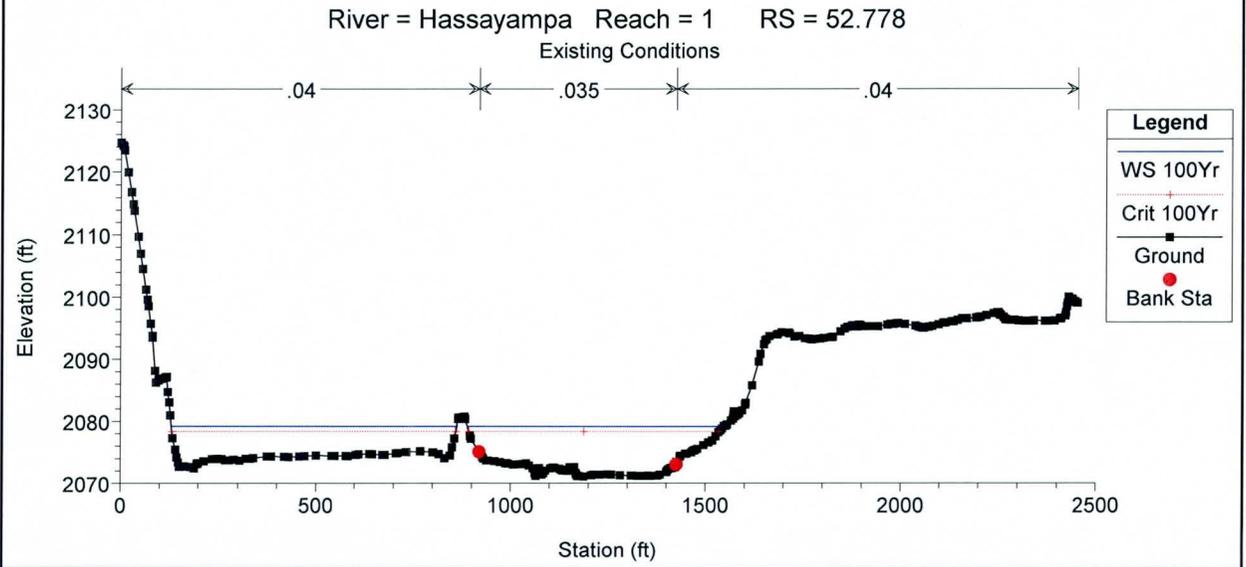
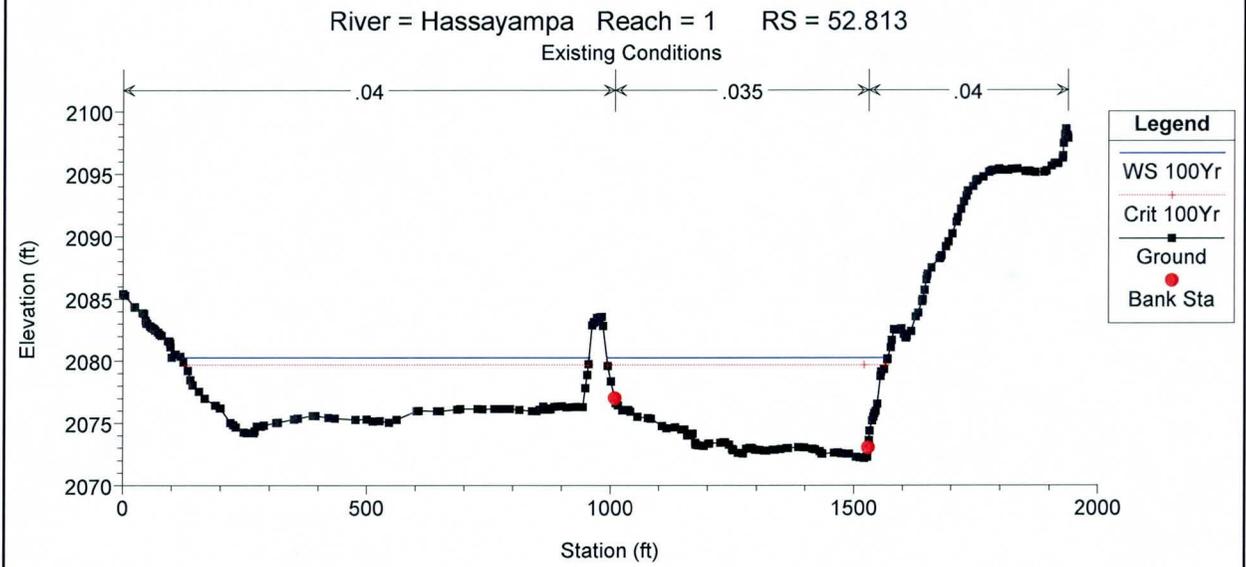
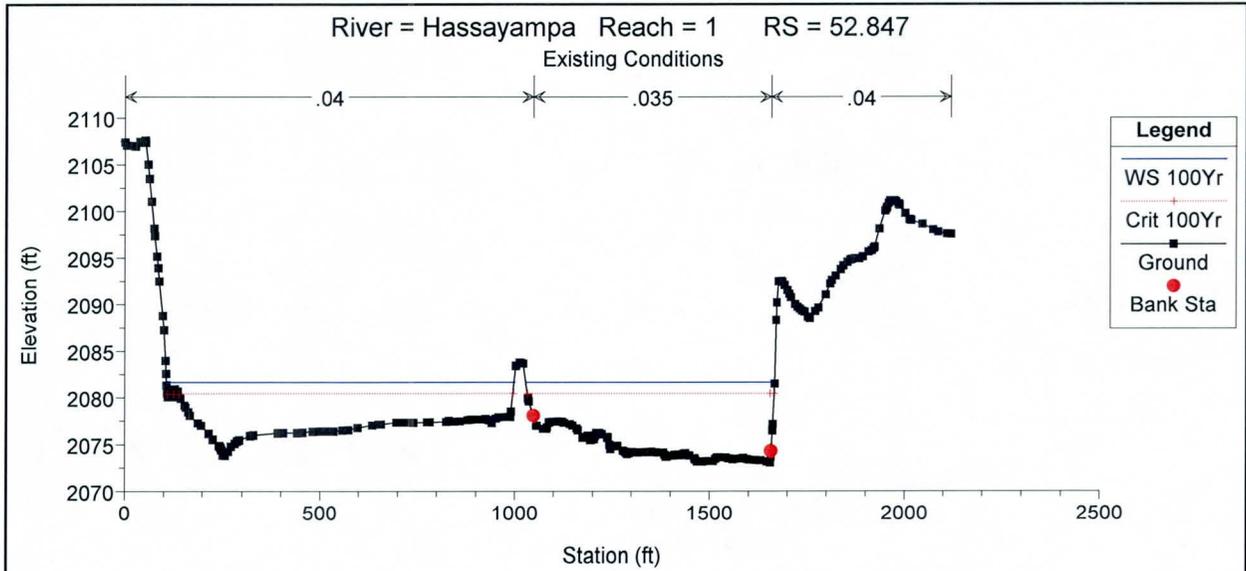


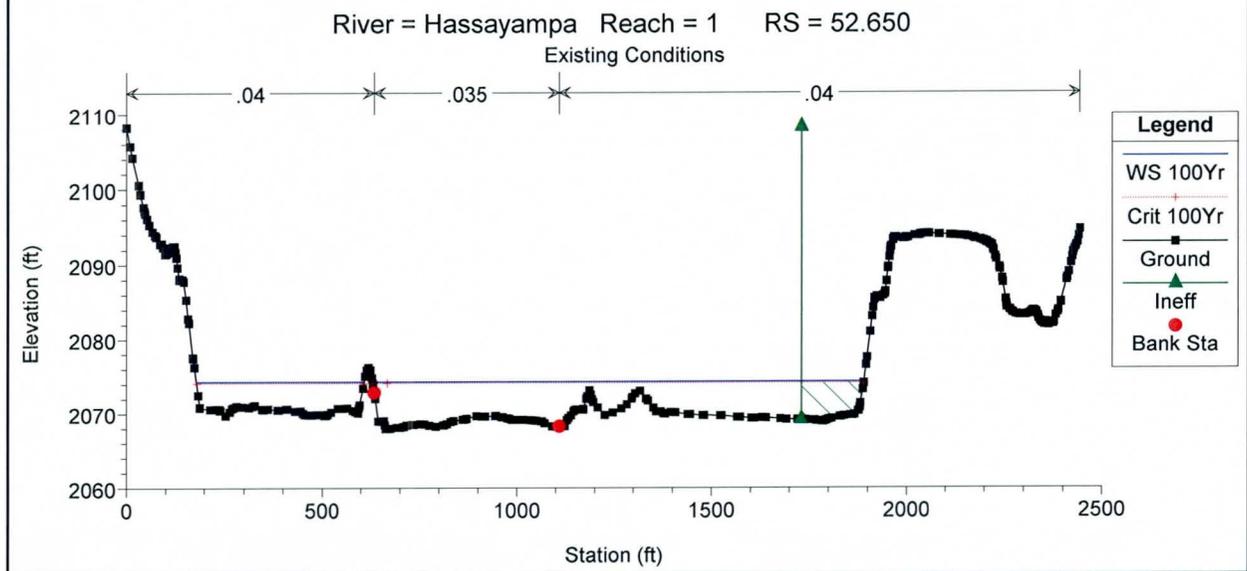
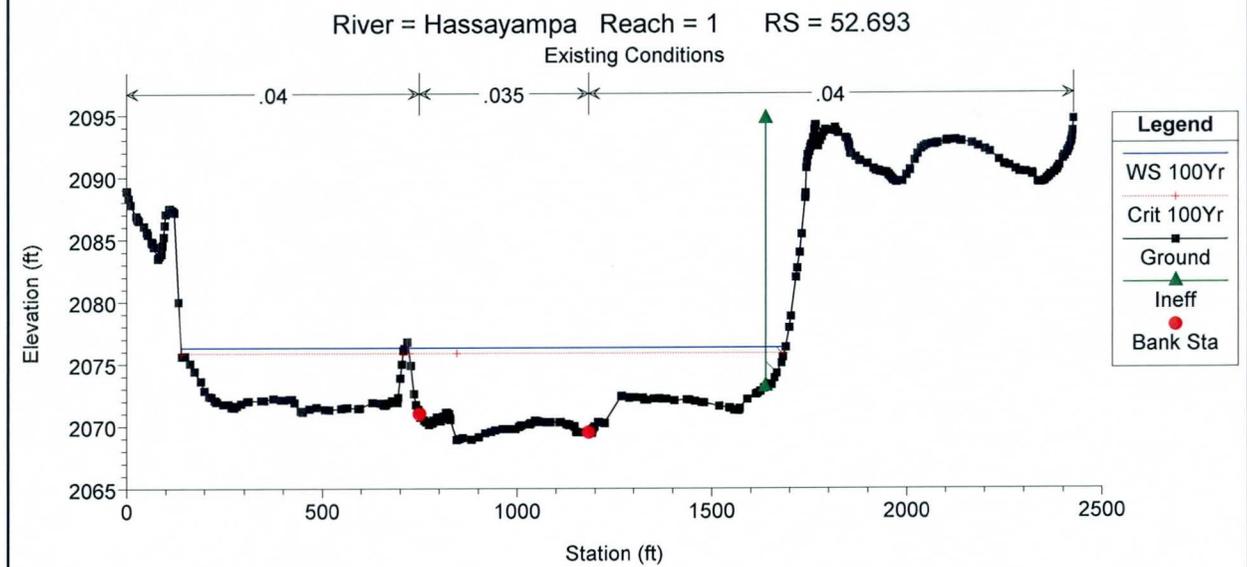
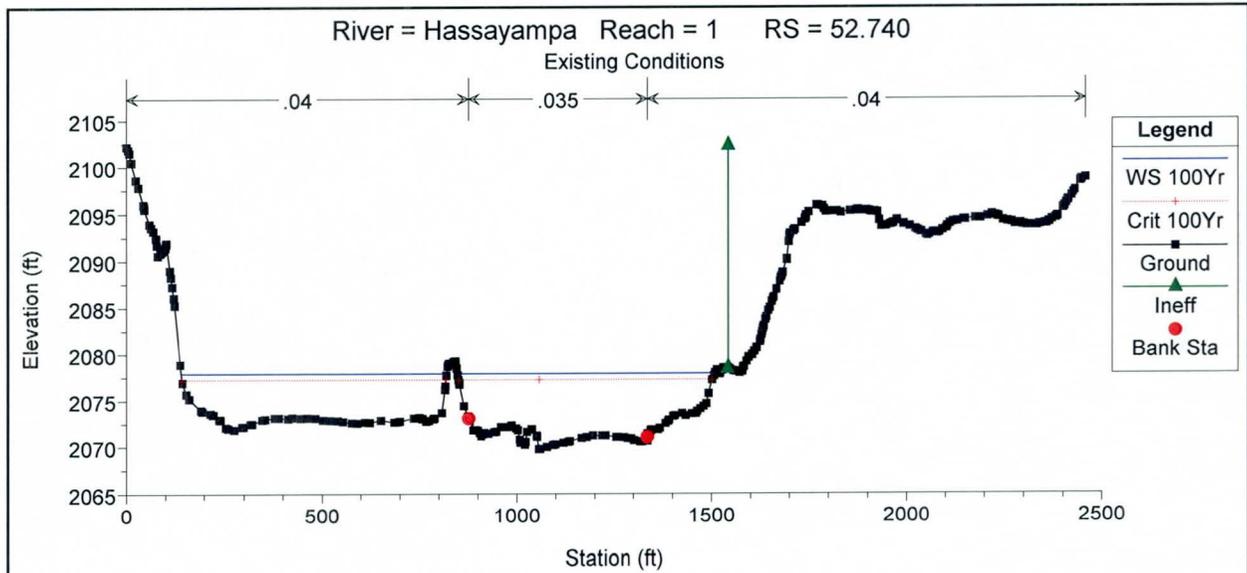


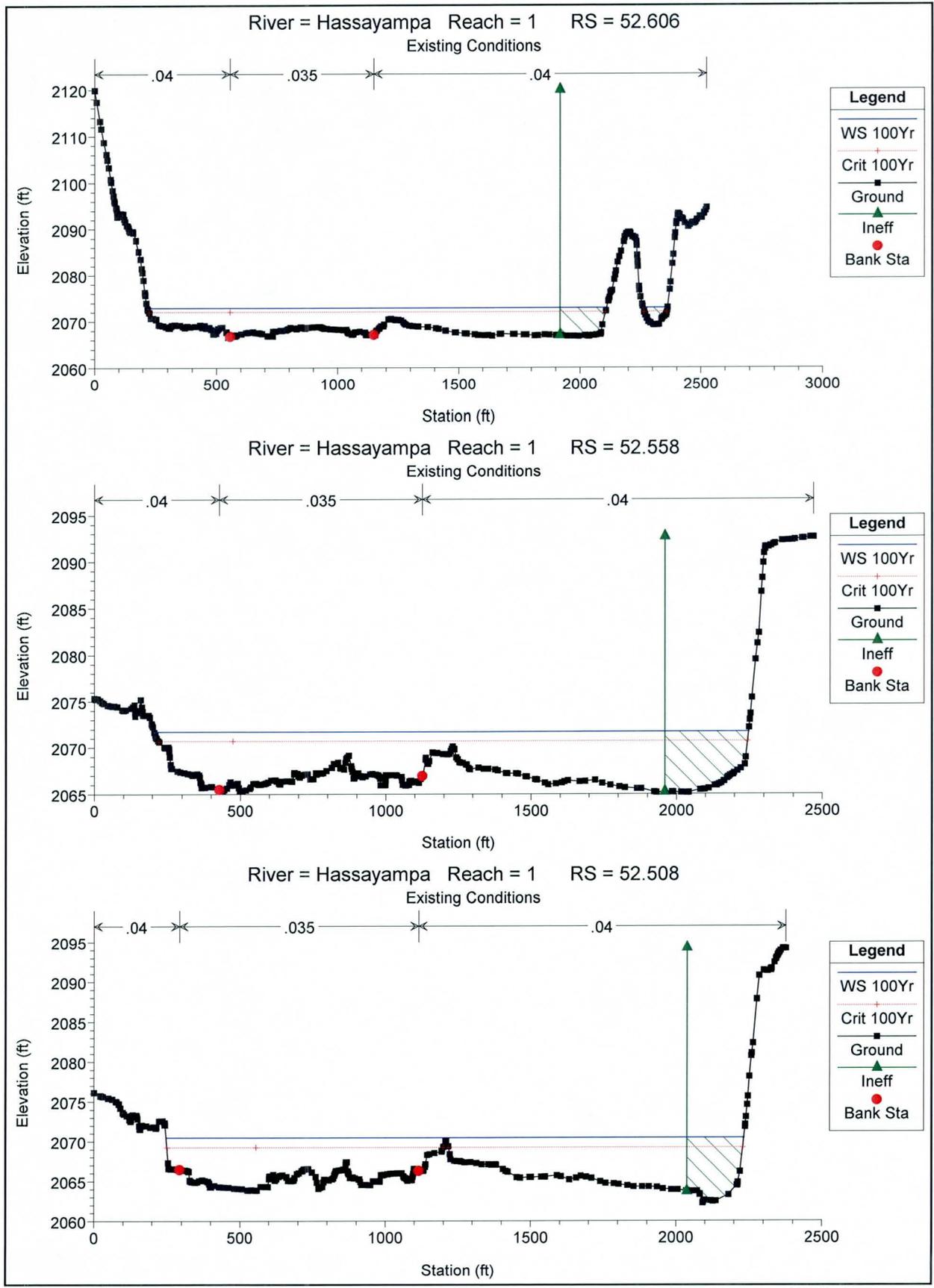


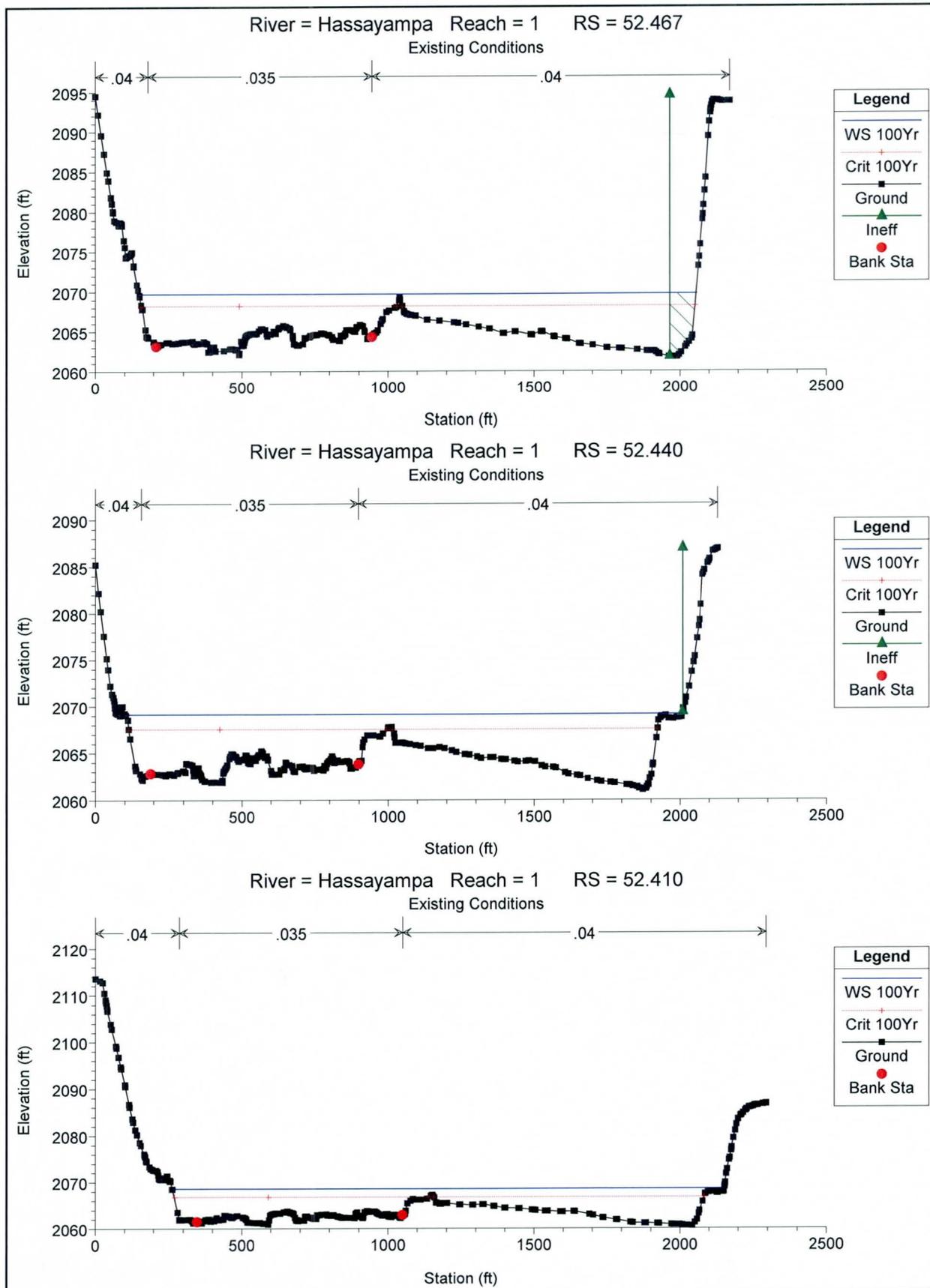


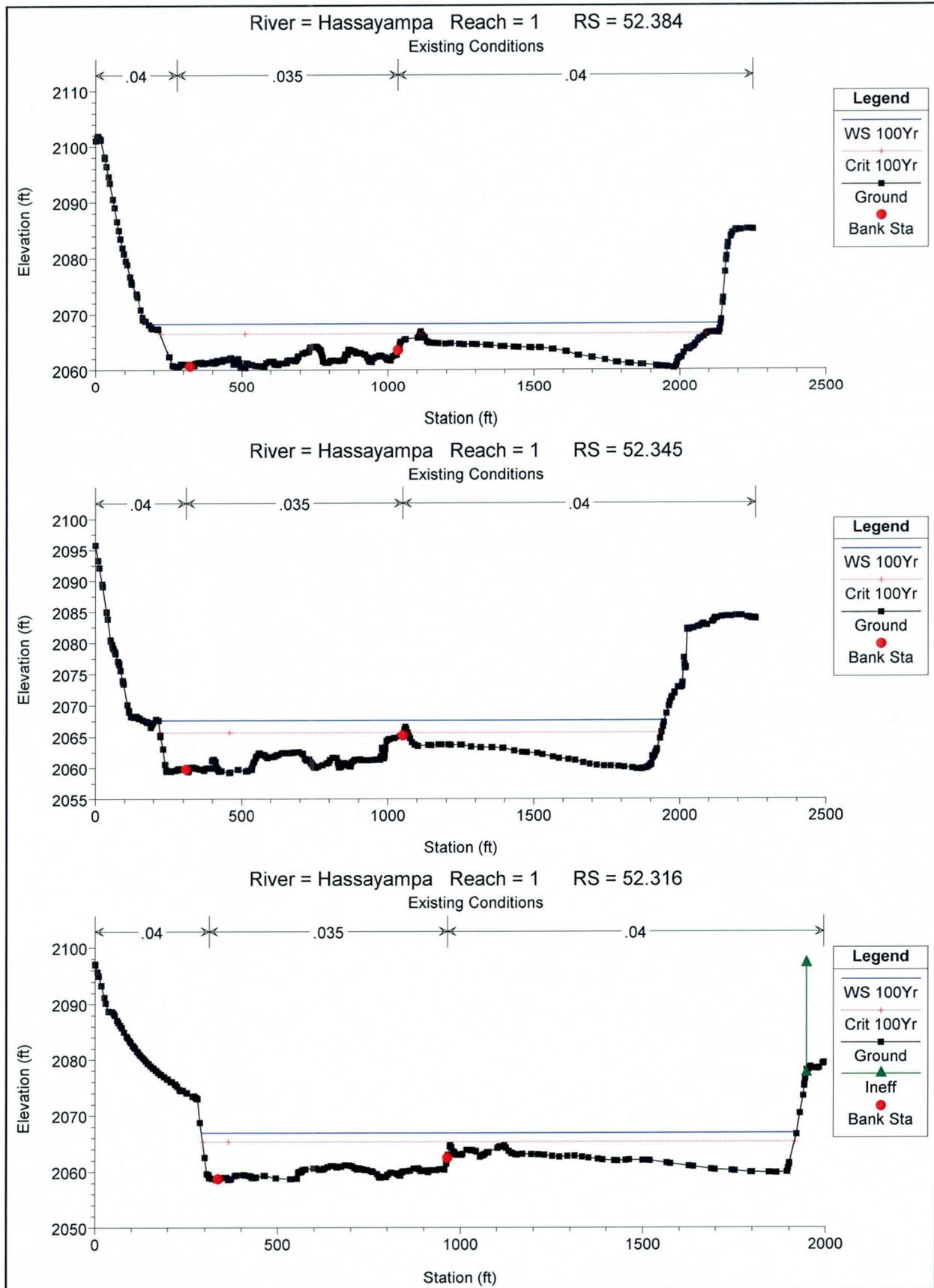


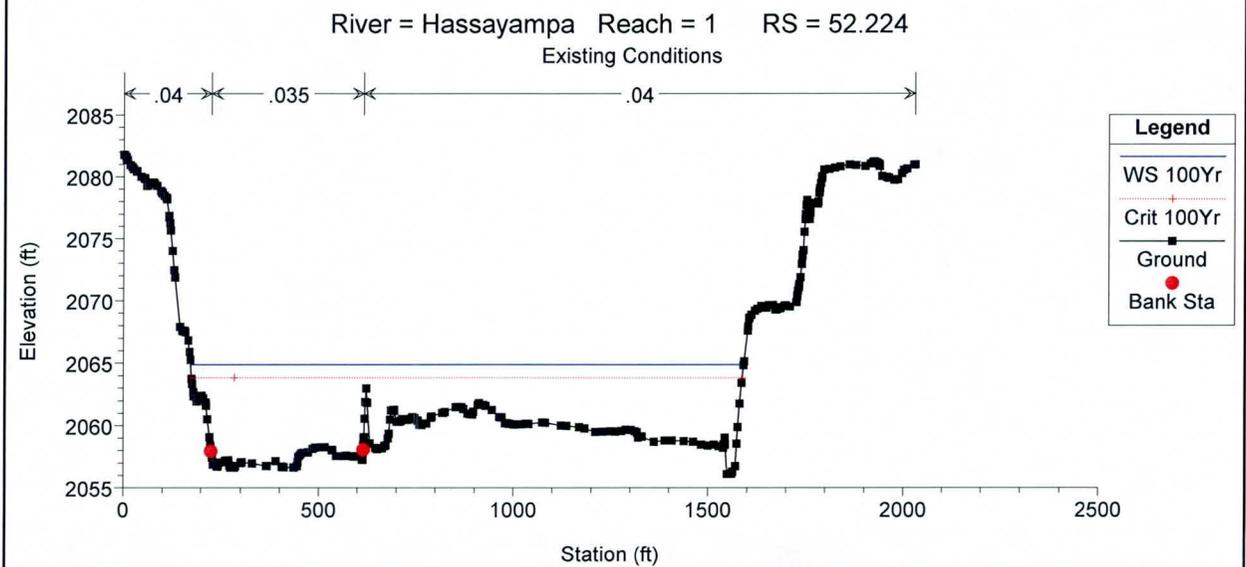
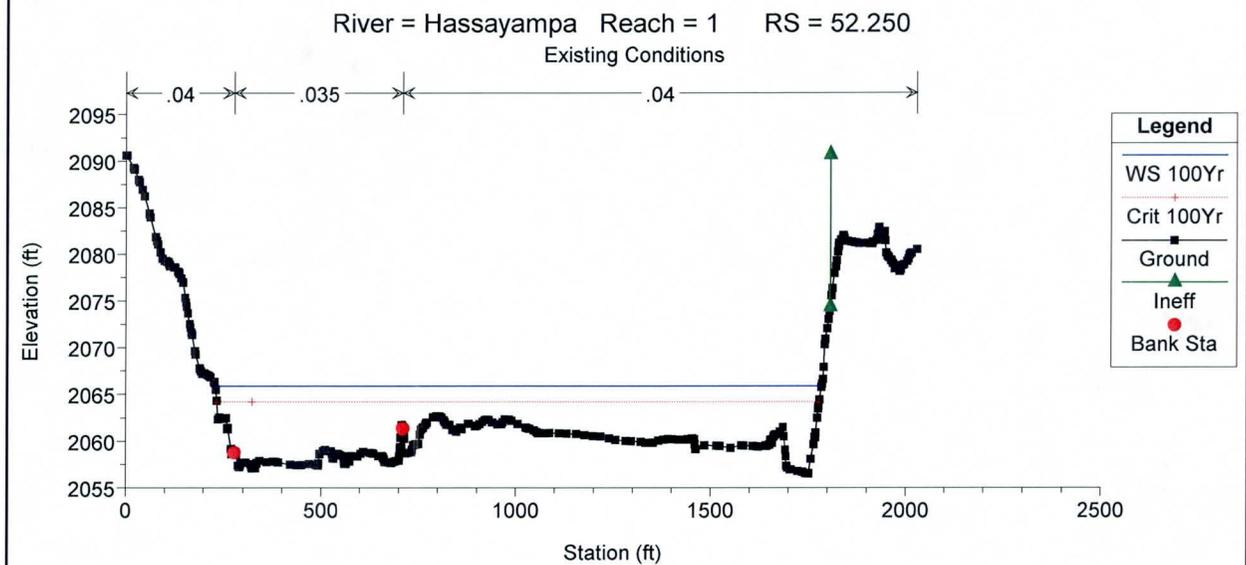
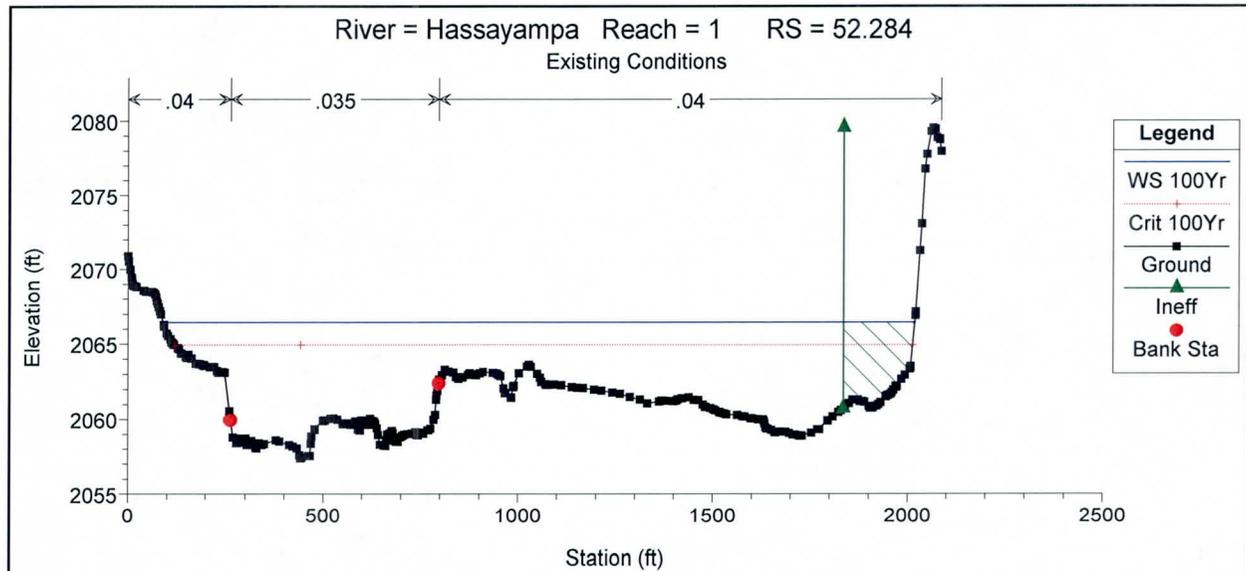


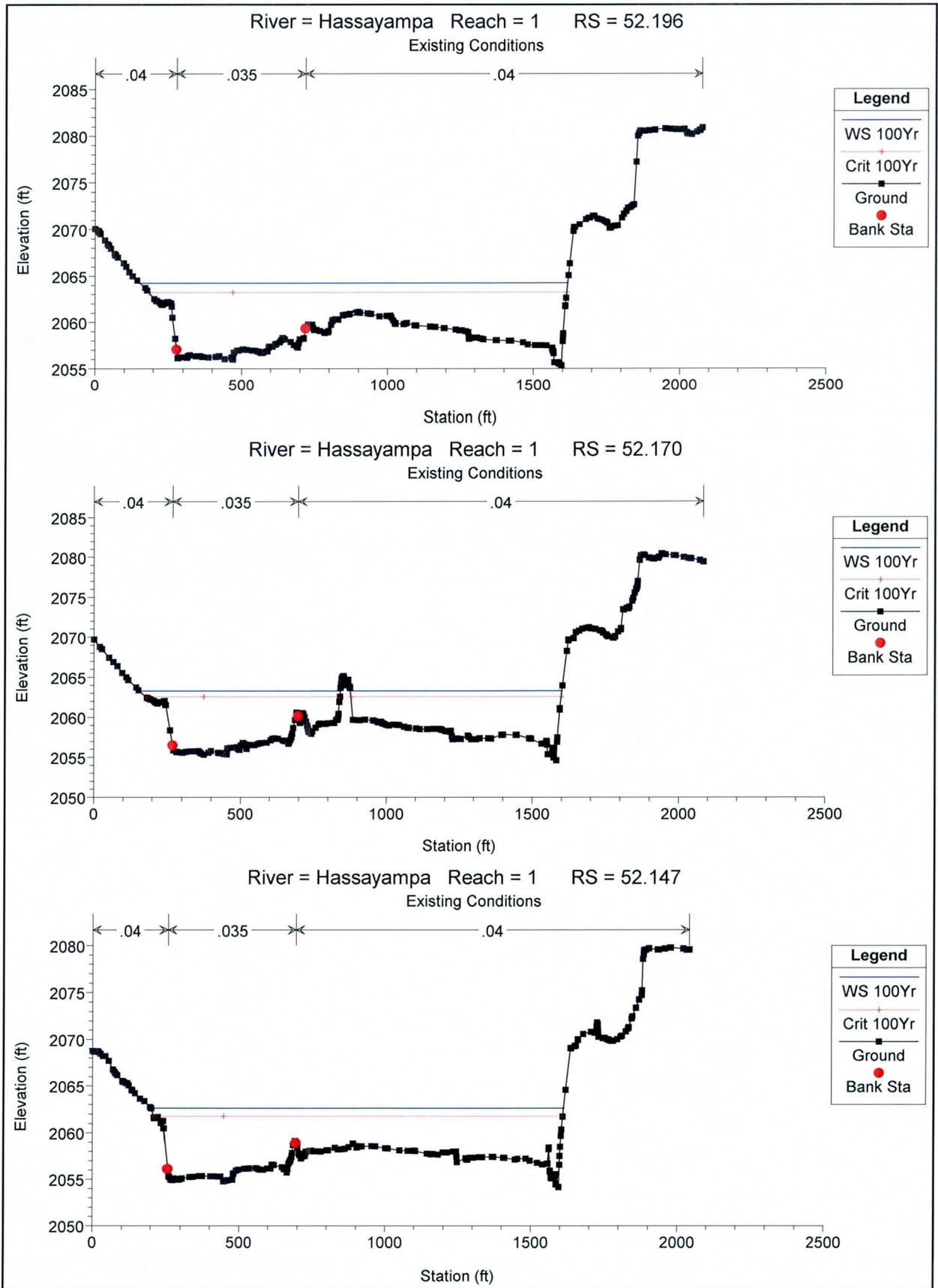


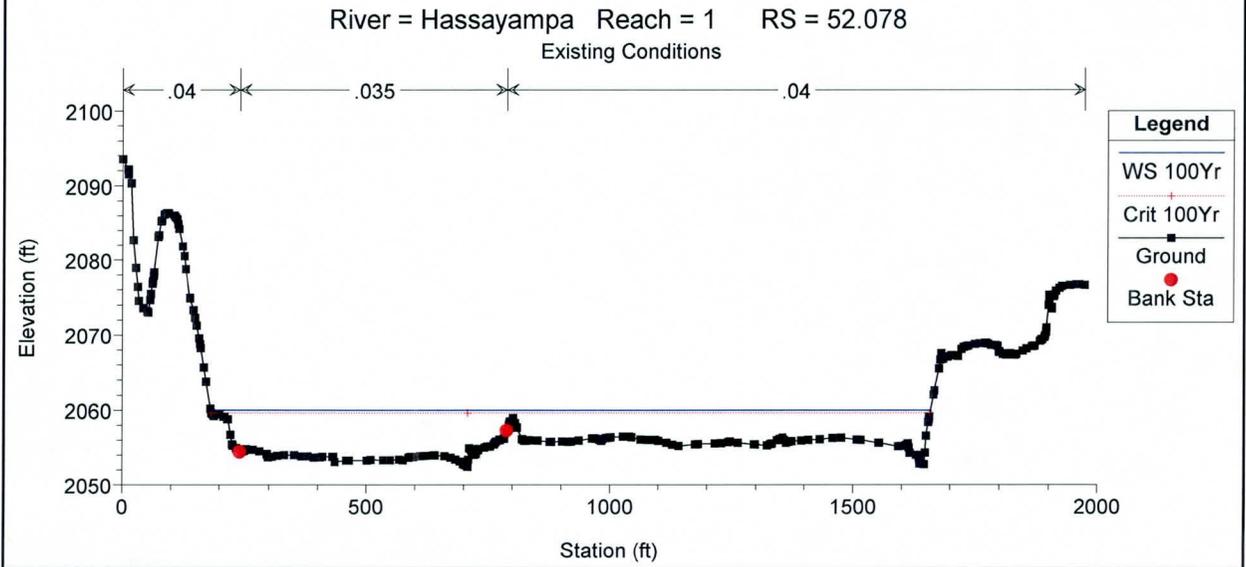
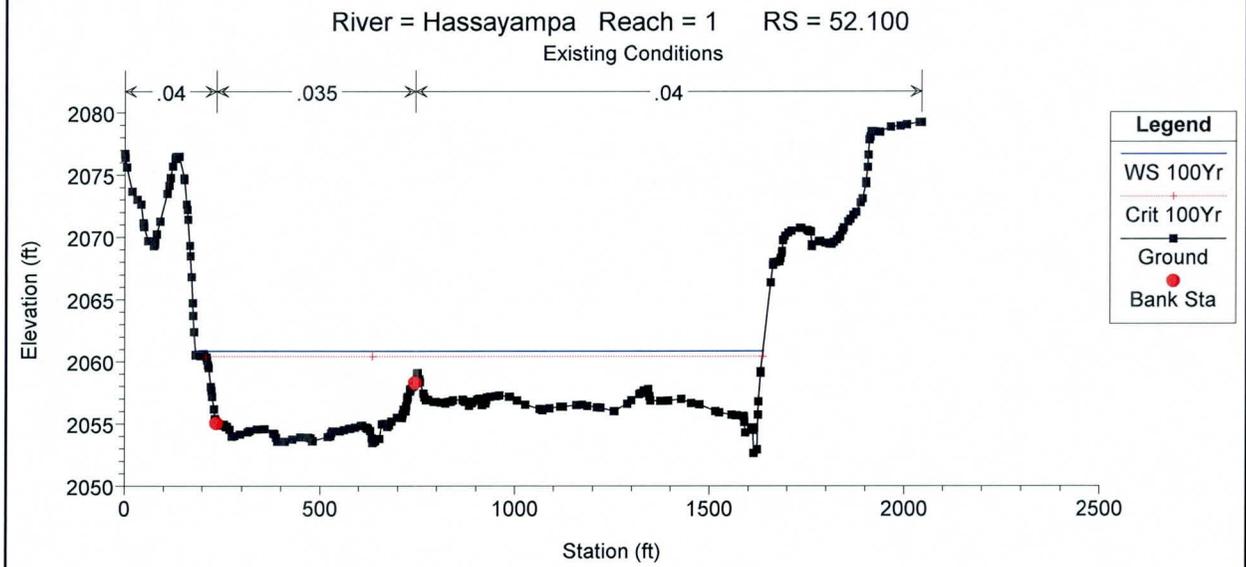
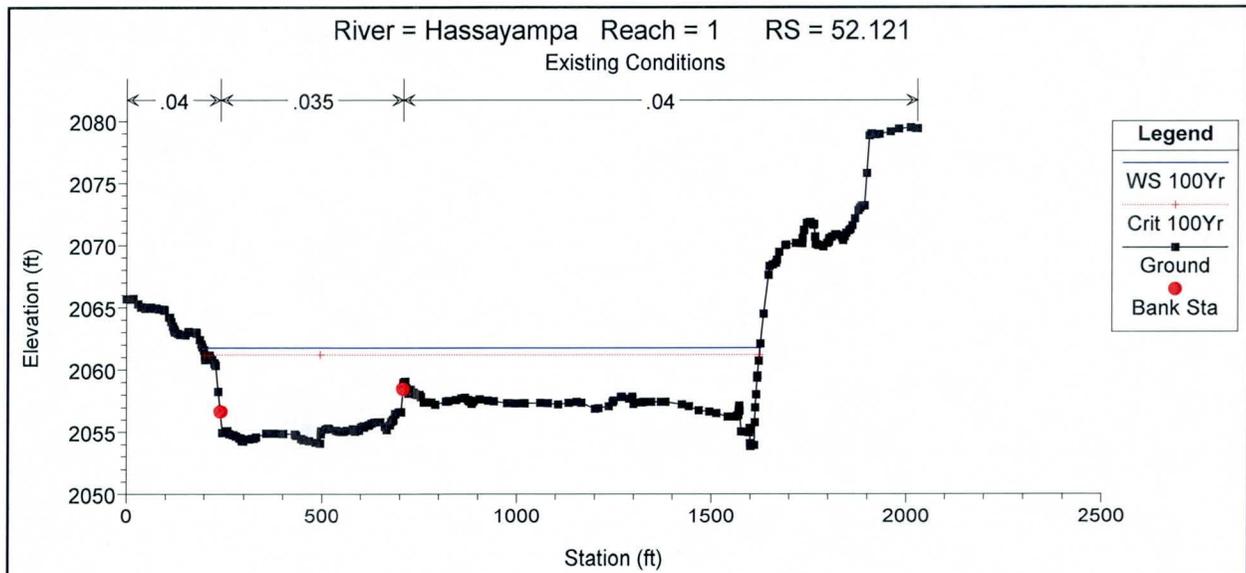


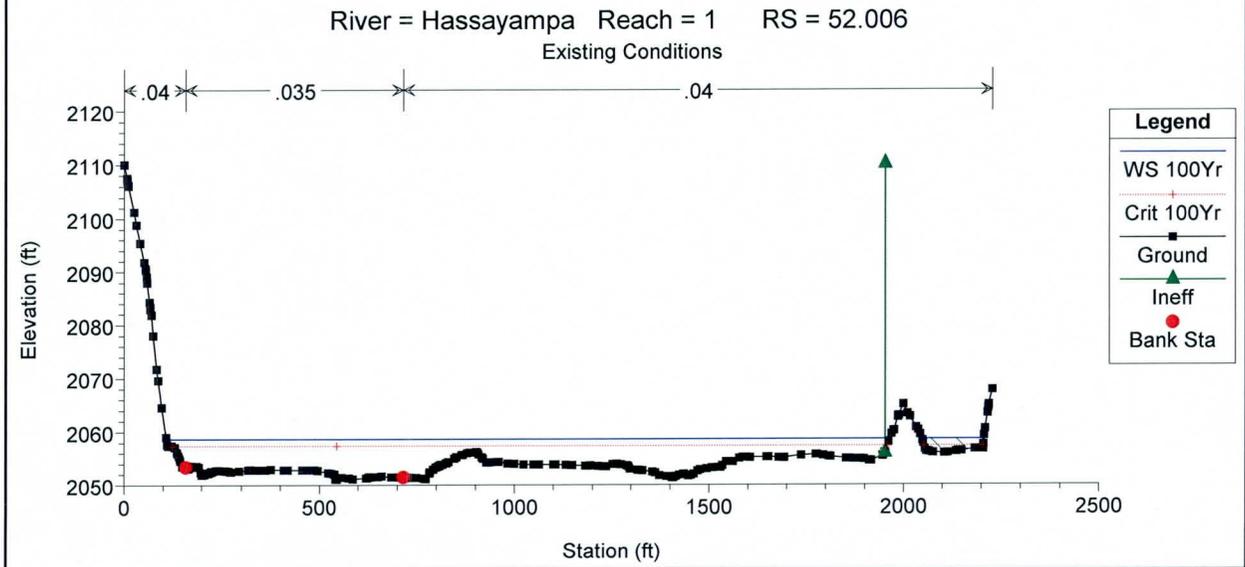
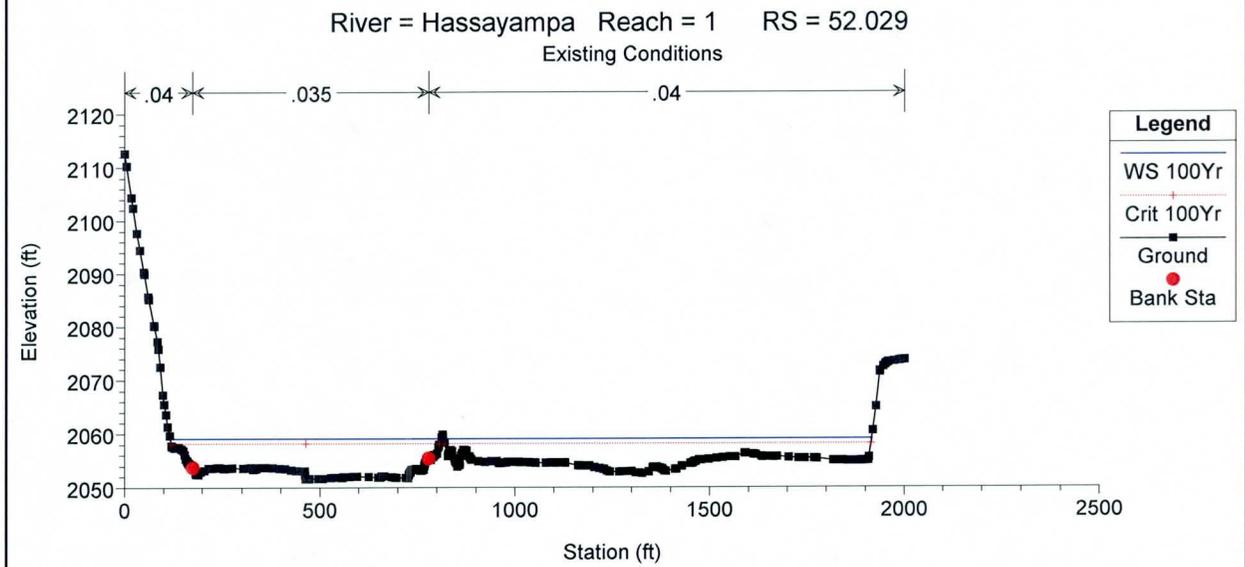
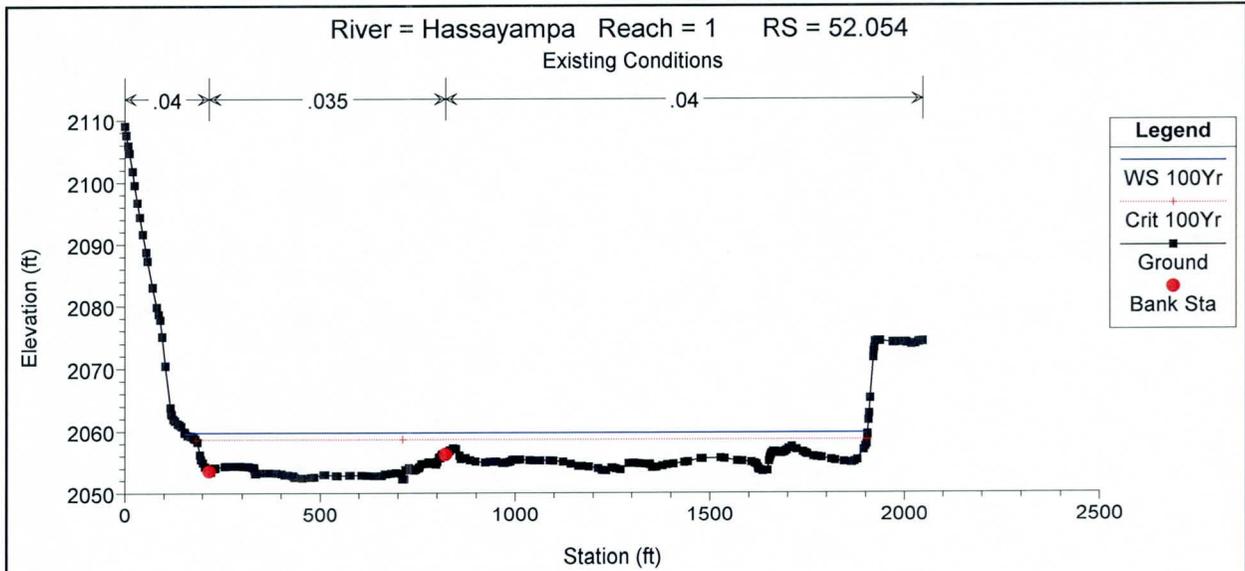


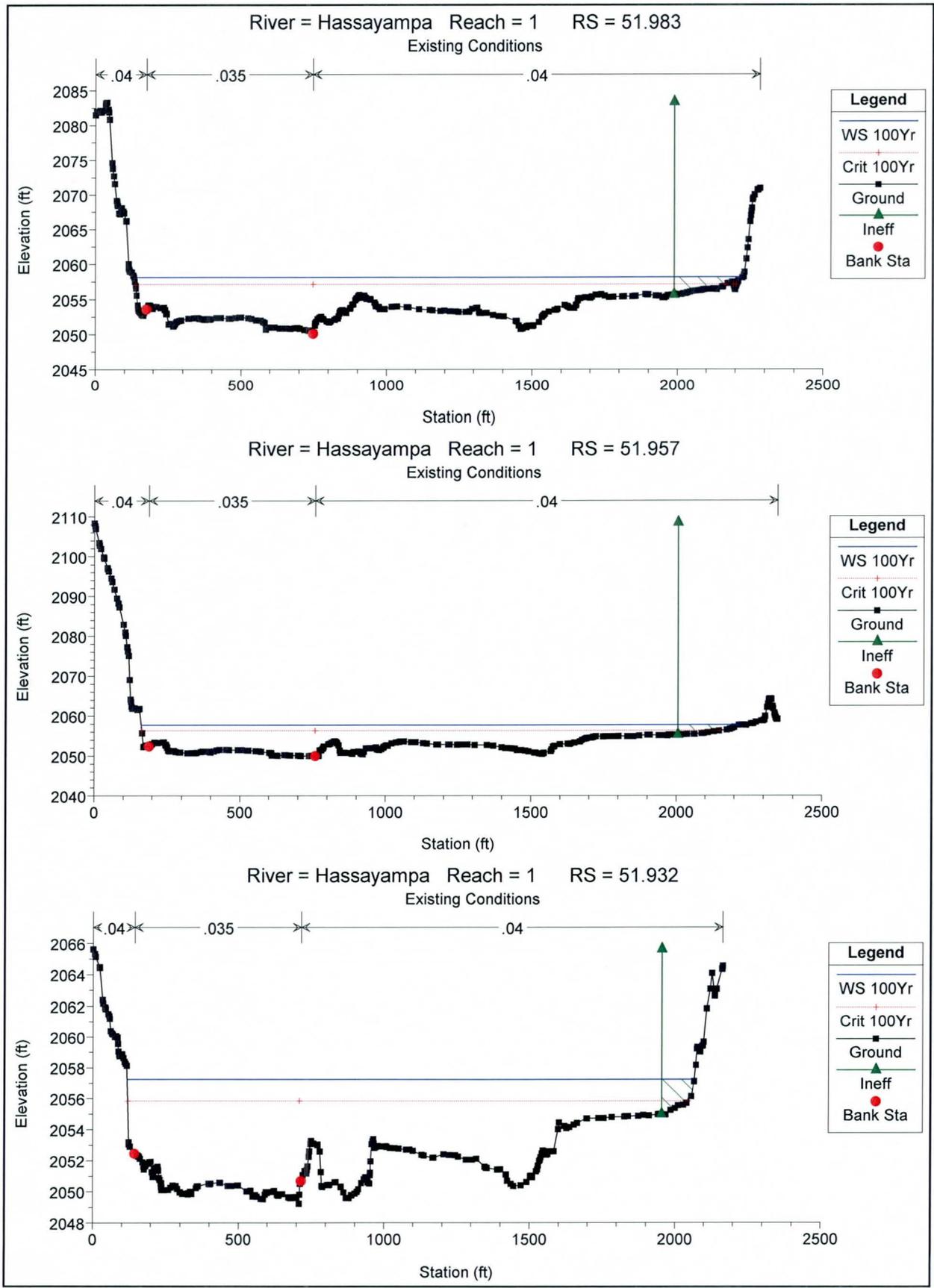


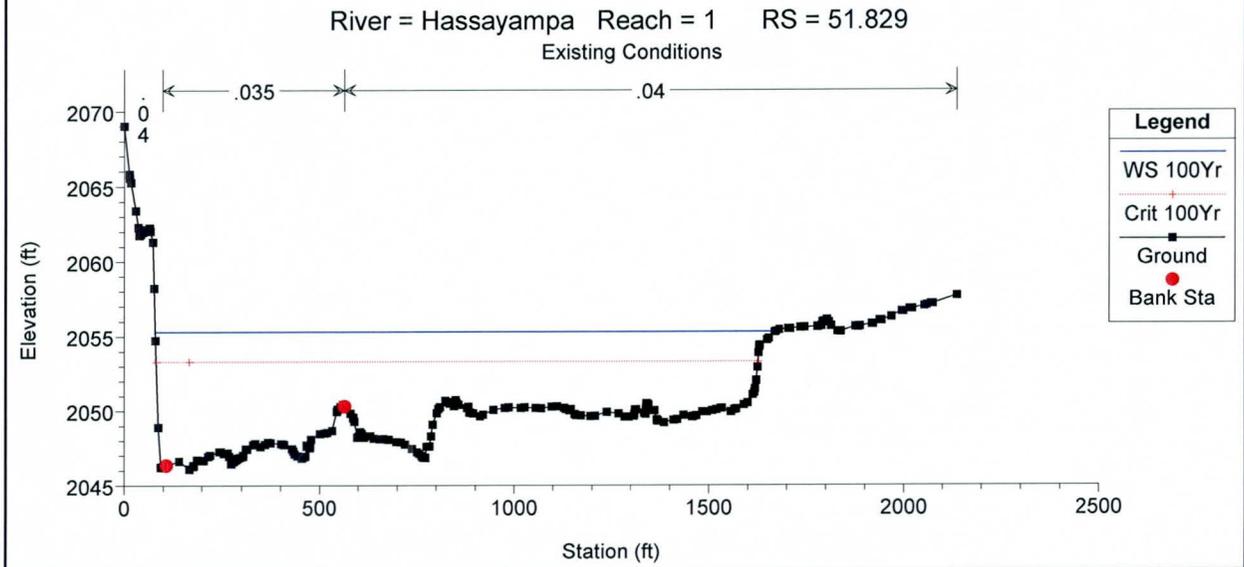
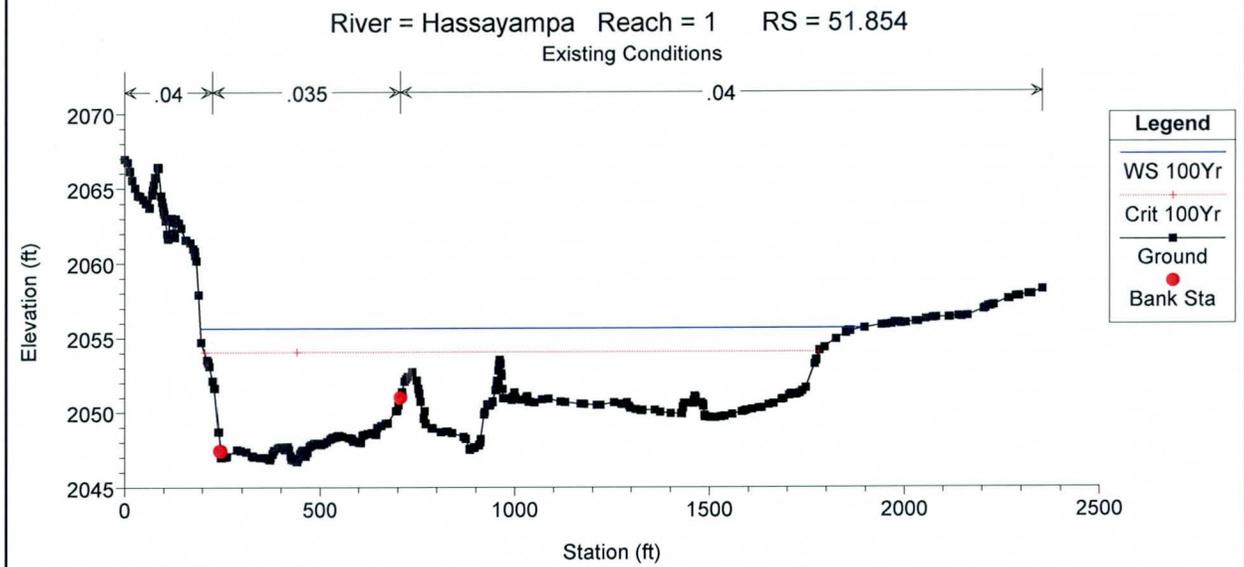
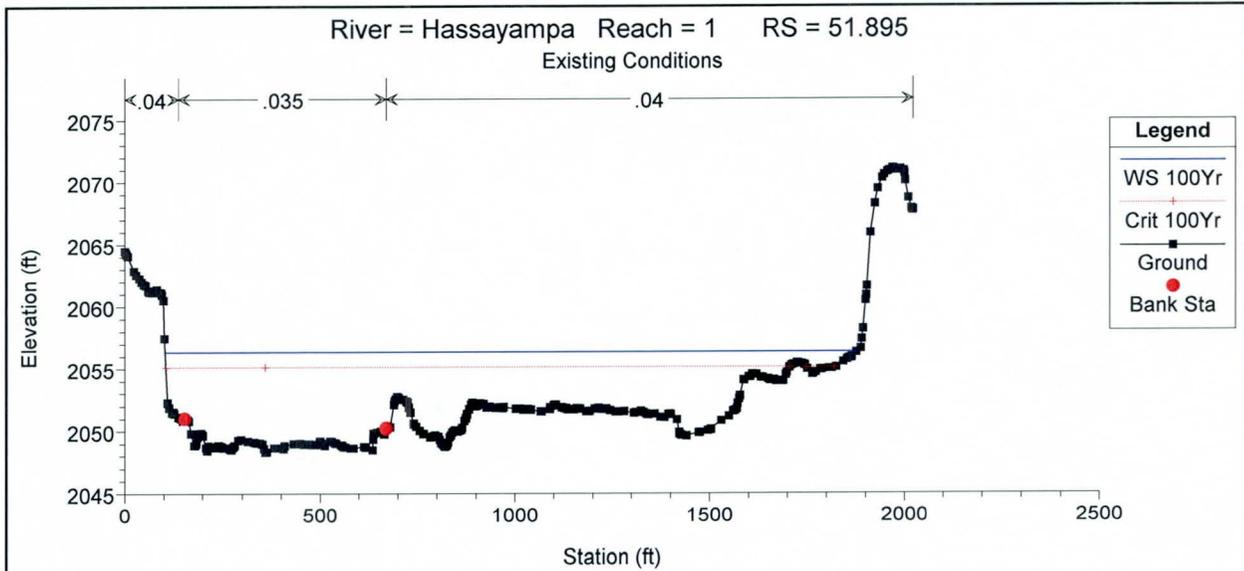


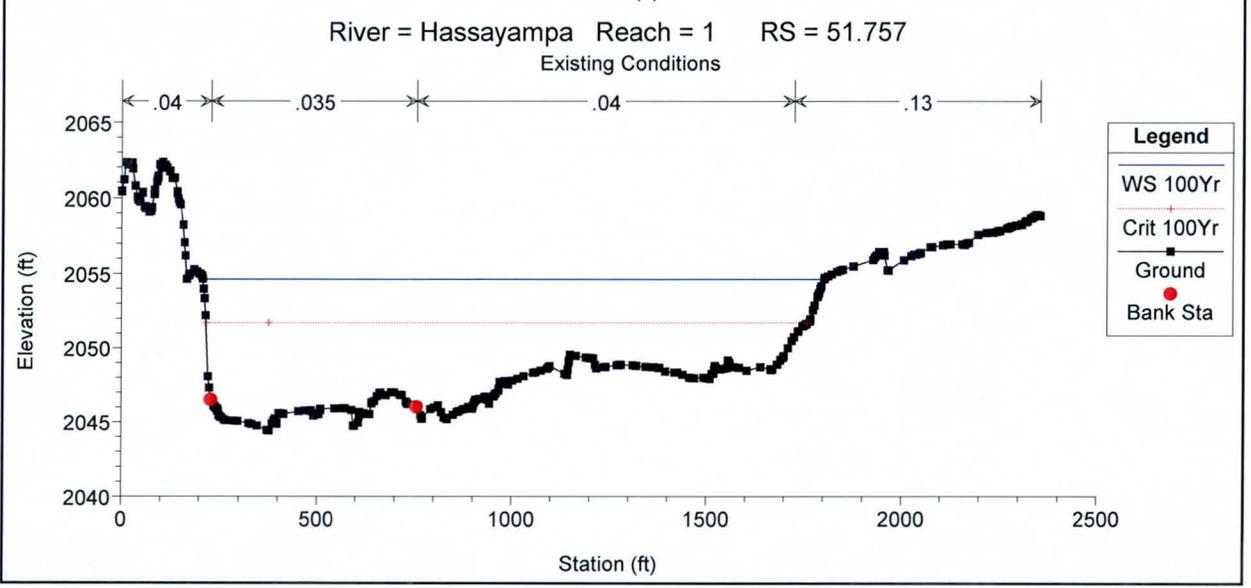
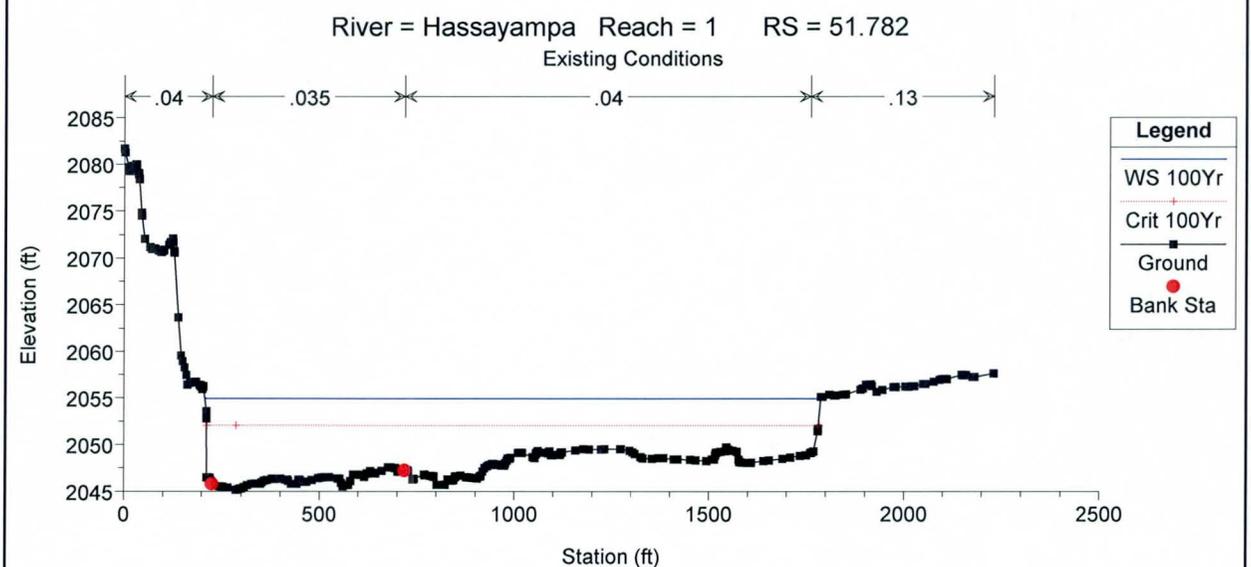
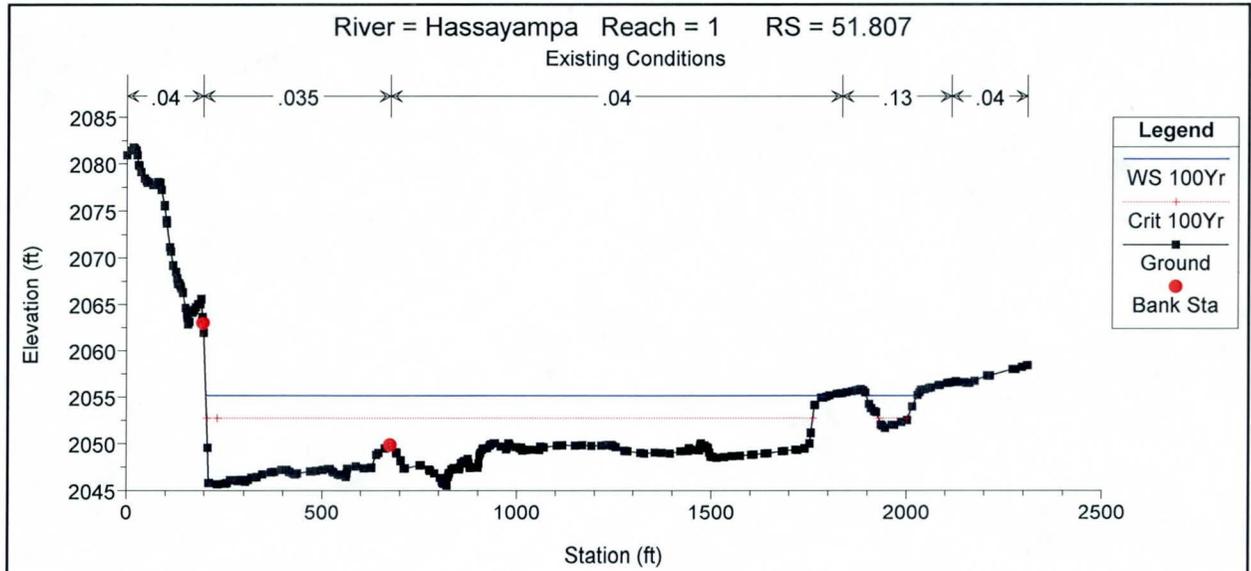


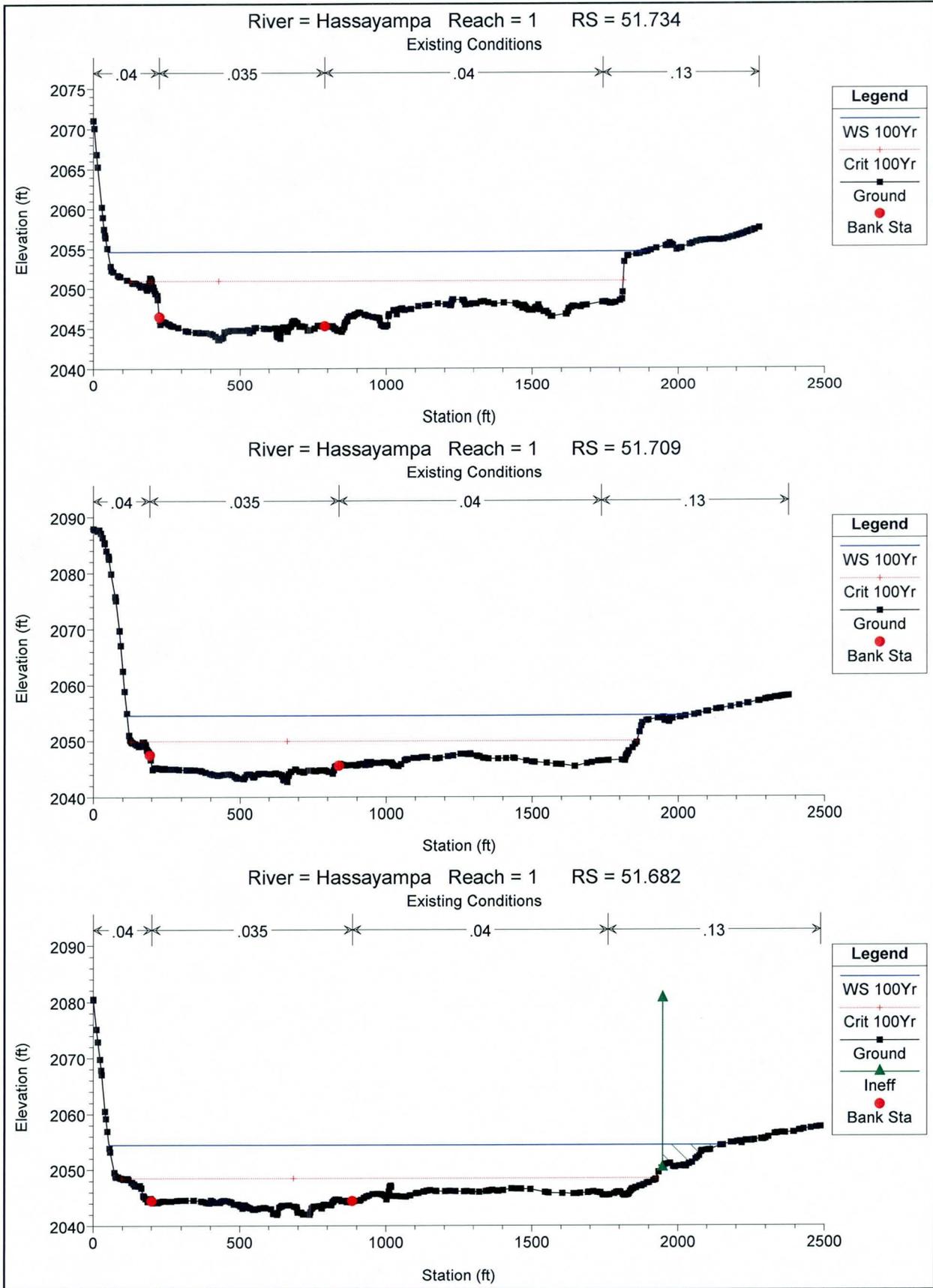


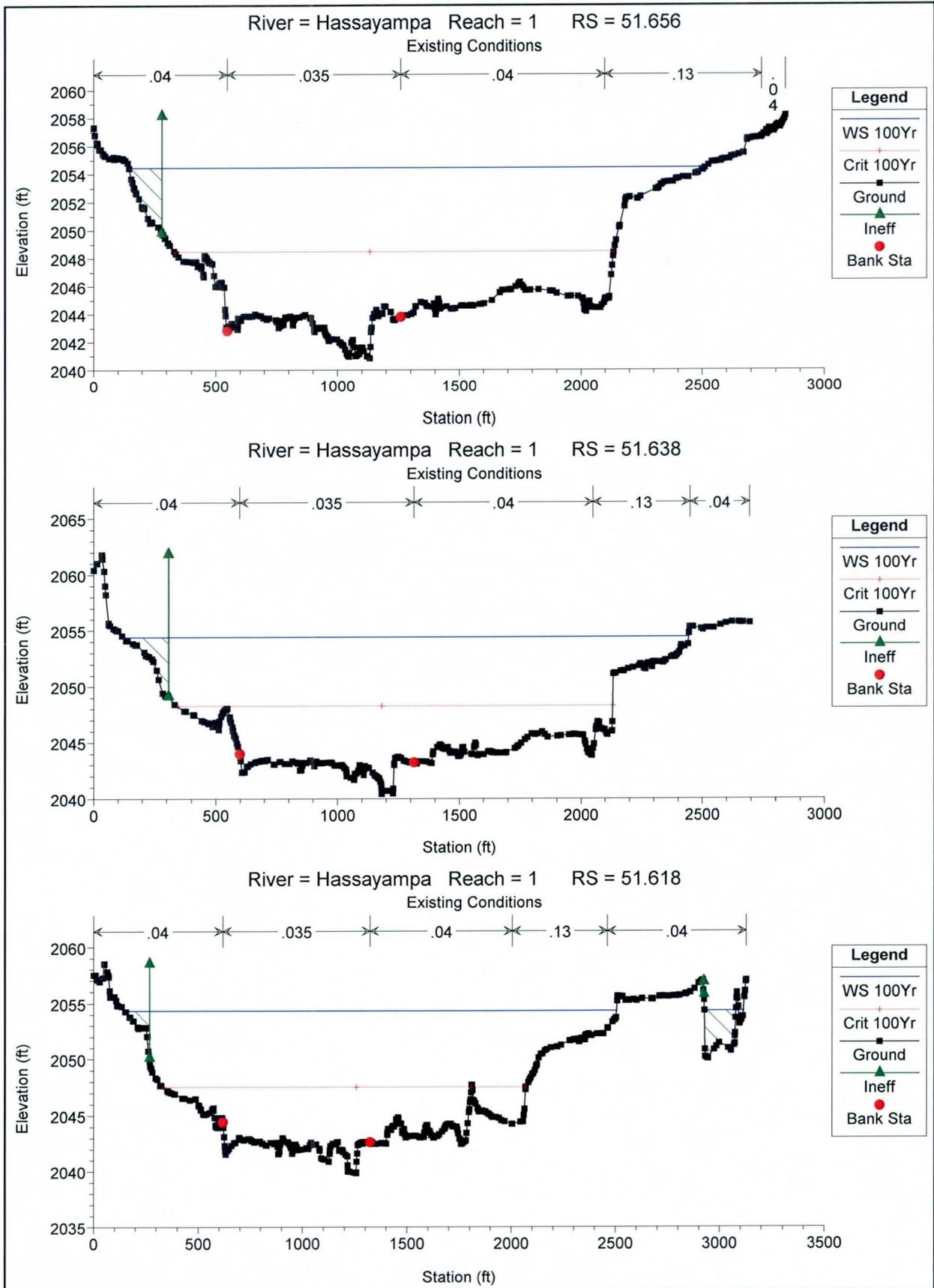


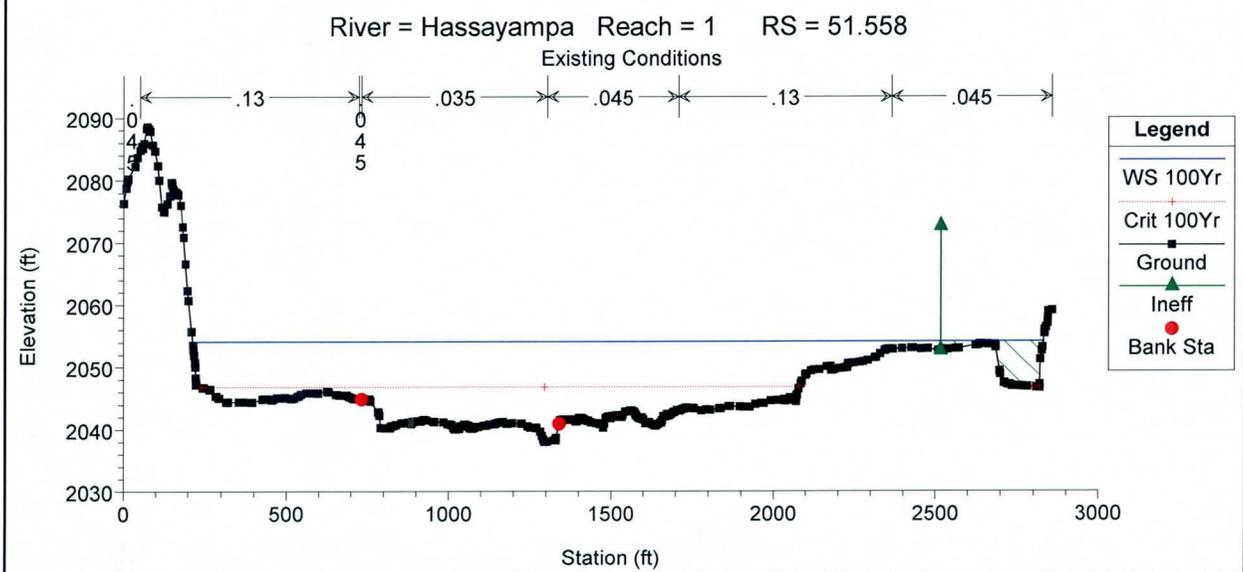
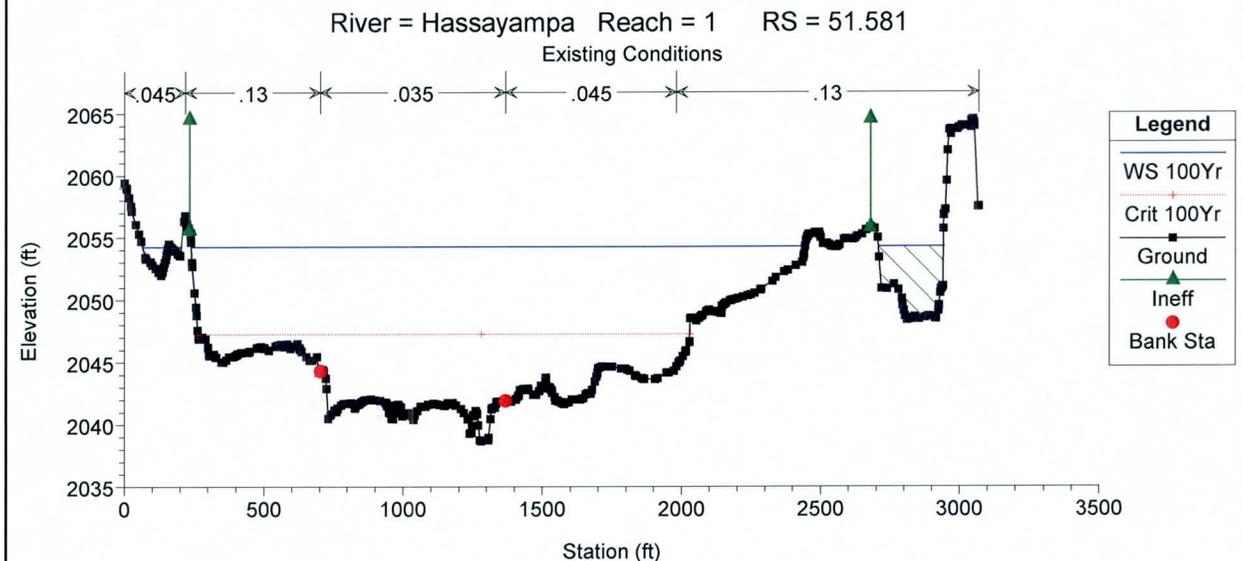
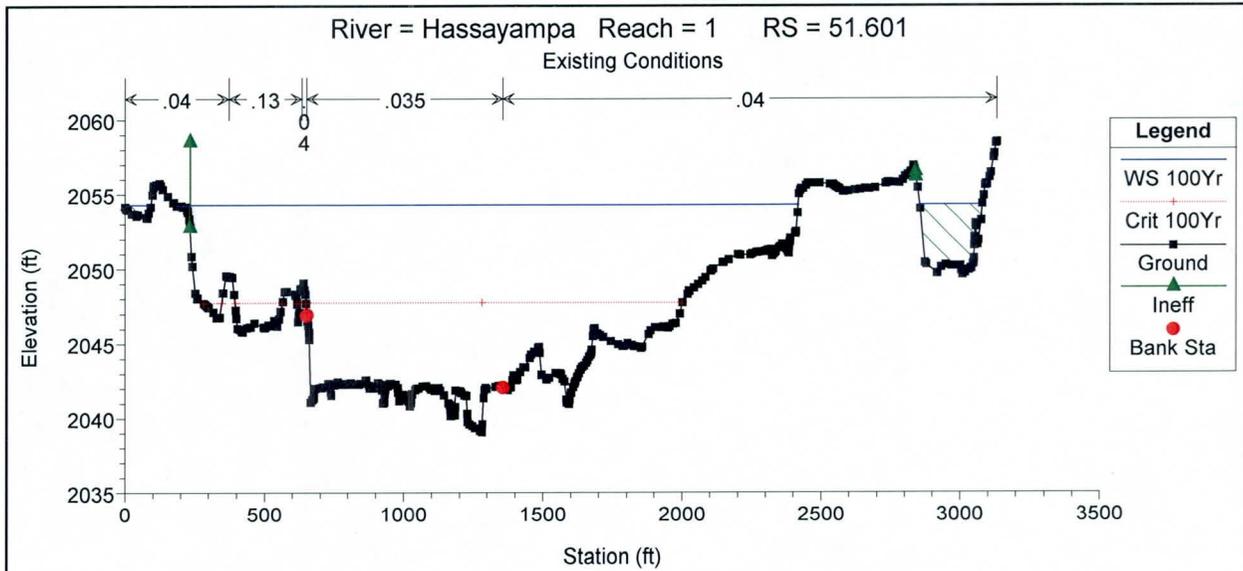


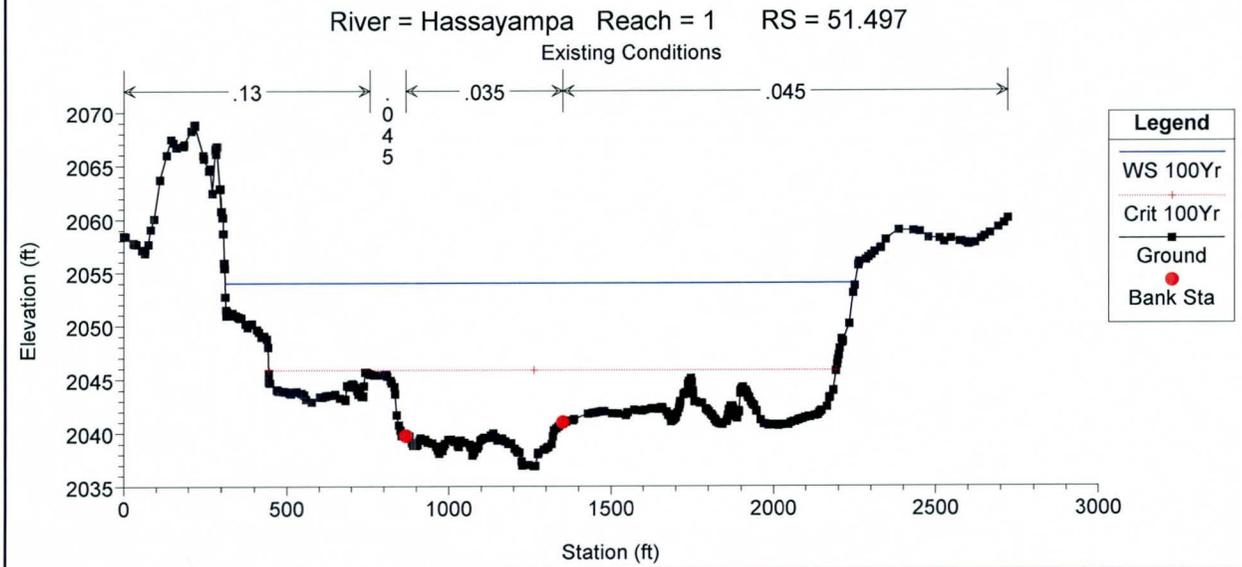
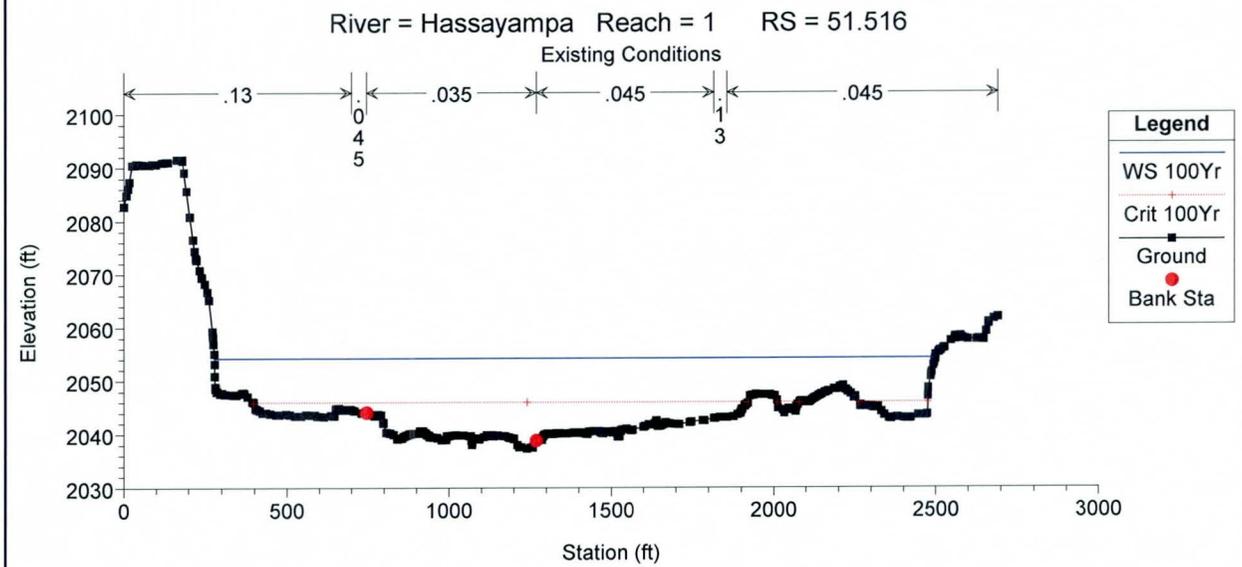
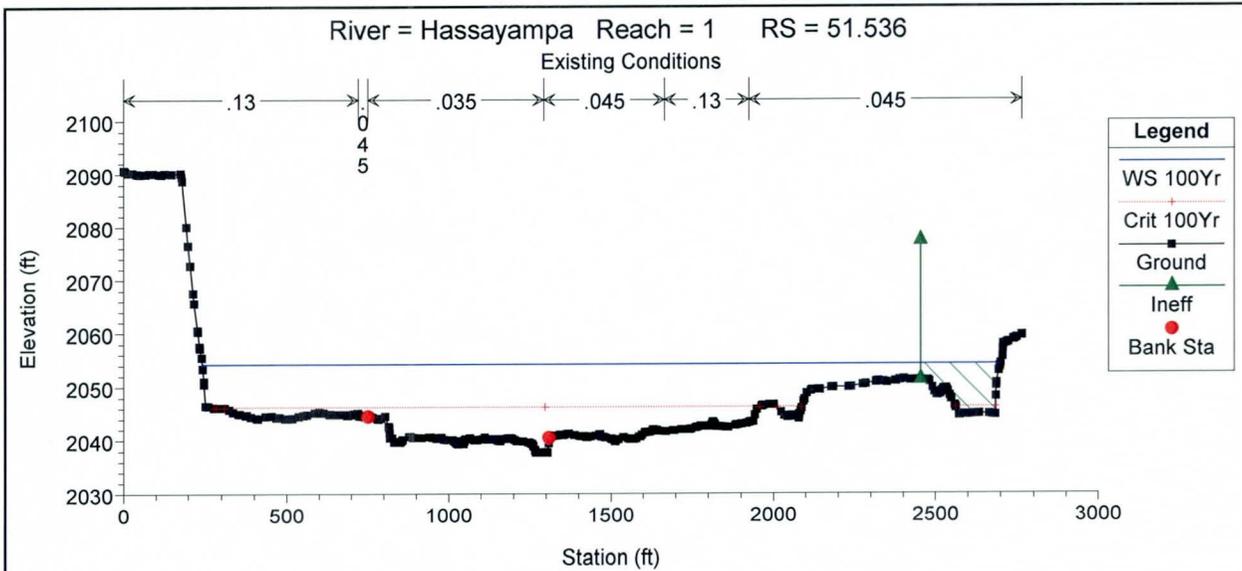


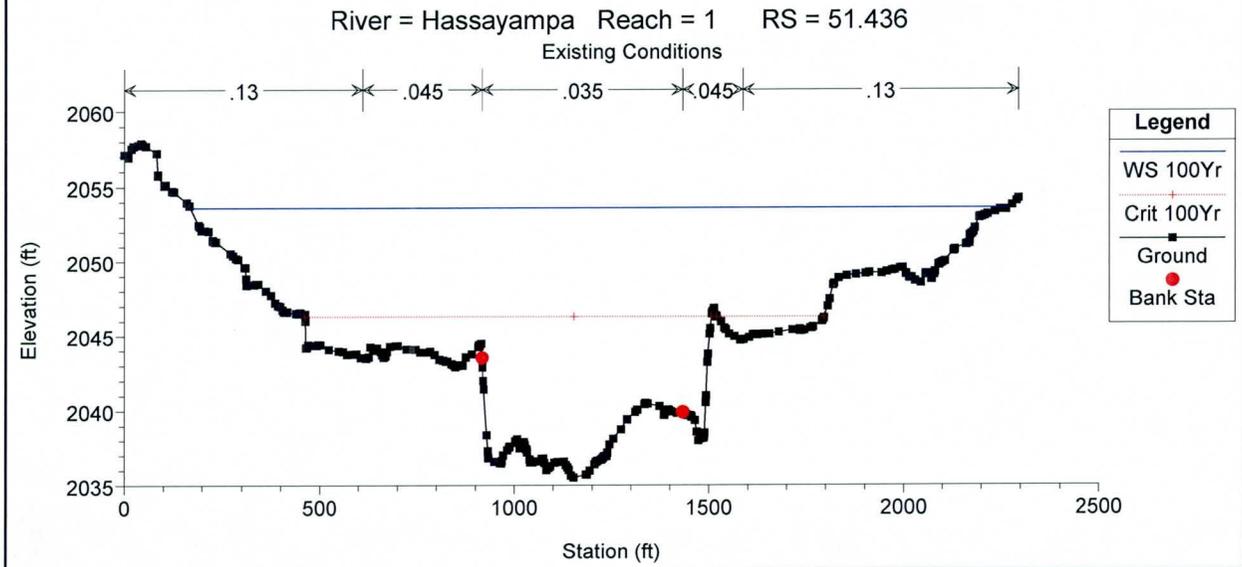
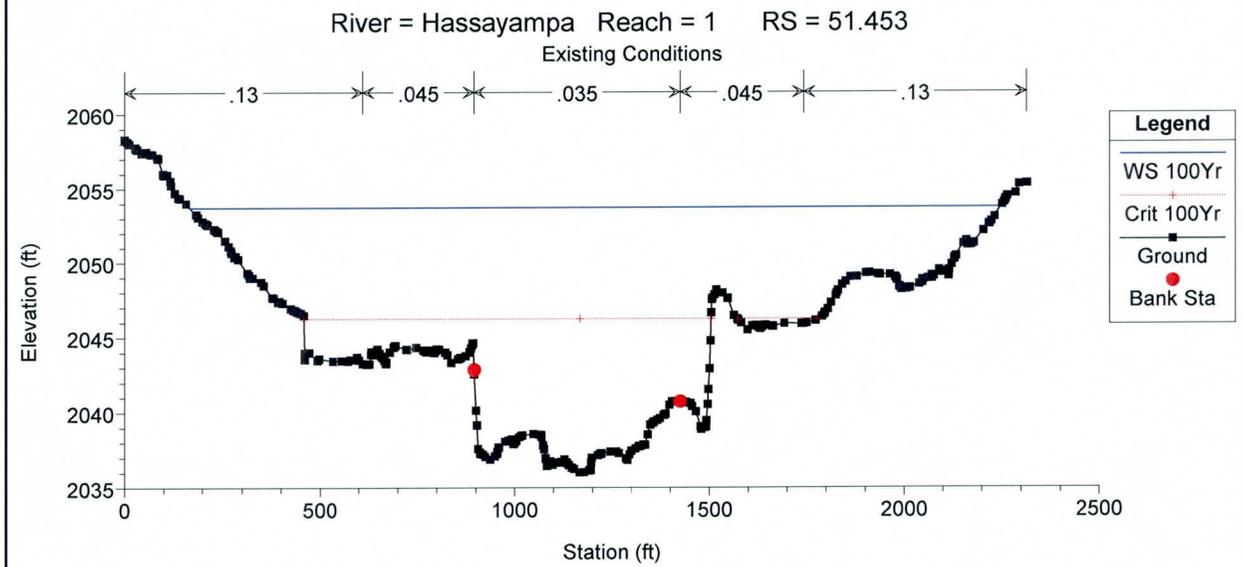
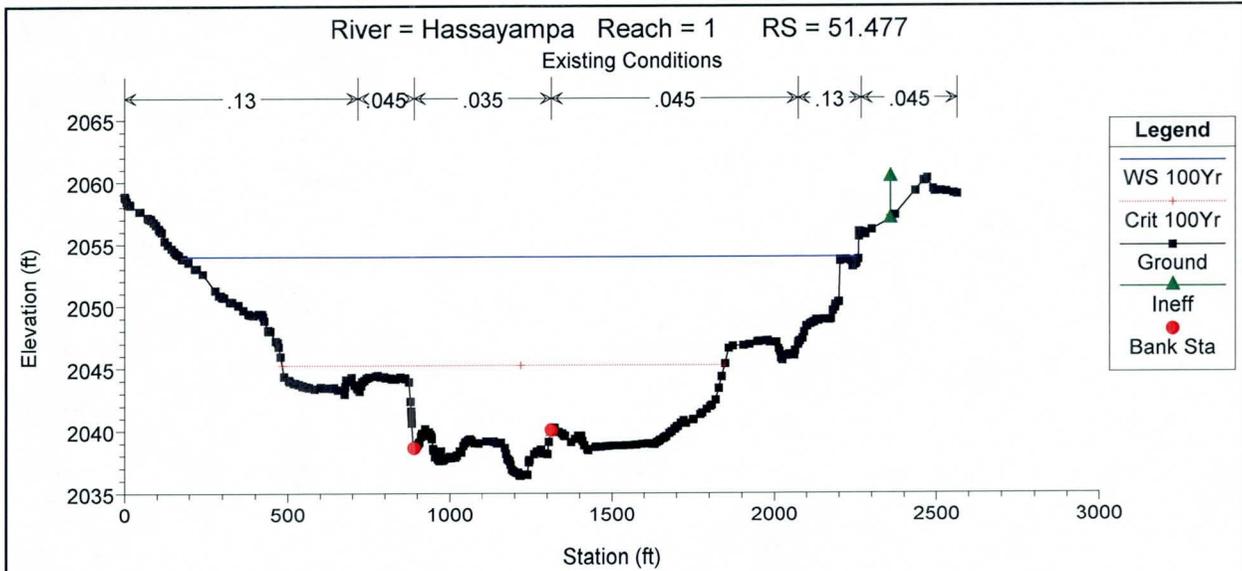


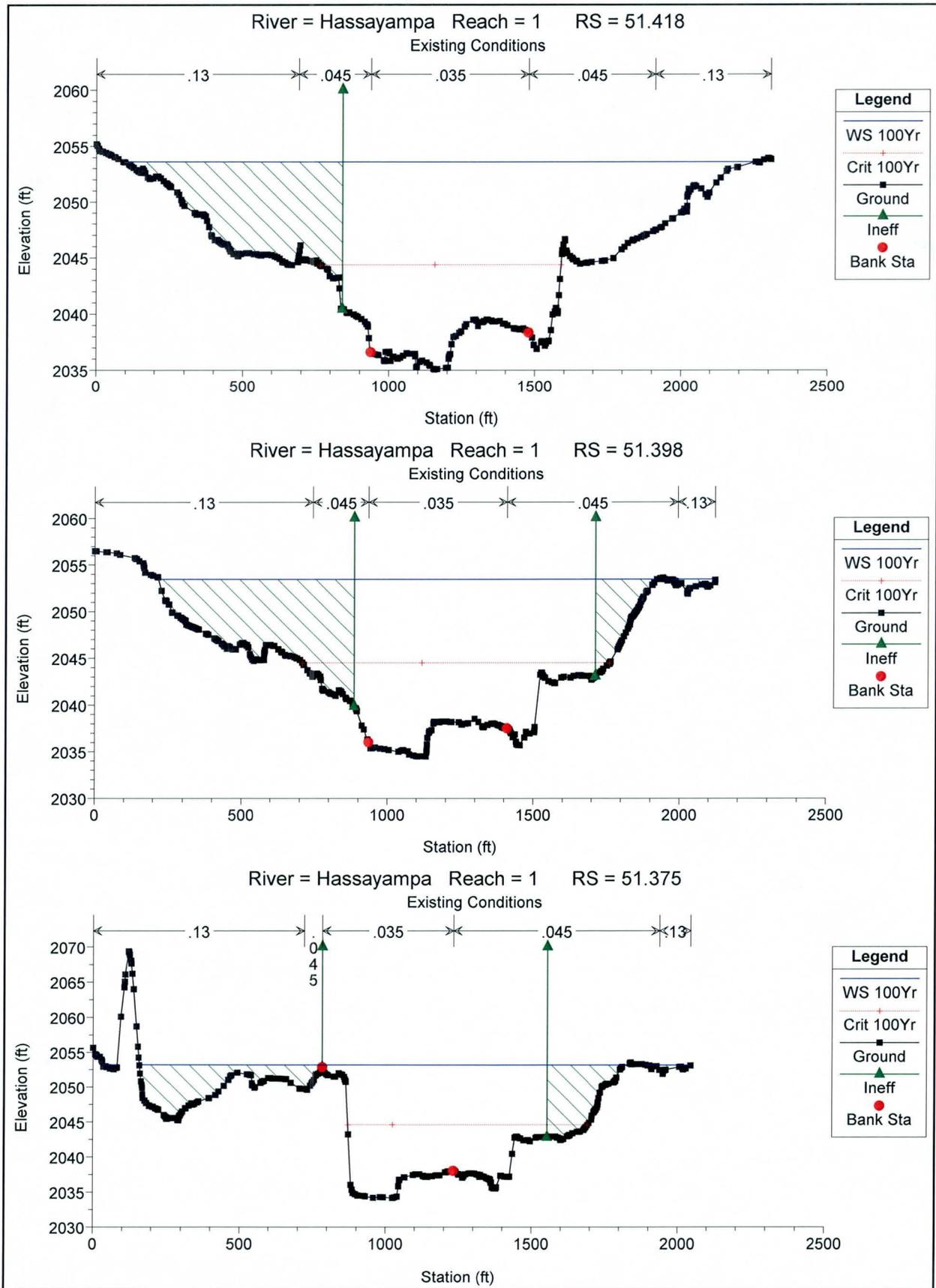


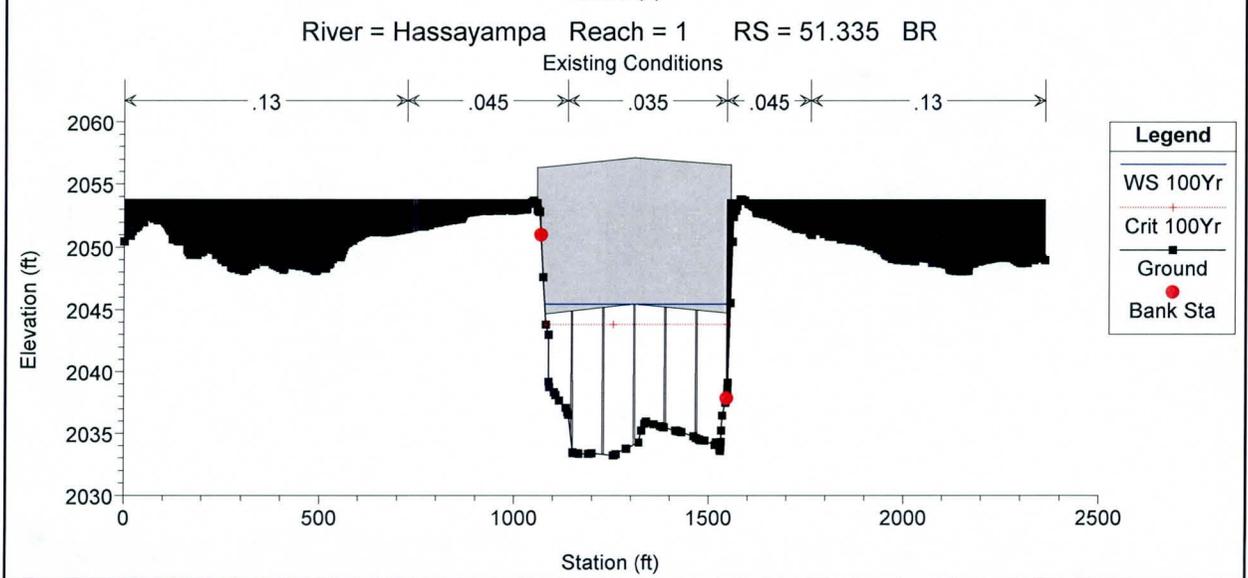
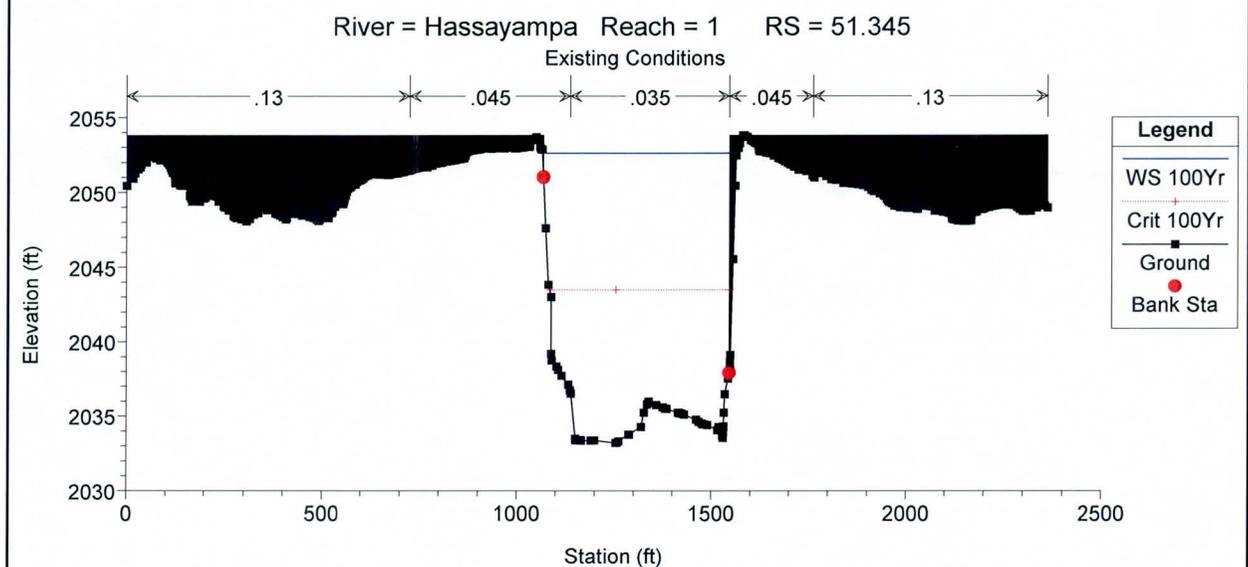
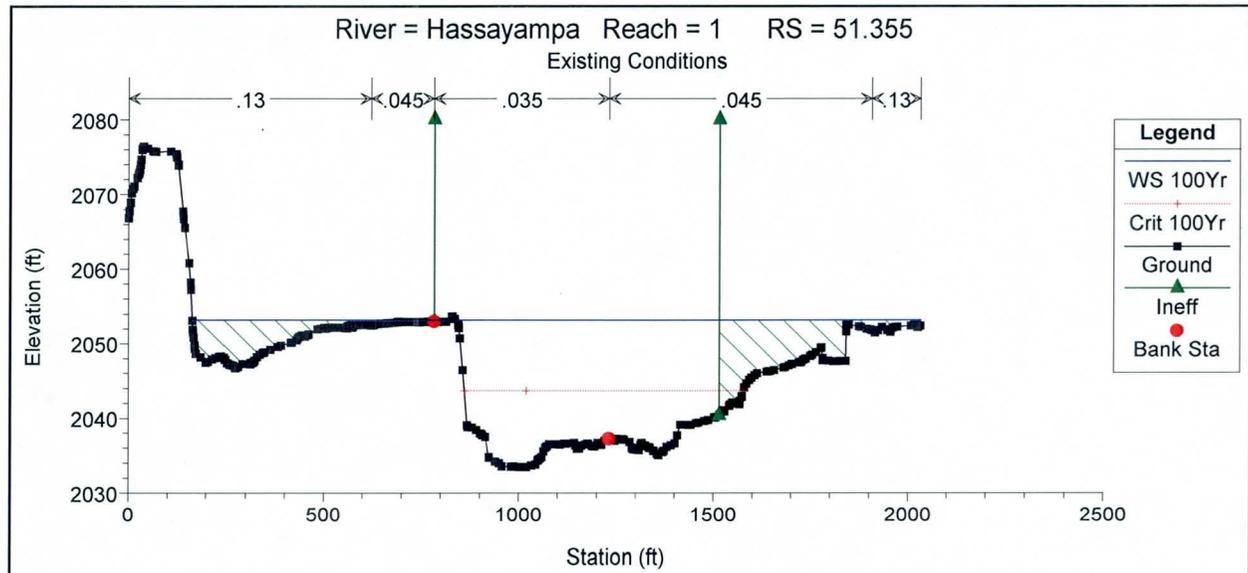


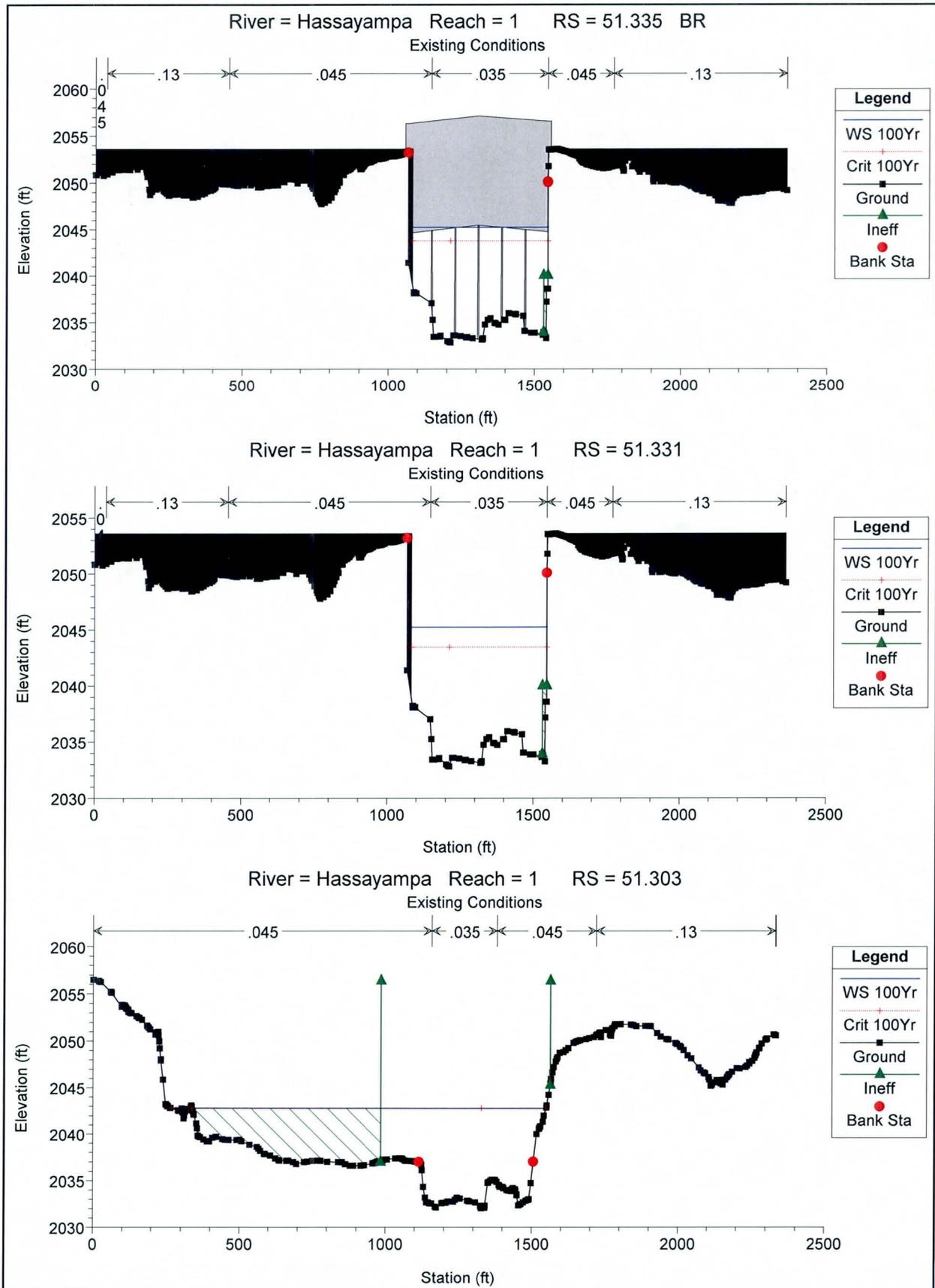


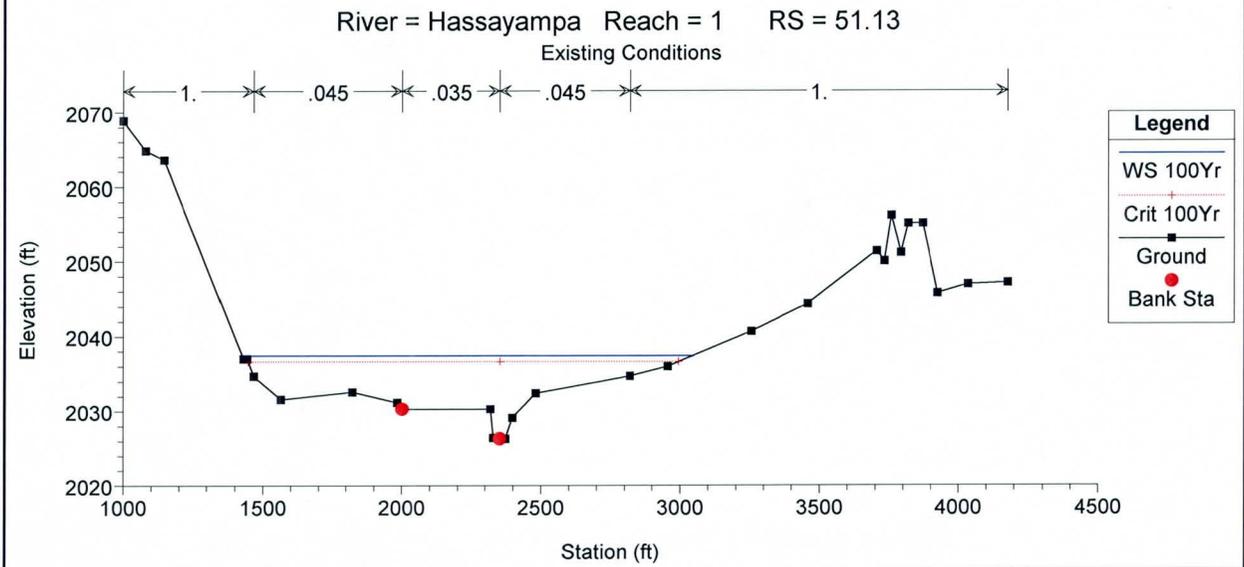
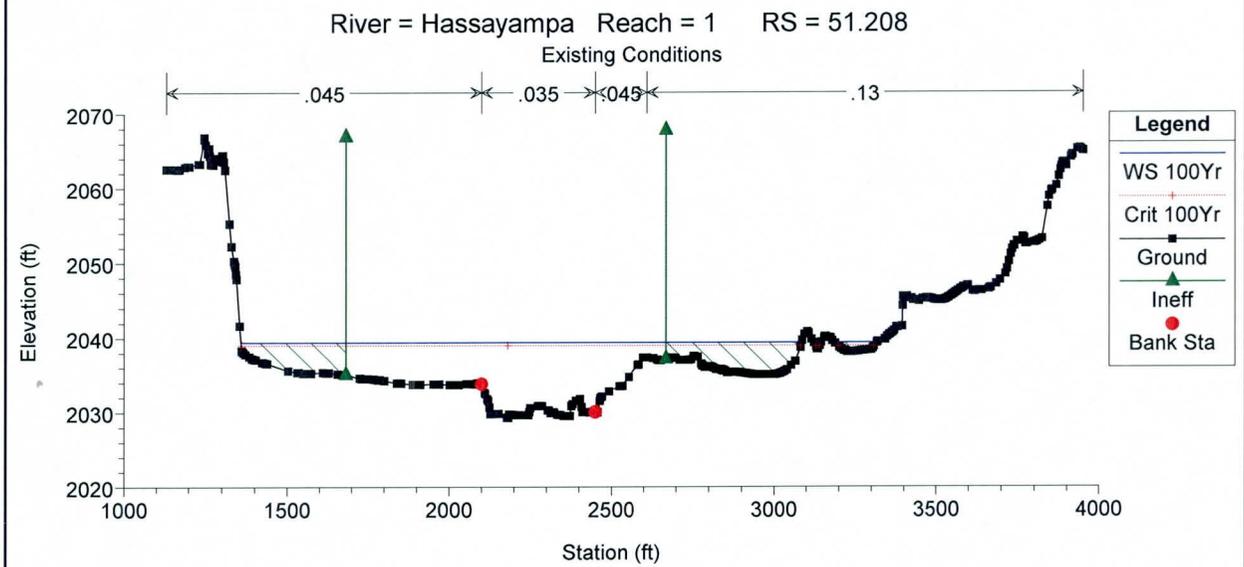
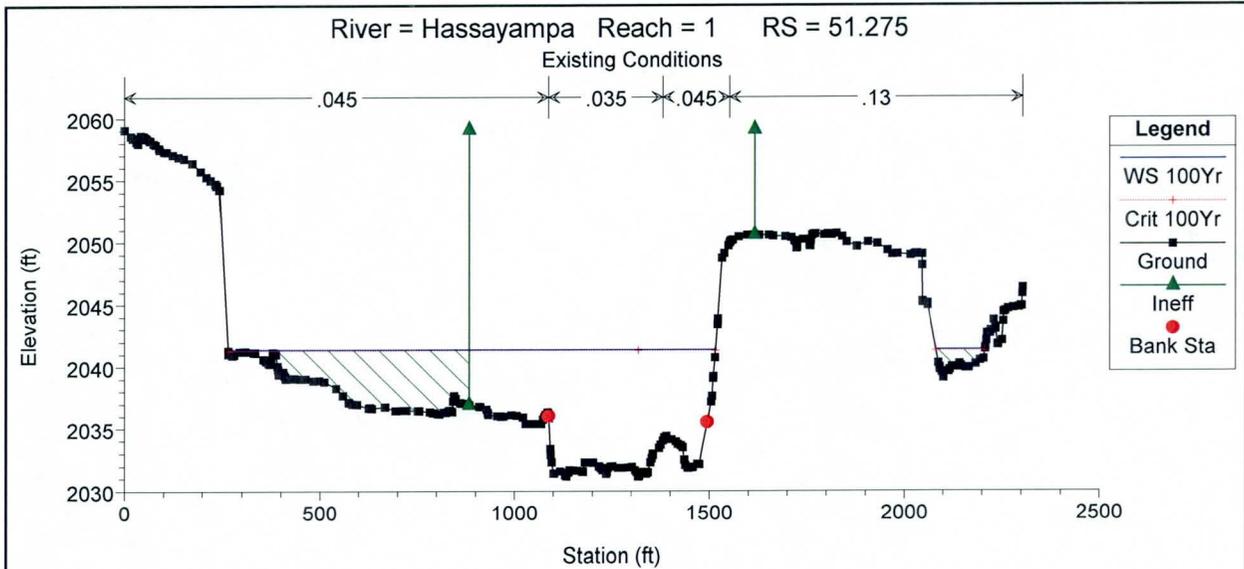


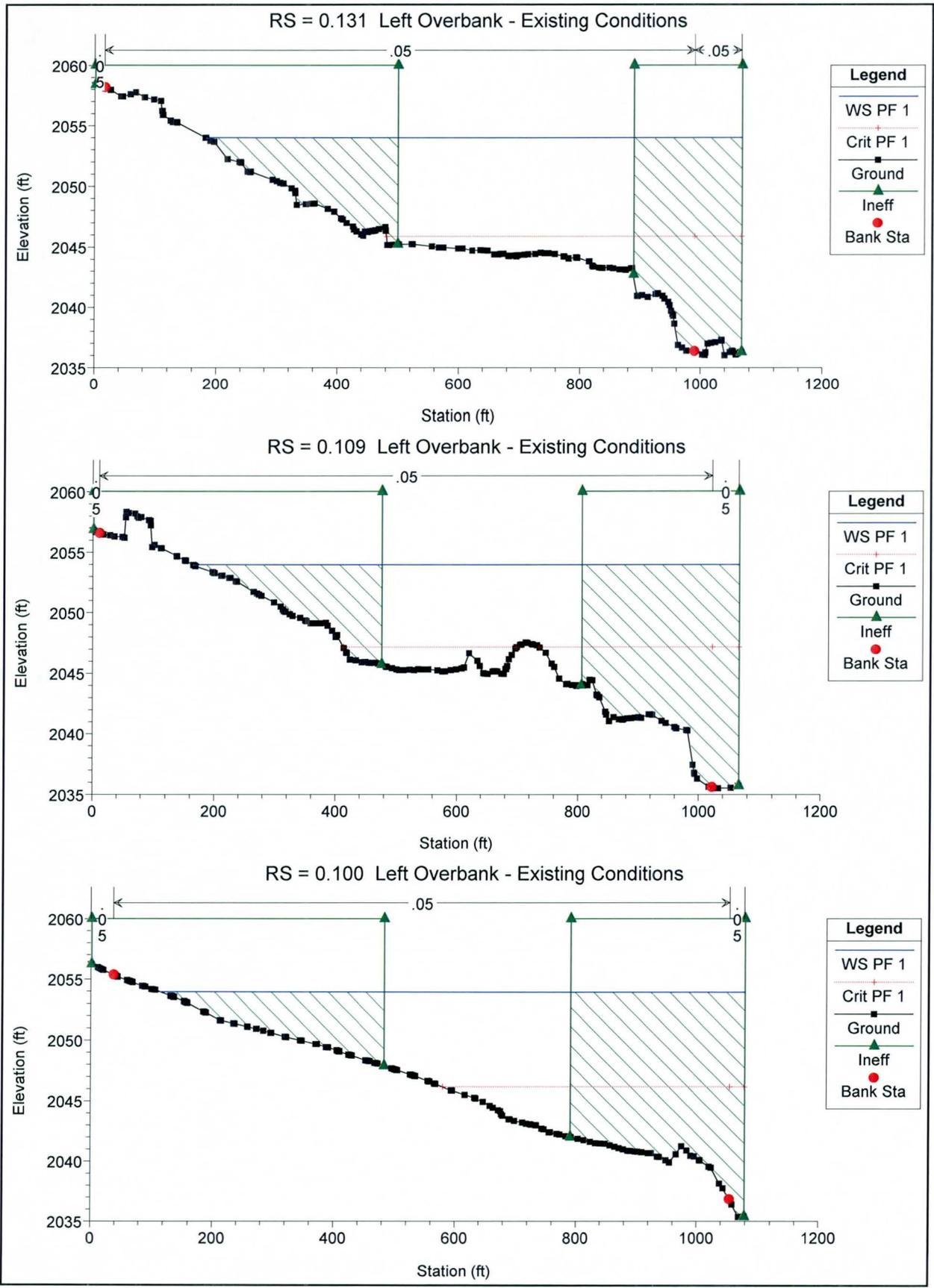


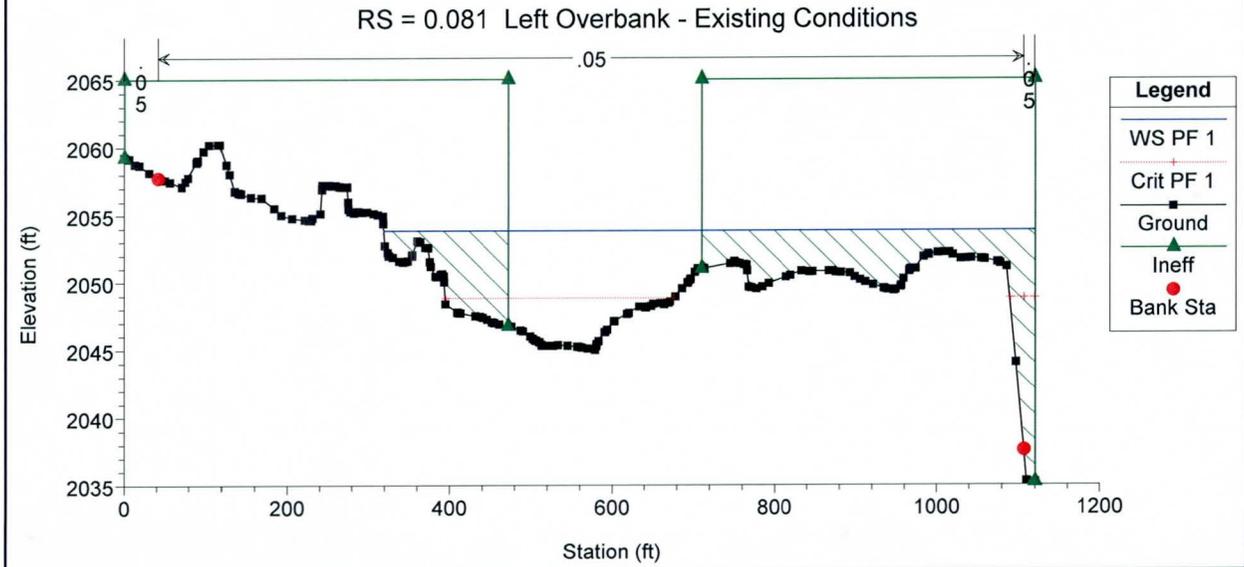
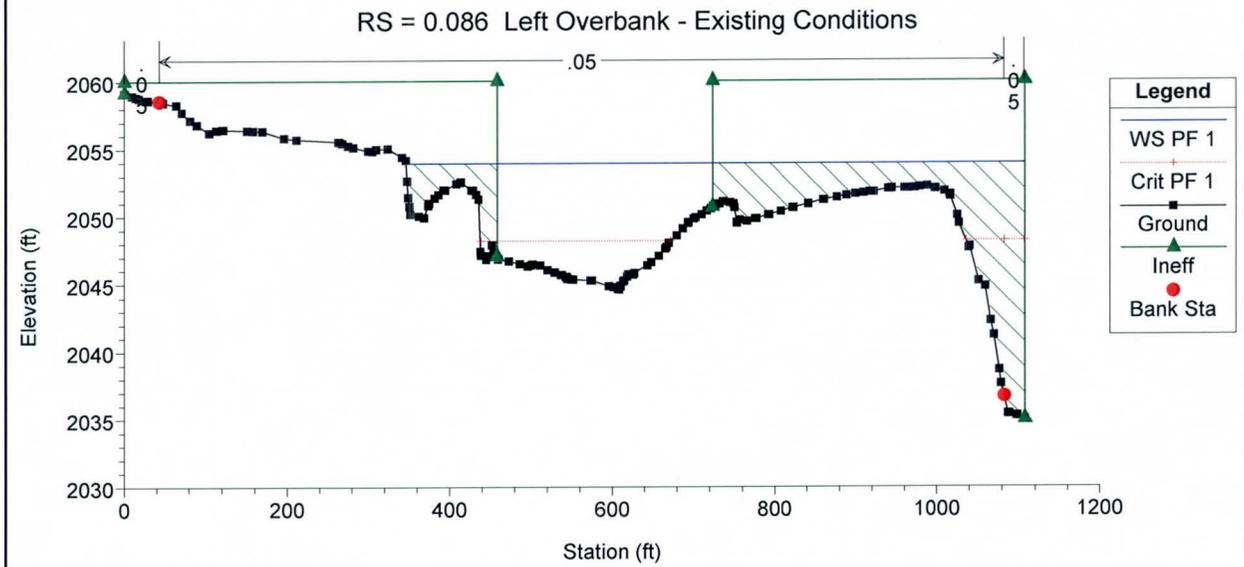
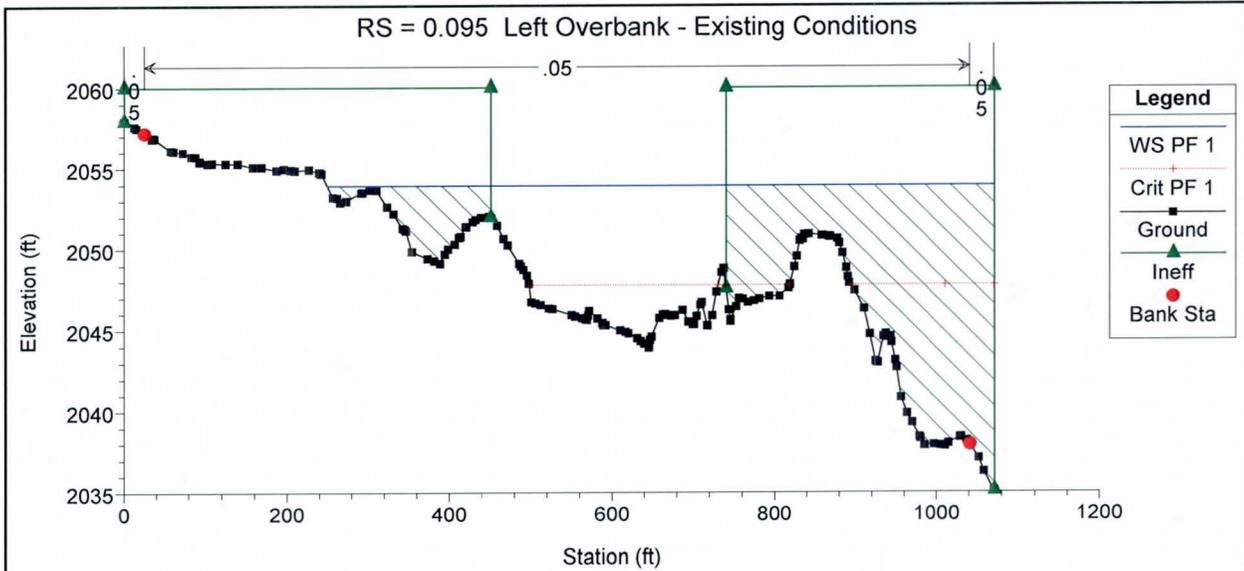


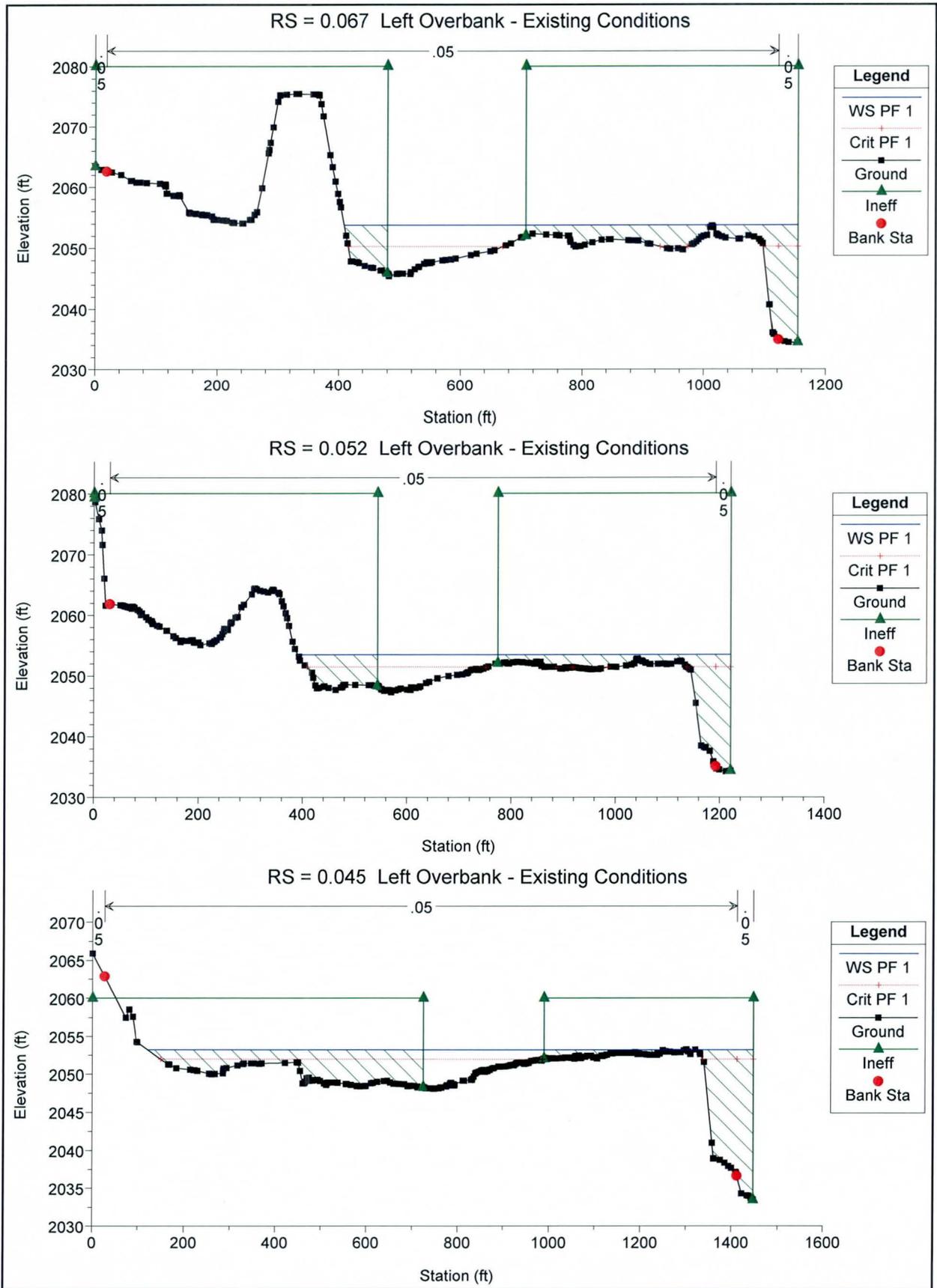


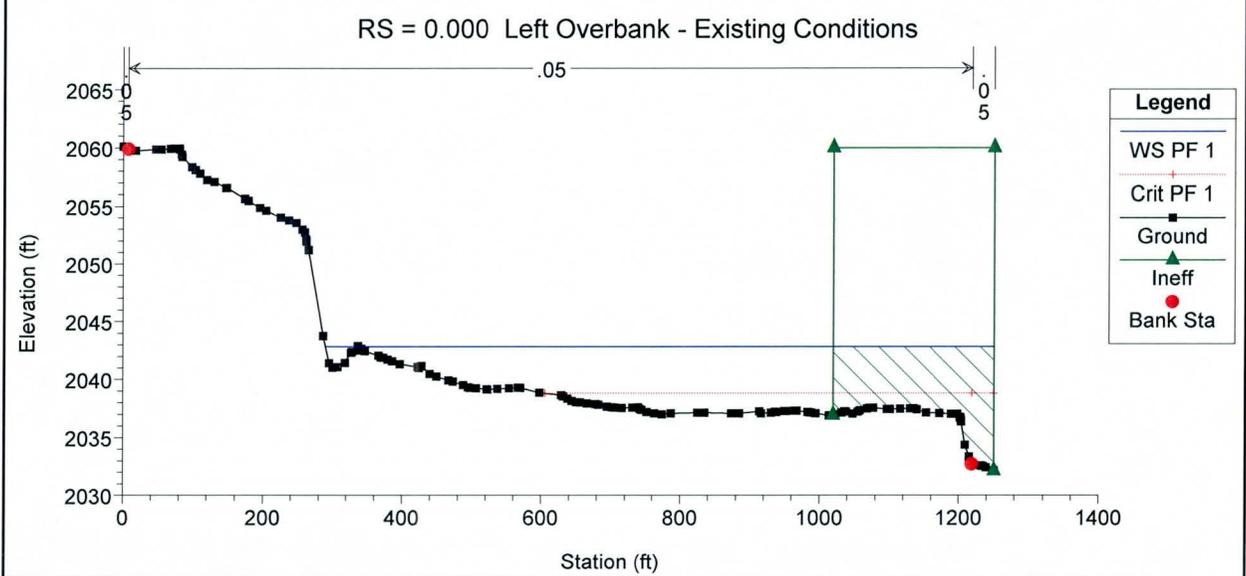
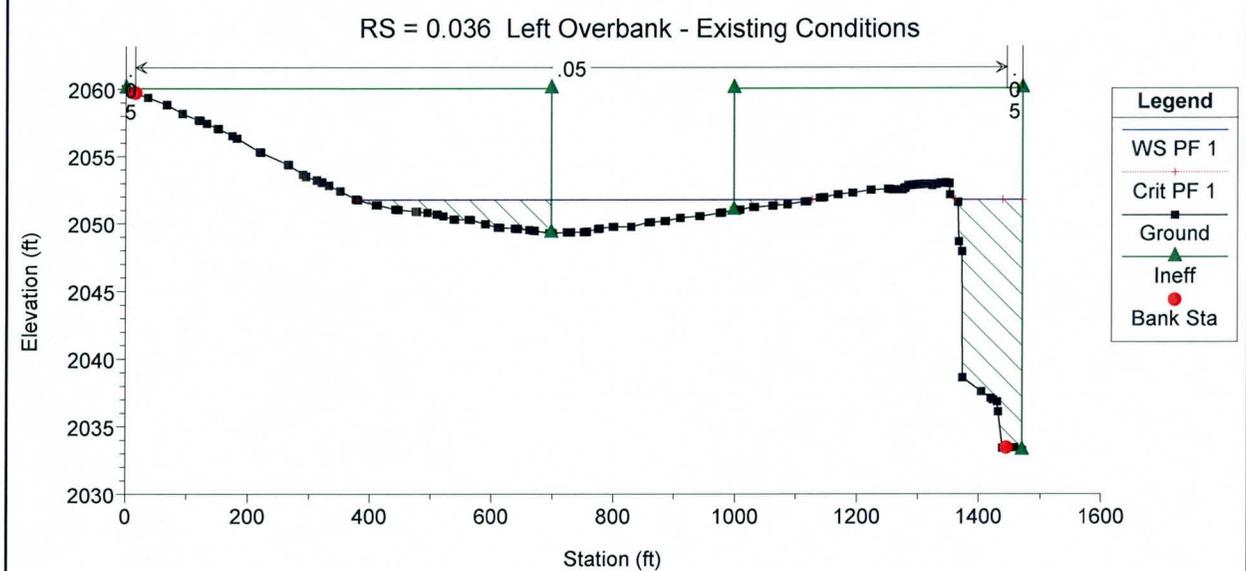
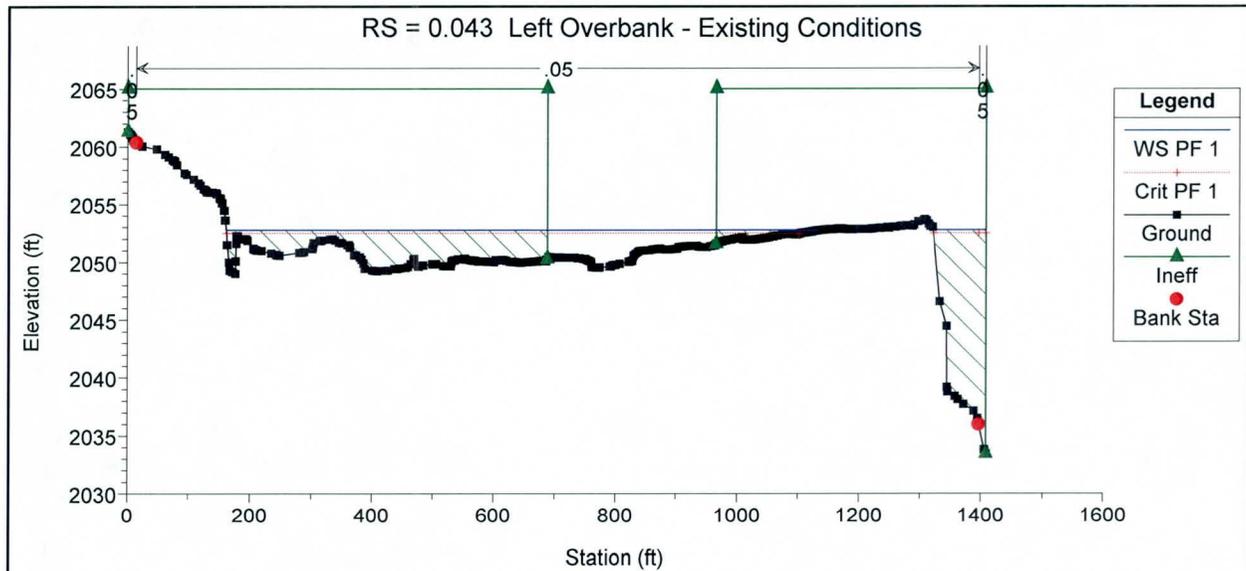


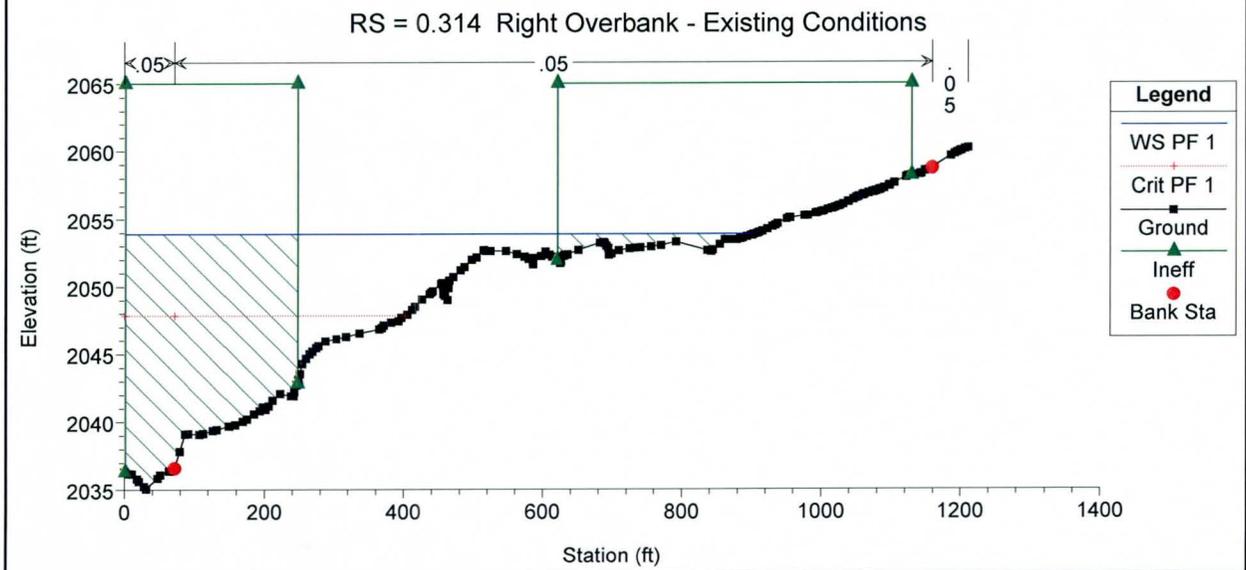
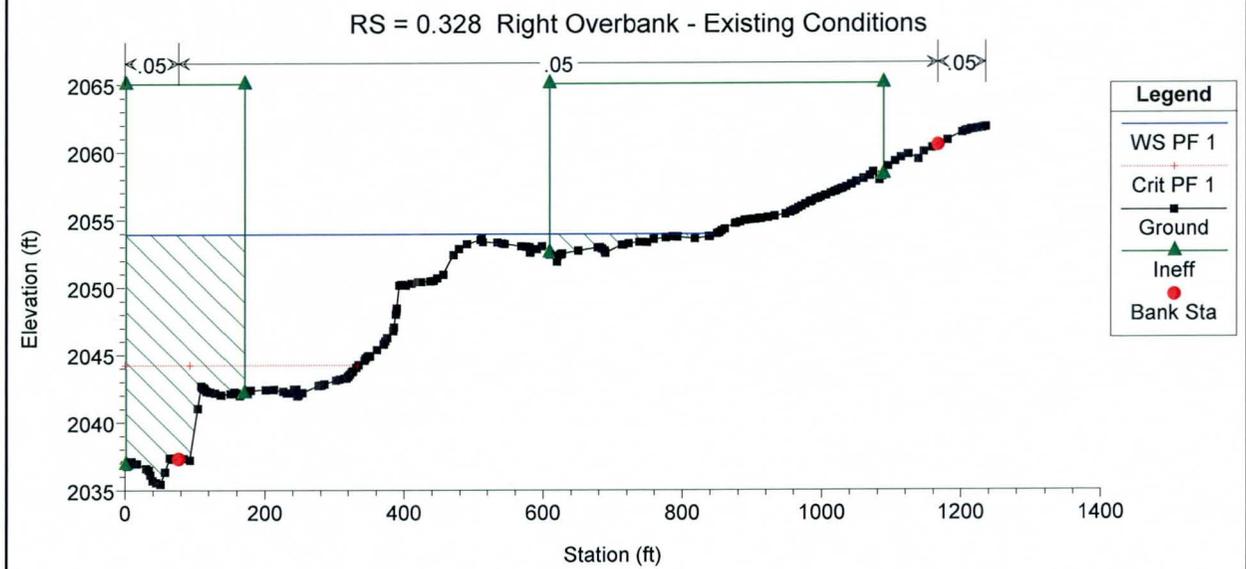
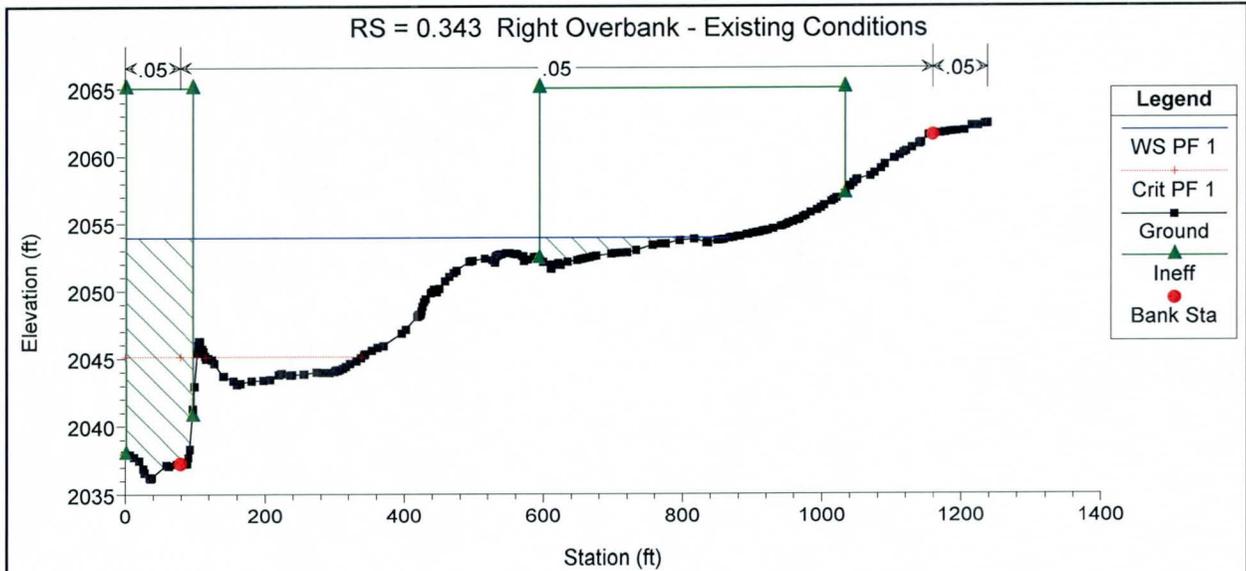


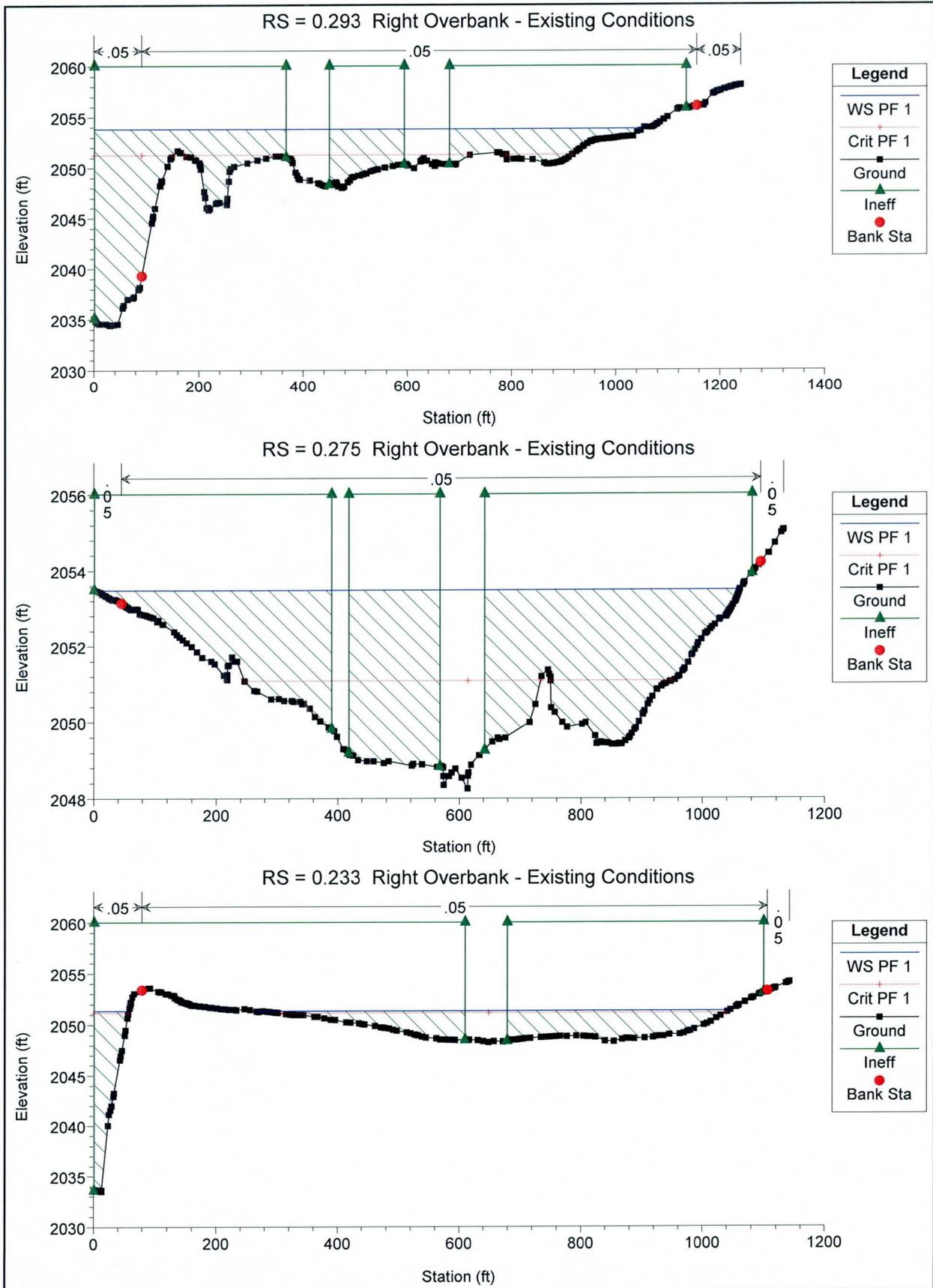


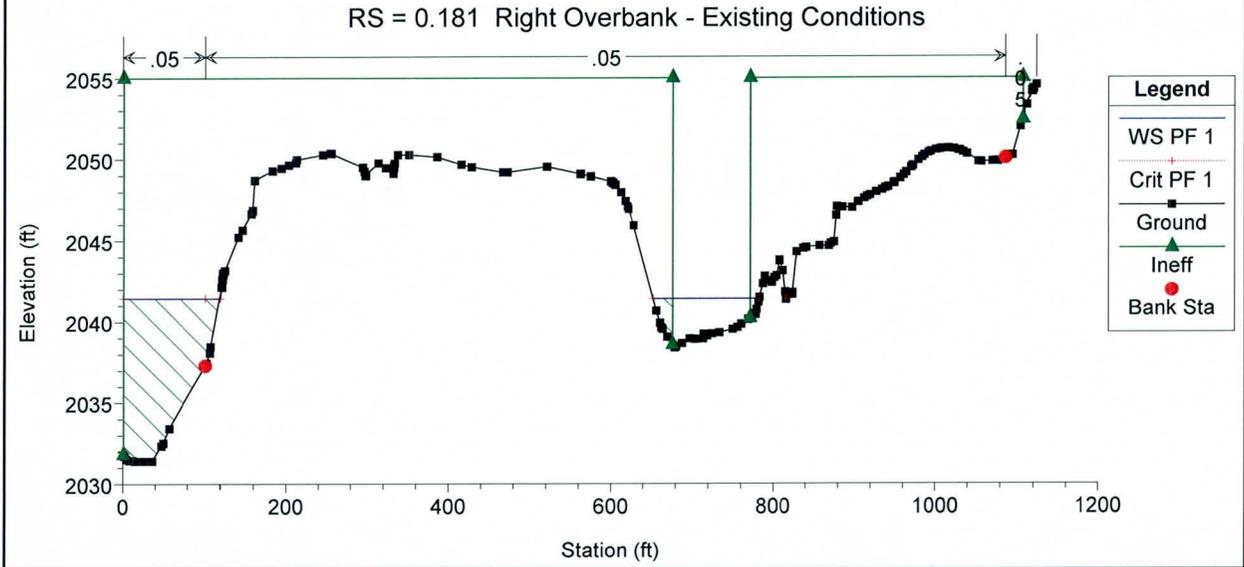
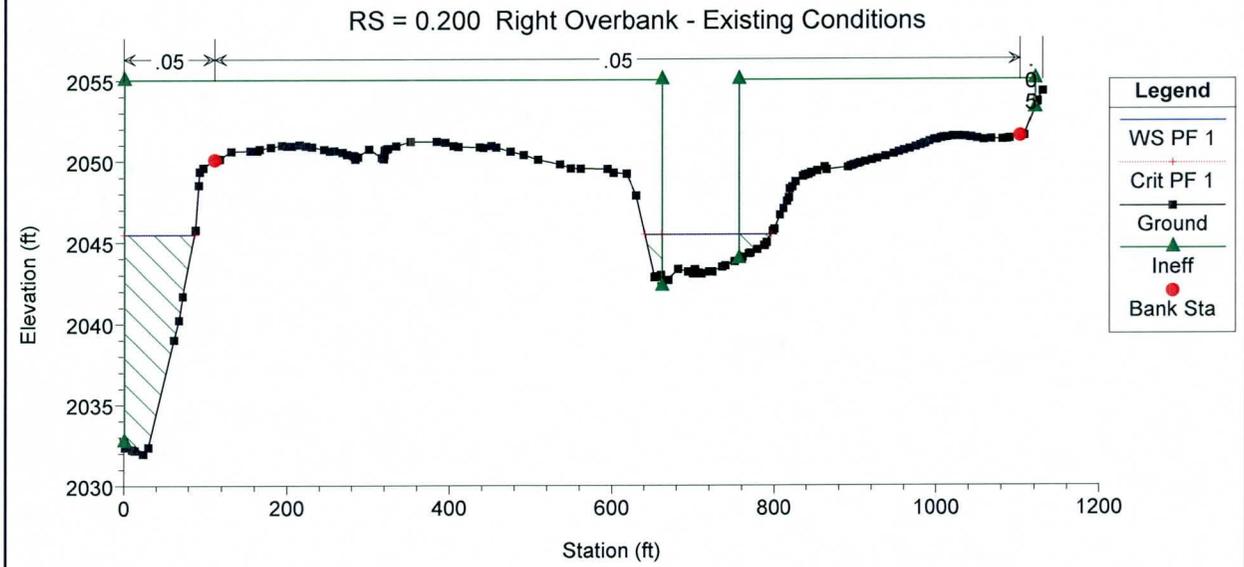
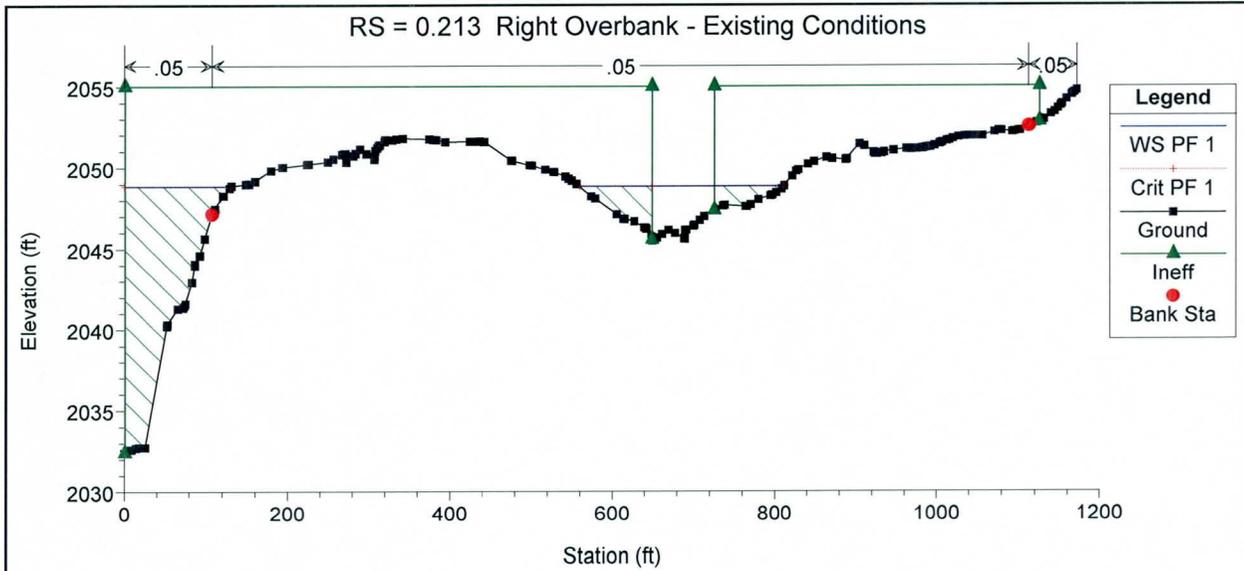


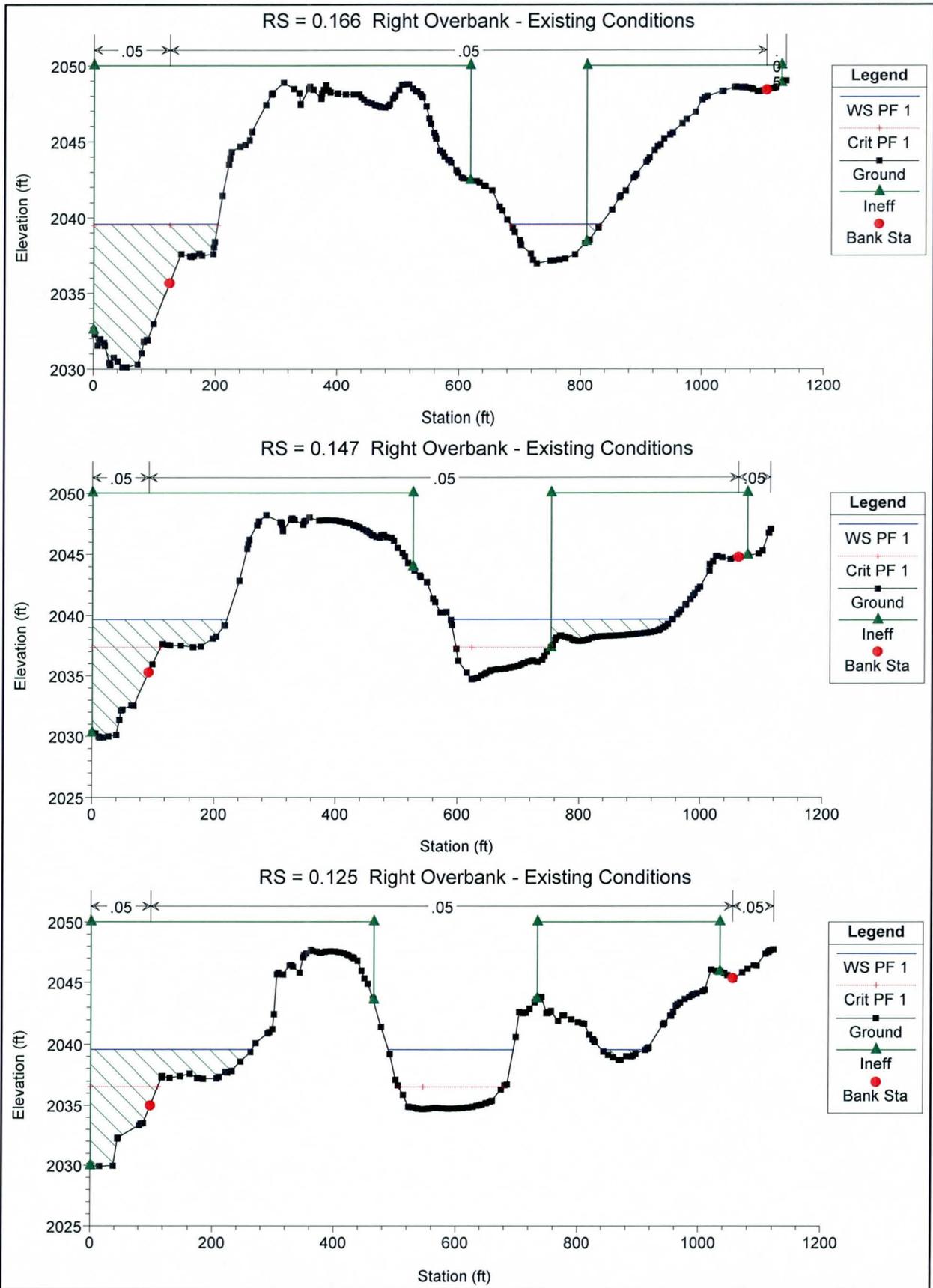




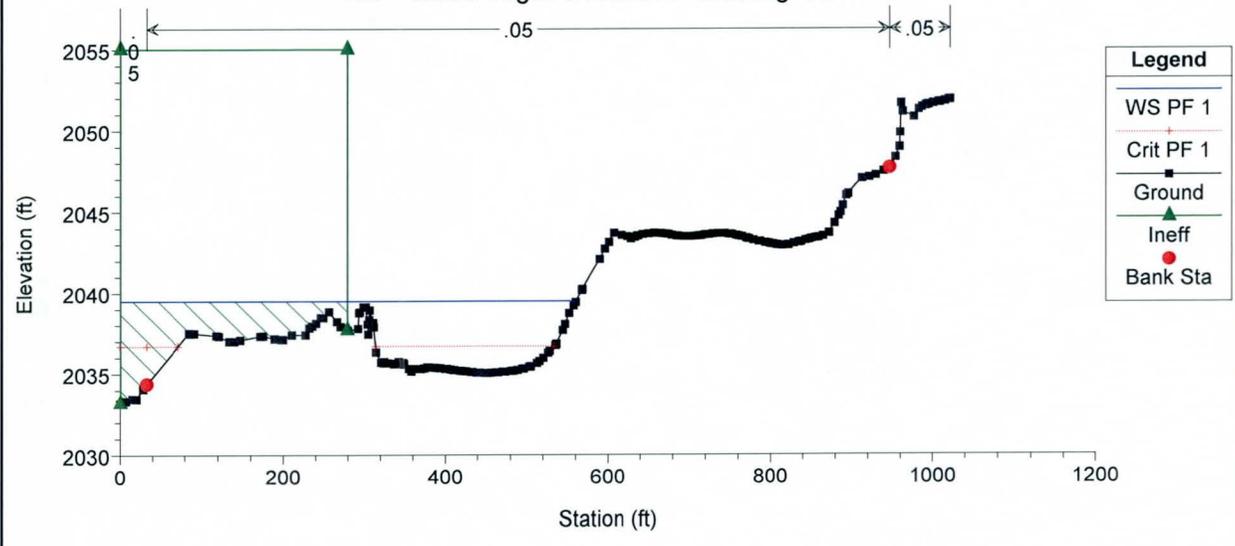








RS = 0.096 Right Overbank - Existing Conditions



### **E.3 Expansion and Contraction Coefficients**

*Not Applicable / Not Included*

## **E.4 Analysis of Structures**

October 7, 2005  
Project No. 600503001

Mr. Berwyn Wilbrink, P.E.  
Jacobs Civil, Inc.  
875 West Elliott Road, Suite 201  
Tempe, Arizona 85284

Subject:        Embankment Stability Analysis  
                  ADOT Contract No. 03-05  
                  TRACS No. 093 MA 198 H5825 01D  
                  US 93, Interim Wickenburg Bypass

Dear Mr. Wilbrink:

Ninyo & Moore is pleased to submit our results of the proposed embankment stability analyses related to the US 93, Interim Wickenburg Bypass project in Wickenburg, Arizona. This analysis was performed at your request in relation to requirements of the Federal Emergency Management Agency (FEMA) Conditional Letter of Map Revision (CLOMR) process.

## ANALYSIS

Slope stability analyses were performed on two proposed embankment slopes, one near Sta. 110+00 and one near Sta. 169+00, which represent the highest slopes shown on the 60 percent project drawings. The analyses were performed using the computer program GSTABL7, a static and pseudo-static slope stability program. Bishops Modified Method was selected for the analysis because it provides conservative solutions when compared with other limit equilibrium methods.

Three cases, as you requested, were analyzed for stability. These cases are: Case I - End of Construction; Case III - Critical Flood Stage; and Case VI - Earthquake (Case I).

The stability analyses performed resulted in the calculation of a factor of safety for the specific slope condition analyzed. The factor of safety is the ratio of forces resisting movement to the forces driving movement. A factor of safety less than 1.0 indicates the driving forces exceed the resisting forces and that movement, and failure, may occur. Typically, a static factor of safety higher than 1.5 is consid-

ered acceptable form an engineering standpoint. Lower factors of safety may be acceptable under specific loading conditions (e.g. earthquake) but is rarely less than 1.1.

**ASSUMPTIONS**

Based on the 60 percent project drawings provided to us, the proposed embankment geometry in these areas is as defined in the table below. We understand the side slopes will consist of soil cement with a thickness of 9 feet, measured horizontally, and extends below existing grade to the design toe down elevation. A 2:1 (horizontal:vertical) earth fillet is proposed above the soil cement bank lining and is planned to extend to the embankment crest.

Station	Approx. Crest Elev. (MSL)	Approx. Top of Bank Elev. (MSL)	Approx. Ground Surface Elev. (MSL)	Side Slopes (H:V)	Approx. Soil Cement Toe Down Elev. (MSL)
110+00	2,060'	2,050'	2,040'	1:1	2,021'
169+00	2,090'	2,071'	2,065'	1.5:1	2,054'

The profile assumed for our analysis consists of imported embankment fill material overlying native sandy soil with soil-cement bank protection. Soil description and parameters used in the analysis are provided in the table below. As we are not aware of the source of the proposed embankment material, conservative soil strength parameters are assumed. If the source material used for construction of the embankments deviates from our assumed properties for the material, the stability analysis should be reevaluated. For Cases I and VI, groundwater was assumed to be at the ground surface. For Case III, water was assumed to be near the 100-year flood elevation, or the top of bank lining elevation.

Material	Unit weight (pcf)	Friction Angle, Phi	Cohesion (psf)
Embankment	125	30	0
Foundation - sand	120	33	0
Soil Cement	140	35	5000

Seismic parameters were obtained from our draft geotechnical report and consist of a peak horizontal ground acceleration of 0.04g. For the Case VI earthquake analysis, two-thirds of the peak acceleration, or 0.03g, was assumed to represent pseudo-static conditions for the analysis.

## RESULTS

The results indicate the proposed embankment slopes are globally stable. The table below summarizes the results of our analyses and shows that in each case, acceptable factors of safety are achieved. Print outs of the analyses, showing the geometry and conditions for each cross section and the 10 slip circles with the lowest calculated safety factor, are attached.

Approximate Station	Factor of Safety		
	Case I	Case III	Case VI
Sta. 110+00	2.36	2.69	2.10
Sta. 169+00	1.86	1.86	1.69

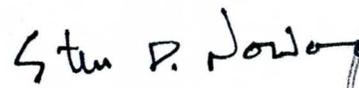
As noted previously, the results of our analysis are dependent on the soil strength properties assumed. If differing soil and/or soil strength parameters are used for construction, the embankment stability analysis should be revisited, as appropriate. Please note the results are for the global stability of the proposed embankments and that shallow, surficial sloughs or slips could occur.

We are very pleased to be part of the Jacobs team, once again. We look forward to continuing to work with you on this project. Should you have any questions related to these results, please contact the undersigned at your convenience.

Sincerely,  
**NINYO & MOORE**



Kevin L. Porter, P.E.  
Senior Project Engineer



Steven D. Nowaczyk, P.E.  
Principal Engineer



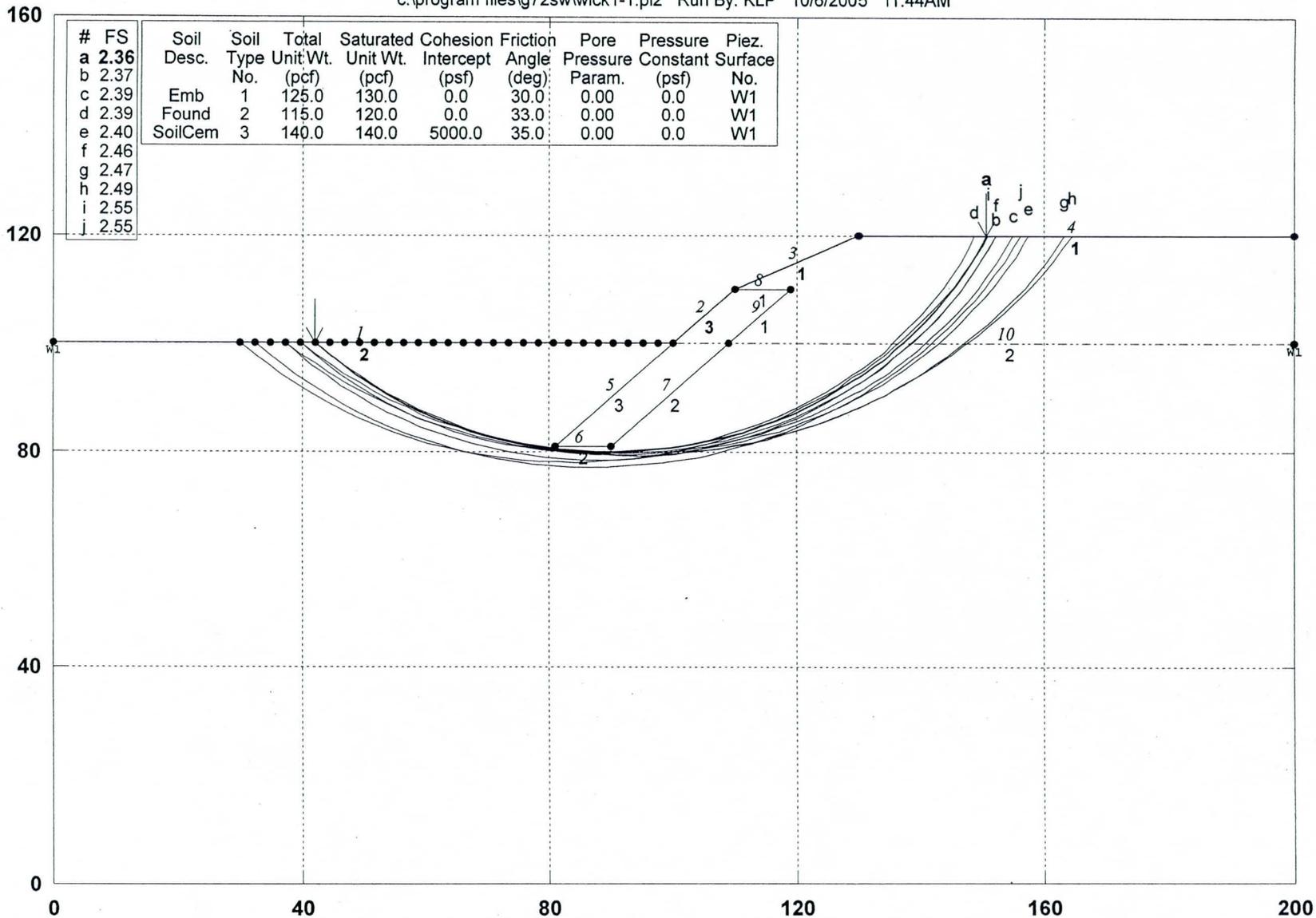
KLP/SDN/hmm

Distribution: (2) Addressee

Attachments: Stability Print Outs

# Wickenburg Bypass - Embankment Stability Sta 110+00 Case I

c:\program files\g72sw\wick1-1.pl2 Run By: KLP 10/6/2005 11:44AM



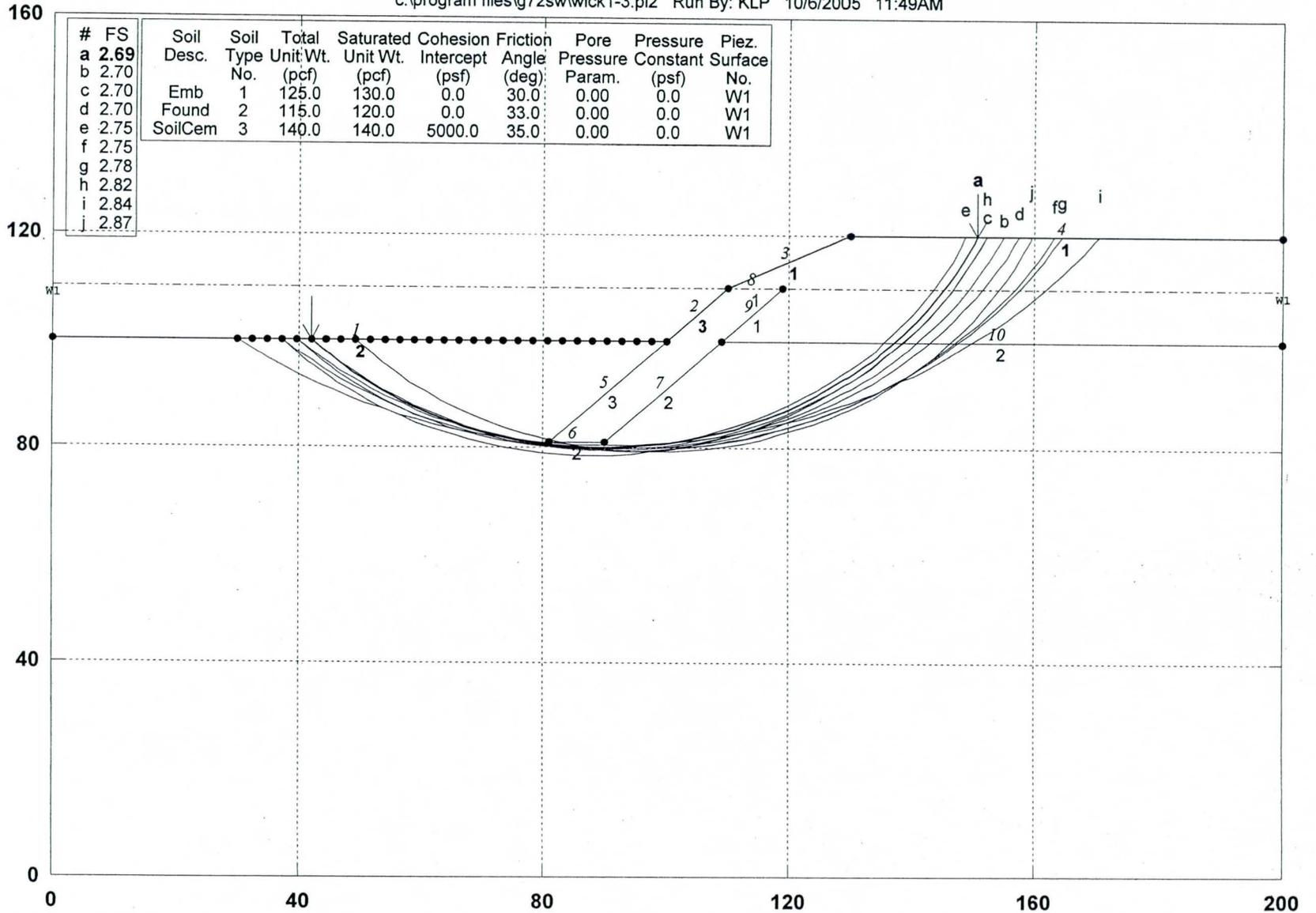
GSTABL7 v.2 FSmin=2.36

Safety Factors Are Calculated By The Modified Bishop Method



# Wickenburg Bypass - Embankment Stability Sta 110+00 Case III

c:\program files\g72sw\wick1-3.pl2 Run By: KLP 10/6/2005 11:49AM



#	FS	Soil Desc.	Soil Type No.	Soil Unit Wt. (pcf)	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param. (psf)	Pressure Constant (psf)	Piez. Surface No.
a	2.69										
b	2.70										
c	2.70	Emb	1	125.0	130.0	0.0	0.0	30.0	0.00	0.0	W1
d	2.70	Found	2	115.0	120.0	0.0	0.0	33.0	0.00	0.0	W1
e	2.75	SoilCem	3	140.0	140.0	5000.0	0.0	35.0	0.00	0.0	W1
f	2.75										
g	2.78										
h	2.82										
i	2.84										
j	2.87										

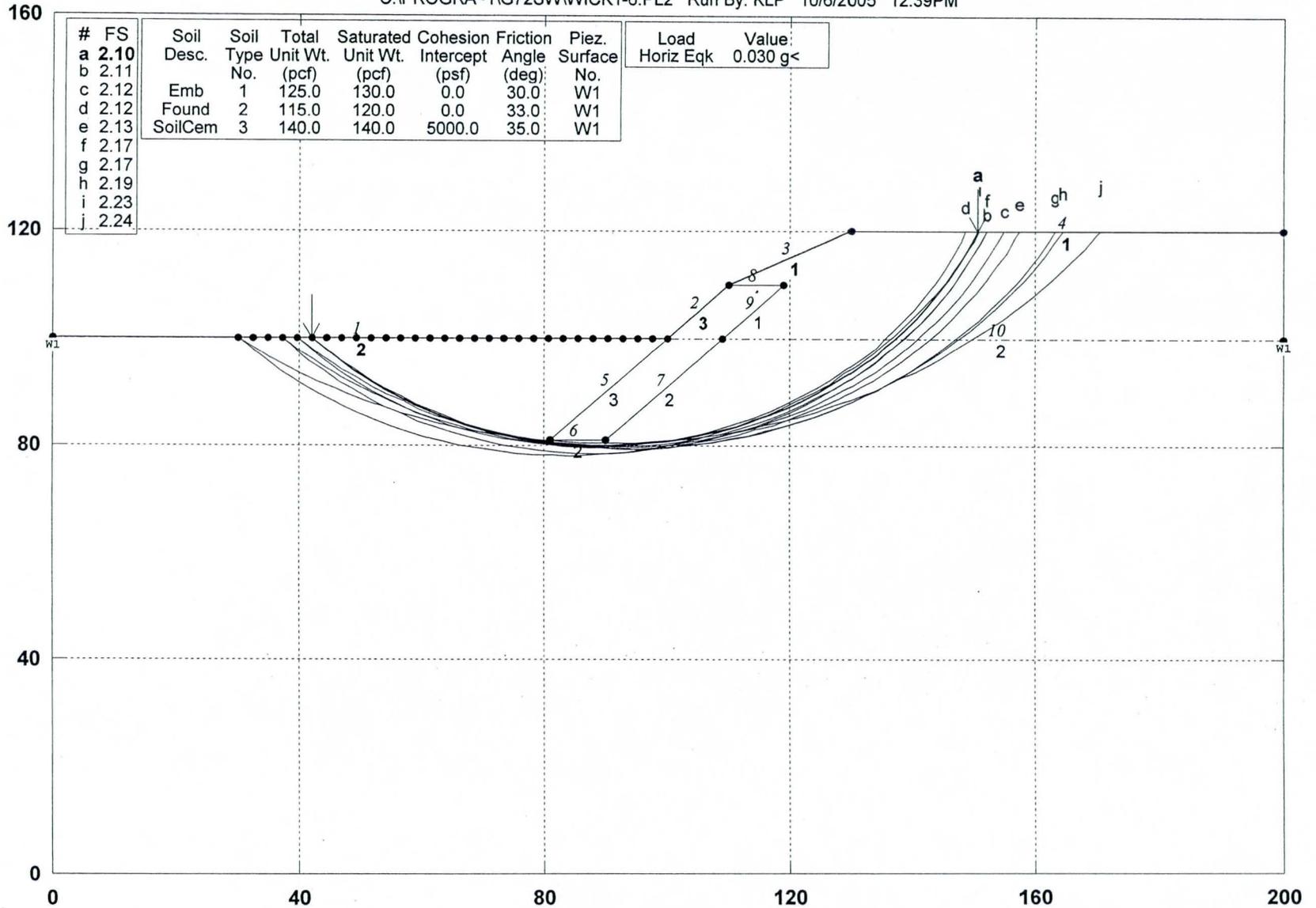
GSTABL7 v.2 FSmin=2.69

Safety Factors Are Calculated By The Modified Bishop Method



# Wickenburg Bypass - Embankment Stability Sta 110+00 Case VI

C:\PROGRA~1\G72SW\WICK1-6.PL2 Run By: KLP 10/6/2005 12:39PM



#	FS	Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.	Load Horiz Eqk	Value
a	2.10									
b	2.11									
c	2.12	Emb	1	125.0	130.0	0.0	30.0	W1		
d	2.12	Found	2	115.0	120.0	0.0	33.0	W1		
e	2.13	SoilCem	3	140.0	140.0	5000.0	35.0	W1		
f	2.17									
g	2.17									
h	2.19									
i	2.23									
j	2.24									

Load Horiz Eqk 0.030 g<

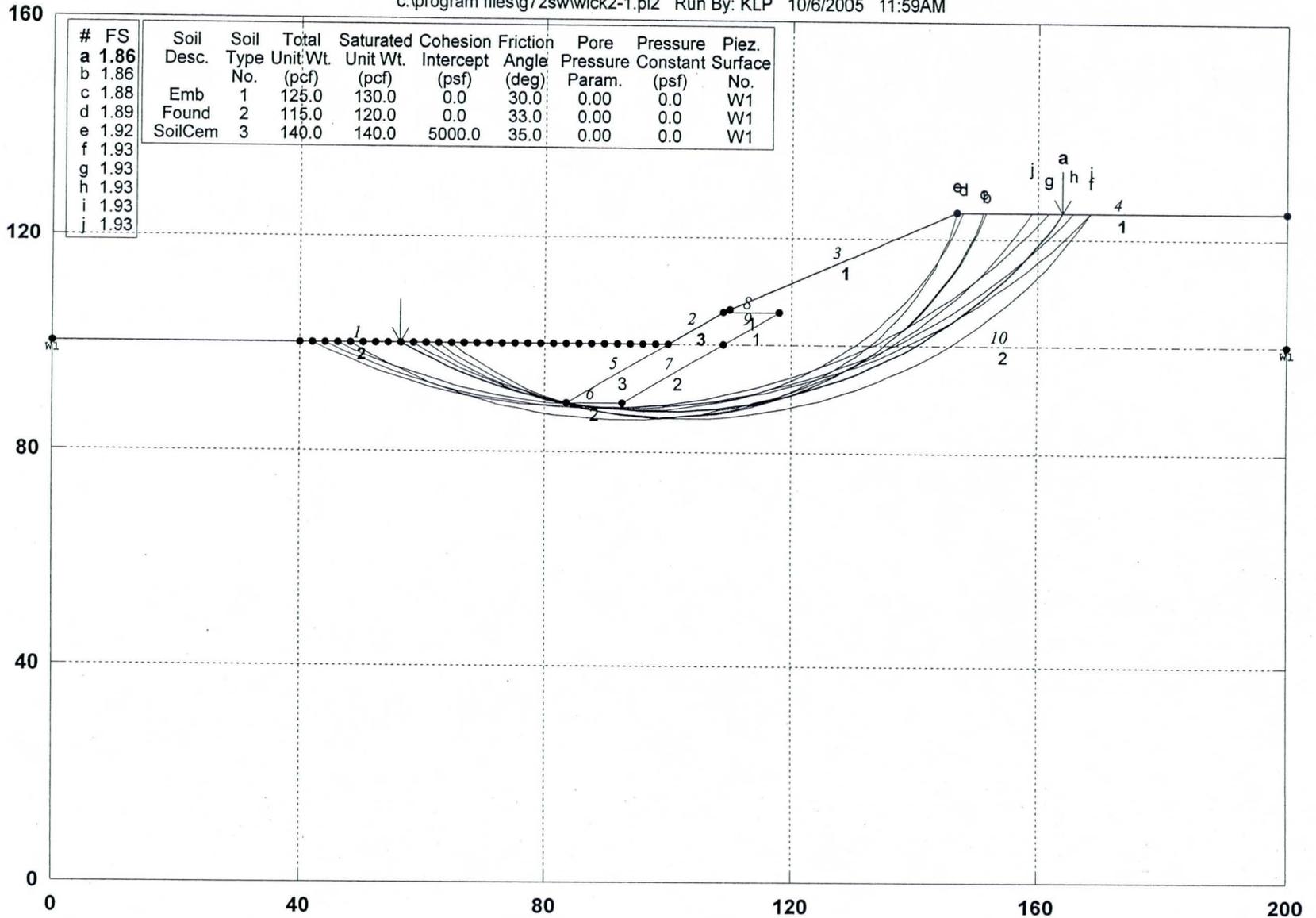
STED



PCSTABL5M/si FSmin=2.10  
Safety Factors Are Calculated By The Modified Bishop Method

# Wickenburg Bypass - Embankment Stability Sta 169+00 Case I

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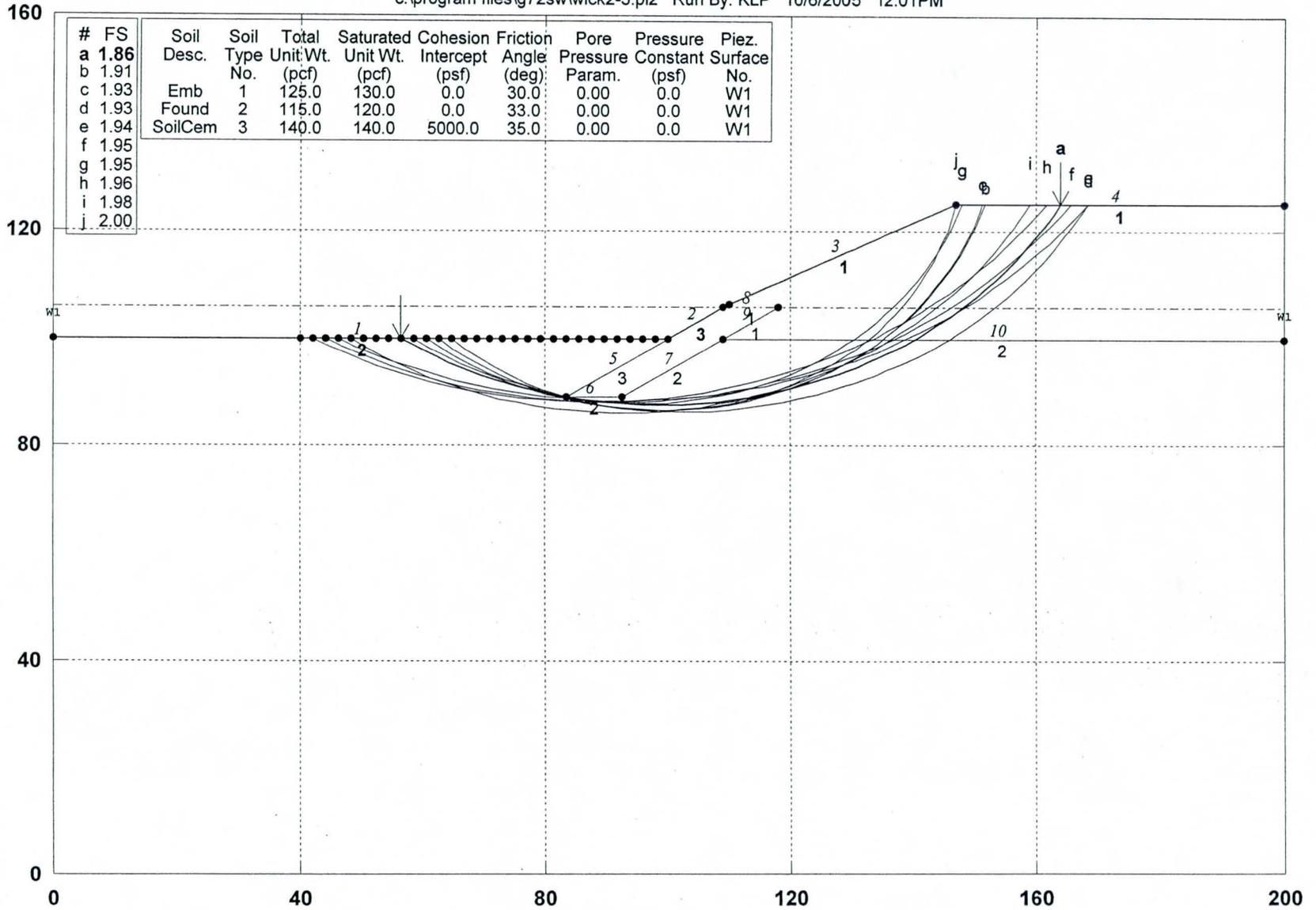
GSTABL7 v.2 FSmin=1.86

Safety Factors Are Calculated By The Modified Bishop Method



# Wickenburg Bypass - Embankment Stability Sta 169+00 Case III

c:\program files\lg72sw\wick2-3.pl2 Run By: KLP 10/6/2005 12:01PM



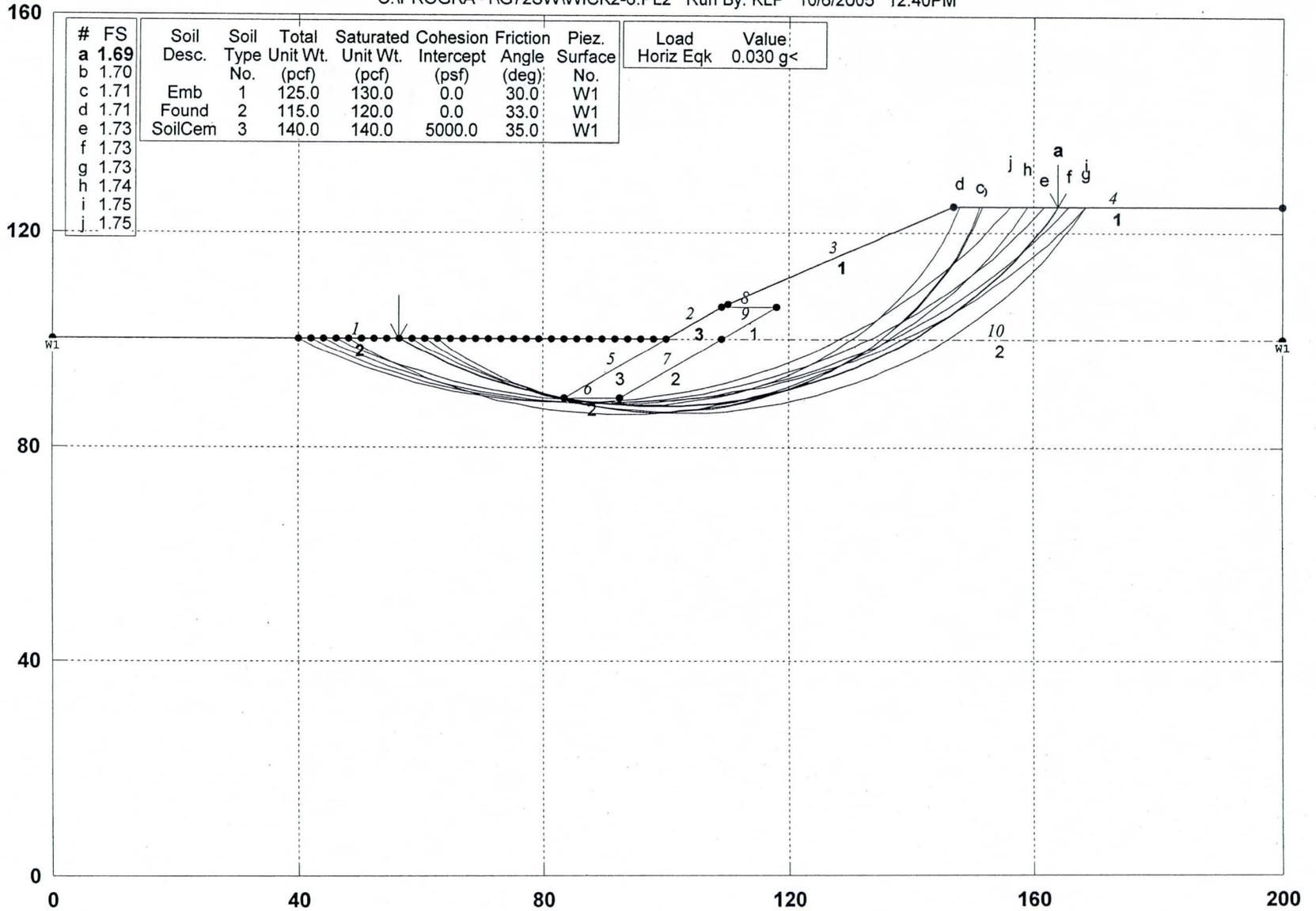
GSTABL7 v.2 FSmin=1.86

Safety Factors Are Calculated By The Modified Bishop Method



# Wickenburg Bypass - Embankment Stability Sta 169+00 Case VI

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PCSTABL5M/si FSmin=1.69

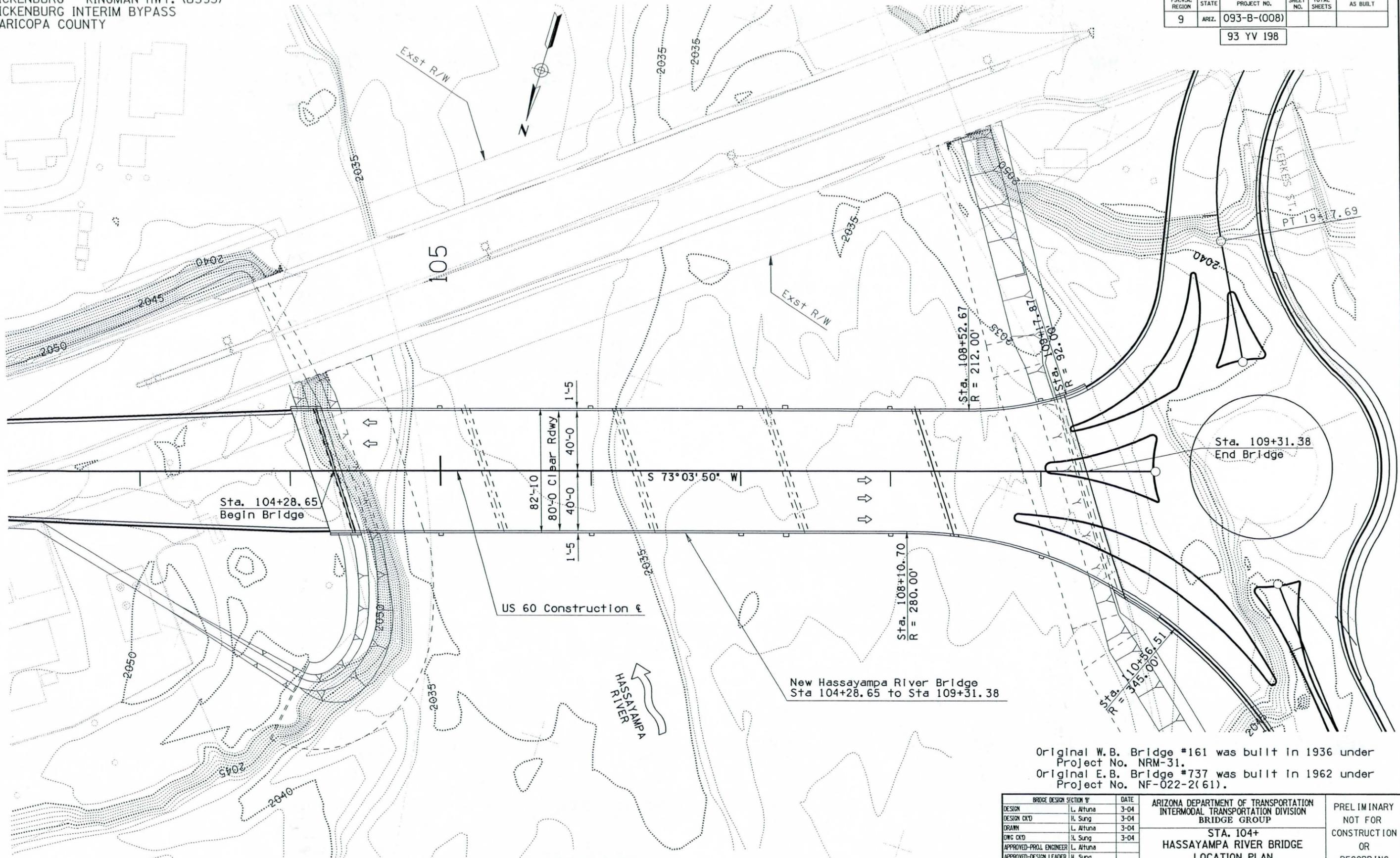
Safety Factors Are Calculated By The Modified Bishop Method

STED



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

93 YV 198



Original W.B. Bridge #161 was built in 1936 under Project No. NRM-31.  
 Original E.B. Bridge #737 was built in 1962 under Project No. NF-022-2(61).

LOCATION PLAN  
 Scale: 1" = 30'-0"

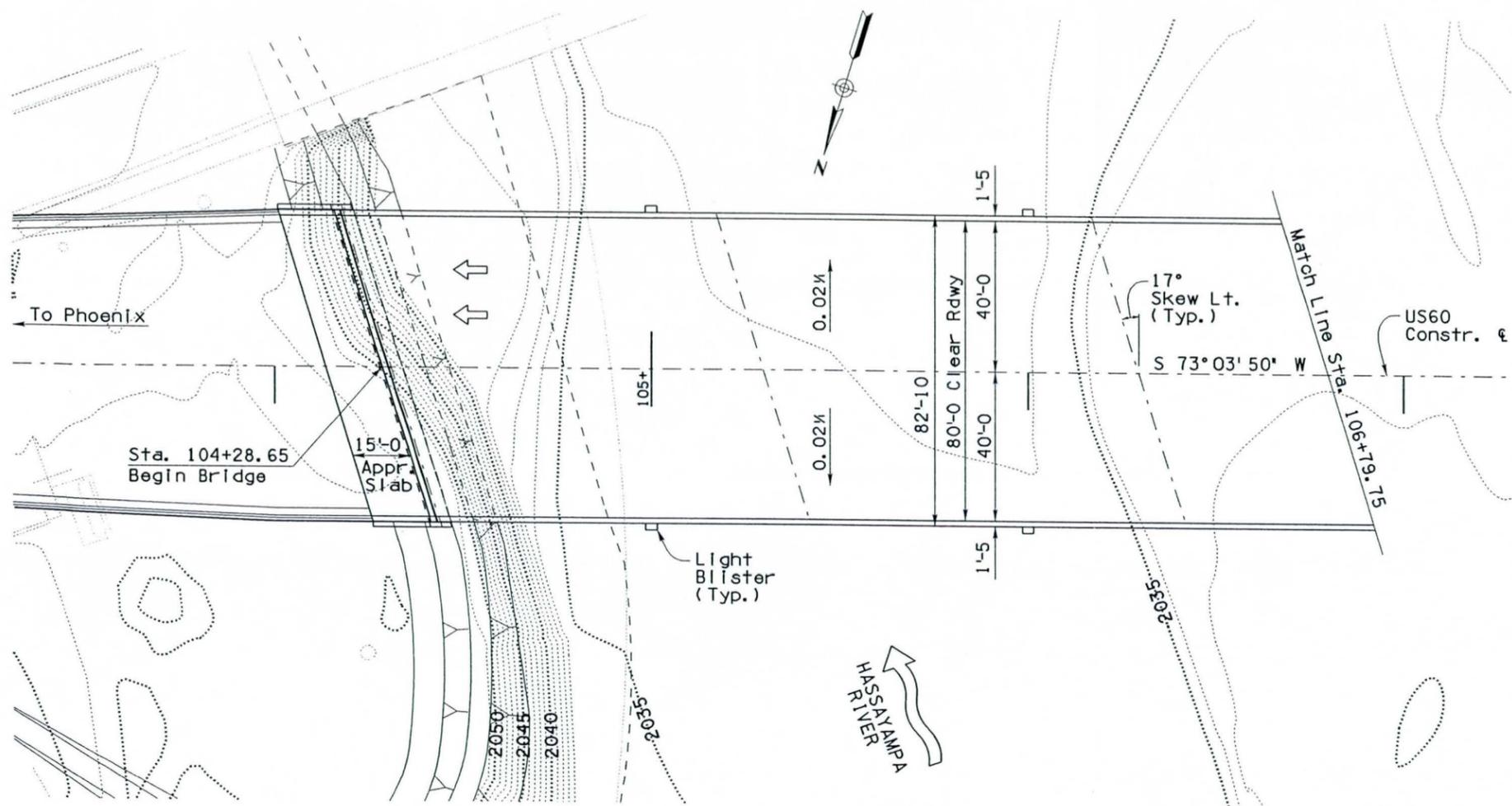
BRIDGE DESIGN SECTION BY			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	3-04			
DESIGN CKD	H. Sung	3-04			
DRAWN	L. Altuna	3-04			
DWG CKD	H. Sung	3-04			
APPROVED-PROJ. ENGINEER	L. Altuna			STA. 104+ HASSAYAMPA RIVER BRIDGE LOCATION PLAN	DWG. S-11 OF 41
APPROVED-DESIGN LEADER	H. Sung				
ROUTE	MILEPOST	STRUCTURE NO.	LOCATION	WICKENBURG INTERIM BYPASS	
US60	110.53	2818			
TRACS NO. H 5825 01C			093-B-(008)		

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

93 YV 198

SHEET LIST

TITLE	DRAWING NO.
LOCATION PLAN	S-1.1
GENERAL PLAN 1	S-1.2
GENERAL PLAN 2	S-1.3
QUANTITIES AND TYPICAL SECTION	S-1.4
FOUNDATION LAYOUT	S-1.5
DRILLED SHAFT DETAILS	S-1.6
ABUTMENT #1 PLAN AND ELEVATION	S-1.7
ABUTMENT #1 DETAILS	S-1.8
ABUTMENT #2 PLAN AND ELEVATION	S-1.9
ABUTMENT #2 DETAILS	S-1.10
WINGWALL DETAILS 1	S-1.11
WINGWALL DETAILS 2	S-1.12
PIER PLAN AND ELEVATION (PINNED)	S-1.13
PIER DETAILS (PINNED)	S-1.14
PIER PLAN AND ELEVATION (EXP.)	S-1.15
PIER DETAILS (EXP.)	S-1.16
BOX BEAM LAYOUT	S-1.17
BOX BEAM/BOX GIRDER LAYOUT	S-1.18
BOX BEAM DETAILS 1	S-1.19
BOX BEAM DETAILS 2	S-1.20
DECK PLAN 1	S-1.21
DECK PLAN 2	S-1.22
TYPICAL DECK CROSS SECTION 1	S-1.23
TYPICAL DECK CROSS SECTION 2	S-1.24
TYPICAL DECK CROSS SECTION 3	S-1.25
TYPICAL DECK CROSS SECTION 4	S-1.26
BOTTOM SLAB REINF. (SPAN 5)	S-1.27
TOP SLAB REINF. (SPAN 5)	S-1.28
DIAPHRAGM DETAILS 1	S-1.29
DIAPHRAGM DETAILS 2	S-1.30
DIAPHRAGM DETAILS 3	S-1.31
DIAPHRAGM DETAILS 4	S-1.32
MISCELLANEOUS DETAILS 1	S-1.33
MISCELLANEOUS DETAILS 2	S-1.34
MISCELLANEOUS DETAILS 3	S-1.35
CAMBER AND SCREED DETAILS	S-1.36
SCREED ELEVATIONS (SPAN 1 & 2)	S-1.37
SCREED ELEVATIONS (SPAN 3 & 4)	S-1.38
SCREED ELEVATIONS (SPAN 5)	S-1.39
FALSEWORK ELEVATIONS (SPAN 5)	S-1.40
STRUCTURAL EXCAVATION AND BACKFILL	S-1.41



PLAN

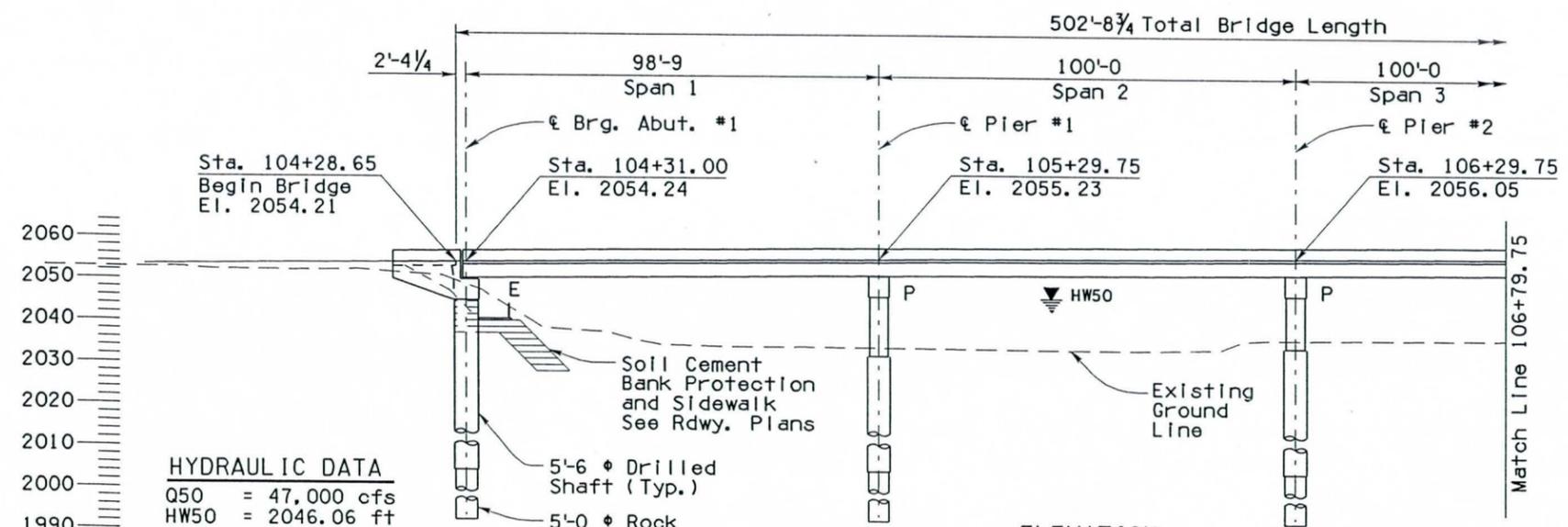
New 5 Span Combination Precast, Prestressed, AASHTO BIV-48 Box Beam & C.I.P. Concrete Box Girder Bridge  
Scale: 1" = 20' Skew = 17° Lt.

SD SHEET LIST

CONCRETE BARRIER AND TRANSITION	SD-1.01
THREE BEAM TRANSITION SYSTEM	SD-1.03
BARRIER JUNCTION BOX	SD-1.11
APPROACH SLAB DETAILS	SD-2.01
DECK JOINT ASSEMBLY COMPRESSION SEAL	SD-3.01

SF SHEET LIST

FOUNDATION DATA	SF-1.1 Thru SF-1.x
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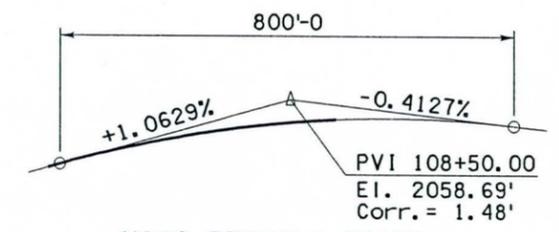


ELEVATION

(Stations and Elevations are measured along Constr.  $\epsilon$ )  
Scale: 1" = 20'-0"

**HYDRAULIC DATA**

Q50	= 47,000 cfs
HW50	= 2046.06 ft
Q100	= 71,000 cfs
HW100	= 2048.79 ft
Q500	= 120,700 cfs
HW500	= 2059.62 ft



US60 PROFILE GRADE

BRIDGE DESIGN SECTION #'		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	3-04		
DESIGN CKD	H. Sung	3-04		
DRAWN	L. Altuna	3-04		
DWG CKD	H. Sung	3-04		
APPROVED-PROJ. ENGINEER		L. Altuna	STA. 104+ HASSAYAMPA RIVER BRIDGE GENERAL PLAN 1	DWG. 5-12 OF 41
APPROVED-DESIGN LEADER		H. Sung		
US60	110.53	2818	LOCATION	WICKENBURG INTERIM BYPASS
ROUTE	MILEPOST	STRUCTURE NO.		
TRACS NO. H 5825 01C			093-B-(008)	OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
93 YV 198					

**GENERAL NOTES:**

Construction Specification - Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, Edition of 2000.

Design Specifications - AASHTO Standard Specifications for Highway Bridges, 17th Edition 2002.

Dead Load - Dead Load includes allowance of 25 pounds per square foot for future wearing surface.

Loading Class - HS20-44 or Alternate Military Loading.

Seismic Performance Category A (Acc = 0.035 g)

Inventory and operating ratings for HS20-44 are in accordance with AASHTO Manual for Condition Evaluation of Bridges, Edition of 1994, and the 1995 thru 1999 Interims. (using Load Factor Method)  
 Inventory Rating HS- xx.xx  
 Operating Rating HS- xx.xx

Prestressed Girder designed by Transformed Section Method.

All concrete shall be Class 'S' unless noted otherwise.

Reinforcing steel shall conform to ASTM Specification A615. All reinforcing shall be furnished as Grade 60.

All bends and hooks shall meet the requirements of AASHTO Article 8.23. All bend dimensions for reinforcing steel shall be out-to-out of bars. All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise.

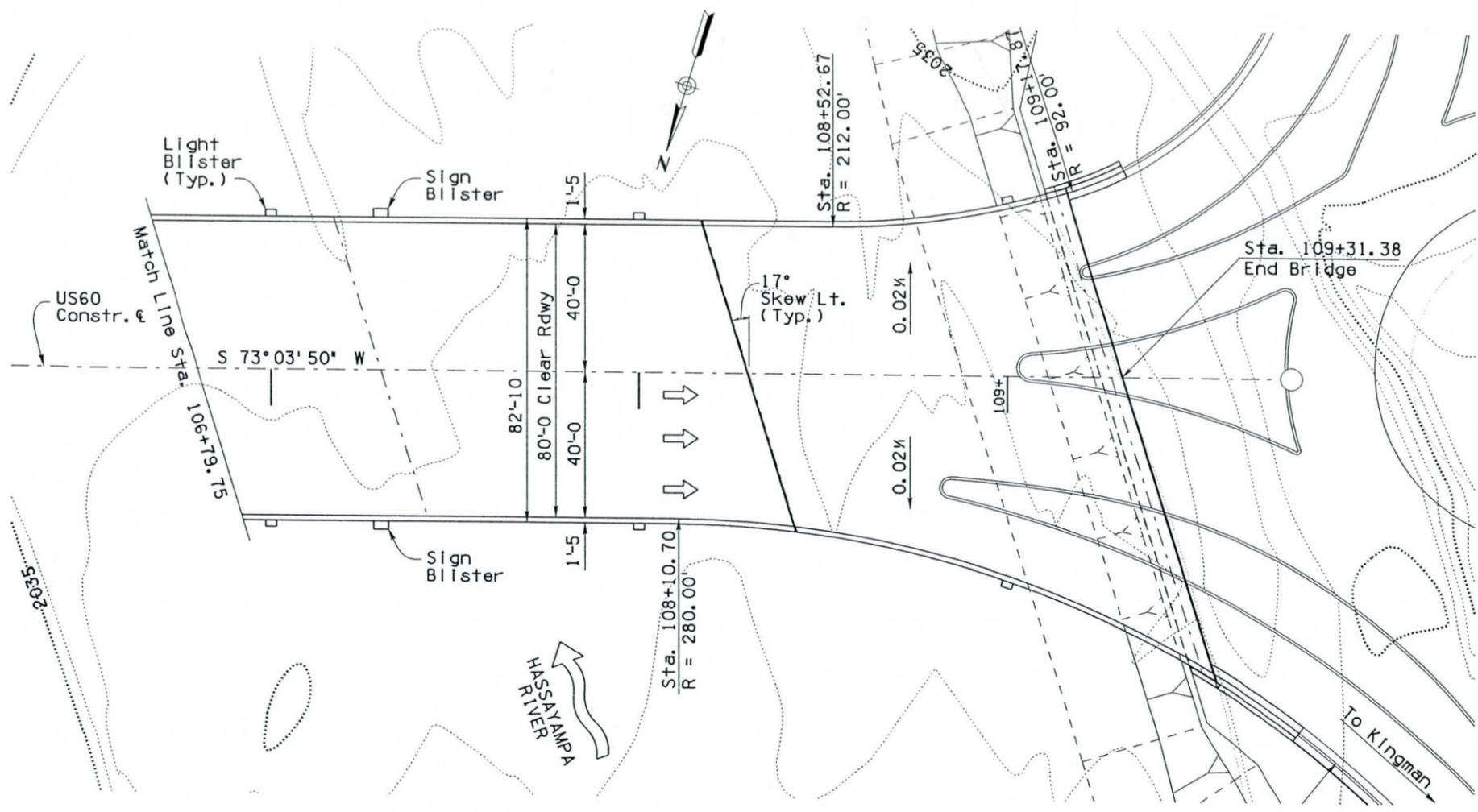
All reinforcing steel shall have 2 inch clear cover unless noted otherwise.

**Stresses (Span 1-4):**  
 Superstructure except barriers ... f'c = 4500 psi  
 Barriers, Barrier Footing ... f'c = 4000 psi  
 Abutments and Foundations ... f'c = 3000 psi  
 Piers ... f'c = 3500 psi  
 Drilled Shafts/Rock Sockets ... f'c = 3500 psi  
 All other Class 'S' concrete ... f'c = 3000 psi  
 Grade 60 transverse deck reinf. ... fs = 20000 psi  
 All other Grade 60 ... fs = 24000 psi  
 Structural steel ... fs = 20000 psi  
 Prestressing steel ... f's = 270000 psi  
 (1/2" dia. 7-wire Low Relaxation Strand)

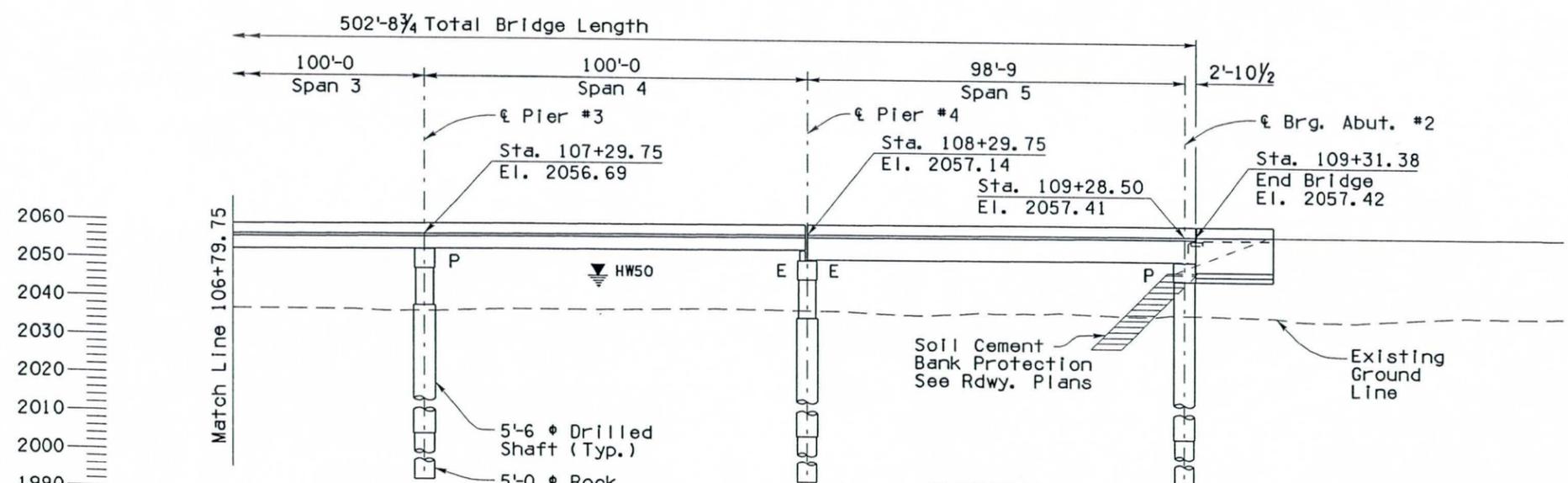
**Stresses (Span 5):**  
 Superstructure except barriers ... f'c = 5000 psi  
 Barriers, Barrier Footing ... f'c = 4000 psi  
 Abutments and Foundations ... f'c = 3000 psi  
 Piers ... f'c = 3500 psi  
 Drilled Shafts/Rock Sockets ... f'c = 3500 psi  
 All other Class 'S' concrete ... f'c = 3000 psi  
 Grade 60 transverse deck reinf. ... fs = 20000 psi  
 All other Grade 60 ... fs = 24000 psi

Barriers shall not be slip formed.

Dimensions shall not be scaled from drawings.

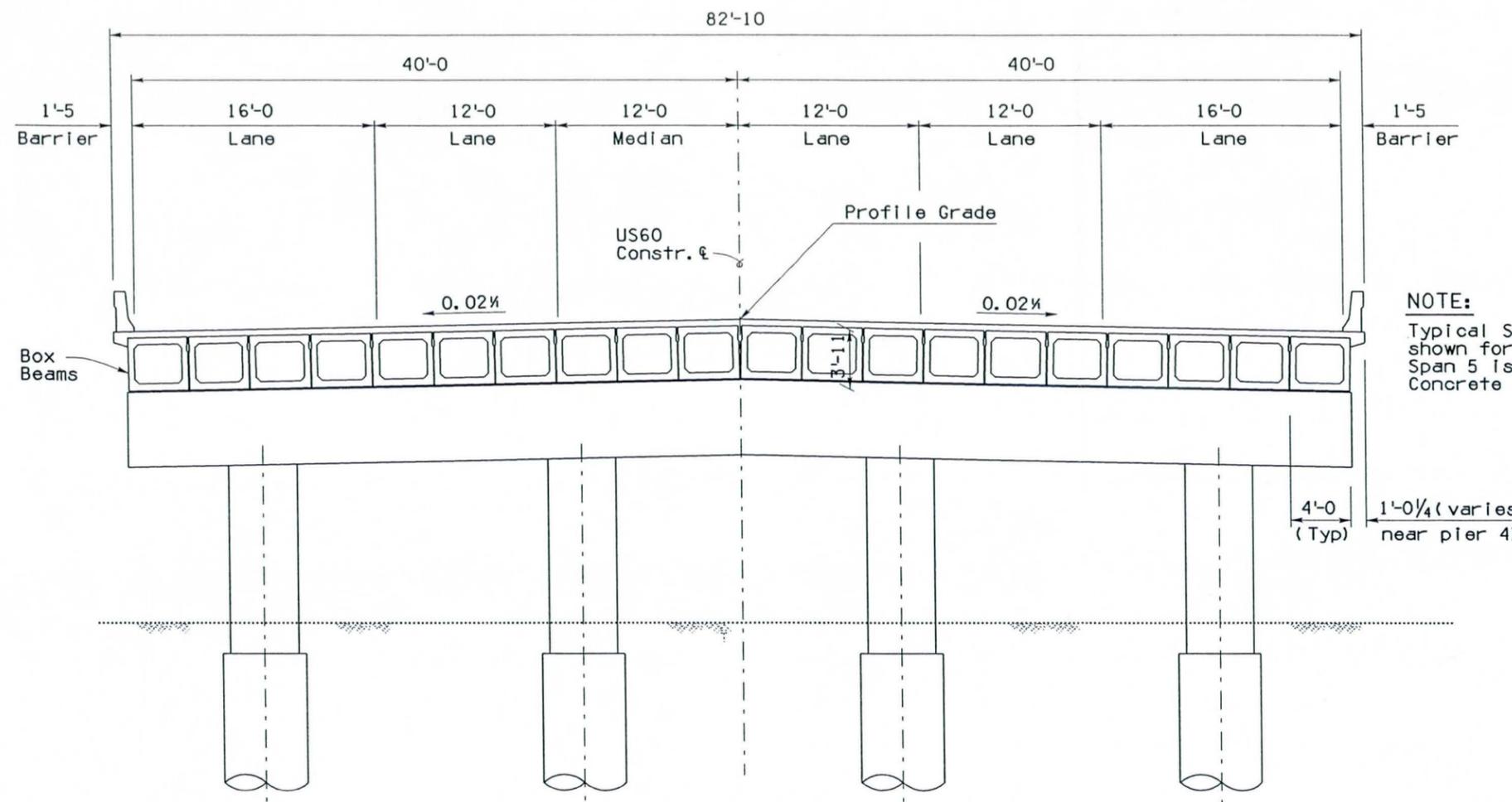


**PLAN**  
 New 5 Span Combination Precast, Prestressed, AASHTO BIV-48 Box Beam & C.I.P. Concrete Box Girder Bridge  
 Scale: 1" = 20'  
 Skew = 17° Lt.

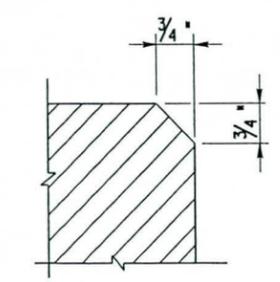


**ELEVATION**  
 (Stations and Elevations are measured along Constr.  $\ell$ )  
 Scale: 1" = 20'-0"

BRIDGE DESIGN SECTION BY		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	3-04		
DESIGN CRD	H. Sung	3-04		
DRAWN	L. Altuna	3-04		
DWG CRD	H. Sung	3-04		
APPROVED-PROJ. ENGINEER	L. Altuna		STA. 104+ HASSAYAMPA RIVER BRIDGE GENERAL PLAN 2	DWG. 5-13 OF 41
APPROVED-DESIGN LEADER	H. Sung			
US60	110.53	2818	LOCATION	
ROUTE	MILEPOST	STRUCTURE NO.	WICKENBURG INTERIM BYPASS	
TRACS NO. H 5825 OIC			093-B-(008)	OF



**NOTE:**  
 Typical Section shown for Span 1-4, Span 5 is C. I. P. Concrete Box Girder



Chamfer all exposed corners thus unless otherwise noted. This note applicable to all sheets pertaining to the structure.

**CHAMFER DETAIL**

**TYPICAL SECTION**  
 Scale: 1" = 5'-0"

**LEGEND:**

- Title/Detail Marker: (1) ← Detail Number
- Section Marker: (1/2) ← Section Number
- Elevation Marker: (1/2) ← Dwg. Number, Elevation Number

For limits of Structural Excavation and Structure Backfill see Dwg. S-1.41

**APPROXIMATE QUANTITIES**

	STRUCT. EXCAV. CY	STRUCT. BKFILL. CY	CLASS "S" CONCRETE				RE INF. STEEL LB	AASHTO TYPE BIV-48 BOX BEAMS LF	66" # DRILLED SHAFTS LF	60" # ROCK SOCKETS LF
			f' c= 3000 psi CY	f' c= 3500 psi CY	f' c= 4500 psi CY	f' c= 5000 psi CY				
Abutment #1	60	101	115				19605	372	56	
Pier #1				120			23050	284	108	
Pier #2				120			23050	276	112	
Pier #3				120			23050	268	120	
Pier #4				145			27130	235	155	
Abutment #2	91	227	160				21270	450	90	
Superstructure					550	935	417000	7920		
<b>TOTAL</b>	<b>151</b>	<b>382</b>	<b>275</b>	<b>505</b>	<b>550</b>	<b>935</b>	<b>554155</b>	<b>7920</b>	<b>1885</b>	<b>641</b>
<b>AS BUILT TOTAL</b>										

**PAINT NOTE:**

Bridge shall be painted in accordance with ADOT Std. Spec. 610 with paint conforming to Subsection 1002-2.04. Paint color shall be as approved by the Engineer.

Superstructure surfaces to be painted include outside surfaces of bridge barriers and transitions, edges and underside of deck overhangs, outside surfaces of exterior beams and webs, and outside surfaces of all diaphragms.

All exposed substructure surfaces shall be painted to at least one foot below finished grade including surfaces of abutments, wingwalls, pier caps and pier columns.

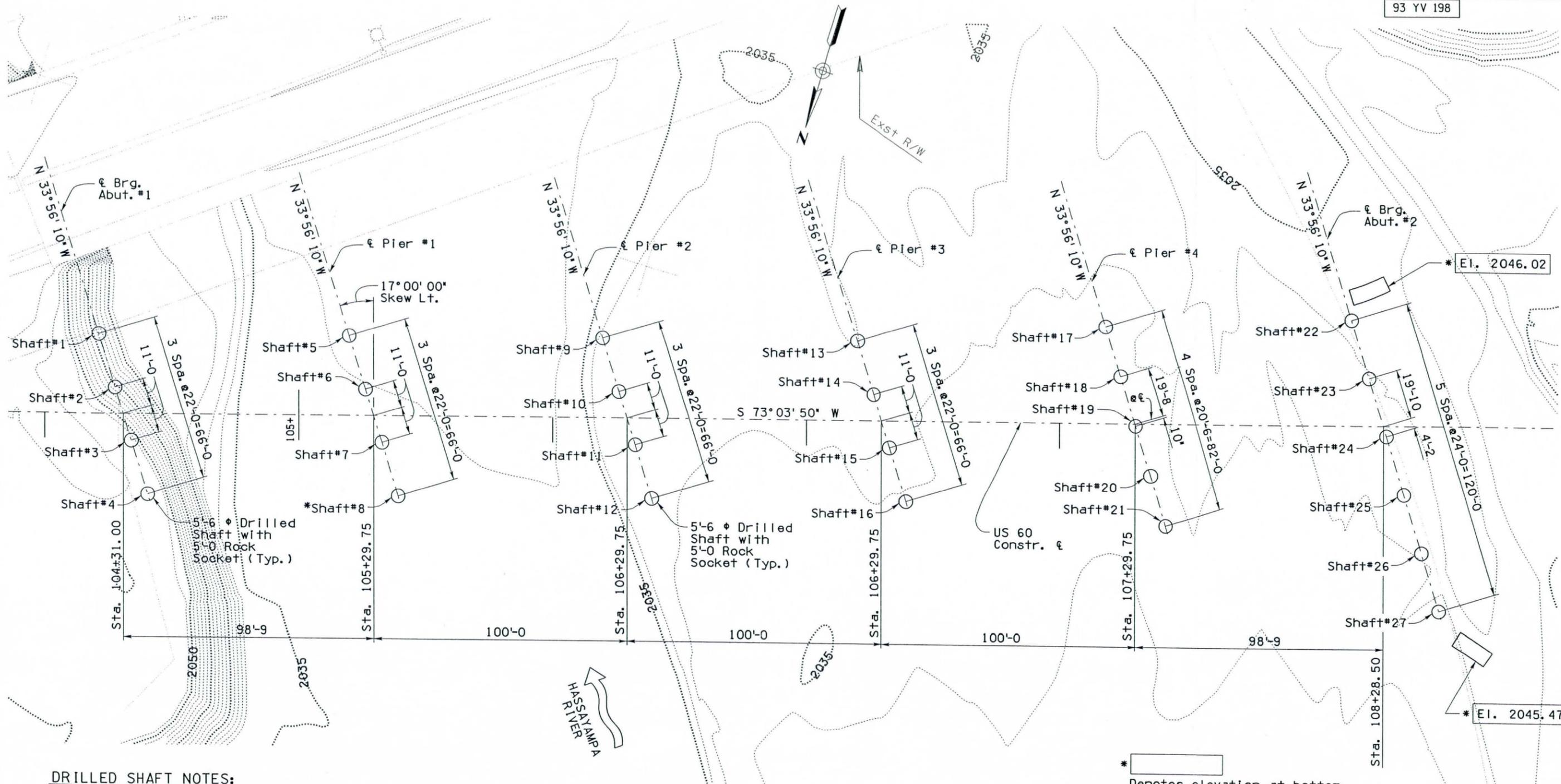
Cost of painting shall be considered incidental to the cost of the concrete items being painted.

Restrainers, Vertical Earthquake (Expansion) .....	20	EA
Restrainers, Vertical Earthquake (Fixed) .....	30	EA
Deck Joint Assembly (4' x 4' Compression Seal) .....	84	FT
Deck Joint Assembly (5' x 5' Compression Seal) .....	86	FT
Approach Slab .....	1246	SF
F-Shape Bridge Concrete Barrier and Transition (32') ..	1086	FT
Thrie Beam Guard Rail Transition System .....	2	EA
Type II Junction Box .....	12	EA

BRIDGE DESIGN SECTION 9'		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Alfuna	3-04		
DESIGN CKD	H. Sung	3-04		
DRAWN	L. Alfuna	3-04		
DWG CKD	H. Sung	3-04		
APPROVED-PROJ. ENGINEER L. Alfuna			STA. 104+ HASSAYAMPA RIVER BRIDGE QUANTITIES AND TYPICAL SECTION	DWG. S-1.4 OF 41
APPROVED-DESIGN LEADER H. Sung				
US60	110.53	2818	LOCATION	
ROUTE	MILEPOST	STRUCTURE NO.	WICKENBURG INTERIM BYPASS	
TRACS NO. H 5825 OIC			093-B-(008)	OF

F.H.R.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

93 YV 198



**DRILLED SHAFT NOTES:**

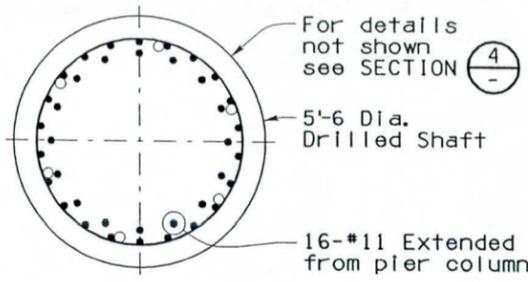
- Information pertaining to the subsurface conditions at the site can be obtained from the Geotechnical Report prepared by Ninyo & Moore Consultants, Report No. xx-xx, dated xx/xx/xxxx. The report will be available at ADOT Materials Group, Geotechnical Section for review.
- It is the responsibility of the prospective bidders to review the Geotechnical Report.
- See Drawings SF-1.1 to SF-1.x for Foundation Data.
- \*4. The confirmation shaft shall be shaft #8.

PLAN  
Scale: 1" = 20'-0"

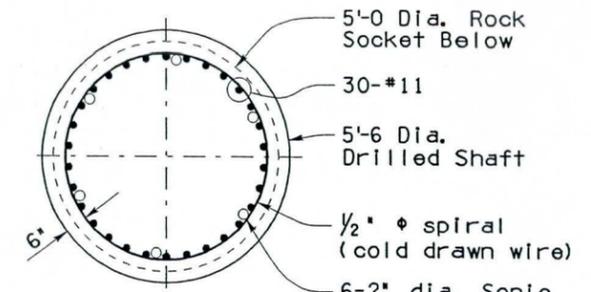
\* [Symbol] Denotes elevation at bottom of separate wingwall footing. For details see DWG. S-1.12

BRIDGE DESIGN SECTION BY		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	6-04		
DESIGN CRD	H. Sung	6-04		
DRAWN	L. Altuna	6-04		
DWG CRD	H. Sung	6-04		
APPROVED-PROJ. ENGINEER	L. Altuna		STA. 104+ HASSAYAMPA RIVER BRIDGE FOUNDATION LAYOUT	DWG. S-1.5 OF 41
APPROVED-DESIGN LEADER	H. Sung			
US60 ROUTE	110.53 MILEPOST	2818 STRUCTURE NO.	LOCATION WICKENBURG INTERIM BYPASS	
TRACS NO. H 5825 OIC			093-B-(008)	OF

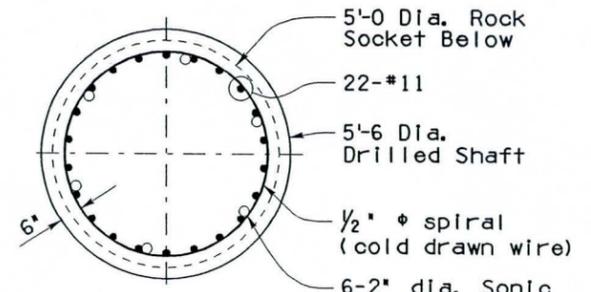
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
93 YV 198					



SECTION 4  
Scale: 1/2" = 1'-0" (4)



SECTION 3  
Scale: 1/2" = 1'-0" (3)



SECTION 4  
Scale: 1/2" = 1'-0" (4)

**DRILLED SHAFT NOTES:**

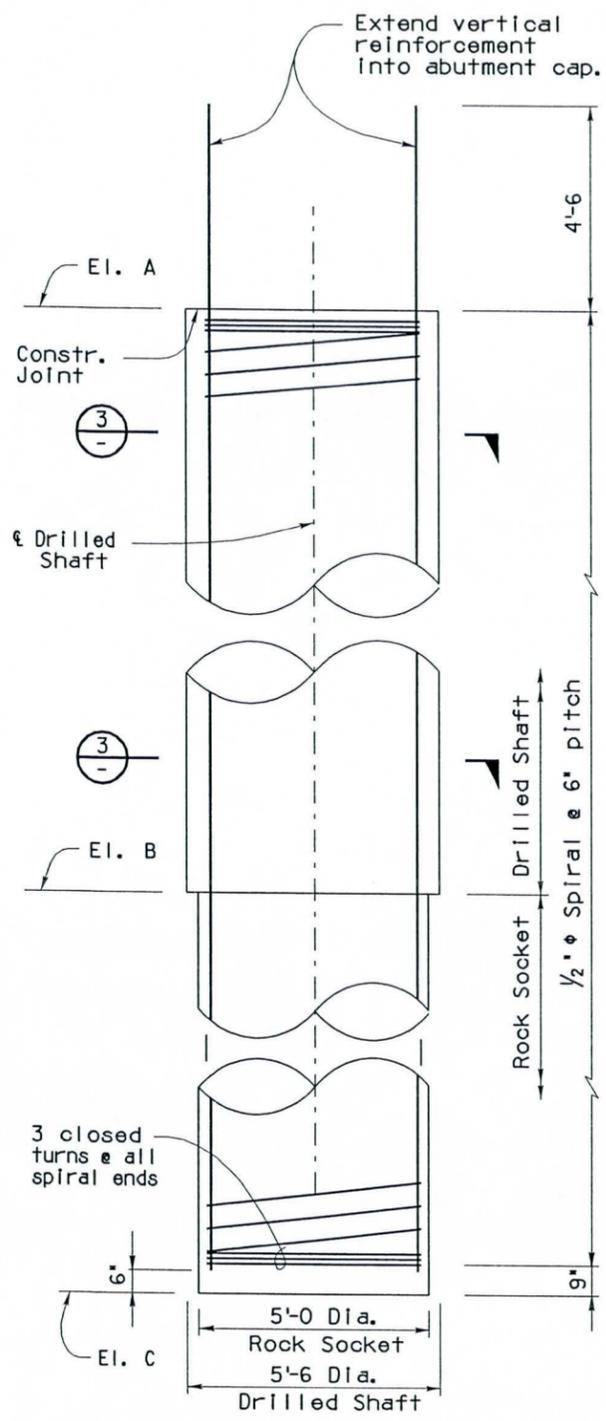
Ties shall be cold drawn wire spirals conforming to AASHTO M-32, Fy=60 ksi. Splices shall have a minimum half turn overlap and a 135° hook around a vertical bar.

Splices for Drilled shaft vertical reinforcement shall be class C tension Lap. Stagger splices a minimum of one Lap length in the lowest portion of the shaft.

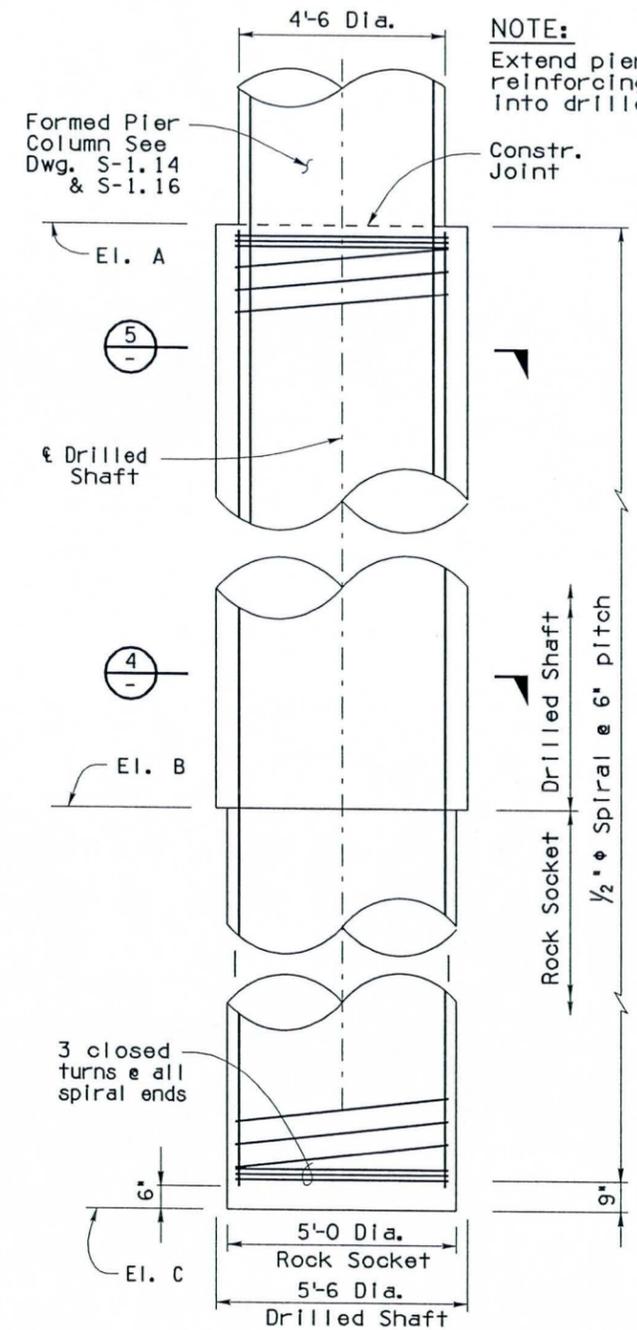
Extension of Drilled Shaft Reinforcing into Abutment Caps is incidental to the bid item for Drilled shafts.

Cross-hole sonic logging conduits are required only for wet excavation or placement methods. Conduits shall be 2 inch dia. schedule 80 PVC pipes.

	Shaft #	El. 'A'	El. 'B'	El. 'C'	Design Load	Capacity
Abut. #1	1	2044.17	1952.00	xxxx.xx	672 K	912 K
	2	2044.66	xxxx.xx	xxxx.xx	672 K	912 K
	3	2044.73	xxxx.xx	xxxx.xx	672 K	912 K
	4	2044.38	1957.00	xxxx.xx	672 K	912 K
Pier #1	5-8	2033.00	1962.00	xxxx.xx	1048 K	1424 K
Pier #2	9-12	2033.00	xxxx.xx	xxxx.xx	1048 K	1424 K
Pier #3	13-16	2033.00	1966.00	xxxx.xx	1048 K	1424 K
Pier #4	17-21	2033.00	1986.00	xxxx.xx	942 K	1312 K
Abut. #2	22	2044.97	1971.00	xxxx.xx	635 K	836 K
	23	2045.44	xxxx.xx	xxxx.xx	635 K	836 K
	24	2045.75	xxxx.xx	xxxx.xx	635 K	836 K
	25	2045.30	xxxx.xx	xxxx.xx	635 K	836 K
	26	2044.86	xxxx.xx	xxxx.xx	635 K	836 K
	27	2044.41	2008.00	xxxx.xx	635 K	836 K



ABUTMENT DRILLED SHAFT ELEVATION 1  
Scale 1/2" = 1'-0"



PIER DRILLED SHAFT ELEVATION 2  
Scale 1/2" = 1'-0"

NOTE:  
Extend pier column reinforcing down 9'-0 into drilled shafts.

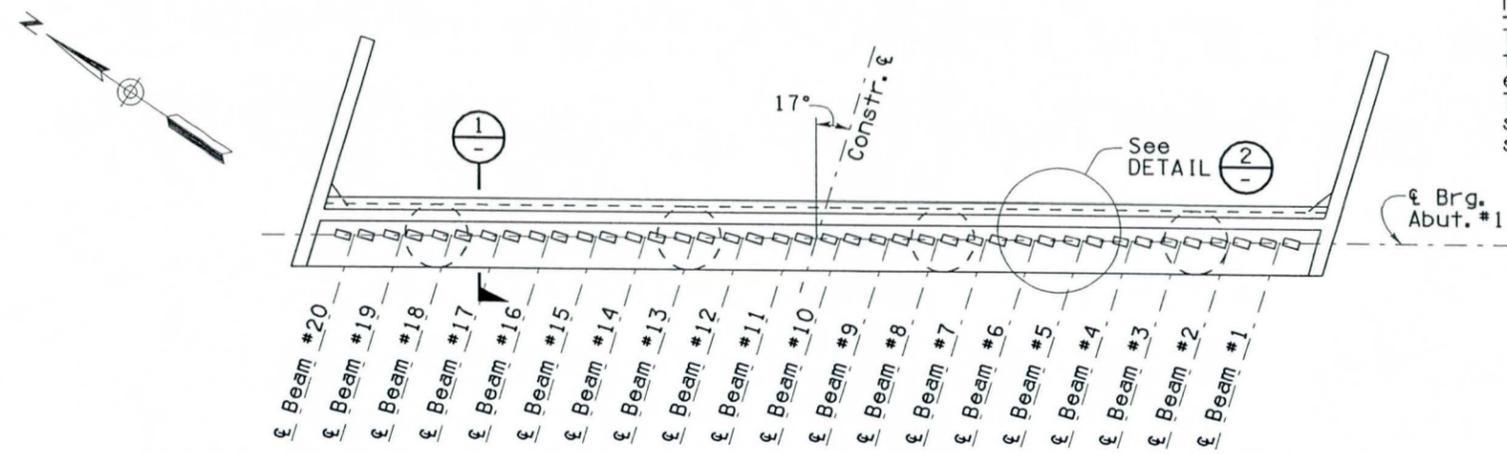
NO. 1 DESCRIPTION OF REVISIONS  
MADE BY DATE  
NO. 2 DESCRIPTION OF REVISIONS  
MADE BY DATE

BRIDGE DESIGN SECTION BY			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	6-04			
DESIGN CKD	H. Sung	6-04			
DRAWN	L. Altuna	6-04			
DWG CKD	H. Sung	6-04			
APPROVED-PROJ. ENGINEER			L. Altuna	STA. 104+ HASSAYAMPA RIVER BRIDGE DRILLED SHAFT DETAILS	
APPROVED-DESIGN LEADER			H. Sung		
US60	110.53	2818	LOCATION	WICKENBURG INTERIM BYPASS	
ROUTE	MILEPOST	STRUCTURE NO.			
TRACS NO. H 5825 OIC				093-B-(008)	OF

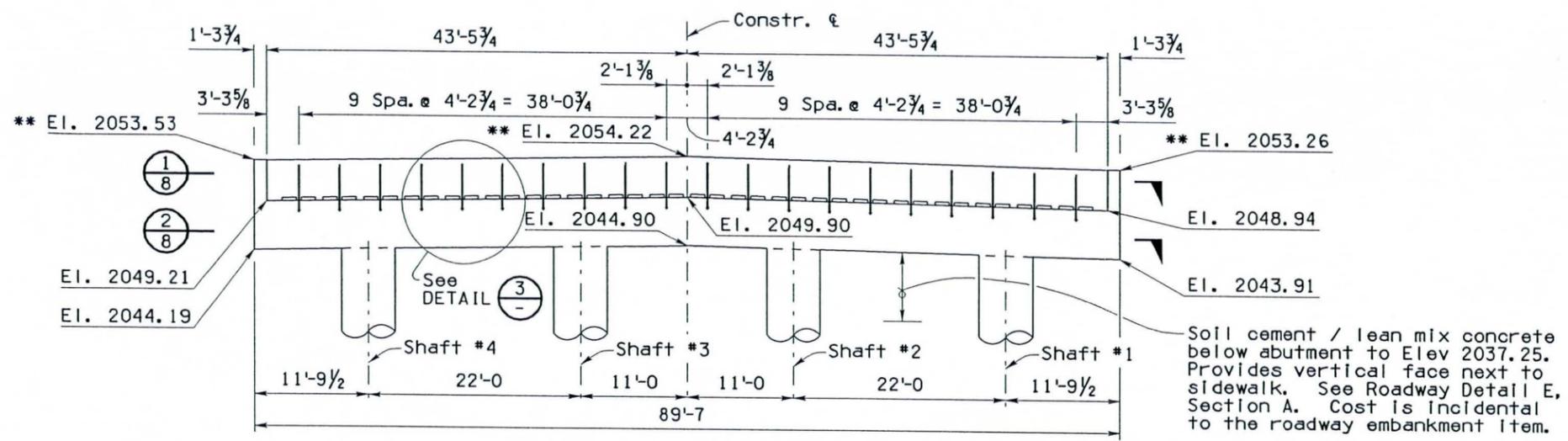
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARZ.	093-B-(008)			
93 YV 198					

**Note:**

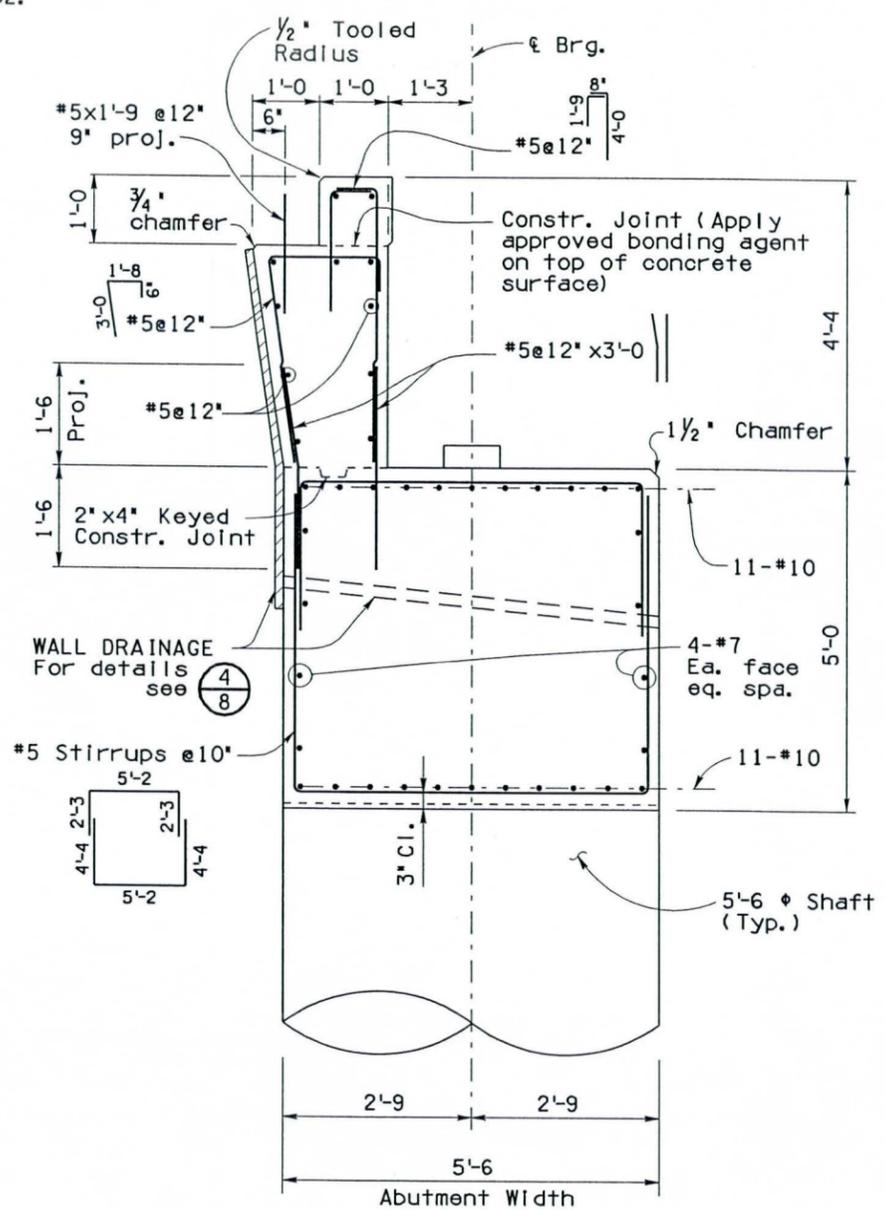
The Contractor shall survey and provide the Engineer with as-built concrete elevations at each box beam bearing seat. The Contractor shall repair any concrete seats that do not meet the tolerance shown in ADOT Spec. 601-4.02.



**PLAN**  
Scale: 1/8" = 1'-0"

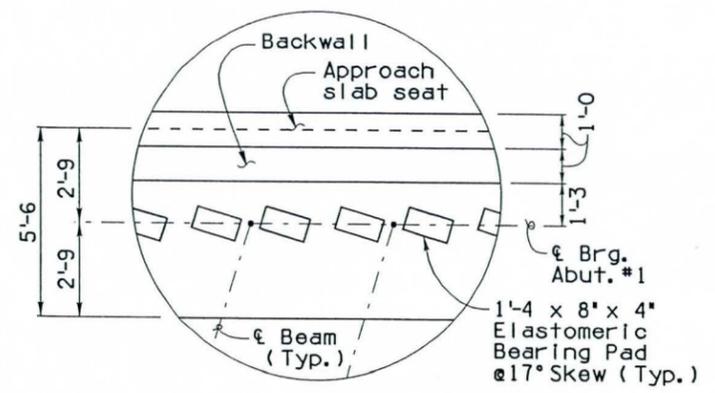


**ELEVATION**  
(Looking Back Station)  
Scale: 1/8" = 1'-0"

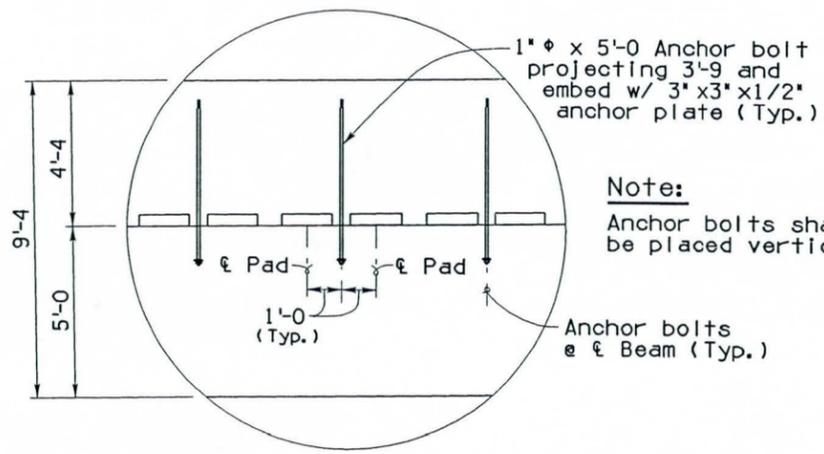


**SECTION 1**  
Scale: 3/4" = 1'-0"

**Note:**  
All Dimensions and Elevations Measured Along & Brg. Abut.#1 unless noted otherwise.



**DETAIL 2**  
Scale: 3/8" = 1'-0"

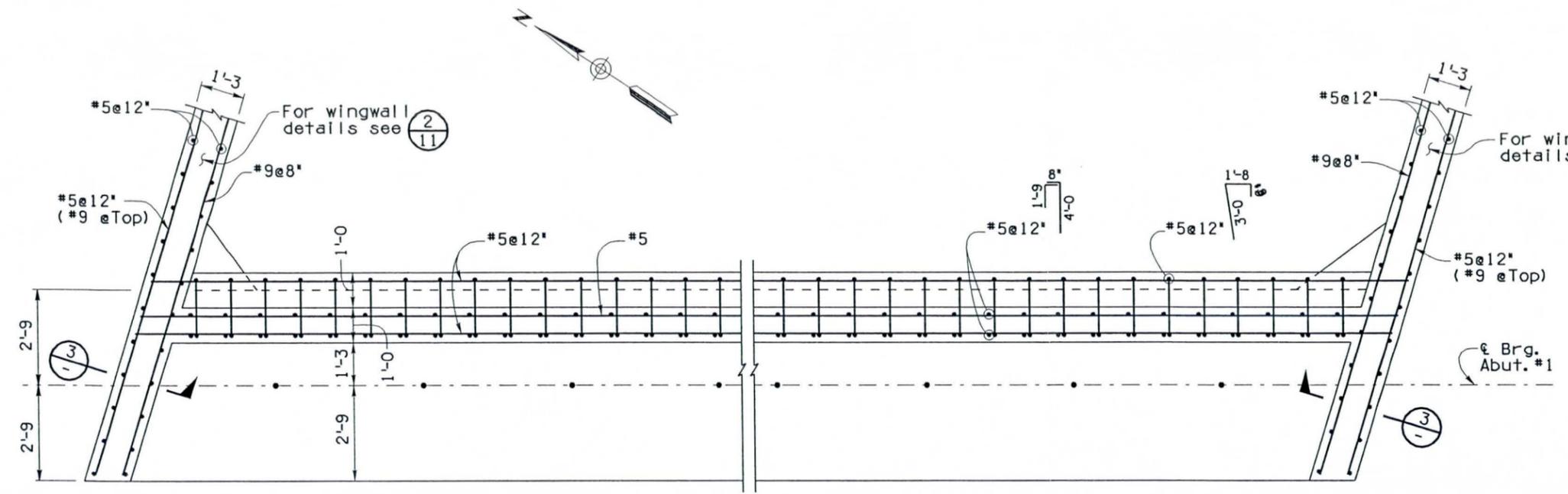


**DETAIL 3**  
Scale: 3/8" = 1'-0"

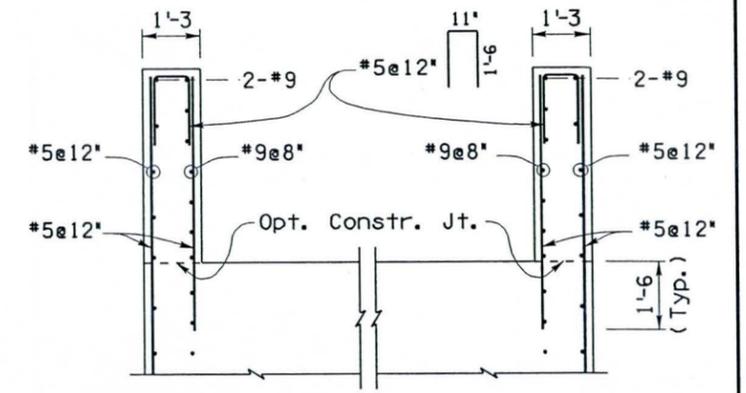
**Note:**  
Anchor bolts shall be placed vertical.

BRIDGE DESIGN SECTION BY			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	7-04			
DESIGN CKD	H. Sung	7-04			
DRAWN	L. Altuna	7-04			
DWG CKD	H. Sung	7-04			
APPROVED-PROJ. ENGINEER	L. Altuna			<b>STA. 104+ HASSAYAMPA RIVER BRIDGE ABUTMENT#1 PLAN AND ELEVATION</b>	
APPROVED-DESIGN LEADER	H. Sung				
US60	110.53	2818		<b>WICKENBURG INTERIM BYPASS</b>	
ROUTE	MILEPOST	STRUCTURE NO.			
TRACS NO. H 5825 OIC				093-B-(008)	OF

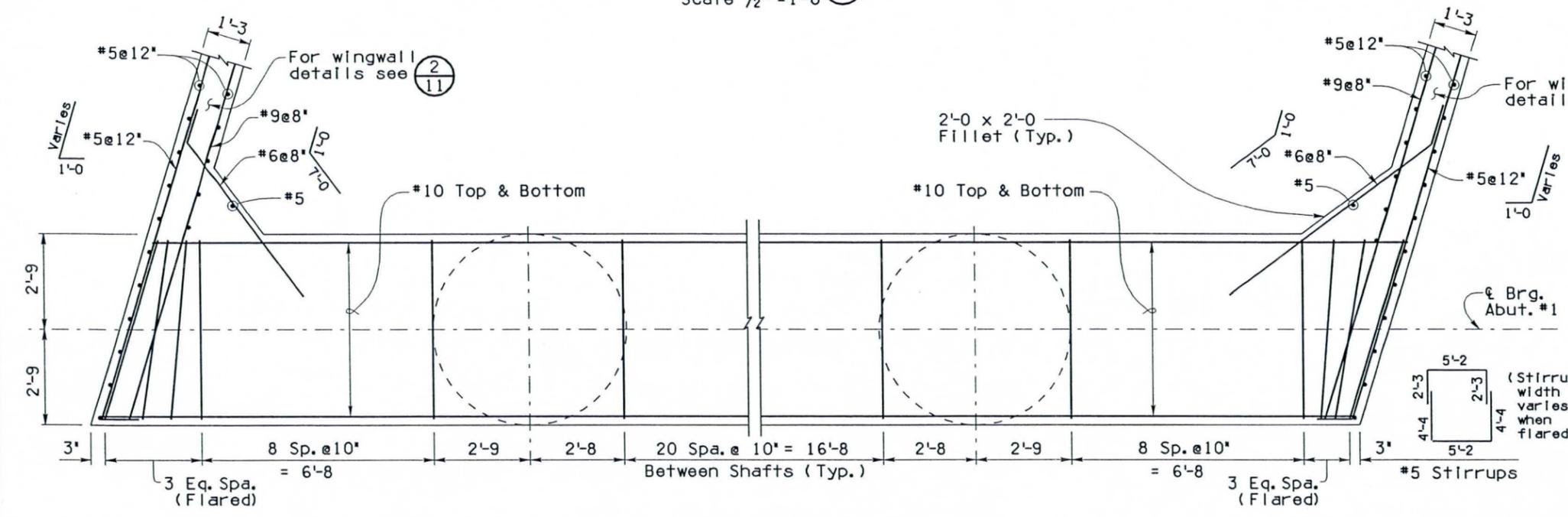
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
93 YV 198					



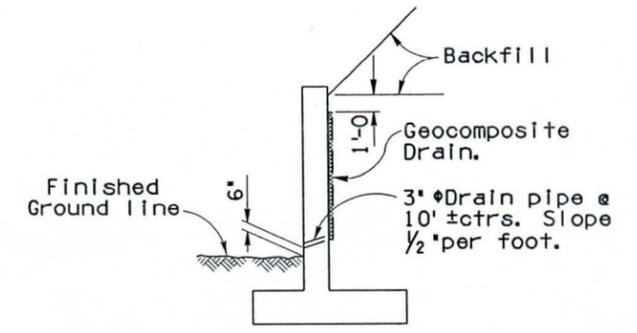
SECTION 1  
Scale 1/2" = 1'-0"



SECTION 3  
Scale 1/2" = 1'-0"



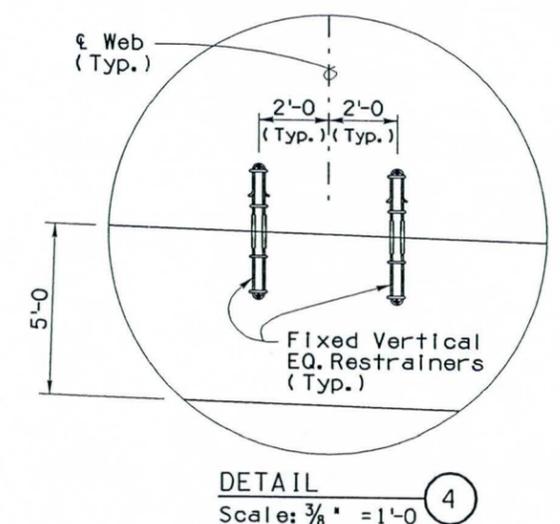
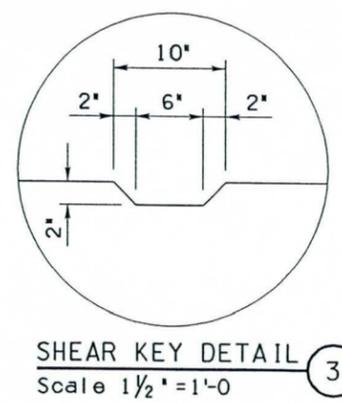
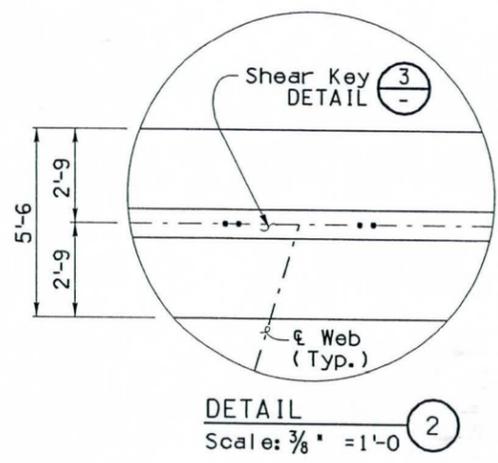
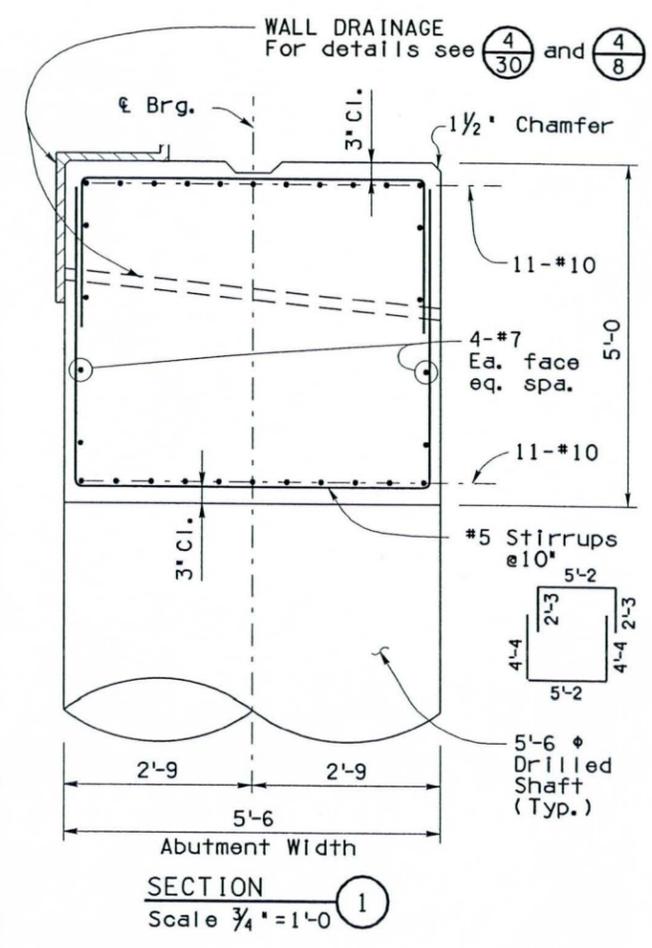
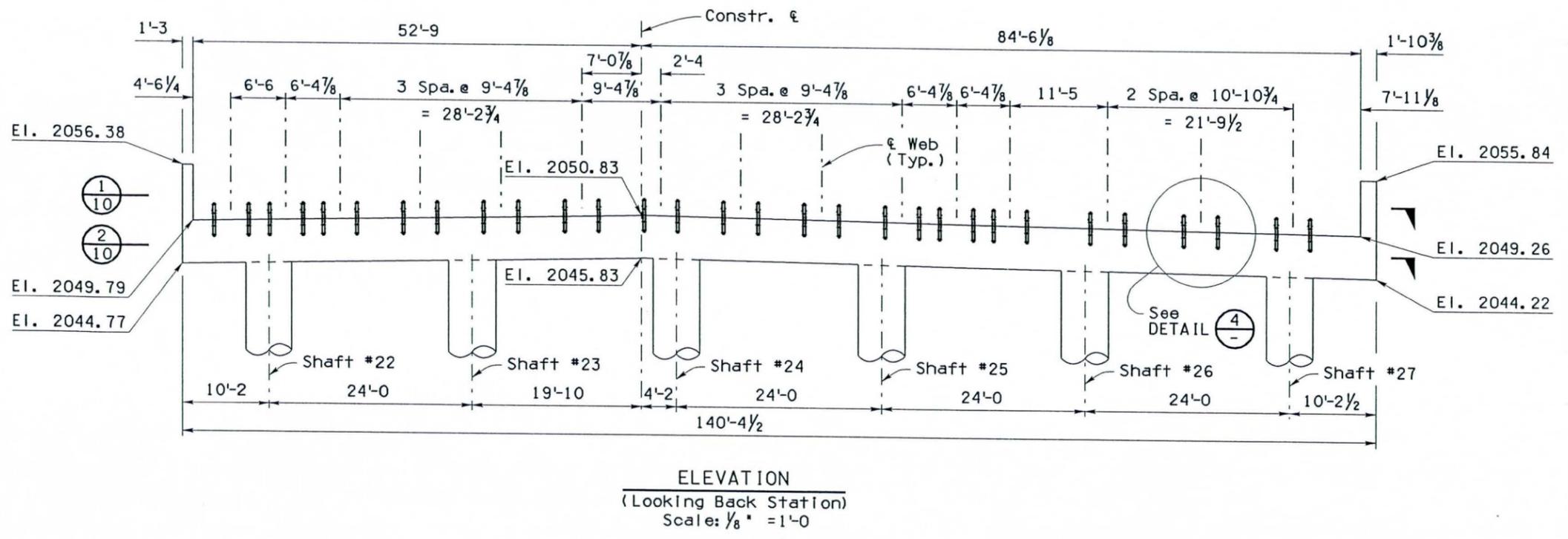
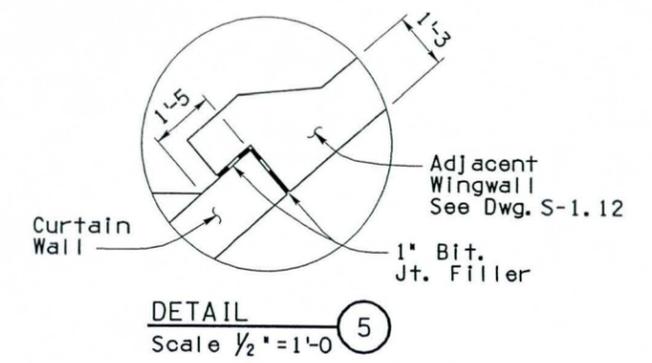
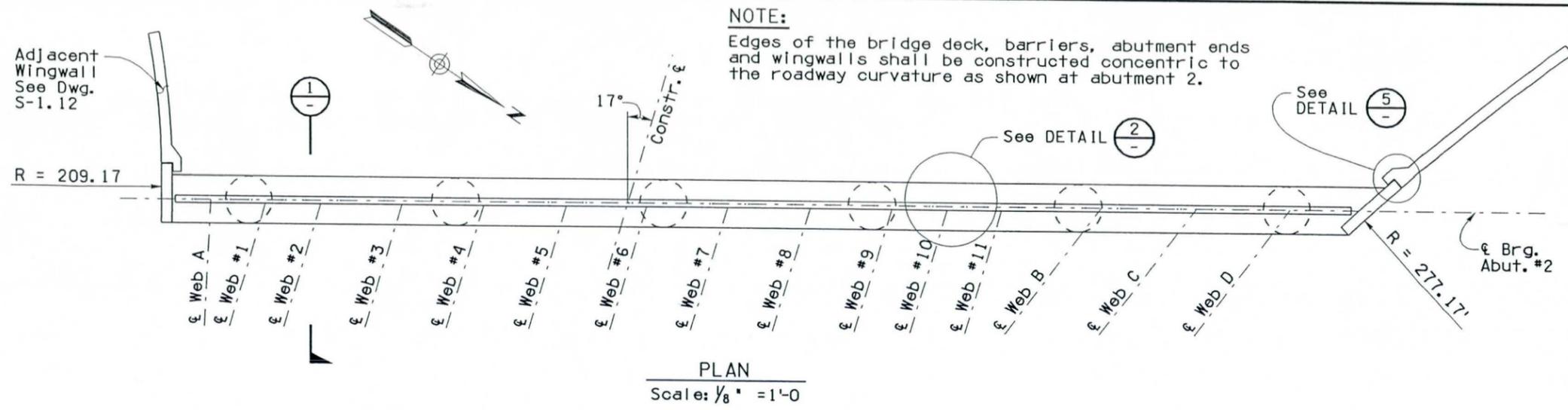
SECTION 2  
Scale 1/2" = 1'-0"



WALL DRAINAGE 4  
Scale 3/16" = 1'-0"

BRIDGE DESIGN SECTION 11			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP		PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	7-04	STA. 104+ HASSAYAMPA RIVER BRIDGE ABUTMENT #1 DETAILS		LOCATION WICKENBURG INTERIM BYPASS	
DESIGN CKD	H. Sung	7-04				
DRAWN	L. Altuna	7-04				
DWG CKD	H. Sung	7-04				
APPROVED-PROJ. ENGINEER	L. Altuna					
APPROVED-DESIGN LEADER	H. Sung					
US60	110.53	2818	LOCATION			
ROUTE	MILEPOST	STRUCTURE NO.				
TRACS NO. H 5825 01C			093-B-(008)		DWG. 5-L8 OF 41	

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
93 YV 198					



**Note:**  
All Dimensions and Elevations Measured Along  $\epsilon$  Brg. Abut. #2 unless noted otherwise.

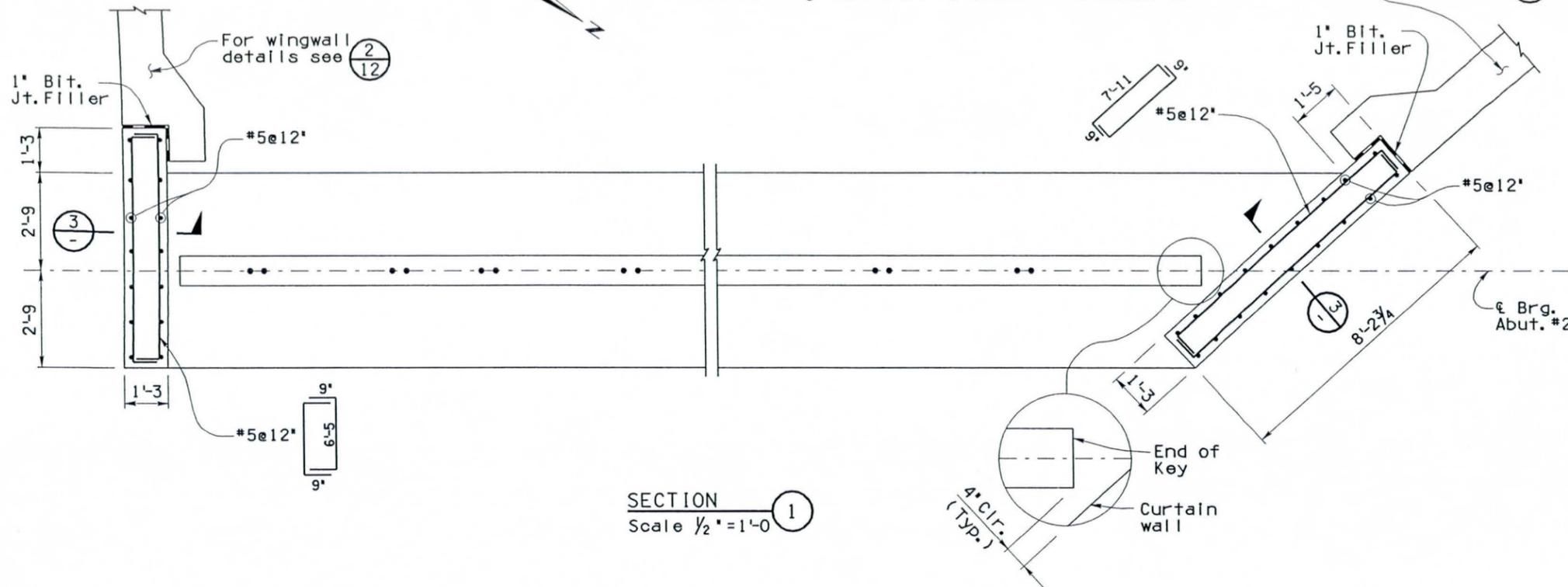
BRIDGE DESIGN SECTION 8'			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	7-04			
DESIGN CRD	H. Sung	7-04			
DRAWN	L. Altuna	7-04			
DWG CRD	H. Sung	7-04			
APPROVED-PROJ. ENGINEER	L. Altuna				
APPROVED-DESIGN LEADER	H. Sung				
US60	110.53	2818		STA. 104+ HASSAYAMPA RIVER BRIDGE ABUTMENT #2 PLAN AND ELEVATION	
ROUTE	MILEPOST	STRUCTURE NO.		LOCATION WICKENBURG INTERIM BYPASS	
TRACS NO. H 5825 OIC				093-B-(008)	DWG. S-1.9 OF 41
					OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

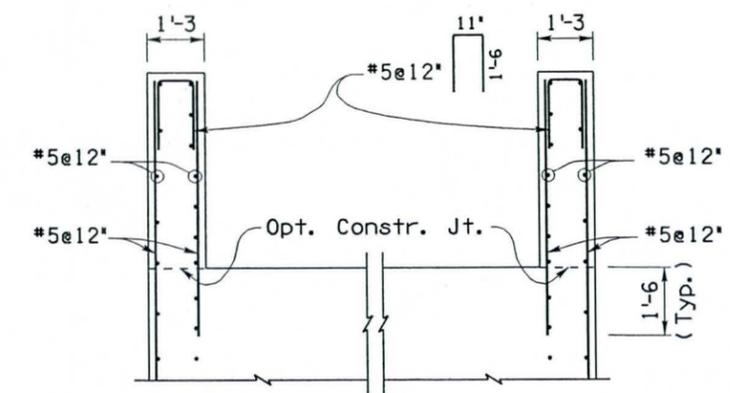
93 YV 198

**NOTE:**

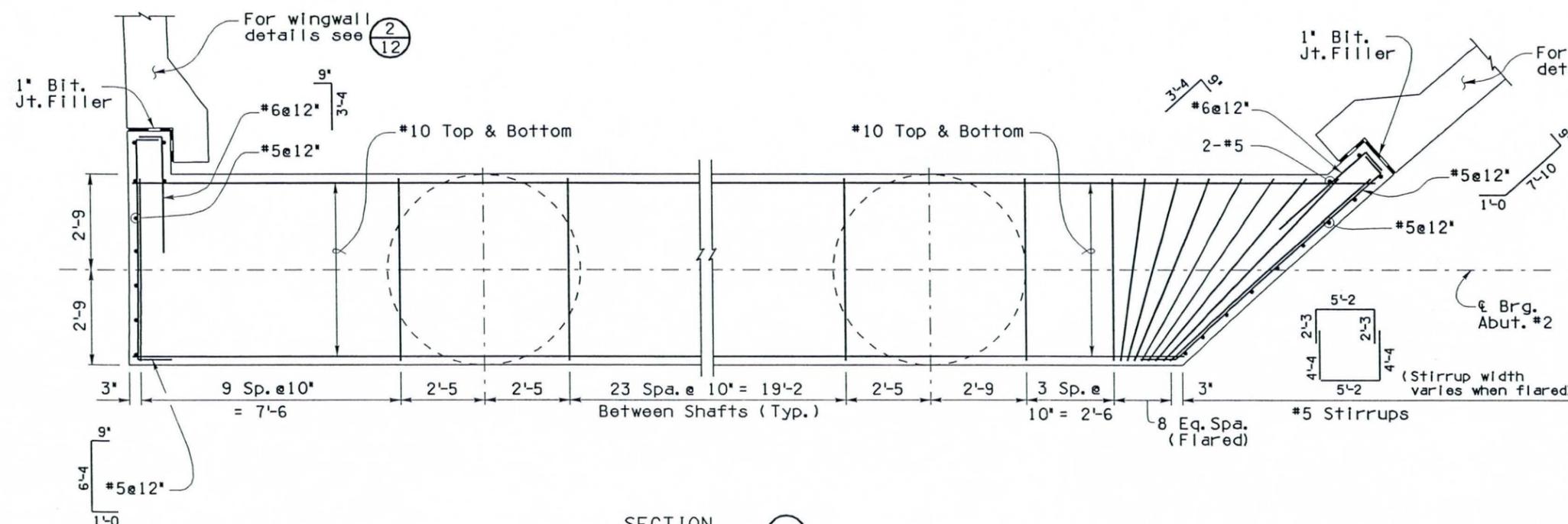
Edges of the bridge deck, barriers, abutment ends and wingwalls shall be constructed concentric to the roadway curvature as shown at abutment 2.



SECTION 1  
Scale 1/2" = 1'-0"



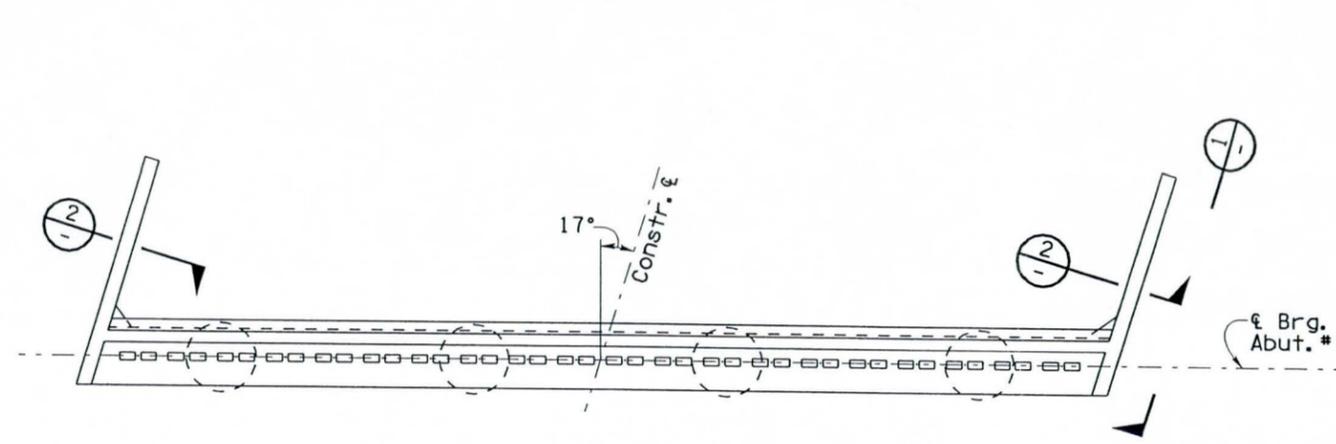
SECTION 3  
Scale 1/2" = 1'-0"



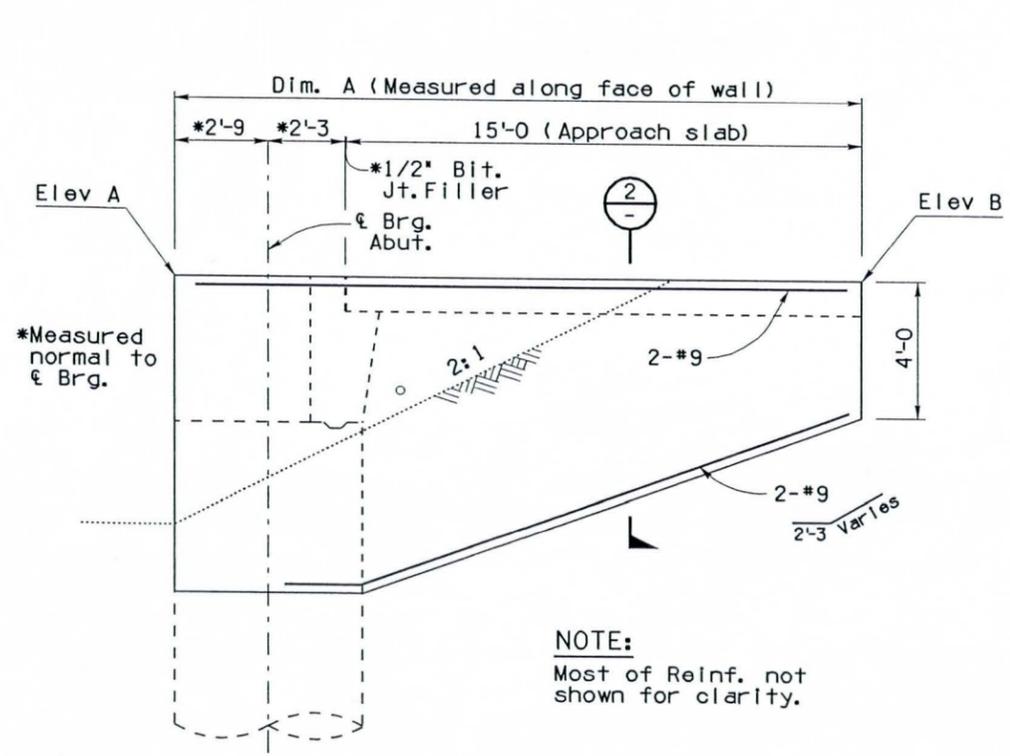
SECTION 2  
Scale 1/2" = 1'-0"

BRIDGE DESIGN SECTION B'		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Alfuna	7-04		
DESIGN CKD	H. Sung	7-04		
DRAWN	L. Alfuna	7-04		
CHKD	H. Sung	7-04		
APPROVED-PROJ. ENGINEER	L. Alfuna		STA. 104+ HASSAYAMPA RIVER BRIDGE ABUTMENT #2 DETAILS	DWG. 5-110 OF 41
APPROVED-DESIGN LEADER	H. Sung			
US60	110.53	2818	LOCATION	
ROUTE	MILEPOST	STRUCTURE NO.	WICKENBURG INTERIM BYPASS	
TRACS NO. H 5825 OIC			093-B-(008)	OF

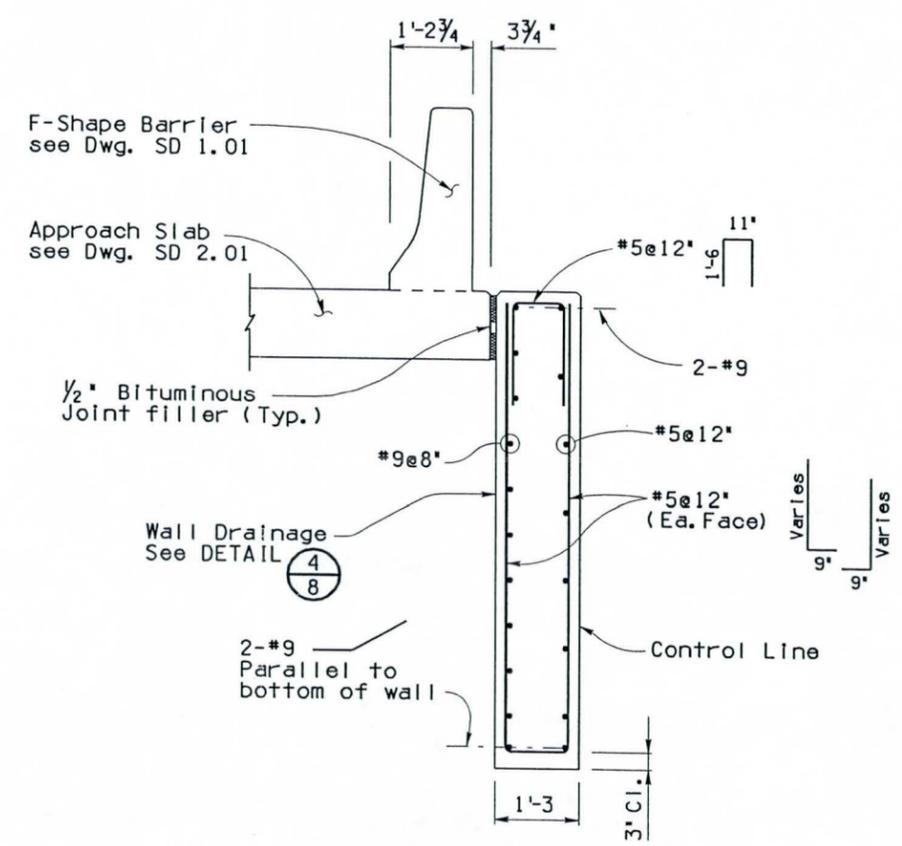
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
93 YV 198					



**ABUTMENT 1 PLAN**  
Scale:  $\frac{1}{8}'' = 1'-0''$



**WINGWALL ELEVATION** ①  
(SE shown, NE similar)  
Scale  $\frac{3}{8}'' = 1'-0''$



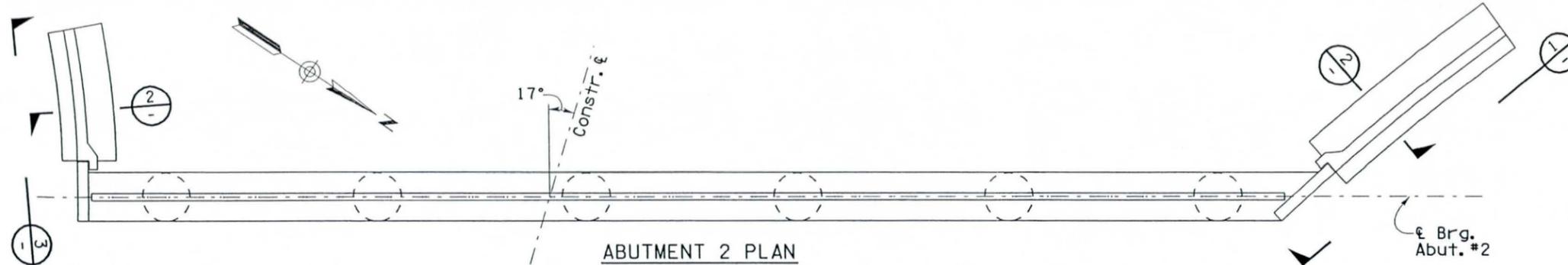
**SECTION** ②  
Scale  $\frac{3}{4}'' = 1'-0''$

Wingwall	Dim. A	Elev. A	Elev. B
SE Abut. 1	19'-10 $\frac{5}{8}$ ''	2053.30	2053.09
NE Abut. 1	20'-7 $\frac{3}{4}$ ''	2053.57	2053.36

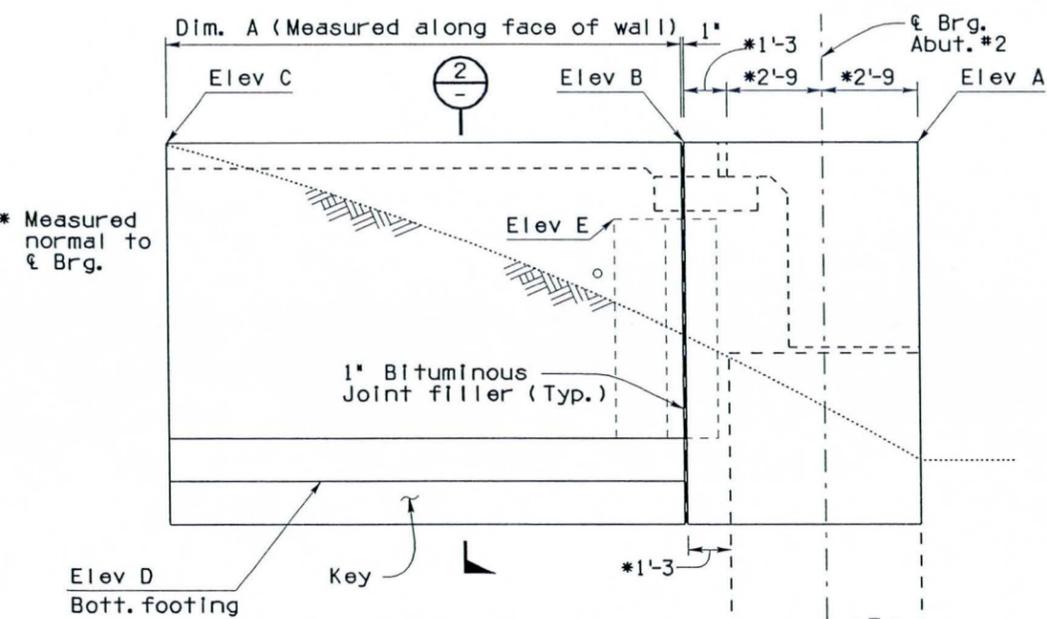
BRIDGE DESIGN SECTION 11		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP		PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	11-04	STA. 104+ HASSAYAMPA RIVER BRIDGE WINGWALL DETAILS 1		
DESIGN CKD	H. Sung	11-04			
DRAWN	L. Altuna	11-04			
DWG CKD	H. Sung	11-04	LOCATION WICKENBURG INTERIM BYPASS		DWG. 5-111 OF 41
APPROVED-PROJ. ENGINEER	L. Altuna		US60 ROUTE 110.53 MILEPOST 2818 STRUCTURE NO.		
APPROVED-DESIGN LEADER	H. Sung		TRACS NO. H 5825 01C		093-B-(008)

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

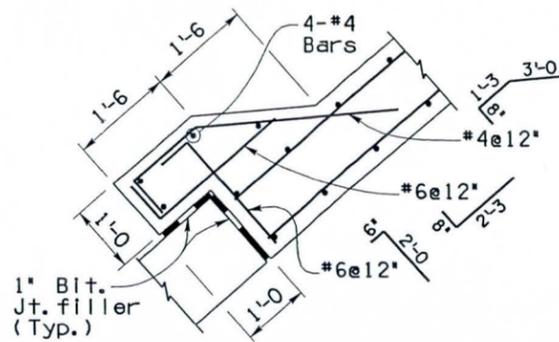
93 YV 198



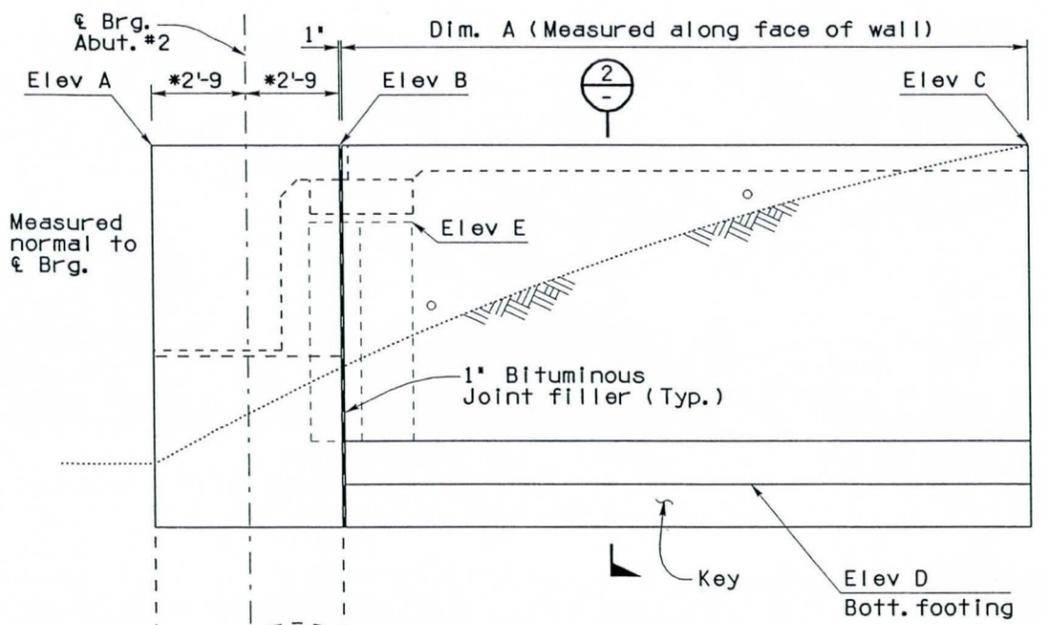
**ABUTMENT 2 PLAN**  
Scale: 1/8" = 1'-0"



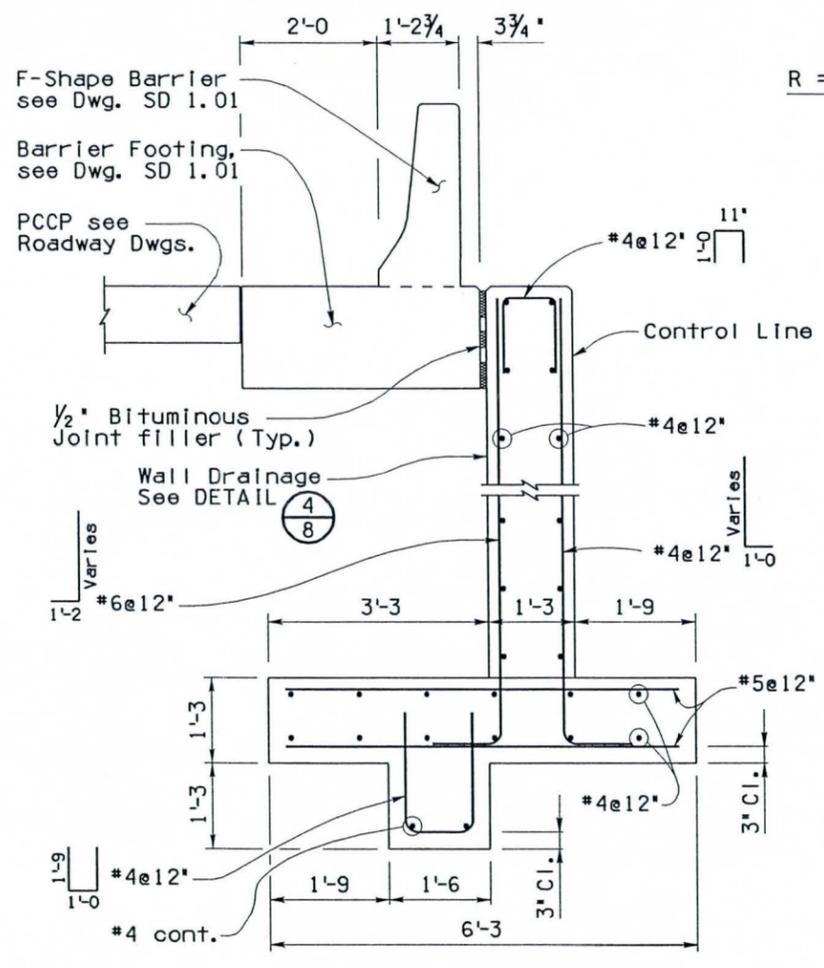
**WINGWALL ELEVATION 3**  
Scale 3/8" = 1'-0"



**WINGWALL KEY DETAIL 4**  
Scale 3/4" = 1'-0"

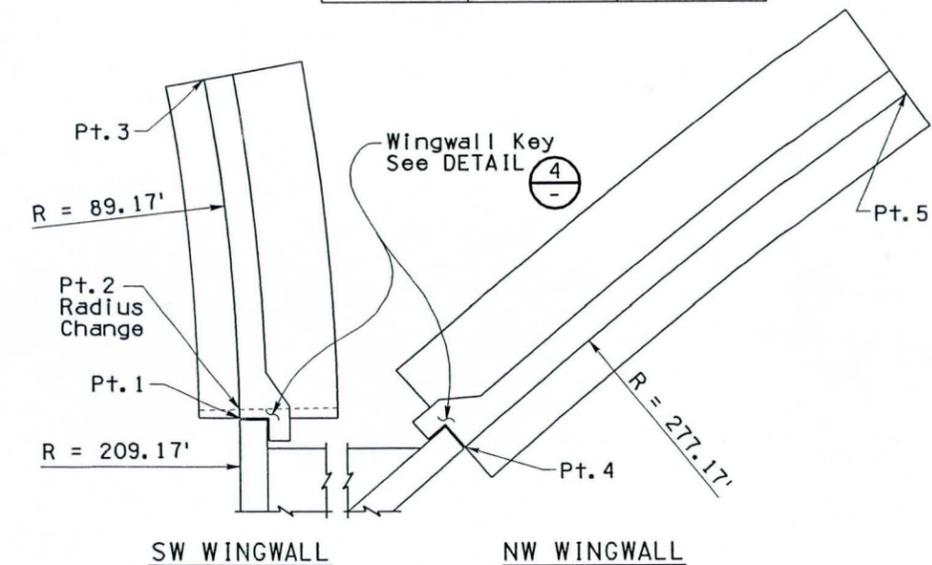


**WINGWALL ELEVATION 1**  
Scale 3/8" = 1'-0"



**SECTION 2**  
Scale 3/4" = 1'-0"

Ref. Pt.	Station	Offset
Pt. 1	109+16.61	52.85' Lt
Pt. 2	109+16.99	52.97' Lt
Pt. 3	109+30.46	58.58' Lt
Pt. 4	109+57.37	84.82' Rt
Pt. 5	109+77.95	98.99' Rt



**WINGWALL PLAN**  
Scale: 1/4" = 1'-0"

Wingwall	SW Abut. 2	NW Abut. 2
Dim. A	15'-0"	25'-0"
Elev. A	2056.36	2055.84
Elev. B	2056.33	2055.76
Elev. C	2056.24	2055.50
Elev. D	2046.02	2045.47
Elev. E	2054.08	2053.51

**NOTES:**  
Edges of the bridge deck, barriers, abutment ends and wingwalls shall be constructed concentric to the roadway curvature as shown at abutment 2.  
100% Soil compaction required below footings.

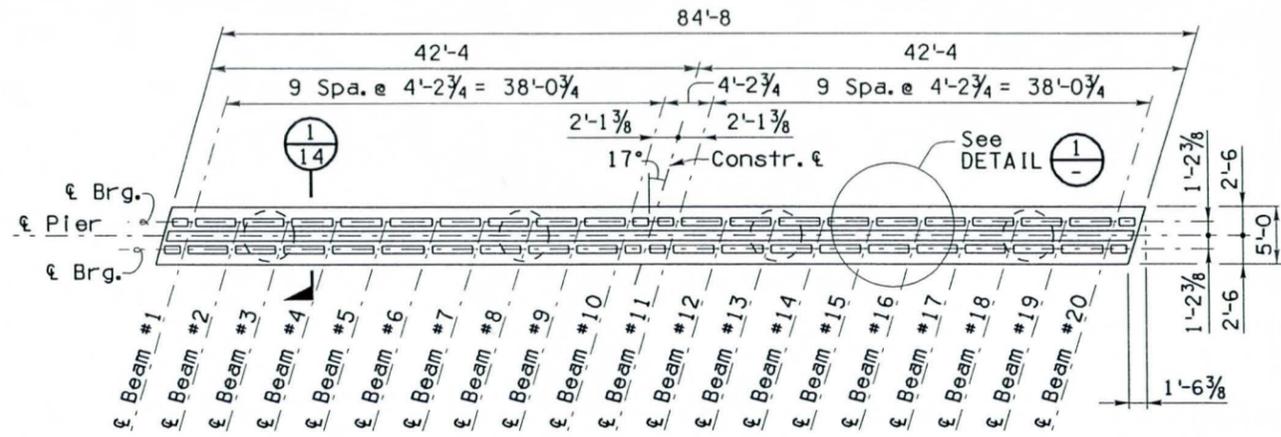
BRIDGE DESIGN SECTION BY		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	11-04		
DESIGN CKD	H. Sung	11-04		
DRAWN	L. Altuna	11-04		
CHKD	H. Sung	11-04		
APPROVED-PROJ. ENGINEER		L. Altuna	STA. 104+ HASSAYAMPA RIVER BRIDGE WINGWALL DETAILS 2	DWG. 5-112 OF 41
APPROVED-DESIGN LEADER		H. Sung		
US60	110.53	2818	LOCATION	WICKENBURG INTERIM BYPASS
ROUTE	MILEPOST	STRUCTURE NO.		
TRACS NO. H 5825 OIC			093-B-(008)	OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

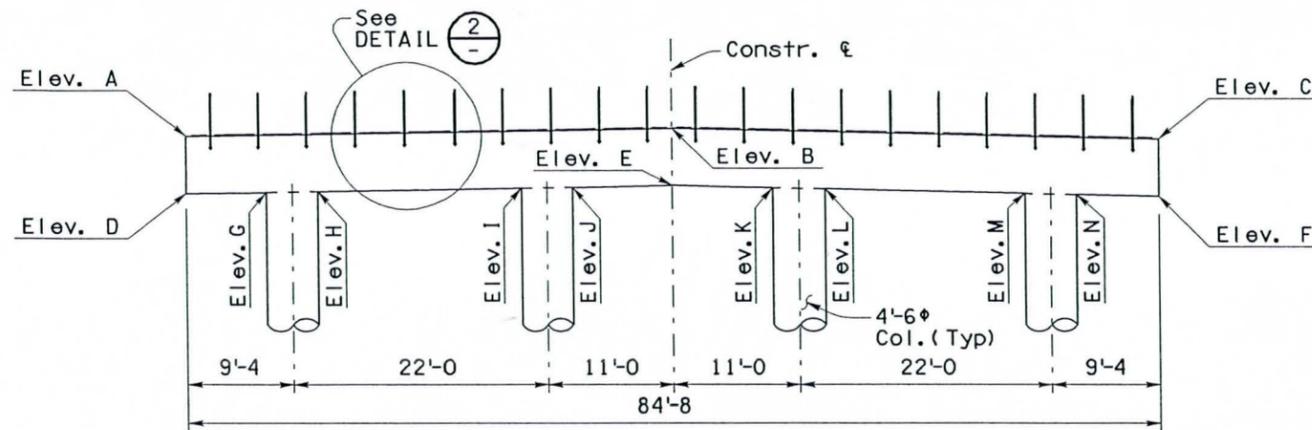
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**Note:**

The Contractor shall survey and provide the Engineer with as-built concrete elevations at each box beam bearing seat. The Contractor shall repair any concrete seats that do not meet the tolerance shown in ADOT Spec. 601-4.02.



**PLAN**  
Scale: 1/8" = 1'-0"



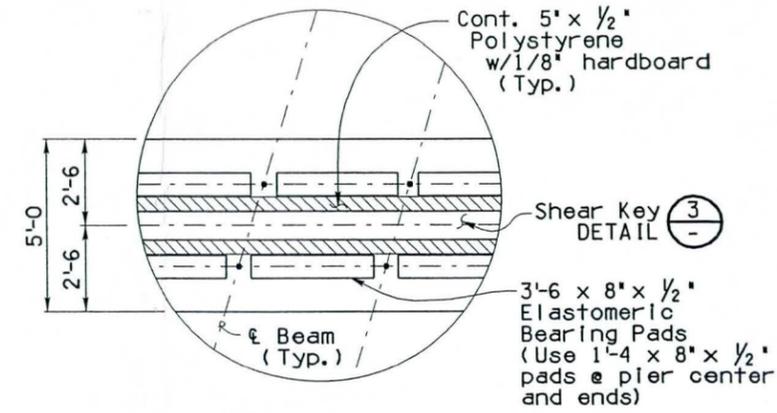
**ELEVATION**  
Scale: 1/8" = 1'-0"

**PIER ELEVATIONS**

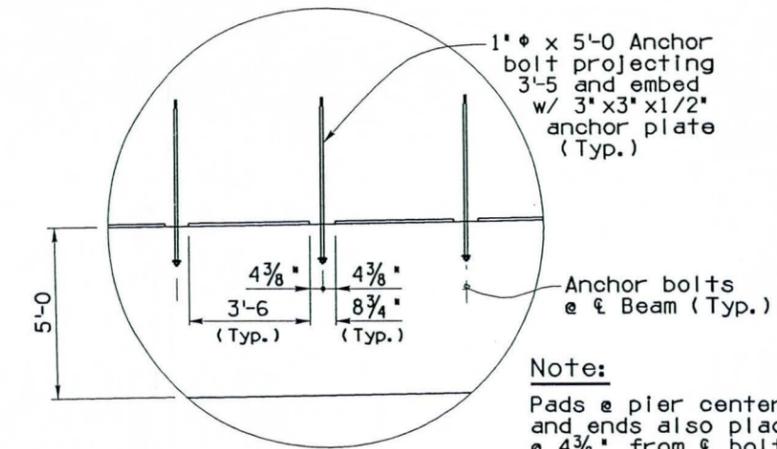
	Elev. A	Elev. B	Elev. C	Elev. D	Elev. E	Elev. F
Pier #1	2050.26	2051.19	2050.49	2045.26	2046.19	2045.49
Pier #2	2051.11	2052.01	2051.29	2046.11	2047.01	2046.29
Pier #3	2051.77	2052.65	2051.91	2046.77	2047.65	2046.91

**COLUMN ELEVATIONS**

	Elev. G	Elev. H	Elev. I	Elev. J	Elev. K	Elev. L	Elev. M	Elev. N
Pier #1	2045.42	2045.51	2045.90	2045.99	2046.04	2045.97	2045.68	2045.60
Pier #2	2046.26	2046.35	2046.73	2046.82	2046.86	2046.78	2046.49	2046.41
Pier #3	2046.92	2047.01	2047.37	2047.47	2047.49	2047.42	2047.11	2047.03

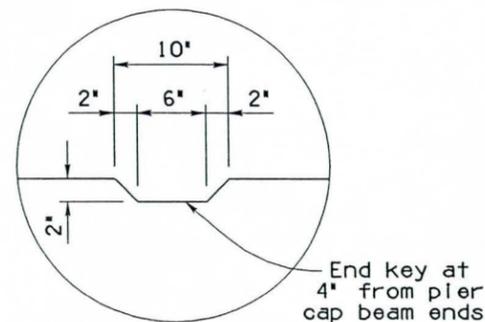


**DETAIL 1**  
Scale: 3/8" = 1'-0"



**DETAIL 2**  
Scale: 3/8" = 1'-0"

**Note:**  
Pads @ pier center and ends also placed @ 4 3/8" from @ bolt.



**SHEAR KEY DETAIL 3**  
Scale 1 1/2" = 1'-0"

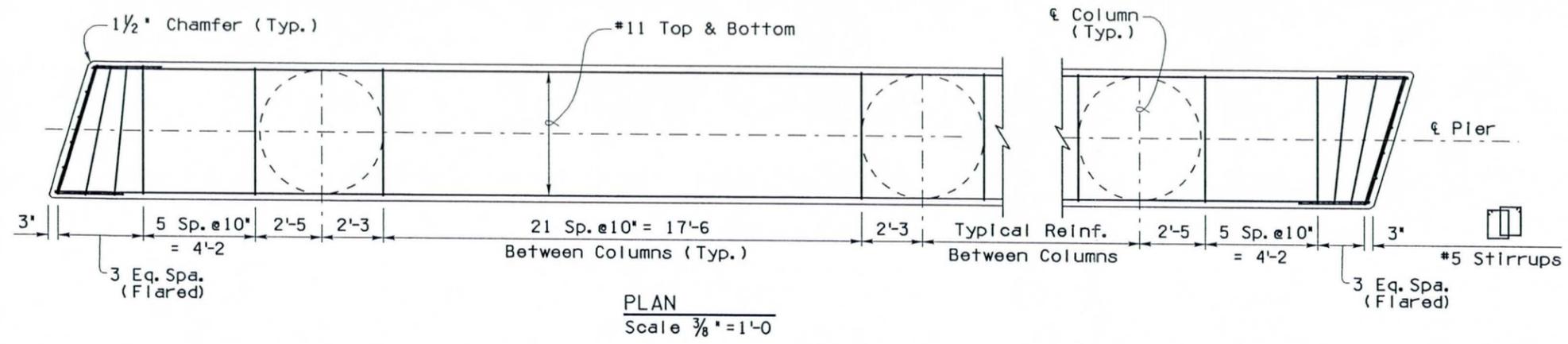
**Notes:**

All dimensions and elevations are measured along the centerline of pier unless noted otherwise.

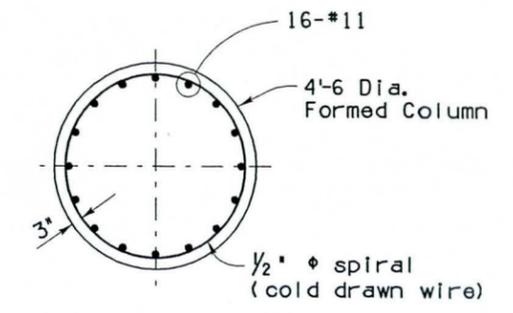
Piers #1, #2 & #3 are pinned piers.

BRIDGE DESIGN SECTION #		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	7-04		
DESIGN CKD	H. Sung	7-04		
DRANN	L. Altuna	7-04		
DWG CKD	H. Sung	7-04	STA. 104+ HASSAYAMPA RIVER BRIDGE PIER PLAN AND ELEVATION (PINNED)	
APPROVED-PROJ. ENGINEER	L. Altuna		LOCATION	
APPROVED-DESIGN LEADER	H. Sung		WICKENBURG INTERIM BYPASS	
US60	110.53	2818	093-B-(008)	
ROUTE	MILEPOST	STRUCTURE NO.	DWG. 5-113 OF 41	
TRACS NO. H 5825 OIC			OF	

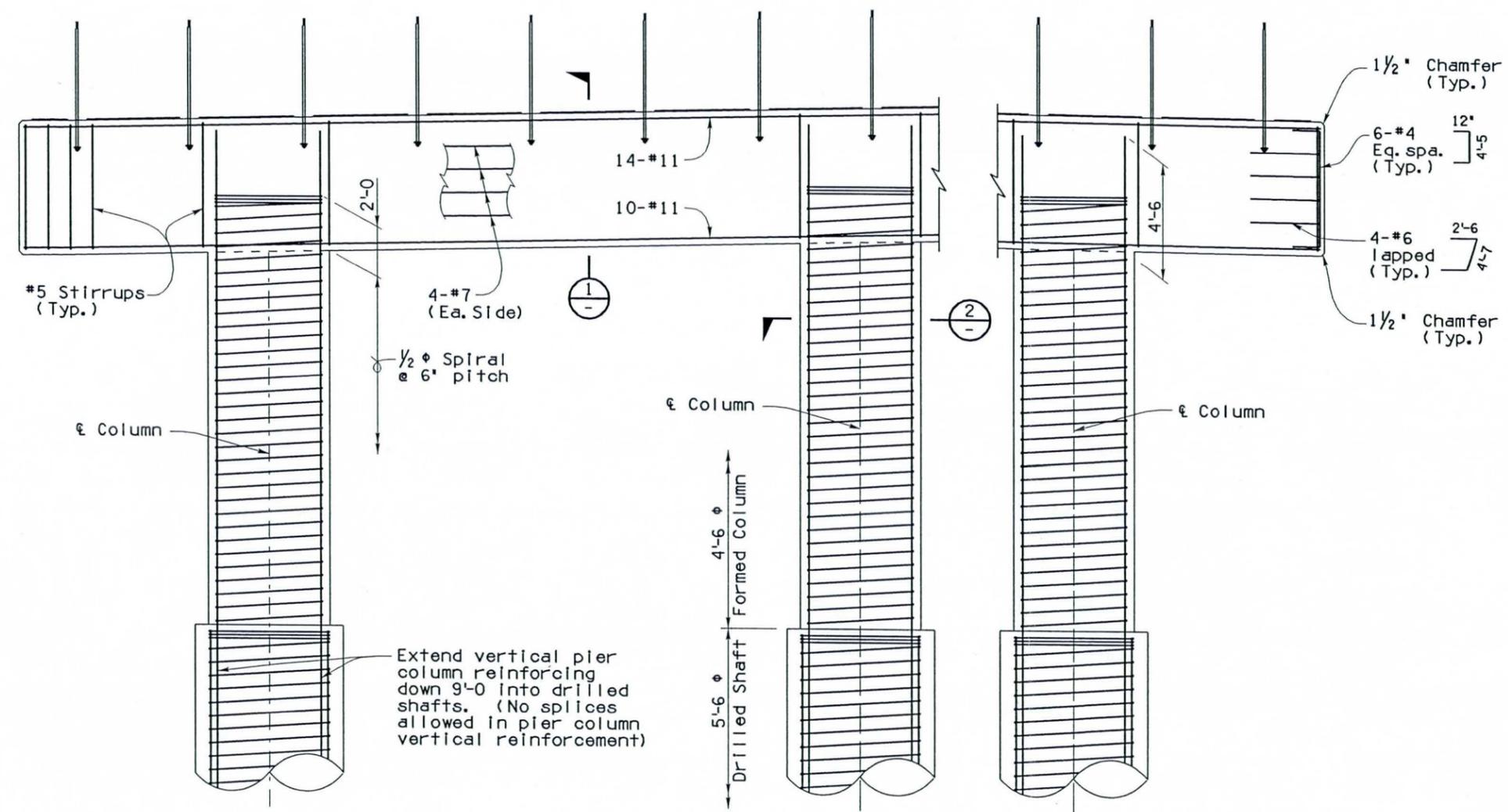
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
93 YV 198					



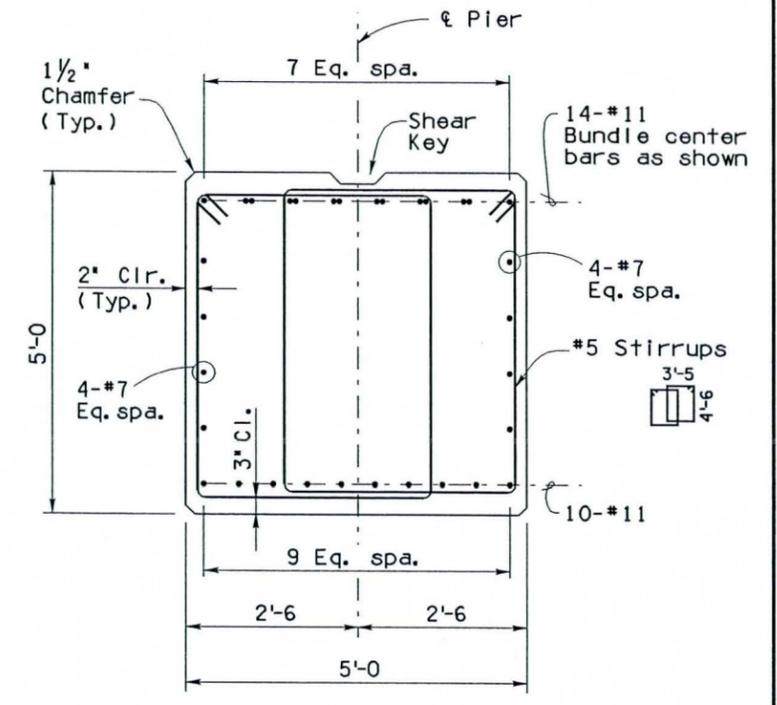
PLAN  
Scale 3/8" = 1'-0"



SECTION 2  
Scale: 1/2" = 1'-0"



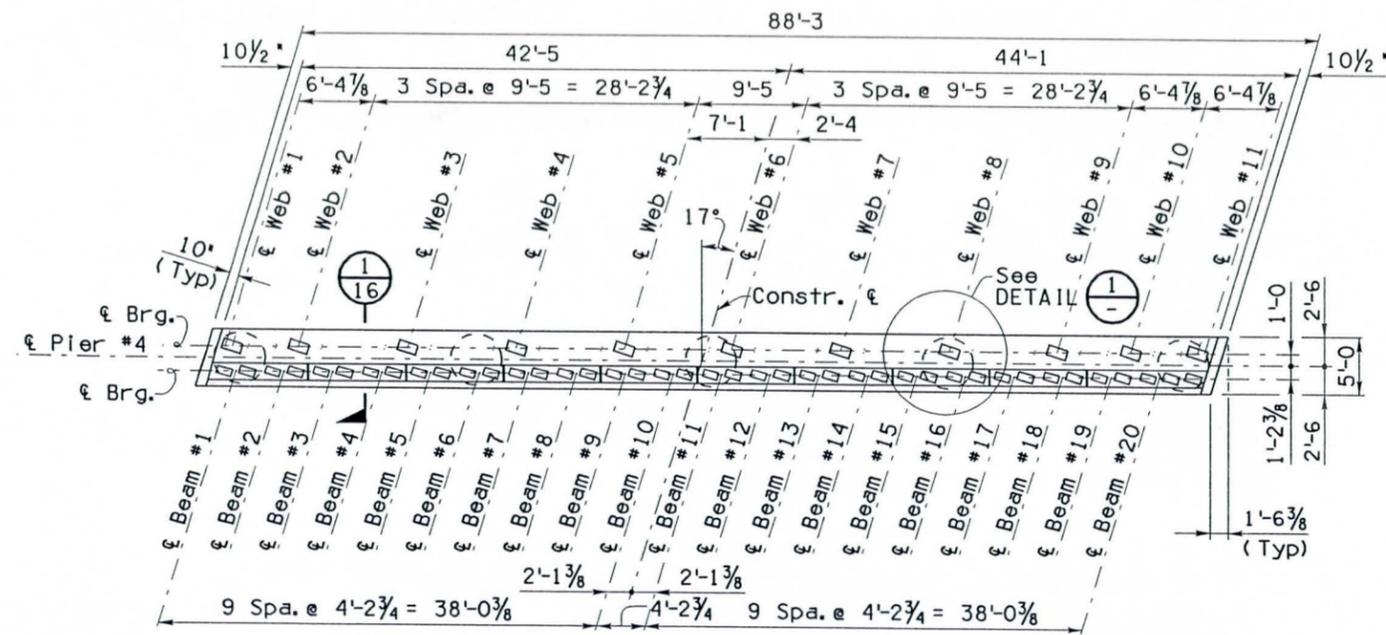
ELEVATION  
Scale 3/8" = 1'-0"



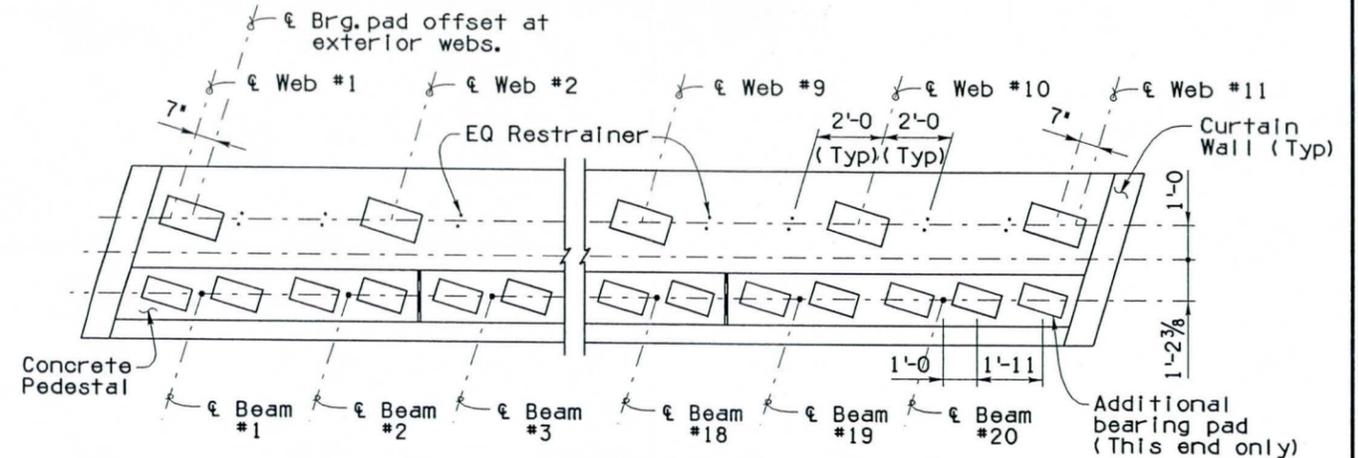
SECTION 1  
Scale: 3/4" = 1'-0"

BRIDGE DESIGN SECTION 8'			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP		PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	7-04	STA. 104+ HASSAYAMPA RIVER BRIDGE PIER DETAILS (PINNED)			
DESIGN CKD	H. Sung	7-04				
DRAWN	L. Altuna	7-04	LOCATION WICKENBURG INTERIM BYPASS			
DWG CKD	H. Sung	7-04				
APPROVED-PROJ. ENGINEER	L. Altuna		US60 110.53 2818 ROUTE MILEPOST STRUCTURE NO.			DWG. 5-114 OF 41
APPROVED-DESIGN LEADER	H. Sung					TRACS NO. H 5825 OIC

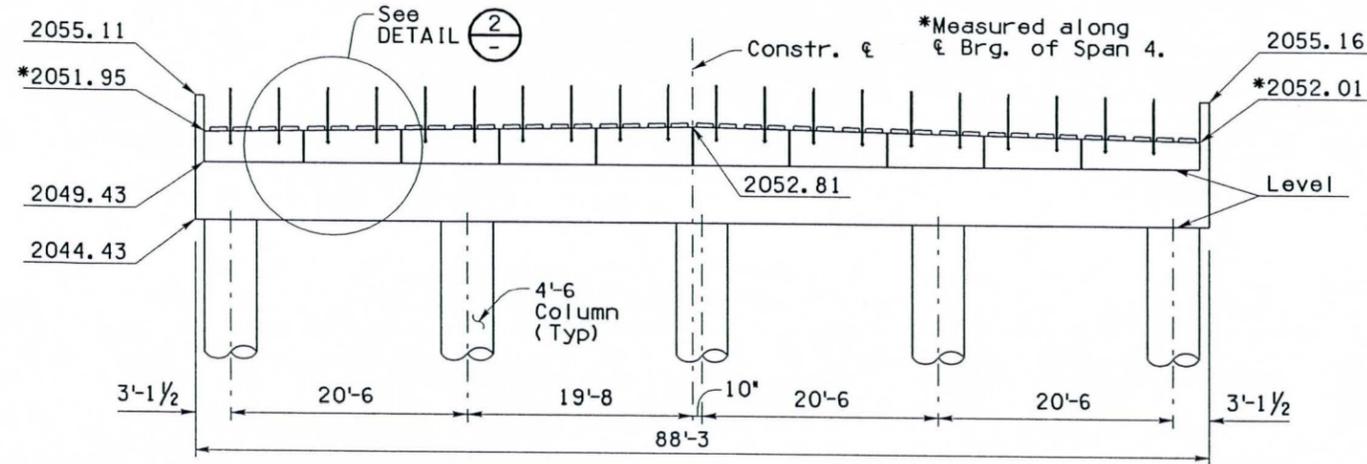
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
93 YV 198					



PLAN  
Scale: 1/8" = 1'-0"

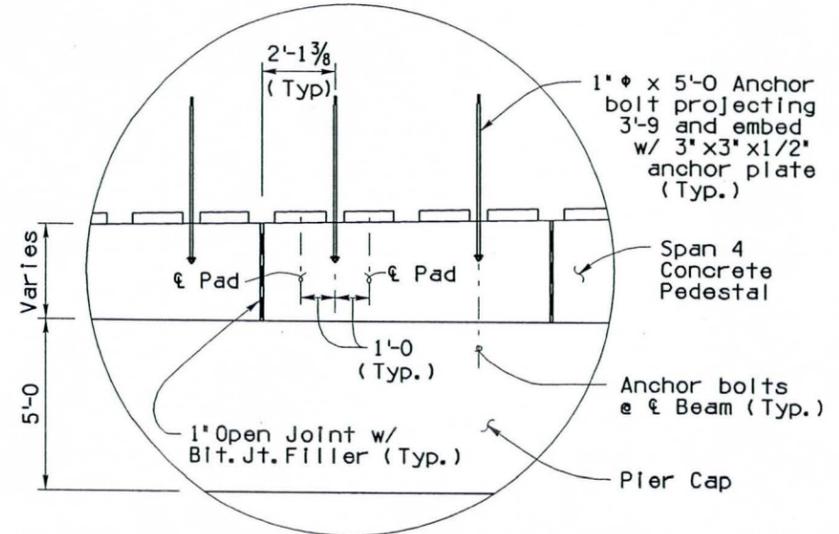


PARTIAL PLAN  
Scale: 3/8" = 1'-0"



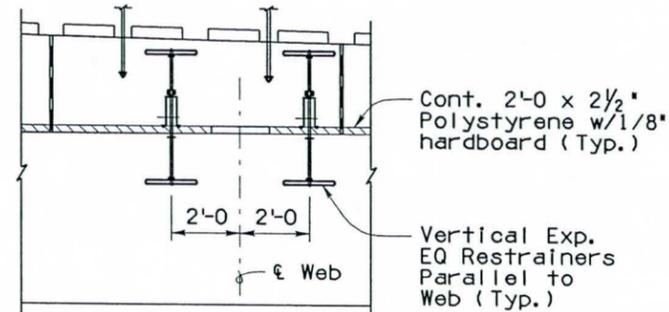
ELEVATION  
Scale: 1/8" = 1'-0"

**Note:**  
The Contractor shall survey and provide the Engineer with as-built concrete elevations at span 5 bearing seat, and each box beam bearing seat (span 4). The Contractor shall repair any concrete seats that do not meet the tolerance shown in ADOT Spec. 601-4.02.

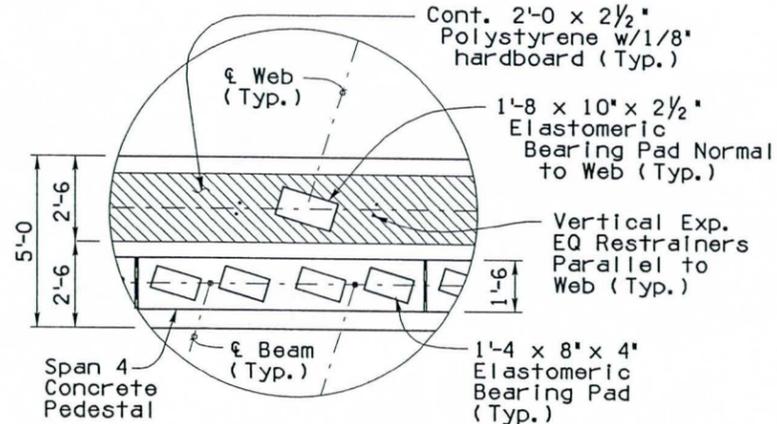


DETAIL 2  
Scale: 3/8" = 1'-0"

**Note:**  
All Dimensions and Elevations Measured Along & Pier #4 unless noted otherwise.



PARTIAL ELEVATION  
(Looking Back Station)  
Scale: 3/8" = 1'-0"

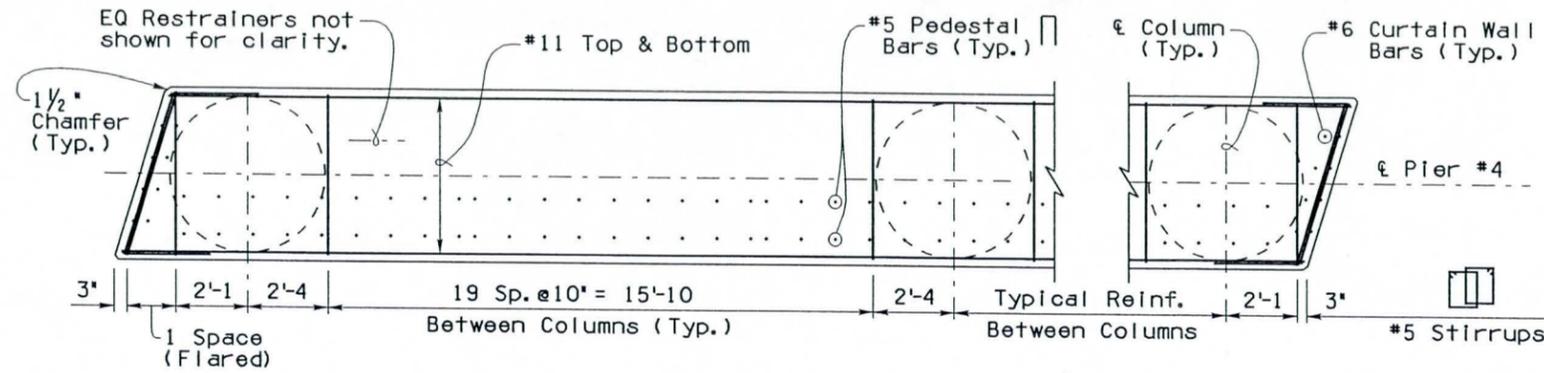


DETAIL 1  
Scale: 3/8" = 1'-0"

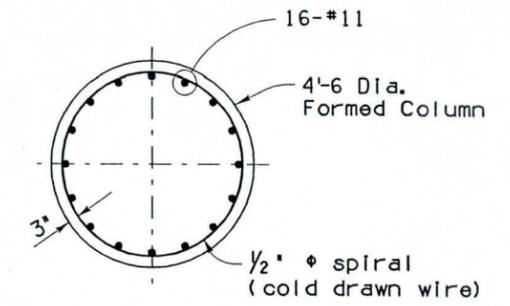
BRIDGE DESIGN SECTION BY		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP		PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	7-04	STA. 104+ HASSAYAMPA RIVER BRIDGE PIER PLAN AND ELEVATION (EXP.)		
DESIGN CKD	H. Sung	7-04			
DRAWN	L. Altuna	7-04			
DWG CKD	H. Sung	7-04			
APPROVED-PROJ. ENGINEER	L. Altuna		LOCATION WICKENBURG INTERIM BYPASS		DWG. 5-115 OF 41
APPROVED-DESIGN LEADER	H. Sung				
US60	110.53	2818	093-B-(008)		OF
ROUTE	MILEPOST	STRUCTURE NO.			
TRACS NO. H 5825 OIC					

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

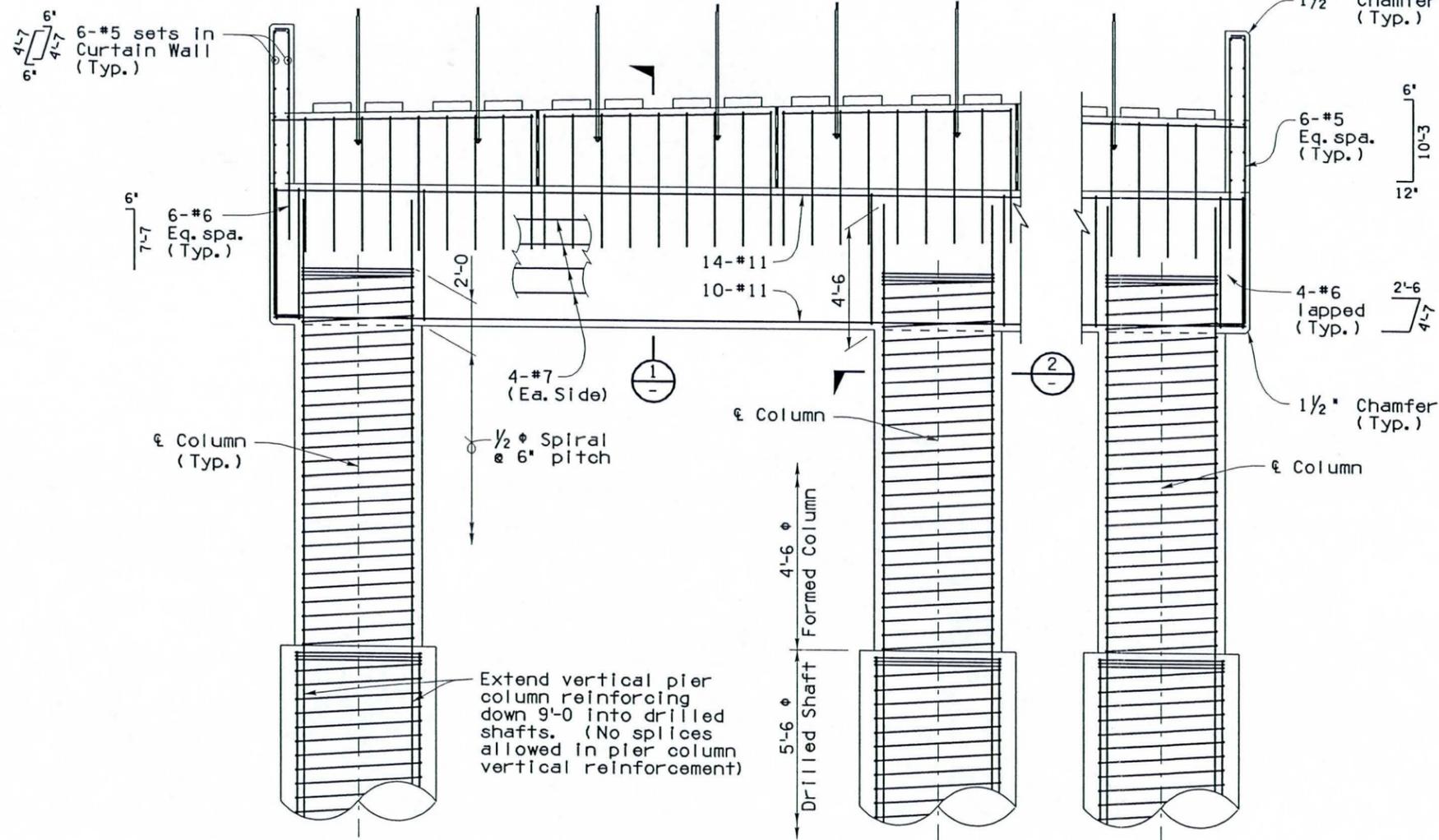
93 YV 198



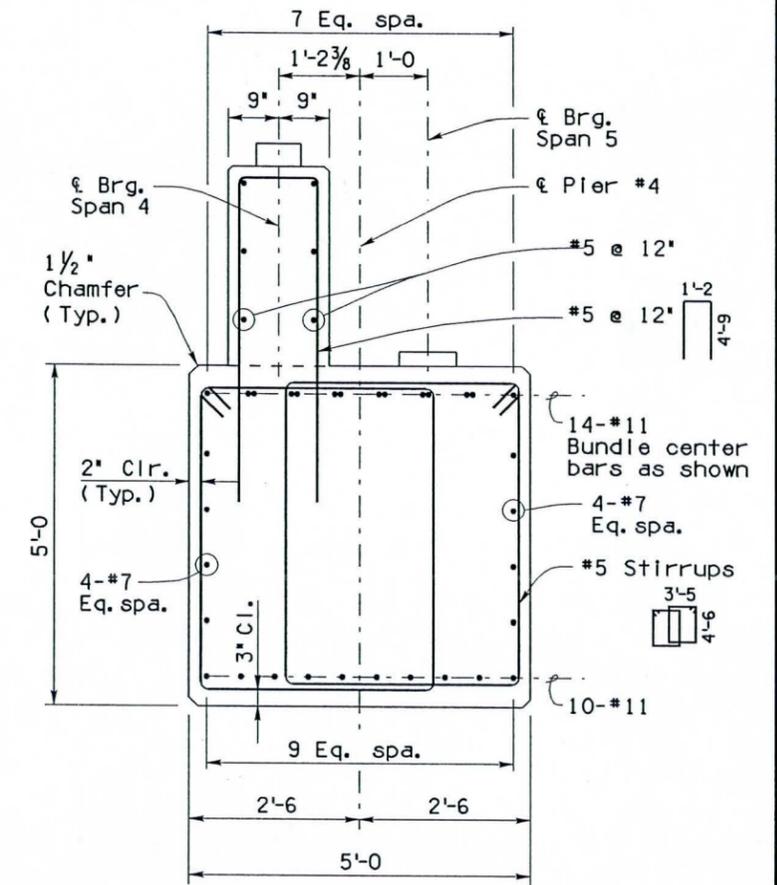
PLAN  
Scale: 3/8" = 1'-0"



SECTION 2  
Scale: 1/2" = 1'-0"



ELEVATION  
Scale: 3/8" = 1'-0"

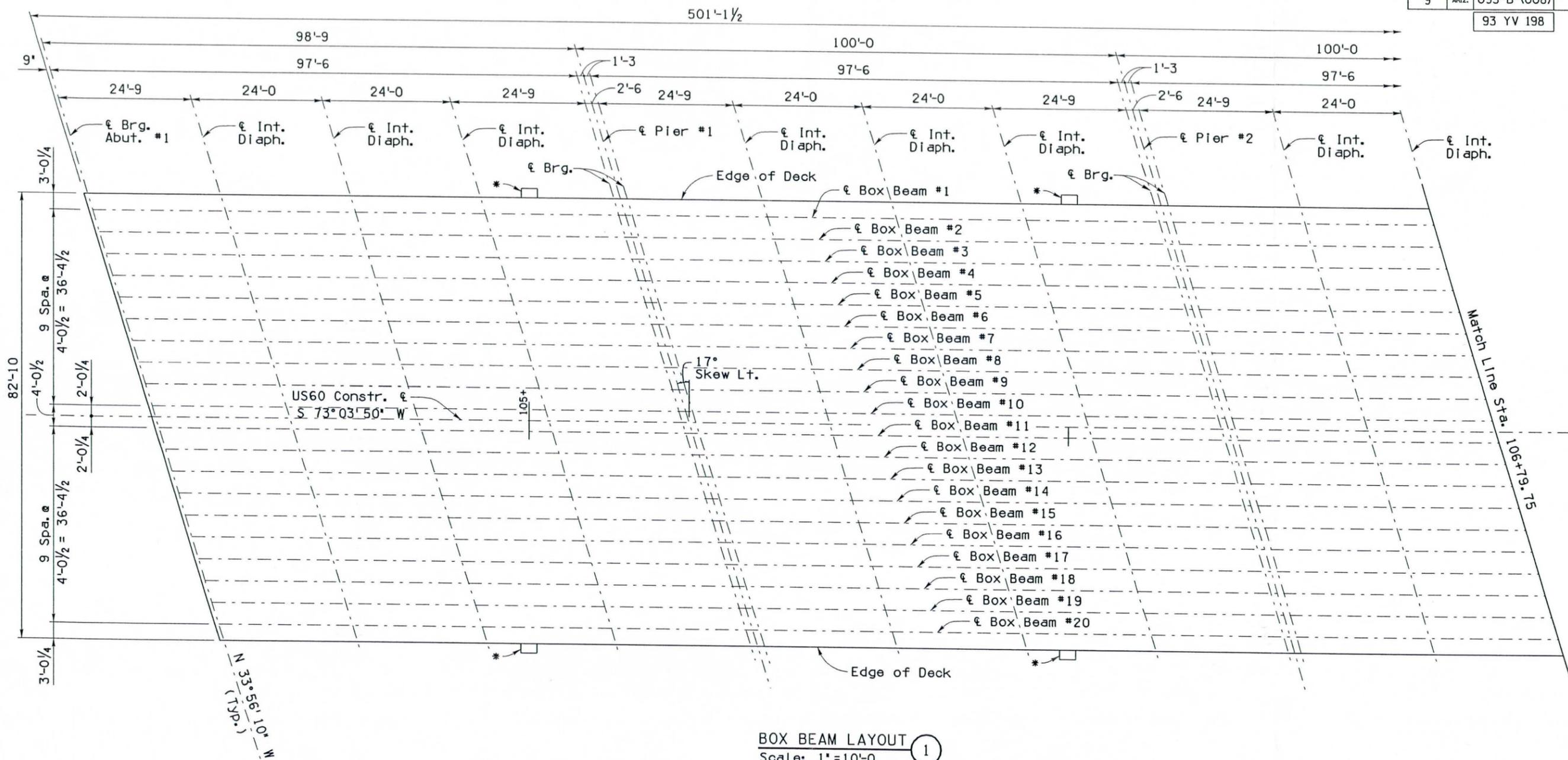


SECTION 1  
Scale: 3/4" = 1'-0"

BRIDGE DESIGN SECTION 'B'			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	7-04			
DESIGN CKD	H. Sung	7-04			
DRAWN	L. Altuna	7-04			
DWG CKD	H. Sung	7-04			
APPROVED-PROJ. ENGINEER	L. Altuna				
APPROVED-DESIGN LEADER	H. Sung				
US60	110.53	2818	LOCATION	WICKENBURG INTERIM BYPASS	DWG. 5-116 OF 41
ROUTE	MILEPOST	STRUCTURE NO.			
TRACS NO. H 5825 OIC				093-B-(008)	OF

\* Light Pole Blister, for details see Dwg. S-1.34

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
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BOX BEAM LAYOUT 1  
Scale: 1" = 10'-0"

NO. 1 DESCRIPTION OF REVISIONS  
MADE BY DATE  
NO. 2 DESCRIPTION OF REVISIONS  
MADE BY DATE

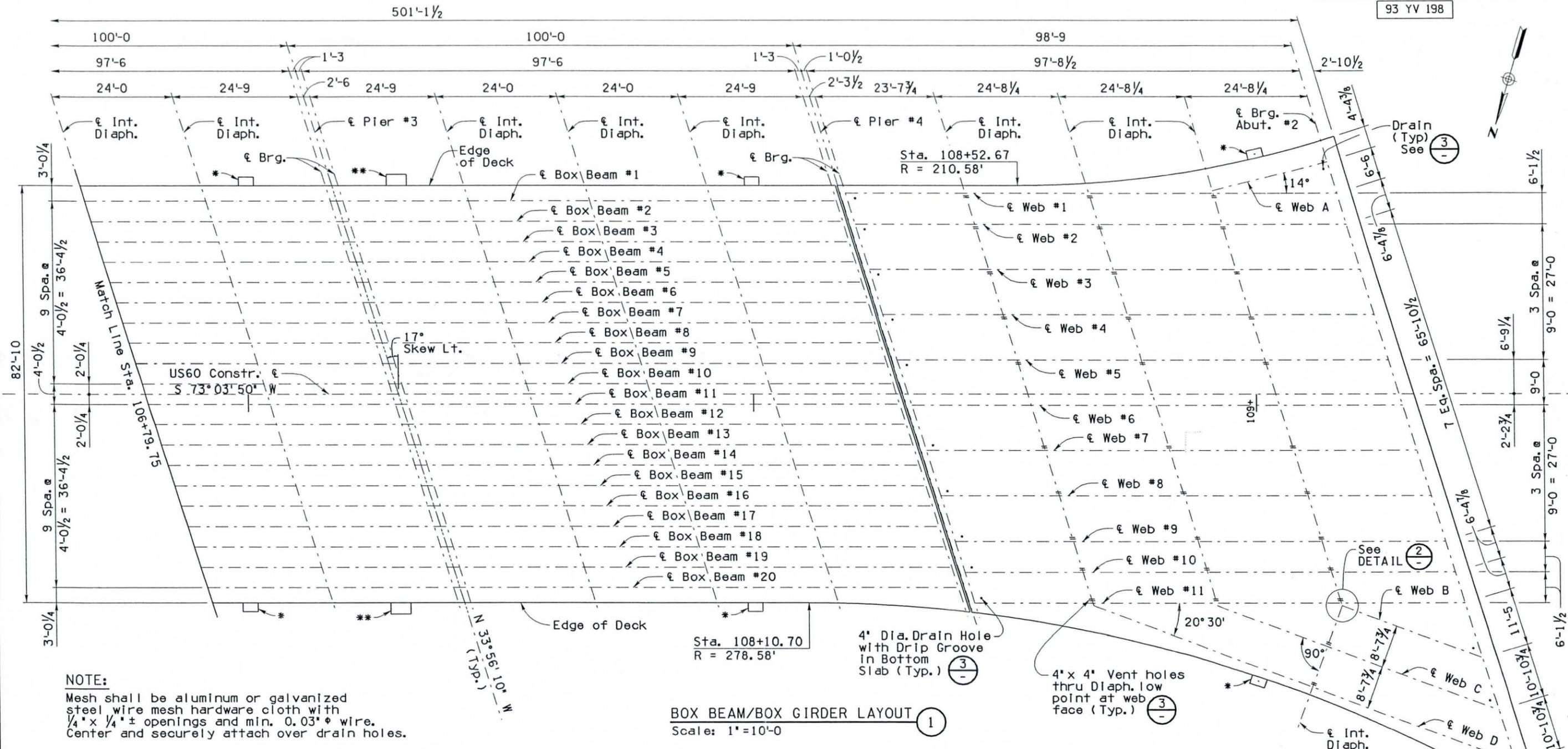
BRIDGE DESIGN SECTION BY			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	7-04			
DESIGN CKD	H. Sung	7-04			
DRAWN	D. Benton	7-04			
CHKD CKD	H. Sung	7-04			
APPROVED-PROJ. ENGINEER	L. Altuna				
APPROVED-DESIGN LEADER	H. Sung				
US60	110.53	2818	LOCATION	WICKENBURG INTERIM BYPASS	
ROUTE	MILEPOST	STRUCTURE NO.			
TRACS NO. H 5825 OIC					
			093-B-(008)	DWG. 5-117 OF 41	
				OF	

\* Light Pole Blister, for details see Dwg. S-1.34

\*\* Sign Column Blister, for details see Dwg. S-1.35

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

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**NOTE:**

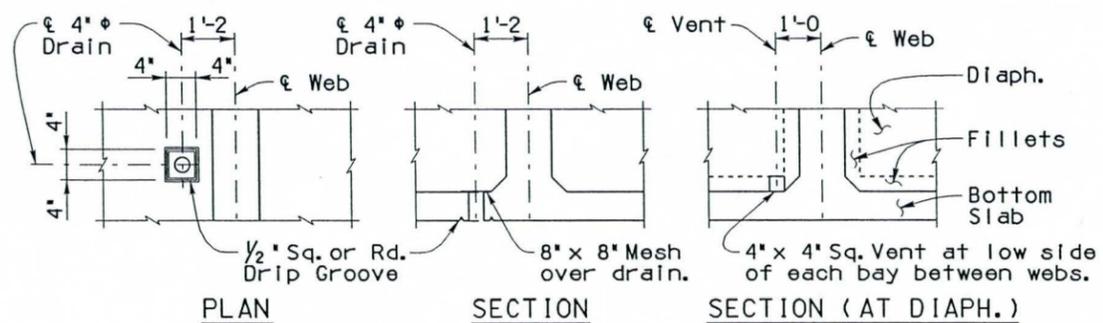
Mesh shall be aluminum or galvanized steel wire mesh hardware cloth with 1/4" x 1/4" ± openings and min. 0.03" φ wire. Center and securely attach over drain holes.

**BOX BEAM/BOX GIRDER LAYOUT** ①

Scale: 1" = 10'-0"

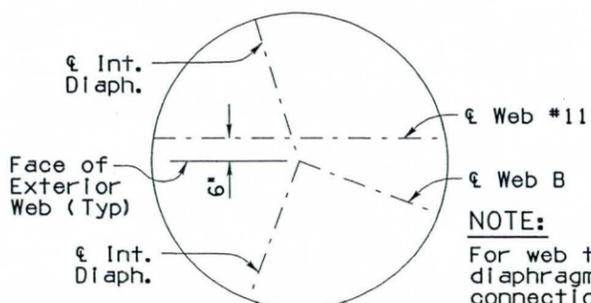
**NOTE:**

The centerline of webs A, B, C & D intersect with centerline of intermediate diaphragms at face of exterior web. See DETAIL ②



**CELL VENT AND DRAIN DETAIL** ③

Scale 1/2" = 1'-0"



**DETAIL** ②

Scale: 1/2" = 1'-0"

**NOTE:**

For web to diaphragm connection details, See ③/26

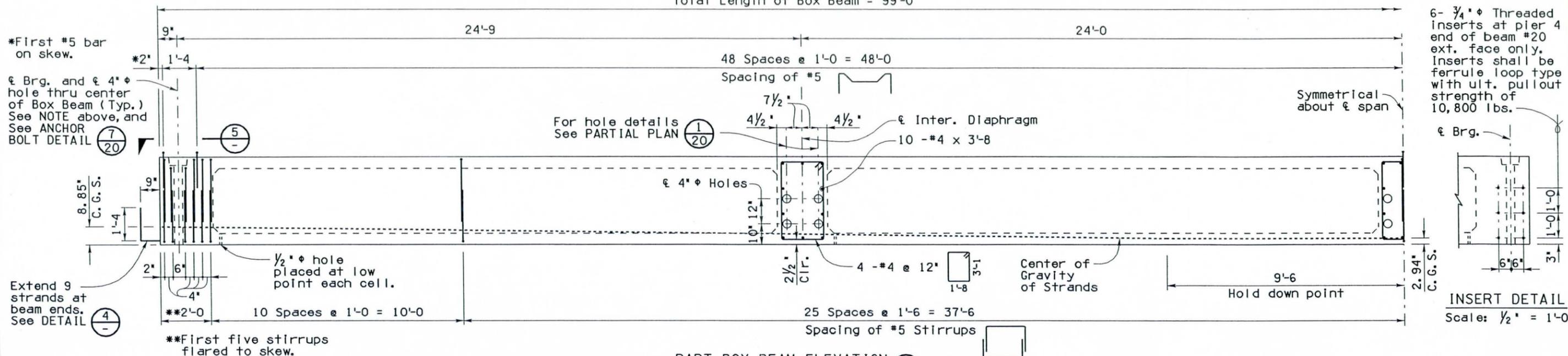
BRIDGE DESIGN SECTION 8'			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING	
DESIGN	L. Alfuna	7-04	STA. 104+ HASSAYAMPA RIVER BRIDGE BOX BEAM/BOX GIRDER LAYOUT			
DESIGN CKD	H. Sung	7-04				
DRAWN	D. Benton	7-04				
DWG CKD	H. Sung	7-04				
APPROVED-PROJ. ENGINEER	L. Alfuna					
APPROVED-DESIGN LEADER	H. Sung			LOCATION	WICKENBURG INTERIM BYPASS	DWG. S-1.18 OF 41
US60	110.53	2818		TRACS NO. H 5825 OIC	093-B-(008)	OF

**NOTE:**

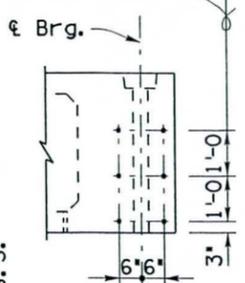
The 4"  $\phi$  anchor bolt holes shall be cast so they are vertical when the box beams are erected. The center #4 bar in the top slab shall be stopped 2" clear of the anchorage recess.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
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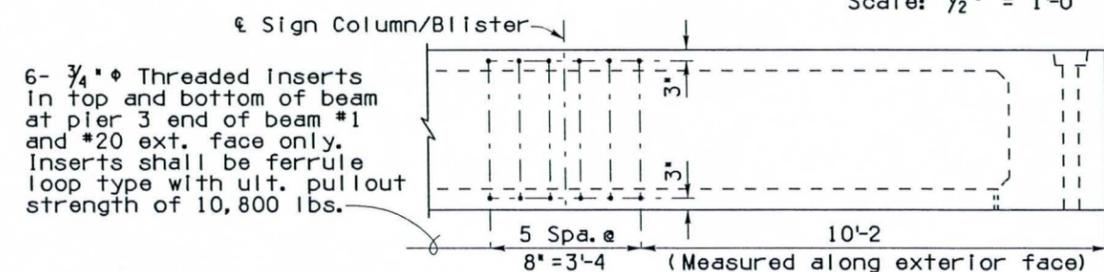
Total Length of Box Beam = 99'-0"



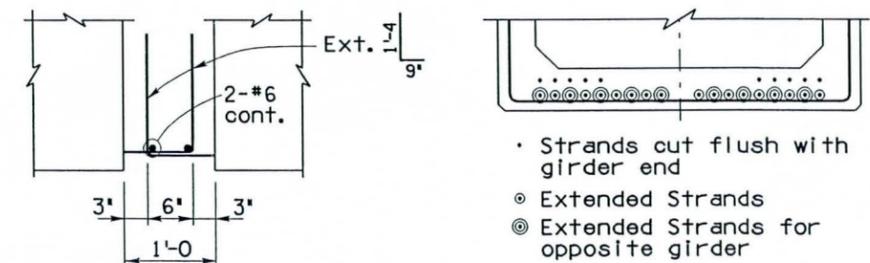
6- 3/4"  $\phi$  Threaded inserts at pier 4 end of beam #20 ext. face only. Inserts shall be ferrule loop type with ult. pullout strength of 10,800 lbs.



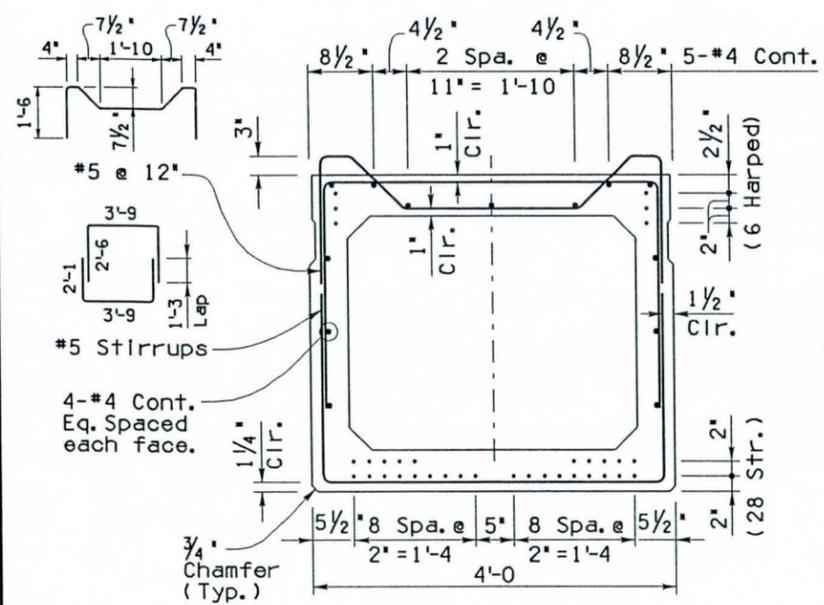
**PART BOX BEAM ELEVATION 1**  
Scale: 1/2" = 1'-0"



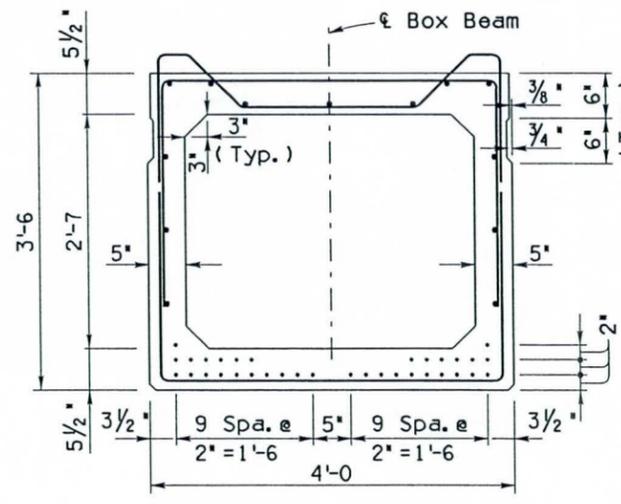
**INSERT DETAIL**  
Scale: 1/2" = 1'-0"



**CONTINUITY CONNECTION DETAIL 4**  
Scale 1" = 1'-0"

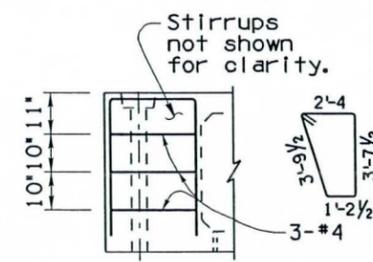


**SECTION AT END 2**  
TYPE BIV-48 BOX BEAM

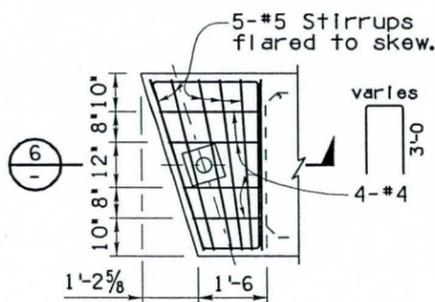


**SECTION AT MIDSPAN 3**  
TYPE BIV-48 BOX BEAM

**TYPE BIV-48 BOX BEAM SECTIONS**  
Scale: 1" = 1'-0"



**SECTION 6**  
Scale: 1/2" = 1'-0"



**BEAM END DIAPHRAGM 5**  
Scale: 1/2" = 1'-0"

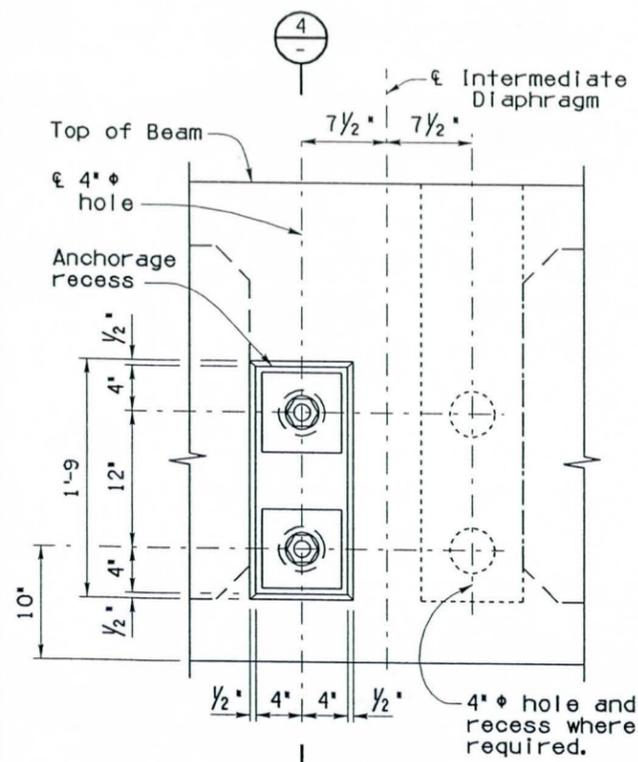
**NOTE:**  
Extend 9 strands as shown, except at abutment 1 and pier 4 where strands shall be cut flush with girder end and coated with asphalt material.

**PRETENSION BOX BEAM NOTES:**  
34-1/2"  $\phi$  7 wire low relaxation strands.  
P<sub>i</sub> = 1054 Kips. Initial tension before losses.  
P<sub>w</sub> = 828 Kips. Working force remaining after all losses.  
f'<sub>ci</sub> = 4000 psi - Minimum Concrete strength at transfer.  
f'<sub>c</sub> = 5100 psi - Minimum Concrete strength at 28 days.  
Use of masked strands shall not be allowed.  
All low relaxation strands shall be stressed to 0.75 f'<sub>s</sub>.  
Beams shall be prestressed by the pretensioning method only.  
Exterior face of exterior box beams shall have no shear key.

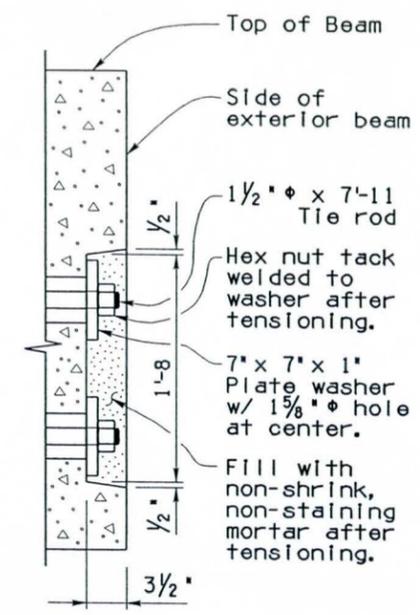
BRIDGE DESIGN SECTION 10'			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING		
DESIGN	L. Alfuna	7-04	STA. 104+ HASSAYAMPA RIVER BRIDGE BOX BEAM DETAILS 1				
DESIGN CKD	H. Sung	7-04					
DRAWN	L. Alfuna	7-04					
DWG CKD	H. Sung	7-04					
APPROVED-PROJ. ENGINEER	L. Alfuna						
APPROVED-DESIGN LEADER	H. Sung			LOCATION WICKENBURG INTERIM BYPASS	DWG. S-119 OF 41		
US60	110.53	2818	ROUTE			MILEPOST	STRUCTURE NO.
TRACS NO. H 5825 OIC							

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

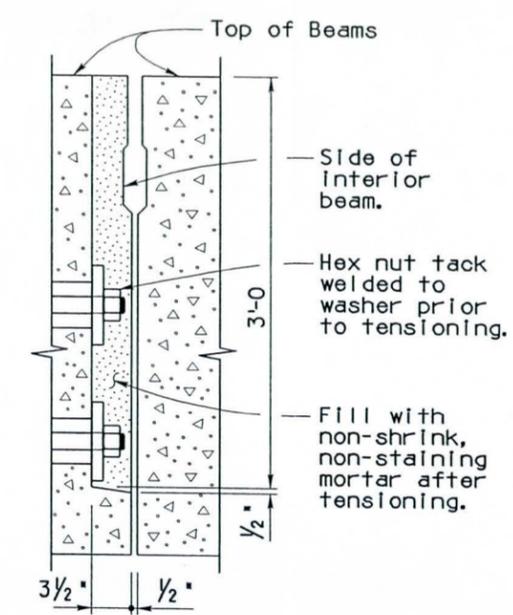
93 YV 198



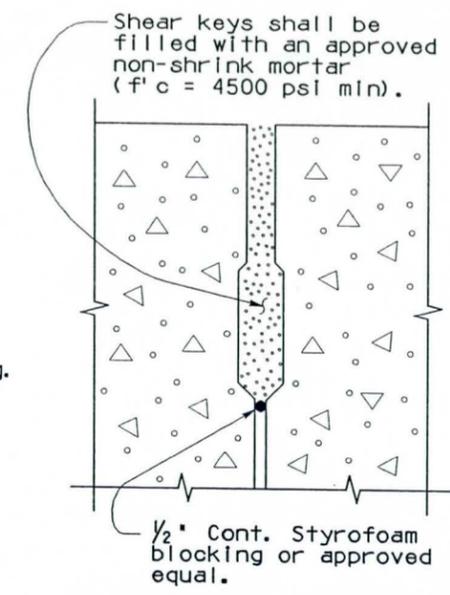
SIDE VIEW 3  
Scale: 1 1/2" = 1'-0"



SECTION 4  
Scale: 1 1/2" = 1'-0"



SECTION 5  
Scale: 1 1/2" = 1'-0"



SHEAR KEY DETAIL 6  
Scale: 3" = 1'-0"

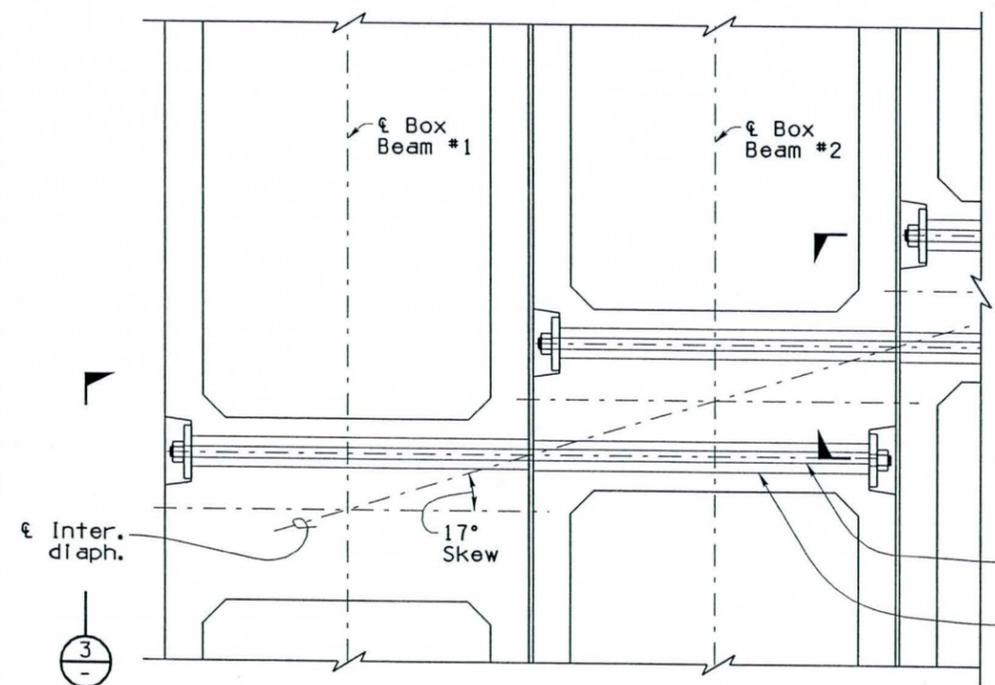
LATERAL TENSION NOTES:

Beams shall be erected first with holes centered on anchor bolts. Install lateral tie rods and apply tension after each adjacent beam is erected. Shear keys between beams #10 & 11 shall be filled 12 hours prior to applying lateral tension. Shear keys between all other beams may be filled after lateral tensioning if beam are not moved out of position at anchor bolts (due to tensioning).

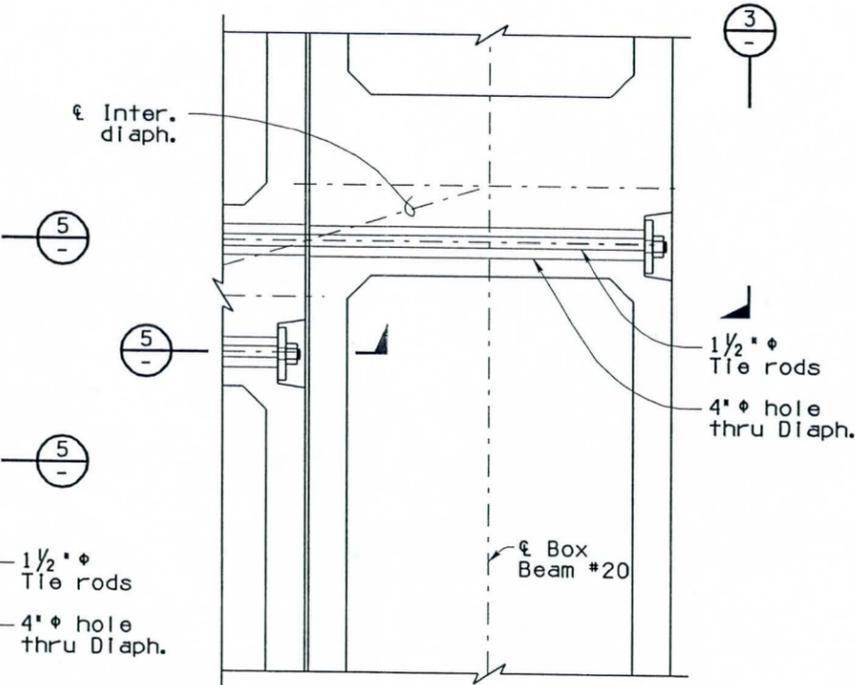
All lateral tie rods shall be tensioned, and all shear keys shall be filled prior to placing of the deck slab. Fill shear keys of all beams as shown in SHEAR KEY DETAIL.

All tie rods per beam shall be initially snug tightened prior to tensioning. Final tensioning shall be by turn of the nut method from the snug tight position to achieve 30 kips of force.

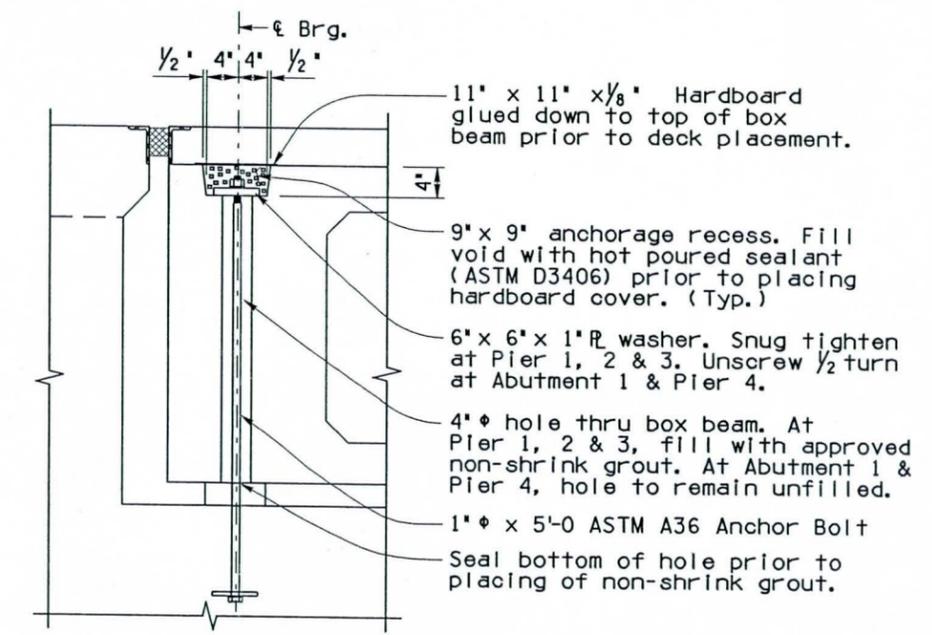
1 1/2 inch diameter tie rods and bearing plates shall be ASTM A36 steel. Tie rods shall be threaded 3 inches at each end. Nuts shall be ASTM A563. All hardware shall be galvanized in accordance with ASTM A153.



PART. PLAN LT. EDGE 1  
Scale: 1" = 1'-0"



PART. PLAN RT. EDGE 2  
Scale: 1" = 1'-0"

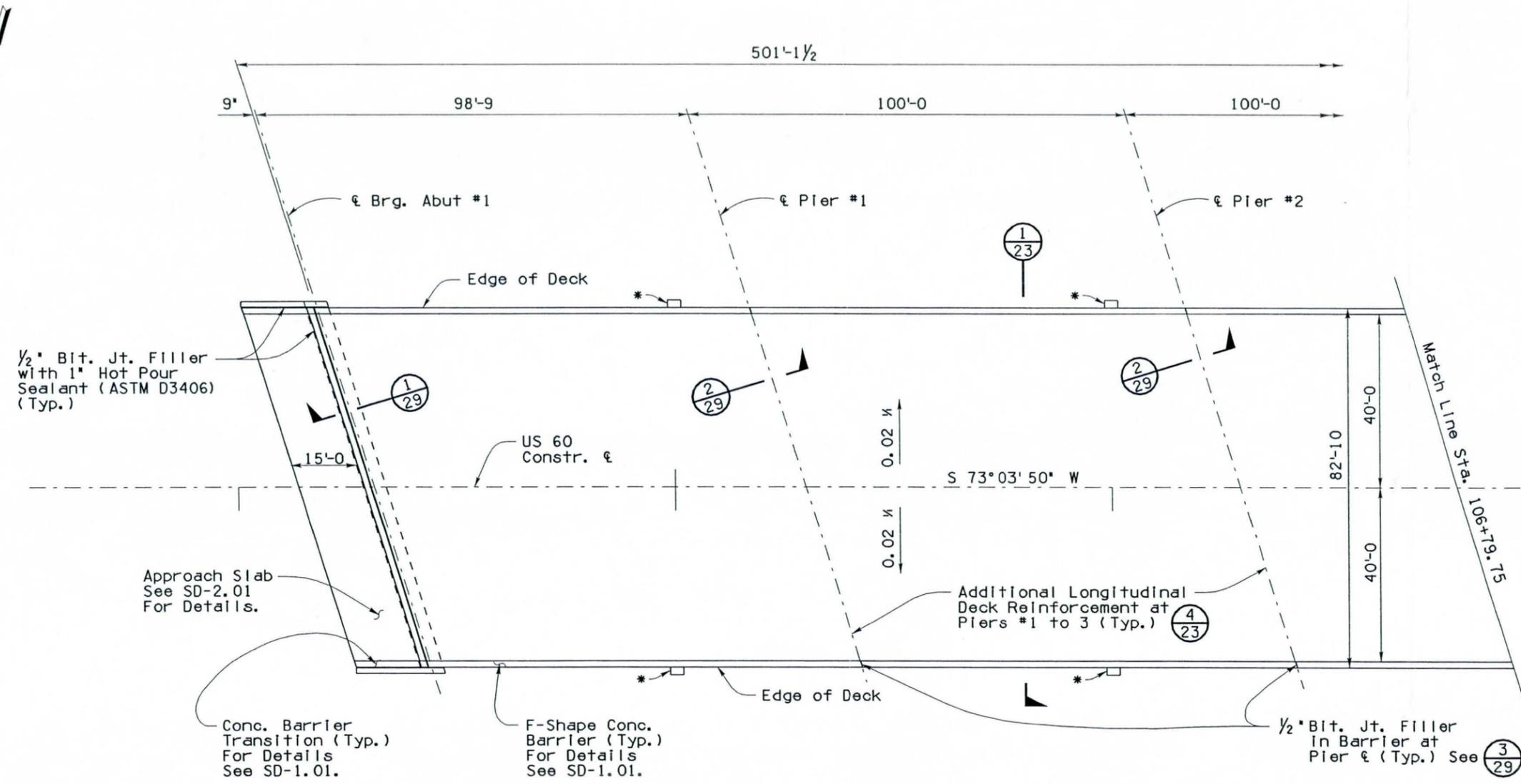


ANCHOR BOLT DETAIL 7  
(Abutment shown, Pier similar)  
Scale: 1" = 1'-0"

BRIDGE DESIGN SECTION 1'			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Alfuna	7-04			
DESIGN CKD	H. Sung	7-04			
DRAWN	D. Benton	7-04			
CHKD CKD	H. Sung	7-04			
APPROVED-PROJ. ENGINEER	L. Alfuna				
APPROVED-DESIGN LEADER	H. Sung				
US60	110.53	2818	LOCATION	STA. 104+ HASSAYAMPA RIVER BRIDGE BOX BEAM DETAILS 2	
ROUTE	MILEPOST	STRUCTURE NO.	WICKENBURG INTERIM BYPASS		
TRACS NO. H 5825 OIC			093-B-(008)	DWG. 5-120 OF 41	

\* Light Pole Blister, for details see Dwg. S-1.34

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
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1/2" Bit. Jt. Filler with 1" Hot Pour Sealant (ASTM D3406) (Typ.)

Approach Slab See SD-2.01 For Details.

Conc. Barrier Transition (Typ.) For Details See SD-1.01.

F-Shape Conc. Barrier (Typ.) For Details See SD-1.01.

Additional Longitudinal Deck Reinforcement at Piers #1 to 3 (Typ.)

1/2" Bit. Jt. Filler in Barrier at Pier Centerline (Typ.) See

DECK PLAN  
Scale: 1" = 15'-0"

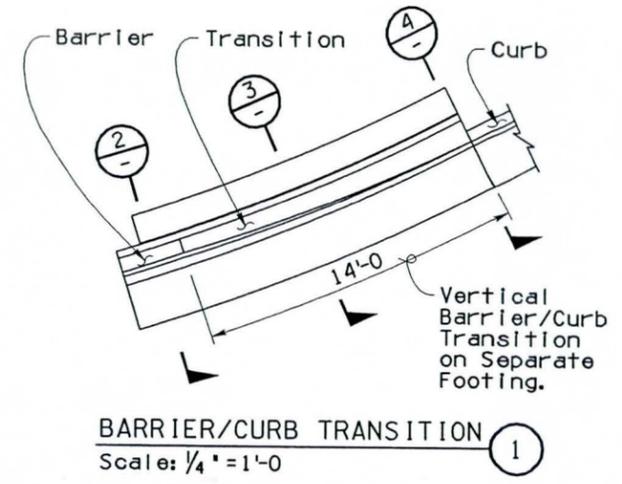
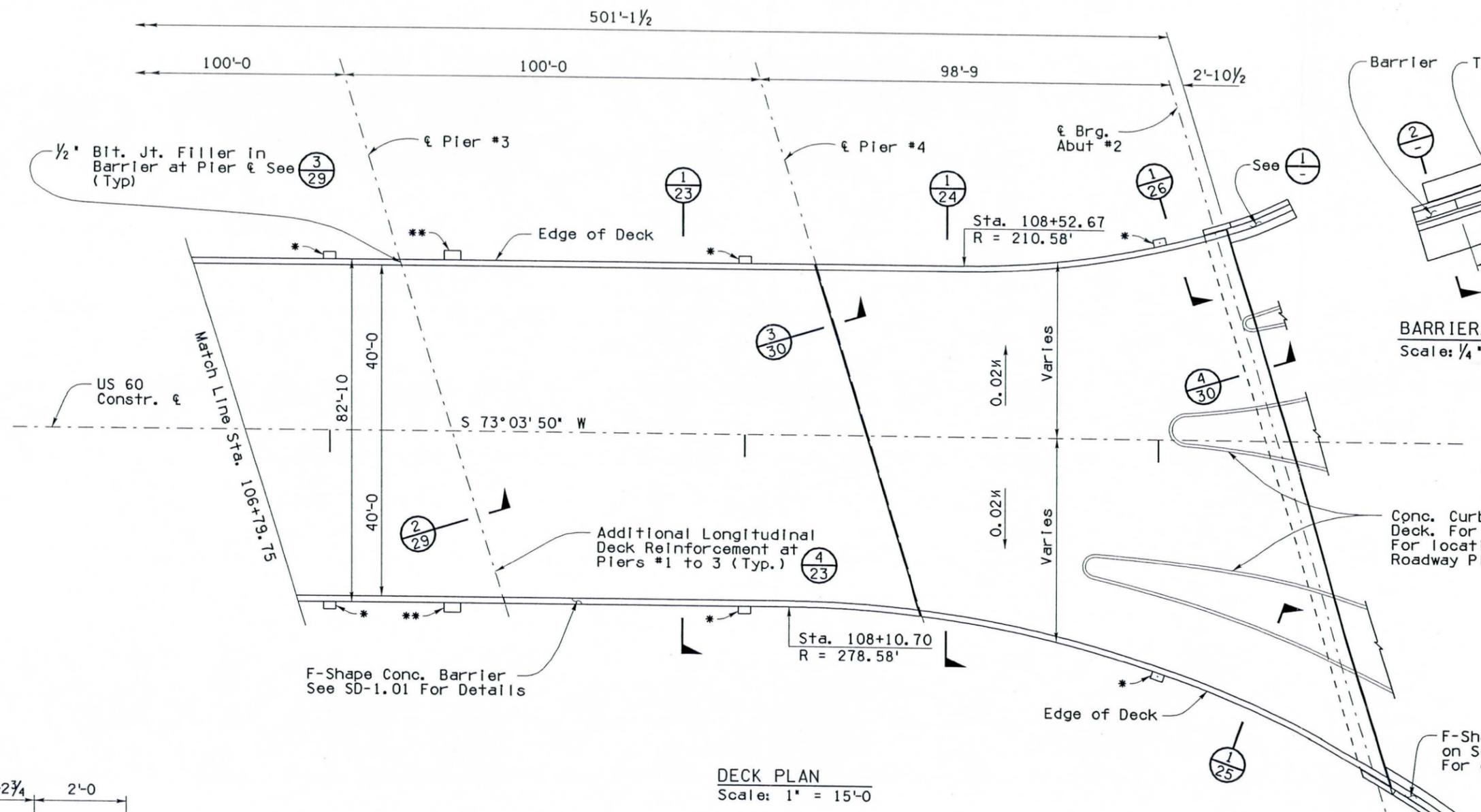
NO. 1 DESCRIPTION OF REVISIONS  
MADE BY  
DATE  
NO. 2 DESCRIPTION OF REVISIONS  
MADE BY  
DATE

BRIDGE DESIGN SECTION BY			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	7-04			
DESIGN CKD	H. Sung	7-04			
DRAWN	D. Benton	7-04			
DWG CKD	H. Sung	7-04			
APPROVED-PROJ. ENGINEER	L. Altuna				
APPROVED-DESIGN LEADER	H. Sung				
ROUTE	110.53	2818	LOCATION	STA. 104+ HASSAYAMPA RIVER BRIDGE DECK PLAN 1 WICKENBURG INTERIM BYPASS	
	MILEPOST	STRUCTURE NO.			
TRACS NO. H 5825 OIC				093-B-(008)	OF

\* Light Pole Blister, for details see Dwg. S-1.34

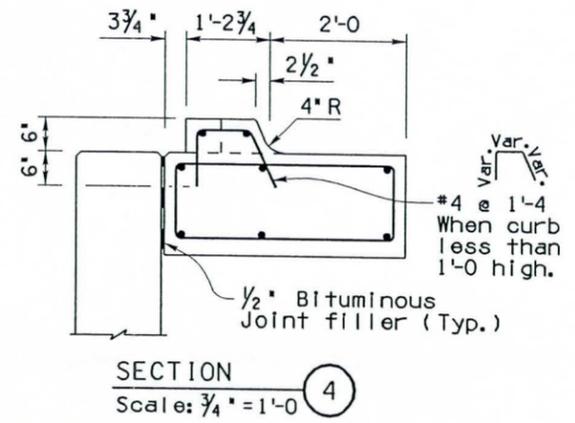
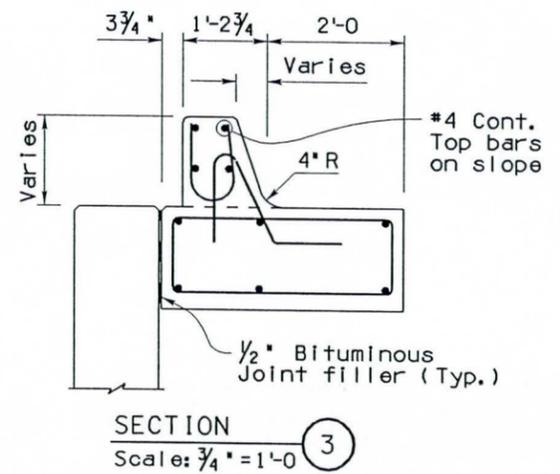
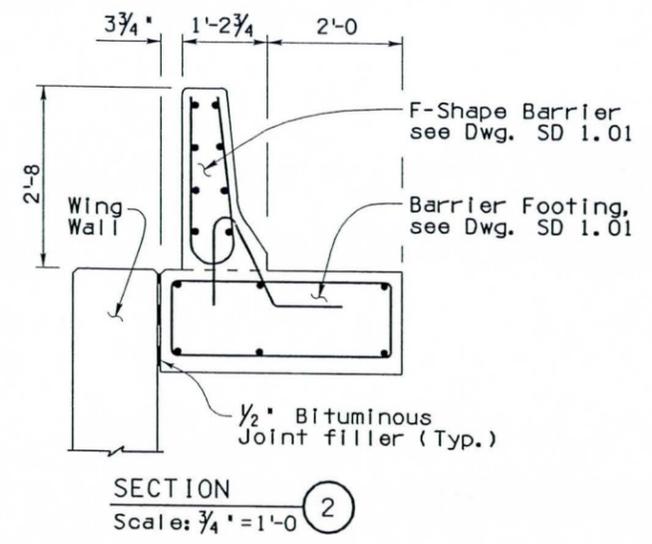
\*\* Sign Column Blister, for details see Dwg. S-1.35

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
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Conc. Curb on Bridge Deck. For details See (4/25) For locations See Roadway Plans (Typ.)

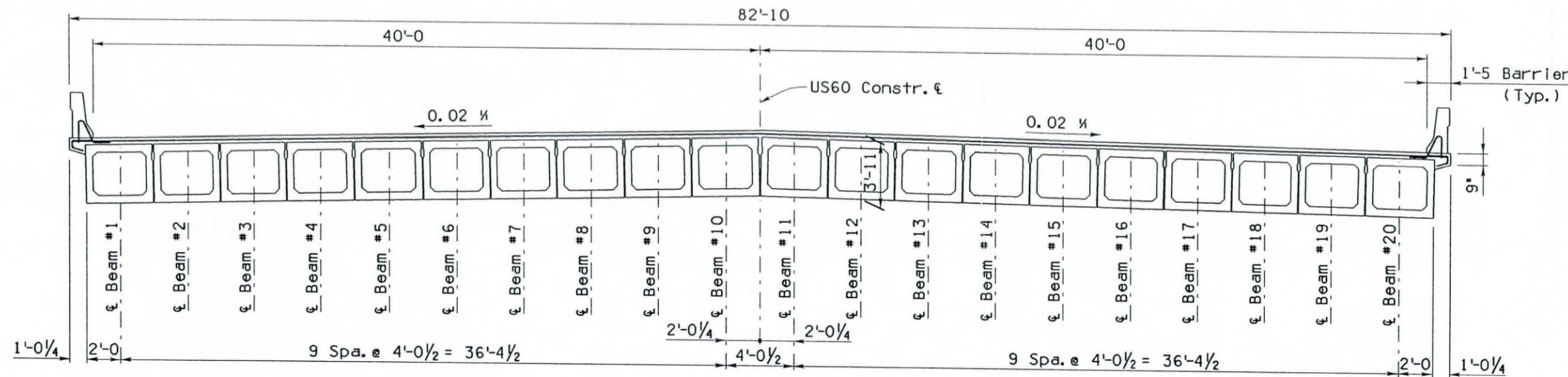
F-Shape Conc. Barrier on Separate Footing. For details See SD-1.01.



BRIDGE DESIGN SECTION B'			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	7-04			
DESIGN CKD	H. Sung	7-04			
DRAWN	D. Benton	7-04			
DWG CKD	H. Sung	7-04		STA. 104+ HASSAYAMPA RIVER BRIDGE DECK PLAN 2	DWG. S-1.22 OF 41
APPROVED-PROJ. ENGINEER	L. Altuna				
APPROVED-DESIGN LEADER	H. Sung			LOCATION WICKENBURG INTERIM BYPASS	93-B-(008)
US60 ROUTE	110.53 MILEPOST	2818 STRUCTURE NO.			
TRACS NO. H 5825 01C					OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

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**BARRIER BAR NOTE:**

Cost of barrier bar embedded into deck is included in Item No. 6011130 (L.F.) F-Shape Bridge Concrete Barrier and Transition (32').

**DECK REINFORCEMENT NOTES:**

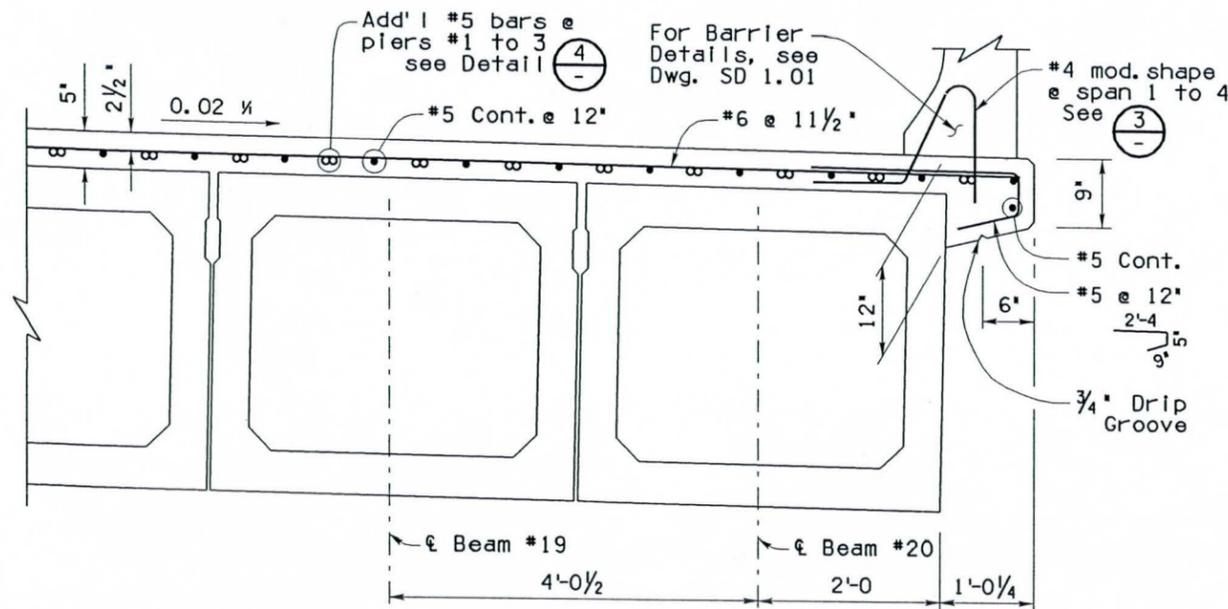
All transverse deck reinforcing shall be placed parallel to the piers on 17° skew.  
All longitudinal deck reinforcing shall be placed parallel to the US60 construction line.

**SPLICE NOTES:**

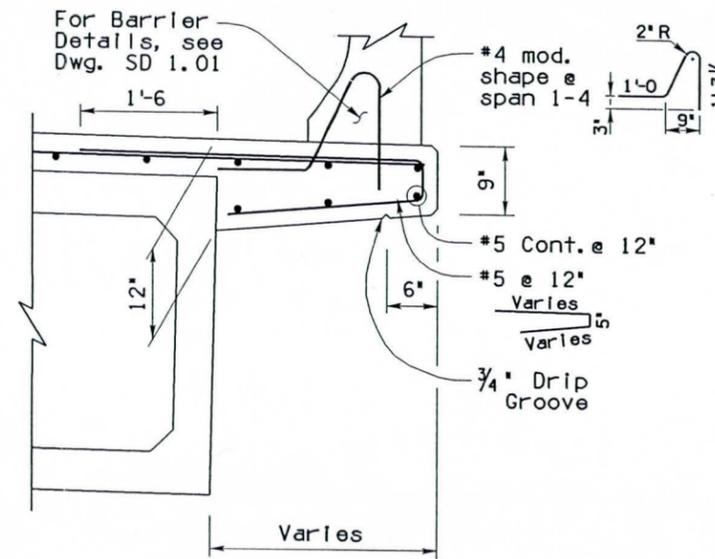
All continuous horizontal bars in Deck Slab, Diaphragms and Barriers including transverse slab bars may be spliced if approved by the Engineer with the following limitations unless noted otherwise:

- Minimum lap length of bar splices shall be:
  - #4 bars 1'-4"
  - #5 bars 1'-8"
  - #6 bars 1'-11"
- Bars shall not be spliced within the required lap length of the adjacent bars.
- Transverse deck bars shall be spliced at center of box beam.
- No splices allowed for longitudinal deck bars within 20'-0" either side of piers.

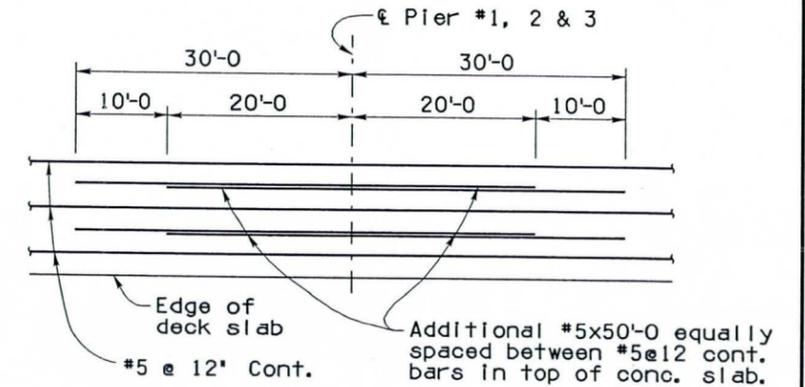
**CROSS SECTION (Spans 1 to 4)**  
BIV-48 PRECAST BOX BEAMS  
Scale: 1/4" = 1'-0"



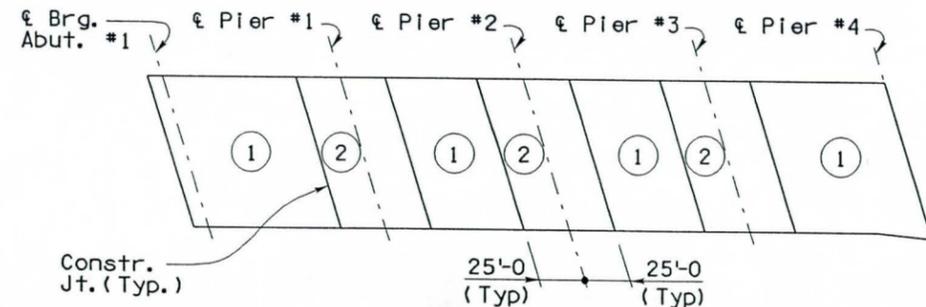
**PART. SECTION RT. EDGE (2)**  
Scale: 1" = 1'-0"



**PART. SECTION RT. EDGE (3)**  
(Overhang Near Pier #4)  
Scale: 1" = 1'-0"



**ADDITIONAL LONG. DECK REINF. (4)**  
(AT PIERS 1, 2 & 3)  
No Scale



**DECK POUR SCHEDULE (5)**  
No Scale

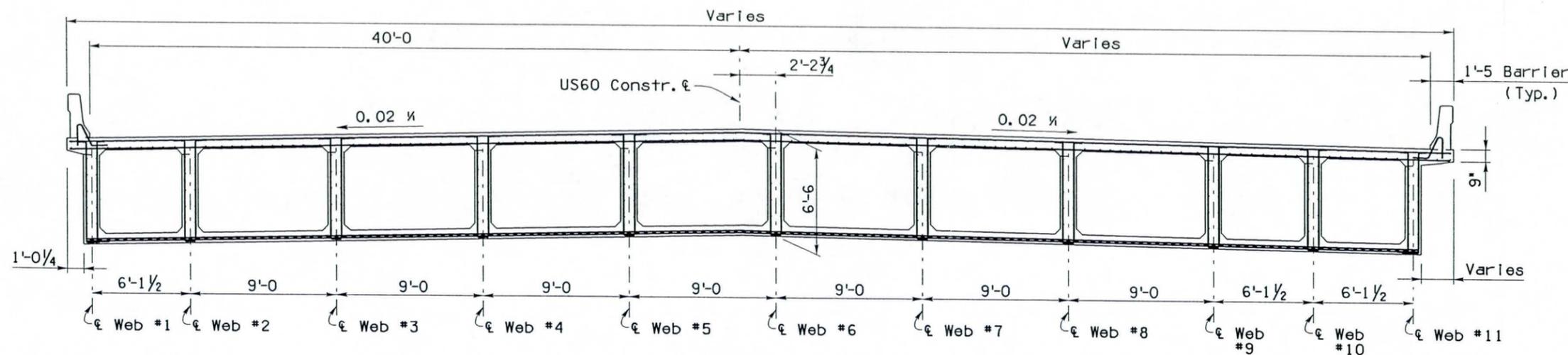
**POUR NOTES:**

- Numbers ① & ② indicate placing sequence of deck concrete. Pour ② sections a minimum of 12 hours after adjacent ① sections have been poured.
- Pier 1, 2 & 3 diaphragms shall be poured concurrent with the deck slab.
- Sections ① and ② may be poured consecutively but only in the direction from ① to ② and a minimum of 12 hours after the adjacent ① section has been poured.
- The Contractor shall submit a Deck Pour Schedule to the Engineer for approval prior to placing concrete.

BRIDGE DESIGN SECTION BY			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP		PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	7-04		STA. 104+ HASSAYAMPA RIVER BRIDGE TYPICAL CROSS SECTION 1		
DESIGN CRD	H. Sung	7-04				
DRAWN	S. Nickel	8-04				
DWG CRD	H. Sung	7-04				
APPROVED-PROJ. ENGINEER	L. Altuna			LOCATION WICKENBURG INTERIM BYPASS		DWG. S-123 OF 41
APPROVED-DESIGN LEADER	H. Sung			US60 ROUTE 110.53 MILEPOST 2818 STRUCTURE NO.		TRACS NO. H 5825 01C
				093-B-(008)		OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

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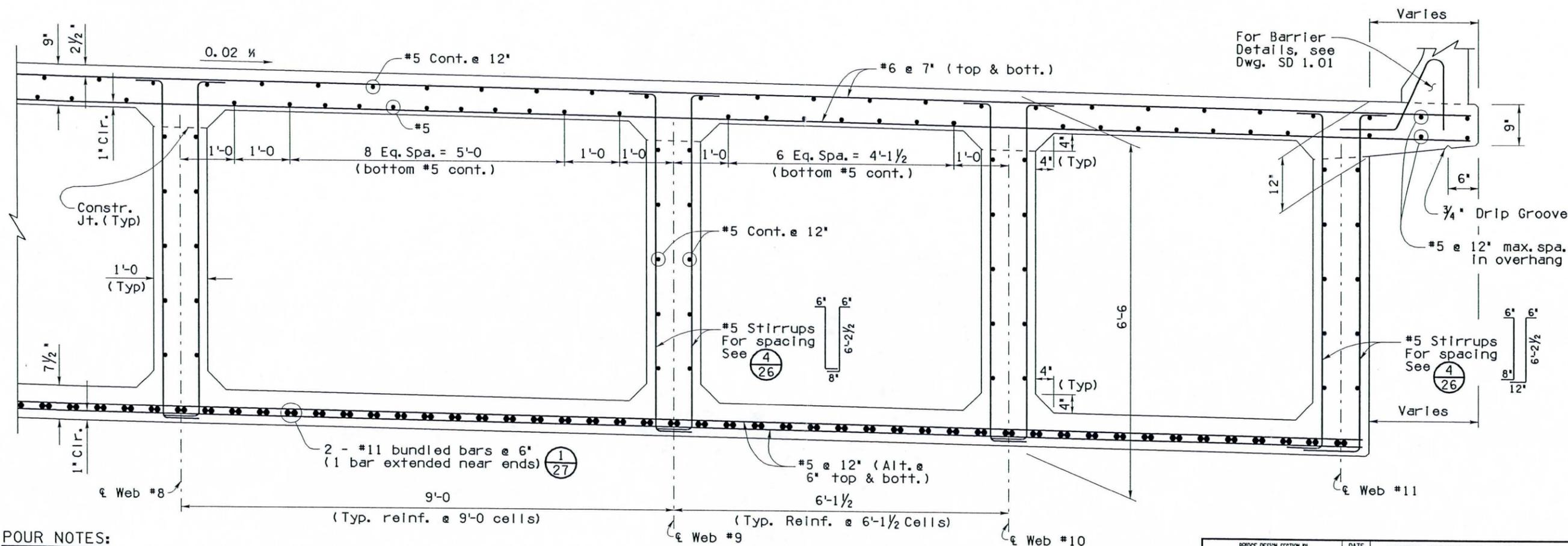


CROSS SECTION (Span 5)  
C. I. P. CONCRETE BOX GIRDER (1)  
Scale: 1/4" = 1'-0"

**BARRIER BAR NOTE:**  
Cost of barrier bar embedded into deck is included in Item No. 6011130 (L.F.) F-Shape Bridge Concrete Barrier and Transition (32').

**DECK REINF. NOTES:**  
Transverse deck reinforcing shall be placed parallel to the pier on 17° skew (Except in NW flared area).  
Longitudinal deck reinforcing shall be placed parallel to the US60 constr. & (Except in flared areas).

**BOTTOM SLAB REINF. NOTES:**  
Transverse bottom slab reinforcing shall be placed parallel to 17° skew (Except in NW flared area).  
Longitudinal bottom slab reinforcing shall be placed parallel to the US60 constr. & (Except in flared areas).



PART. SECTION RT. EDGE (2)  
Scale: 1" = 1'-0"

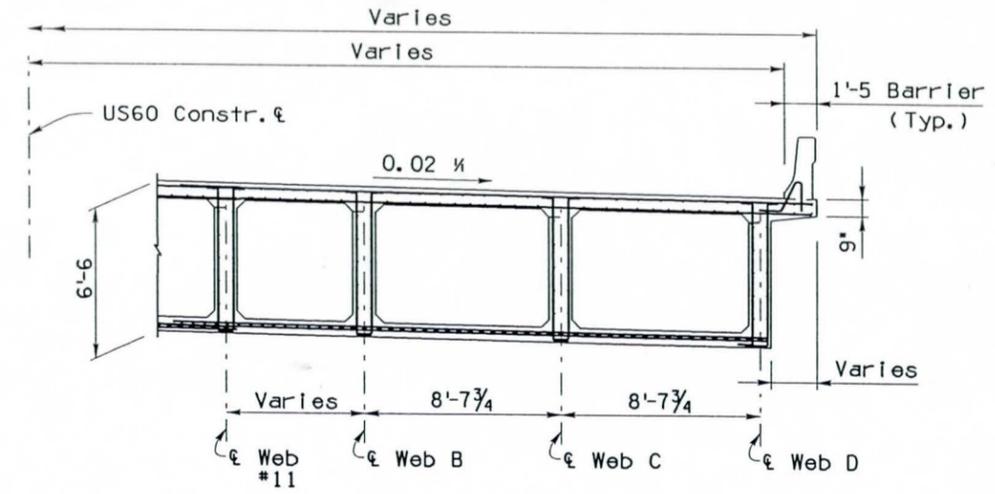
- POUR NOTES:**
- All of span 5 bottom slab, webs and diaphragms shall be placed in one monolithic pour (First pour).
  - All of span 5 deck shall be placed in one monolithic pour (Second pour).
  - The Contractor shall submit a Pour Schedule to the Engineer for approval prior to placing concrete.

**NOTE:**  
For web to diaphragm connection details, See (3/26)

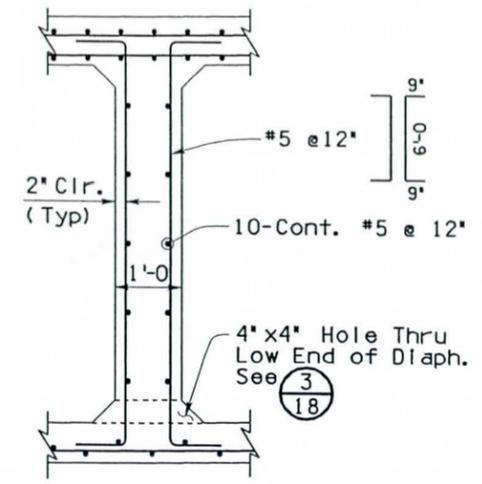
BRIDGE DESIGN SECTION 2		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	A. Islam	2-05		
DESIGN CRD	H. Sung	2-05		
DRAWN	L. Altuna	3-05		
DWG CRD	H. Sung	3-05		
APPROVED-PROJ. ENGINEER	L. Altuna		STA. 104+ HASSAYAMPA RIVER BRIDGE TYPICAL CROSS SECTION 2	DWG. S-1.24 OF 41
APPROVED-DESIGN LEADER	H. Sung			
US60 ROUTE	110.53 MILEPOST	2818 STRUCTURE NO.	LOCATION	
TRACS NO. H 5825 OIC			WICKENBURG INTERIM BYPASS	
			093-B-(008)	OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

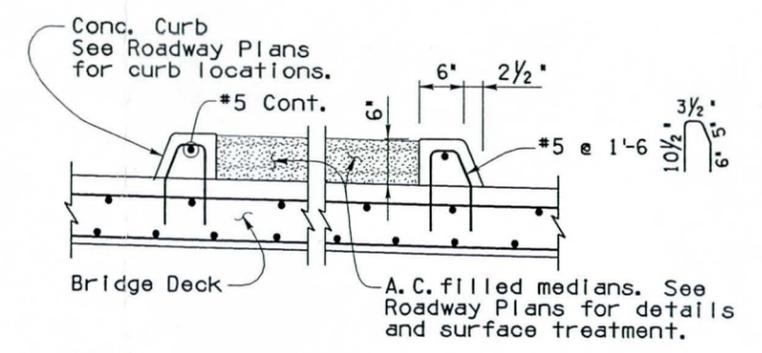
93 YV 198



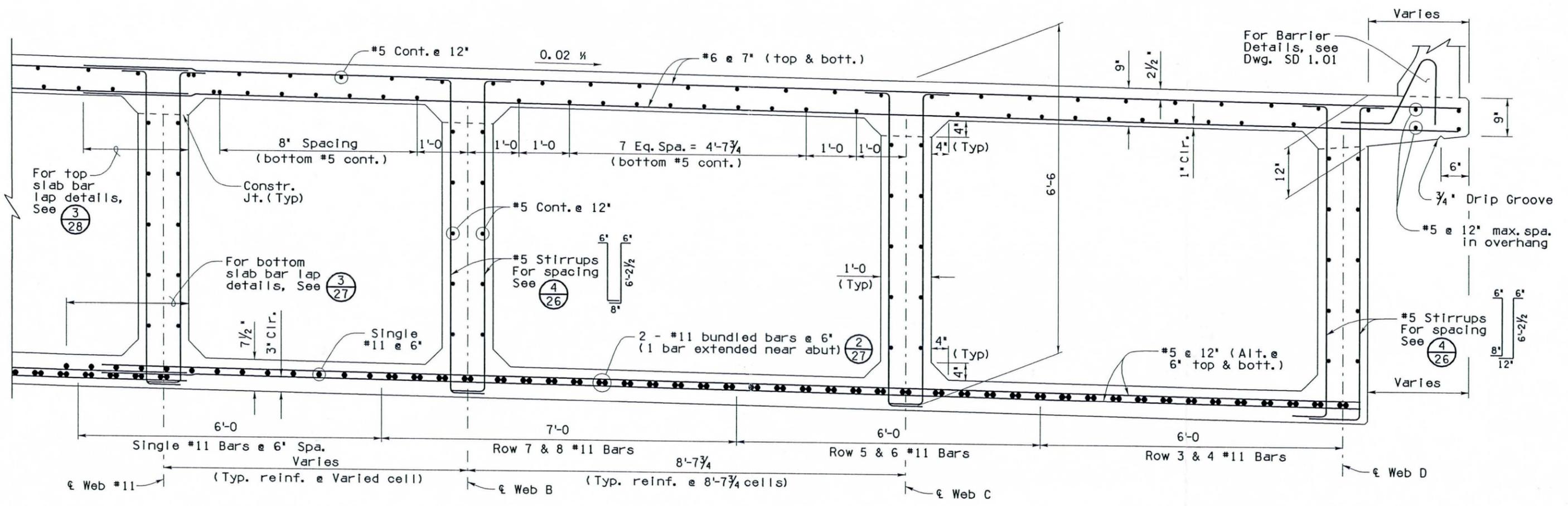
CROSS SECTION (Span 5) RT. FLARE  
C. I. P CONCRETE BOX GIRDER  
Scale: 1/4" = 1'-0"



INTER. DIAPH. SECTION  
Scale: 3/4" = 1'-0"



PART. DECK SECTION AT CURB  
Scale: 1" = 1'-0"



PART. SECTION RT. FLARE  
Scale: 1" = 1'-0"

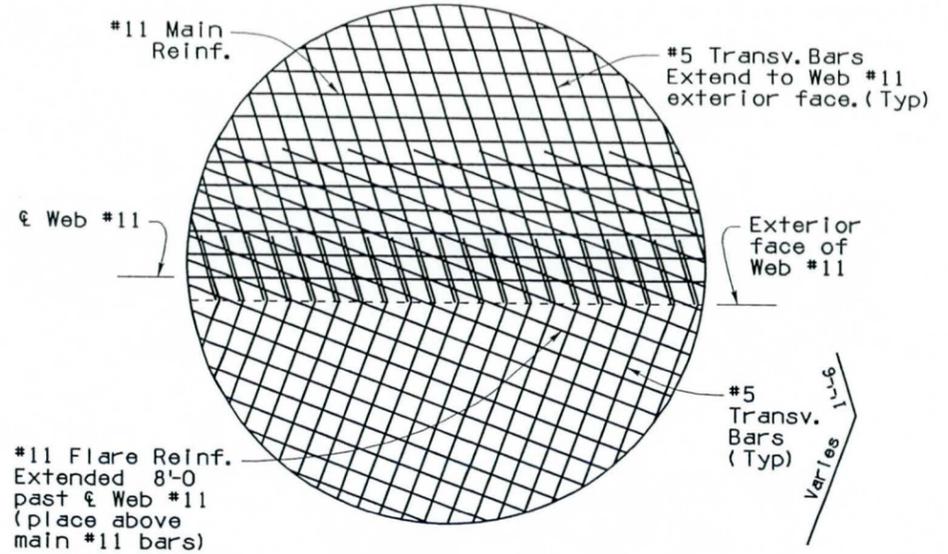
NOTE:  
For web to diaphragm connection details, See 3/26

BRIDGE DESIGN SECTION 3		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	A. Islam	2-05		
DESIGN CKD	H. Sung	2-05		
DRAWN	L. Altuna	3-05		
DWG CKD	H. Sung	3-05		
APPROVED-PROJ. ENGINEER	L. Altuna		STA. 104+ HASSAYAMPA RIVER BRIDGE TYPICAL CROSS SECTION 3	DWG. 5-125 OF 41
APPROVED-DESIGN LEADER	H. Sung			
US60 ROUTE	110.53	2818	LOCATION	
			WICKENBURG INTERIM BYPASS	
TRACS NO. H 5825 OIC			093-B-(008)	OF

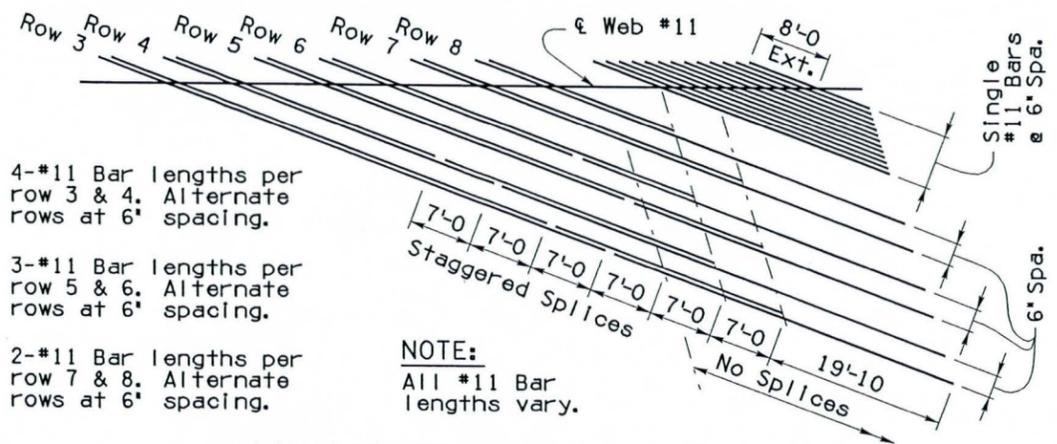


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NOTE:  
Transverse bars on 17° Skew @ SW flare.



REINFORCING DETAIL 3  
Scale: 1/2" = 1'-0"

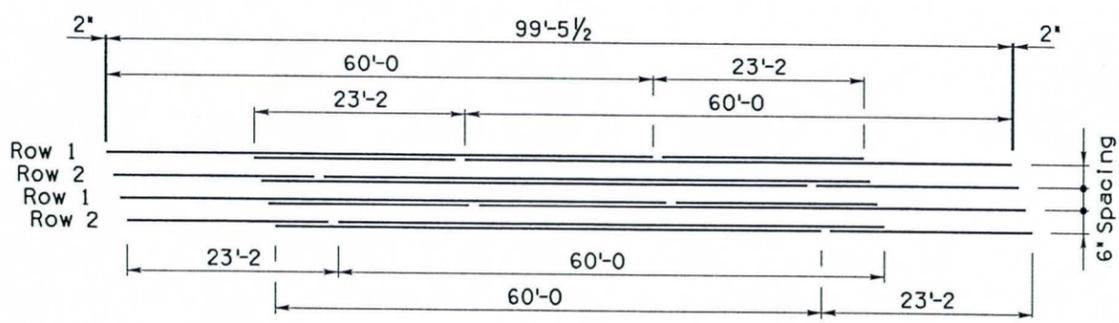


4-#11 Bar lengths per row 3 & 4. Alternate rows at 6" spacing.  
3-#11 Bar lengths per row 5 & 6. Alternate rows at 6" spacing.  
2-#11 Bar lengths per row 7 & 8. Alternate rows at 6" spacing.

NOTE:  
All #11 Bar lengths vary.

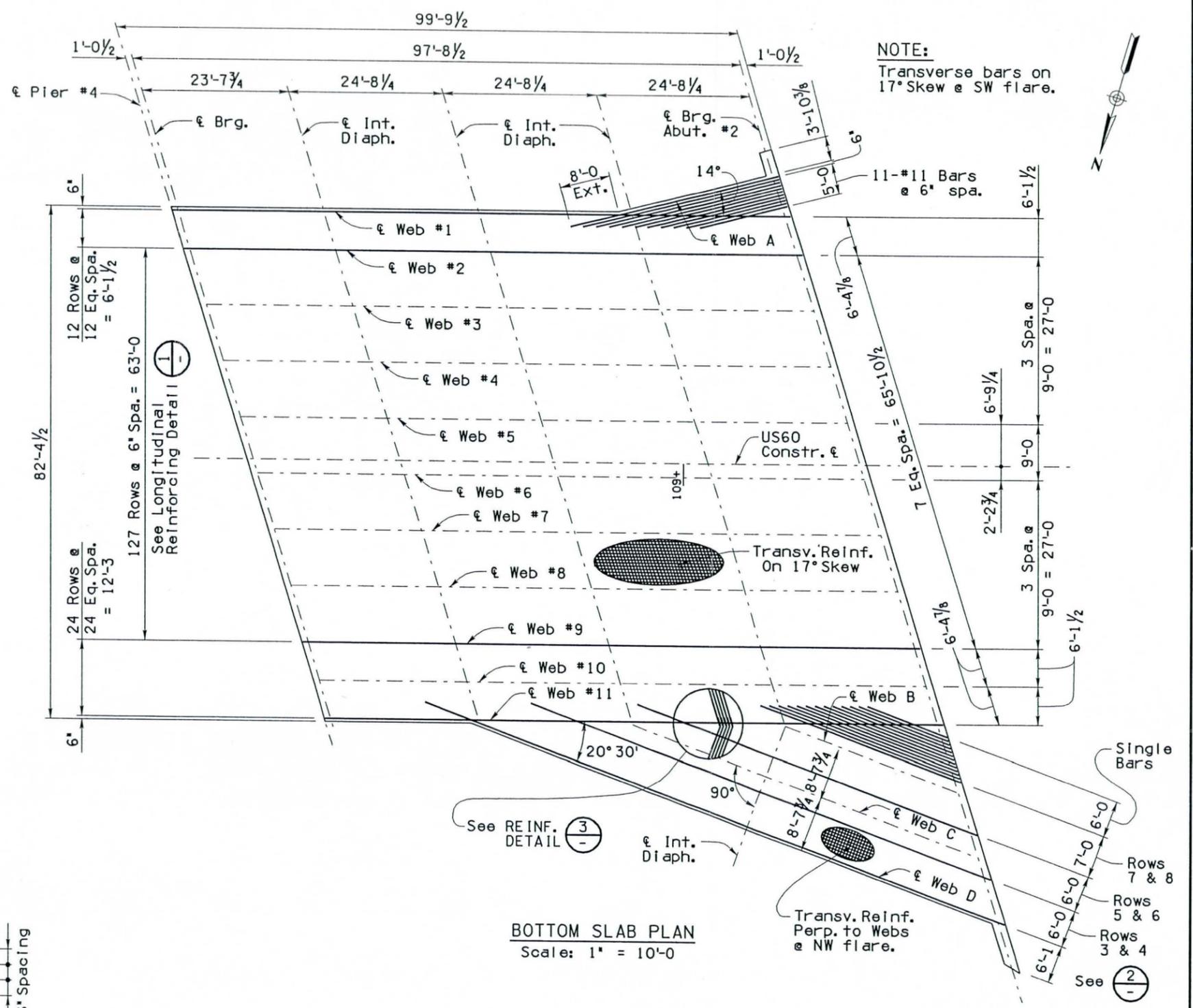
LONGITUDINAL REINFORCING 2  
(At NW Flared Webs)  
Scale: 1" = 10'-0"

NOTE:  
Each row is a two bar bundle. Spliced #11 bars shall be butted end to end (no space between).



4-#11 Bar lengths per row 1 & 2. Alternate rows at 6" spacing.

LONGITUDINAL REINFORCING 1  
Scale: 1" = 10'-0"



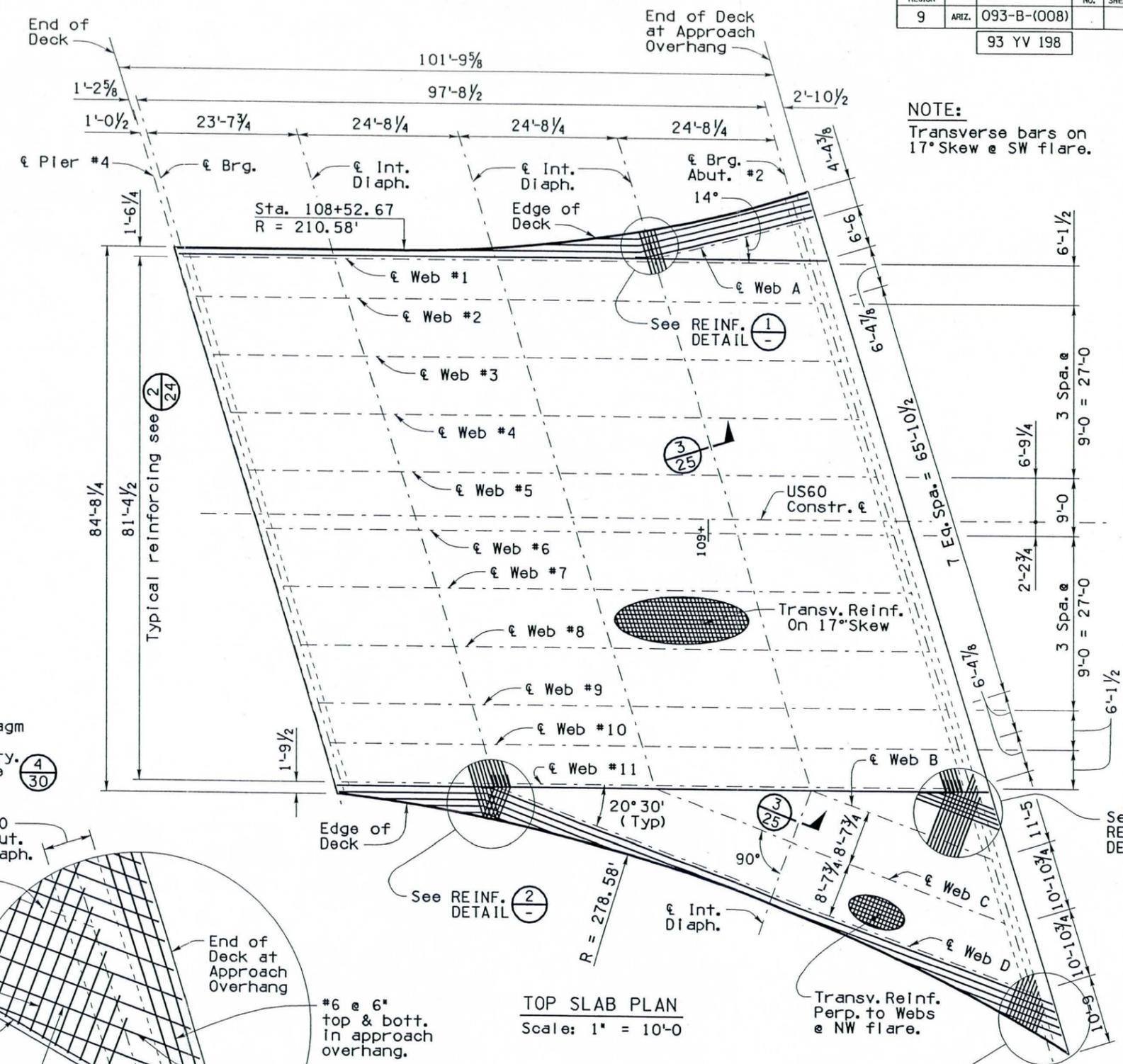
BOTTOM SLAB PLAN  
Scale: 1" = 10'-0"

BRIDGE DESIGN SECTION BY		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	A. Islam	2-05		
DESIGN CRD	H. Sung	2-05		
DRAWN	L. Altuna	3-05		
CHKD	H. Sung	3-05		
APPROVED-PROJ. ENGINEER	L. Altuna		STA. 104+ HASSAYAMPA RIVER BRIDGE BOTTOM SLAB REINF. (SPAN 5)	DWG. 5-127 OF 41
APPROVED-DESIGN LEADER	H. Sung			
US60	110.53	2818	LOCATION	
ROUTE	MILEPOST	STRUCTURE NO.	WICKENBURG INTERIM BYPASS	
TRACS NO. H 5825 OIC			093-B-(008)	OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

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NOTE:  
Transverse bars on 17° Skew @ SW flare.



TOP SLAB PLAN  
Scale: 1" = 10'-0"

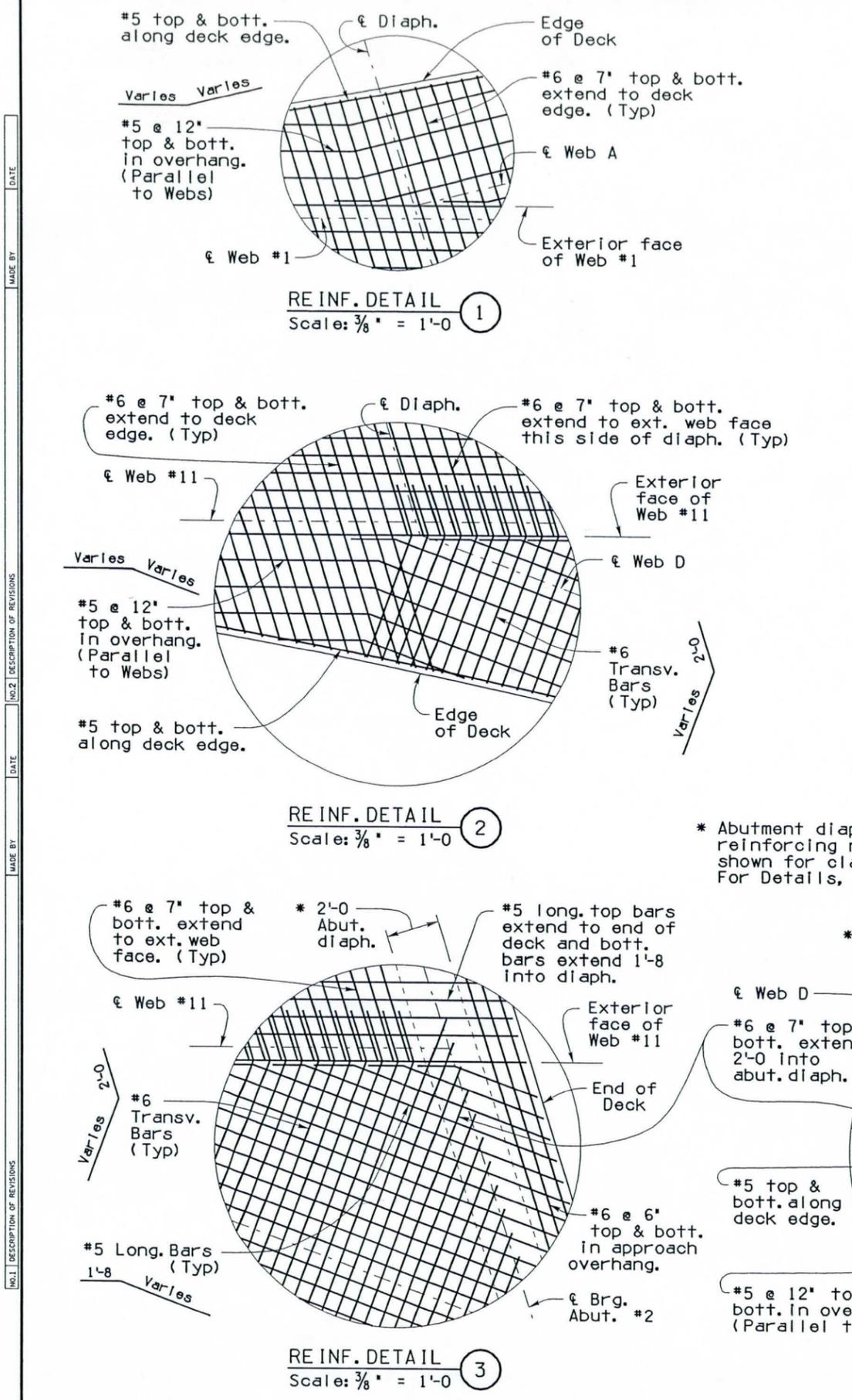
RE INF. DETAIL 1  
Scale: 3/8" = 1'-0"

RE INF. DETAIL 2  
Scale: 3/8" = 1'-0"

RE INF. DETAIL 3  
Scale: 3/8" = 1'-0"

RE INF. DETAIL 4  
Scale: 3/8" = 1'-0"

\* Abutment diaphragm reinforcing not shown for clarity. For Details, See (4/30)



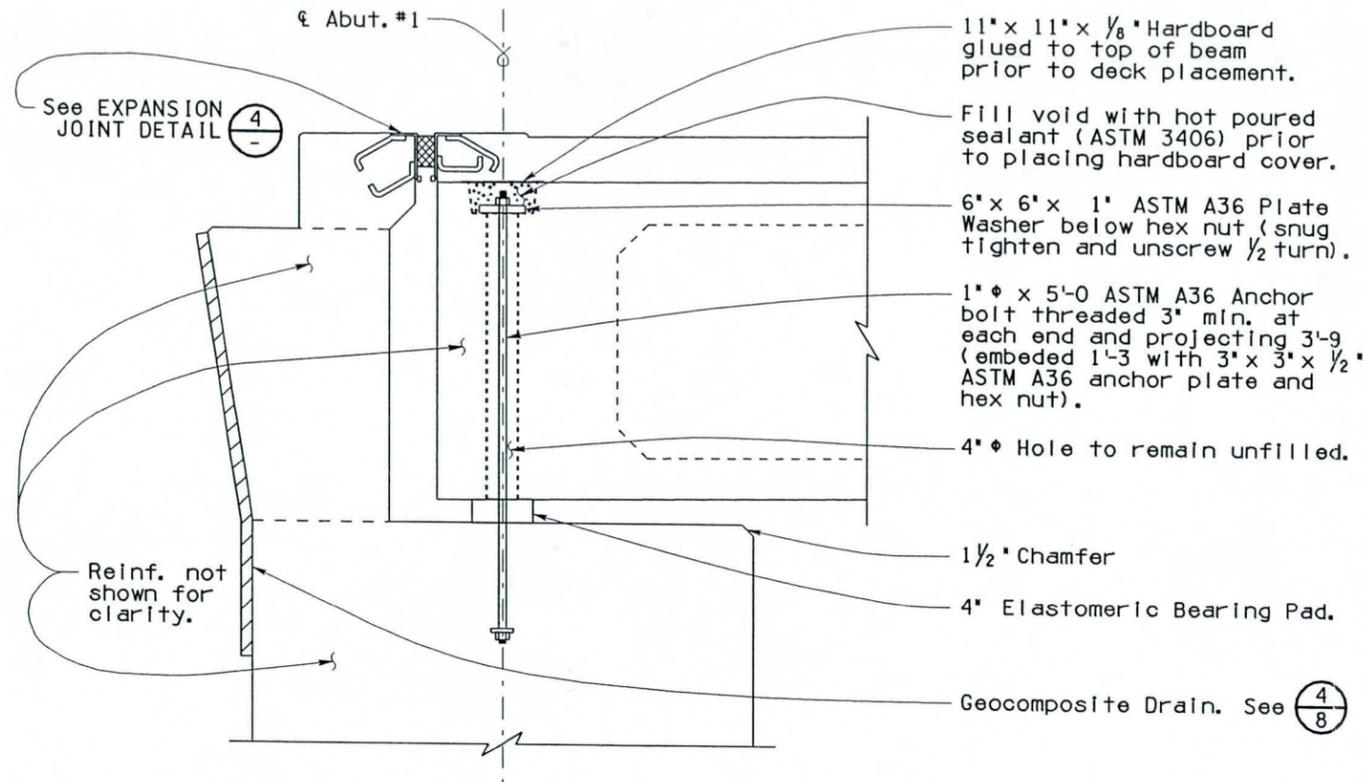
NO. 1 DESCRIPTION OF REVISIONS  
NO. 2 DESCRIPTION OF REVISIONS  
MADE BY  
DATE

BRIDGE DESIGN SECTION BY		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	A. Islam	2-05		
DESIGN CKD	H. Sung	2-05		
DRAWN	L. Altuna	3-05		
CHKD	H. Sung	3-05		
APPROVED-PROJ. ENGINEER		L. Altuna	STA. 104+ HASSAYAMPA RIVER BRIDGE TOP SLAB REINF. (SPAN 5)	DWG. 5-128 OF 41
APPROVED-DESIGN LEADER		H. Sung		
US60	110.53	2818	LOCATION	
ROUTE	MILEPOST	STRUCTURE NO.	WICKENBURG INTERIM BYPASS	
TRACS NO. H 5825 OIC			093-B-(008)	OF

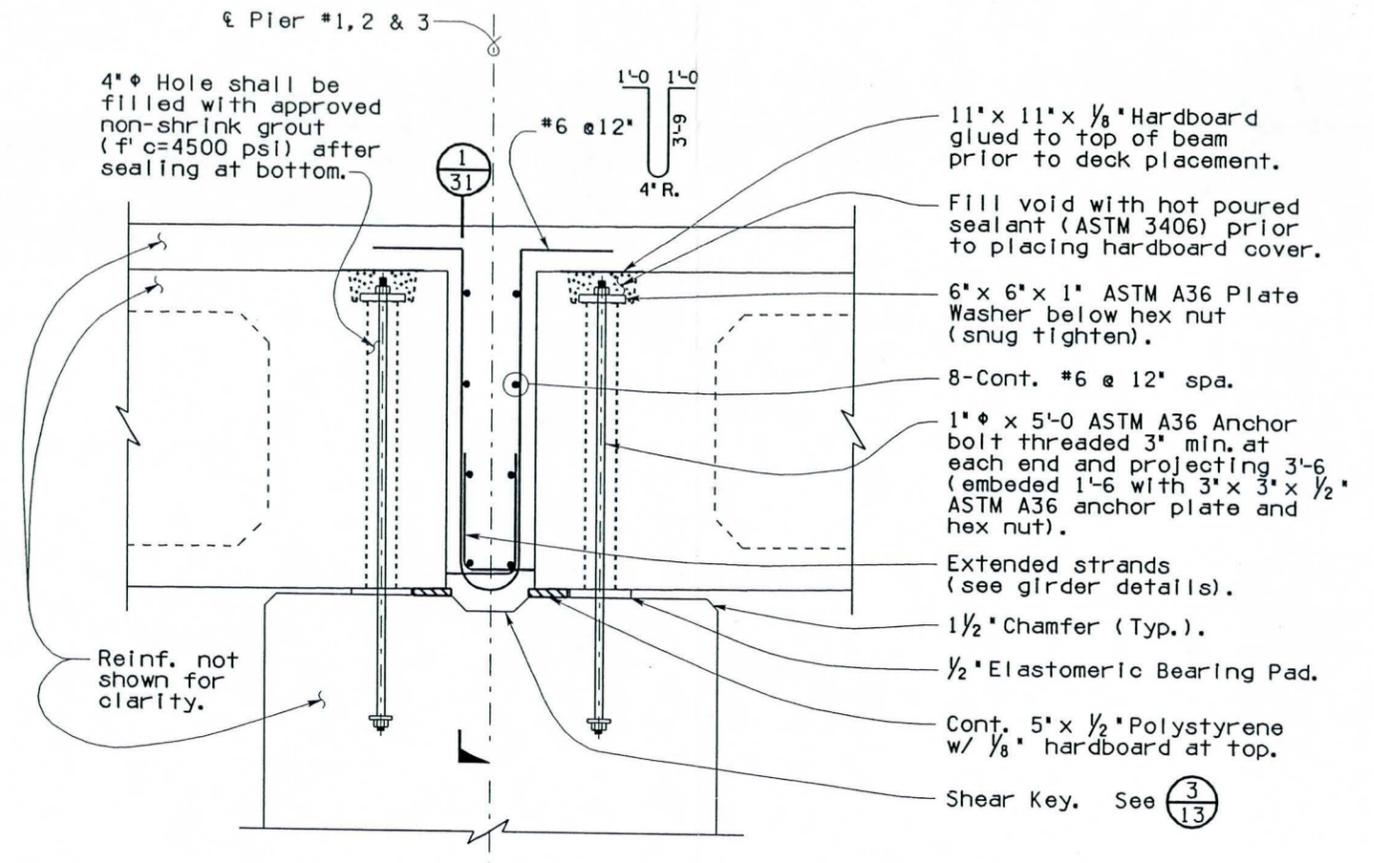
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
93 YV 198					

**NOTE:**

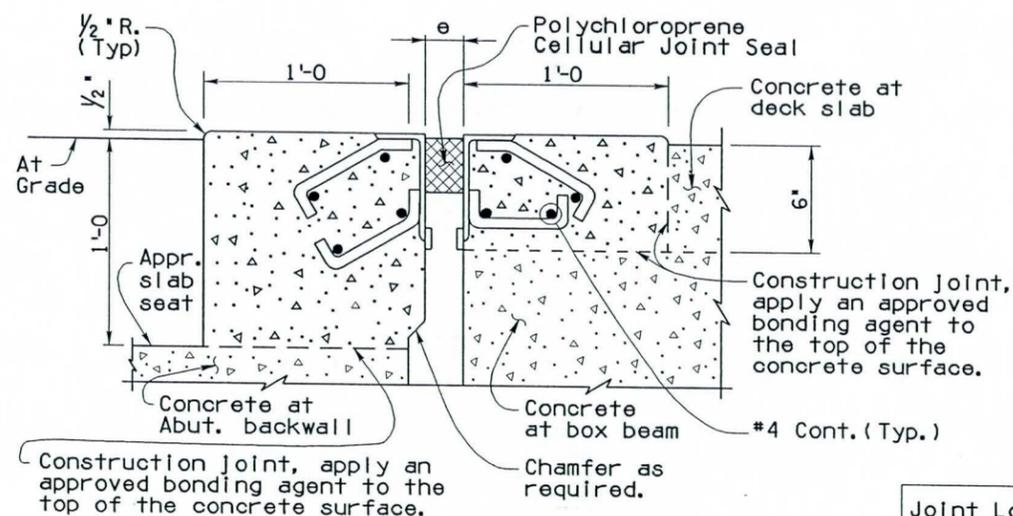
Pier 1, 2 and 3 diaphragms shall be placed monolithic with the top slab, and concrete strength shall be  $f'c=4500$  psi.



**SECTION 1**  
Scale: 1" = 1'-0"



**SECTION 2**  
Scale: 1" = 1'-0"



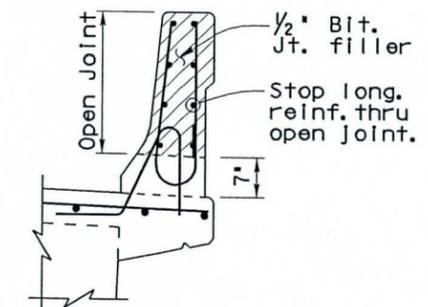
**EXPANSION JOINT DETAIL**  
(Abut. #1 shown, Pier #4 similar)

**EXPANSION JOINT NOTE:**

Joint shall be installed 1/2' above grade to match overlay at approaches. For details not shown, see Dwg. SD 3.01. The Contractor shall take due care in the placement of the concrete under the joint angles to ensure that consolidation is properly achieved. After placement, the Engineer shall inspect joints for voids by sounding the angle with a hammer. The Contractor shall repair all voids by epoxy injection.

Joint Location	Joint Size	Movement Rating (M.R.)	Temp. Correction	'e' @ Mean Temp.	Installed 'e'
Abut. #1	4' x 4'	1 1/2"	1/8" / 10° F	2 3/8"	
Pier #4	5' x 5'	2 1/4"	3/16" / 10° F	3"	

Mean Temperature = 70° F

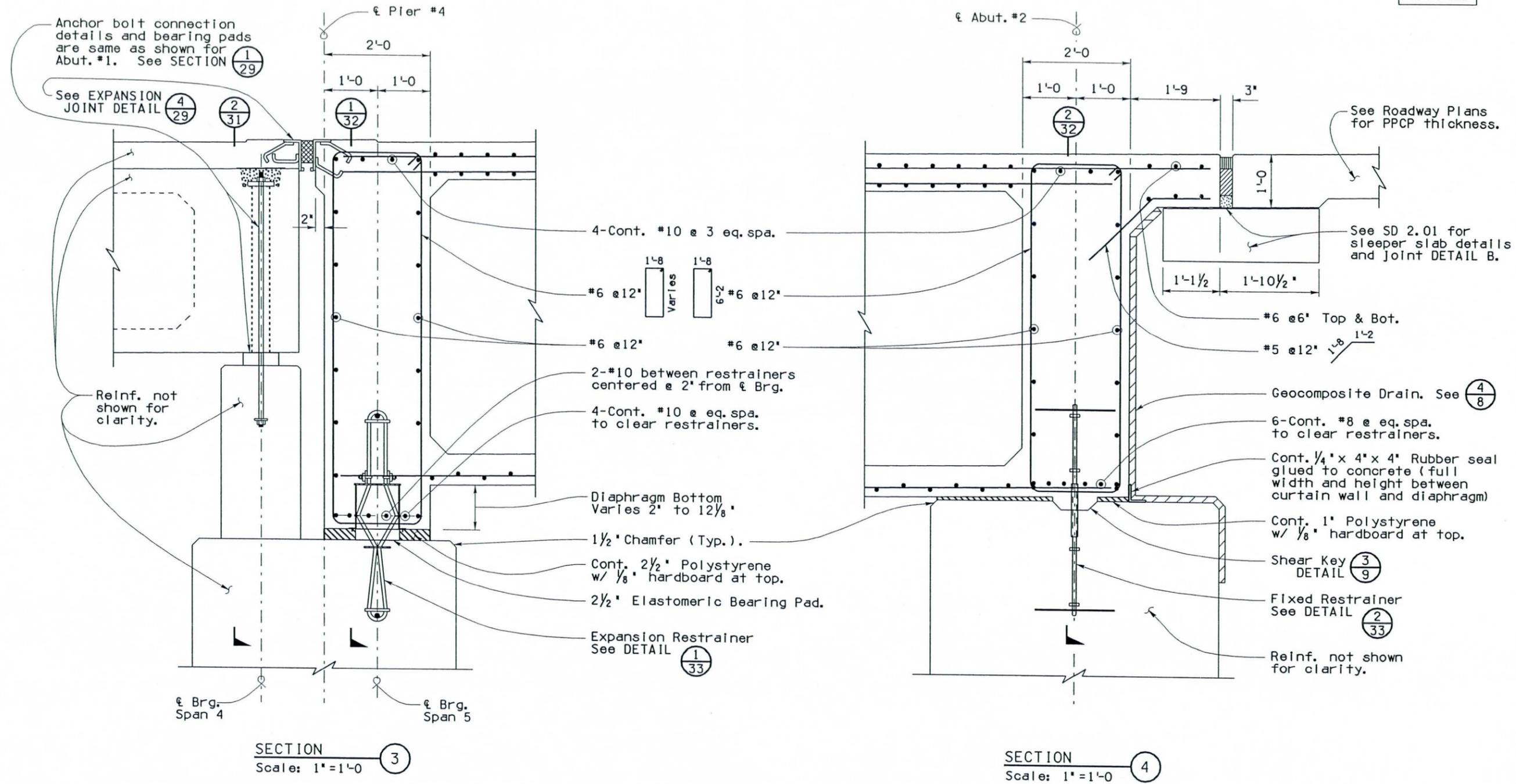


**TYPICAL OPEN JOINT THRU BARRIER AT PIER**  
Scale 3/4" = 1'-0"

BRIDGE DESIGN SECTION 'B'		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP		PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Alfuna	7-04	STA. 104+ HASSAYAMPA RIVER BRIDGE DIAPHRAGM DETAILS 1		
DESIGN CKD	H. Sung	7-04			LOCATION WICKENBURG INTERIM BYPASS
DRAWN	L. Alfuna	7-04			
DWG CKD	H. Sung	7-04	TRACS NO. H 5825 01C		093-B-(008)
APPROVED-PROJ. ENGINEER	L. Alfuna		2818		
APPROVED-DESIGN LEADER	H. Sung		110.53		OF
US60	110.53	2818	ROUTE MILEPOST STRUCTURE NO.		

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

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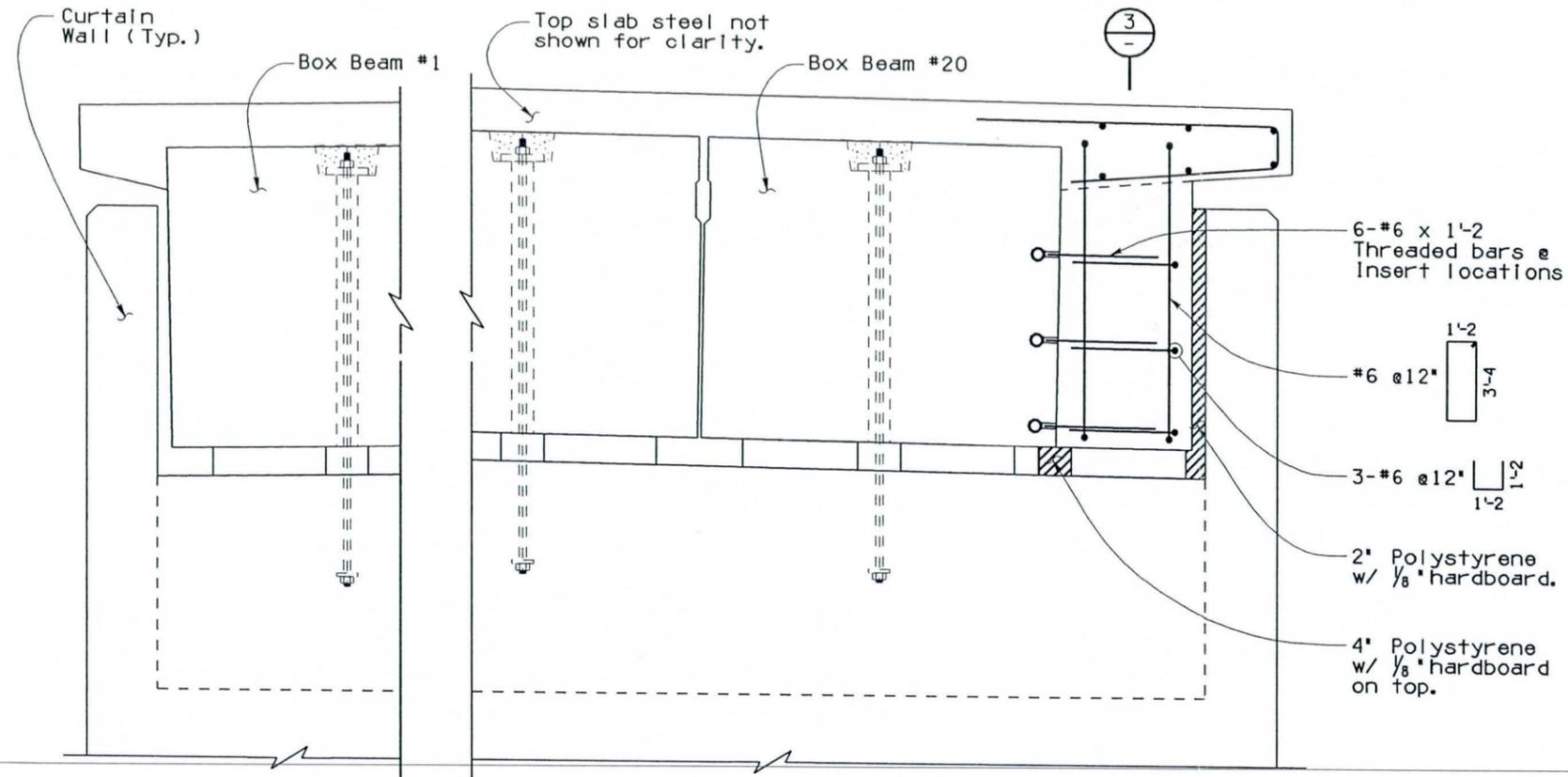


NO. 2 DESCRIPTION OF REVISIONS

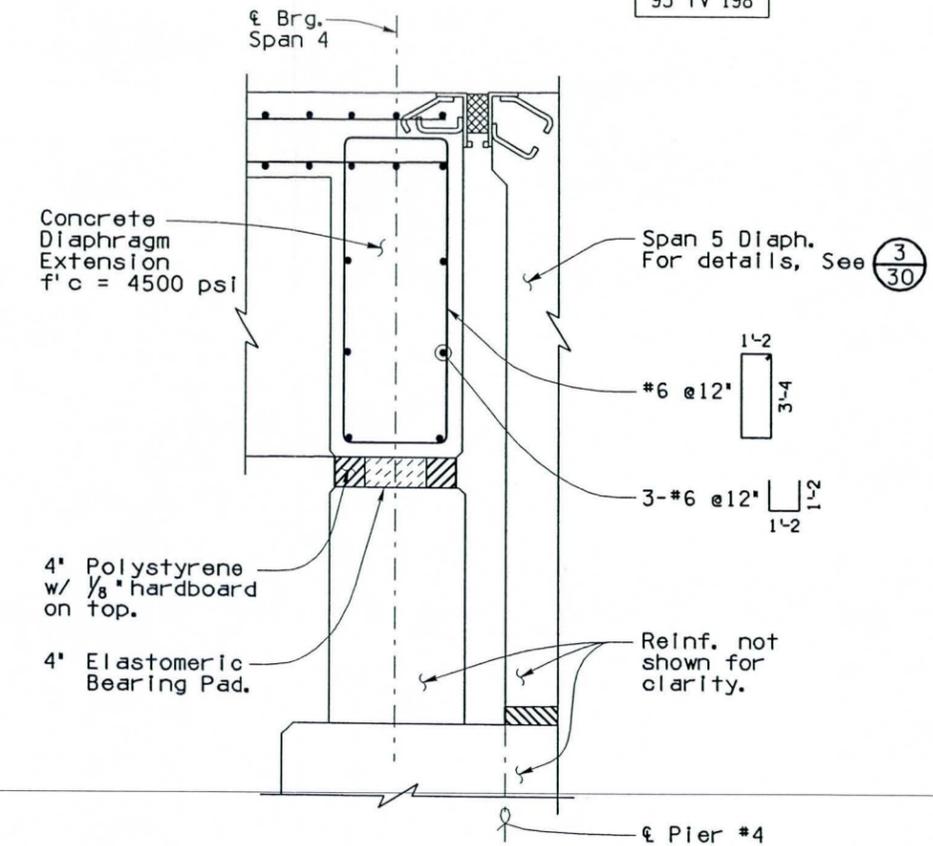
BRIDGE DESIGN SECTION 9'			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna		7-04		
DESIGN CKD	H. Sung		7-04		
DRAWN	L. Altuna		7-04		
DWG CKD	H. Sung		7-04		
APPROVED-PROJ. ENGINEER	L. Altuna			STA. 104+ HASSAYAMPA RIVER BRIDGE DIAPHRAGM DETAILS 2	LOCATION WICKENBURG INTERIM BYPASS
APPROVED-DESIGN LEADER	H. Sung				
US60	110.53	2818			
ROUTE	MILEPOST	STRUCTURE NO.			
TRACS NO. H 5825 OIC				093-B-(008)	OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

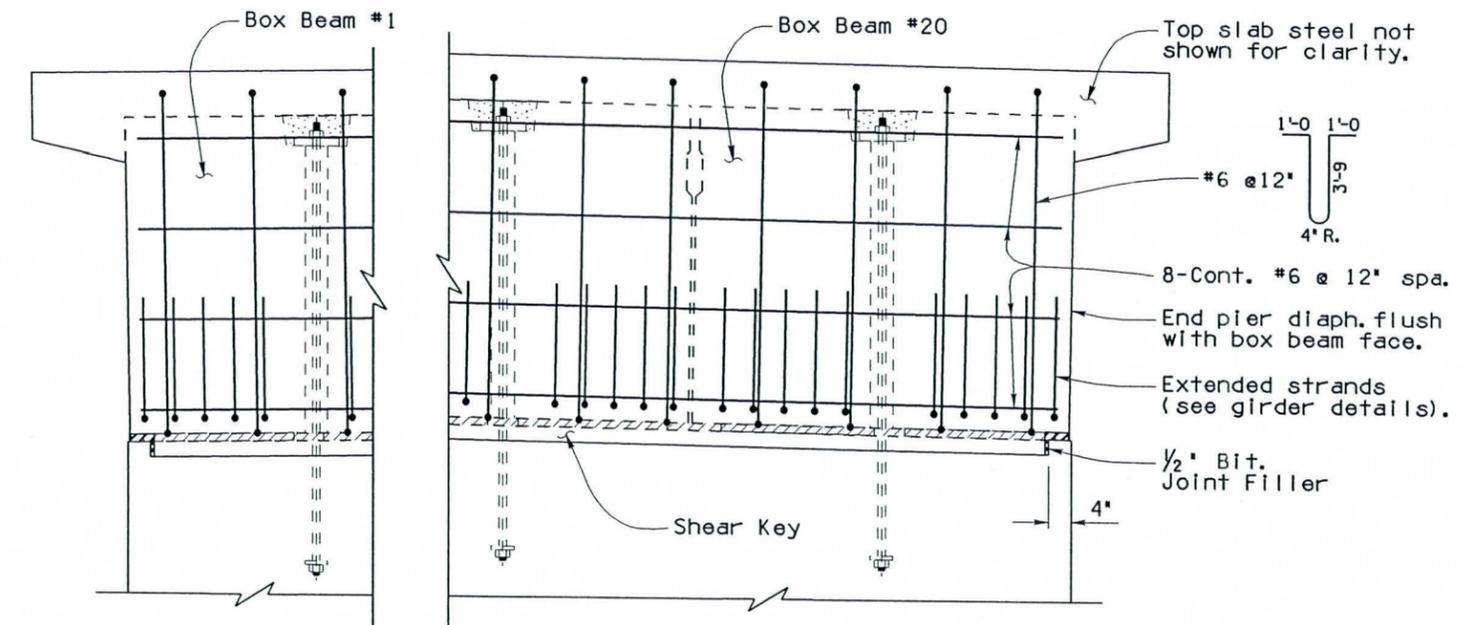
93 YV 198



PART. SECTION 2  
Scale: 1"=1'-0"



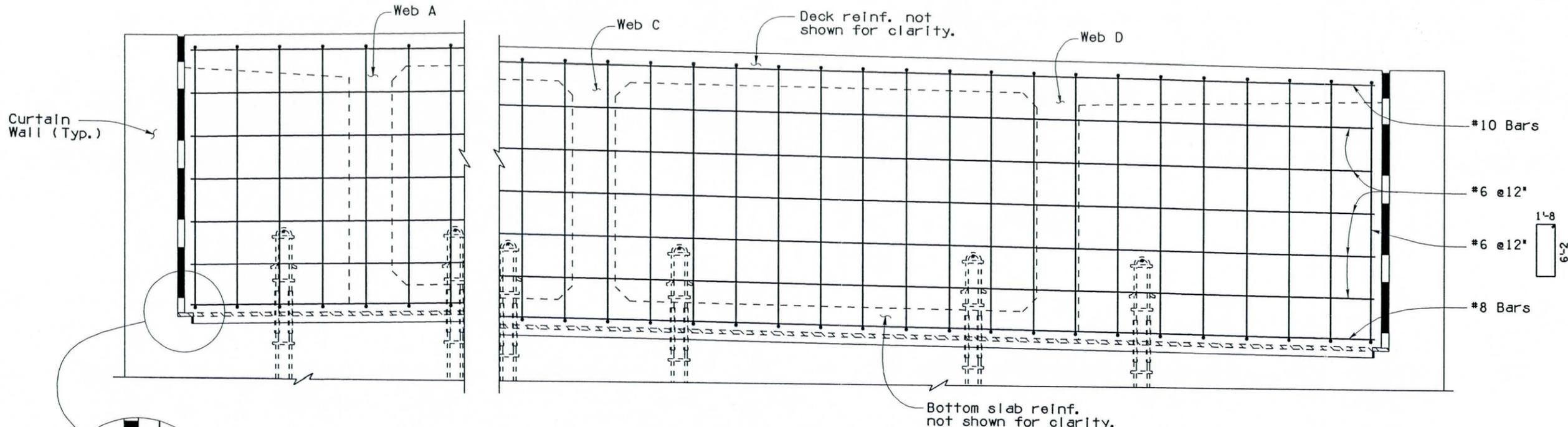
SECTION 3  
Scale: 1"=1'-0"



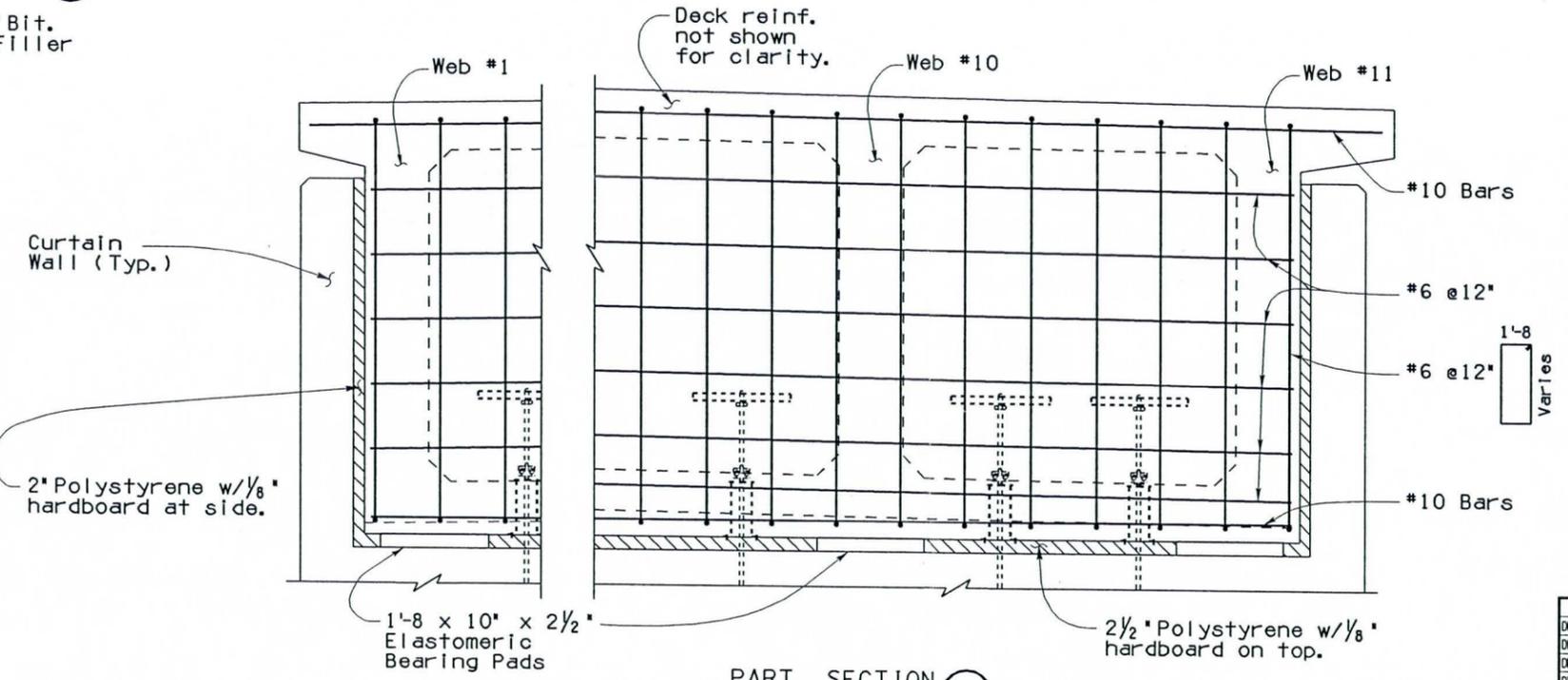
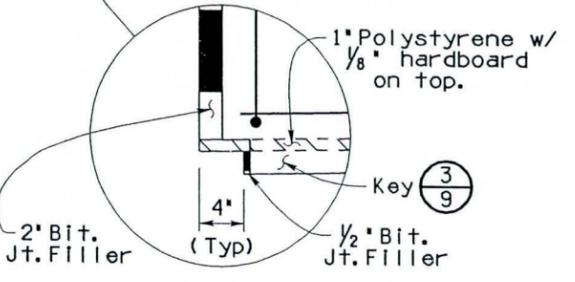
PART. SECTION 1  
Scale: 1"=1'-0"

BRIDGE DESIGN SECTION 3			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	7-04			
DESIGN CKD	H. Sung	7-04			
DRAWN	L. Altuna	7-04			
DWG CKD	H. Sung	7-04			
APPROVED-PROJ. ENGINEER	L. Altuna			STA. 104+ HASSAYAMPA RIVER BRIDGE DIAPHRAGM DETAILS 3	DWG. 5-131 OF 41
APPROVED-DESIGN LEADER	H. Sung				
US60	110.53	2818	LOCATION	WICKENBURG INTERIM BYPASS	
ROUTE	MILEPOST	STRUCTURE NO.			
TRACS NO. H 5825 01C			093-B-(008)		OF

NO. 1 DESCRIPTION OF REVISIONS  
NO. 2 DESCRIPTION OF REVISIONS



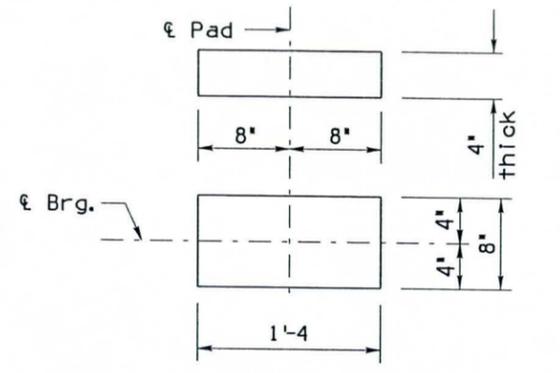
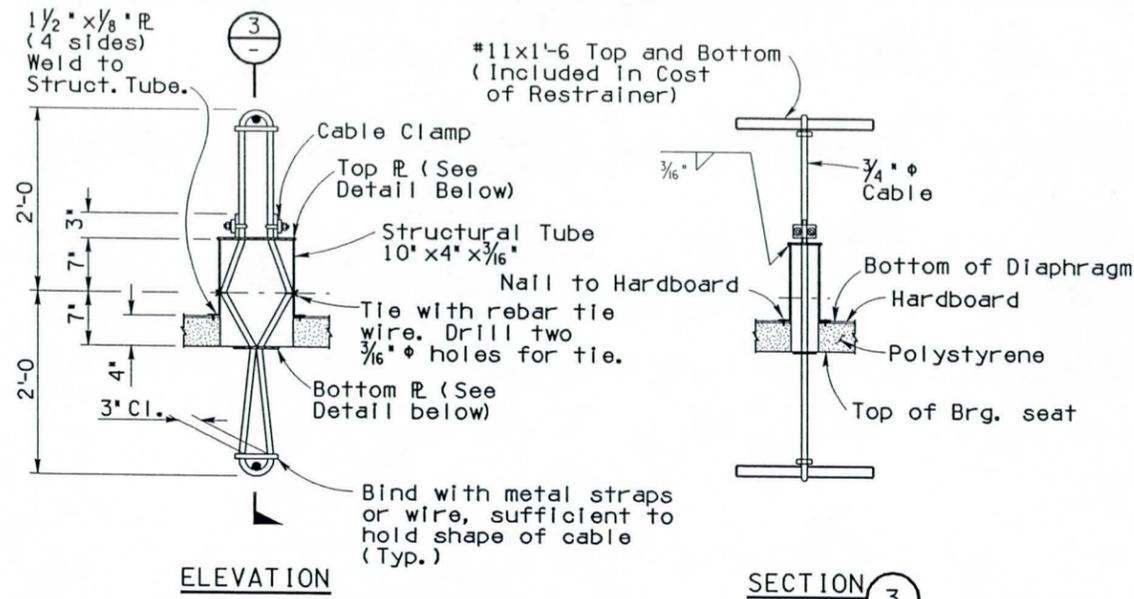
**PART. SECTION 2**  
Scale: 3/4" = 1'-0"



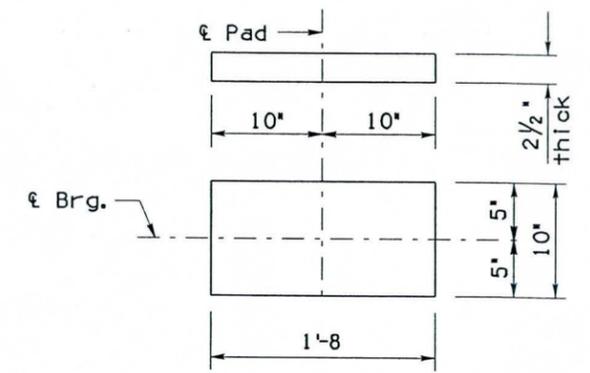
**PART. SECTION 1**  
Scale: 3/4" = 1'-0"

BRIDGE DESIGN SECTION 01		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	7-04		
DESIGN CKD	H. Sung	7-04		
DRAWN	L. Altuna	7-04		
DWG CKD	H. Sung	7-04		
APPROVED-PROJ. ENGINEER	L. Altuna		STA. 104+ HASSAYAMPA RIVER BRIDGE DIAPHRAGM DETAILS 4	DWG. 5-1.32 OF 41
APPROVED-DESIGN LEADER	H. Sung			
US60	110.53	2818	LOCATION	WICKENBURG INTERIM BYPASS
ROUTE	MILEPOST	STRUCTURE NO.		
TRACS NO. H 5825 01C			093-B-(008)	OF

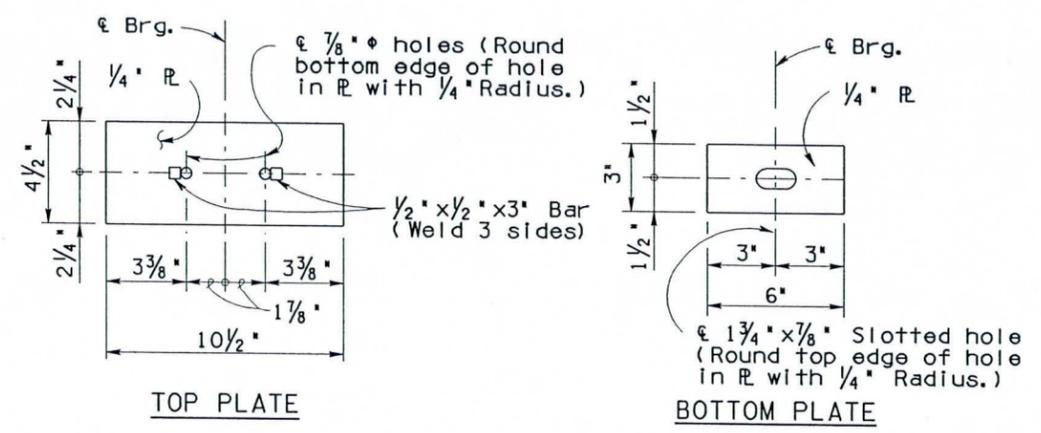
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
93 YV 198					



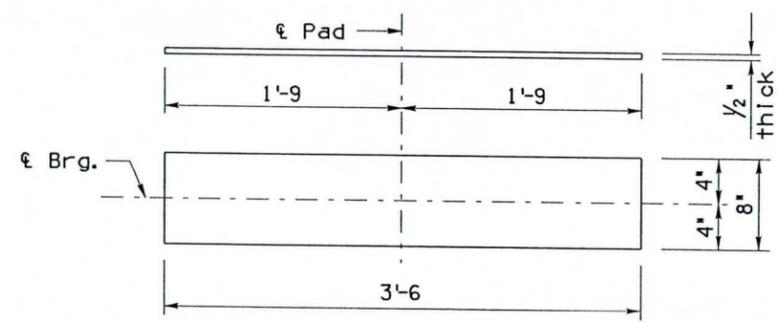
**EXPANSION BEARING PAD DETAIL 4**  
 Abutment #1 & Pier #4 (Span 4)  
 Design Load = 43 Kips  
 (81 Total Pads Required)  
 Scale: 1/2" = 1'-0"



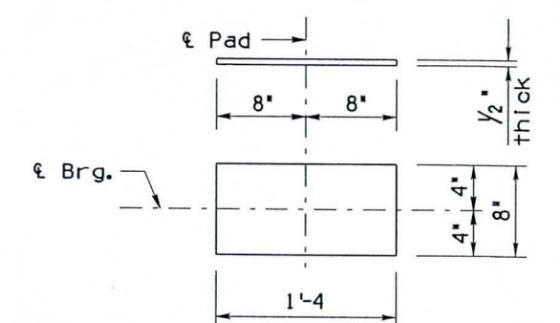
**EXPANSION BEARING PAD DETAIL 5**  
 Pier #4 (Span 5)  
 Design Load = 189 Kips  
 (11 Total Pads Required)  
 Scale: 1/2" = 1'-0"



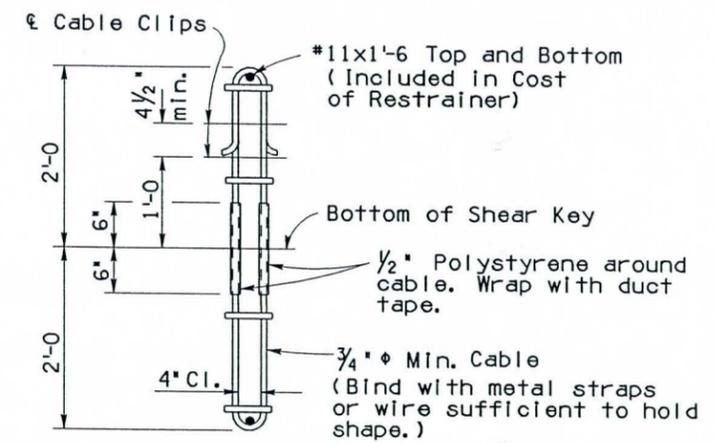
**EXPANSION RESTRAINER DETAIL 1**



**FIXED BEARING PAD DETAIL 6**  
 Pier #1, Pier #2 & Pier #3  
 Design Load = 88 Kips  
 (108 Total Pads Required)  
 Scale: 1/2" = 1'-0"



**FIXED BEARING PAD DETAIL 7**  
 Pier #1, Pier #2 & Pier #3  
 Design Load = 44 Kips  
 (24 Total Pads Required)  
 Scale: 1/2" = 1'-0"



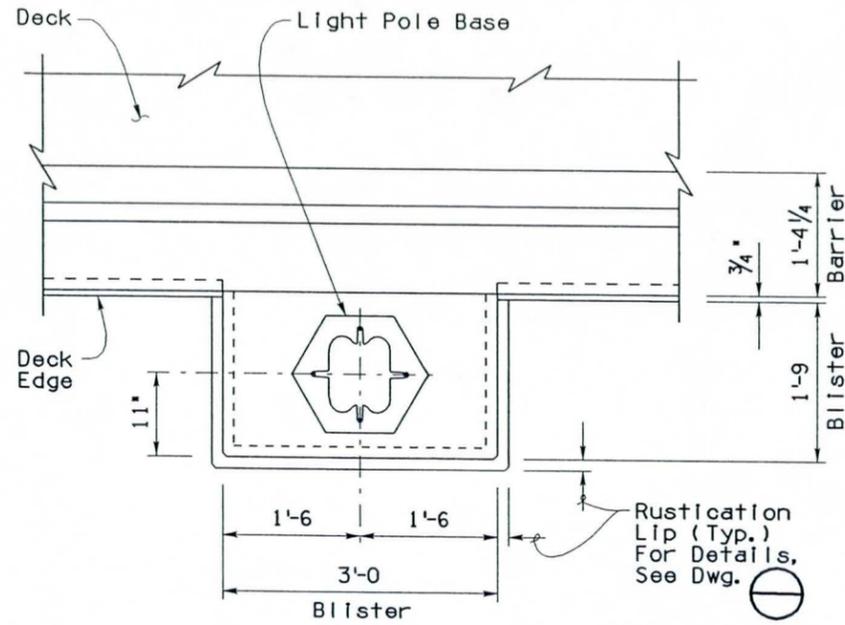
**RESTRAINER NOTES:**  
 Seal all openings in structural tube to prohibit concrete intrusion.  
 Restrainer Cables shall be 3/4" preformed 6x19 galvanized with the minimum breaking strength of 42 Kips. One sample of cable 3 feet in length shall be furnished to the Engineer for testing.

**ELASTOMERIC BEARING PAD CRITERIA**  
 Design Method A  
 Elastomer Grade 0  
 Shear Modulus G=130 psi (Durometer Hardness 55)  
 Low Temperature Zone A.  
 Expansion Bearing pads shall be Steel Laminated Neoprene pads.

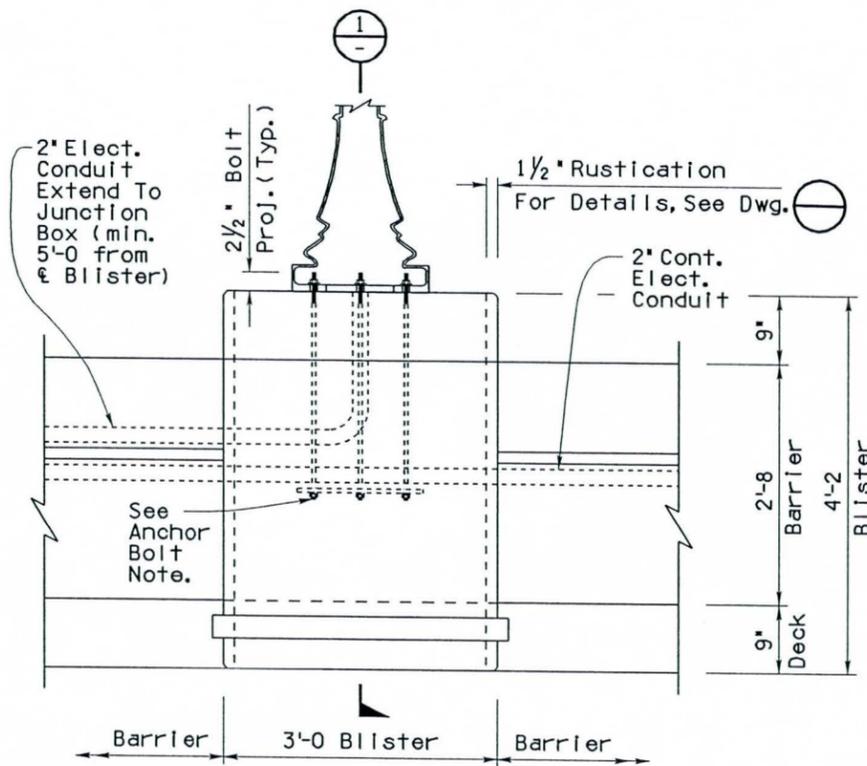
For Expansion Joint Detail, See 4/29

BRIDGE DESIGN SECTION BY		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Alfuna	7-04		
DESIGN CKD	H. Sung	7-04		
DRAWN	D. Benton	7-04		
DWG CKD	H. Sung	7-04	STA. 104+ HASSAYAMPA RIVER BRIDGE MISCELLANEOUS DETAILS 1	DWG. S-1.33 OF 41
APPROVED-PROJ. ENGINEER	L. Alfuna			
APPROVED-DESIGN LEADER	H. Sung		LOCATION WICKENBURG INTERIM BYPASS	
US60	110.53	2818	TRACS NO. H 5825 01C	093-B-(008)

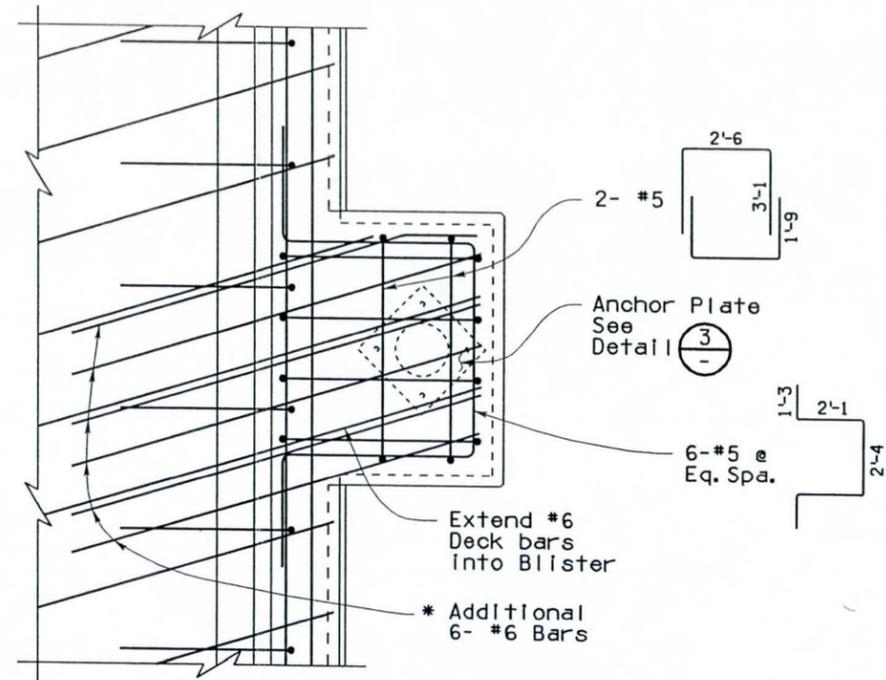
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
93 YV 198					



PLAN  
Scale: 1"=1'-0"

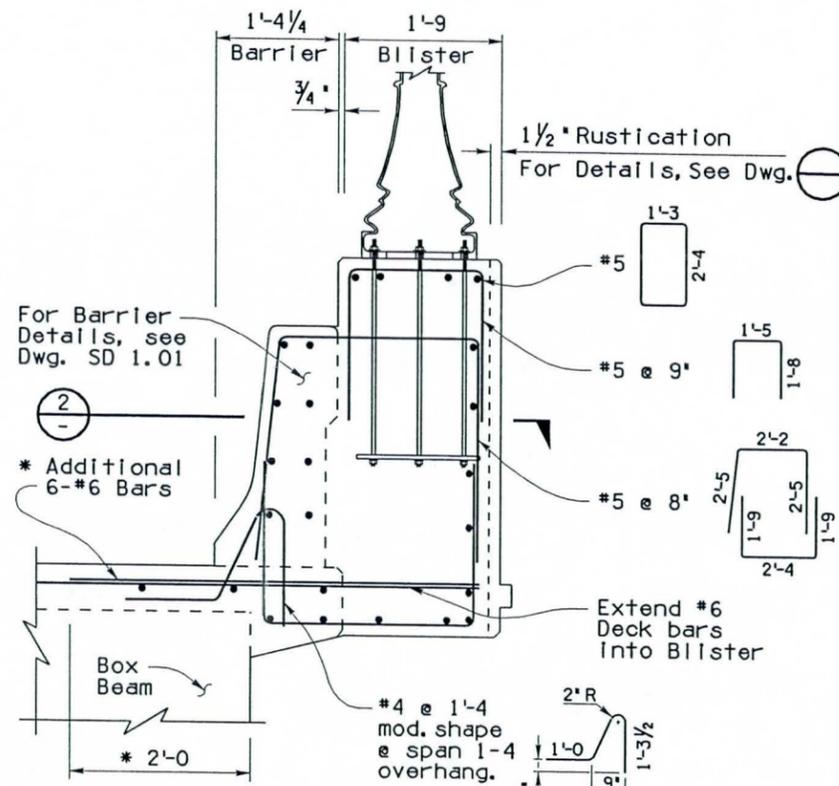


ELEVATION  
Scale: 1"=1'-0"



SECTION 2  
Scale: 1"=1'-0"

\* Additional 6 - #6 Bars extended into deck slab 2'-0" past edge of beam or web.



SECTION 1  
(Span 1-4 shown, Span 5 similar)  
Scale: 1"=1'-0"

ANCHOR BOLT NOTES:

Anchor bolts shall be ASTM A36 steel with 2 hex nuts and 2 washers per bolt. Exposed portions shall be galvanized in accordance with ASTM A153.

Bolt Diameter = 1/2"  
Bolt Length = 30"  
Thread Length = 4" at both ends  
No. of Bolts = 4  
Bolt Circle  $\phi$  = 12"

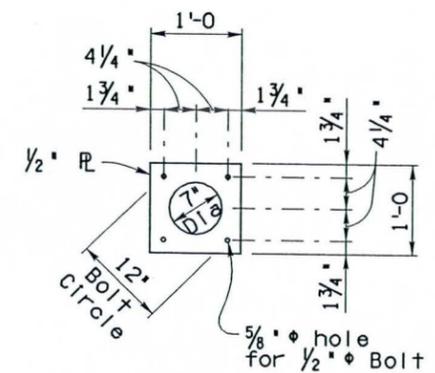
No. Anchor PL = 1  
Anchor PL = 1/2" x 1'-0" x 1'-0"

Pole Base PL = 17 3/4"  $\phi$  Hexagonal

LIGHT POLE/BLISTER LOCATIONS

1.	Sta. 105+00	42.25'	Lt.
2.	Sta. 105+00	42.25'	Rt.
3.	Sta. 106+00	42.25'	Lt.
4.	Sta. 106+00	42.25'	Rt.
5.	Sta. 107+00	42.25'	Lt.
6.	Sta. 107+00	42.25'	Rt.
7.	Sta. 108+00	42.25'	Lt.
8.	Sta. 108+00	42.25'	Rt.
9.	Sta. 109+00	47.66'	Lt.
10.	Sta. 109+00	57.00'	Rt.

Note: Blister no. 9 & 10 shall be constructed concentric to the deck edge curvature.



ANCHOR PLATE DETAIL 3  
Scale: 1"=1'-0"

BRIDGE DESIGN SECTION 1'			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP		PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	4-05	STA. 104+ <b>HASSAYAMPA RIVER BRIDGE</b> <b>MISCELLANEOUS DETAILS 2</b>			
DESIGN CKD	H. Sung	4-05				
DRAWN	L. Altuna	4-05				
DWG CKD	H. Sung	4-05				
APPROVED-PROJ. ENGINEER	L. Altuna			LOCATION <b>WICKENBURG INTERIM BYPASS</b>		
APPROVED-DESIGN LEADER	H. Sung					
US60	110.53	2818	LOCATION	WICKENBURG INTERIM BYPASS		
ROUTE	MILEPOST	STRUCTURE NO.				
TRACS NO. H 5825 01C			093-B-(008)		DWG. S-134 OF 41	

F.H.M.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

93 YV 198

**ANCHOR BOLT NOTES:**

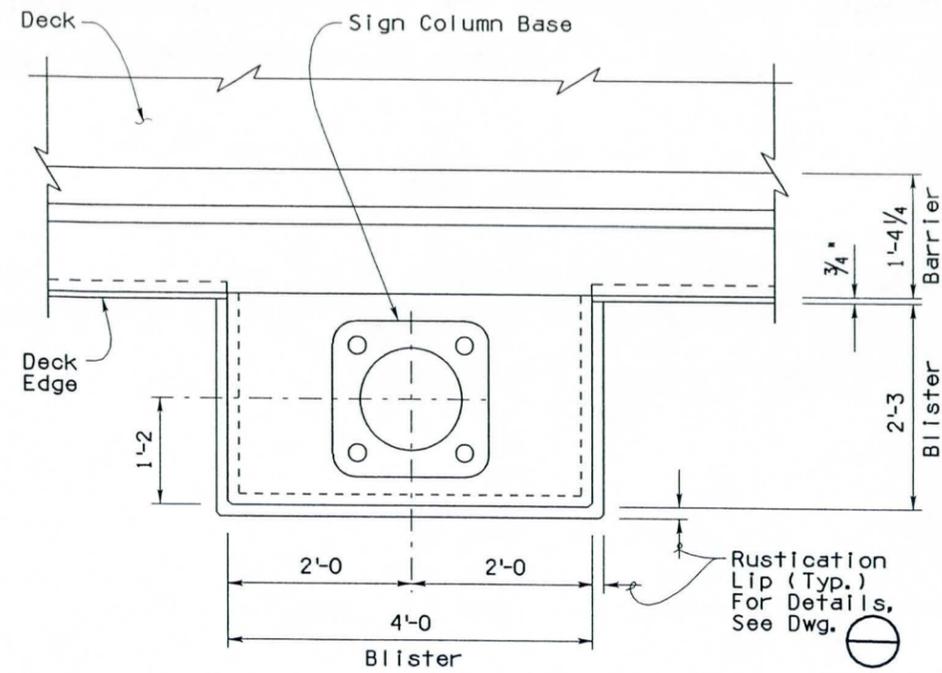
Anchor bolts shall be ASTM A36 steel with 3 hex nuts and 2 washers per bolt. Exposed portions shall be galvanized in accordance with ASTM A153.

Bolt Diameter = 2"  
 Bolt Length = 7'-0"  
 Thread Length = 9' at top, 4' at bottom  
 No. of Bolts = 4  
 Bolt Circle  $\phi$  = 20"  $\pm$   
 (See Standard Drawing)

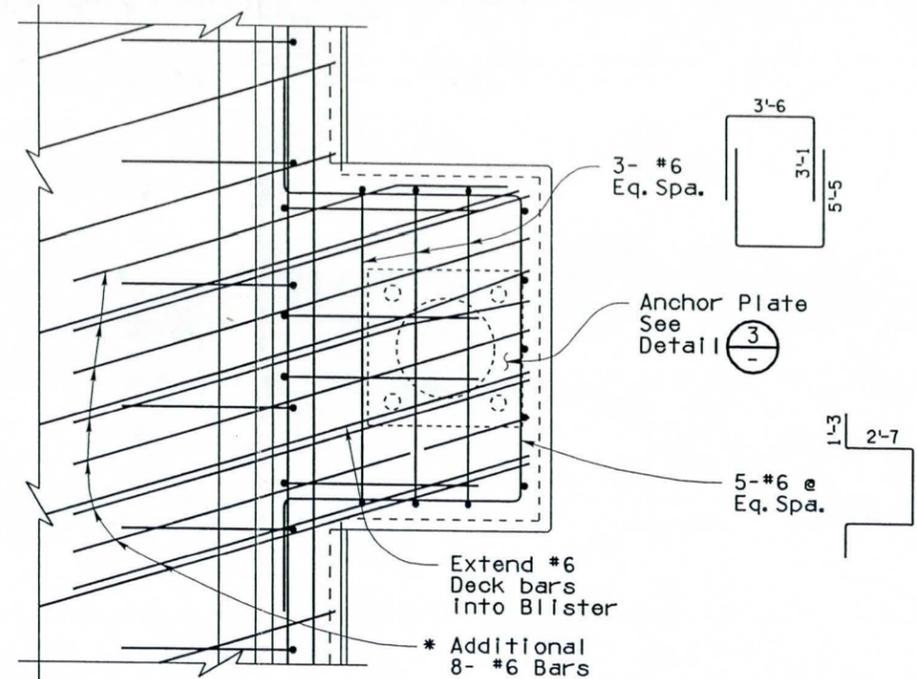
No. Anchor PL = 1  
 Anchor PL = 1' x 1'-8 1/2" x 1'-8 1/2"  
 Pole Base PL = 20"  $\pm$  Square  
 (See Standard Drawing)

**SIGN COLUMN/BLISTER LOCATIONS**

- Sta. 107+29.75 42.50' Lt.
- Sta. 107+29.75 42.50' Rt.

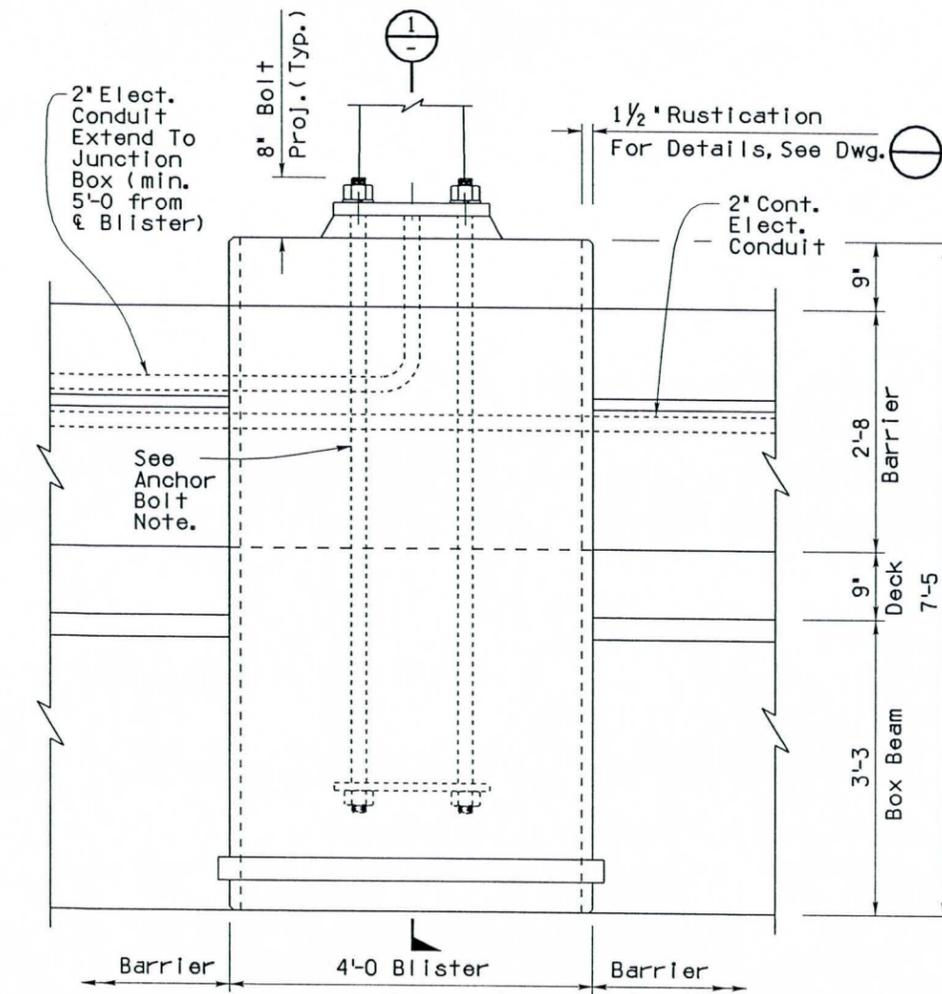


**PLAN**  
 Scale: 1"=1'-0"

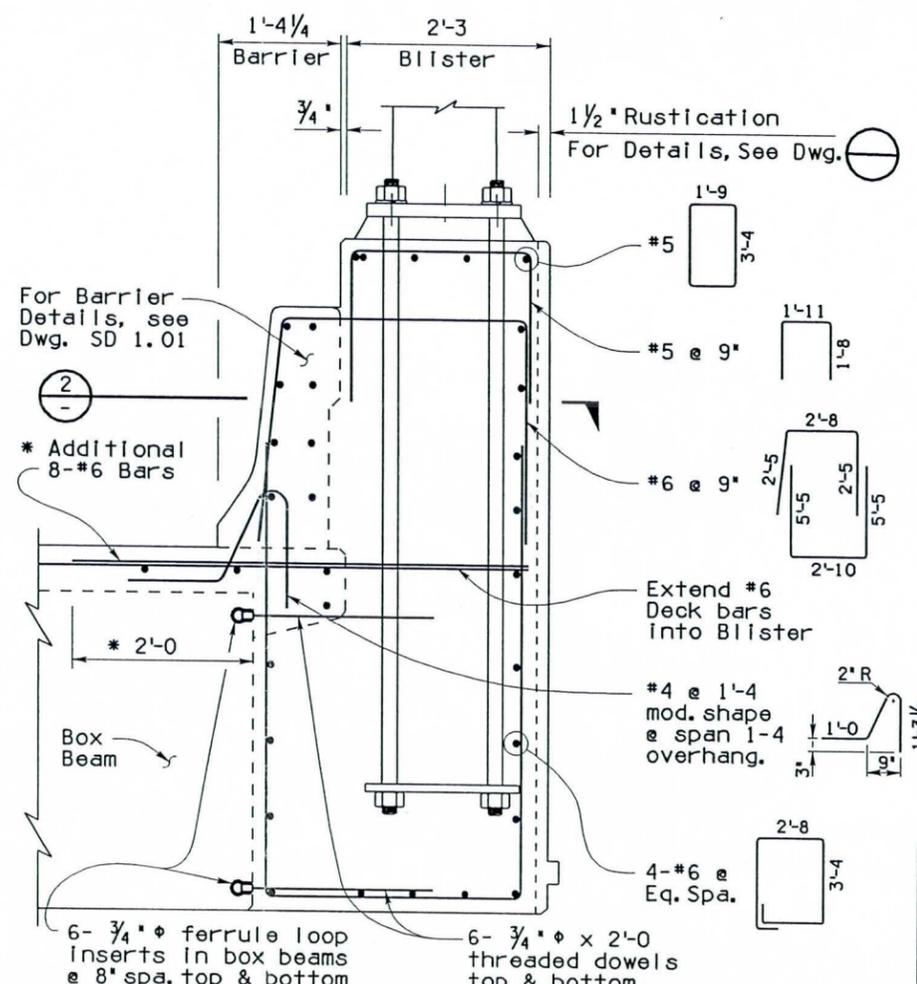


**SECTION 2**  
 Scale: 1"=1'-0"

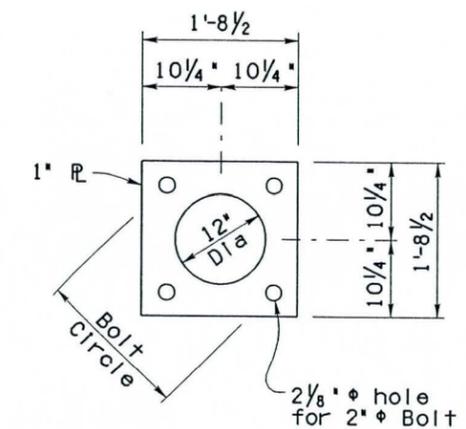
\* Additional 8 - #6 Bars extended into deck slab 2'-0" past edge of beam or web.



**ELEVATION**  
 Scale: 1"=1'-0"

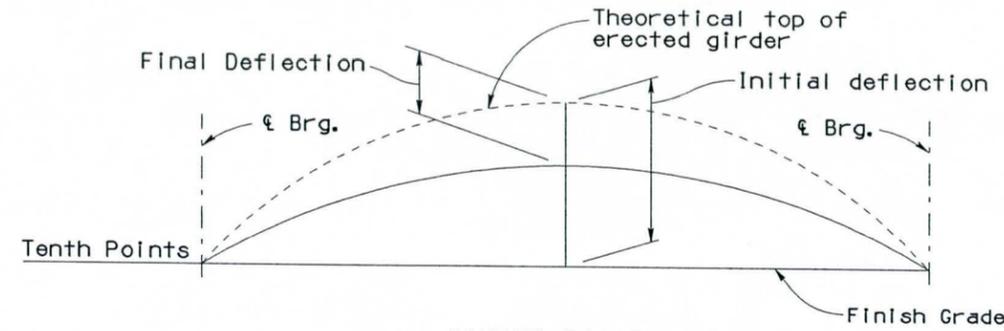


**SECTION 1**  
 Scale: 1"=1'-0"



**ANCHOR PLATE DETAIL 3**  
 Scale: 1"=1'-0"

BRIDGE DESIGN SECTION B'			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	4-05			
DESIGN CRD	H. Sung	4-05			
DRAWN	L. Altuna	4-05			
DWG CRD	H. Sung	4-05			
APPROVED-PROJ. ENGINEER	L. Altuna				
APPROVED-DESIGN LEADER	H. Sung			LOCATION	
US60	110.53	2818		WICKENBURG INTERIM BYPASS	
ROUTE	MILEPOST	STRUCTURE NO.			
TRACS NO. H 5825 OIC				093-B-(008)	OF



**CAMBER DIAGRAM 1**  
Span 1 - 4)  
No Scale

DEFLECTION (ft.)										
Span	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	
Initial	1-4	0.065	0.109	0.138	0.155	0.161	0.155	0.138	0.109	0.065
Final	1	0.042	0.084	0.120	0.143	0.148	0.139	0.114	0.076	0.034
Final	2	0.032	0.069	0.101	0.124	0.133	0.124	0.102	0.068	0.032
Final	3	0.032	0.068	0.102	0.124	0.133	0.124	0.101	0.069	0.032
Final	4	0.034	0.076	0.114	0.139	0.148	0.143	0.120	0.084	0.042

**CAMBER NOTE (SPAN 1-4):**

The initial deflection equals the upward deflection resulting from initial prestressing, less the downward deflection due to the dead load of the box beam, and with adjustments for the effects of creep and loss of prestress at the time of erection (assumed to be 60 days from casting).

Final deflection equals the deflection due to the dead load of the deck slab, barriers and the effects of long term creep and loss of prestress on the composite continuous box beams.

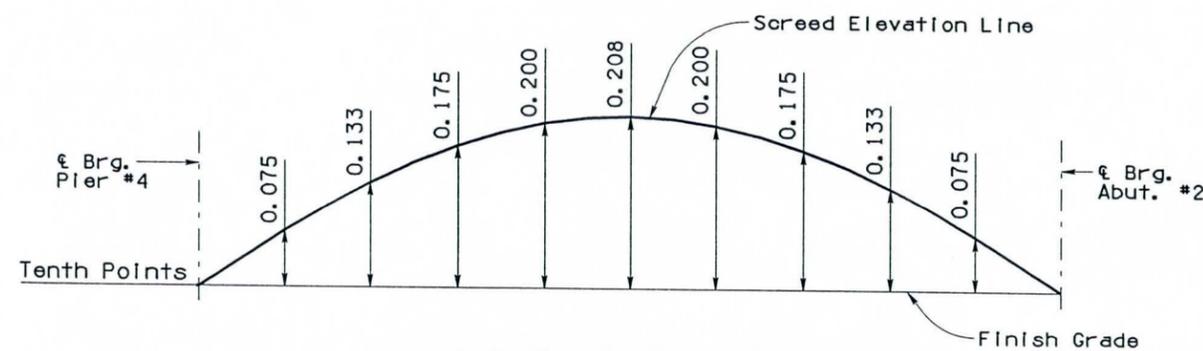
**SCREED NOTE (SPAN 1-4):**

The Screed Elevation Includes an allowance for the final deflection due to the dead load of the concrete deck slab, barrier and the effects of long term creep & loss of prestress.

Screed elevations shall be used in setting screeds regardless of the measured top of erected box beam elevations. (DO NOT USE FINISHED GRADE ELEVATIONS FOR SETTING SCREDS)

The top of erected box beam elevations shall be measured prior to setting deck formwork. The Contractor shall provide as-built top of box beam elevations at tenth points to the Engineer for verification of screed grade elevations.

The build-up shall be calculated based on the measured top of erected box beam elevation. The build-up equals the (screed elevation) minus (slab thickness of 5") minus (measured top of erected box beam elevation).



**SPAN 5 CAMBER DIAGRAM 2**  
(Dimensions are in feet)  
No Scale

**CAMBER/SCREED NOTE (SPAN 5):**

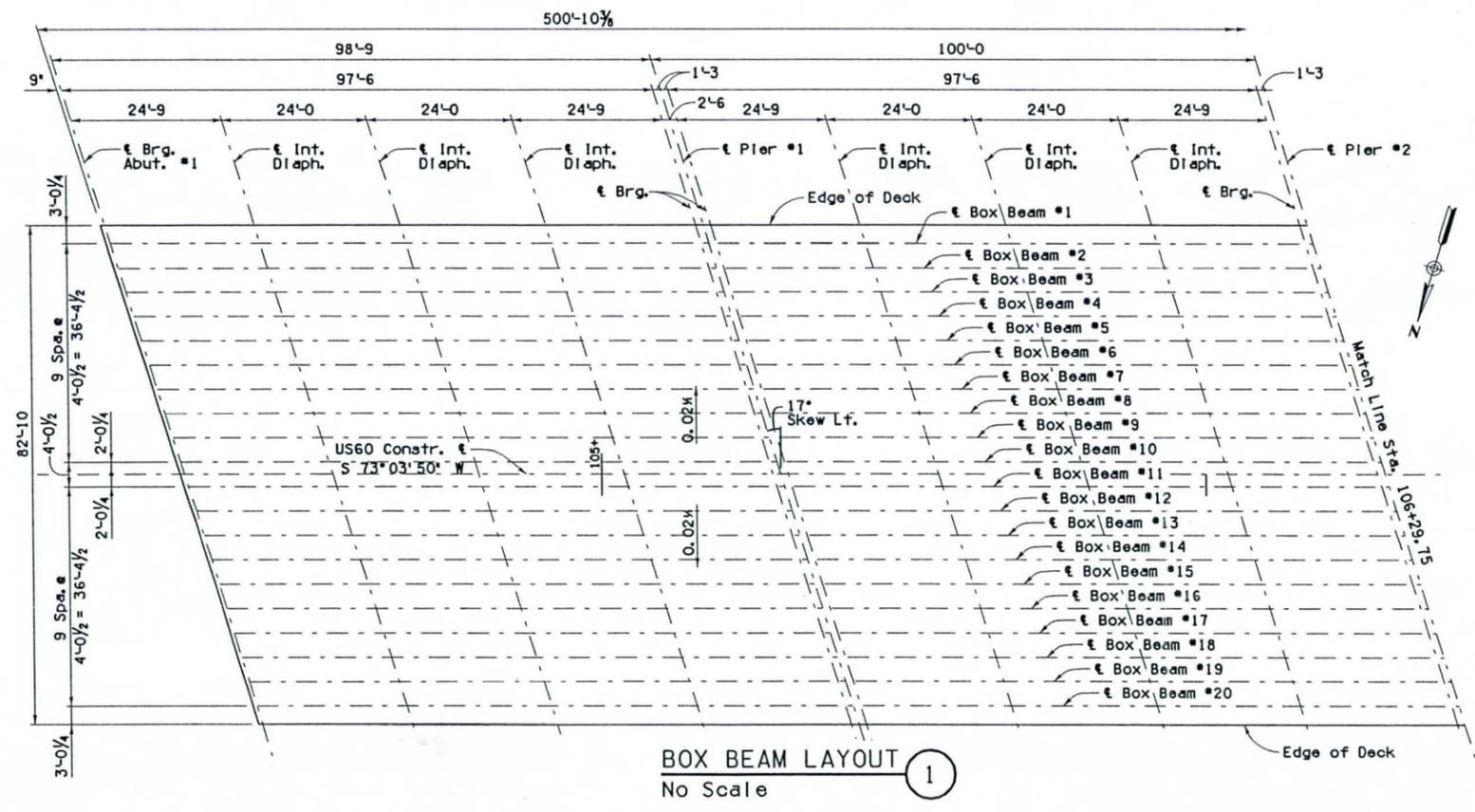
The Screed Elevation Includes an allowance for the final deflection due to the dead load of the concrete superstructure, barriers and the effects of long term creep.

Screed elevations shall be used in setting screeds. (DO NOT USE FINISHED GRADE ELEVATIONS FOR SETTING SCREDS)

BRIDGE DESIGN SECTION BY			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	7-04			
DESIGN CRD	H. Sung	7-04			
DRAWN	D. Benton	7-04			
DWG CRD	H. Sung	7-04			
APPROVED-PROJ. ENGINEER	L. Altuna			STA. 104+ HASSAYAMPA RIVER BRIDGE CAMBER AND SCREED DETAILS	CONSTRUCTION OR RECORDING
APPROVED-DESIGN LEADER	H. Sung				
US60	110.53	2818	LOCATION	WICKENBURG INTERIM BYPASS	
ROUTE	MILEPOST	STRUCTURE NO.			
TRACS NO. H 5825 01C			093-B-(008)		DWG. S-1.36 OF 41
					OF

BRIDGE SCREED ELEVATIONS ( SPANS #1 & #2)

	€ Brg. Abut. #1	0.1pt.	0.2pt.	0.3pt.	0.4pt.	0.5pt.	0.6pt.	0.7pt.	0.8pt.	0.9pt.	€ Pler #1	0.1pt.	0.2pt.	0.3pt.	0.4pt.	0.5pt.	0.6pt.	0.7pt.	0.8pt.	0.9pt.	€ Pler #2
LT. EDGE	2053.27	2053.42	2053.57	2053.71	2053.84	2053.94	2054.04	2054.11	2054.17	2054.22	2054.28	2054.41	2054.53	2054.66	2054.77	2054.86	2054.94	2055.00	2055.04	2055.08	2055.13
€ BEAM #1	2053.34	2053.49	2053.64	2053.78	2053.91	2054.01	2054.10	2054.18	2054.24	2054.29	2054.35	2054.48	2054.60	2054.73	2054.83	2054.93	2055.00	2055.06	2055.11	2055.15	2055.20
€ BEAM #2	2053.44	2053.58	2053.73	2053.87	2054.00	2054.11	2054.20	2054.27	2054.33	2054.38	2054.44	2054.57	2054.70	2054.82	2054.93	2055.02	2055.10	2055.15	2055.20	2055.24	2055.29
€ BEAM #3	2053.53	2053.68	2053.83	2053.97	2054.09	2054.20	2054.29	2054.37	2054.42	2054.48	2054.54	2054.66	2054.79	2054.91	2055.02	2055.11	2055.19	2055.25	2055.29	2055.33	2055.38
€ BEAM #4	2053.63	2053.77	2053.92	2054.06	2054.19	2054.29	2054.38	2054.46	2054.52	2054.57	2054.63	2054.75	2054.88	2055.00	2055.11	2055.20	2055.28	2055.34	2055.38	2055.42	2055.47
€ BEAM #5	2053.72	2053.87	2054.01	2054.15	2054.28	2054.39	2054.48	2054.55	2054.61	2054.66	2054.72	2054.84	2054.97	2055.09	2055.20	2055.29	2055.37	2055.43	2055.47	2055.51	2055.56
€ BEAM #6	2053.81	2053.96	2054.11	2054.25	2054.37	2054.48	2054.57	2054.64	2054.70	2054.75	2054.81	2054.94	2055.06	2055.18	2055.29	2055.39	2055.46	2055.52	2055.56	2055.60	2055.65
€ BEAM #7	2053.91	2054.05	2054.20	2054.34	2054.47	2054.57	2054.66	2054.74	2054.79	2054.85	2054.90	2055.03	2055.15	2055.28	2055.38	2055.48	2055.55	2055.61	2055.65	2055.69	2055.74
€ BEAM #8	2054.00	2054.15	2054.30	2054.44	2054.56	2054.67	2054.76	2054.83	2054.89	2054.94	2055.00	2055.12	2055.25	2055.37	2055.47	2055.57	2055.64	2055.70	2055.74	2055.78	2055.83
€ BEAM #9	2054.10	2054.24	2054.39	2054.53	2054.65	2054.76	2054.85	2054.92	2054.98	2055.03	2055.09	2055.21	2055.34	2055.46	2055.57	2055.66	2055.73	2055.79	2055.83	2055.87	2055.92
€ BEAM #10	2054.19	2054.34	2054.48	2054.62	2054.75	2054.85	2054.94	2055.02	2055.07	2055.12	2055.18	2055.30	2055.43	2055.55	2055.66	2055.75	2055.82	2055.88	2055.92	2055.96	2056.01
CONSTR €	2054.24	2054.38	2054.53	2054.67	2054.80	2054.90	2054.99	2055.06	2055.12	2055.17	2055.23	2055.35	2055.48	2055.60	2055.70	2055.80	2055.87	2055.93	2055.97	2056.01	2056.05
€ BEAM #11	2054.20	2054.35	2054.50	2054.64	2054.76	2054.87	2054.96	2055.03	2055.08	2055.14	2055.19	2055.32	2055.44	2055.56	2055.67	2055.76	2055.83	2055.89	2055.93	2055.97	2056.02
€ BEAM #12	2054.13	2054.28	2054.43	2054.57	2054.69	2054.80	2054.89	2054.96	2055.02	2055.07	2055.12	2055.25	2055.37	2055.49	2055.60	2055.69	2055.76	2055.82	2055.86	2055.90	2055.94
€ BEAM #13	2054.07	2054.21	2054.36	2054.50	2054.62	2054.73	2054.82	2054.89	2054.95	2055.00	2055.05	2055.18	2055.30	2055.42	2055.53	2055.62	2055.69	2055.75	2055.79	2055.83	2055.87
€ BEAM #14	2054.00	2054.15	2054.29	2054.43	2054.56	2054.66	2054.75	2054.82	2054.88	2054.93	2054.98	2055.11	2055.23	2055.35	2055.46	2055.55	2055.62	2055.68	2055.72	2055.76	2055.80
€ BEAM #15	2053.93	2054.08	2054.23	2054.36	2054.49	2054.59	2054.68	2054.75	2054.81	2054.86	2054.91	2055.04	2055.16	2055.28	2055.39	2055.48	2055.55	2055.61	2055.65	2055.69	2055.73
€ BEAM #16	2053.86	2054.01	2054.16	2054.30	2054.42	2054.52	2054.61	2054.68	2054.74	2054.79	2054.84	2054.97	2055.09	2055.21	2055.32	2055.41	2055.48	2055.53	2055.58	2055.62	2055.66
€ BEAM #17	2053.80	2053.94	2054.09	2054.23	2054.35	2054.46	2054.54	2054.61	2054.67	2054.72	2054.77	2054.90	2055.02	2055.14	2055.24	2055.34	2055.41	2055.46	2055.51	2055.54	2055.58
€ BEAM #18	2053.73	2053.88	2054.02	2054.16	2054.28	2054.39	2054.47	2054.55	2054.60	2054.65	2054.71	2054.83	2054.95	2055.07	2055.17	2055.26	2055.34	2055.39	2055.43	2055.47	2055.51
€ BEAM #19	2053.66	2053.81	2053.95	2054.09	2054.21	2054.32	2054.41	2054.48	2054.53	2054.58	2054.64	2054.76	2054.88	2055.00	2055.10	2055.19	2055.26	2055.32	2055.36	2055.40	2055.44
€ BEAM #20	2053.59	2053.74	2053.89	2054.02	2054.15	2054.25	2054.34	2054.41	2054.46	2054.51	2054.57	2054.69	2054.81	2054.93	2055.03	2055.12	2055.19	2055.25	2055.29	2055.33	2055.37
RT. EDGE	2053.54	2053.69	2053.84	2053.97	2054.10	2054.20	2054.29	2054.36	2054.41	2054.46	2054.51	2054.63	2054.76	2054.87	2054.98	2055.07	2055.14	2055.20	2055.24	2055.27	2055.31

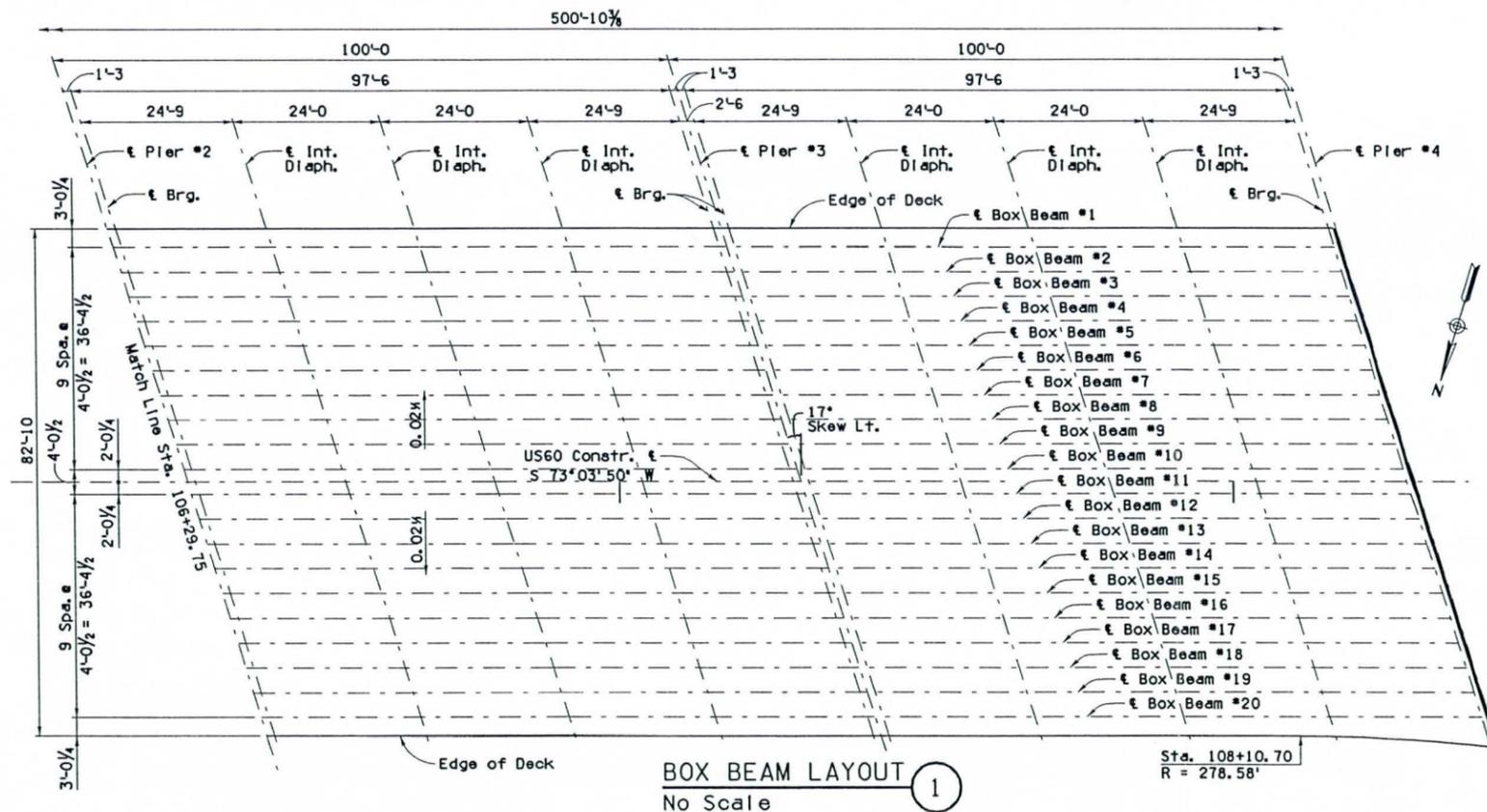


BOX BEAM LAYOUT 1  
No Scale

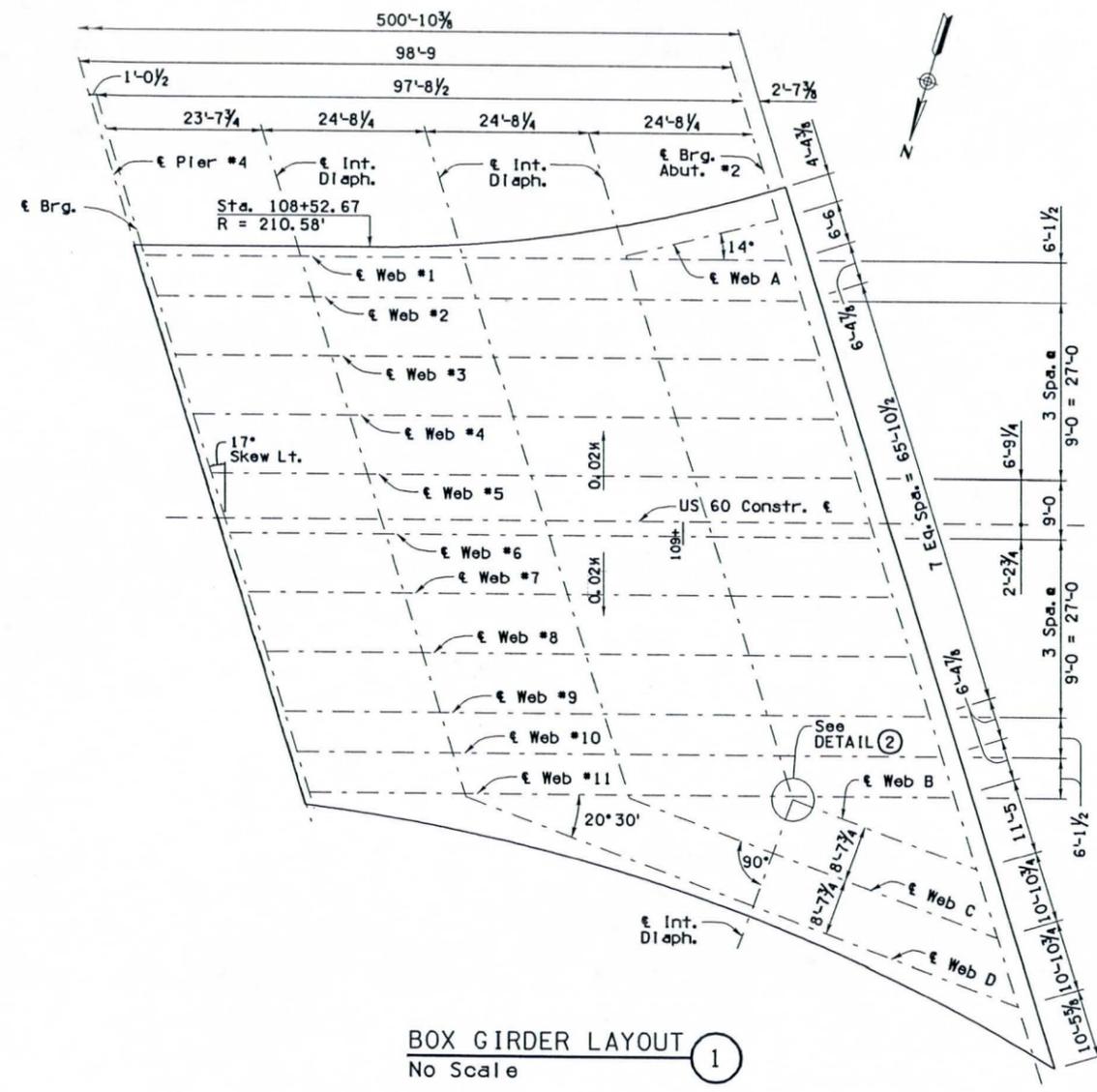
BRIDGE DESIGN SECTION BY		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	H. Sung	3-05		
DESIGN CKD	L. Altuna	4-05		
DRAWN	D. Benton	7-04		
DWG CKD	L. Altuna	4-05	STA. 104+ HASSAYAMPA RIVER BRIDGE SCREED ELEVATIONS (SPAN 1 & 2)	CONSTRUCTION OR RECORDING
APPROVED-PROJ. ENGINEER	L. Altuna			
APPROVED-DESIGN LEADER	H. Sung		LOCATION	DWG. S-137 OF 41
US60	110.53	2818	WICKENBURG INTERIM BYPASS	
ROUTE	MILEPOST	STRUCTURE NO.		
TRACS NO. H 5825 01C			093-B-(008)	OF

BRIDGE SCREED ELEVATIONS (SPANS #3 & #4)

	€ Pier #2	0.1pt.	0.2pt.	0.3pt.	0.4pt.	0.5pt.	0.6pt.	0.7pt.	0.8pt.	0.9pt.	€ Pier #3	0.1pt.	0.2pt.	0.3pt.	0.4pt.	0.5pt.	0.6pt.	0.7pt.	0.8pt.	0.9pt.	€ Pier #4	
LT. EDGE	2055.13	2055.24	2055.34	2055.45	2055.54	2055.62	2055.67	2055.71	2055.74	2055.77	2055.79	2055.88	2055.98	2056.07	2056.14	2056.20	2056.24	2056.27	2056.27	2056.27	2056.27	
€ BEAM #1	2055.20	2055.30	2055.41	2055.52	2055.61	2055.68	2055.74	2055.78	2055.81	2055.83	2055.86	2055.95	2056.04	2056.13	2056.21	2056.27	2056.31	2056.33	2056.34	2056.34	2056.34	2056.33
€ BEAM #2	2055.29	2055.39	2055.50	2055.61	2055.70	2055.77	2055.83	2055.87	2055.90	2055.92	2055.94	2056.03	2056.13	2056.22	2056.30	2056.35	2056.39	2056.42	2056.42	2056.42	2056.42	2056.42
€ BEAM #3	2055.38	2055.48	2055.59	2055.69	2055.79	2055.86	2055.92	2055.96	2055.98	2056.01	2056.03	2056.12	2056.22	2056.31	2056.38	2056.44	2056.48	2056.50	2056.51	2056.51	2056.51	2056.50
€ BEAM #4	2055.47	2055.57	2055.68	2055.78	2055.87	2055.95	2056.00	2056.04	2056.07	2056.09	2056.12	2056.21	2056.30	2056.39	2056.47	2056.53	2056.57	2056.59	2056.59	2056.59	2056.59	2056.59
€ BEAM #5	2055.56	2055.66	2055.77	2055.87	2055.96	2056.04	2056.09	2056.13	2056.16	2056.18	2056.21	2056.30	2056.39	2056.48	2056.56	2056.61	2056.65	2056.67	2056.68	2056.68	2056.68	2056.68
€ BEAM #6	2055.65	2055.75	2055.86	2055.96	2056.05	2056.13	2056.18	2056.22	2056.25	2056.27	2056.30	2056.38	2056.48	2056.57	2056.64	2056.70	2056.74	2056.76	2056.77	2056.76	2056.76	2056.76
€ BEAM #7	2055.74	2055.84	2055.95	2056.05	2056.14	2056.22	2056.27	2056.31	2056.34	2056.36	2056.38	2056.47	2056.57	2056.66	2056.73	2056.79	2056.83	2056.85	2056.85	2056.85	2056.85	2056.85
€ BEAM #8	2055.83	2055.93	2056.04	2056.14	2056.23	2056.30	2056.36	2056.40	2056.43	2056.45	2056.47	2056.56	2056.65	2056.74	2056.82	2056.87	2056.91	2056.93	2056.94	2056.94	2056.94	2056.93
€ BEAM #9	2055.92	2056.02	2056.13	2056.23	2056.32	2056.39	2056.45	2056.49	2056.51	2056.53	2056.56	2056.65	2056.74	2056.83	2056.90	2056.96	2057.00	2057.02	2057.02	2057.02	2057.02	2057.02
€ BEAM #10	2056.01	2056.11	2056.22	2056.32	2056.41	2056.48	2056.54	2056.58	2056.60	2056.62	2056.65	2056.73	2056.83	2056.92	2056.99	2057.05	2057.08	2057.10	2057.11	2057.11	2057.11	2057.10
CONSTR €	2056.05	2056.16	2056.26	2056.36	2056.45	2056.53	2056.58	2056.62	2056.65	2056.67	2056.69	2056.78	2056.87	2056.96	2057.03	2057.09	2057.13	2057.15	2057.15	2057.15	2057.15	2057.14
€ BEAM #11	2056.02	2056.12	2056.23	2056.33	2056.42	2056.49	2056.54	2056.58	2056.61	2056.63	2056.65	2056.74	2056.83	2056.92	2057.00	2057.05	2057.09	2057.11	2057.11	2057.11	2057.11	2057.11
€ BEAM #12	2055.94	2056.05	2056.15	2056.26	2056.34	2056.42	2056.47	2056.51	2056.54	2056.56	2056.58	2056.67	2056.76	2056.85	2056.92	2056.98	2057.01	2057.03	2057.04	2057.04	2057.04	2057.03
€ BEAM #13	2055.87	2055.98	2056.08	2056.18	2056.27	2056.34	2056.40	2056.44	2056.46	2056.48	2056.50	2056.59	2056.69	2056.77	2056.85	2056.90	2056.94	2056.96	2056.96	2056.96	2056.96	2056.95
€ BEAM #14	2055.80	2055.90	2056.01	2056.11	2056.20	2056.27	2056.32	2056.36	2056.39	2056.41	2056.43	2056.52	2056.61	2056.70	2056.77	2056.83	2056.86	2056.88	2056.89	2056.88	2056.88	2056.88
€ BEAM #15	2055.73	2055.83	2055.94	2056.04	2056.13	2056.20	2056.25	2056.29	2056.31	2056.33	2056.36	2056.44	2056.54	2056.62	2056.70	2056.75	2056.79	2056.81	2056.81	2056.81	2056.81	2056.80
€ BEAM #16	2055.66	2055.76	2055.86	2055.97	2056.05	2056.12	2056.18	2056.22	2056.24	2056.26	2056.28	2056.37	2056.46	2056.55	2056.62	2056.67	2056.71	2056.73	2056.73	2056.73	2056.73	2056.72
€ BEAM #17	2055.58	2055.69	2055.79	2055.89	2055.98	2056.05	2056.10	2056.14	2056.17	2056.19	2056.21	2056.29	2056.39	2056.47	2056.55	2056.60	2056.64	2056.66	2056.66	2056.65	2056.65	2056.65
€ BEAM #18	2055.51	2055.61	2055.72	2055.82	2055.91	2055.98	2056.03	2056.07	2056.09	2056.11	2056.13	2056.22	2056.31	2056.40	2056.47	2056.52	2056.56	2056.58	2056.58	2056.58	2056.57	2056.57
€ BEAM #19	2055.44	2055.54	2055.65	2055.75	2055.83	2055.91	2055.96	2055.99	2056.02	2056.04	2056.06	2056.15	2056.24	2056.32	2056.39	2056.45	2056.49	2056.50	2056.51	2056.50	2056.49	2056.49
€ BEAM #20	2055.37	2055.47	2055.57	2055.67	2055.76	2055.83	2055.88	2055.92	2055.95	2055.96	2055.99	2056.07	2056.16	2056.25	2056.32	2056.37	2056.41	2056.43	2056.43	2056.43	2056.42	2056.42
RT. EDGE	2055.31	2055.42	2055.52	2055.62	2055.71	2055.78	2055.83	2055.87	2055.89	2055.91	2055.93	2056.02	2056.11	2056.19	2056.26	2056.32	2056.35	2056.37	2056.37	2056.35	2056.33	2056.33



BRIDGE DESIGN SECTION BY:		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	H. Sung	3-05		
DESIGN CKD	L. Altuna	4-05		
DRAWN	D. Benton	7-04		
DWG CKD	L. Altuna	4-05		
APPROVED-PROJ. ENGINEER L. Altuna			STA. 104+ HASSAYAMPA RIVER BRIDGE SCREED ELEVATIONS (SPAN 3 & 4)	DWG. S-138 OF 41
APPROVED-DESIGN LEADER H. Sung				
US60	110.53	2818	LOCATION WICKENBURG INTERIM BYPASS	093-B-(008)
ROUTE	MILEPOST	STRUCTURE NO.	TRACS NO. H 5825 OIC	



BRIDGE SCREED ELEVATIONS (SPAN #5)

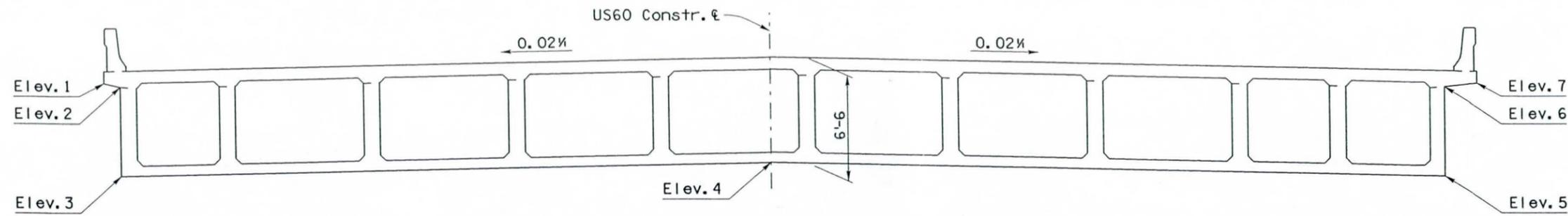
	€	€ Pier #4	0.1pt.	0.2pt.	0.3pt.	0.4pt.	0.5pt.	0.6pt.	0.7pt.	0.8pt.	0.9pt.	€ Brg. Abut. #2
LT. EDGE	2056.29	2056.40	2056.50	2056.55	2056.61	2056.64	2056.64	2056.64	2056.61	2056.56	2056.48	2056.38
€ WEB #1	2056.30	2056.41	2056.51	2056.58	2056.64	2056.68	2056.70	2056.70	2056.70	2056.68	2056.65	2056.59
€ WEB #2	2056.43	2056.54	2056.64	2056.71	2056.77	2056.81	2056.82	2056.82	2056.83	2056.81	2056.77	2056.72
€ WEB #3	2056.62	2056.73	2056.83	2056.90	2056.96	2056.99	2057.01	2057.01	2056.99	2056.99	2056.96	2056.90
€ WEB #4	2056.81	2056.92	2057.01	2057.09	2057.14	2057.18	2057.20	2057.20	2057.18	2057.14	2057.09	
€ WEB #5	2057.00	2057.11	2057.20	2057.28	2057.33	2057.37	2057.39	2057.39	2057.37	2057.33	2057.27	
CONSTR €	2057.14	2057.25	2057.35	2057.42	2057.47	2057.51	2057.53	2057.53	2057.51	2057.47	2057.41	
€ WEB #6	2057.10	2057.21	2057.30	2057.38	2057.43	2057.47	2057.48	2057.48	2057.46	2057.43	2057.37	
€ WEB #7	2056.93	2057.04	2057.13	2057.20	2057.26	2057.29	2057.31	2057.31	2057.29	2057.25	2057.19	
€ WEB #8	2056.76	2056.87	2056.96	2057.03	2057.09	2057.12	2057.14	2057.14	2057.12	2057.08	2057.02	
€ WEB #9	2056.59	2056.70	2056.79	2056.86	2056.91	2056.95	2056.96	2056.96	2056.94	2056.90	2056.84	
€ WEB #10	2056.48	2056.58	2056.67	2056.74	2056.80	2056.83	2056.85	2056.84	2056.82	2056.78	2056.72	
€ WEB #11	2056.36	2056.47	2056.56	2056.63	2056.68	2056.71	2056.73	2056.72	2056.70	2056.66	2056.60	
RT. EDGE	2056.33	2056.41	2056.46	2056.49	2056.49	2056.46	2056.40	2056.31	2056.19	2056.03	2055.84	

BRIDGE SCREED ELEVATIONS (SPAN #5)

	€ Brg. Pier #4	0.1pt.	0.2pt.	0.3pt.	0.4pt.	0.5pt.	0.6pt.	0.7pt.	0.8pt.	0.9pt.	€ Brg. Abut. #2
€ WEB A	-	-	-	-	-	-	-	-	2056.65	2056.56	2056.46
€ WEB B	-	-	-	-	-	-	-	-	2056.65	2056.53	2056.39
€ WEB C	-	-	-	-	-	2056.70	2056.64	2056.55	2056.45	2056.33	2056.19
€ WEB D	-	-	-	2056.58	2056.55	2056.50	2056.44	2056.35	2056.25	2056.13	2055.98

BOX GIRDER LAYOUT 1  
No Scale

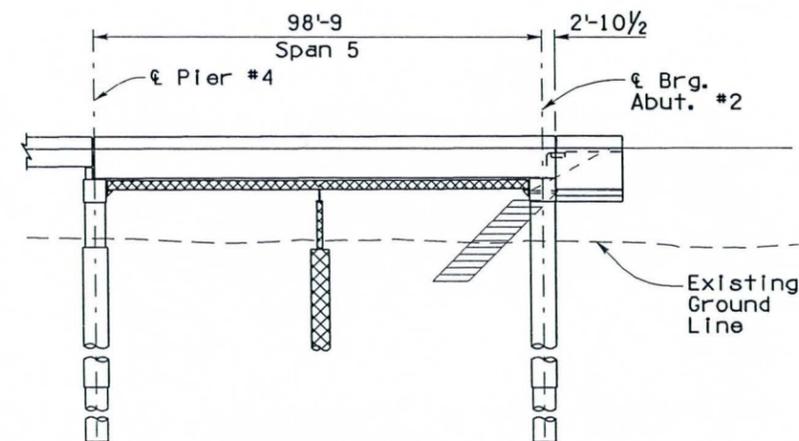
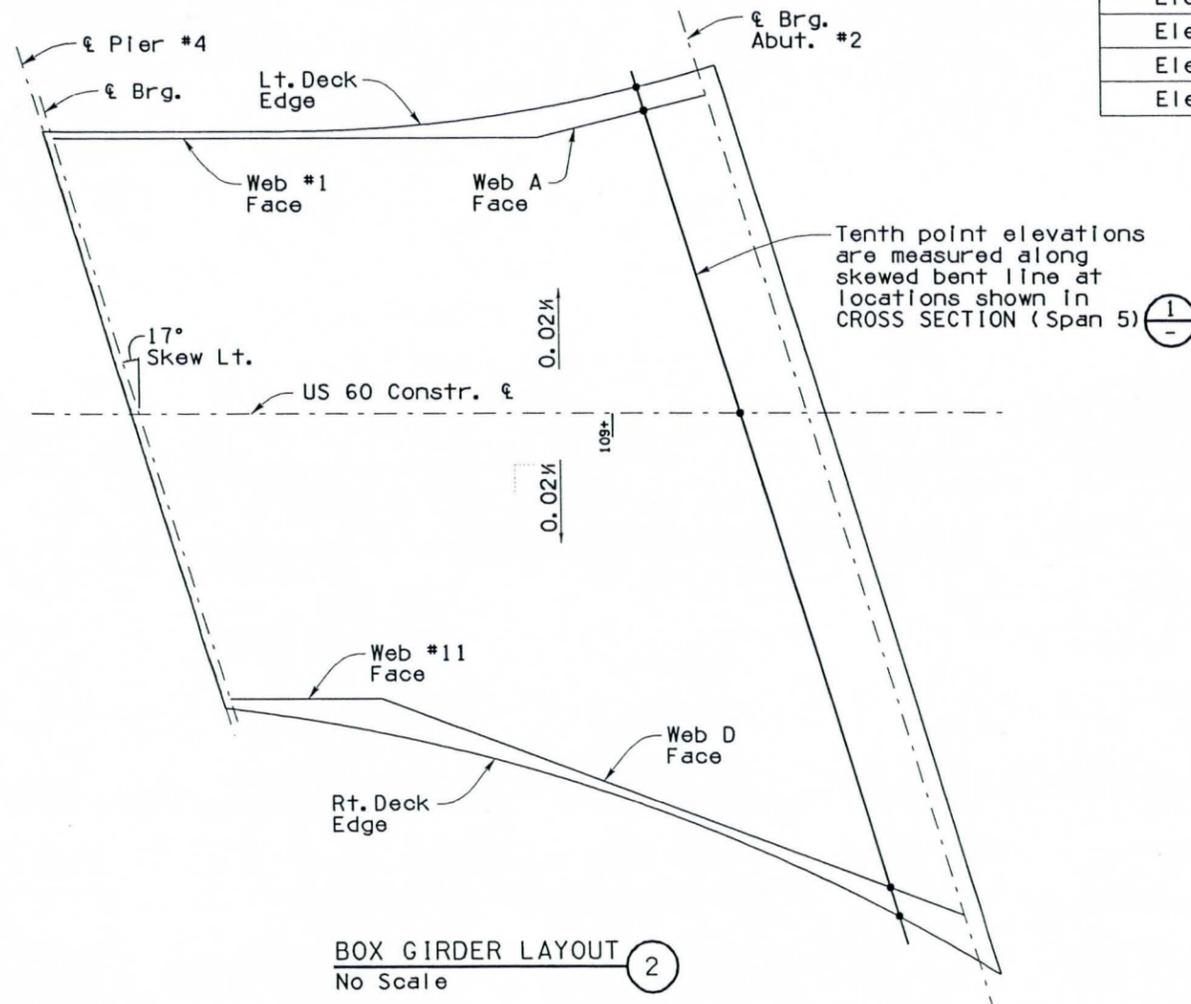
BRIDGE DESIGN SECTION #			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	H. Sung	3-05			
DESIGN CKD	L. Altuna	4-05			
DRAWN	D. Benton	7-04			
DWG CKD	L. Altuna	4-05		STA. 104+ HASSAYAMPA RIVER BRIDGE SCREED ELEVATIONS (SPAN 5)	DWG. S-1.39 OF 41
APPROVED-PROJ. ENGINEER	L. Altuna				
APPROVED-DESIGN LEADER	H. Sung			LOCATION WICKENBURG INTERIM BYPASS	093-B-(008)
US60	110.53	2818			
ROUTE	MILEPOST	STRUCTURE NO.			



CROSS SECTION (Span 5)  
 C. I. P CONCRETE BOX GIRDER ①  
 Scale: 1/4" = 1'-0"

BRIDGE FALSEWORK ELEVATIONS (SPAN #5)

	℄ Pier #4	0.1pt.	0.2pt.	0.3pt.	0.4pt.	0.5pt.	0.6pt.	0.7pt.	0.8pt.	0.9pt.	℄ Brg. Abut. #2
Elev. 1	2055.54	2055.65	2055.75	2055.80	2055.86	2055.89	2055.89	2055.86	2055.81	2055.73	2055.63
Elev. 2	2055.29	2055.40	2055.50	2055.57	2055.63	2055.67	2055.69	2055.69	2055.64	2055.55	2055.45
Elev. 3	2049.79	2049.90	2050.00	2050.07	2050.13	2050.17	2050.19	2050.19	2050.14	2050.05	2049.95
Elev. 4	2050.64	2050.75	2050.85	2050.92	2050.97	2051.01	2051.03	2051.03	2051.01	2050.97	2050.91
Elev. 5	2049.85	2049.96	2050.05	2050.07	2050.04	2049.99	2049.93	2049.84	2049.74	2049.62	2049.47
Elev. 6	2055.35	2055.46	2055.55	2055.57	2055.54	2055.49	2055.43	2055.34	2055.24	2055.12	2054.97
Elev. 7	2055.58	2055.66	2055.71	2055.74	2055.74	2055.71	2055.65	2055.56	2055.44	2055.28	2055.09



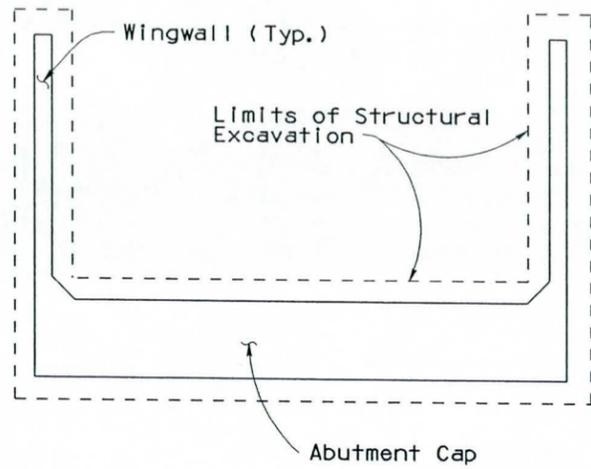
**FALSEWORK NOTE:**

In addition to the requirements of ADOT Std. Spec. Sect. 601-3.02, falsework shall be designed for stream forces and scour depth equal to the 15yr storm event:  
 Q15 = xxxx cfs  
 HW15 = xxxx ft  
 V15 = xx fps

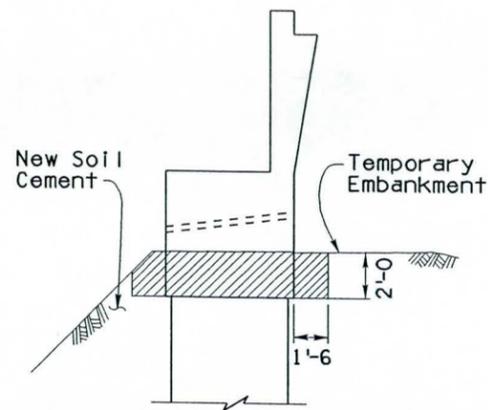
Temporary falsework foundations shall be constructed to a sufficient depth below the scour elevation to resist applied vertical and horizontal loads, and after use, shall be removed to a min. 2 feet below channel bottom (El. 2033 ft).  
 Cost of falsework shall be considered as incidental to the item for Structural Concrete (Class S) (f'c = 5000 psi.)

BRIDGE DESIGN SECTION BY			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP		PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	4-05	STA. 104+ HASSAYAMPA RIVER BRIDGE FALSEWORK ELEVATIONS (SPAN 5)			
DESIGN CKD	H. Sung	4-05				
DRAWN	L. Altuna	4-05	LOCATION WICKENBURG INTERIM BYPASS			
DWG CKD	H. Sung	4-05				
APPROVED-PROJ. ENGINEER	L. Altuna		093-B-(008)			
APPROVED-DESIGN LEADER	H. Sung					
ROUTE	MILEPOST	STRUCTURE NO.	TRACS NO. H 5825 01C			OF
US60	110.53	2818				

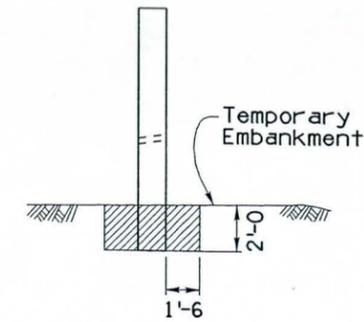
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
93 YV 198					



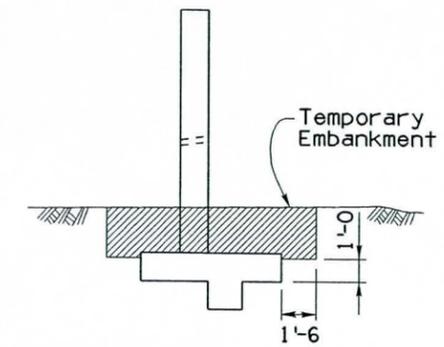
TYPICAL ABUTMENT PLAN



TYPICAL ABUTMENT SECTION  
(Abut. #1 shown, Abut. #2 similar)



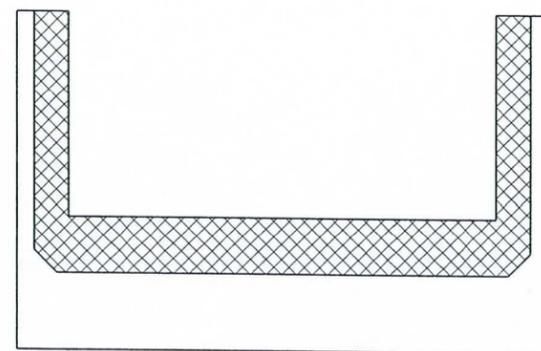
ABUT. #1 WING WALL SECTION



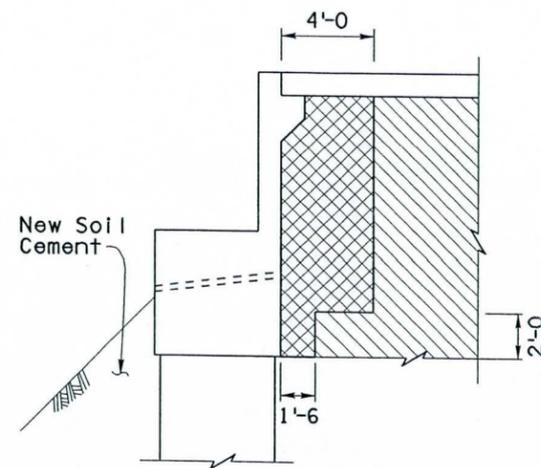
ABUT. #2 WING WALL SECTION

**LEGEND**  
 Structural Excavation

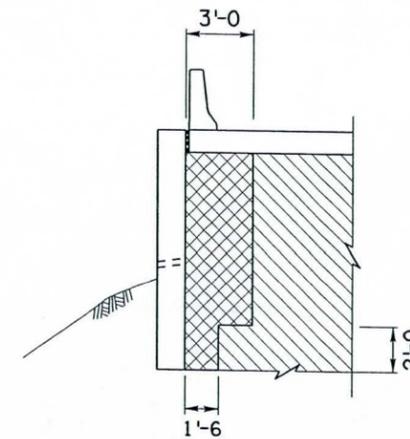
STRUCTURAL EXCAVATION LIMITS



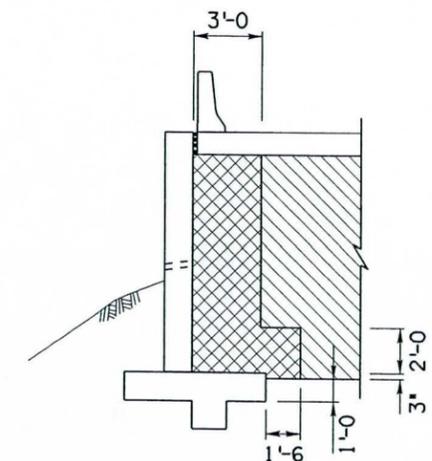
TYPICAL ABUTMENT PLAN



TYPICAL ABUTMENT SECTION  
(Abut. #1 shown, Abut. #2 similar)



ABUT. #1 WING WALL SECTION



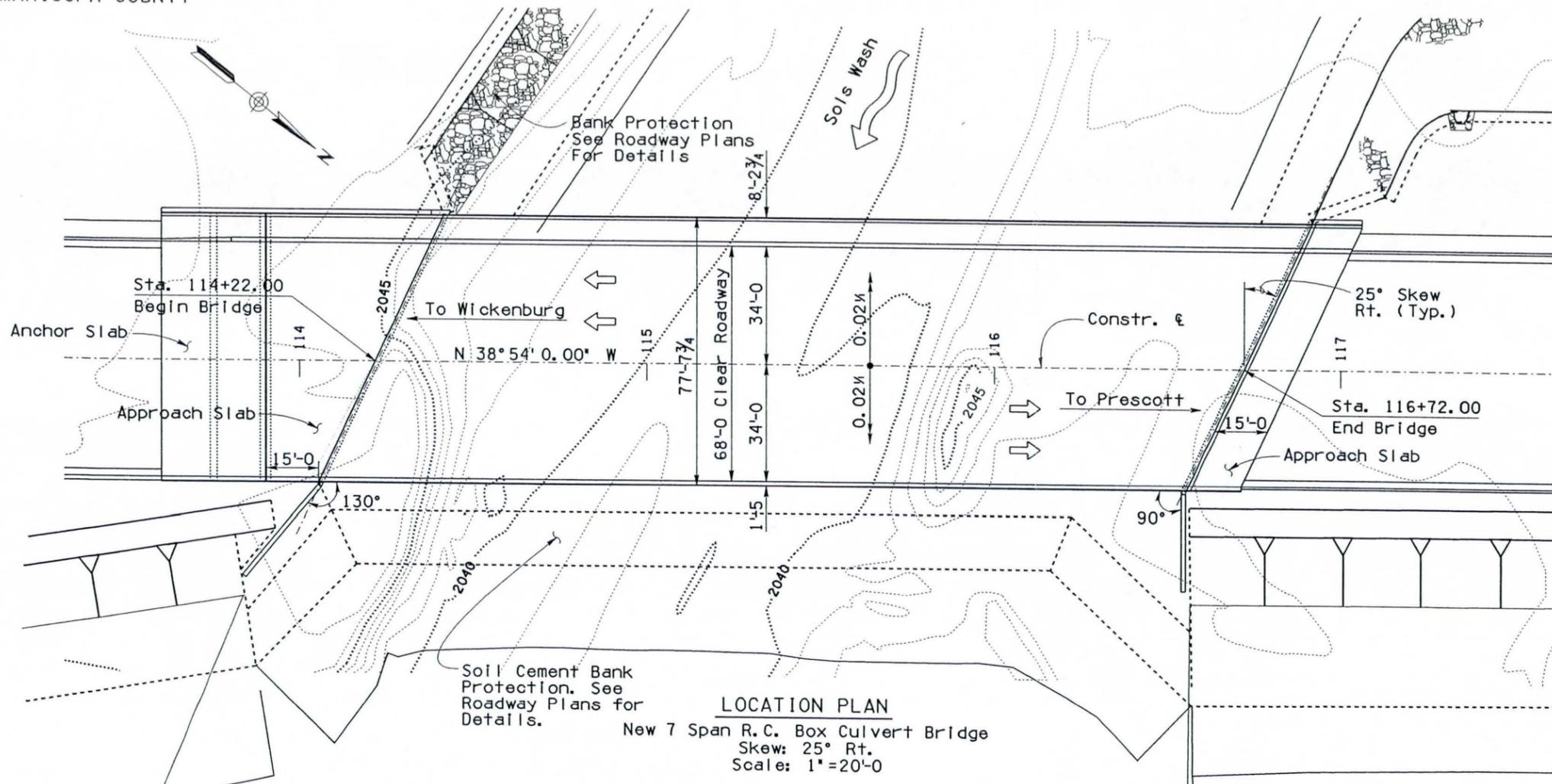
ABUT. #2 WING WALL SECTION

**LEGEND**  
 Roadway Embankment  
 See special Provisions  
 203 - 10.03 (A) and  
 203 - 10.03 (B) (1).  
 Structure Backfill

STRUCTURE BACKFILL LIMITS

BRIDGE DESIGN SECTION #'S	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP		PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna 7-04	<b>STA. 104+ HASSAYAMPA RIVER BRIDGE STRUCT. EXCAVATION AND BACKFILL</b>		DWG. 5-1.41 OF 41 OF
DESIGN CKD	H. Sung 7-04			
DRAWN	D. Benton 7-04			
DWG CKD	H. Sung 7-04			
APPROVED-PROJ. ENGINEER	L. Altuna	LOCATION <b>WICKENBURG INTERIM BYPASS</b>		
APPROVED-DESIGN LEADER	H. Sung			
US60	110.53	2818		
ROUTE	MILEPOST	STRUCTURE NO.		
TRACS NO. H 5825 01C		093-B-(008)		

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
093 YV 198					



**SHEET LIST**

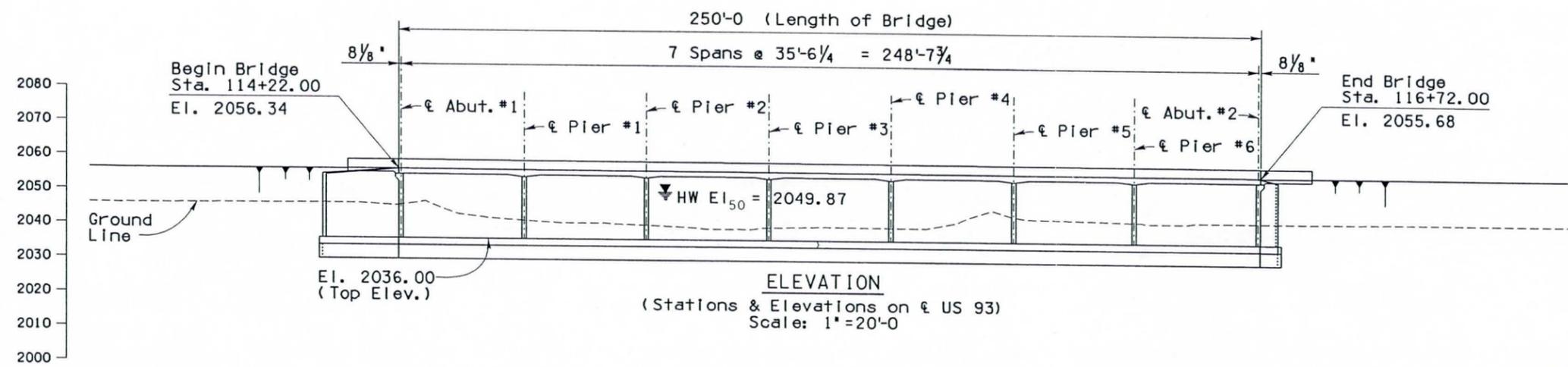
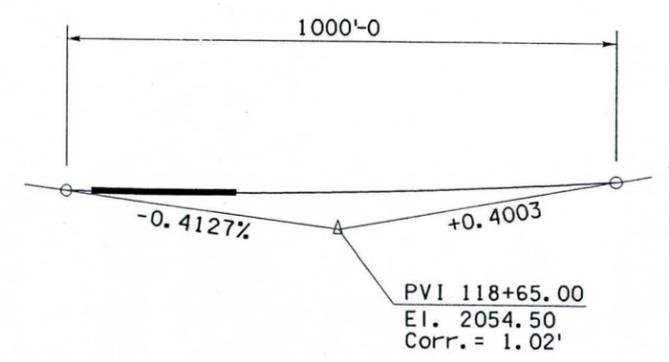
TITLE	DRAWING NO.
GENERAL PLAN	S-2.1
QUANTITIES AND TYPICAL SECTION	S-2.2
FOUNDATION LAYOUT	S-2.3
FOUNDATION DETAILS	S-2.4
ABUTMENT #1 PLAN AND ELEVATION	S-2.5
ABUTMENT #2 PLAN AND ELEVATION	S-2.6
ABUTMENT WINGWALL ELEVATIONS	S-2.7
WINGWALL DETAILS	S-2.8
PIER PLAN & ELEVATION	S-2.9
DECK PLAN	S-2.10
DECK DETAILS	S-2.11
SEPARATION BARRIER & RAILING 1	S-2.12
SEPARATION BARRIER & RAILING 2	S-2.13
MISCELLANEOUS DETAILS	S-2.14
STRUCTURAL EXCAVATION AND BACKFILL	S-2.15

**SD SHEET LIST**

CONCRETE BARRIER AND TRANSITION	SD-1.01
THREE-BEAM GUARD RAIL TRANSITION	SD-1.03
APPROACH SLAB DETAILS	SD-2.01
ANCHOR SLAB DETAILS	SD-2.03

**SF SHEET LIST**

FOUNDATION DATA	SF-2.1 Thru SF-2.x
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**HYDRAULIC DATA**

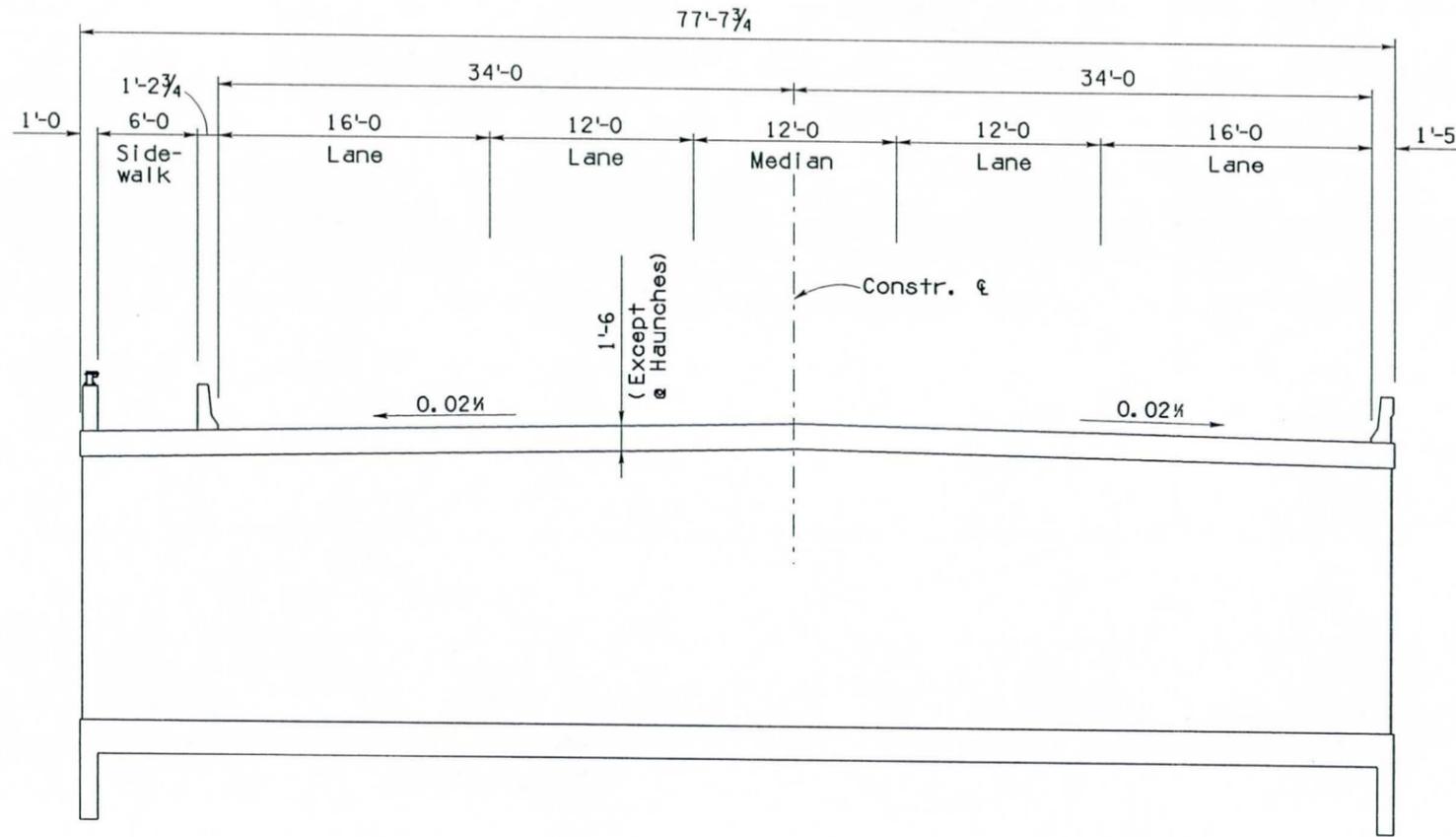
Q 50	= 12,453 cfs
Q 100	= 15,045 cfs
HW 50	= 2049.87 ft.
HW 100	= 2052.07 ft.

**TOP OF DECK STATIONS & ELEVATIONS ALONG CONSTR. E**

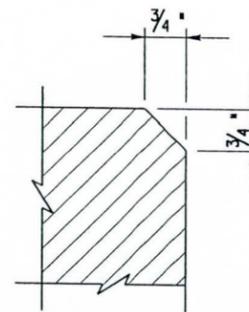
	E ABUT. #1	E PIER #1	E PIER #2	E PIER #3	E PIER #4	E PIER #5	E PIER #6	E ABUT. #2
Station	114+22.69	114+58.21	114+93.73	115+29.25	115+64.77	116+00.29	116+35.81	116+71.33
Elevation	2056.34	2056.21	2056.10	2056.00	2055.90	2055.82	2055.74	2055.68

BRIDGE DESIGN SECTION B'			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	7-04			
DESIGN CKD	D. Benton	7-04			
DRAWN	S. Nickel	7-04			
DWG CKD	D. Benton	8-04			
APPROVED-PROJ. ENGINEER	L. Altuna		STA. 114+ SOLS WASH BRIDGE GENERAL PLAN		
APPROVED-DESIGN LEADER	H. Sung				
US93 ROUTE	199.50 MILEPOST	2819 STRUCTURE NO.	LOCATION	WICKENBURG INTERIM BYPASS	DWG. S-21 OF
TRACS NO. H 5825 OIC			093-B-(008)		OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
093 YV 198					



TYPICAL SECTION  
Scale: 3/16" = 1'-0"



Chamfer all exposed corners thus unless otherwise noted. This note applicable to all sheets pertaining to the structure.

CHAMFER DETAIL

GENERAL NOTES:

Construction Specification - Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, Edition of 2000.

Design Specifications - AASHTO Standard Specifications for Highway Bridges, 17th Edition, 2002.

Dead Load - Dead Load includes allowance of 25 pounds per square foot for future wearing surface.

Loading Class - HS20-44 and/or Interstate Alternate Loading.

Seismic Performance Category \* (Acc = 0.035 g)

Inventory and operating ratings for HS20-44 are in accordance with AASHTO Manual for Condition Evaluation of Bridges, Edition of 1994 in accordance with the Load Factor Method.

Inventory Rating HS-\*\*\*\*  
Operating Rating HS-\*\*\*\*

All concrete shall be Class 'S' unless noted otherwise.

Reinforcing steel shall conform to ASTM Specification A615. All reinforcing shall be furnished as Grade 60.

All bends and hooks shall meet the requirements of AASHTO Article 8.23. All bend dimensions for reinforcing steel shall be out-to-out of bars. All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise.

All reinforcing steel shall have 2 inch clear cover unless noted otherwise.

Stresses:

- Superstructure except barriers ... f'c = 4500 psi
- Barriers ..... f'c = 4000 psi
- Substructure (Footings and Bottom Slab) ..... f'c = 3000 psi
- Substructure (Abutments, Wingwalls and Piers) ..... f'c = 3500 psi
- All other Class 'S' concrete ..... f'c = 3000 psi
- Grade 60 Longitudinal deck Reinf.. fs = 20000 psi
- All other Grade 60 ..... fs = 24000 psi

Barriers shall be constructed after spans have taken dead load deflection. Barriers shall not be slip formed.

Dimensions shall not be scaled from drawings.

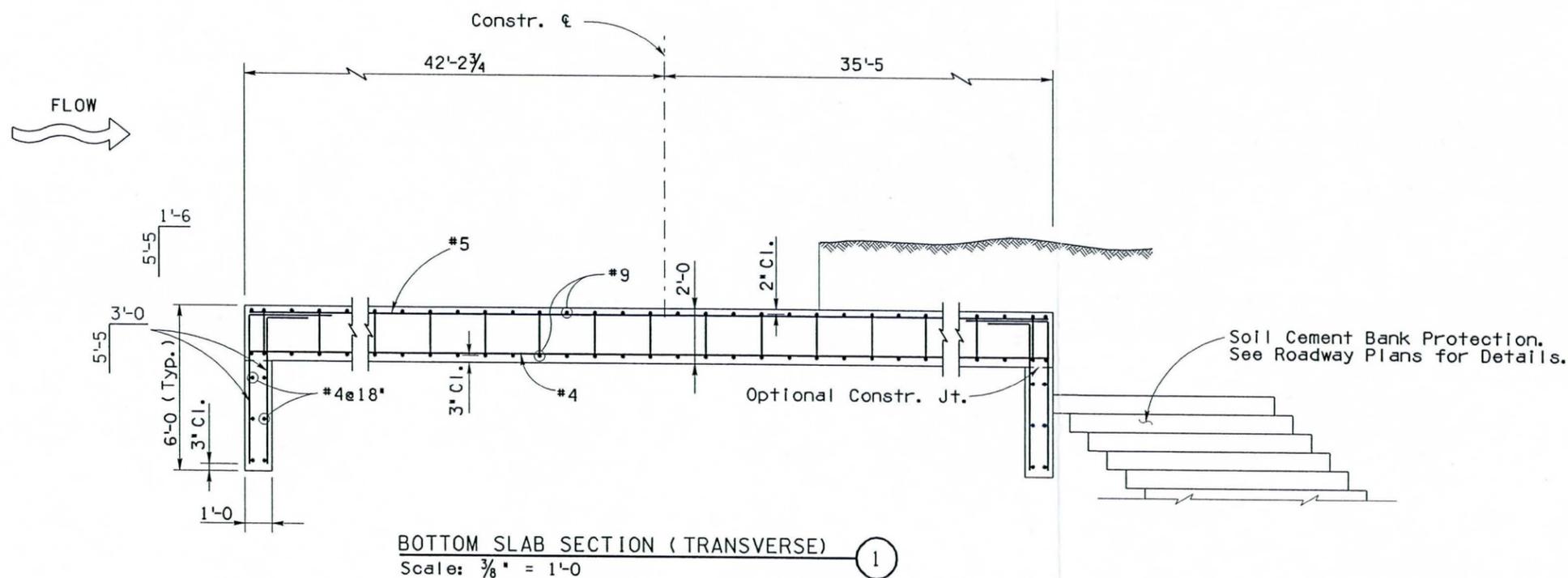
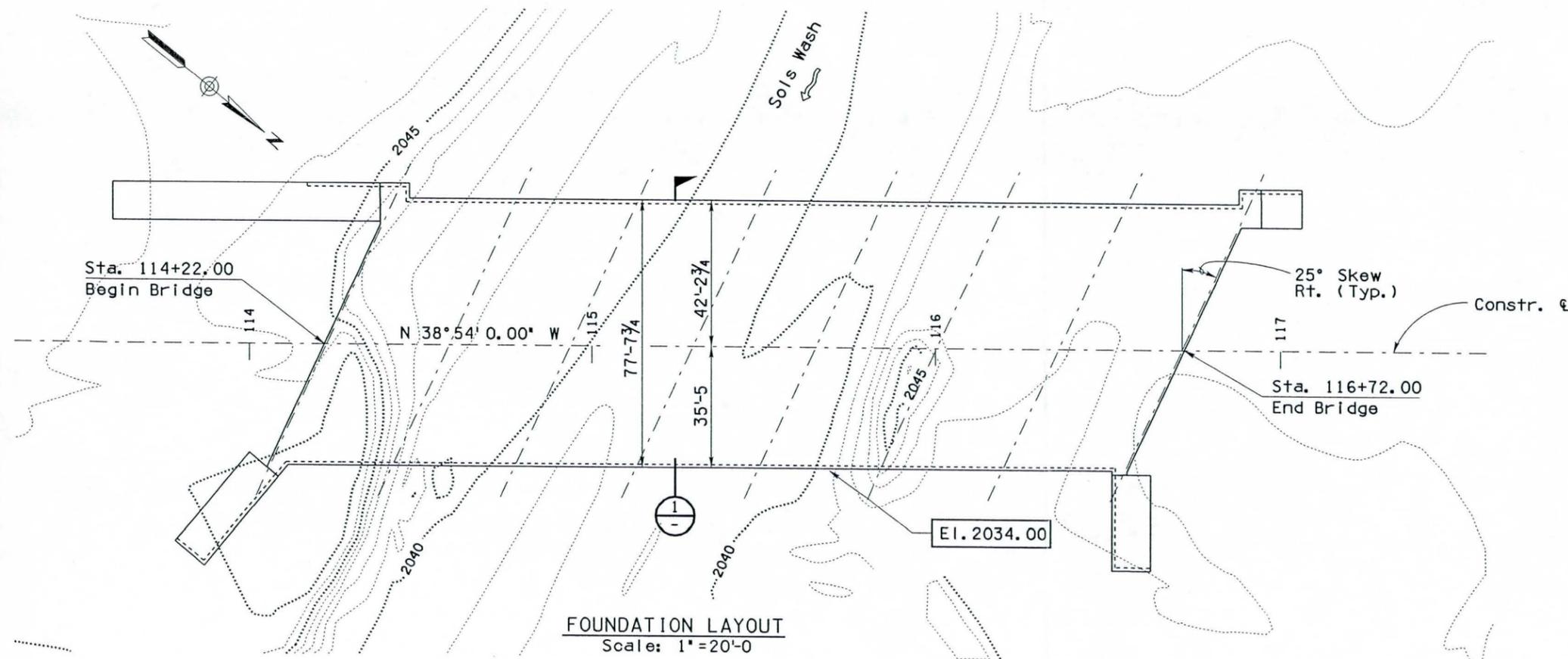
ITEM	APPROXIMATE QUANTITIES					REINFORCING STEEL LBS.
	STRUC. EXCAV. C. Y.	STRUC. BKFILL. C. Y.	CLASS 'S' CONCRETE			
			f' c=3000psi C. Y.	f' c=3500psi C. Y.	f' c=4500psi C. Y.	
Substructure	5117	631	1664	698		555775
Superstructure					1136	249865
TOTAL	5117	631	1664	698	1136	805640
As-built Total						

F-Shape Bridge Concrete Barrier (SD-1.01, 32 inch)	657 LF
Approach Slab (SD-2.01)	3727 SF
Concrete Bridge Parapet and Rail	346 LF
Three Beam Guard Rail Transition System (SD-1.03)	2 EA
Type 2 Anchor Slab (SD-2.03)	2330 SF

BRIDGE DESIGN SECTION 'B'			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Altuna	7-04			
DESIGN CKD	D. Benton				
DRWN	S. Nickel	7-04			
DWG CKD	D. Benton			STA. 114+ SOLS WASH BRIDGE	
APPROVED-PROJ. ENGINEER	L. Altuna			GENERAL NOTES AND QUANTITIES	
APPROVED-DESIGN LEADER	H. Sung			WICKENBURG INTERIM BYPASS	
US93	199.50	2819	LOCATION	WICKENBURG INTERIM BYPASS	
ROUTE	MILEPOST	STRUCTURE NO.		093-B-(008)	
TRACS NO. H 5825 01C				OF	

F.H.M.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

093 YV 198



**NOTE:**

Allowable Bearing Pressure = X.X ksf  
Modulus of Subgrade Reaction = XXX pci/in.

☐ Denotes Bottom of Footing Elevations

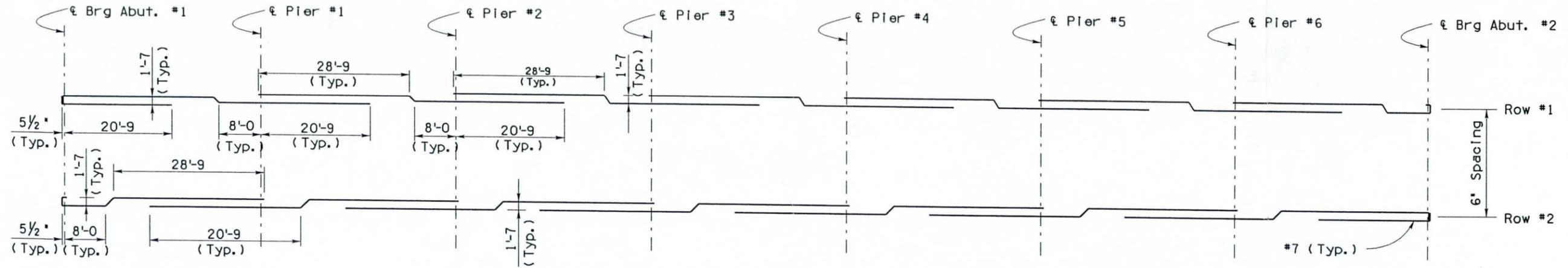
**CONSTRUCTION JOINT NOTE:**

At Contractor's option, transverse construction joints may be provided at 6'-0" from € Pier.

BRIDGE DESIGN SECTION BY		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	D. Benton	7-04		
DESIGN CKD	L. Alfuna	7-04		
DRAWN	C. D'Andrea	7-04		
DWG CKD	D. Benton	7-04	STA. 114+ SOLS WASH BRIDGE FOUNDATION LAYOUT	DWG. 5-23 OF
APPROVED-PROJ. ENGINEER	D. Benton			
APPROVED-DESIGN LEADER	H. Sung		LOCATION WICKENBURG INTERIM BYPASS	OF
ROUTE	US93	MILEPOST 199.50		
TRACS NO. H 5825 01C			093-B-(008)	

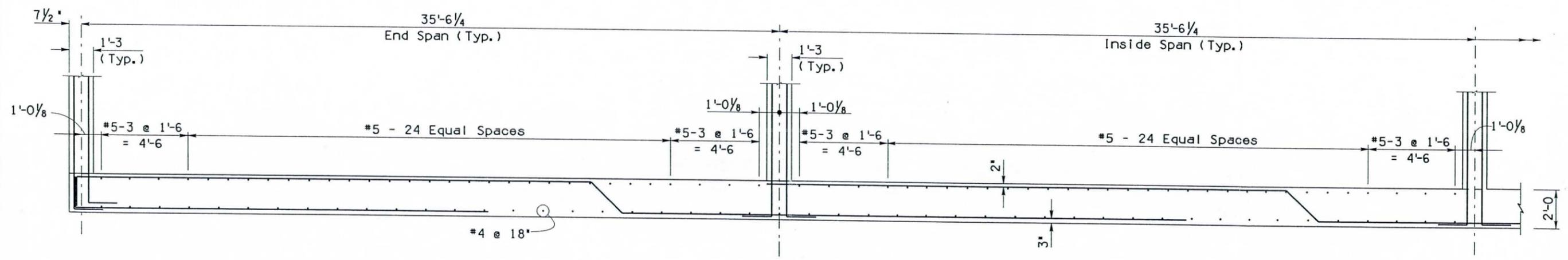
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

093 YV 198



REINFORCING PLACING DIAGRAM  
Scale:  $\frac{3}{32}$ " = 1'-0"

NOTE:  
All Bars are #9 Except As Noted.  
Row #1 and Row #2 to be Placed  
Alternately at 6' Spacing.

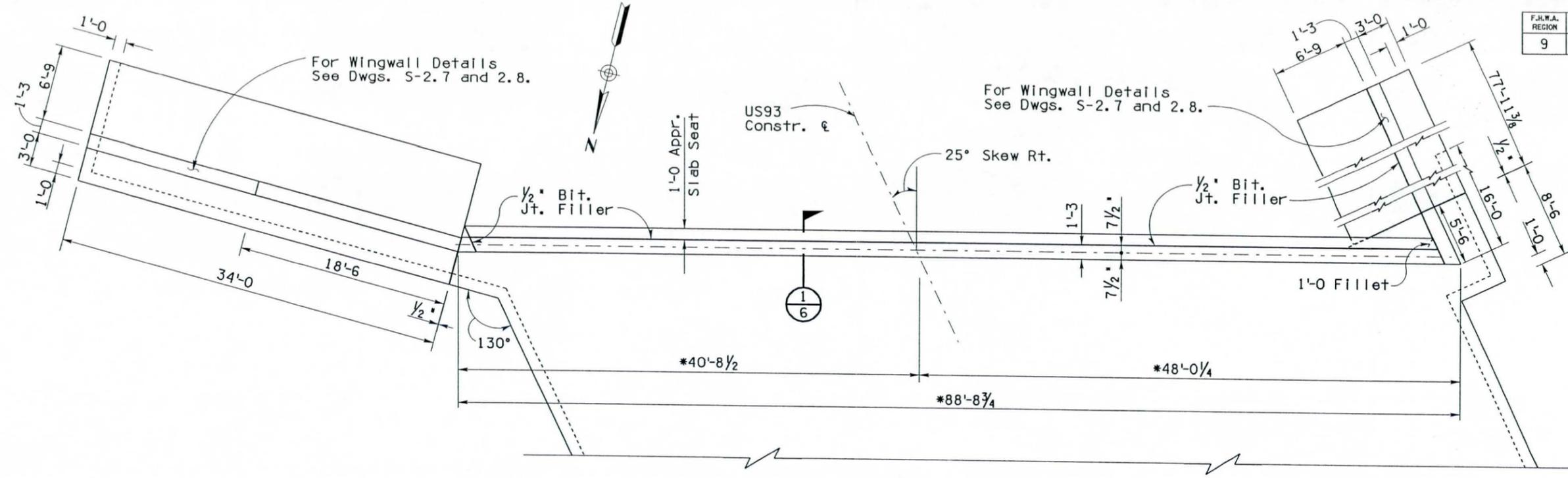


BOTTOM SLAB SECTION (LONGITUDINAL)  
(Row #1 shown, for Row #2 see REINFORCING PLACING DIAGRAM)  
Scale:  $\frac{3}{8}$ " = 1'-0"

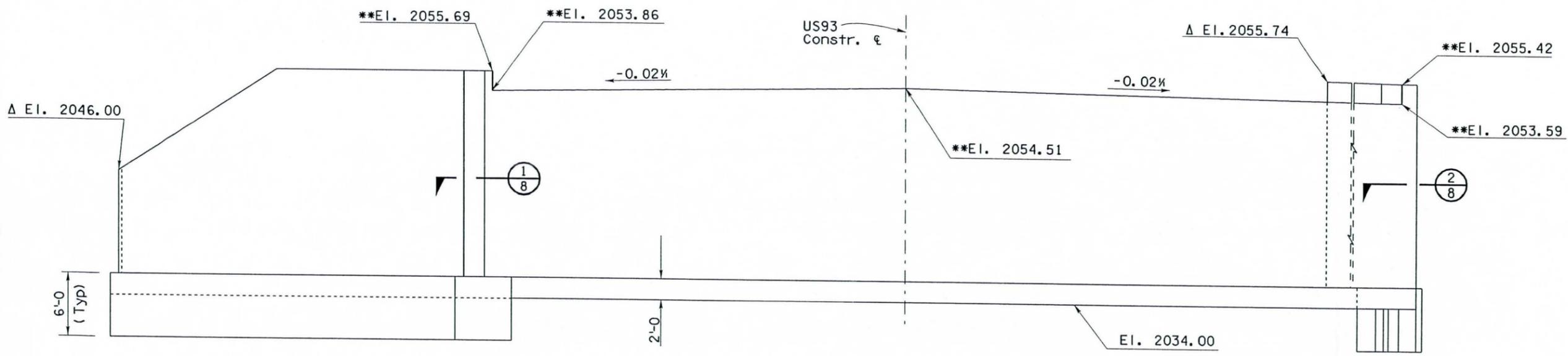
2

BRIDGE DESIGN SECTION BY			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	D. Benton	7-04			
DESIGN CKD	L. Altuna	7-04			
DRAWN	C. D'Andrea	7-04			
DWG CKD	D. Benton	7-04			
APPROVED-PROJ. ENGINEER	L. Altuna	7-04		STA. 114+ SOLS WASH BRIDGE FOUNDATION DETAILS	DWG. 5-24 OF
APPROVED-DESIGN LEADER	H. Sung				
US93	199.50	2819	LOCATION		
ROUTE	MILEPOST	STRUCTURE NO.	WICKENBURG INTERIM BYPASS		
TRACS NO. H 5825 01C			093-B-(008)		OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
093 YV 198					



**PLAN**  
Abutment #1, Looking Back Station  
Scale: 3/16" = 1'-0"



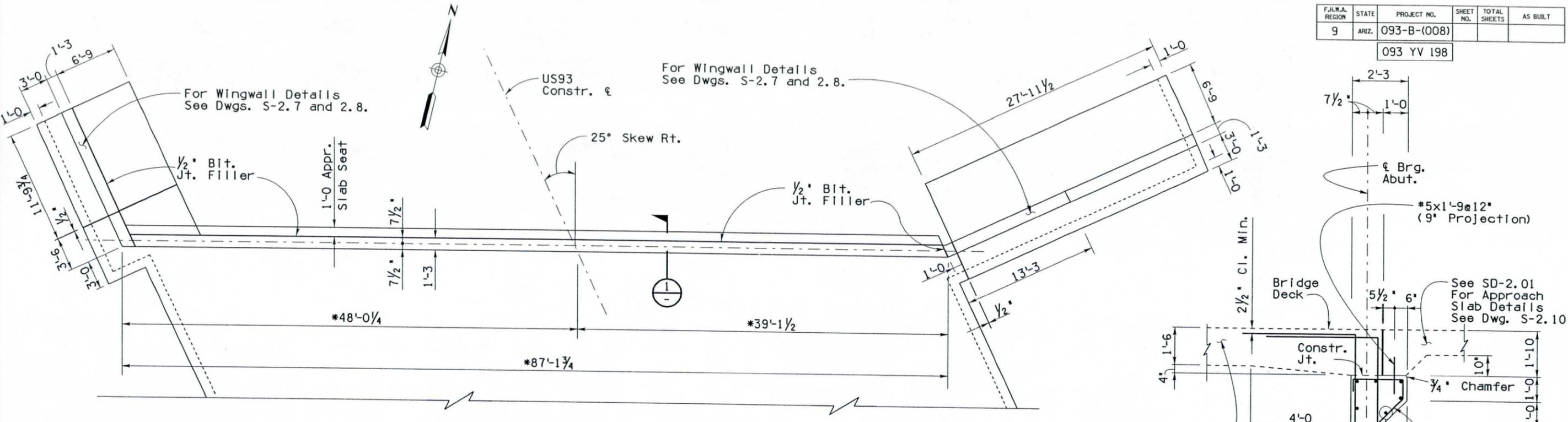
**ELEVATION**  
Scale: 3/16" = 1'-0"

- NOTES:**
- Superstructure not shown for clarity.
  - \* Measured at Front Face of Abutment Wall
  - \*\* Elevation taken along Abutment &
  - Δ Elevation taken along Wingwall &

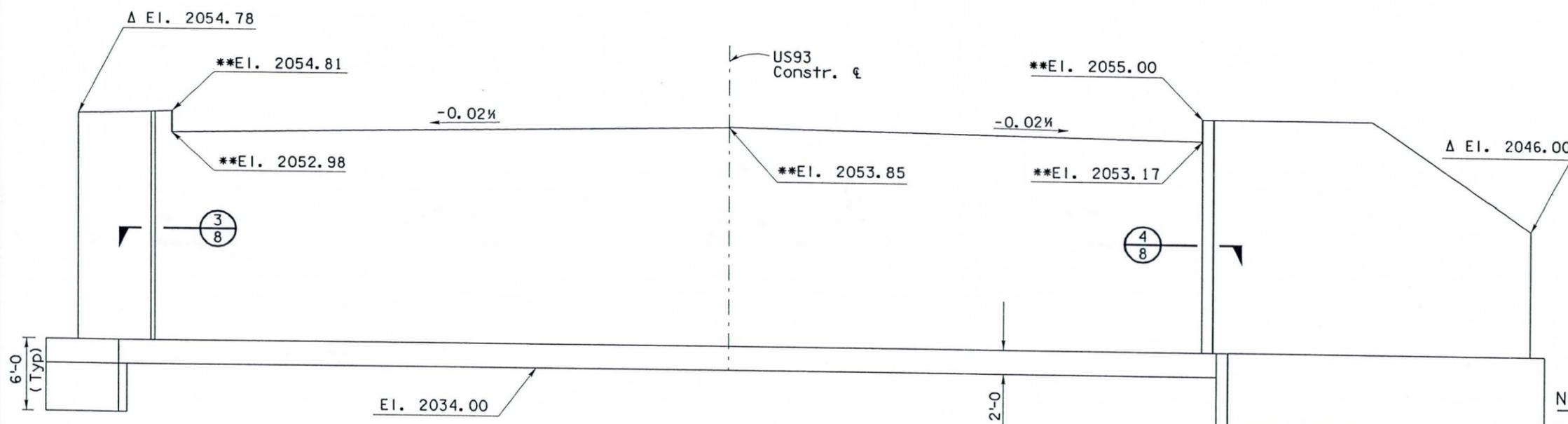
BRIDGE DESIGN SECTION BY			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	STA. 114+ SOLS WASH BRIDGE ABUT.#1 PLAN & ELEVATION	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	D. Benton	7-04				
DESIGN CKD	L. Alfuna	7-04				
DRAWN	S. Nickel	8-04				
DWG CKD	D. Benton	8-04				
APPROVED-PROJ. ENGINEER	L. Alfuna	8-04				
APPROVED-DESIGN LEADER	H. Sung					
US93 ROUTE	199.50 MILEPOST	2819 STRUCTURE NO.	LOCATION	WICKENBURG INTERIM BYPASS		
TRACS NO. H 5825 OIC			093-B-(008)	DWG. S-25 OF		
				OF		

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

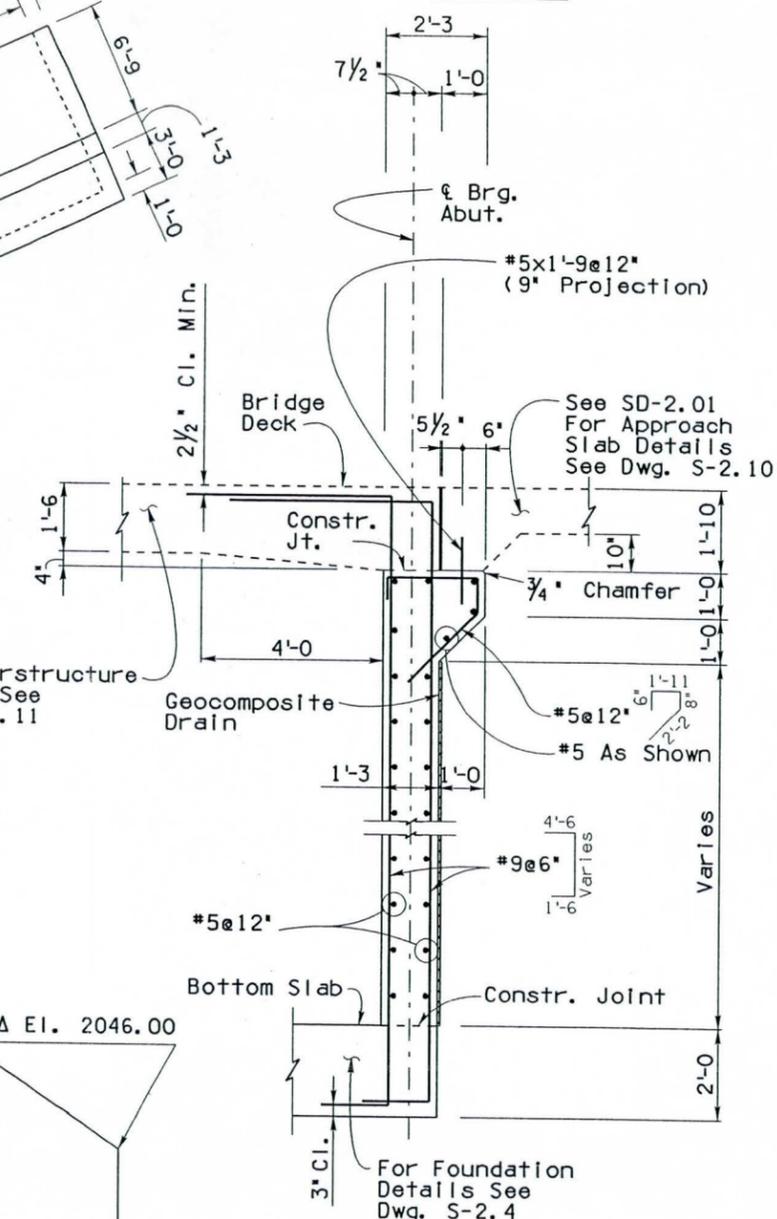
093 YV 198



PLAN  
Abutment #2, Looking Up Station  
Scale: 3/16" = 1'-0"



ELEVATION  
Scale: 3/16" = 1'-0"



ABUTMENT SECTION 1  
Scale: 1/2" = 1'-0"

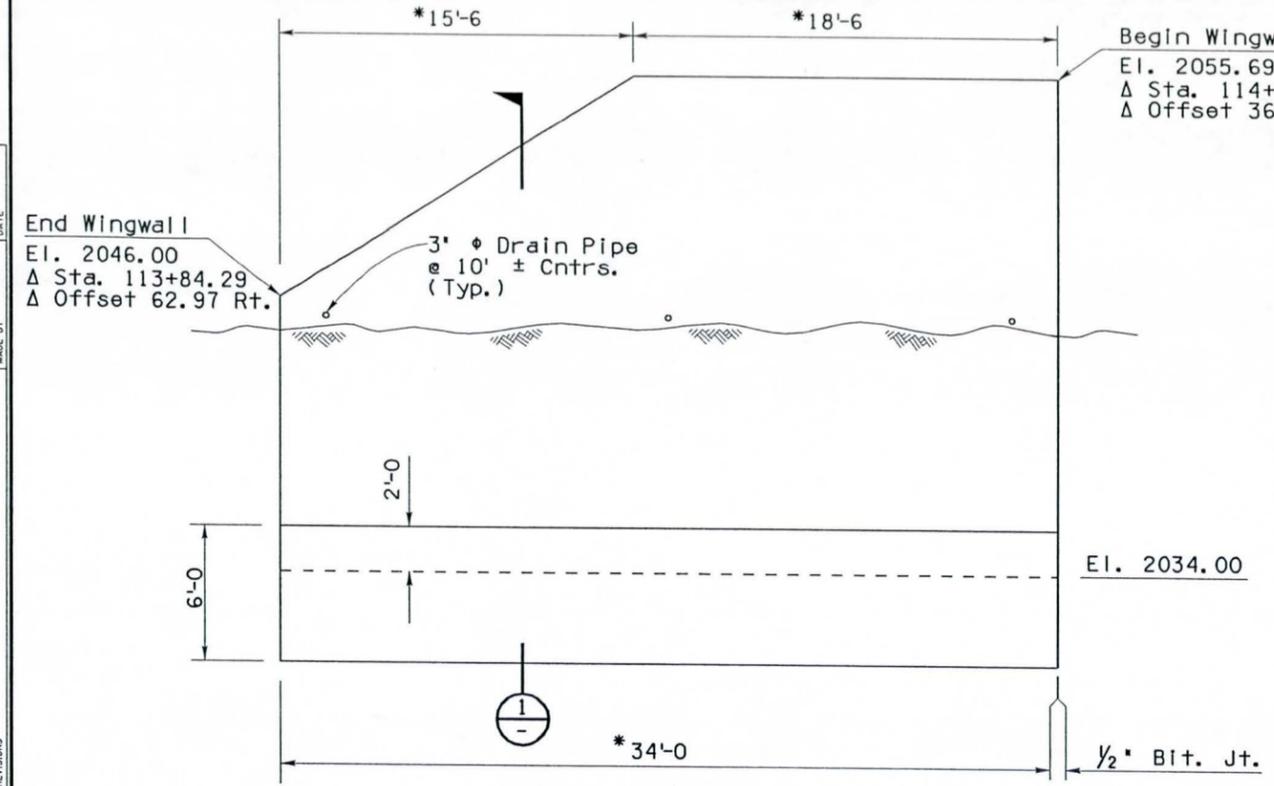
NOTE:  
Barrier not shown for clarity. Construct 1/2' open joint in Barrier to match joint at Abutment, and at each Pier Centerline.

- NOTES:
- Superstructure not shown for clarity.
  - \* Measured at Front Face of Abutment Wall.
  - \*\* Elevation Taken Along Abutment E
  - Δ Elevation taken Along Wingwall E

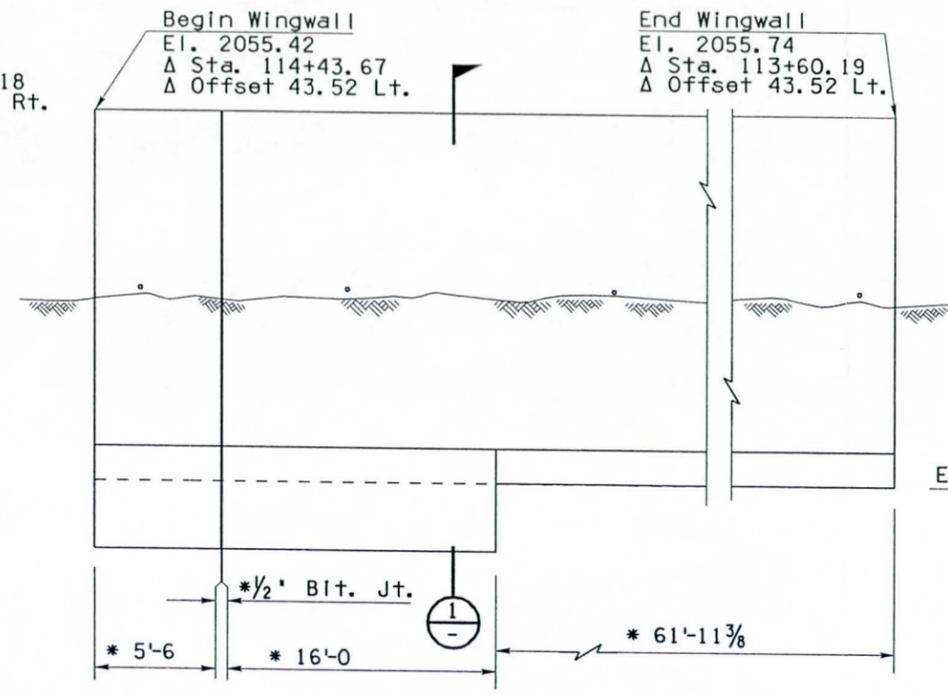
BRIDGE DESIGN SECTION BY			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP		PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	D. Benton		7-04	STA. 114+ SOLS WASH BRIDGE ABUT.#2 PLAN & ELEVATION		
DESIGN CKD	L. Alfuna		7-04			
DRAWN	S. Nickel		7-04	LOCATION WICKENBURG INTERIM BYPASS		093-B-(008)
DWG CKD	D. Benton		7-04			
APPROVED-PROJ. ENGINEER	L. Alfuna			US93 ROUTE		199.50 MILEPOST
APPROVED-DESIGN LEADER	H. Sung					
US93 ROUTE			199.50 MILEPOST		2819 STRUCTURE NO.	
TRACS NO. H 5825 01C			093-B-(008)		OF	

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

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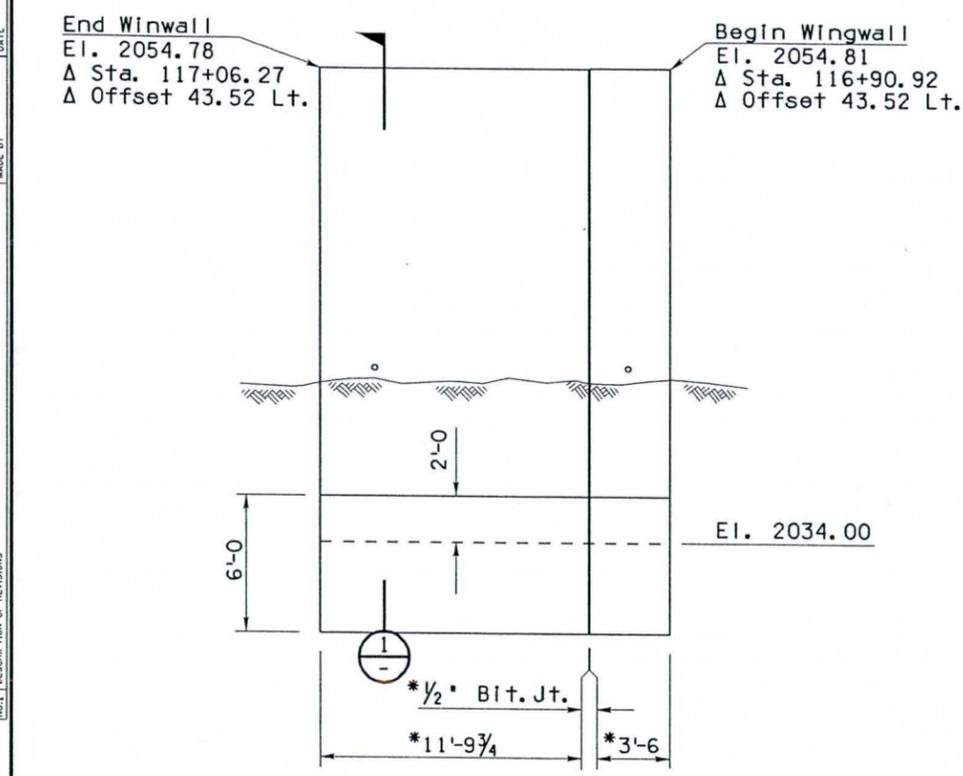


ABUT. #1 SE WINGWALL ELEVATION  
Scale: 1/4" = 1'-0"

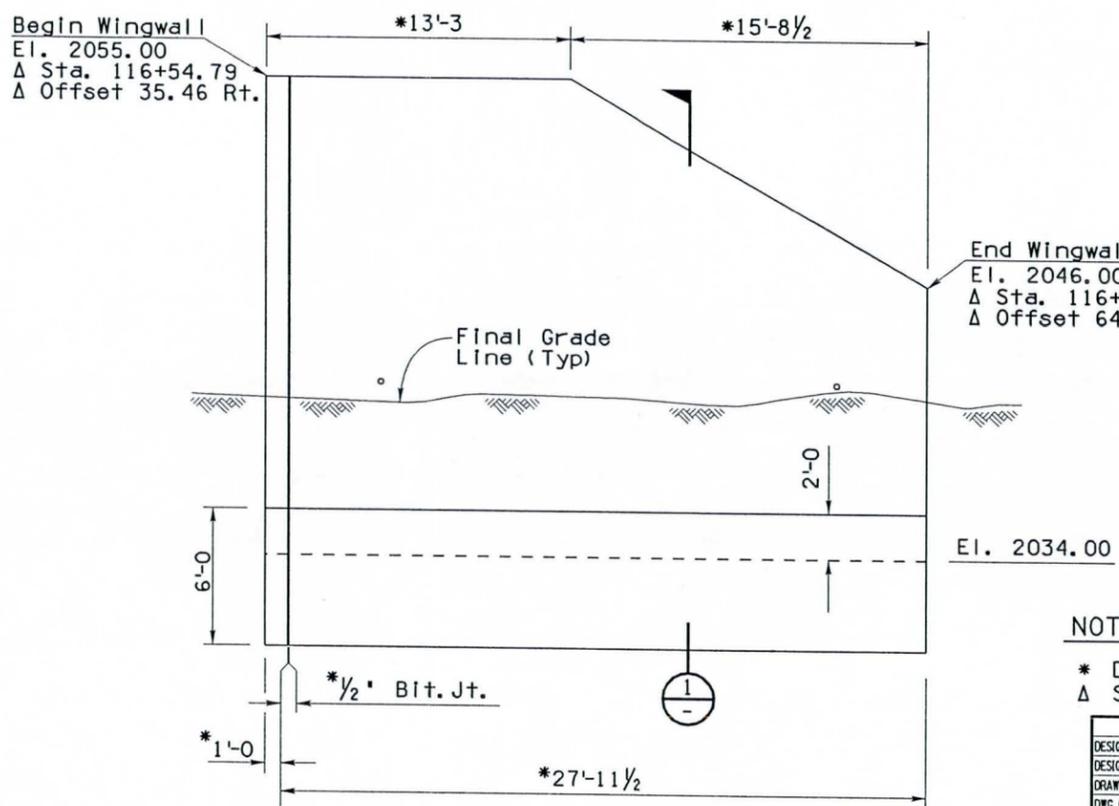


ABUT. #1 SW WINGWALL ELEVATION  
Scale: 3/16" = 1'-0"

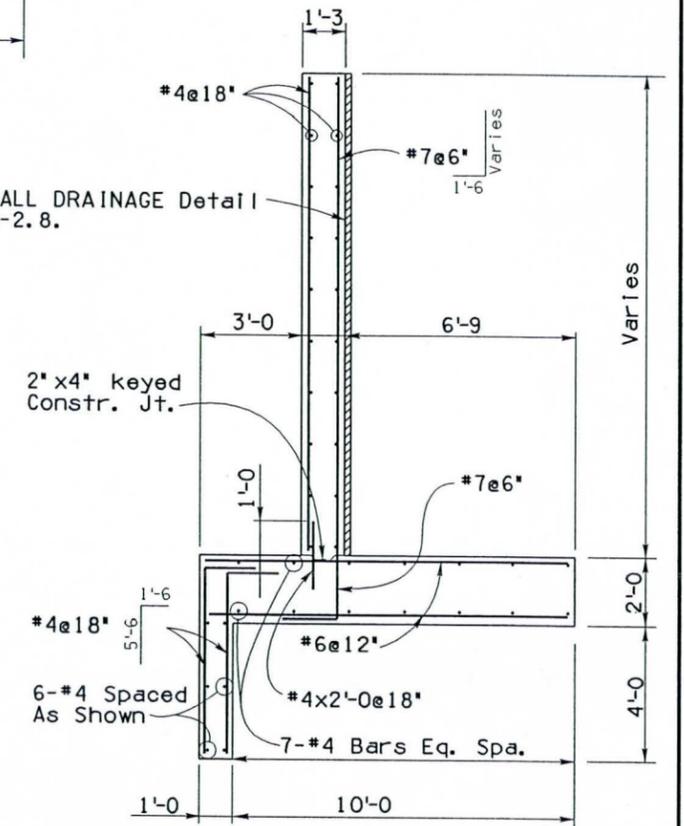
See WALL DRAINAGE Detail  
Dwg. S-2.8.



ABUT. #2 NW WINGWALL ELEVATION  
Scale: 1/4" = 1'-0"



ABUT. #2 NE WINGWALL ELEVATION  
Scale: 1/4" = 1'-0"



SECTION 1  
Scale: 3/8" = 1'-0"

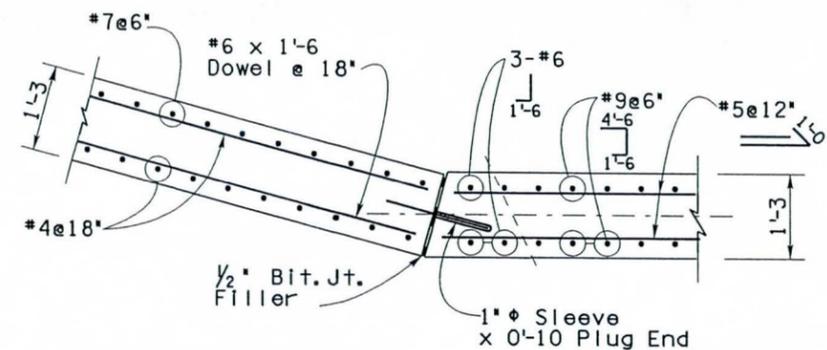
NOTES:

- \* Dimensions Measured Along Length of Wingwall
- Δ Stations and offsets are measured to front face of wall.

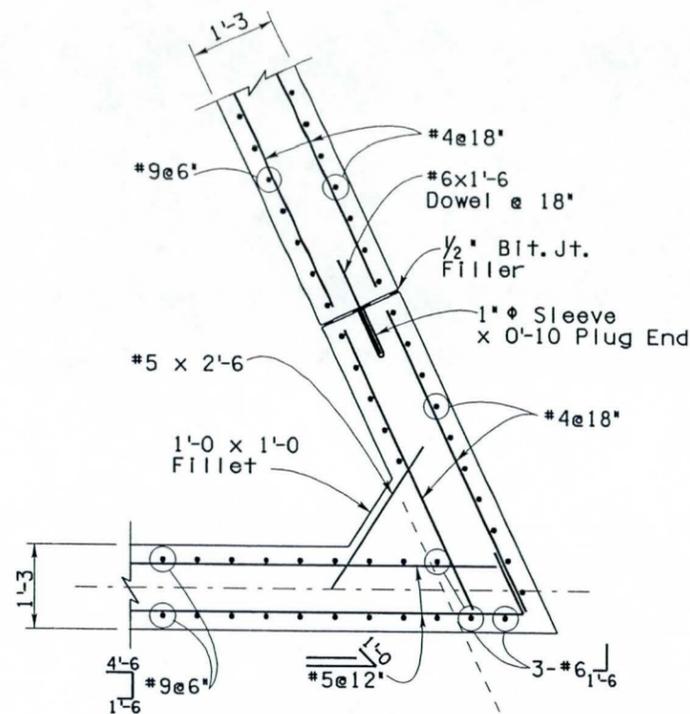
BRIDGE DESIGN SECTION #		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP		PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	D. Benton		STA. 114+ SOLS WASH BRIDGE ABUTMENT WINGWALL ELEVATIONS		
DESIGN CKD	L. Altuna				
DRAWN	S. Nickel	01-05			
DWG CKD	L. Altuna				
APPROVED-PROJ. ENGINEER	L. Altuna		LOCATION WICKENBURG INTERIM BYPASS		DWG. S-2.7 OF
APPROVED-DESIGN LEADER	H. Sung		US93 ROUTE 199.50 MILEPOST 2819 STRUCTURE NO.		093-B-(008)
TRACS NO. H 5825 01C					OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

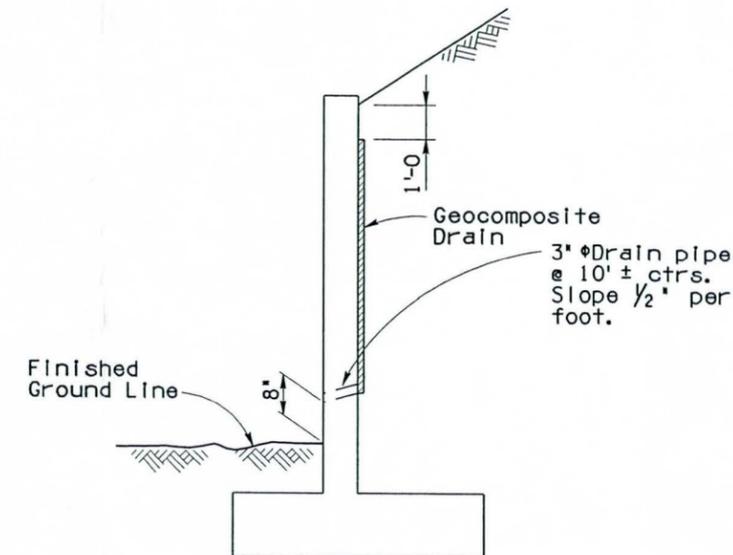
093 YV 198



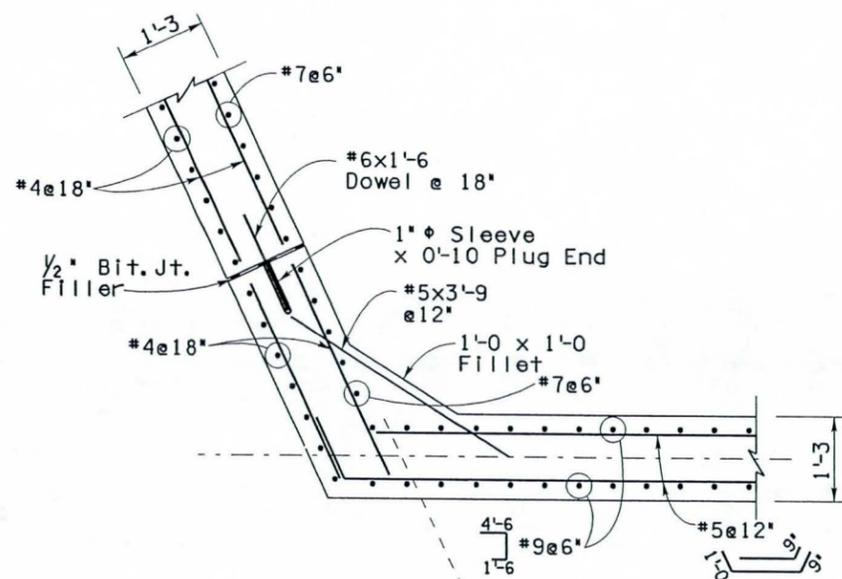
SECTION 1  
Northeast Wingwall  
Scale: 3/4" = 1'-0"



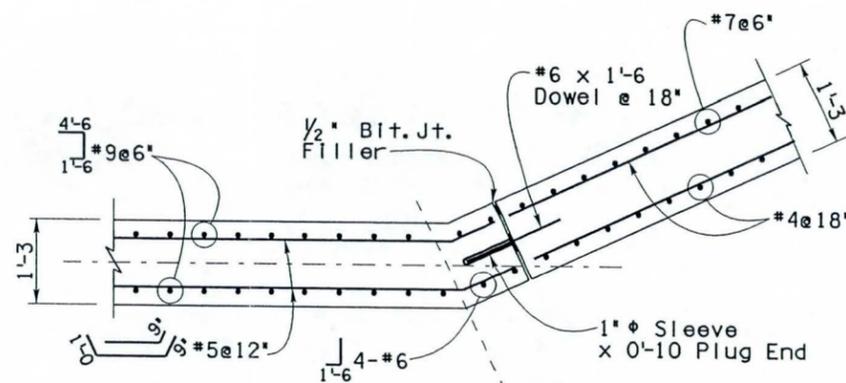
SECTION 2  
Southeast Wingwall  
Scale: 3/4" = 1'-0"



WALL DRAINAGE  
No Scale



SECTION 3  
Southwest Wingwall  
Scale: 3/4" = 1'-0"



SECTION 4  
Northwest Wingwall  
Scale: 3/4" = 1'-0"

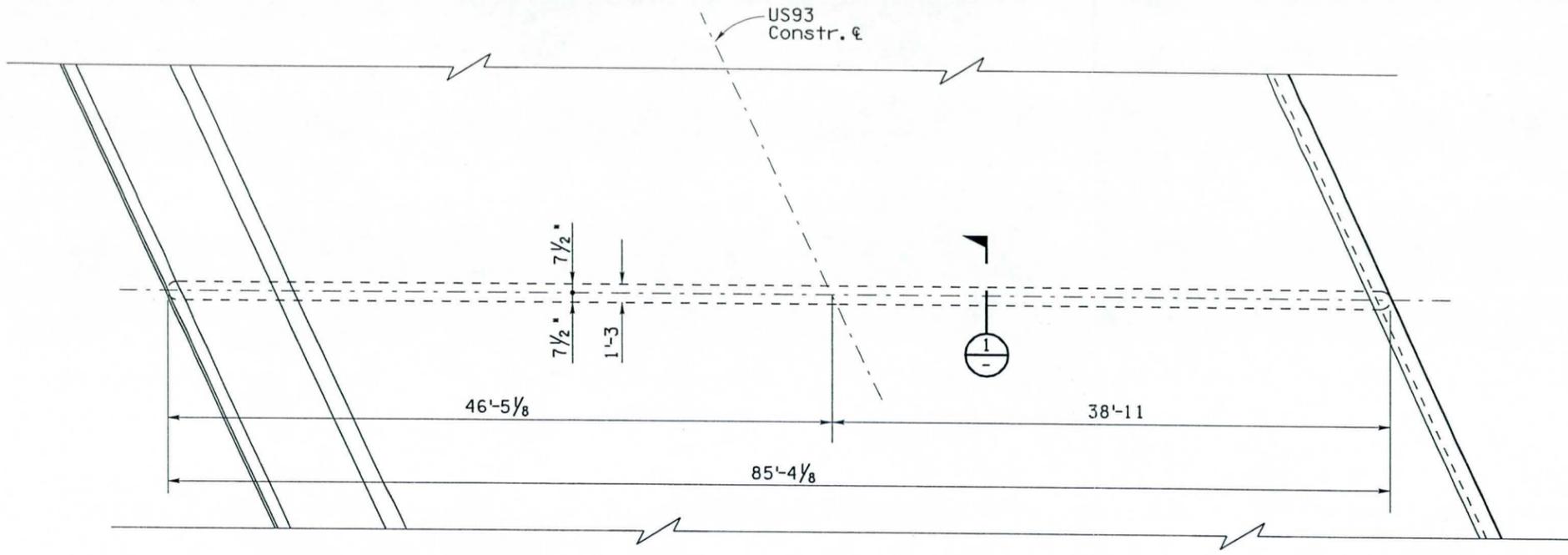
ABUTMENT #1

ABUTMENT #2

BRIDGE DESIGN SECTION 'B'		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP		PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	D. Benton		STA. 114+ SOLS WASH BRIDGE WINGWALL DETAILS		
DESIGN CKD	L. Alfuna				
DRAWN	S. Nickel	01-05	LOCATION WICKENBURG INTERIM BYPASS		
DWG CKD	L. Alfuna				
APPROVED-PROJ. ENGINEER	L. Alfuna		TRACS NO. H 5825 OIC		
APPROVED-DESIGN LEADER	H. Sung				
US93	199.50	2819	093-B-(008)		DWG. 5-2.8 OF
ROUTE	MILEPOST	STRUCTURE NO.			OF

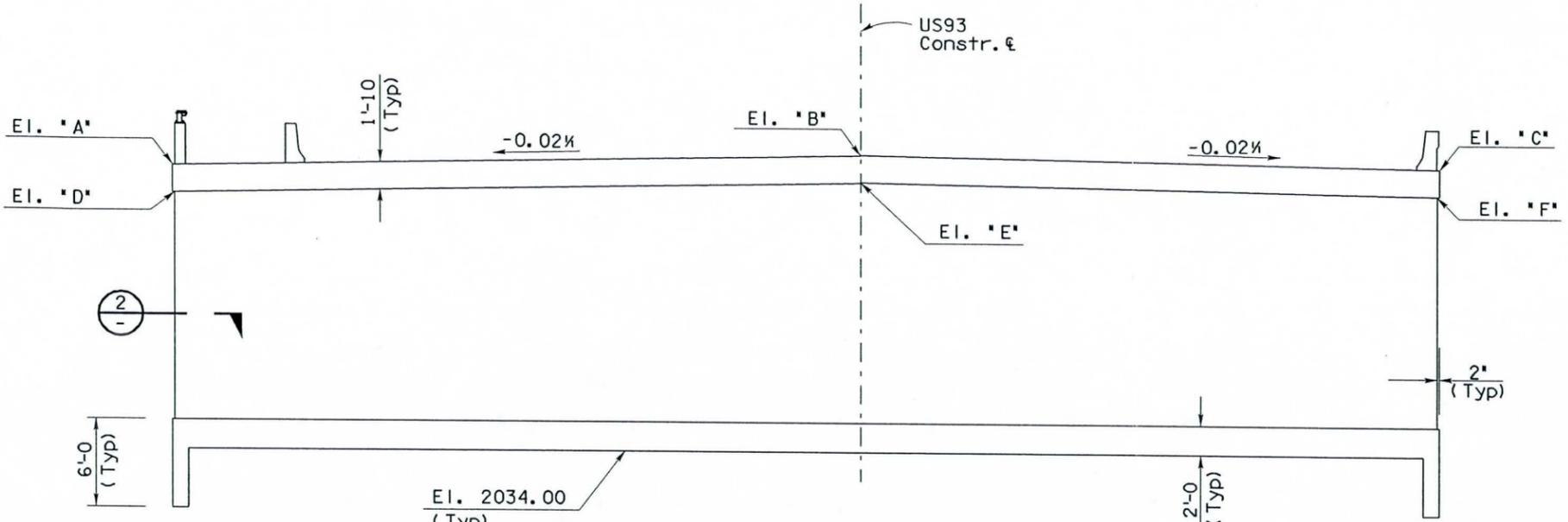
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

093 YV 198



PLAN

Scale:  $\frac{3}{16}" = 1'-0$

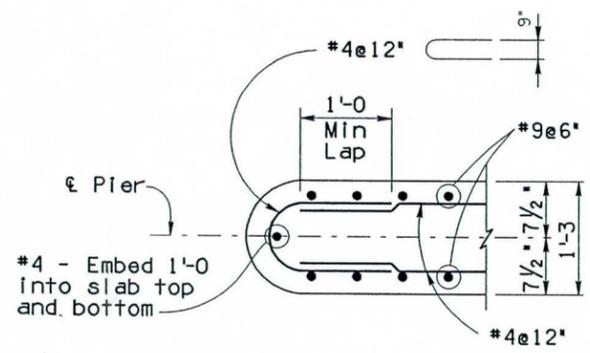
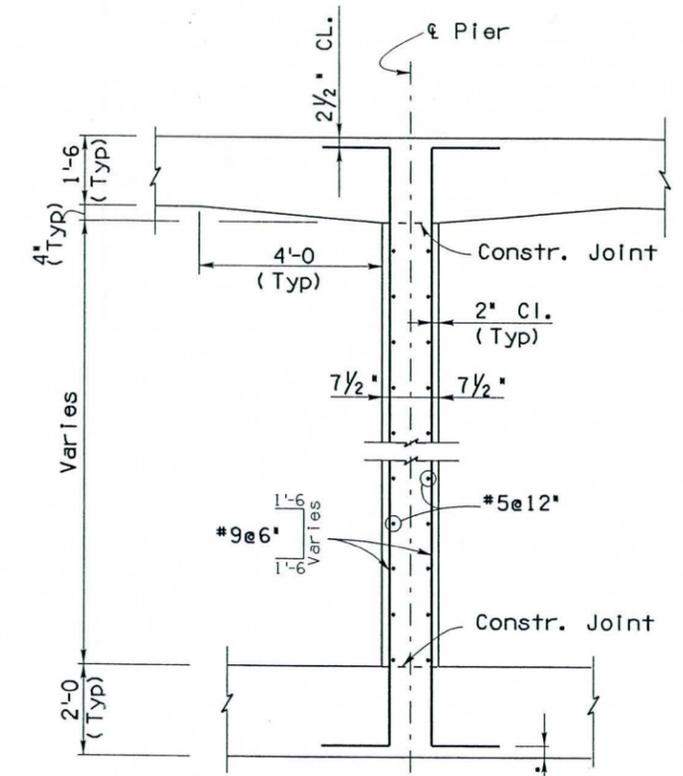


ELEVATION

Scale:  $\frac{3}{16}" = 1'-0$

	$\epsilon$ Pier #1	$\epsilon$ Pier #2	$\epsilon$ Pier #3	$\epsilon$ Pier #4	$\epsilon$ Pier #5	$\epsilon$ Pier #6
EL. 'A'	2055.30	2055.20	2055.10	2055.01	2054.93	2054.86
EL. 'B'	2056.21	2056.10	2056.00	2055.90	2055.82	2055.74
EL. 'C'	2055.56	2055.44	2055.33	2055.24	2055.15	2055.07
EL. 'D'	2053.47	2053.37	2053.27	2053.18	2053.10	2053.03
EL. 'E'	2054.38	2054.27	2054.17	2054.07	2053.99	2053.91
EL. 'F'	2053.73	2053.61	2053.50	2053.41	2053.32	2053.24

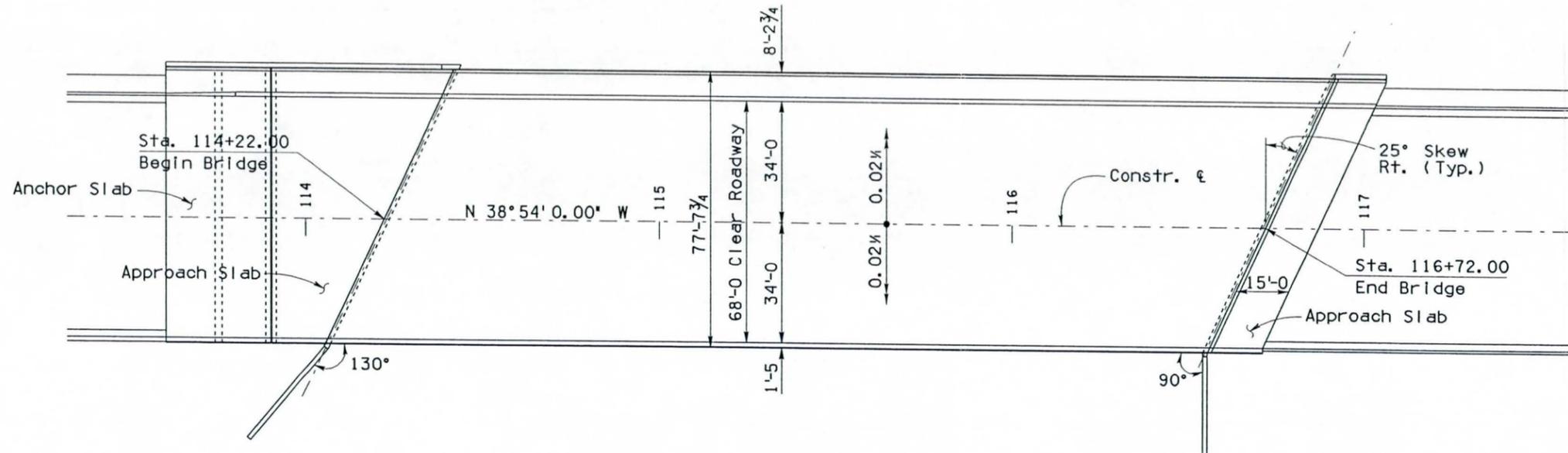
NOTE:  
Elevations and Dimensions are Measured Along Pier  $\epsilon$



BRIDGE DESIGN SECTION 01		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	D. Benton	7-04		
DESIGN CKD	L. Altuna	7-04		
DRAWN	D. Benton	7-04		
DWG CKD	D. Benton	7-04	STA. 114+ SOLS WASH BRIDGE PIER PLAN AND ELEVATION	DWG. S-2.9 OF
APPROVED-PROJ. ENGINEER	L. Altuna			
APPROVED-DESIGN LEADER	H. Sung		LOCATION WICKENBURG INTERIM BYPASS	093-B-(008)
US93 ROUTE	199.50	2819 STRUCTURE NO.		

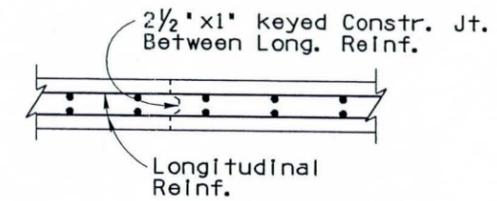
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

093 YV 198

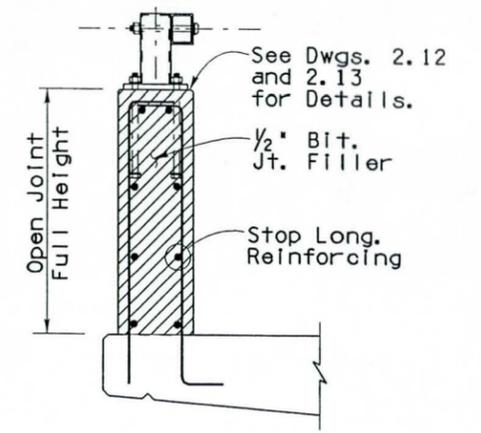


DECK PLAN  
Scale: 1" = 20'-0"

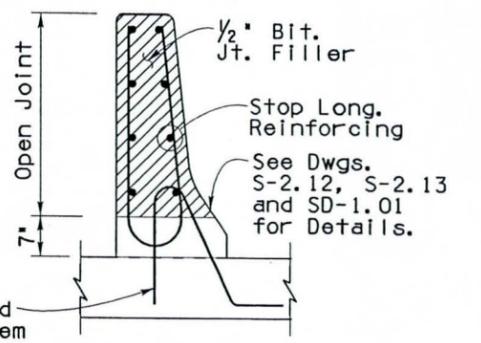
1. Number ① & ② indicate sequence of deck concrete. Pour ② sections a minimum of 12 hours after adjacent ① sections have been poured.
2. Section ① and ② may be poured consecutively but only in the direction from ① to ② and a minimum of 12 hours after the adjacent ① section has been poured.
3. The Contractor shall submit a Deck Pour Schedule to the Engineer for approval prior to placing concrete.



TYPICAL KEYED CONSTR. JT.  
No Scale

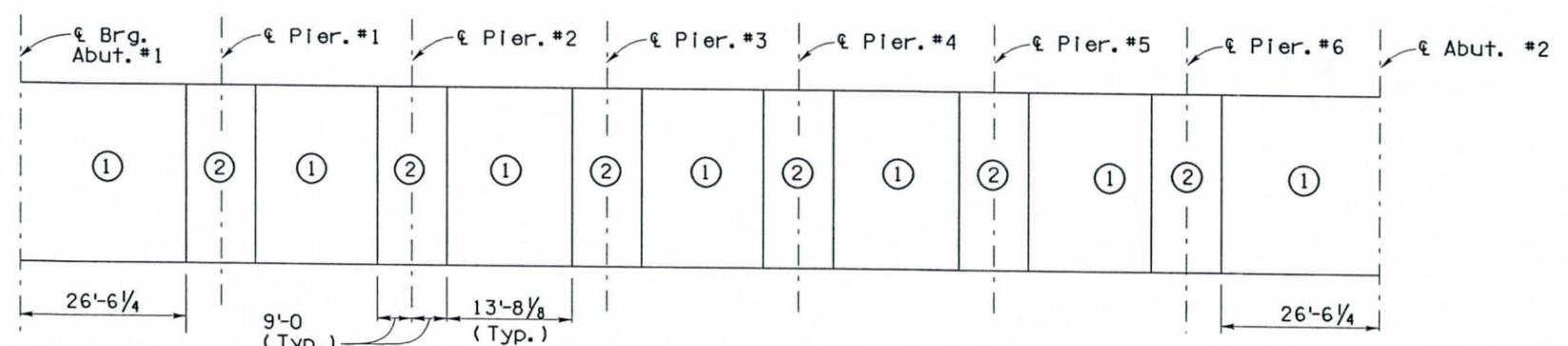


PARAPET DETAIL (1)  
(Abut. & Pier  $\epsilon$ )  
Scale: 1" = 1'-0"

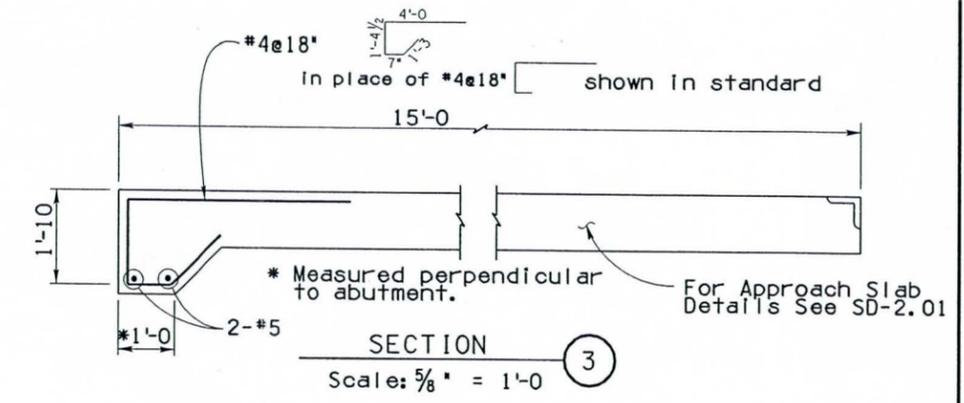


BARRIER DETAIL (2)  
(Abut. & Pier  $\epsilon$ )  
Scale: 1" = 1'-0"

Cost of Reinforcing Imbedded into Deck is included in Item No. 6011130. F-Shape Bridge Concrete Barrier and Transition (32')



Deck Pour Diagram  
Not to Scale



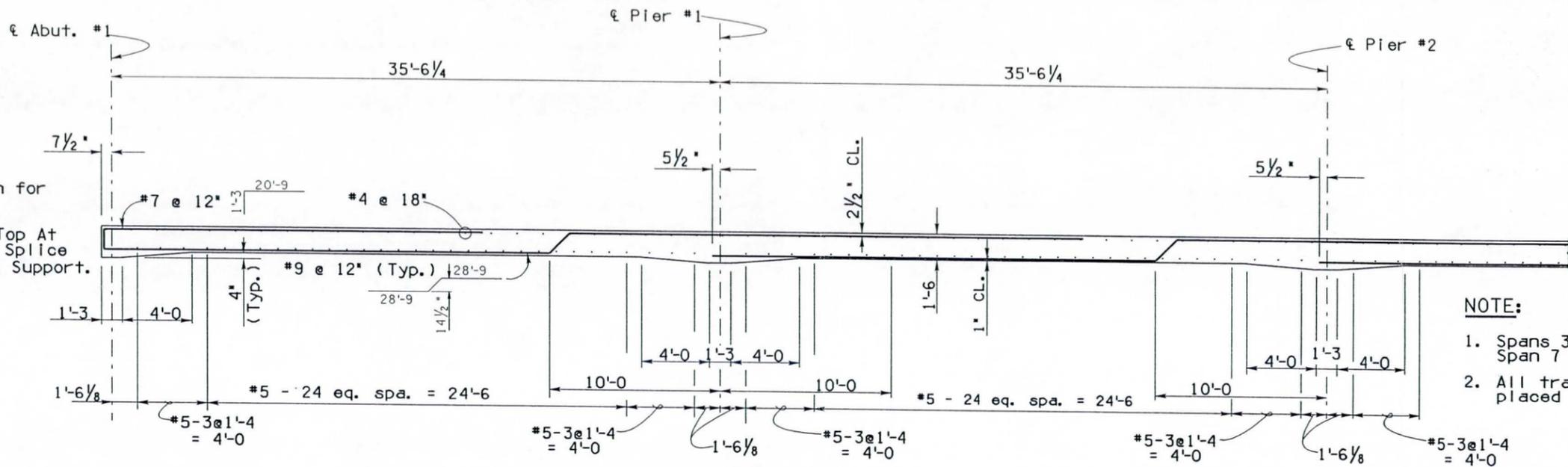
SECTION (3)  
Scale: 5/8" = 1'-0"

BRIDGE DESIGN SECTION BY		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	D. Benton	8-04		
DESIGN CKD	L. Altuna	7-04		
DRAWN	S. Nickel	8-04		
CHKD	D. Benton	8-04		
APPROVED-PROJ. ENGINEER	L. Altuna		STA. 114+ SOLS WASH BRIDGE DECK PLAN	DWG. S-2.10 OF
APPROVED-DESIGN LEADER	H. Sung			
US93	199.50	2819	LOCATION	
ROUTE	MILEPOST	STRUCTURE NO.	WICKENBURG INTERIM BYPASS	
TRACS NO. H 5825 01C			093-B-(008)	OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

093 YV 198

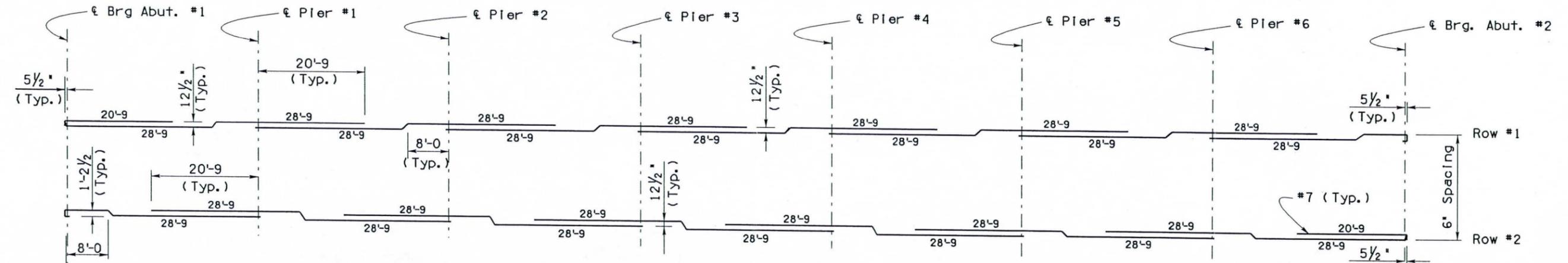
**SPLICE NOTE:**  
 Min. Splice Length for  
 #4 Bars: 1'-0"  
 #5 Bars: 1'-6"  
 Locate Splice In Top At  
 Mid-Span. Locate Splice  
 In Bottom Over The Support.



**NOTE:**  
 1. Spans 3 thru 6 same as span 2. Span 7 similar to span 1, opposite hand.  
 2. All transverse reinforcement shall be placed perpendicular to Constr.  $\epsilon$ .

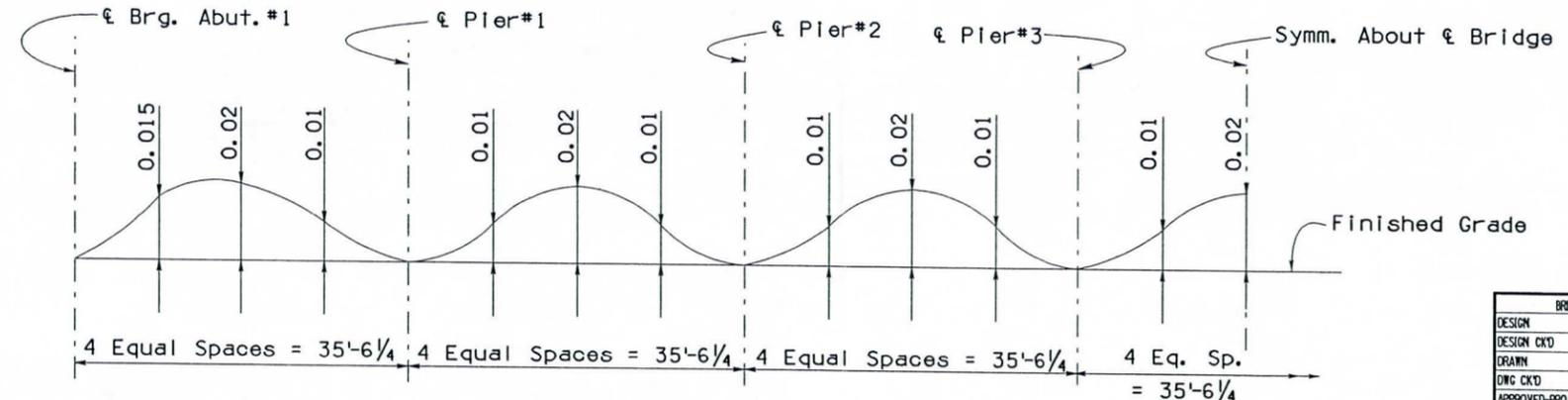
**DECK ELEVATION**

(Row #1 shown, for Row #2, See REINFORCING PLACING DIAGRAM)  
 Scale: 1/4" = 1'-0"



**REINFORCING PLACING DIAGRAM**

Scale: 1/32" = 1'-0"



**DEAD LOAD CAMBER DIAGRAM (Ft.)**

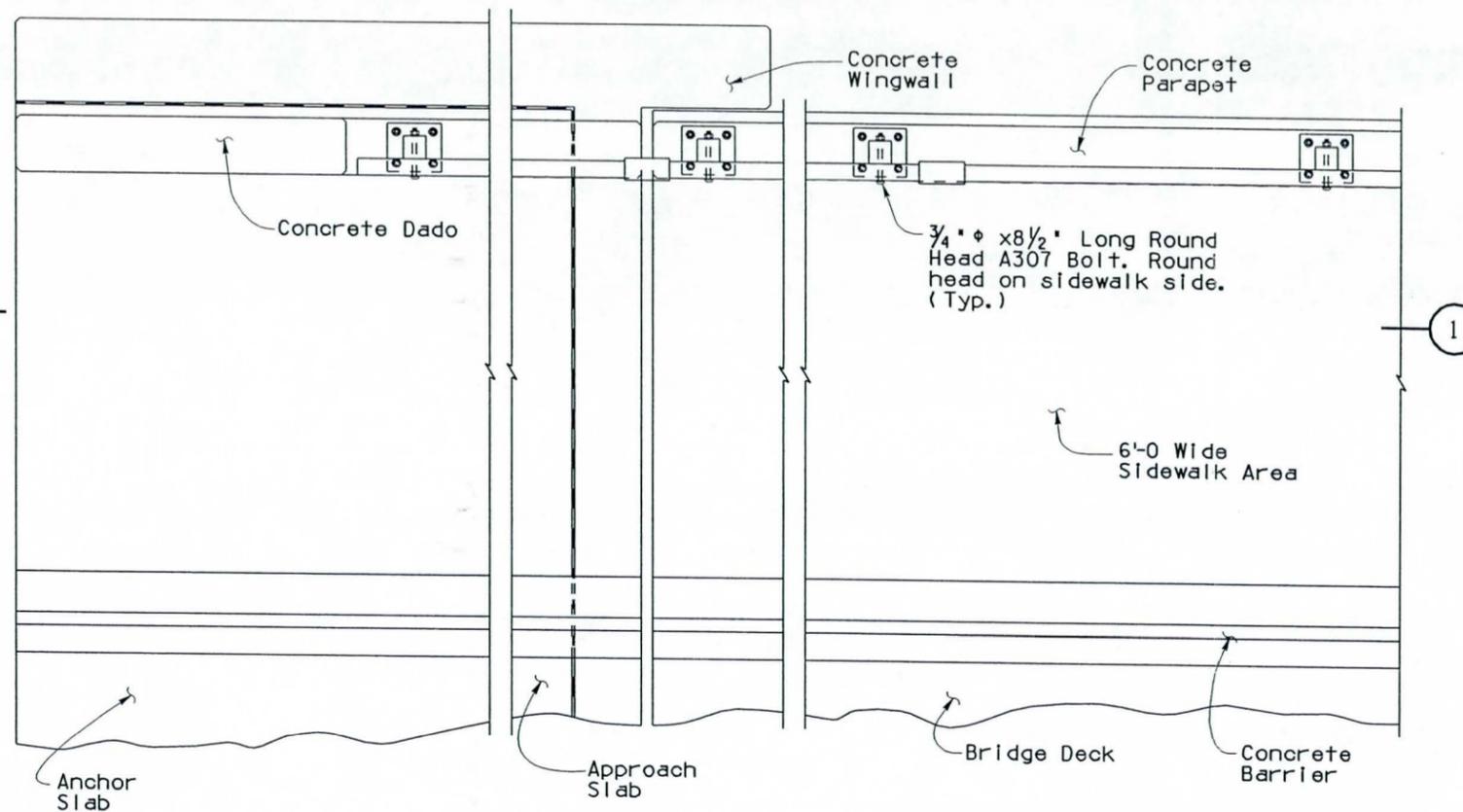
No Scale

**NOTE:**  
 All Bars are #9 Except As Noted.  
 Row #1 and Row #2 to be Placed Alternately at 6" Spacing.

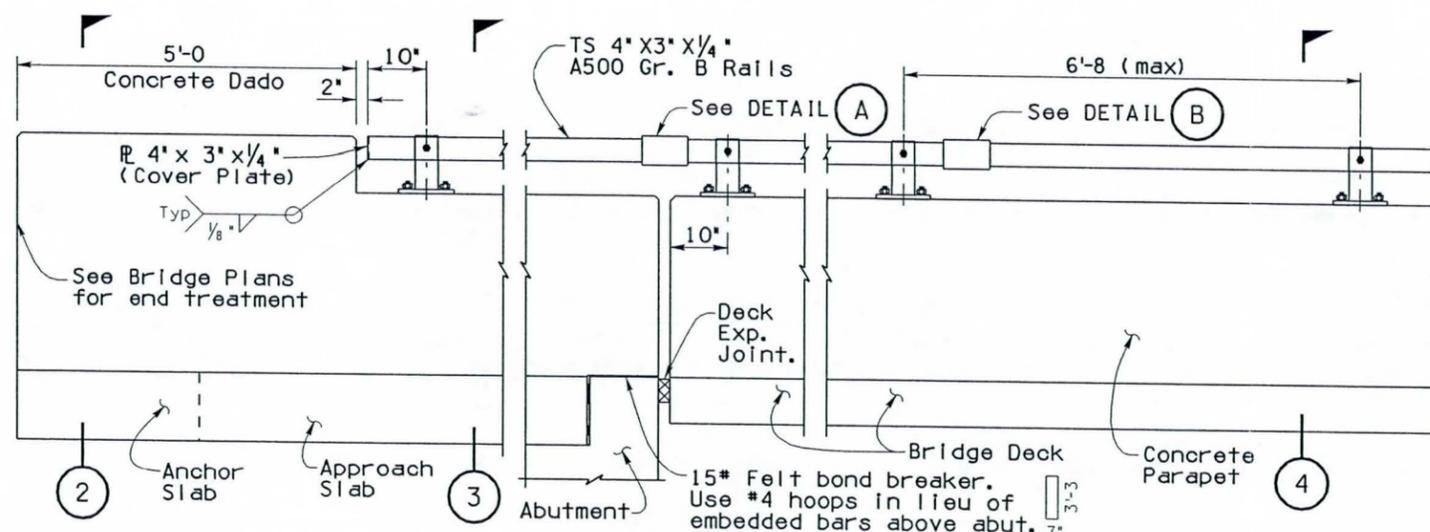
BRIDGE DESIGN SECTION BY		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	D. Benton	7-04		
DESIGN CKD	L. Altuna	7-04		
DRAWN	S. Nickel	8-04		
DWG CKD	D. Benton	8-04		
APPROVED-PROJ. ENGINEER	L. Altuna		STA. 114+ SOLS WASH BRIDGE DECK DETAILS	DWG. 5-2.II OF
APPROVED-DESIGN LEADER	H. Sung			
US93	199.50	2819		
ROUTE	MILEPOST	STRUCTURE NO.	LOCATION	
TRACS NO. H 5825 01C			WICKENBURG INTERIM BYPASS	
			093-B-(008)	OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

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PLAN  
Scale 3/4" = 1'-0"



ELEVATION AT PARAPET  
Scale 3/4" = 1'-0"

**GENERAL NOTES:**

Construction Specification - Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, Latest Edition.

Design Specifications - AASHTO LRFD Bridge Design Specifications, Customary US Units, Second Edition 1998 with 1999 Interim Revisions.

The barrier has been successfully crash tested and documented in "Testing of New Bridge Rail and Transition Designs" Volume 1, Report No. FHWA-RD-93-058, 1997. The barrier is structurally evaluated as meeting the requirements of NCHRP Report 350 Test Level 4.

All concrete shall be Class S (f'c = 4000 psi).

Reinforcing steel shall conform to ASTM Specification A615. All reinforcing shall be furnished as Grade 60.

All bends and hooks shall meet the requirements of AASHTO LRFD Bridge Design Specifications Article 5.10.2. All bar bend dimensions for reinforcing steel shall be out-to-out of bars. All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise.

Concrete barriers and parapets on continuous superstructures shall have 1/2" bituminous joint filler in open joints over piers, see bridge drawings for details.

Structural steel shall conform to ASTM Specification A36 unless noted otherwise.

Structural tube steel rails and posts shall conform to ASTM Specification A500 Grade B.

All exposed edges of steel railing shall be ground smooth. All post bolt heads shall be to the inside (sidewalk side).

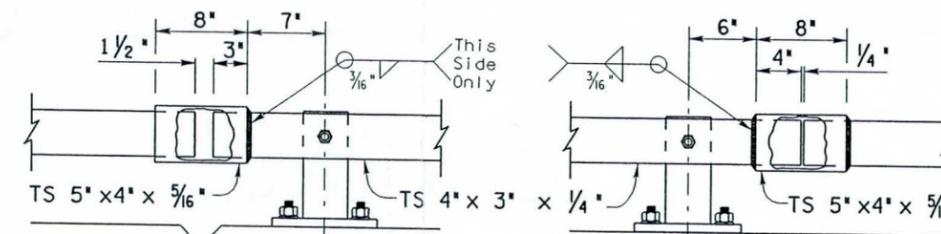
All structural steel railing assembly components shall be galvanized in accordance with ASTM Specification A123. All galvanizing damaged in handling, transportation or welding shall be repaired by the application of a paste compound of an approved zinc powder and flux.

See Bridge Plans for railing and barrier layout, elevations, joint locations and rail/barrier end treatments.

For fence attachment details, see Structure Detail SD 1.05.

Pay Item includes all labor and materials for galvanized steel railing and concrete barrier, parapet, dado and footing.

Item No. 601xxxx COMBINATION PEDESTRIAN-BRIDGE RAILING-SEPARATION BARRIER  
Measure: Linear Foot



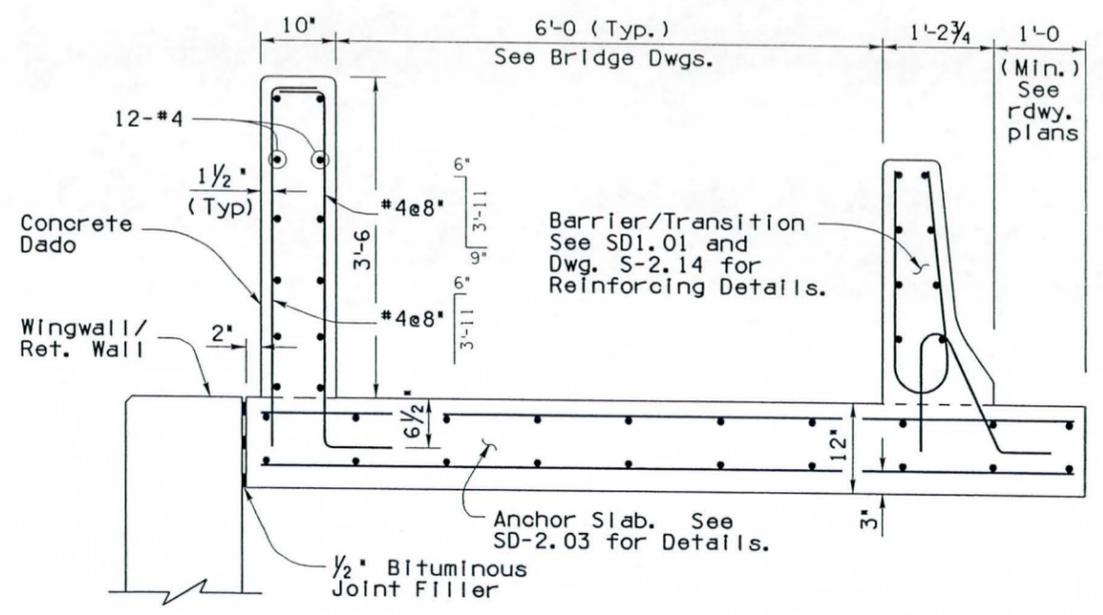
EXP. RAIL SPLICE (A)  
Scale 1/2" = 1'-0"

TYP. RAIL SPLICE (B)  
Scale 1/2" = 1'-0"

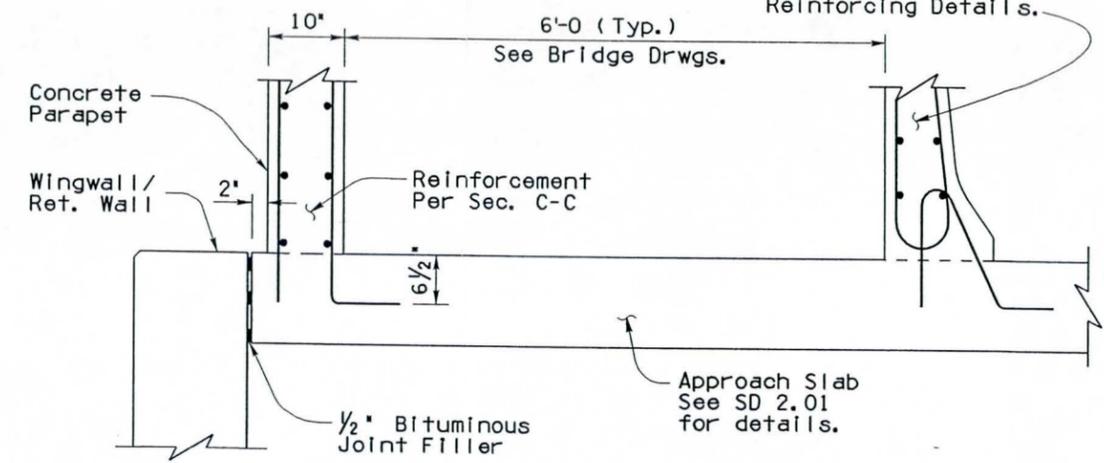
BRIDGE DESIGN SECTION B'			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	L. Alfuna	7-04			
DESIGN CKD	D. Benton	7-04			
DRAWN	L. Alfuna	7-04			
DWG CKD	D. Benton	7-04		STA. 114+ SOLS WASH BRIDGE SEPARATION BARRIER & RAILING 1	
APPROVED-PROJ. ENGINEER	L. Alfuna				
APPROVED-DESIGN LEADER	H. Sung			LOCATION WICKENBURG INTERIM BYPASS	
ROUTE	199.50	2819			
TRACS NO. H 5825 OIC				093-B-(008)	DWG. 5-212 OF
					OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

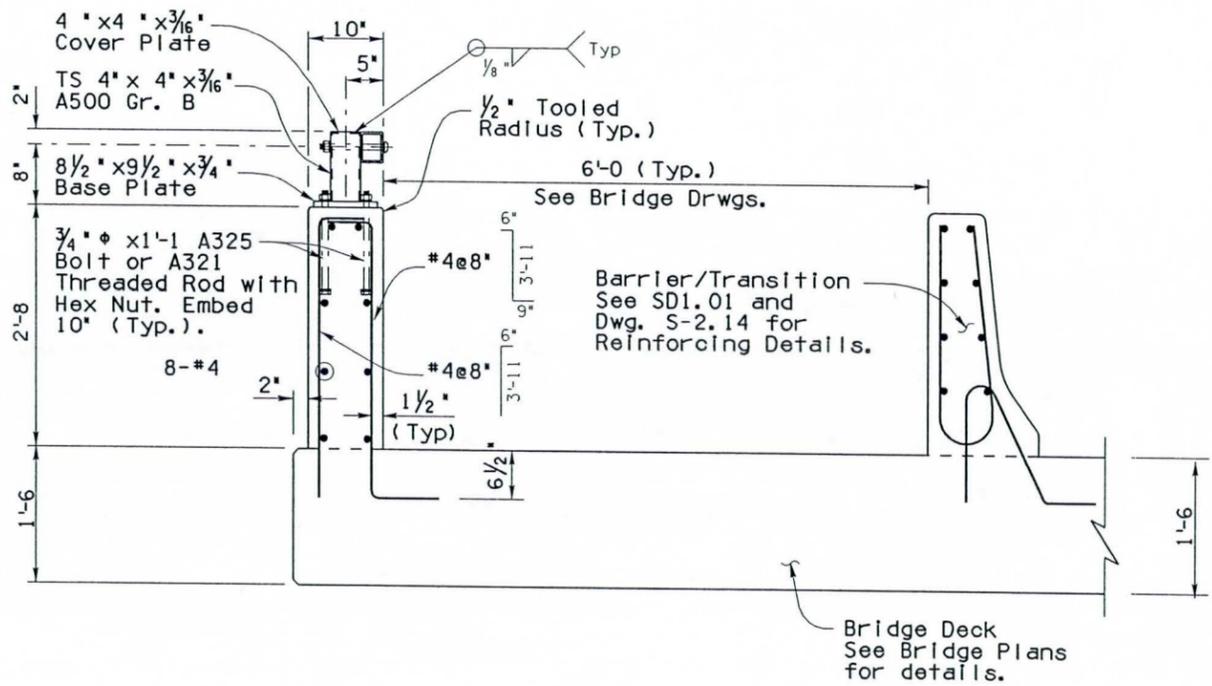
093 YV 198



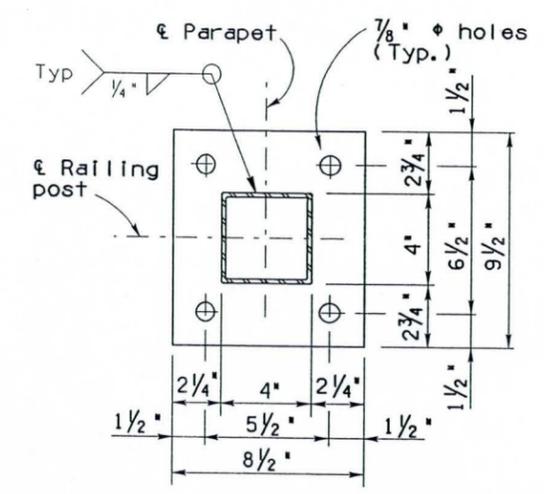
PEDESTRIAN RAIL / SEPARATION BARRIER (2)  
On Anchor Slab  
Scale: 1" = 1'-0"



PEDESTRIAN RAIL / SEPARATION BARRIER (3)  
(On Approach Slab)  
Scale: 1" = 1'-0"



PEDESTRIAN RAIL / SEPARATION BARRIER (4)  
(On Bridge)  
Scale: 1" = 1'-0"

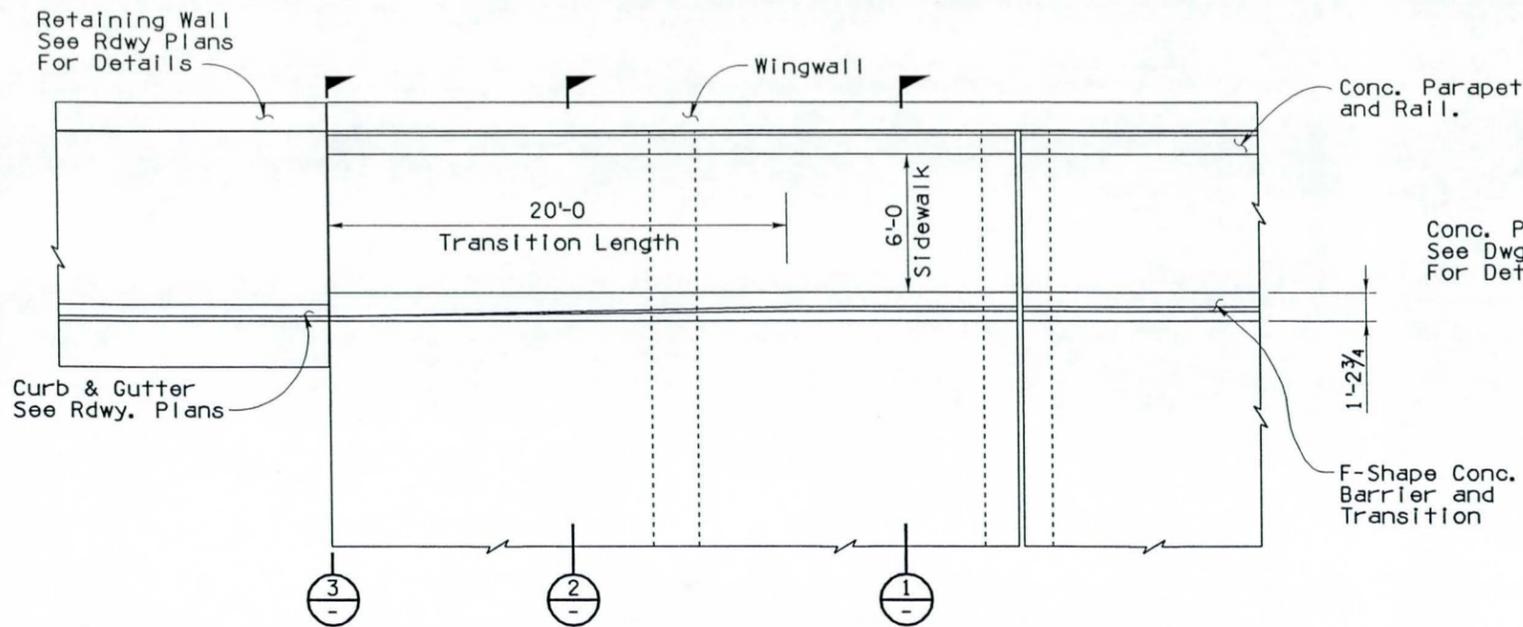


BASE PLATE DETAIL  
Scale 3" = 1'-0"

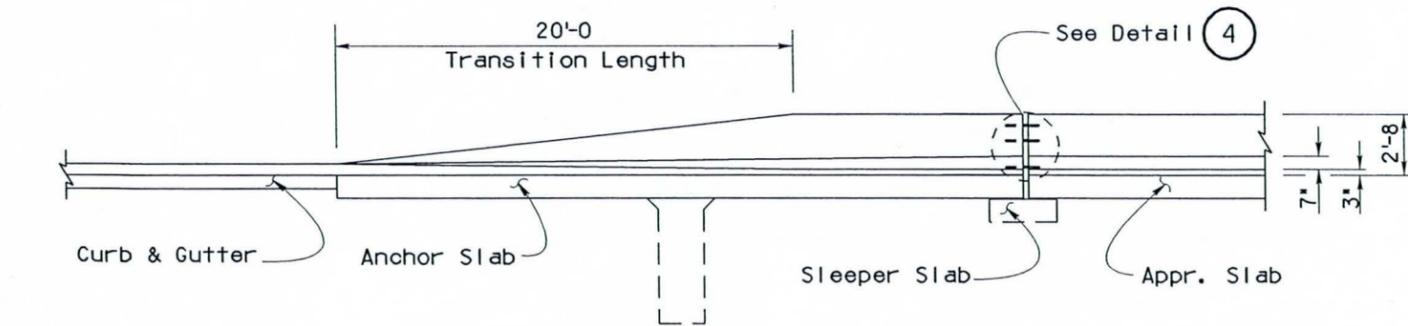
BRIDGE DESIGN SECTION BY			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	D. Benton	7-04			
DESIGN CKD	L. Altuna	7-04			
DRAWN	L. Altuna	7-04			
CHKD	D. Benton	7-04			
APPROVED-PROJ. ENGINEER			L. Altuna	STA. 114+ SOLS WASH BRIDGE	
APPROVED-DESIGN LEADER			H. Sung	SEPARATION BARRIER & RAILING 2	
US93	199.50	2819	LOCATION	WICKENBURG INTERIM BYPASS	
ROUTE	MILEPOST	STRUCTURE NO.	093-B-(008)		
TRACS NO. H 5825 OIC			DWG. S-213 OF		
			OF		

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

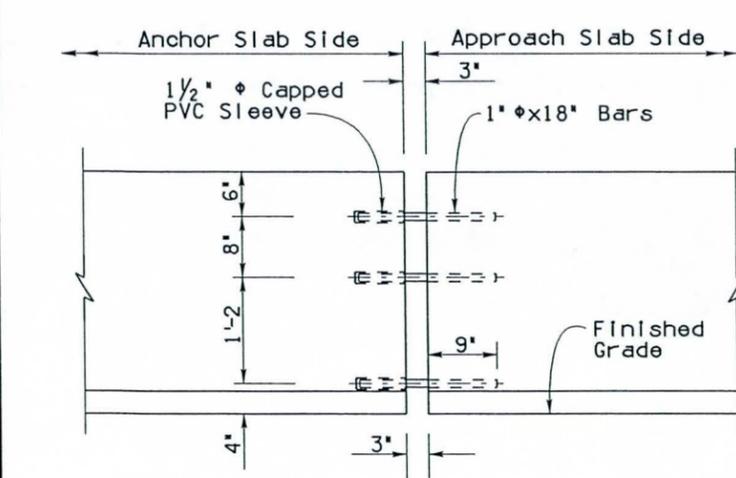
093 YV 198



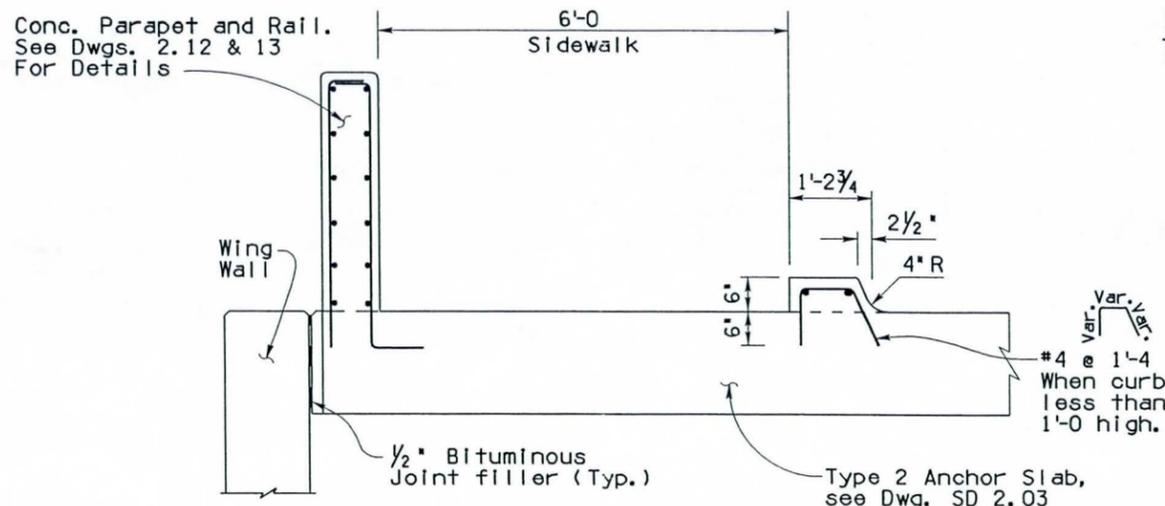
**BARRIER TRANSITION PLAN**  
Scale: 1/4" = 1'-0"



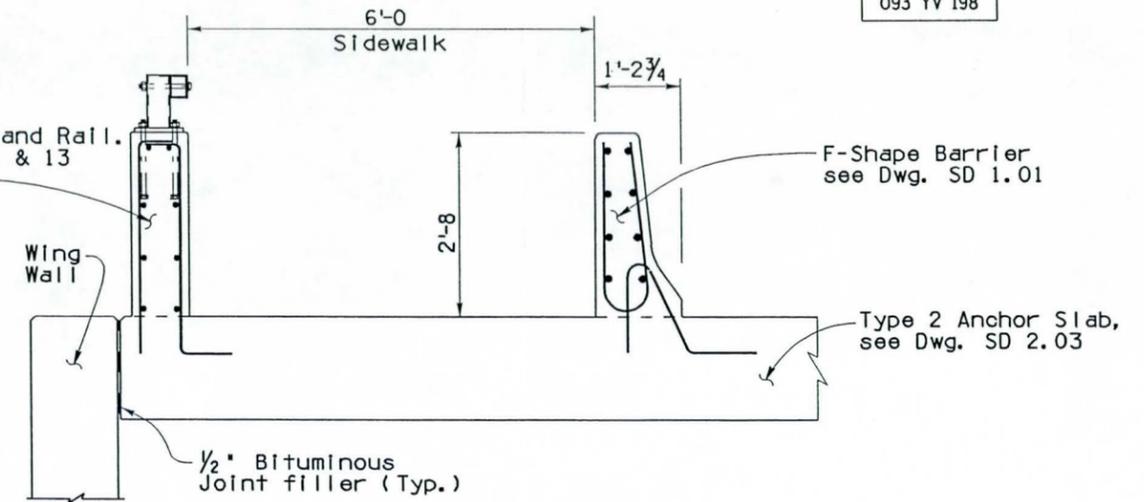
**BARRIER TRANSITION ELEVATION**  
Scale: 1/4" = 1'-0"



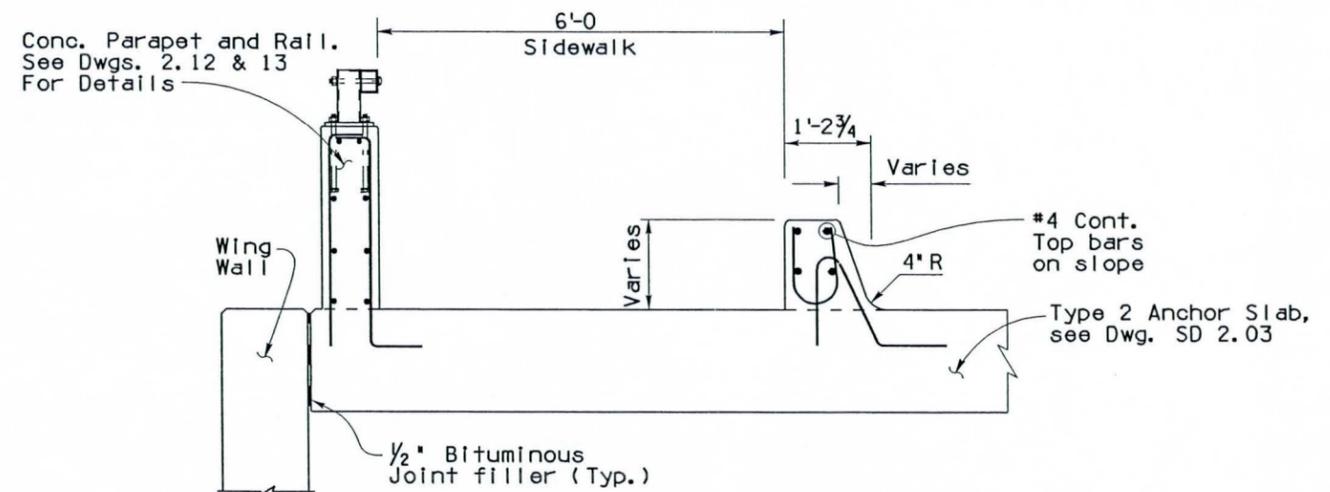
**DETAIL 4**  
Scale: 1" = 1'-0"



**SECTION 3**  
Scale: 3/4" = 1'-0"



**SECTION 1**  
Scale: 3/4" = 1'-0"

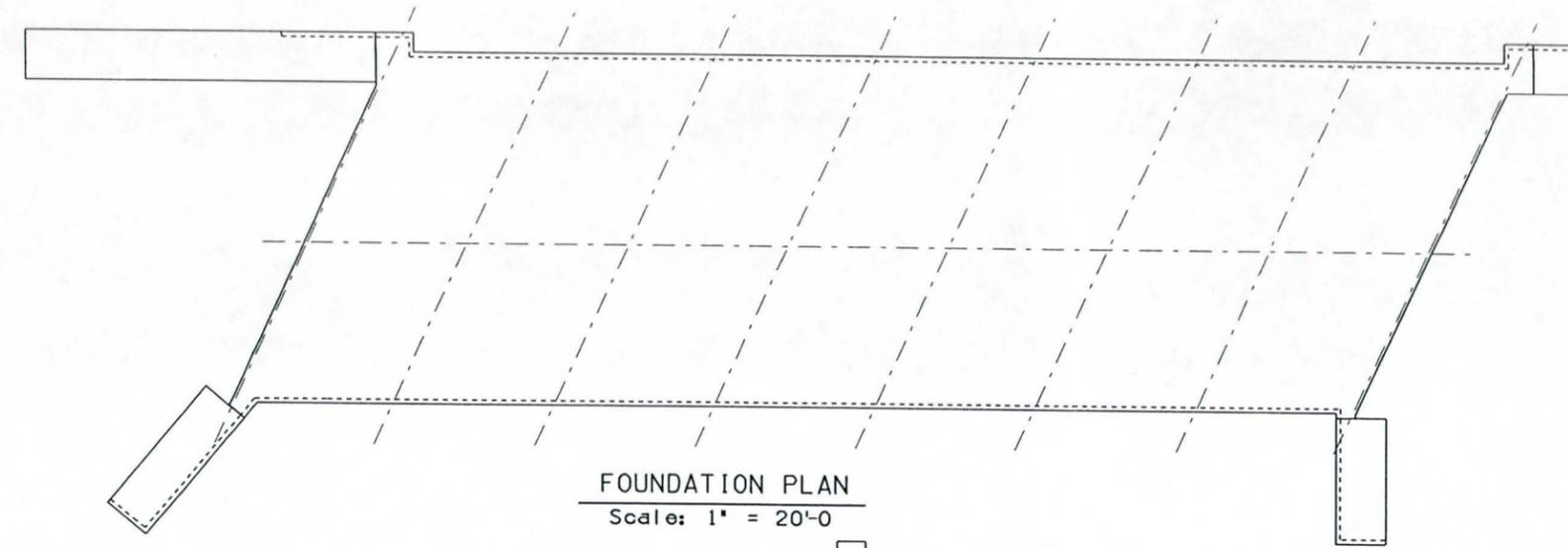


**SECTION 2**  
Scale: 3/4" = 1'-0"

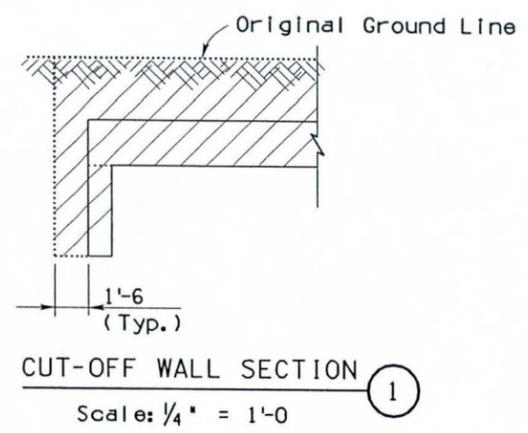
BRIDGE DESIGN SECTION BY			DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP		PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	D. Benton	2-05		STA. 114+ SOLS WASH BRIDGE MISCELLANEOUS DETAILS		
DESIGN CKD	L. Altuna	2-05				
DRAWN	D.B./S.N.	2-05		LOCATION WICKENBURG INTERIM BYPASS		
DWG CKD	D. Benton	2-05				
APPROVED-PROJ. ENGINEER	L. Altuna			093-B-(008)		
APPROVED-DESIGN LEADER	H. Sung					
ROUTE	MILEPOST	STRUCTURE NO.	LOCATION		DWG. S-2.14 OF	
US93	199.50	2819	WICKENBURG INTERIM BYPASS		OF	
TRACS NO. H 5825 01C						

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

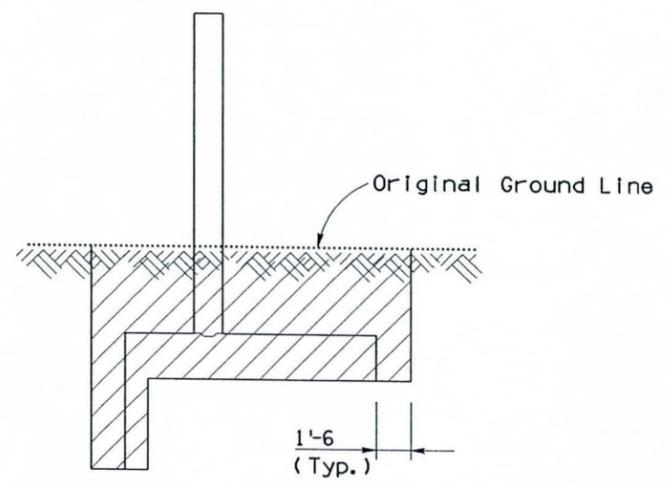
093 YV 198



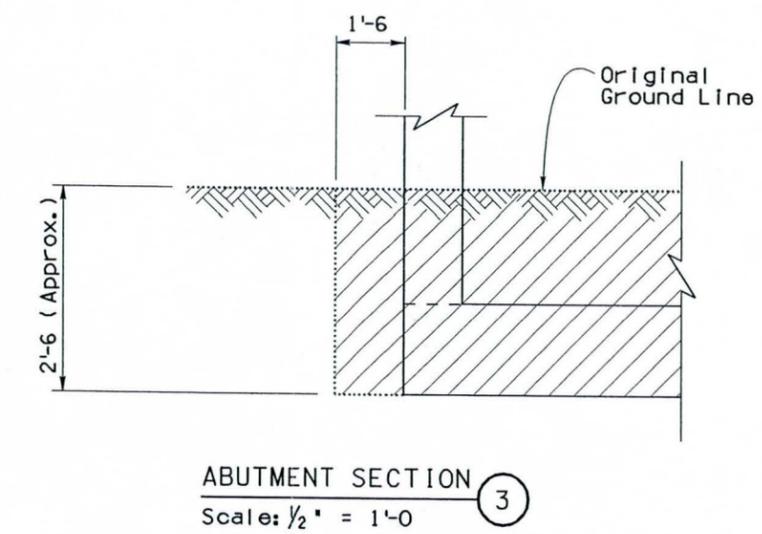
**FOUNDATION PLAN**  
Scale: 1" = 20'-0"



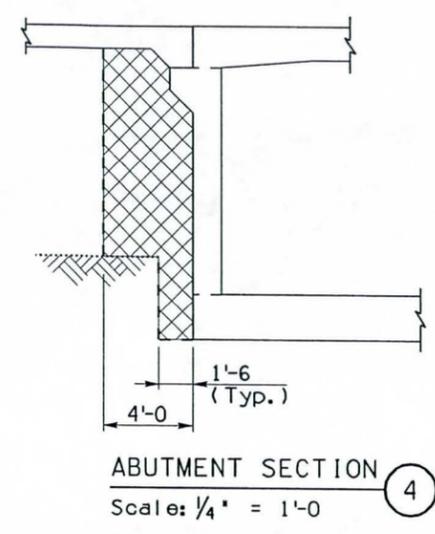
**CUT-OFF WALL SECTION 1**  
Scale: 1/4" = 1'-0"



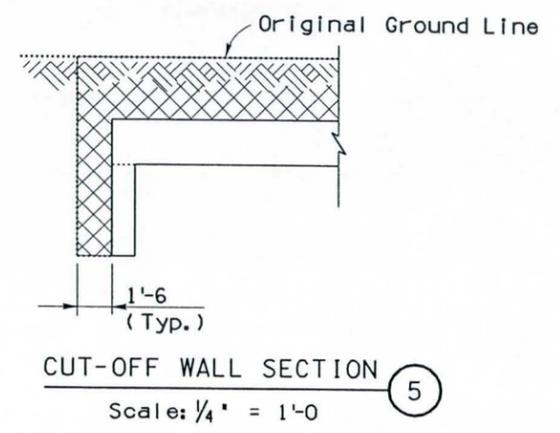
**RETAINING WALL/WING WALL SECTION 2**  
Scale: 1/4" = 1'-0"



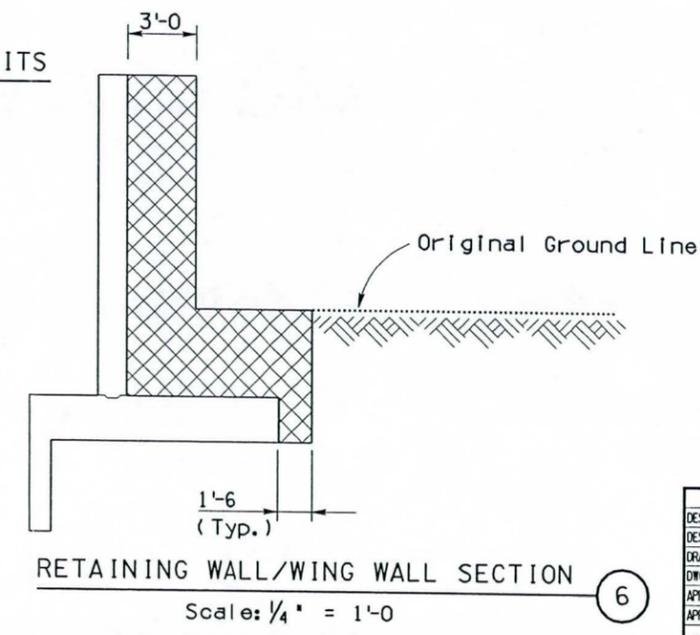
**ABUTMENT SECTION 3**  
Scale: 1/2" = 1'-0"



**ABUTMENT SECTION 4**  
Scale: 1/4" = 1'-0"



**CUT-OFF WALL SECTION 5**  
Scale: 1/4" = 1'-0"



**RETAINING WALL/WING WALL SECTION 6**  
Scale: 1/4" = 1'-0"

**STRUCTURAL EXCAVATION LIMITS**

**STRUCTURAL BACKFILL LIMITS**

**LEGEND:**

	Structure Excavation
	Roadway Excavation
	Structure Backfill
	Roadway Embankment

See Special Provisions  
203-10.03 (1) and  
203-10.03 (B) (1).

BRIDGE DESIGN SECTION B'		DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP	PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING
DESIGN	D. Benton	7-04		
DESIGN CKD	L. Altuna	7-04		
DRAWN	S. Nickel	8-04		
DWG CKD	D. Benton	8-04	STA. 114+ SOLS WASH BRIDGE STRUCTURAL EXC. AND BACKFILL	DWG. 5-215 OF
APPROVED-PROJ. ENGINEER	L. Altuna			
APPROVED-DESIGN LEADER	H. Sung		LOCATION WICKENBURG INTERIM BYPASS	OF
US93	199.50	2819	TRACS NO. H 5825 01C	093-B-(008)
ROUTE	MILEPOST	STRUCTURE NO.		

NO. 1 DESCRIPTION OF REVISIONS DATE MADE BY NO. 2 DESCRIPTION OF REVISIONS DATE MADE BY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
093 YV 198					

**GENERAL NOTES:**

Construction Specification - Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, 2000 Edition.

Design Specifications - AASHTO LRFD Bridge Design Specifications, Customary US Units, Second Edition 1998 with 1999, 2000 and 2001 Interim Revisions.

All concrete shall be Class S (f'c = 4000 psi).  
Reinforcing steel shall conform to ASTM Specification A615. All reinforcing shall be furnished as Grade 60. All bends and hooks shall meet the requirements of AASHTO LRFD Bridge Design Specifications Article 5.10.2. All bend dimensions for reinforcing steel shall be out-to-out of bars. All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise.

All reinforcing steel shall have 1/2 inches clear cover unless noted otherwise. Chamfer all exposed corners of concrete (3/4" Chamfer).

Dimensions shall not be scaled from drawings.

This barrier has been successfully crash tested and documented in Transportation Research Record No. 1258, 1990. This barrier is structurally evaluated as meeting the requirements of NCHRP Report 350 Test Level 4.

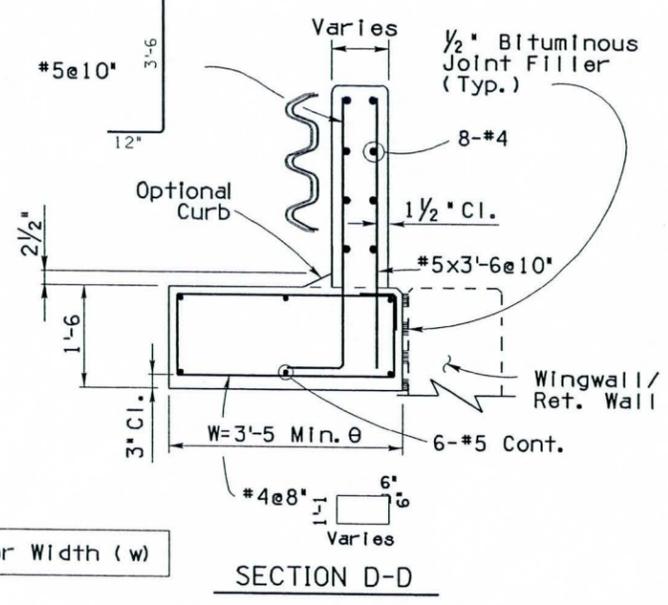
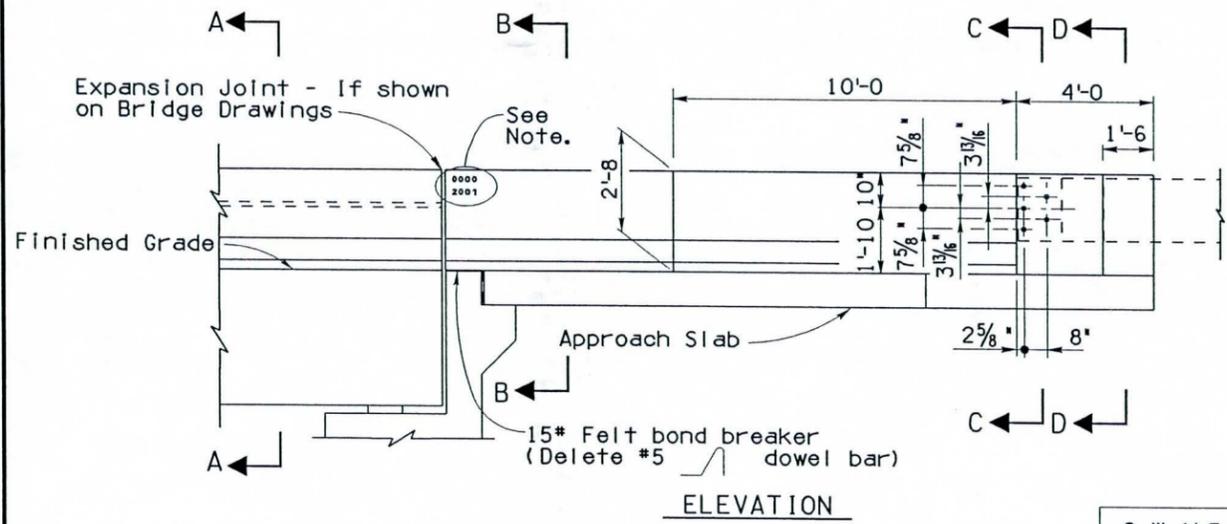
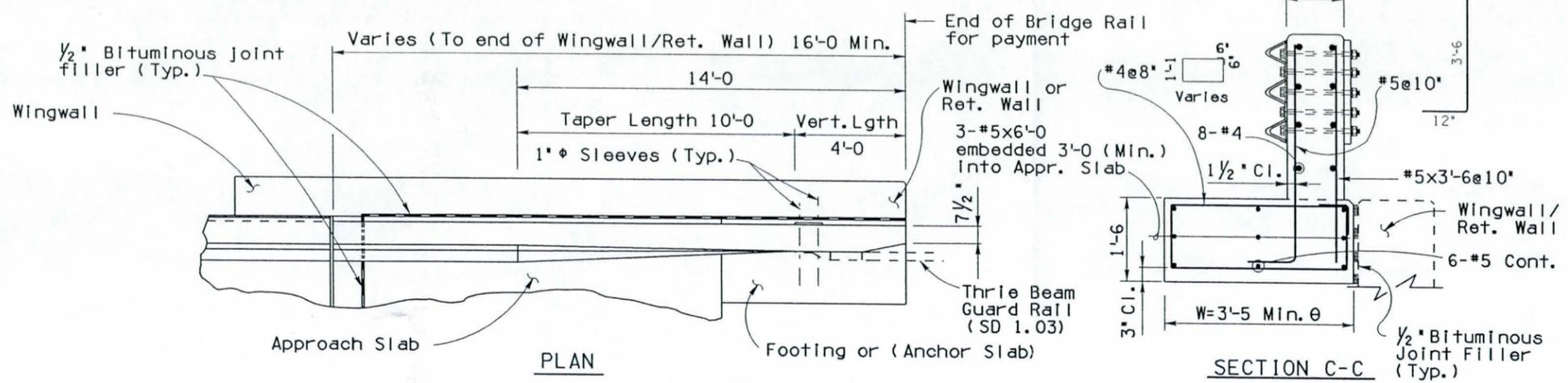
Concrete barriers on continuous superstructures shall have 1/2" bituminous joint filler in open joints over piers. See bridge drawings for details.

For bridge deck cantilever over 4'-0", additional deck reinforcement may be required.

Item No. 6011130  
F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION (32")  
Measure: Linear Foot

Imbed 1/2", Bridge Number and Year Built, using 1 1/2" w x 2" h number impressions in concrete, located as shown.

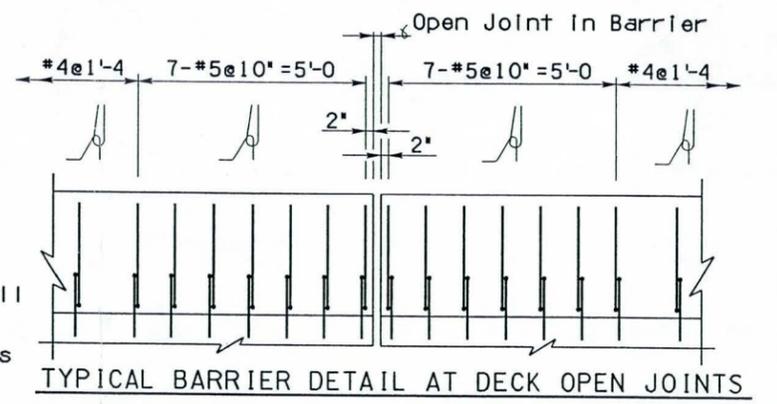
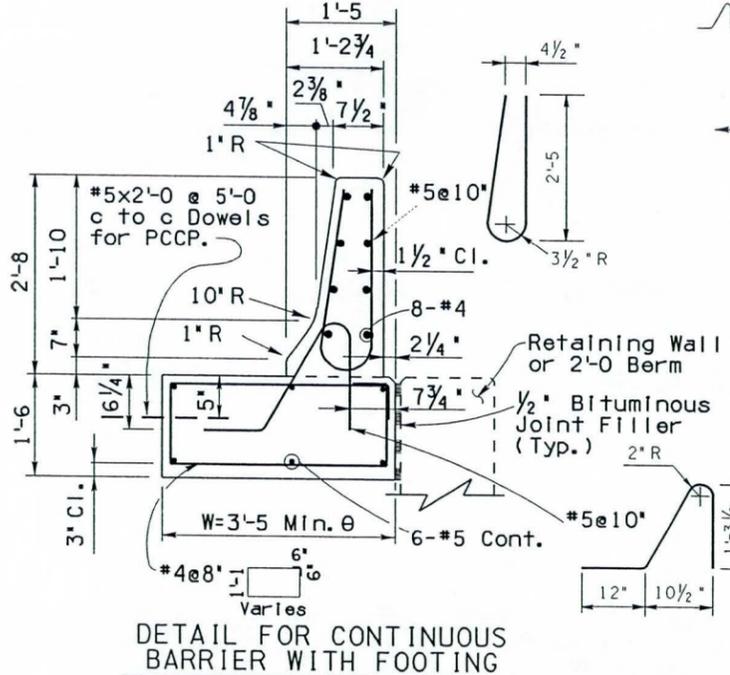
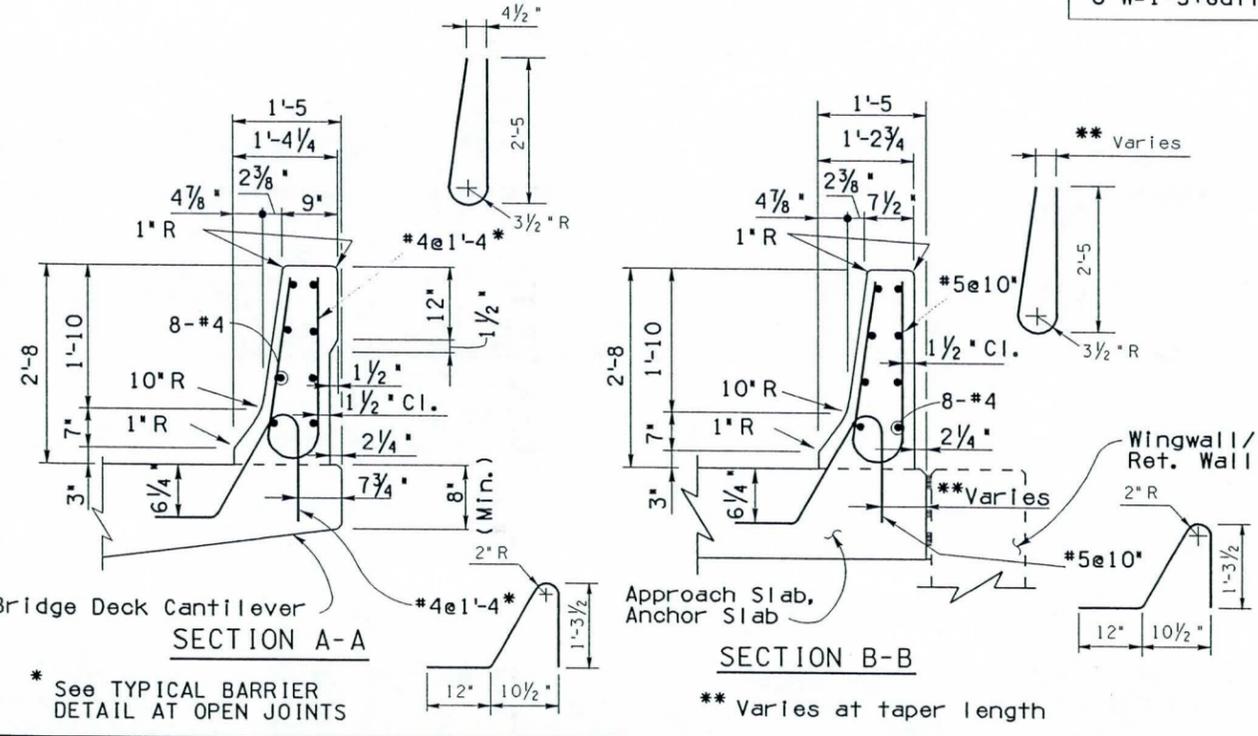
Anchorage bars are included in the pay item for barrier.



$\theta W = 1'-5 + \text{Gutter Width (w)}$

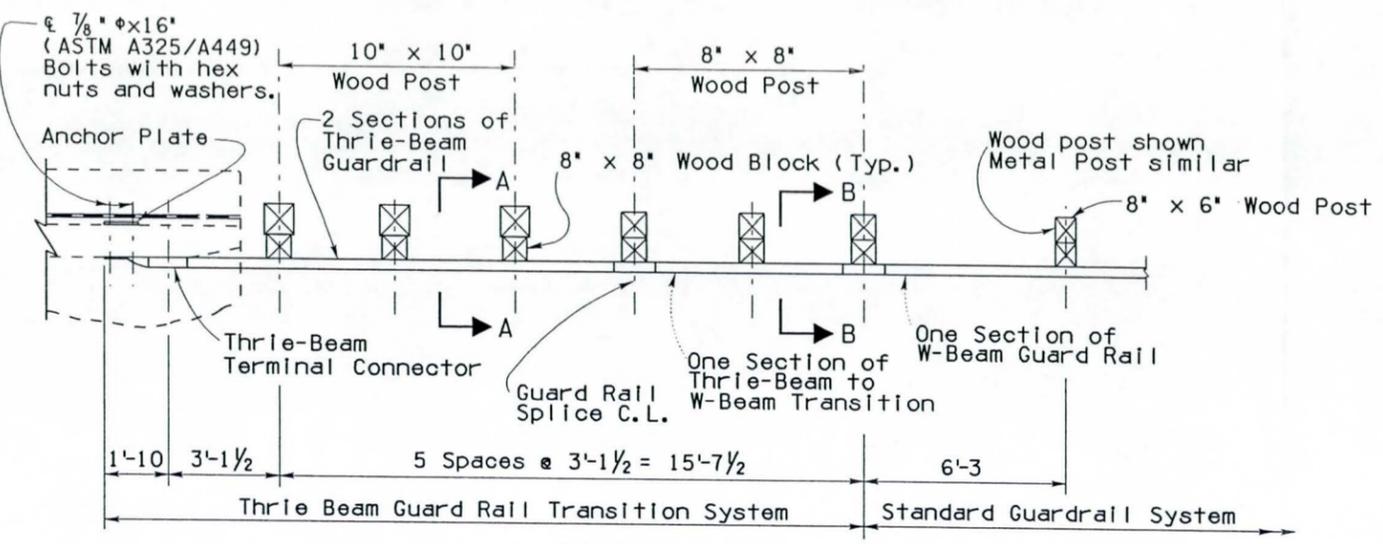
Note to Designer: The information presented in this Standard Detail has been prepared in accordance with recognized engineering principles and is for general use. It should not be used for specific application without competent professional examination and verification of its suitability and applicability by a licensed professional engineer. Contents within the inner border line shall not be altered.

NO.	DESCRIPTION OF REVISIONS	DATE	BY
1	Original Issue	8-99	S.U.H.
2	Bid Item No.	9-99	S.U.H.
3	Guardrail Height	7-01	S.U.H.
4	Footing width and Dowel	8-01	S.U.H.

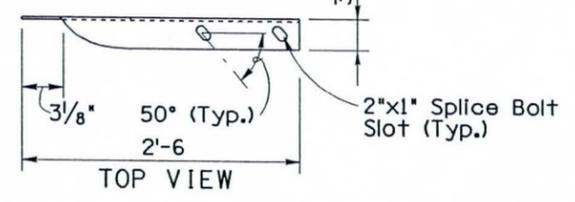


DESIGN APPROVED <i>Shafi U. Hasan</i>		ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP STRUCTURE DETAIL	
APPROVED FOR DISTRIBUTION <i>J. Daniel Davis</i>		32 INCH F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION	
ROUTE US93	LOCATION WICKENBURG INTERIM BYPASS	DRAWING NO. SD 1.01	
TRACS NO. H 5825 01C		093-B-(008)	

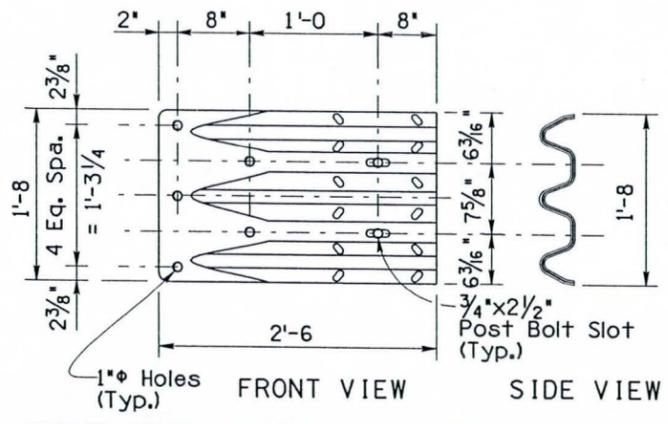
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
093 YV 198					



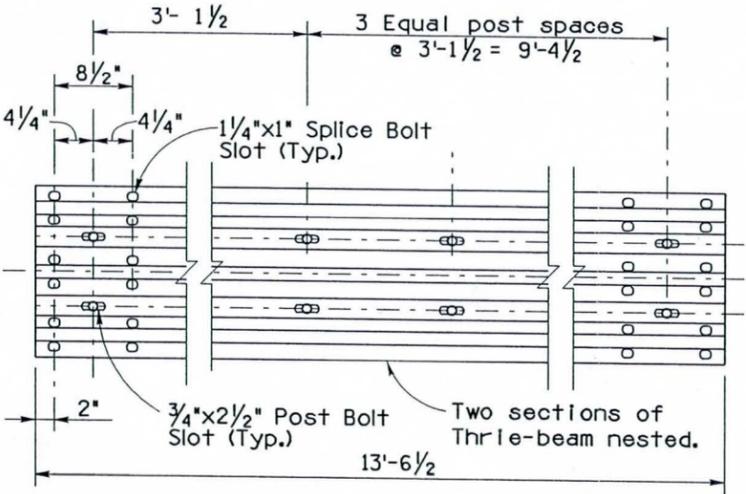
PLAN



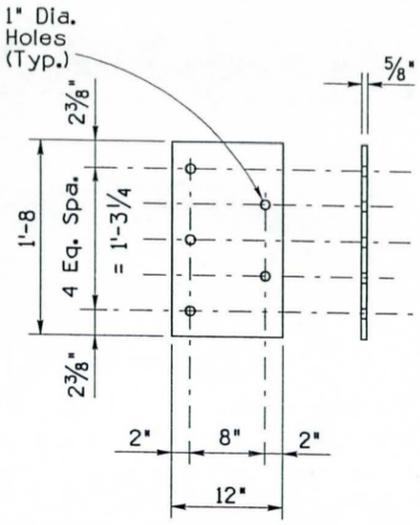
TOP VIEW



THRIE BEAM TERMINAL CONNECTOR  
NO SCALE



THRIE BEAM ELEVATION  
NO SCALE



ANCHOR PLATE  
NO SCALE

GENERAL NOTES:

Structural steel shall conform to ASTM Specification A36 unless noted otherwise.

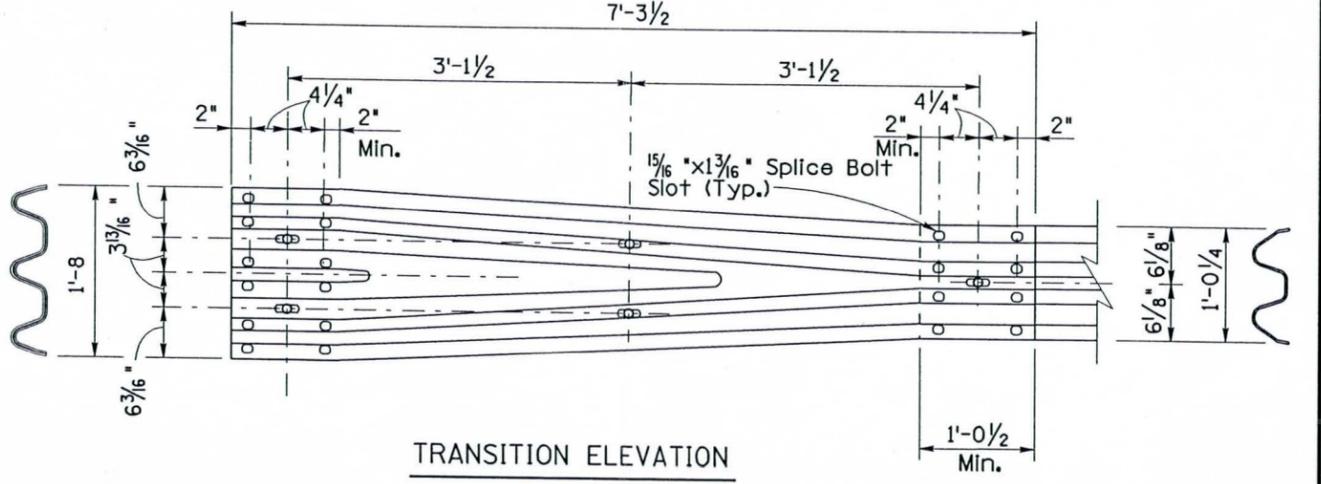
The terminal connectors shall be galvanized after fabrication in accordance with ASTM Specification A123.

Bolts, washers and anchor plate shall be galvanized or, at the contractors option, stainless steel bolts and washers may be used. They shall conform to or exceed the mechanical requirements of ASTM A325, unless noted otherwise.

Overlap of the terminal connector, thrie beam, transition and guardrails shall be in the direction of the adjacent traffic lane.

Thrie Beam Transition Hardware provided is per AASHTO-AGC-ARTBA Joint Committee Task Force 13 Report.

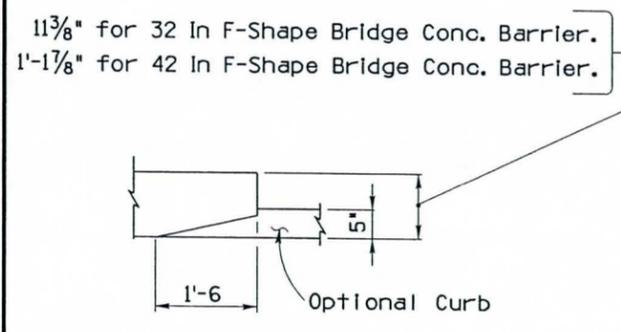
Item No. 9050430  
THRIE BEAM GUARD RAIL TRANSITION SYSTEM.  
Measure: Each



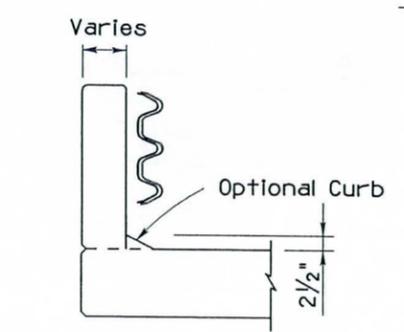
TRANSITION ELEVATION  
NO SCALE

Note to Designer: The information presented in this Standard Detail has been prepared in accordance with recognized engineering principles and is for general use. It should not be used for specific application without competent professional examination and verification of its suitability and applicability by a licensed professional engineer. Contents within the inner border line shall not be altered.

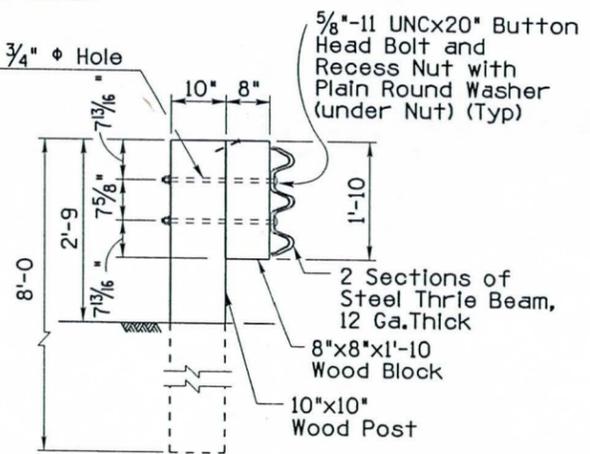
NO.	DESCRIPTION OF REVISIONS	DATE	BY
1	Original Issue	8-99	S.A.H.
2	Guardrail Height	7-01	S.A.H.
3	Limits of Transition, Allow Inps	9-02	S.A.H.
4			



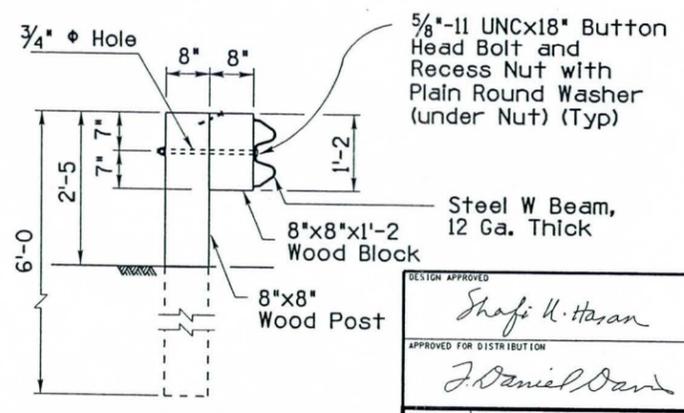
PART PLAN  
(Showing Opt. Curb)  
NO SCALE



PART ELEVATION  
(Showing Opt. Curb)  
NO SCALE



SECTION A-A  
NO SCALE

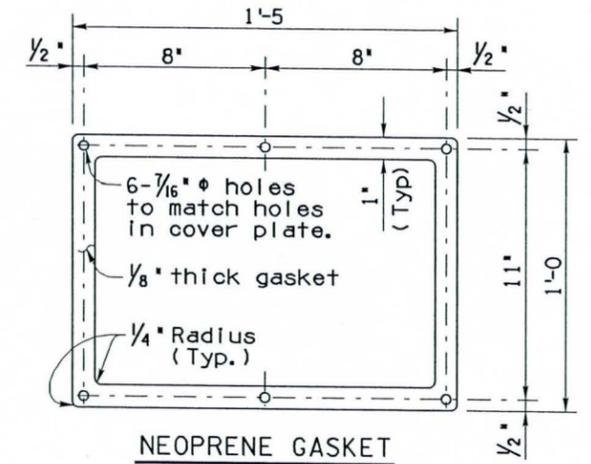
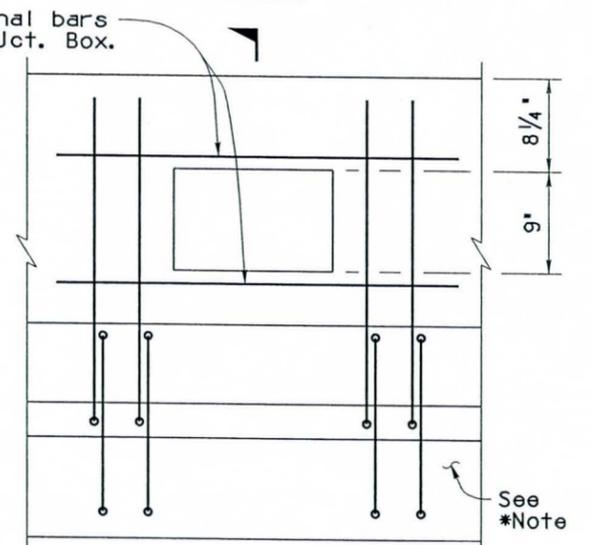
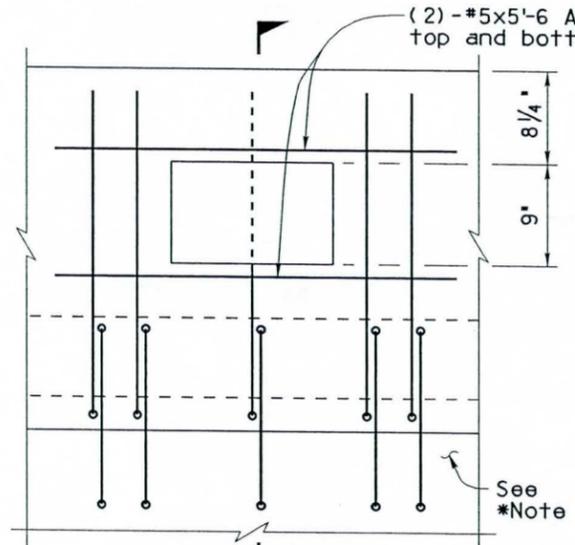
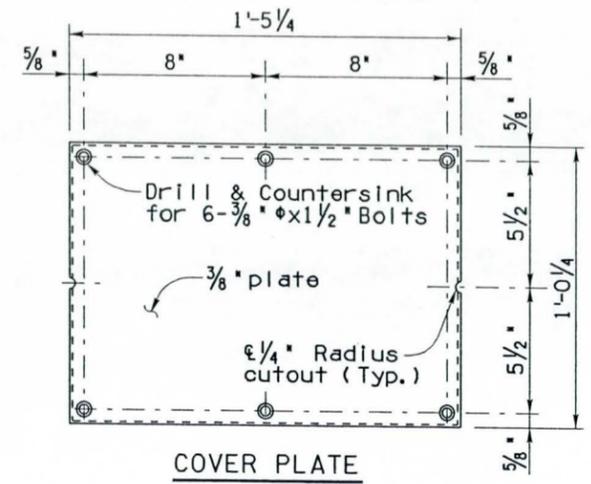
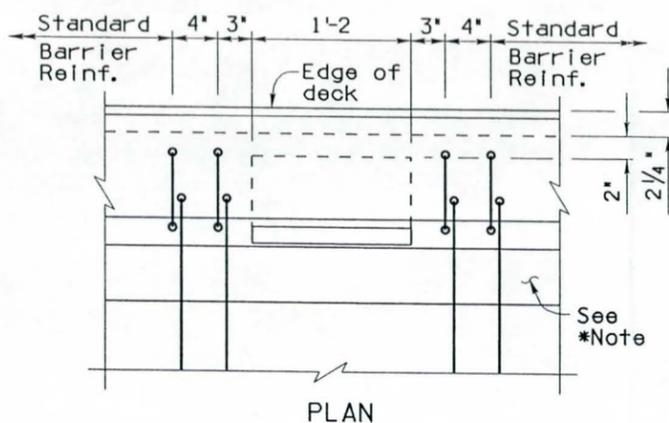
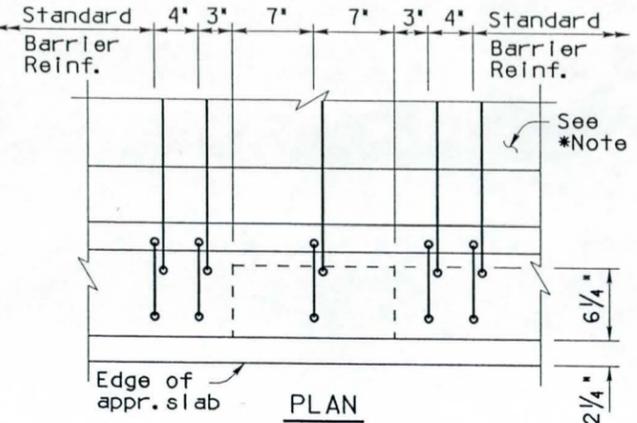


SECTION B-B  
NO SCALE

DESIGN APPROVED <i>Shafi U. Hasan</i>		ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP STRUCTURE DETAIL	
APPROVED FOR DISTRIBUTION <i>J. Daniel Davis</i>		THRIE BEAM GUARD RAIL TRANSITION SYSTEM	
ROUTE US93	LOCATION WICKENBURG INTERIM BYPASS	DRAWING NO. SD 1.03	
TRACS NO. H 5825 01C		093-B-(008)	OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
093 YV 198					

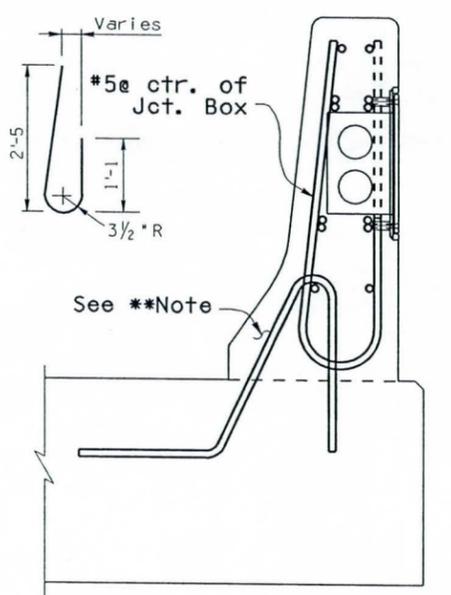
**GENERAL NOTES:**  
 Construction Specification - Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, Latest Edition.  
 Design Specifications - AASHTO Standard Specifications for Highway Bridges, Latest Edition.  
 Structural steel shall conform to ASTM A36.  
 All welding shall conform to the requirements of the American Welding Society, ANSI/AASHTO/AWS D1.5-96 Bridge Welding Code.  
 All bolts shall conform to ASTM A307. Threaded inserts shall be loop type (U.N.C. thread).  
 All bolts, nuts and washers shall be galvanized in accordance with ASTM A153. All other steel shall be galvanized after fabrication in accordance with ASTM A123.  
 Chamfer all bottom edges of cover plate  $\frac{1}{8}$ " x 45°. Cover plate shall have 1" letters embossed  $\frac{1}{8}$ " to say: "ADOT ELECTRICAL HIGH VOLTAGE".



1  
ELEVATION  
(Back Face)

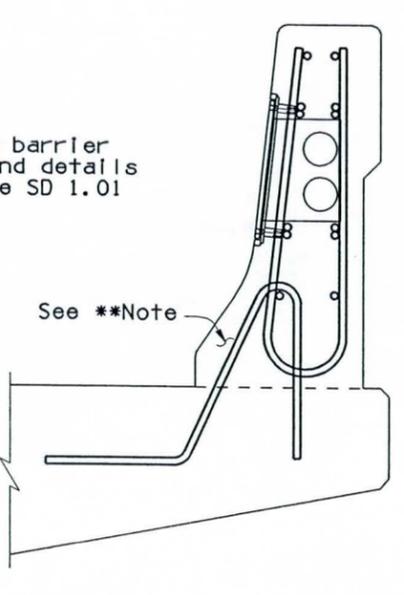
2  
ELEVATION  
(Front Face)

\*Note: Horiz. barrier reinforcement not shown for clarity.

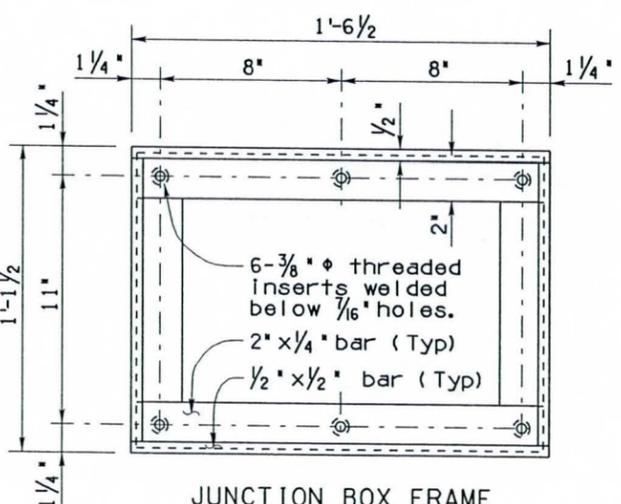


1  
TYPE I JUNCTION BOX  
(At Approach Transition)

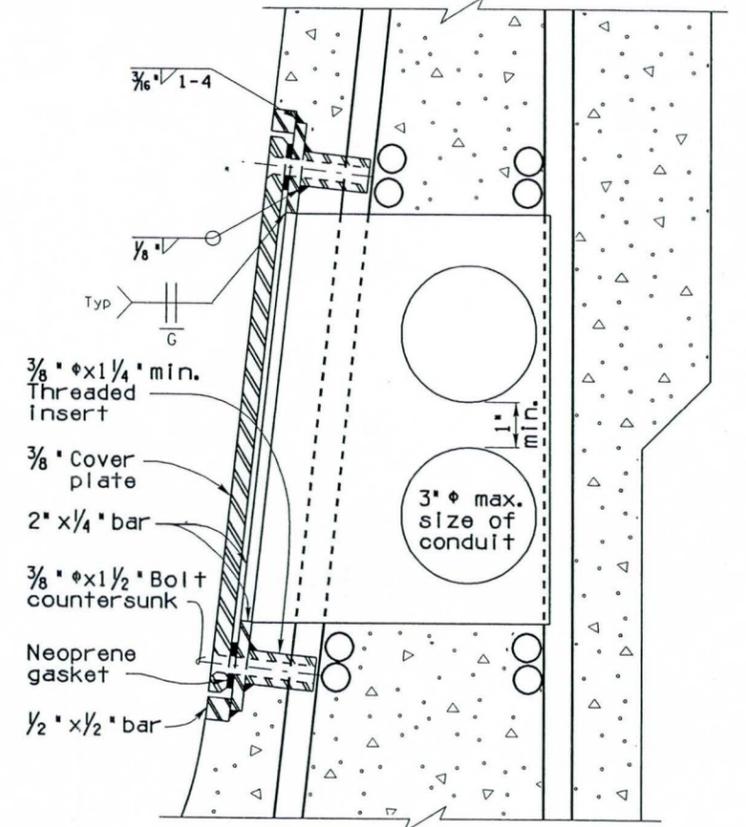
\*\*Note: For concrete barrier dimensions and details not shown see SD 1.01 or SD 1.02



2  
TYPE II JUNCTION BOX  
(On Bridge)



JUNCTION BOX FRAME



JUNCTION BOX DETAIL

Item No. 7320475  
 TYPE I JUNCTION BOX  
 Measure: Each  
 Item No. 7320476  
 TYPE II JUNCTION BOX  
 Measure: Each  
 Junction Box for 32' barrier shown. Details similar for 42' barrier.

DESIGN APPROVED <i>Henry Man-Fa Sung</i>		ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP STRUCTURE DETAIL	
APPROVED FOR DISTRIBUTION <i>J. Daniel Davis</i>		BARRIER JUNCTION BOX	
ROUTE US93	LOCATION WICKENBURG INTERIM PASS	DRAWING NO. SD 1.11	
TRACS NO. H 5825 01C	093-B-(008)	OF	

Note to Designer: The information presented in this Standard Detail has been prepared in accordance with recognized engineering principles and is for general use. It should not be used for specific application without competent professional examination and verification of its suitability and applicability by a licensed professional engineer. Contents within the inner border line shall not be altered.

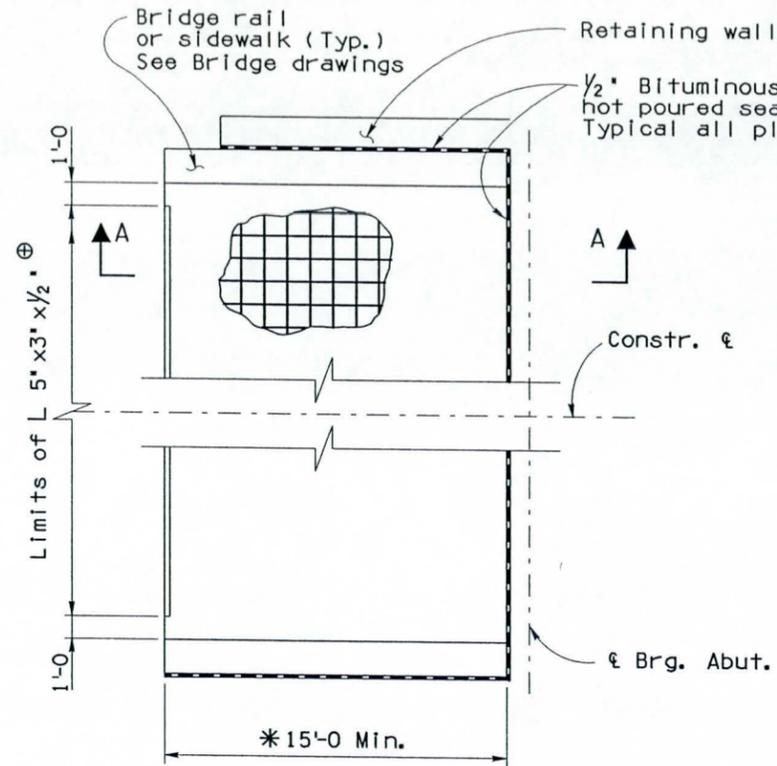
NO.	DATE	DESCRIPTION OF REVISIONS
1	5-02	Original Issue
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3		
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F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
093 YV 198					

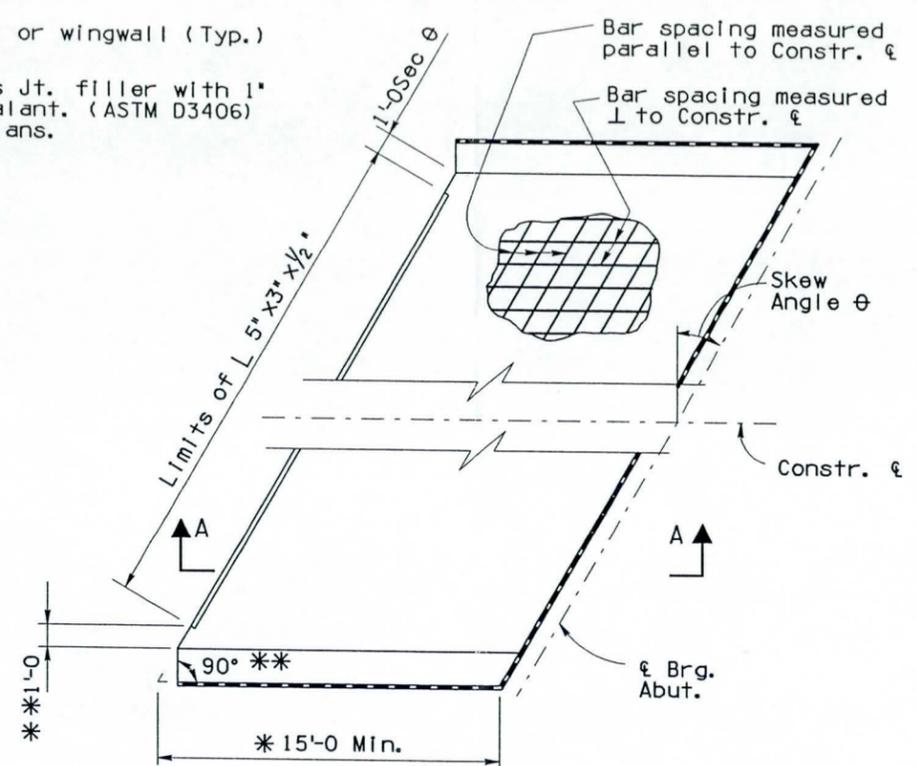
**GENERAL NOTES:**

Construction - Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, latest Edition. Design - AASHTO Standard Specification for Highway Bridges, 16th Edition, 1996 and the 1997 and 1998 Interim Specifications. All concrete shall be Class 'S' (f'c = 3000 psi). Reinforcing steel shall conform to ASTM Specification A615. All reinforcing shall be furnished as Grade 60 (fs = 24,000 psi). All bends and hooks shall meet the requirements of AASHTO Article 8.23. All bend dimensions for reinforcing steel shall be out-to-out of bars. All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise. All reinforcing steel shall have 2" clear cover unless noted otherwise. Structural steel shall conform to ASTM Specification A36. All welding shall conform to the requirements of the American Welding Society, ANSI/AASHTO/AWS, D1.5-96 Bridge Welding Code. Paint and Painting shall conform to Standard Specifications. Contact surfaces shall not be painted. Dimensions shall not be scaled from drawings. Item No. 6011371 APPROACH SLAB Measure: Square foot

Note to Designer: The information presented in this Standard Detail has been prepared in accordance with recognized engineering principles and is for general use. It should not be used for specific application without competent professional examination and verification of its suitability and applicability by a licensed professional engineer. Contents within the inner border line shall not be altered.

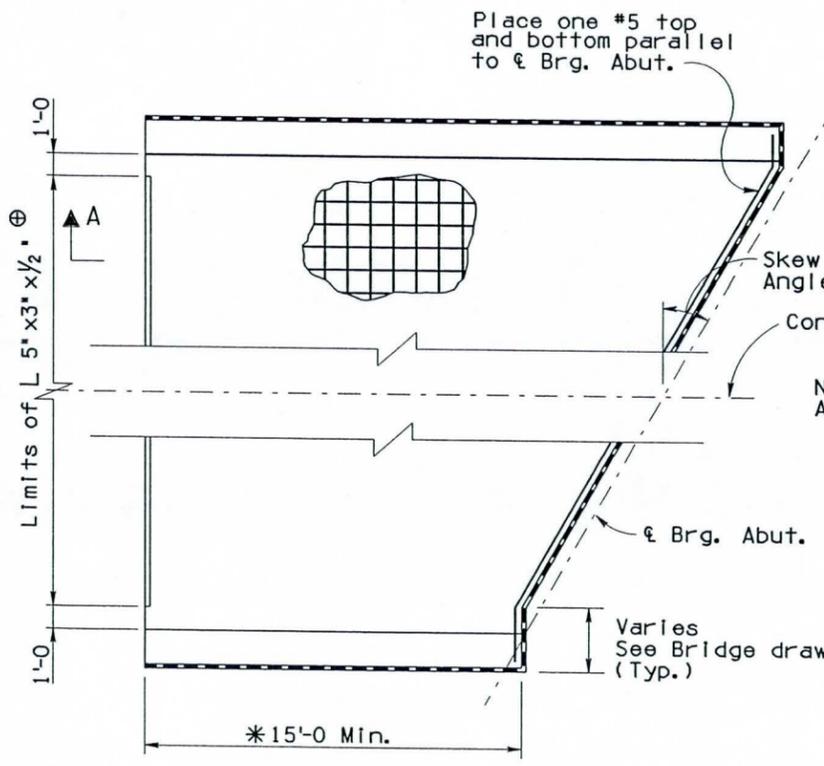


**PLAN A**  
Rt. Angle Bridge

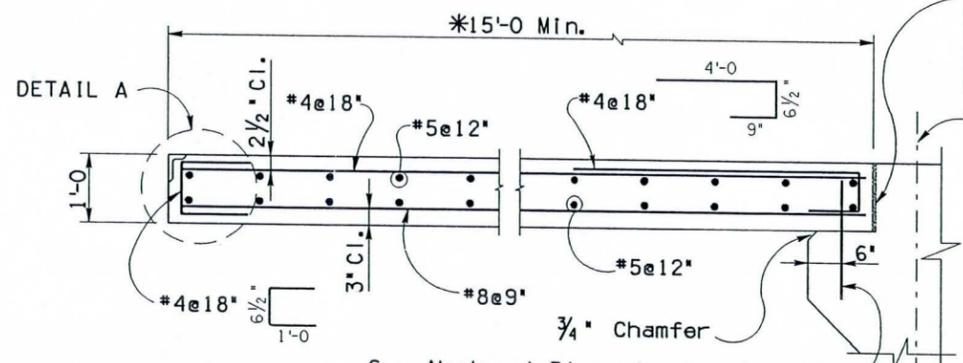


**PLAN B**  
Skewed Bridge without Anchor Slab  
Skew Angle  $\leq 45^\circ$

\* See Bridge drawings for length.  
\*\* For skew angle over  $20^\circ$

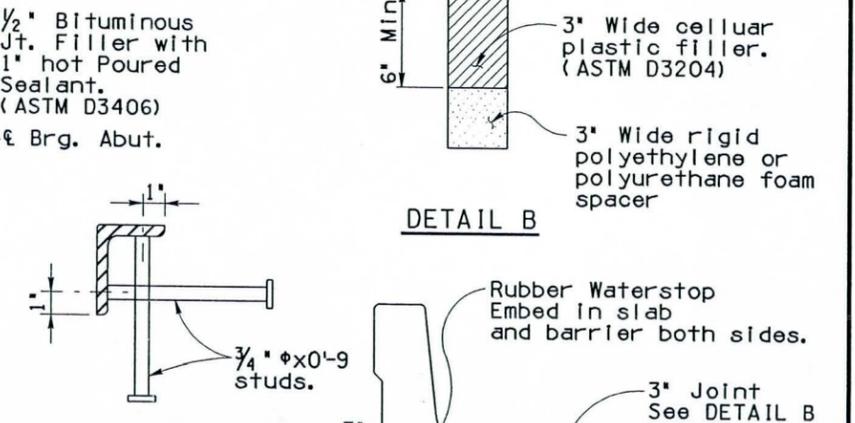


**PLAN C**  
Skewed Bridge  $> 45^\circ$  without Anchor Slab shown  
Skewed Bridge with Anchor Slab  
Skew Angle  $\leq 60^\circ$

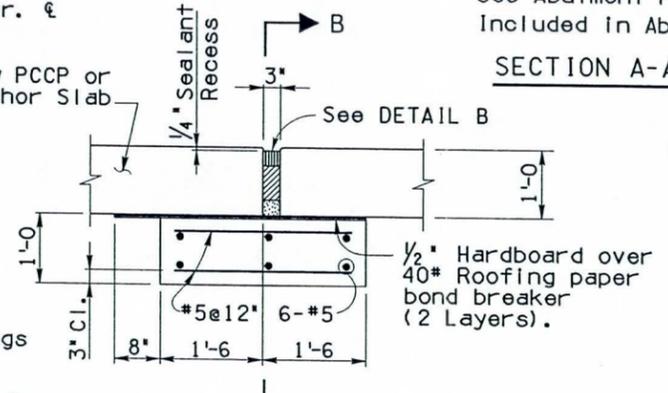


See Abutment Plans for bar Details. Included in Abut. Quantities.

**SECTION A-A**

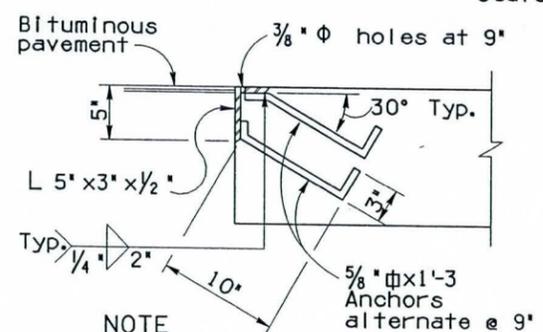


**DETAIL B**  
Rubber Waterstop Embed in slab and barrier both sides.  
3" Joint See DETAIL B



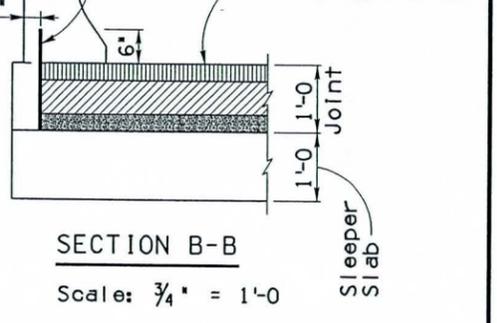
**NOTE**  
Omit guard angle for this alternate.  
Concrete Pavement Alternate

**DETAIL A**



**NOTE**  
Omit guard angle thru raised median and sidewalks.  
Bituminous Pavement Alternate

**ALTERNATE ANCHOR DETAIL**  
Scale 3" = 1'-0"

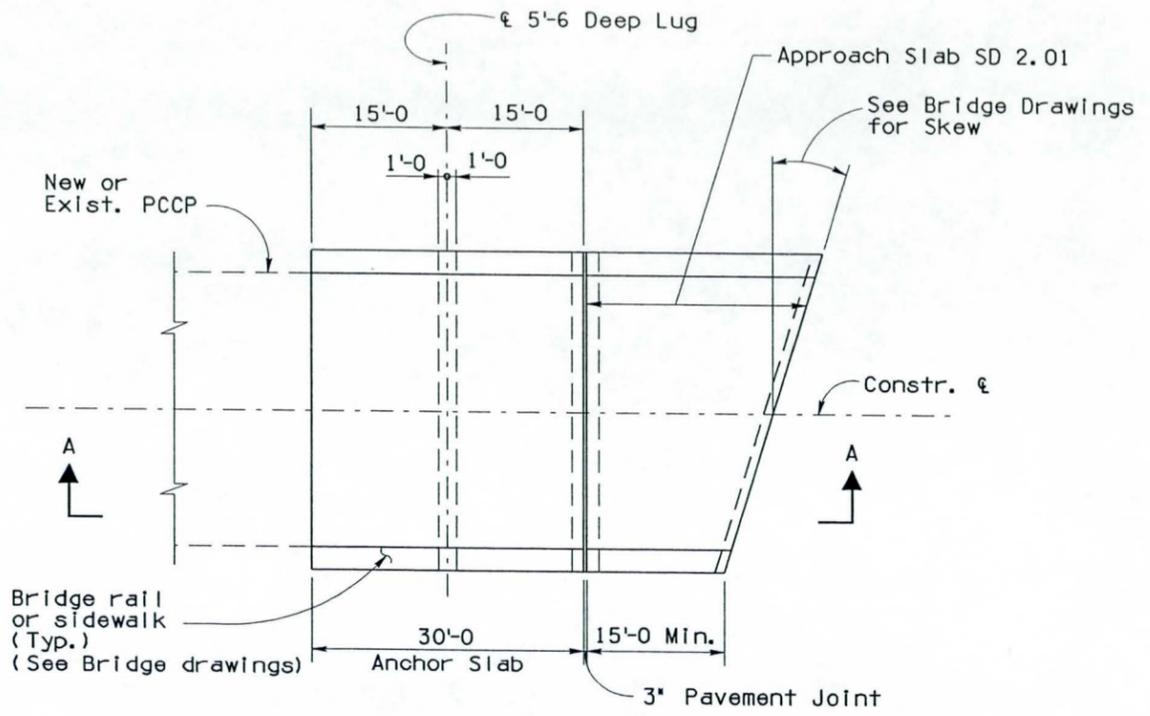


**SECTION B-B**  
Scale: 3/4" = 1'-0"

NO.	DESCRIPTION OF REVISIONS	DATE	BY
1	Original Issue	11-00	JRP.
2			
3			
4			

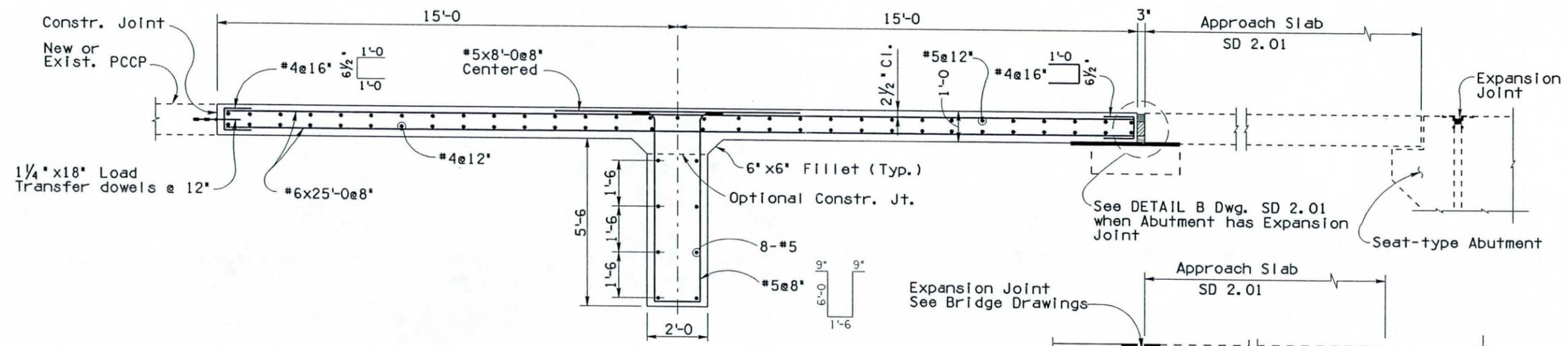
DESIGN APPROVED <i>James R. Pyne</i>		ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP STRUCTURE DETAIL	
APPROVED FOR DISTRIBUTION <i>J. Daniel Davis</i>		APPROACH SLAB DETAILS	
ROUTE US93	LOCATION WICKENBURG INTERIM BYPASS	DRAWING NO. SD 2.01	
TRACS NO. H 5825 01C	093-B-(008)	OF	

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
			093 YV 198		

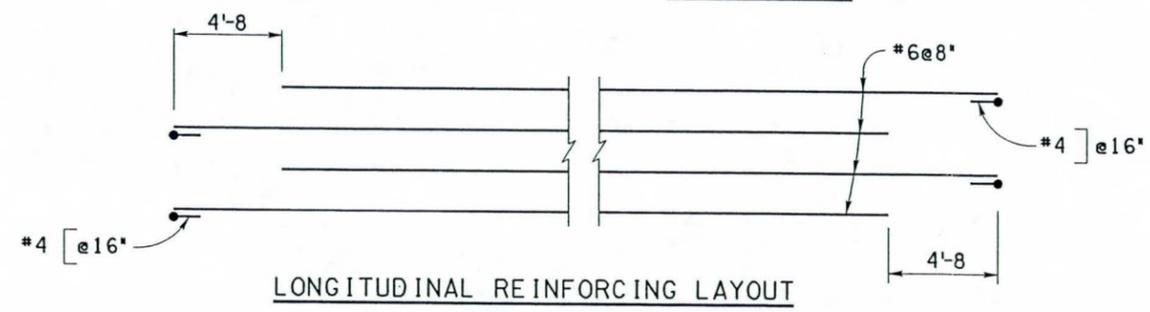


**PLAN - TYPE 2 ANCHOR SLAB**  
(For Pavement 200 Ft. to 700 Ft. In Length)

**GENERAL NOTES:**  
 Construction - Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, latest Edition.  
 Design - AASHTO Standard Specification for Highway Bridges, 16th Edition, 1996 and the 1997 and 1998 Interim Specifications.  
 All concrete shall be Class 'S' ( $f'c = 3000$  psi).  
 Reinforcing steel shall conform to ASTM Specification A615.  
 All reinforcing shall be furnished as Grade 60 ( $f_s = 24,000$  psi).  
 All bends and hooks shall meet the requirements of AASHTO Article 8.23. All bend dimensions for reinforcing steel shall be out-to-out of bars. All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise.  
 All reinforcing steel shall have 3" clear cover unless noted otherwise.  
 Anchor lug to be cast in precompacted roadway embankment or cast in forms and soil compacted to embankment requirements prior to casting the Anchor Slab.  
 Dimensions shall not be scaled from drawings.  
 Item No. 6011373  
 TYPE 2 ANCHOR SLAB  
 Measure: Square foot



**SECTION A-A**



**LONGITUDINAL REINFORCING LAYOUT**

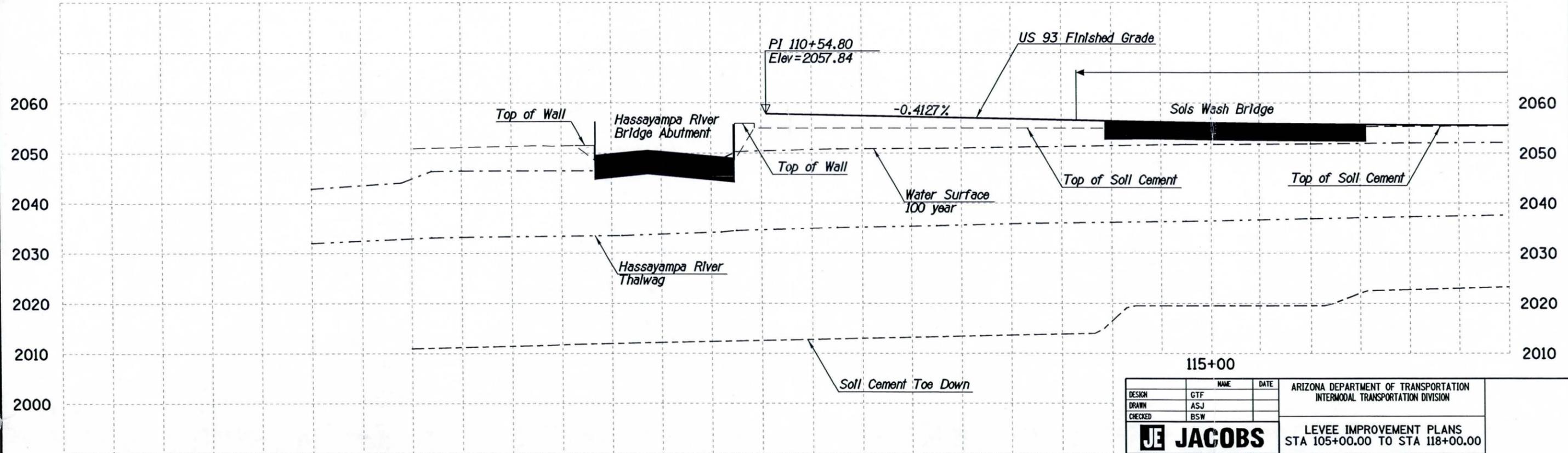
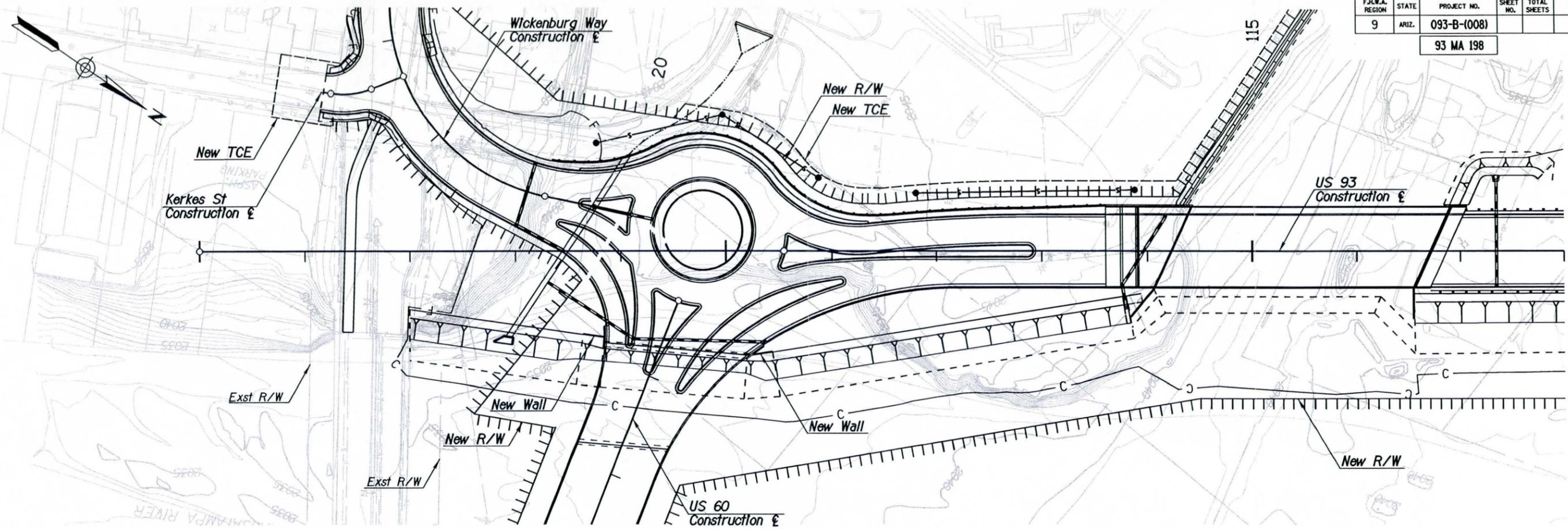
Note to Designer: The information presented in this Standard Detail has been prepared in accordance with recognized engineering principles and is for general use. It should not be used for specific application without competent professional examination and verification of its suitability and applicability by a licensed professional engineer. Contents within the inner border line shall not be altered.

NO.	DESCRIPTION OF REVISIONS	MADE BY	DATE
1	Original Issue	J.R.P.	11-00
2			
3			
4			

DESIGN APPROVED <i>James R. Pyne</i>		ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION BRIDGE GROUP STRUCTURE DETAIL	
APPROVED FOR DISTRIBUTION <i>J. Daniel Davis</i>		TYPE 2 ANCHOR SLAB DETAILS	
ROUTE US93	LOCATION WICKENBURG INTERIM PASS	DRAWING NO. SD 2.03	
TRACS NO. H 5825 01C		093-B-(008)	OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

93 MA 198

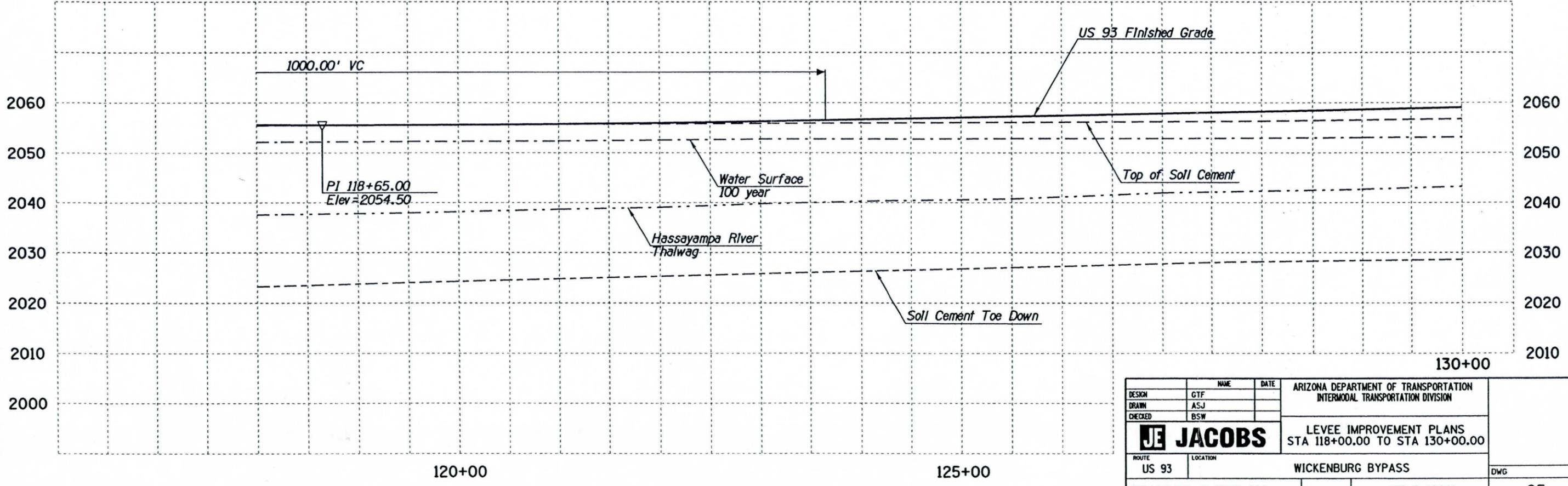
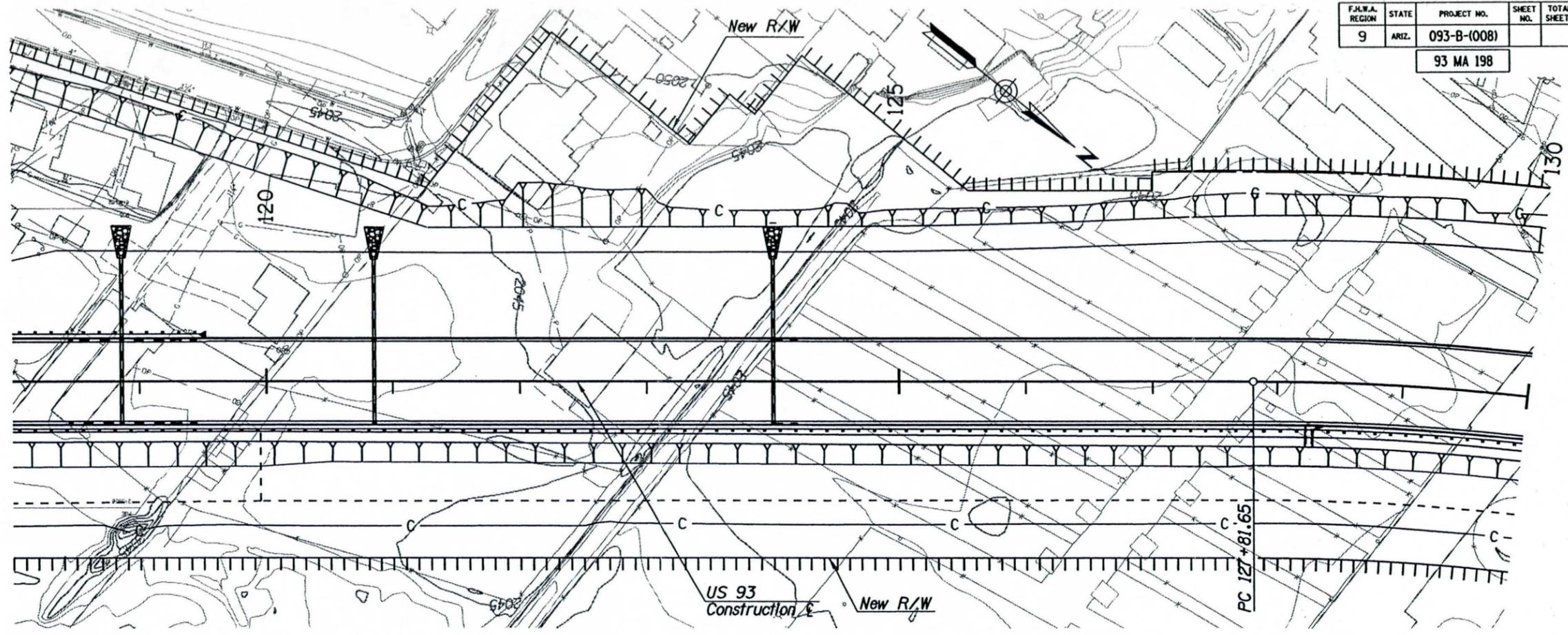


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CHECKED	BSW		
<b>JE JACOBS</b>			LEVEE IMPROVEMENT PLANS STA 105+00.00 TO STA 118+00.00
ROUTE	US 93	LOCATION	WICKENBURG BYPASS
TRACS NO. H 5825 01C			093-B-(008)
			DWG OF

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

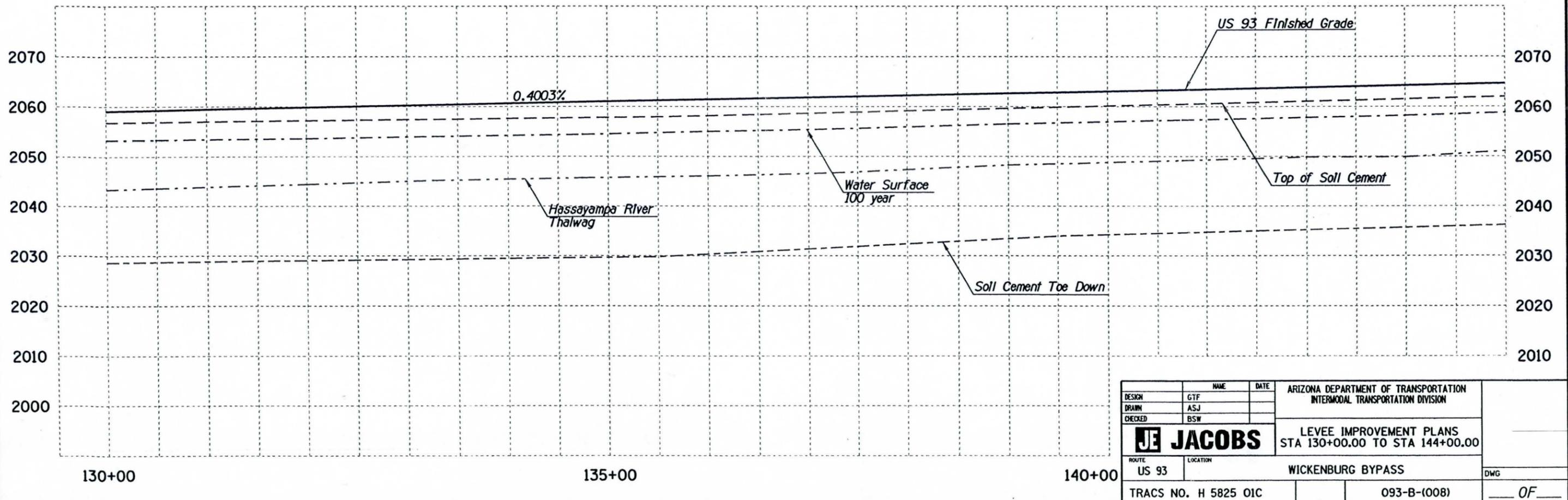
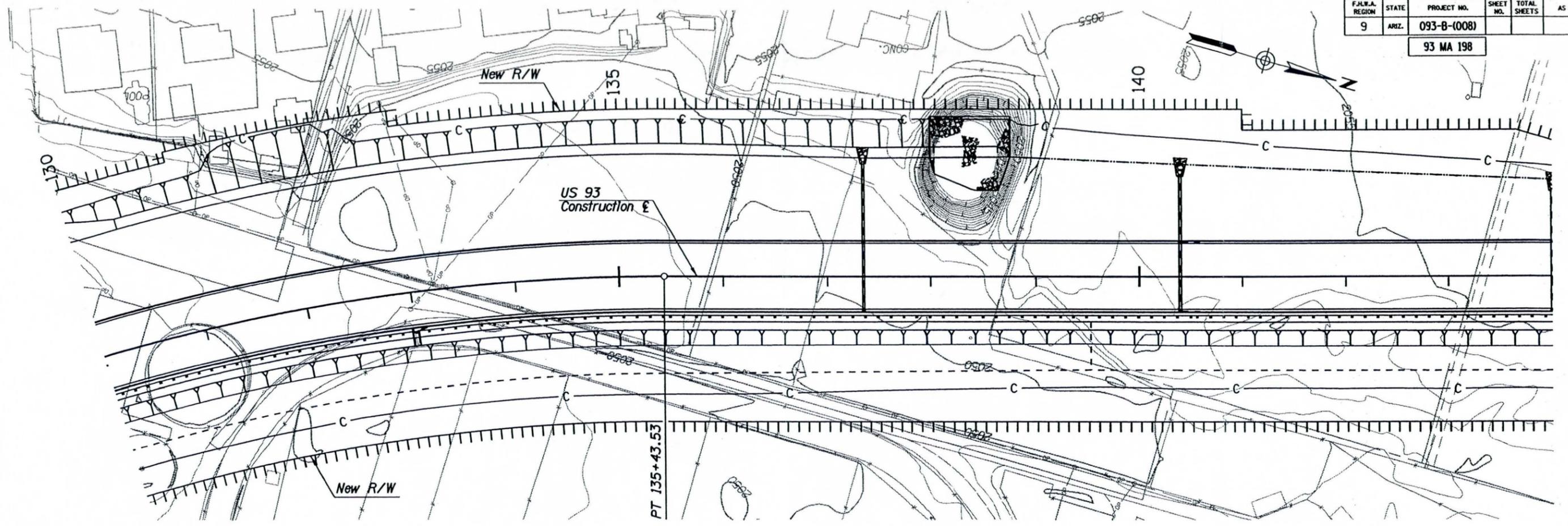
93 MA 198



DESIGN	GTF	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION
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CHECKED	BSW		
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ROUTE	LOCATION		WICKENBURG BYPASS
US 93			DWG
TRACS NO. H 5825 01C			093-B-(008)
			___ OF ___

DATE: \_\_\_\_\_ LOCATION: \_\_\_\_\_ REVISIONS: \_\_\_\_\_ FINISHED PLANS: \_\_\_\_\_ SURVEY NO.: \_\_\_\_\_

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93 MA 198					

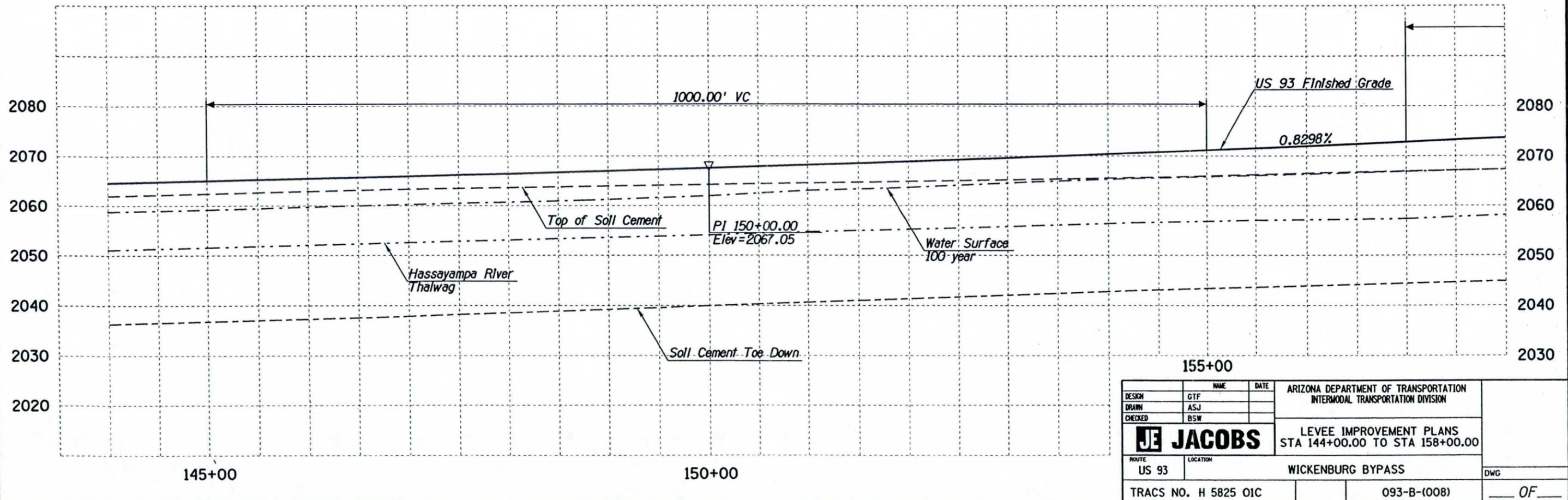
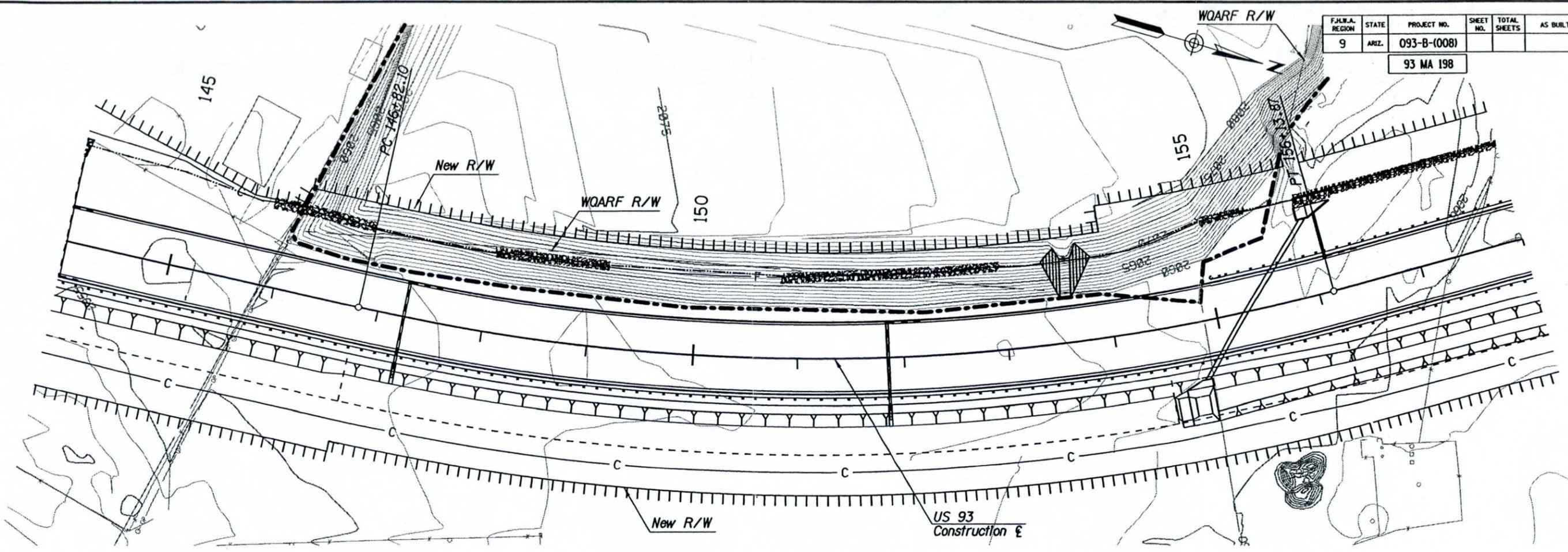


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CHECKED	BSW			
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ROUTE	US 93	LOCATION	WICKENBURG BYPASS	
TRACS NO. H 5825 01C		093-B-(008)		DWG OF

DATE: \_\_\_\_\_ LOCATION: \_\_\_\_\_ REVISIONS: \_\_\_\_\_ FINISHED PLANS: \_\_\_\_\_ SURVEY NO. \_\_\_\_\_

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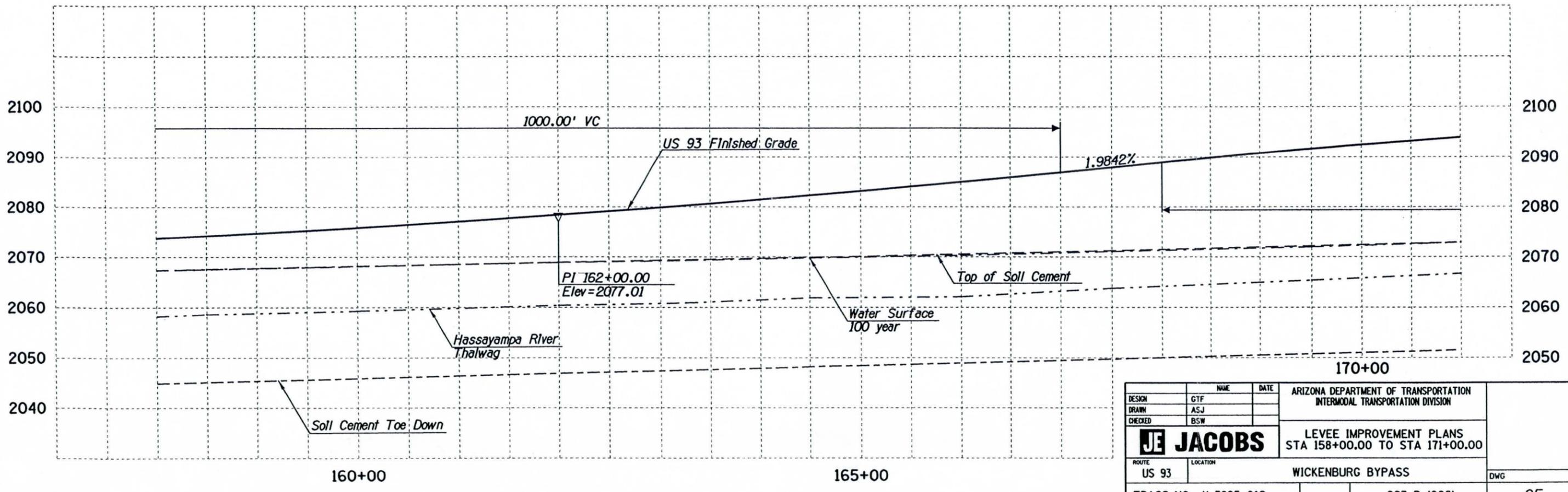
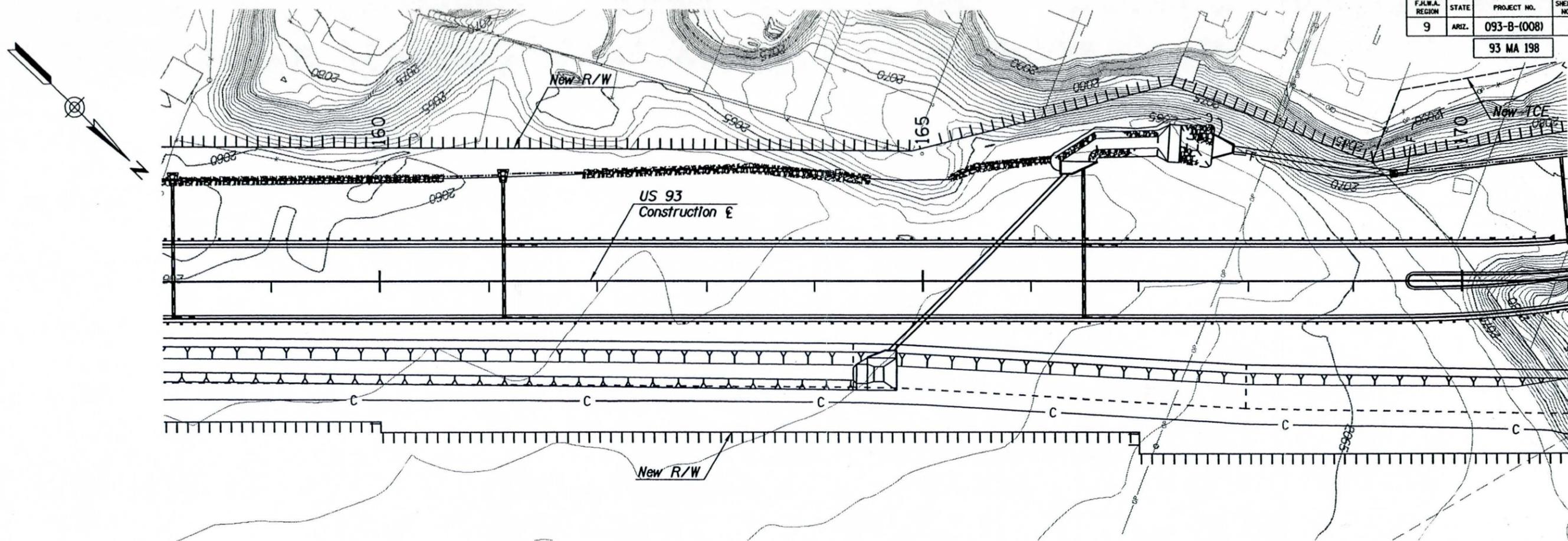
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
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93 MA 198					



DESIGN	GTF	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION
DRAWN	ASJ		
CHECKED	BSW		
<b>JE JACOBS</b>			LEVEE IMPROVEMENT PLANS STA 144+00.00 TO STA 158+00.00
ROUTE	LOCATION	DWG	
US 93	WICKENBURG BYPASS		
TRACS NO. H 5825 01C		093-B-(008)	OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			

93 MA 198

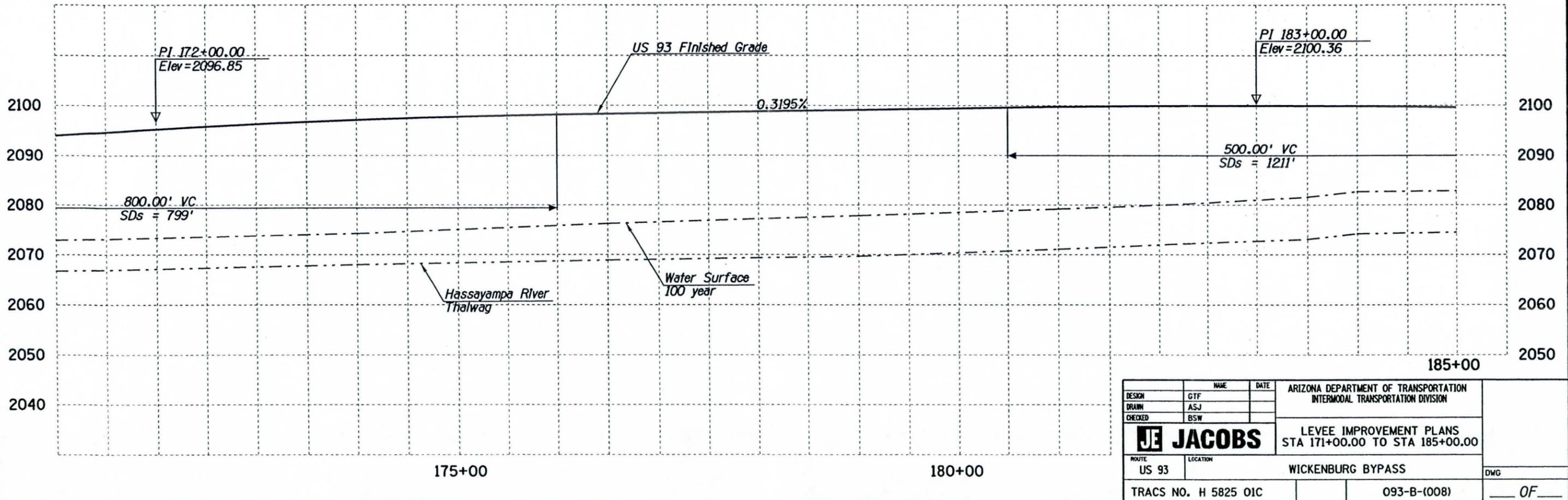
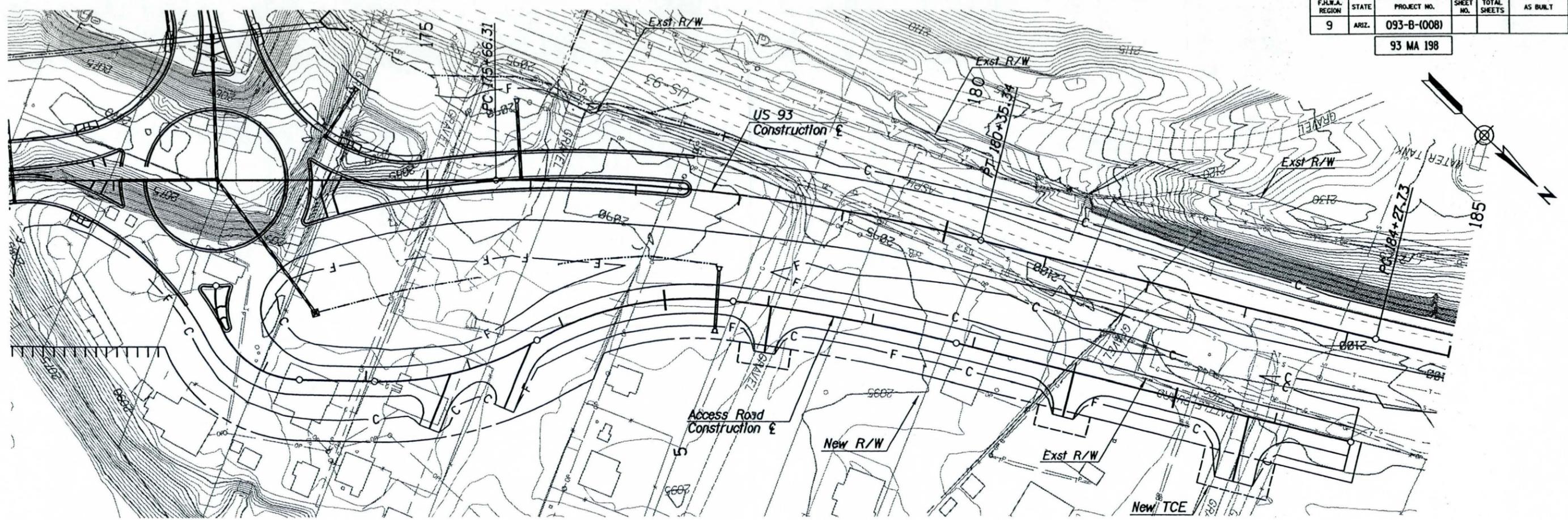


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DRAWN	ASJ		
CHECKED	BSW		
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ROUTE	LOCATION		DWG
US 93	WICKENBURG BYPASS		
TRACS NO. H 5825 01C		093-B-(008)	OF

DATE LOCATION REVISIONS FINISHED PLANS SURVEY NO. DATE LOCATION REVISIONS FINISHED PLANS SURVEY NO.

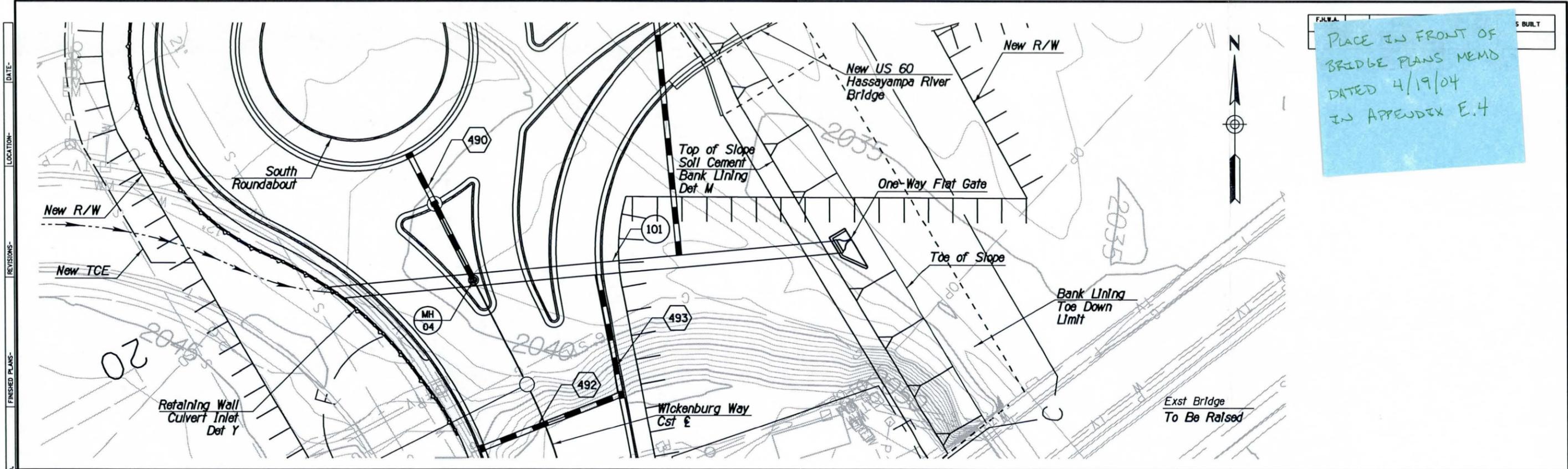
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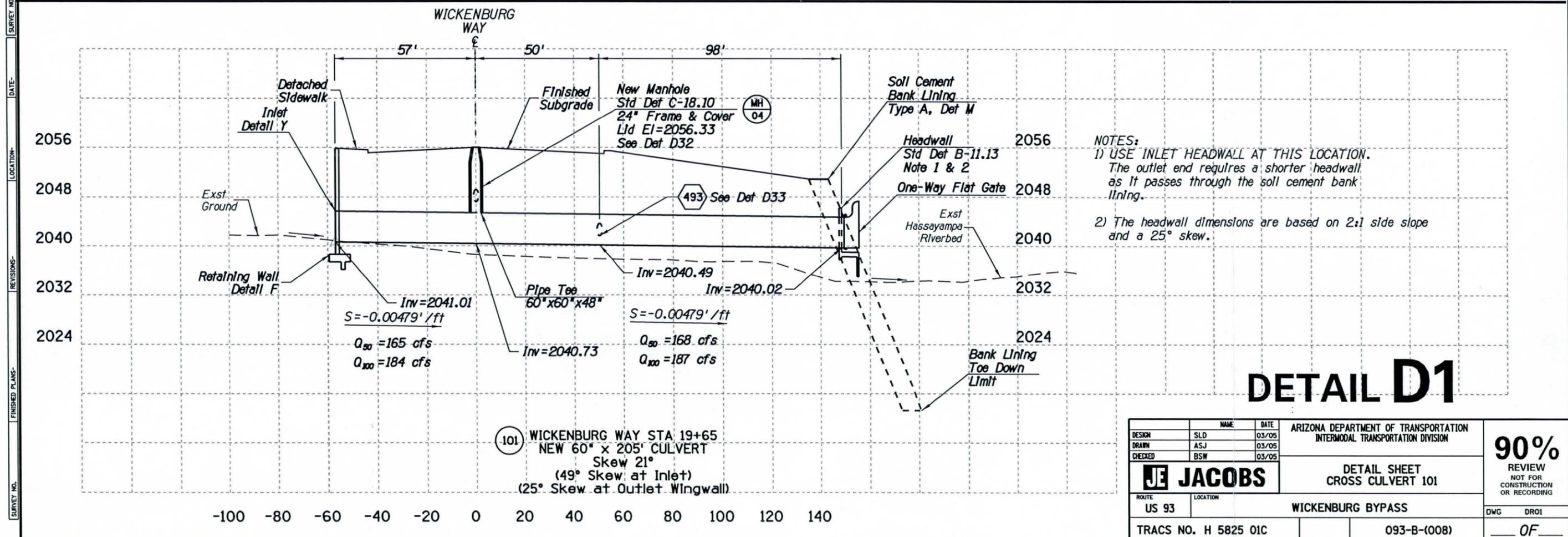


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CHECKED	BSW		
<b>JE JACOBS</b>			LEVEE IMPROVEMENT PLANS STA 171+00.00 TO STA 185+00.00
ROUTE	LOCATION	DWG	
US 93	WICKENBURG BYPASS		
TRACS NO. H 5825 01C		093-B-(008)	OF

DATE: LOCATION: REVISIONS: FINISHED PLANS: SURVEY NO. DATE: LOCATION: REVISIONS: FINISHED PLANS: SURVEY NO.



PLACE IN FRONT OF BRIDGE PLANS MEMO DATED 4/19/04 IN APPENDIX E.4

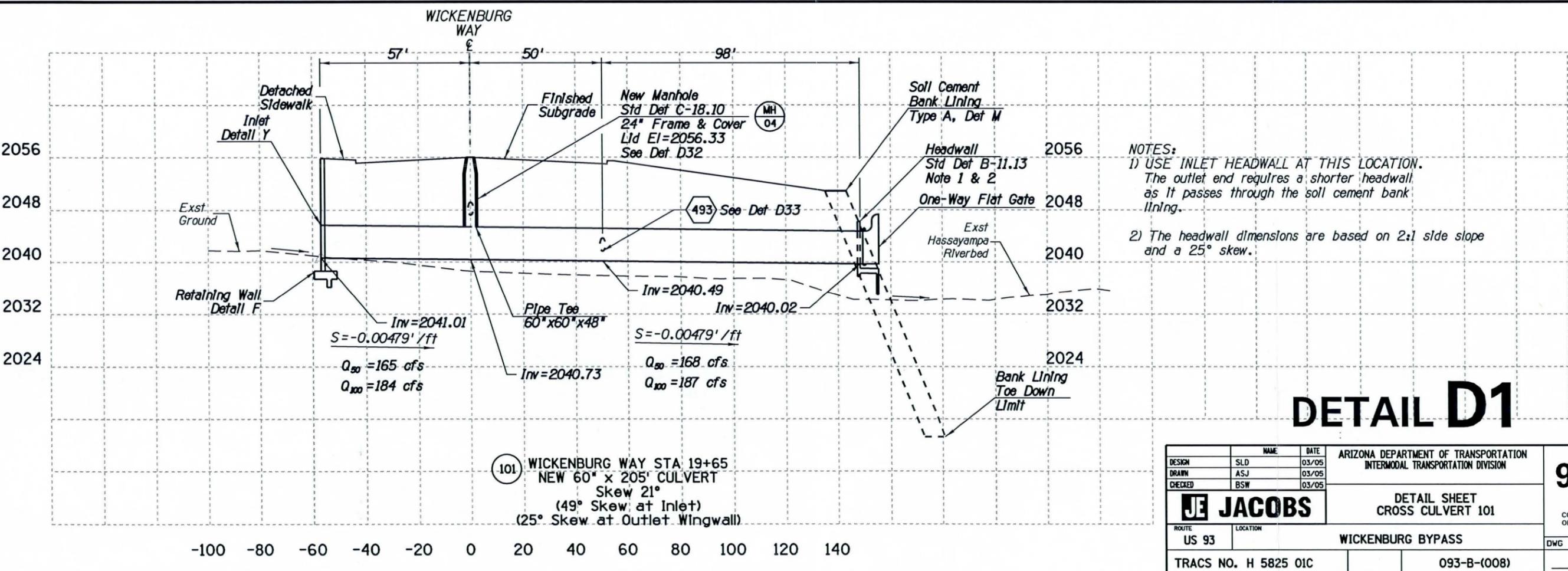
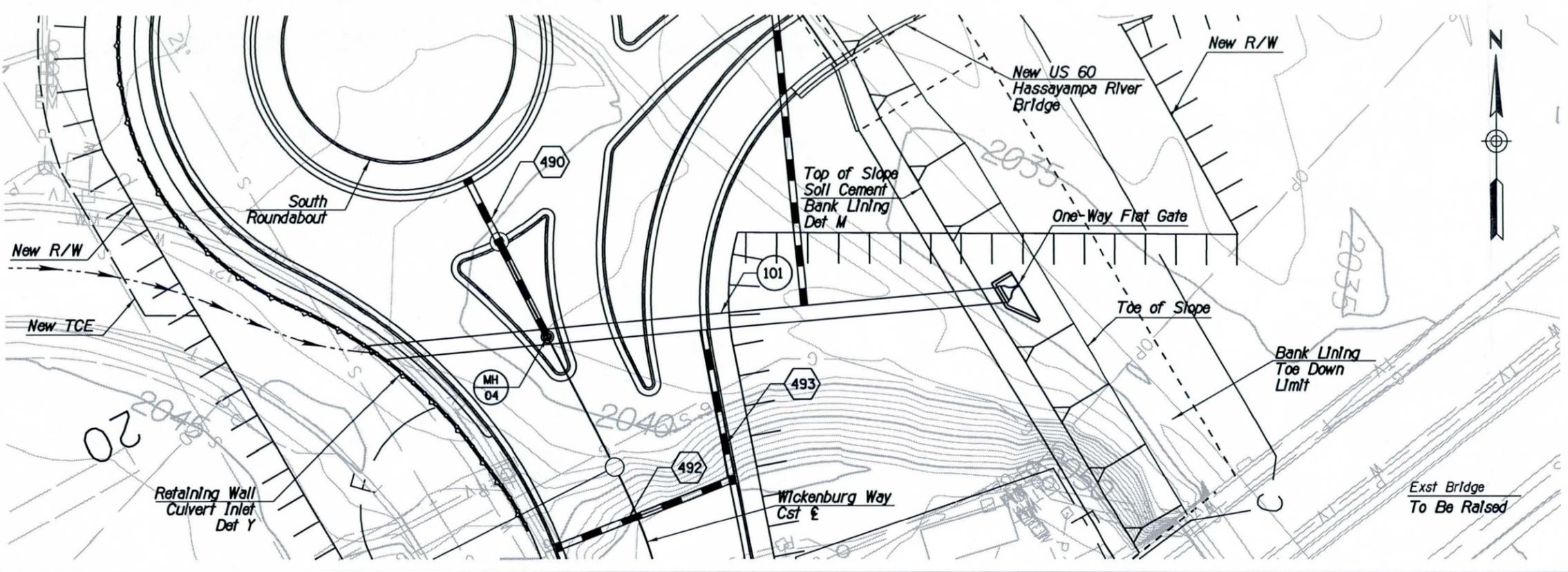


NOTES:  
 1) USE INLET HEADWALL AT THIS LOCATION. The outlet end requires a shorter headwall as it passes through the soil cement bank lining.  
 2) The headwall dimensions are based on 2:1 side slope and a 25° skew.

# DETAIL D1

DESIGN	SLD	DATE	03/05	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	<b>90%</b> REVIEW NOT FOR CONSTRUCTION OR RECORDING
DRAWN	ASJ	DATE	03/05		
CHECKED	BSW	DATE	03/05		
<b>JACOBS</b>		DETAIL SHEET CROSS CULVERT 101			
ROUTE	US 93	LOCATION	WICKENBURG BYPASS	DWG	DROI
TRACS NO. H 5825 01C			093-B-(008)	OF	

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)			
93 MA 198					



# DETAIL D1

DESIGN	SLD	DATE	03/05	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	<b>90%</b> REVIEW NOT FOR CONSTRUCTION OR RECORDING
DRAWN	ASJ	DATE	03/05		
CHECKED	BSW	DATE	03/05		
<b>JACOBS</b>		DETAIL SHEET CROSS CULVERT 101		DWG	DR01
ROUTE	US 93	LOCATION	WICKENBURG BYPASS		
TRACS NO. H 5825 01C			093-B-(008)	OF	

**Jacobs Civil Inc.**

875 W. Elliot Road  
Suite 201  
Tempe, Arizona 85284 U.S.A  
1.480.763.8600 Fax 1.480.763.8601

## Transmittal

---

<b>Date</b>	February 19, 2004	<b>From</b>	George Wallace
<b>Attention</b>	Leo Kreymborg	<b>Project #</b>	W7X73400
<b>Firm Name</b>	West Consultants 960 West Elliot Road, Suite 201 Tempe, Arizona 85284-1137	<b>Project</b>	Wickenburg Interim Bypass Contract No. 03-05 TRACS No. H 582501D
		<b>File</b>	W7X73400-2C

**Copies to**

---

**Subject:** Bridge Plans

Leo,

Attached are plans of the two existing Hassayampa River bridges as you requested at our February 17 progress meeting.

Please call if you have questions or need further information.



George Wallace  
Jacobs Civil Inc.  
480-763-8698

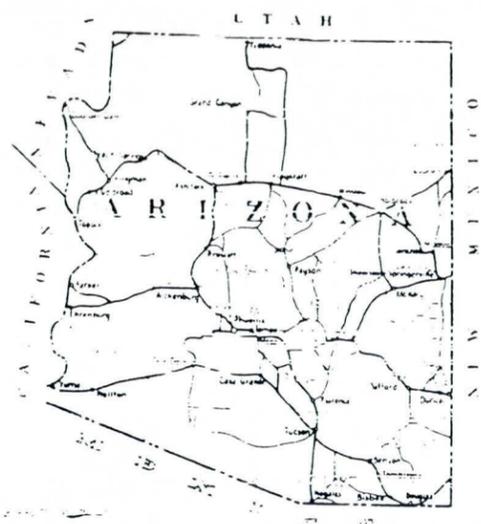
**Enclosures/Attachments**

- |  |   |
|--|---|
| <input type="checkbox"/> Letter                                      | <input type="checkbox"/> Sample                 |
| <input type="checkbox"/> Contract Documents                          | <input type="checkbox"/> Clarification Drawings |
| <input type="checkbox"/> Sketch                                      | <input type="checkbox"/> Print                  |
| <input type="checkbox"/> Modification Drawings                       | <input type="checkbox"/> Shop Drawings          |
| <input checked="" type="checkbox"/> Other <u>Bridge Plans 2 Sets</u> |   |

**Action Requested**

- |   |   |
|---|---|
| <input type="checkbox"/> Resubmit                             | <input type="checkbox"/> For Your Approval  |
| <input type="checkbox"/> For Your Review                      | <input type="checkbox"/> Reply ASAP         |
| <input type="checkbox"/> Information Only                     | <input type="checkbox"/> For Your Signature |
| <input checked="" type="checkbox"/> Your Information and File |   |
| <input type="checkbox"/> Please Comment                       |   |
| <input checked="" type="checkbox"/> Other <u>As Requested</u> |   |

7  
55



STATE OF ARIZONA  
 STATE HIGHWAY DEPARTMENT  
 PLAN AND PROFILE OF PROPOSED  
**STATE HIGHWAY**  
**PHOENIX TO PRESCOTT**  
 MARICOPA COUNTY  
 FEDERAL AID PROJECT NO. 84-C 1<sup>ST</sup> REOP.

AS BUILT JANUARY 1936

**INDEX OF SHEETS**  
 F.A.P. 84-C 1<sup>ST</sup> REOP

TITLE PAGE	1
INDEX PAGE	2
DETAILS	3
PLAN & PROFILE	4
BRIDGES	5

**Project Number**

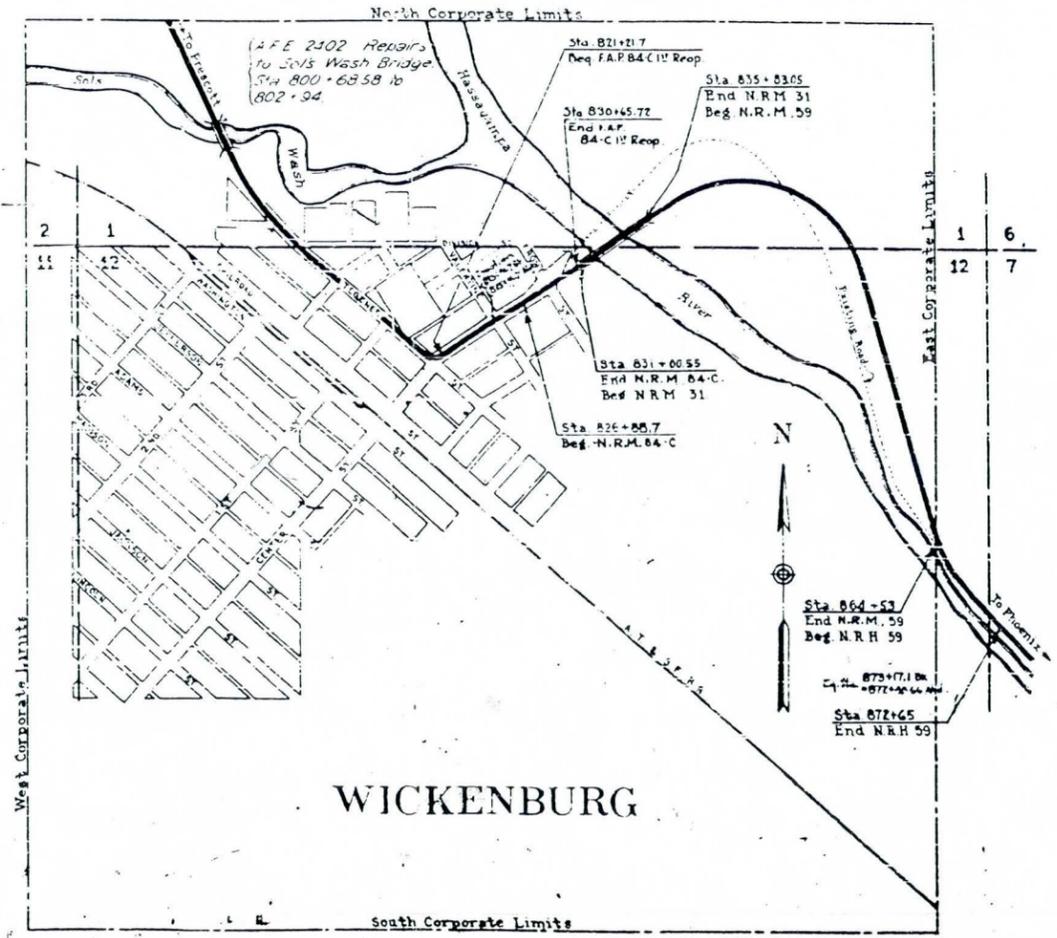
NRM 31 (1935)

**Index to Sheets**

Sheet 2 Plan and Profile  
 Sheet 3-11a Bridge Sheets  
 Sheet 11 Bridge Standard H-1

78"  
 16"  
 5"  
 99"  
 8'-3"

SCALES { PLAN 1 INCH = 20 FEET  
 PROFILE { HORIZ. 1 INCH = 20 FEET  
 VERT. 1 INCH = 2 FEET



NET & GROSS LENGTH OF F.A.P. 84-C 1<sup>ST</sup> REOP. = 0.170 MILES

PROPERTY OF  
 BRIDGE MAINTENANCE  
 STRUCTURE NO. 161  
 RTE. MP 60-110.53 WE

**CONVENTIONAL SIGNS**

STATE AND NATIONAL LINE	---	LEVEE	=====
COUNTY LINE	---	CULVERT	-----
CITY VILLAGE OR BOROUGH	---	DROP INLET	-----
TOWNSHIP LINE	---	TROLLEY POLE	-----
SECTION LINE	---	POWER POLE	-----
GRANT LINE	---	TELEPHONE AND TELEGRAPH POLES	-----
FENCE LINE	---	MARSH	-----
GUARD RAIL	---	HEDGE	-----
UNFENCED PROPERTY	---	BRIDGE	-----
RIGHT OF WAY LINE	---	GRADE LINE	-----
TRAVELED WAY	---	GROUND LINE	-----
RAILROAD	---	SECTION CORNER (FOUND)	-----
RETAINING WALL	---	R/W LINE MARKERS	-----
BASE OR SURVEY LINE	---	ROUNDING OF SLOPE INT	-----
ROAD TRAFFIC SIGNS	---		

RECOMMENDED FOR APPROVAL

ARIZONA STATE HIGHWAY COMMISSION  
 APPROVED: W.R. HUTCHINS  
 STATE HIGHWAY ENGINEER

BY: [Signature]  
 DATE: [Date]  
 DEPUTY STATE HWY ENGR.

RECOMMENDED FOR APPROVAL

DATE: [Date]  
 DISTRICT ENGINEER

RECOMMENDED FOR APPROVAL

DATE: [Date]  
 BRIDGE ENGINEER

RECOMMENDED FOR APPROVAL

DATE: [Date]  
 ENGINEER OF PLANS

RECOMMENDED FOR APPROVAL

DISTRICT ENGINEER  
 PUBLIC ROADS ADMINISTRATION  
 FEDERAL WORKS AGENCY

RECOMMENDED FOR APPROVAL

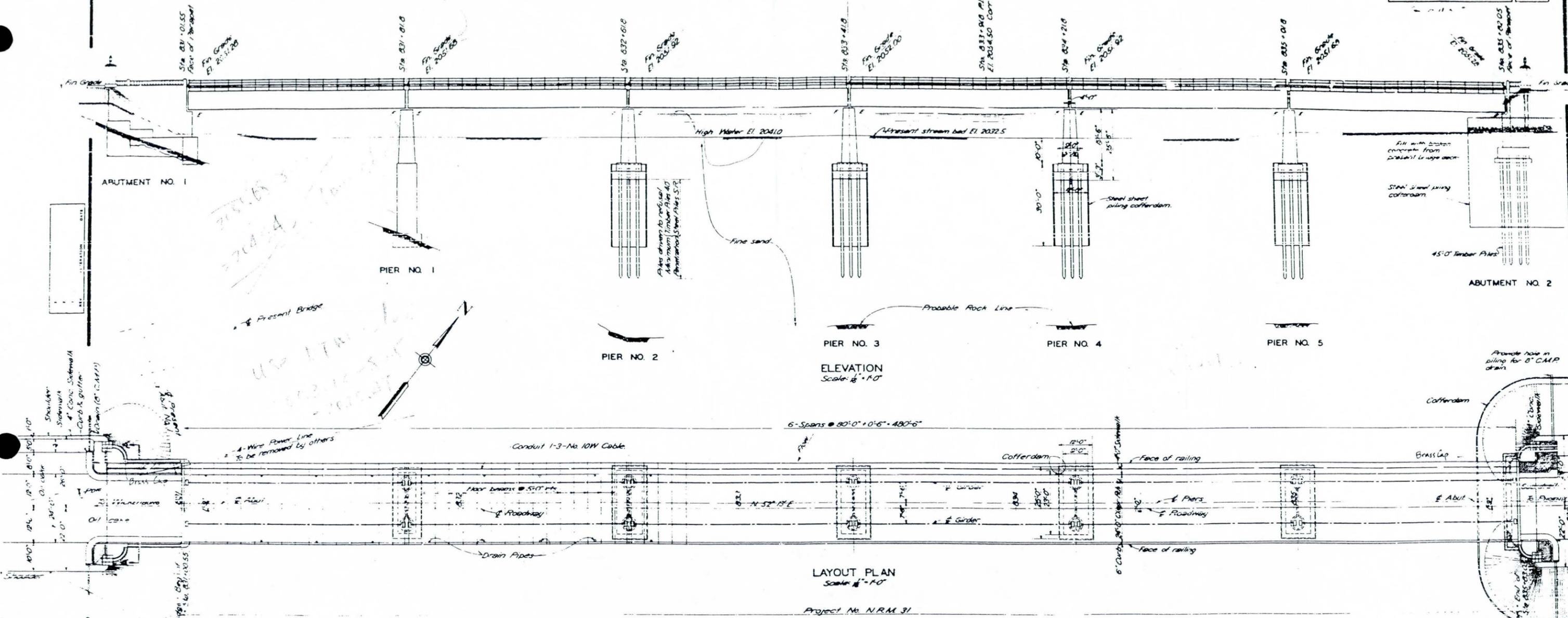
DISTRICT ENGINEER  
 PUBLIC ROADS ADMINISTRATION  
 FEDERAL WORKS AGENCY

APPROVED

ENGINEER OF PLANS

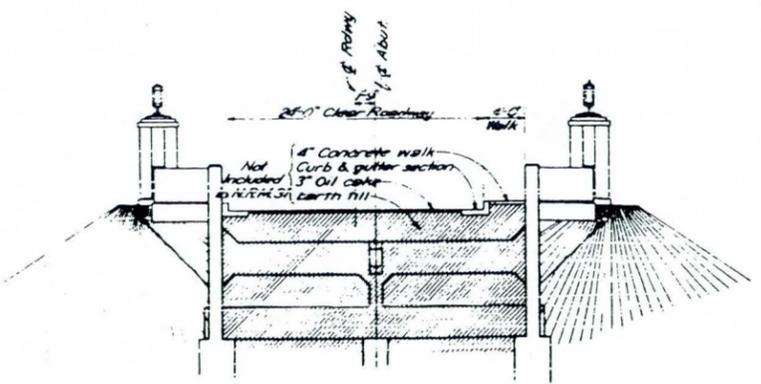
PHOENIX - PRESCOTT HIGHWAY  
WICKENBURG STREETS

NRM		
2	31	3



LAYOUT PLAN  
Scale: 1/4" = 1'-0"

Project No. NRM 31



SECTION A-A  
Scale: 1/4" = 1'-0"

Note:  
Fills curbs and gutters, 8" C.M.P. drains, and approach sidewalks not included in Bridge Project NRM 31.

QUANTITIES

ITEM	SURFT. No.	STRUCT. EXCAV. Cu. Yds.	CONCRETE - Cu. Yds.				REIN. STEEL LBS.	FORMS STEEL LBS.	PAVING MATERIAL	FINISH	TOTAL
			CLASS A	CLASS B	CLASS C	CLASS D					
ABUT. No. 1	11	11.35	2.54	106.00	-	-	8000	-	-	-	106.00
PIER No. 1	10	10.00	-	77.72	179.72	-	7030	-	-	-	179.72
" " 2	10	10.00	-	59.78	60.58	32.31	34.67	4255	-	3920	912
" " 3	10	10.00	-	59.78	60.58	32.31	34.67	4255	-	3920	912
" " 4	10	10.00	-	59.78	60.58	32.31	34.67	4255	-	3920	912
" " 5	10	10.00	-	59.78	60.58	32.31	34.67	4255	-	3920	912
ABUT. No. 2	12 & 13	14.00	0.45	132.37	24.77	24.77	8800	8000	-	16800	3920
6 - Piers	14	-	-	68.15	68.15	-	-	19250	-	19250	-
2 - Abut. Ext. Jts.	-	-	-	-	-	-	-	8800	-	8800	-
5 - Pier Jts. @ Piers	-	-	-	-	-	-	-	8000	-	8000	-
Excavation Abut. No. 1	-	-	-	-	-	-	-	-	-	-	4000
Totals	-	-	3.02	398.30	154.01	194.45	76,830	57,945	8585	116,45	-

Trussion I-Grid Floor or equal (including all necessary steel & conc. filler)  
2" Wearing Surface (Asphalt) Structure in place to be removed - See sheet 3

Sheet 1 of 3 sheets

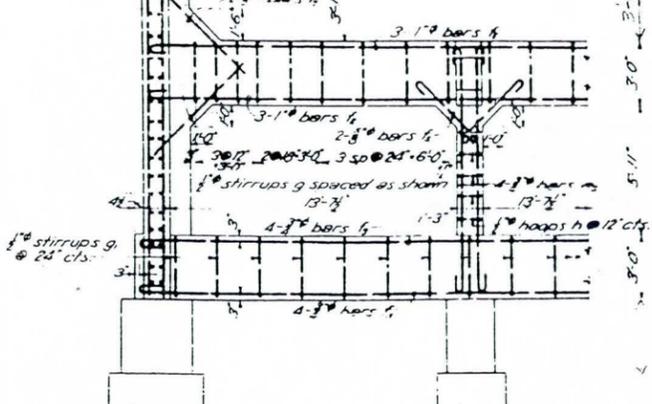
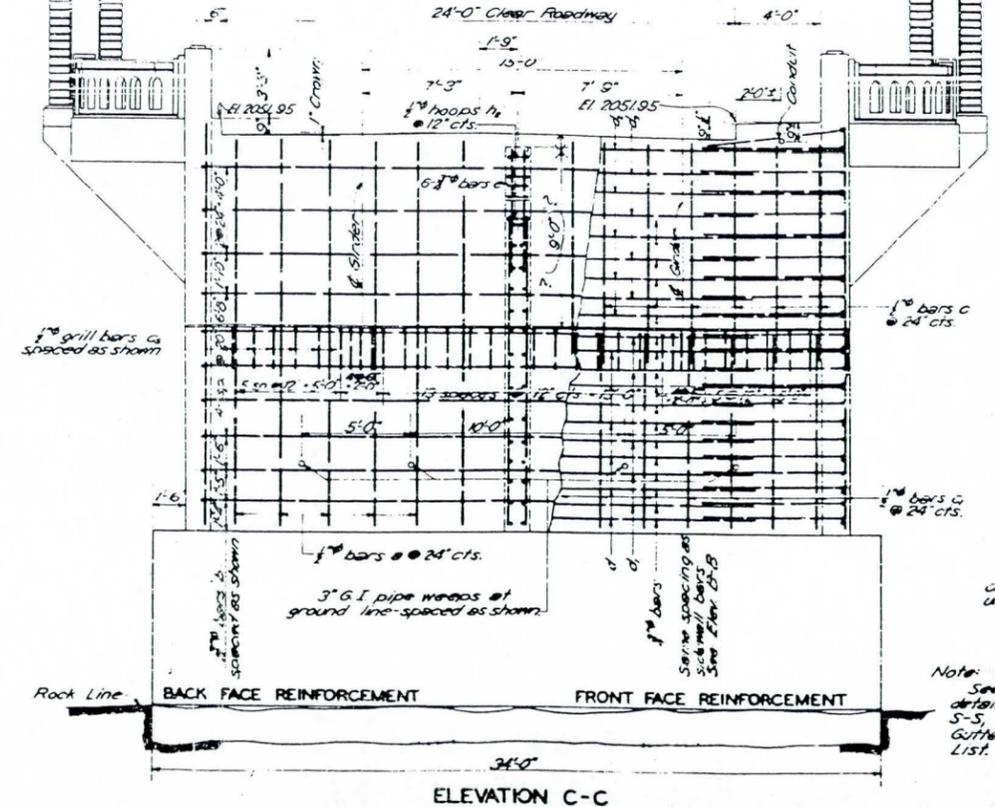
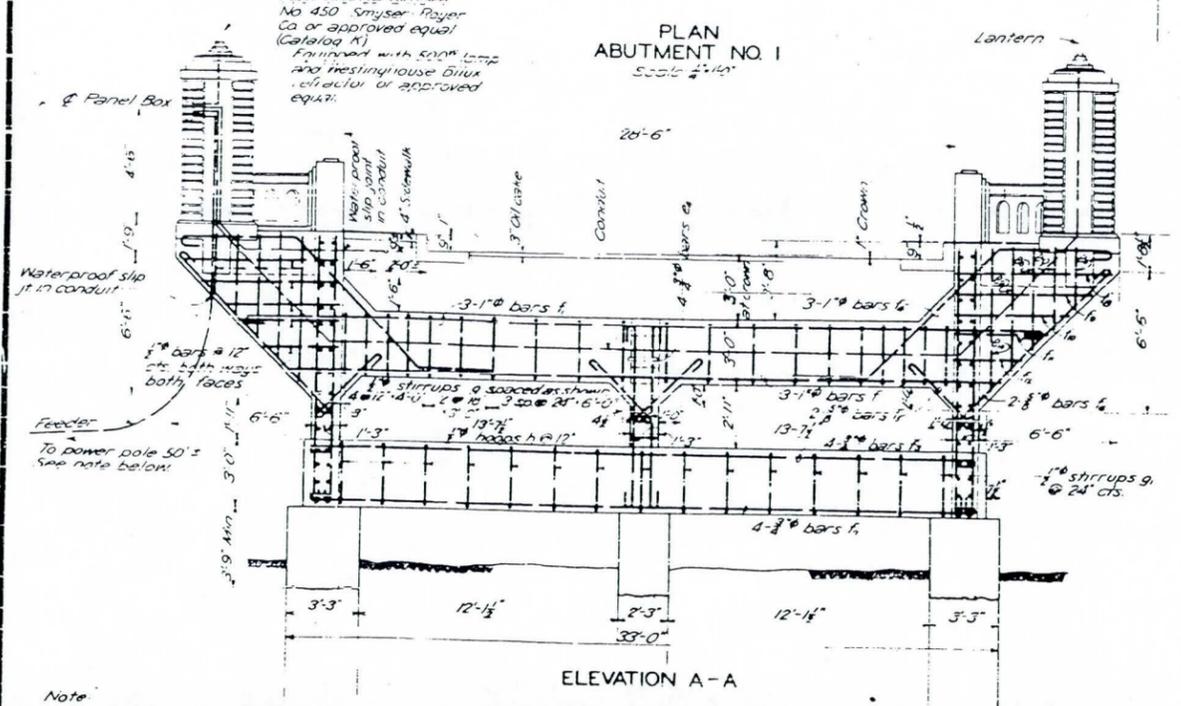
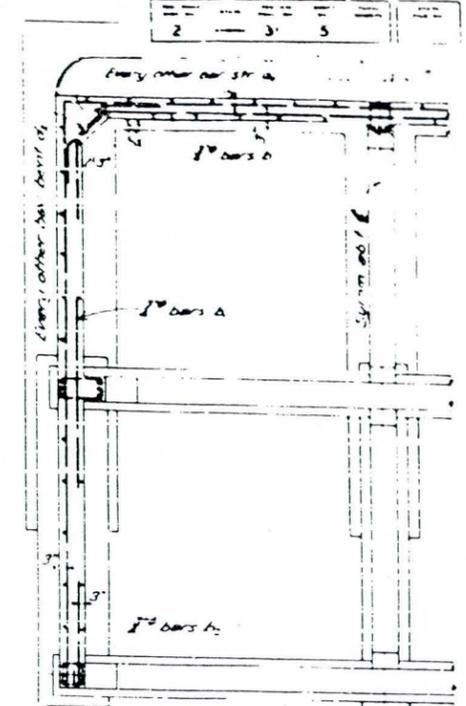
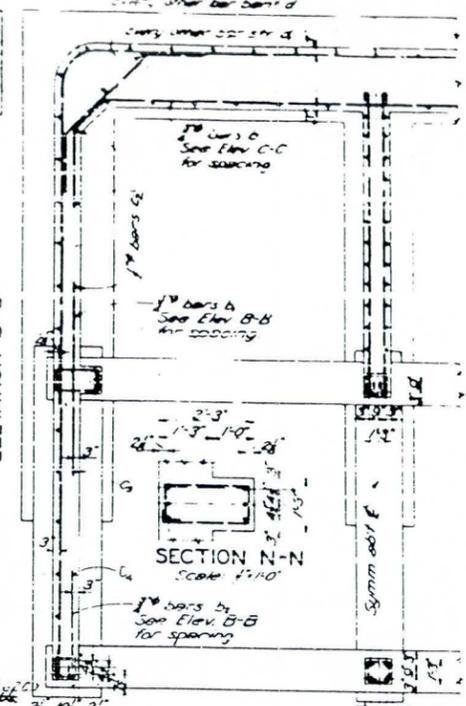
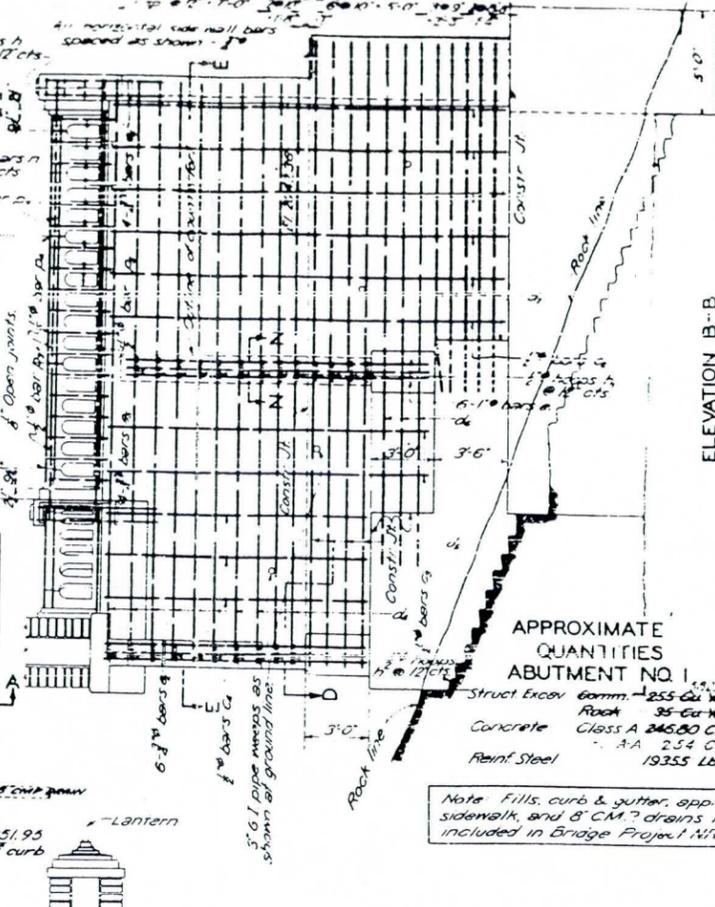
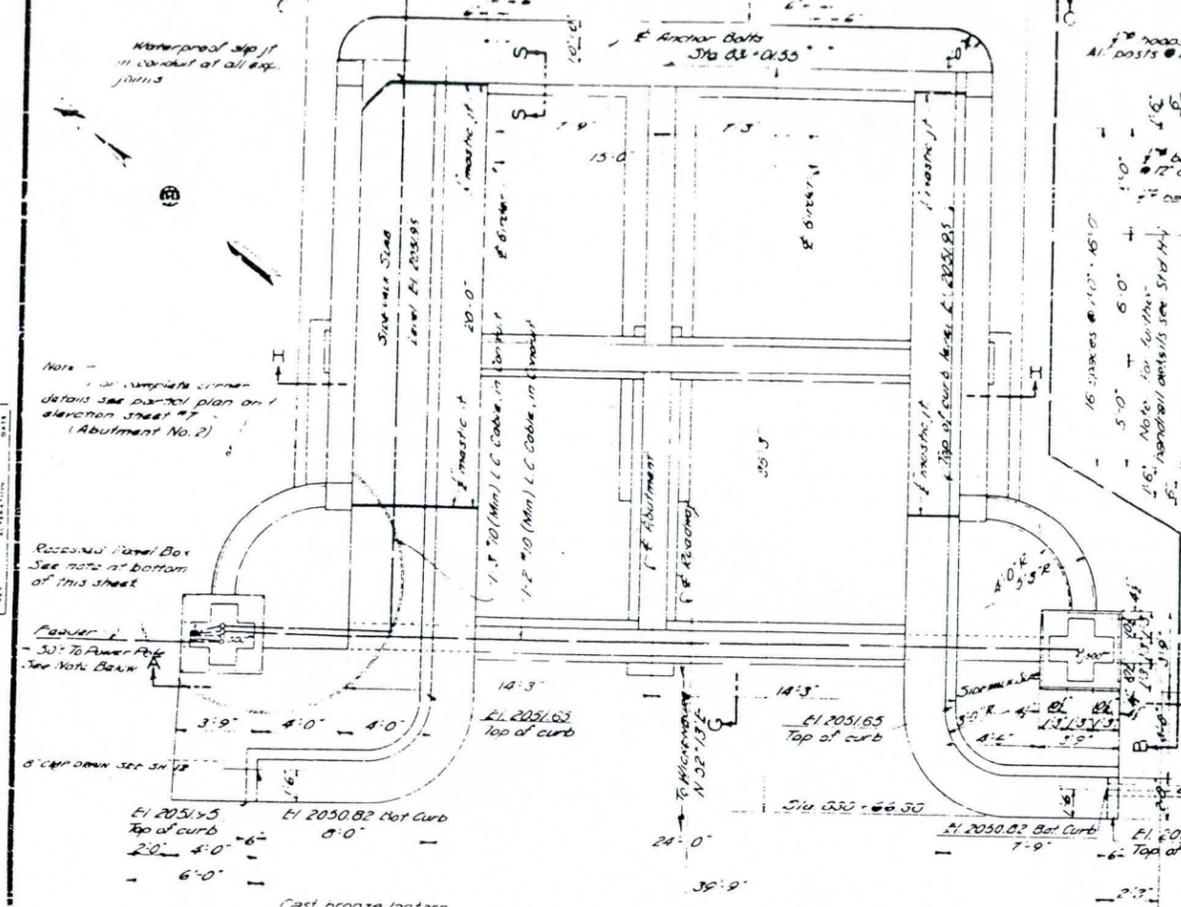
ARIZONA HIGHWAY DEPARTMENT  
**BRIDGE PLANS SPECIAL**

WICKENBURG BRIDGE  
LAYOUT PLAN  
AND ELEVATION  
TIMBER PILE FOUNDATION

Prepared by	Checked by	Approved by
Reviewed by	Design by	Contract No.
Drawn by	Scale	Project No.



PHOENIX - PRESCOTT HIGHWAY



Sheet 3 of 3 sheets  
ALL CONCRETE CLASS A  
EXCEPT CLASS A-A HANDRAIL

ARIZONA HIGHWAY DEPARTMENT  
**BRIDGE PLANS SPECIAL**

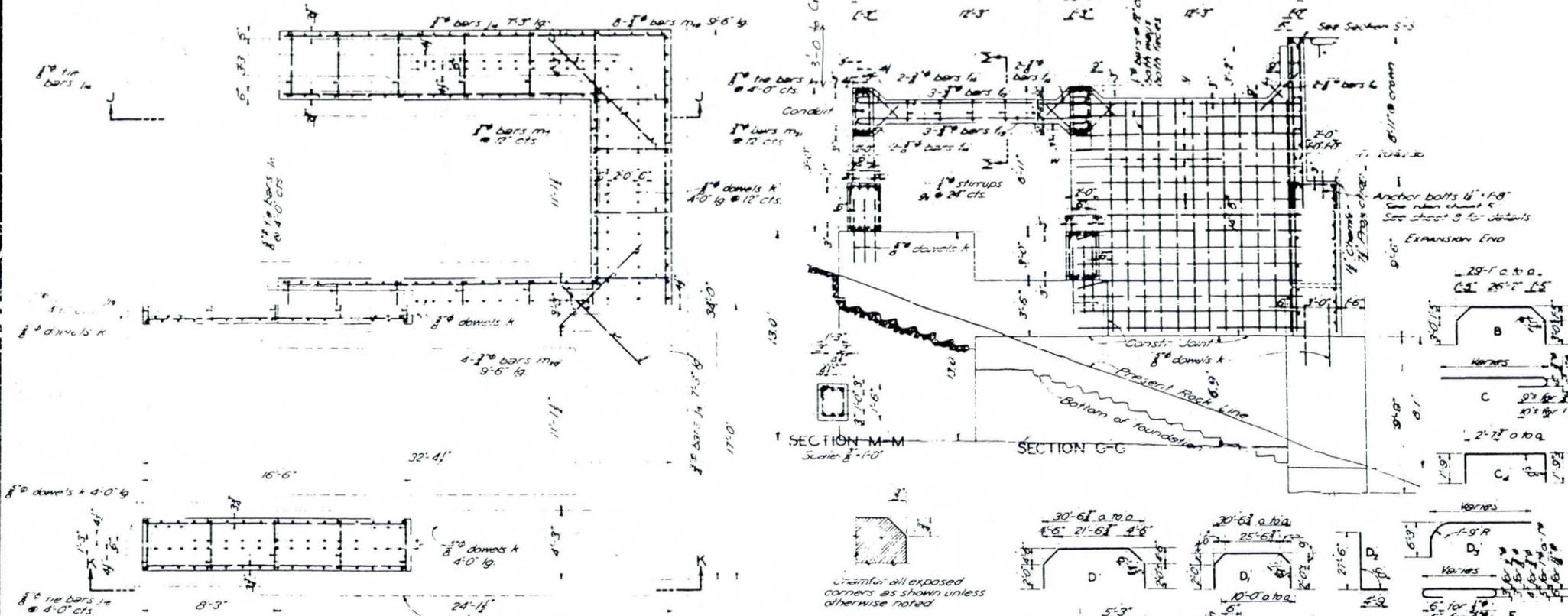
WICKENBURG BRIDGE  
DETAILS  
ABUTMENT NO. 1

DESIGNED	J.A.P.	11-19-35
DRAWN	J.B.P.	12-15-35
CHECKED	J.M.S.	12-15-35
APPROVED	R. [Signature]	

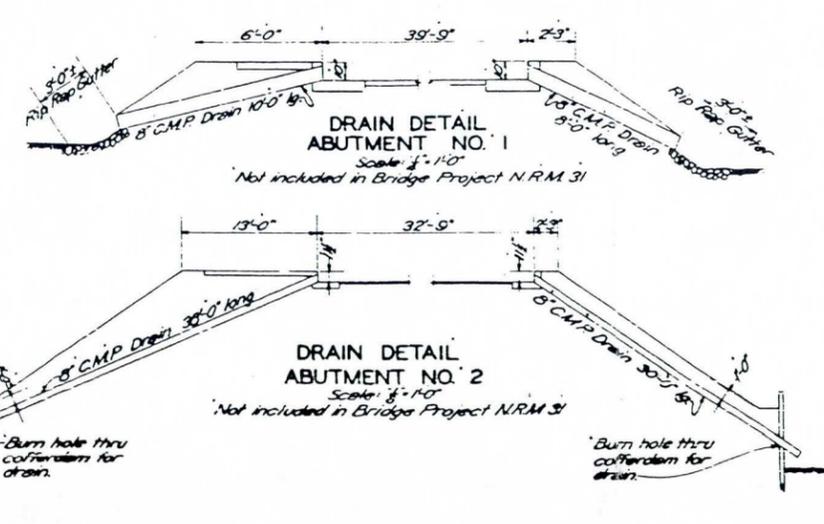
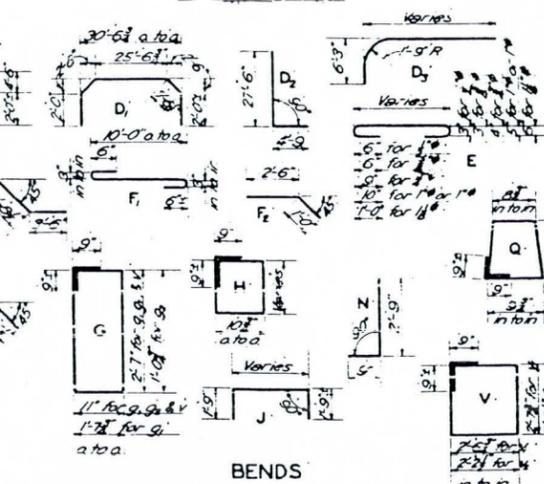
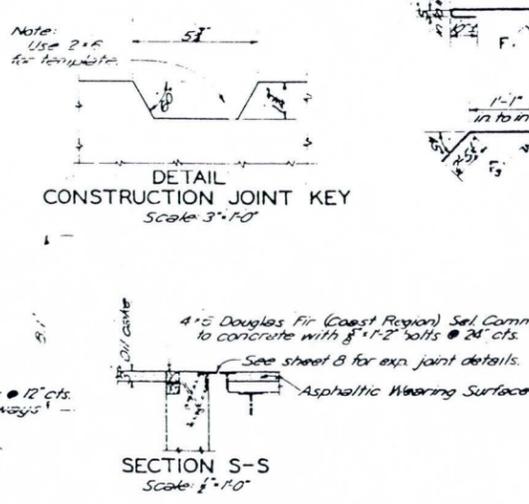
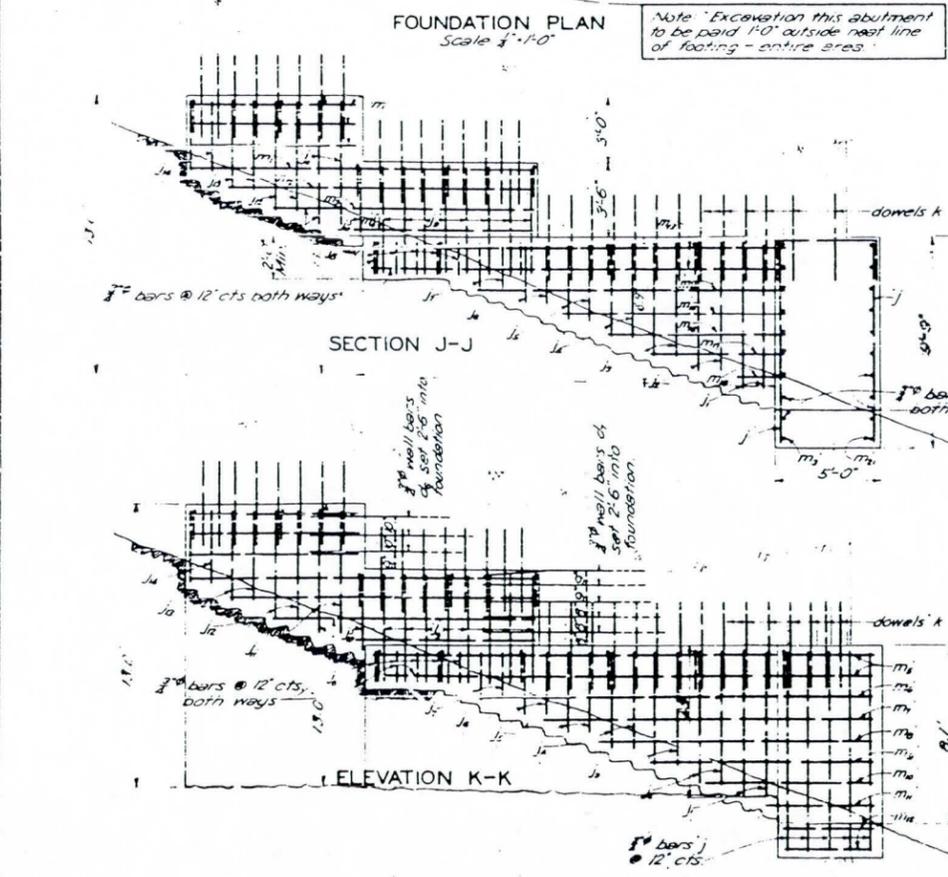


PHOENIX - PRESCOTT HIGHWAY

NRM  
2 11 8



ABUTMENT NO. 1		ABUTMENT NO. 2	
Bar No.	Length	Bar No.	Length
1	18'-0"	1	18'-0"
2	18'-0"	2	18'-0"
3	18'-0"	3	18'-0"
4	18'-0"	4	18'-0"
5	18'-0"	5	18'-0"
6	18'-0"	6	18'-0"
7	18'-0"	7	18'-0"
8	18'-0"	8	18'-0"
9	18'-0"	9	18'-0"
10	18'-0"	10	18'-0"
11	18'-0"	11	18'-0"
12	18'-0"	12	18'-0"
13	18'-0"	13	18'-0"
14	18'-0"	14	18'-0"
15	18'-0"	15	18'-0"
16	18'-0"	16	18'-0"
17	18'-0"	17	18'-0"
18	18'-0"	18	18'-0"
19	18'-0"	19	18'-0"
20	18'-0"	20	18'-0"
21	18'-0"	21	18'-0"
22	18'-0"	22	18'-0"
23	18'-0"	23	18'-0"
24	18'-0"	24	18'-0"
25	18'-0"	25	18'-0"
26	18'-0"	26	18'-0"
27	18'-0"	27	18'-0"
28	18'-0"	28	18'-0"
29	18'-0"	29	18'-0"
30	18'-0"	30	18'-0"



Note: See sheet 5 for plan and further sections and details for abutment No. 1 for abutment No. 2 see sheet 7.

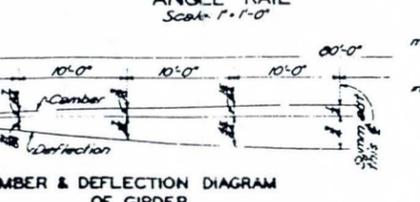
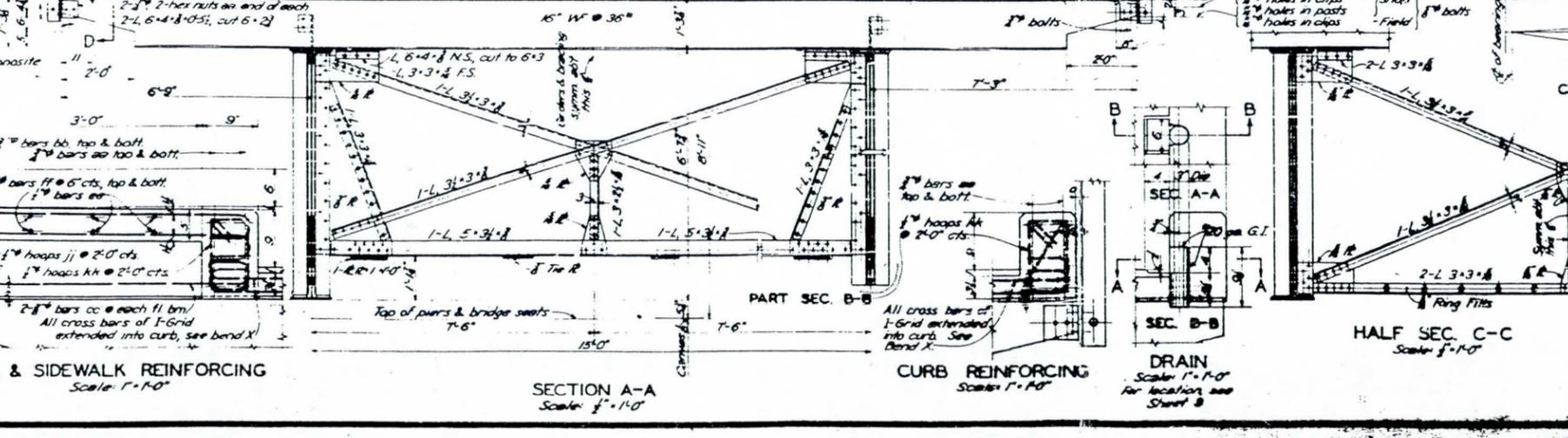
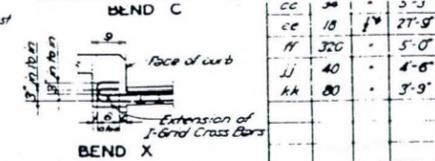
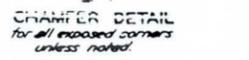
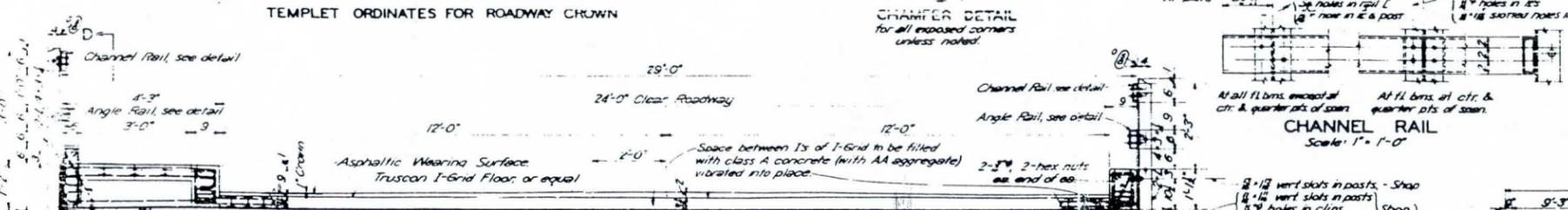
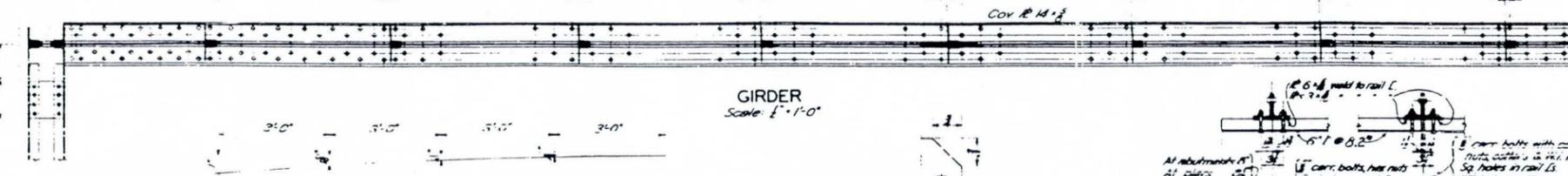
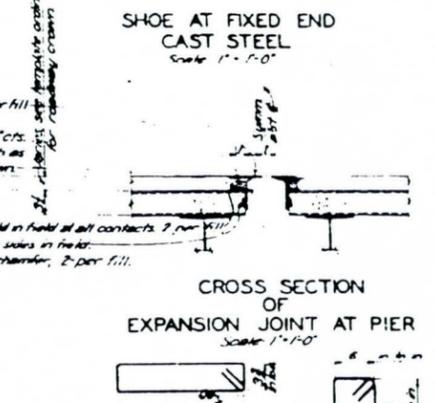
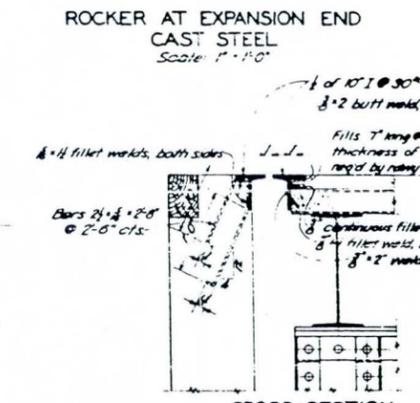
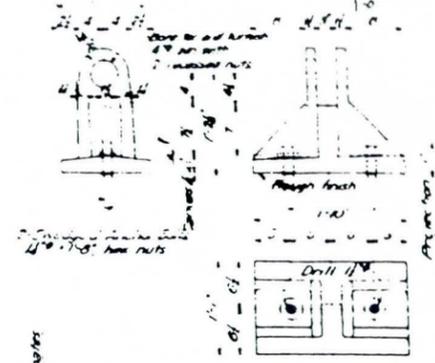
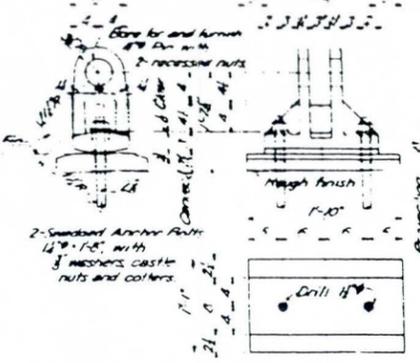
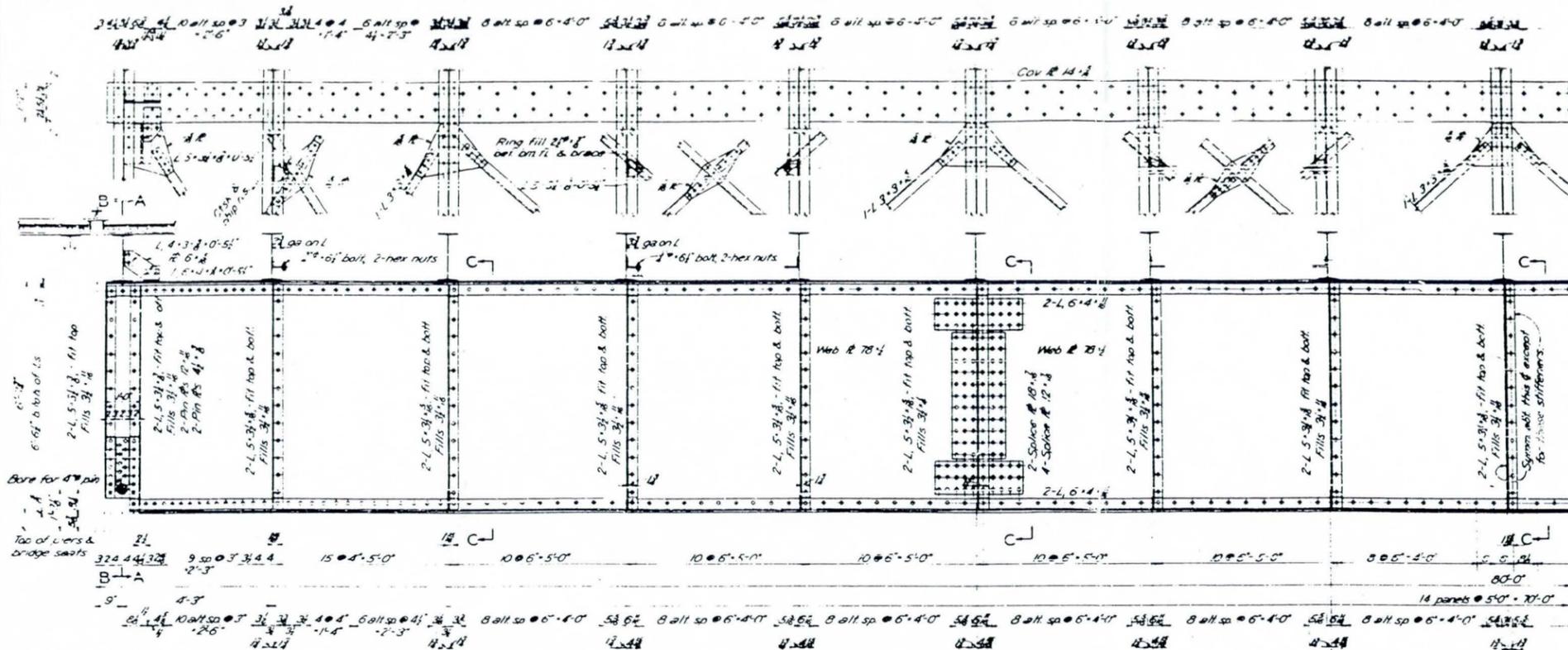
Sheet 4 of 8 sheets  
ALL CONCRETE CLASS A  
ARIZONA HIGHWAY DEPARTMENT  
**BRIDGE PLANS SPECIAL**  
WICKENBURG BRIDGE  
DETAILS & STEEL LIST  
ABUTMENT NO. 1  
STEEL LIST ABUTMENT NO. 2

Date	PAK SWAN	12-20-50
Drawn	J.B.	12-20-50
Checked	A.	12-20-50
Approved	J.H.	12-20-50
Checked	J.H.	12-20-50



PHOENIX - PRESCOTT HIGHWAY  
WICKENBURG STREETS

NRM	
2	3



GENERAL NOTES

Design data: See Spec. A.A. S.M.A. 1928, Loading 2-15  
Structural steel fabrication and materials to be as noted below, Spec. B-2  
All structural steel to be Structural Steel for Bridges, ASTM Spec. A-7-34  
Axial tension 15,000 psi, axial compression 15,000 psi, but not to exceed values for A-40, (17,000 psi)  
Pits of Carbon Steel: Knapings for Locomotives, ASTM Spec. Serial Des. A-20-21

Open holes 1/2" rivets 1/2" in 1/2" holes unless noted.  
Field connections of floor to be in accordance with provisions of manufacturer.  
Field connections except those of floor, to be as noted.  
Paint Shop: One coat paint No. 1, Spec. Y-11-2  
Field: One coat paint No. 3, Spec. Y-11-2, and one coat paint No. 4, Spec. Y-11-2.

QUANTITIES FOR I-DECK

Item	Quantity	Unit
212.22	11.25	2.275
212.22	11.25	2.275
212.22	11.25	2.275

Sheet 5 of 8 sheets  
ALL CONCRETE CLASS A

ARIZONA HIGHWAY DEPARTMENT  
**BRIDGE PLANS SPECIAL**

WICKENBURG BRIDGE  
STEEL & CONCRETE DETAILS  
OF SUPERSTRUCTURE

DESIGNED BY: F.M.S. & J.M.B. JUNIOR  
CHECKED BY: J.M.B. JUNIOR  
DATE: 12-25-35

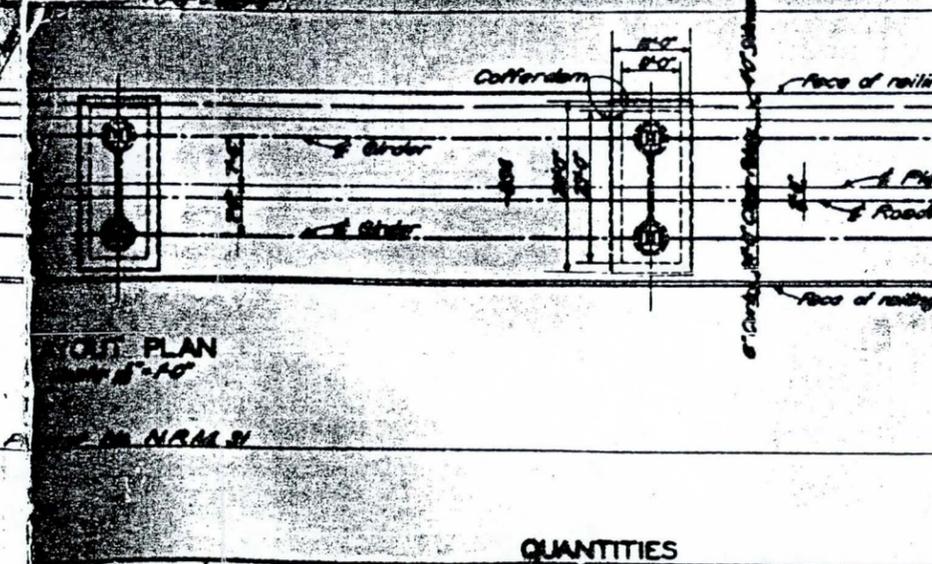
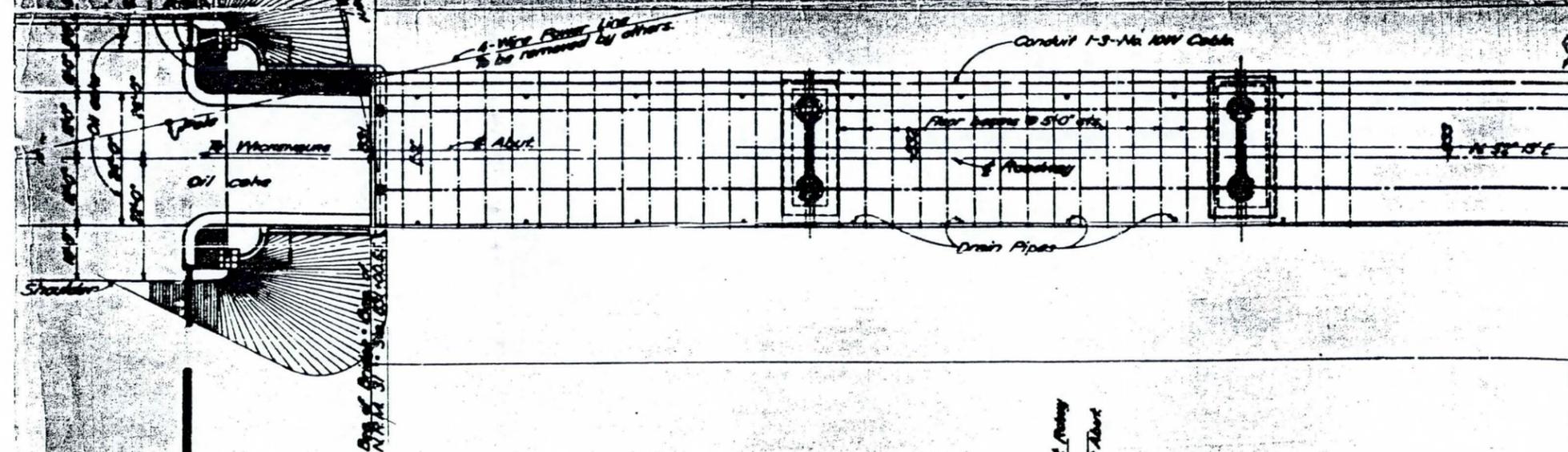
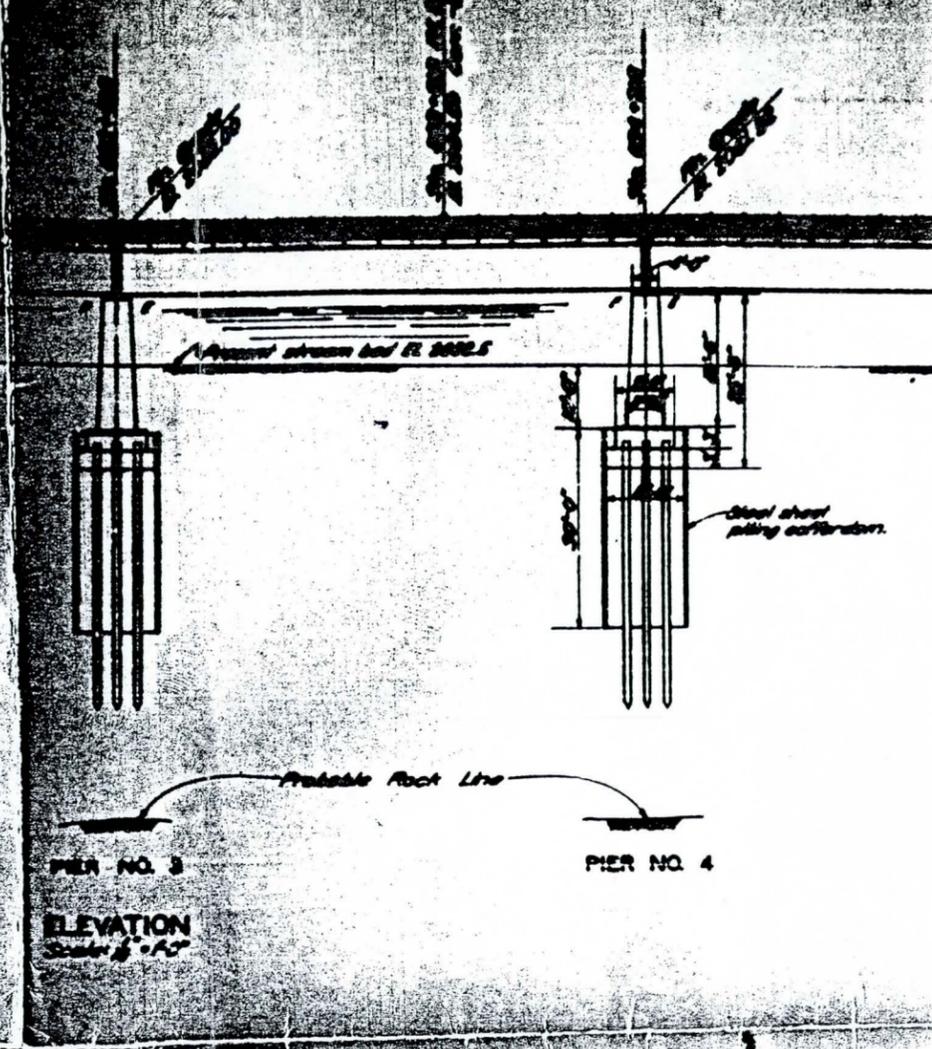
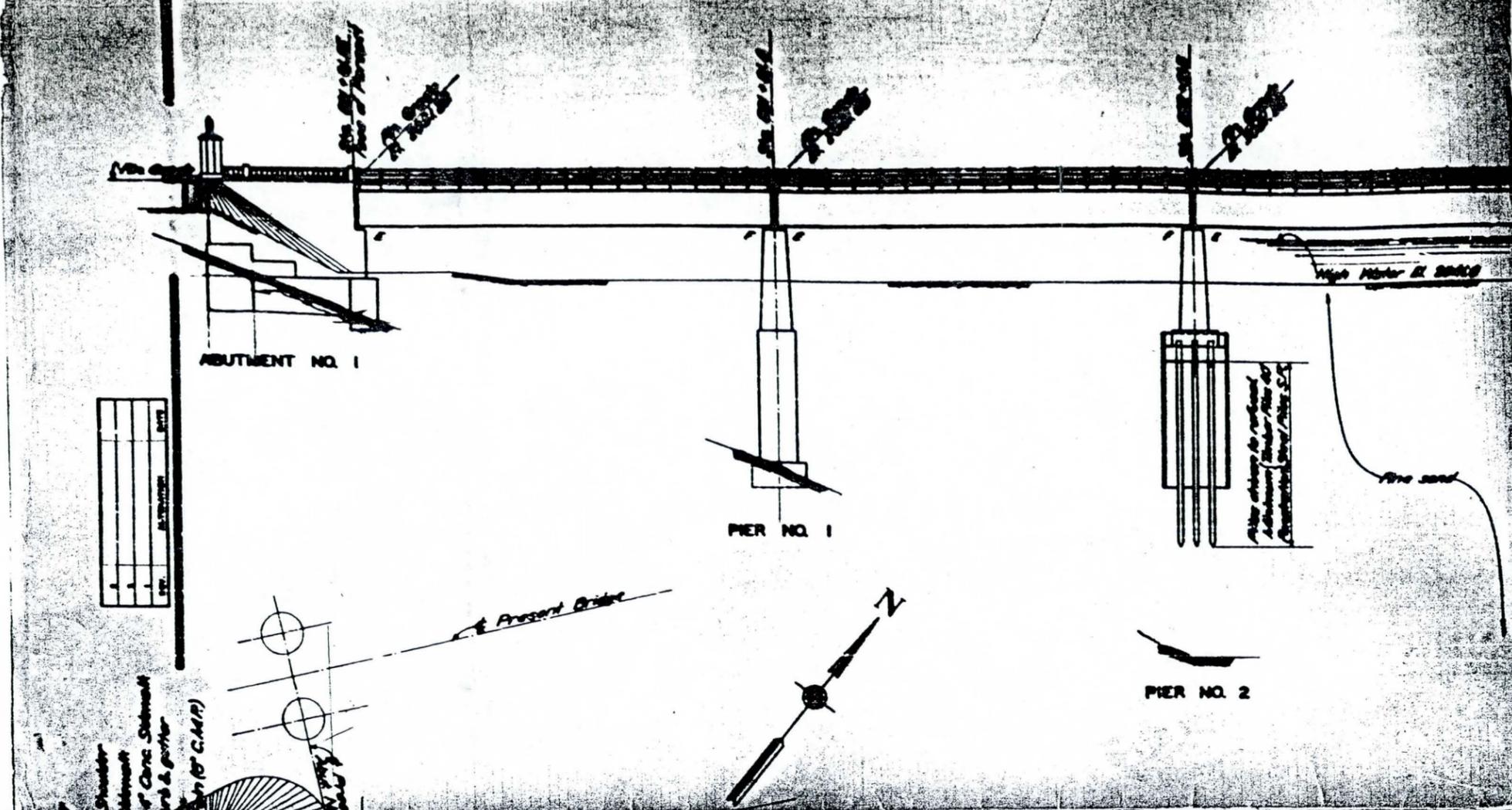




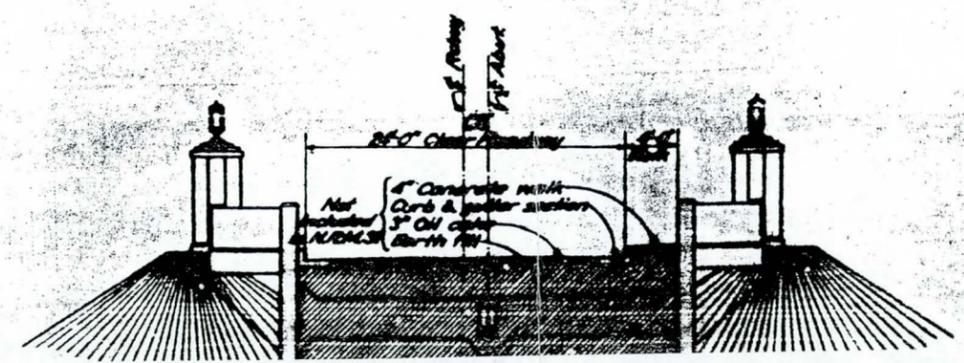




**FRENCH - PRESCOTT HIGHWAY  
WICKENBURG STREETS**

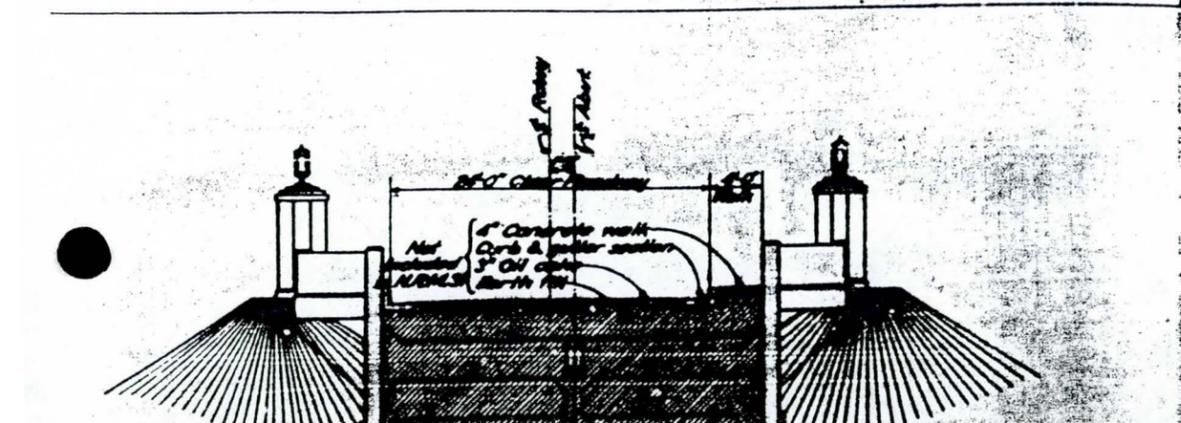
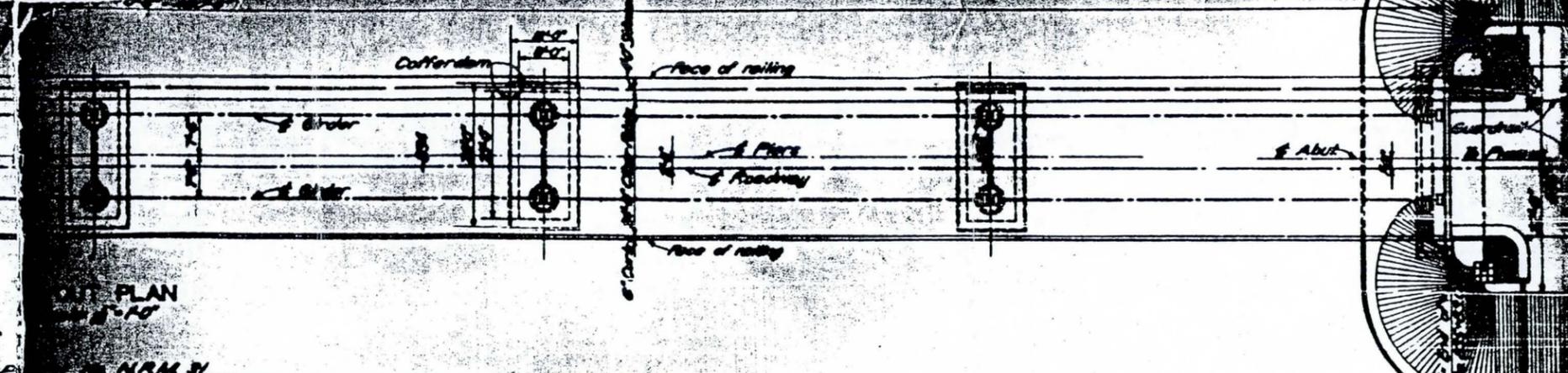
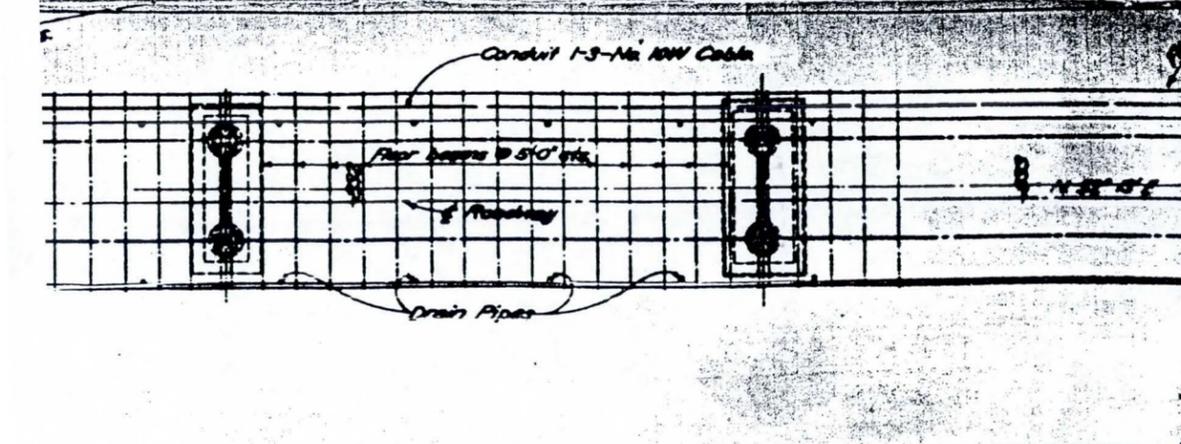
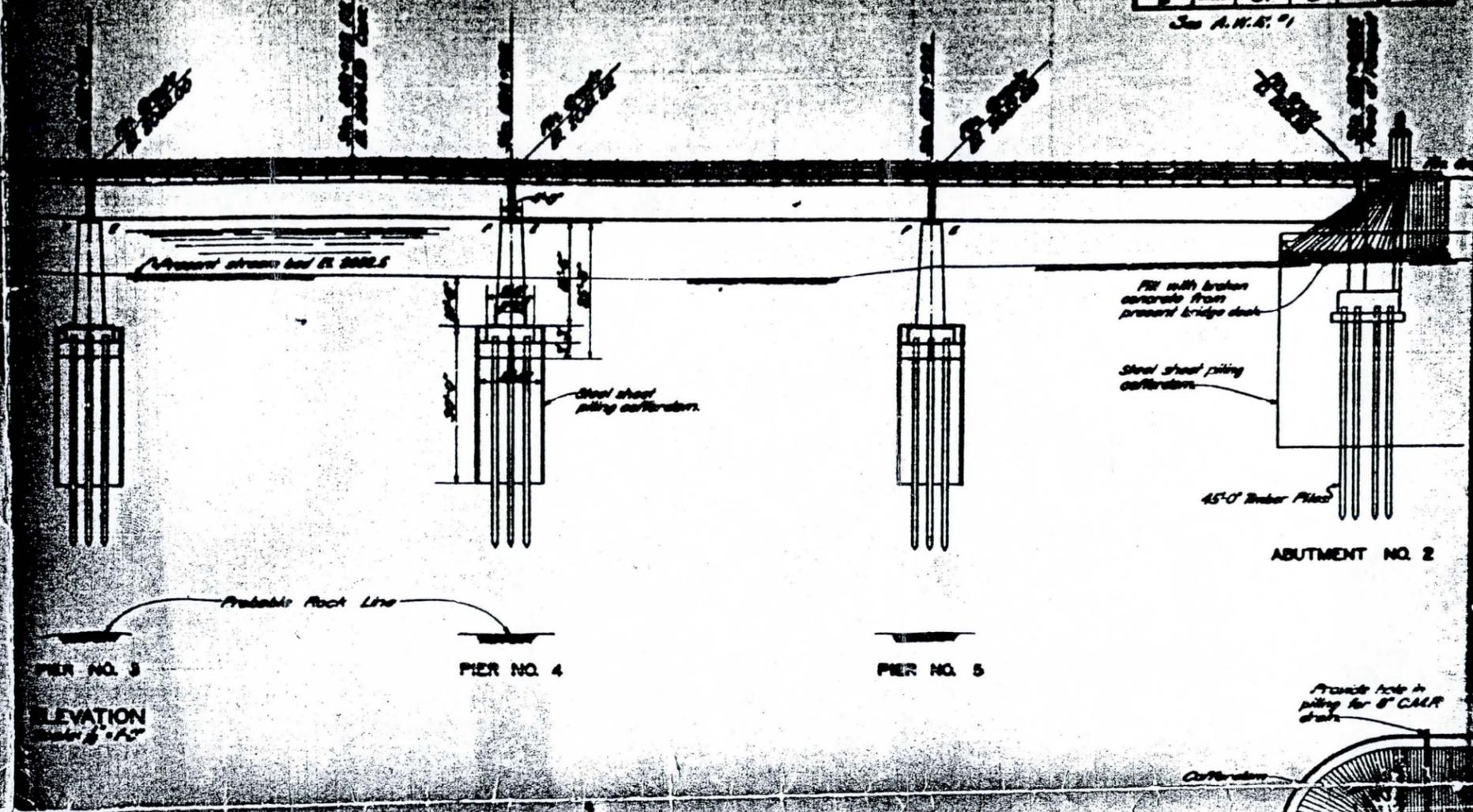
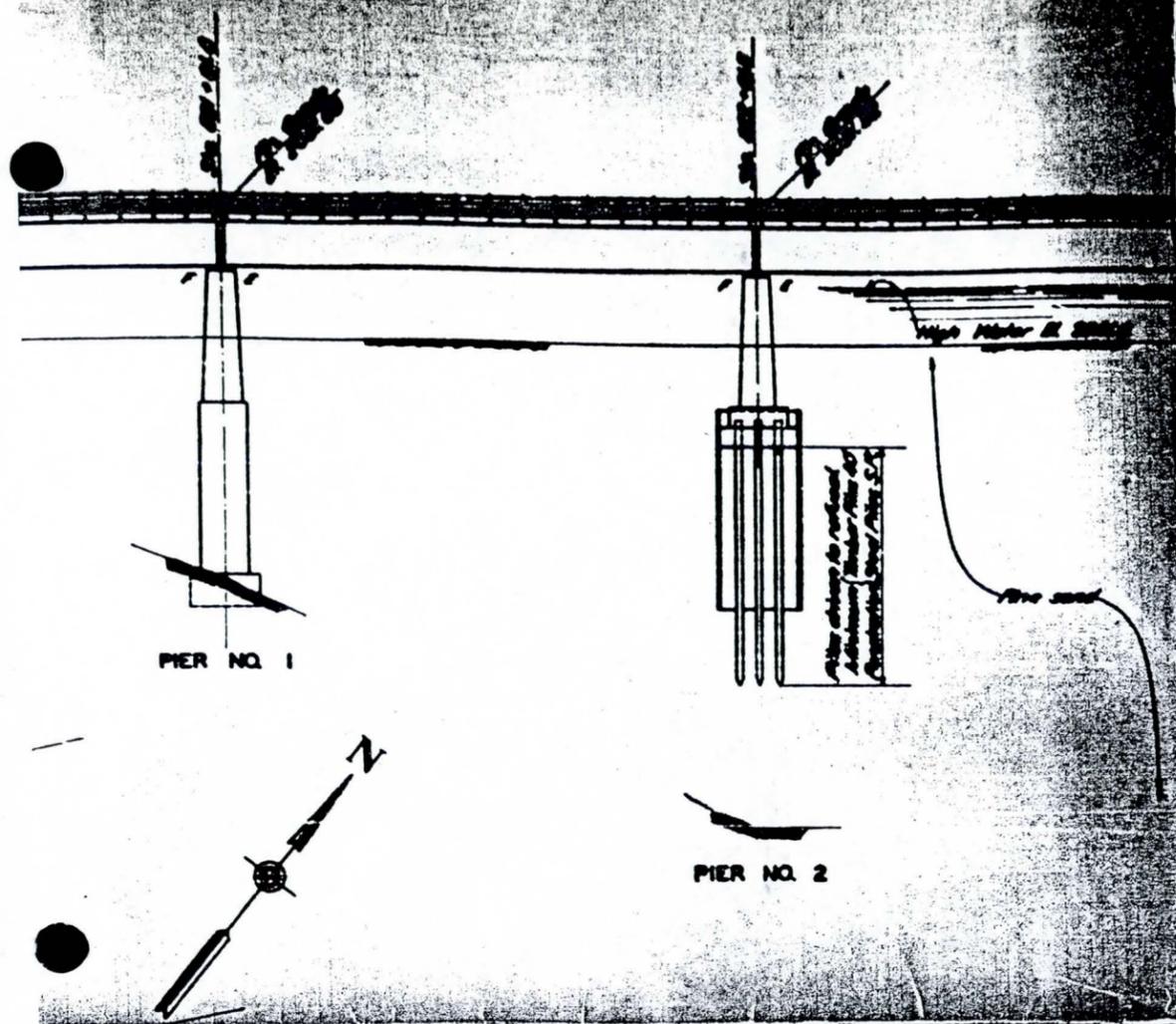


**Note:**  
Fills, curbs and gutters, C.M.P. drains, and approach sidewalks not included in Bridge Project N.R.M.S.



**QUANTITIES**

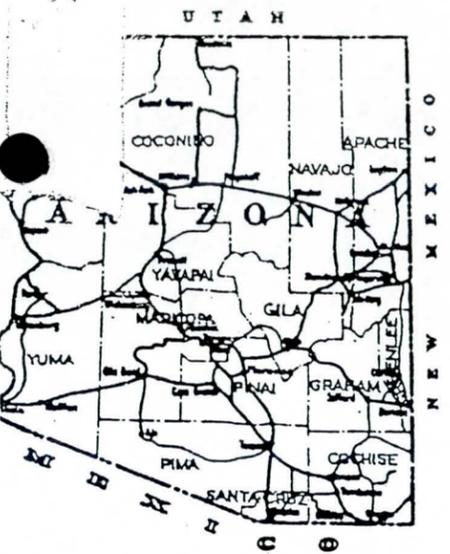
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2	10.00	cu yd	Concrete	772.72	sq ft	Concrete	-	-	Steel	10.00	lbs
3	10.00	cu yd	Concrete	58.70	cu yd	Concrete	32.51	cu yd	Steel	4255	lbs
4	10.00	cu yd	Concrete	58.70	cu yd	Concrete	32.51	cu yd	Steel	4255	lbs
5	10.00	cu yd	Concrete	58.70	cu yd	Concrete	32.51	cu yd	Steel	4255	lbs
6	10.00	cu yd	Concrete	58.70	cu yd	Concrete	32.51	cu yd	Steel	4255	lbs
7	110.00	cu yd	Concrete	0.49	cu yd	Concrete	24.77	cu yd	Steel	10000	lbs



**QUANTITIES**

ITEM NO.	SHEET NO.	SYMBOL	QUANTITY	Concrete - Cu Yds.				STEEL SHEET PILING	STEEL SHEET PILING	STEEL SHEET PILING	STEEL SHEET PILING
				PLAN	ELEVATION	PIERS	ABUTMENTS				
1	11		2.94	178.72	178.72	-	-	1080	-	-	
2	10		-	58.70	60.00	32.31	34.67	4255	612	1710	
3	10		-	58.70	60.00	32.31	34.67	4255	612	1710	
4	10		-	58.70	60.00	32.31	34.67	4255	612	1710	
5	10		-	58.70	60.00	32.31	34.67	4255	612	1710	
6	10		-	58.70	60.00	32.31	34.67	4255	612	1710	
7	10		-	58.70	60.00	32.31	34.67	4255	612	1710	
8	10		-	58.70	60.00	32.31	34.67	4255	612	1710	
9	10		-	58.70	60.00	32.31	34.67	4255	612	1710	
10	10		-	58.70	60.00	32.31	34.67	4255	612	1710	
11	10		-	58.70	60.00	32.31	34.67	4255	612	1710	
12	10		-	58.70	60.00	32.31	34.67	4255	612	1710	
13	10		-	58.70	60.00	32.31	34.67	4255	612	1710	
14	10		-	58.70	60.00	32.31	34.67	4255	612	1710	
15	10		-	58.70	60.00	32.31	34.67	4255	612	1710	

FILE NO.	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
7	ARIZ.	F022-2(1)	1	27	
7	ARIZ.	Non-F022-2(6)A	1	15	



PLANS DIVISION  
JUN 13 1961  
FILE COPY

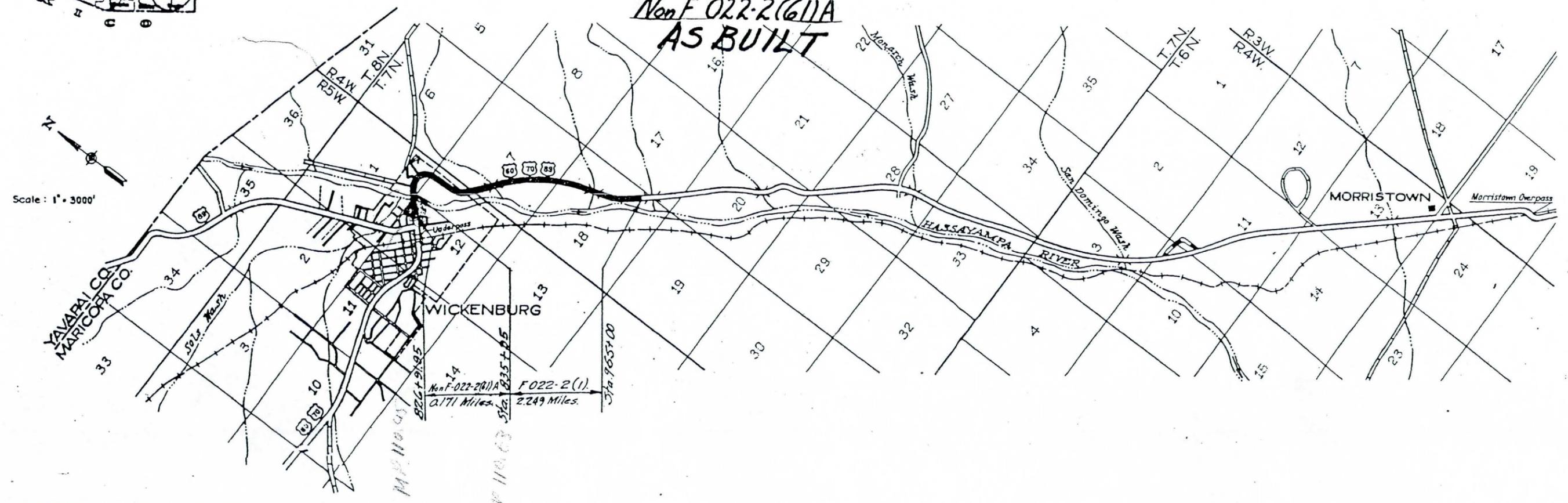
STATE OF ARIZONA  
STATE HIGHWAY DEPARTMENT

PLANS DIVISION  
JUN 13 1961  
FILE COPY

PLAN AND PROFILE OF PROPOSED  
**STATE HIGHWAY**  
**WICKENBURG - PHOENIX HIGHWAY**

MARICOPA COUNTY  
*Non F 022-2(6)A*  
**AS BUILT**

1937  
Hassayampa River  
13.00 =  
✓ 1937 - 110.53  
UPDATED  
MAR 20 1974



**CONVENTIONAL SIGNS**

- |                         |                         |  |
|-------------------------|-------------------------|--|
| STATE AND NATIONAL LINE | CULVERT, CONCRETE       |  |
| CITY LINE               | CULVERT, PIPE           |  |
| VILLAGE OR BOROUGH      | DROP INLET              |  |
| SHIP LINE               | CATTLE GUARD            |  |
| RAILROAD LINE           | POWER POLE              |  |
| RAILROAD CROSSING       | TELEPHONE POLE          |  |
| RAILROAD CROSSING       | CHANNEL OR DITCH        |  |
| RAILROAD CROSSING       | DIKE                    |  |
| RAILROAD CROSSING       | GUIDE POST              |  |
| RAILROAD CROSSING       | BRIDGE                  |  |
| RAILROAD CROSSING       | GRADE LINE              |  |
| RAILROAD CROSSING       | GROUND LINE             |  |
| RAILROAD CROSSING       | SECTION CORNER (Ground) |  |
| RAILROAD CROSSING       | R/W LINE MARKER         |  |
| RAILROAD CROSSING       | TREES AND SHRUBS        |  |

ARIZONA STATE HIGHWAY COMMISSION  
APPROVED WILLIAM E. WILLEY  
STATE HIGHWAY ENGINEER

DEPARTMENT OF COMMERCE  
BUREAU OF PUBLIC ROADS

RECOMMENDED FOR APPROVAL DATE

DATE  DEPUTY STATE ENGINEER

APPROVED

DATE  ASST. STATE ENGINEER

DIVISION ENGINEER

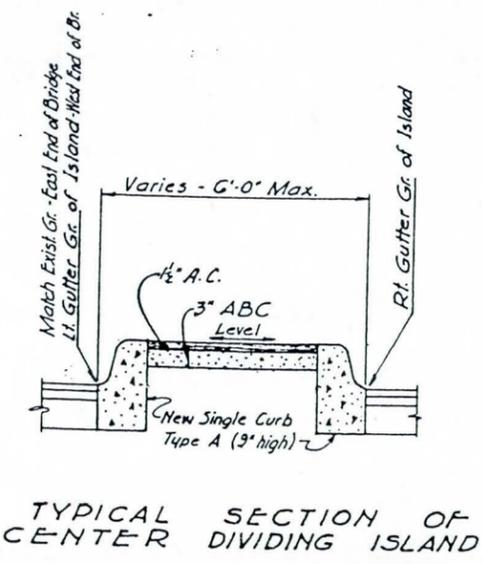
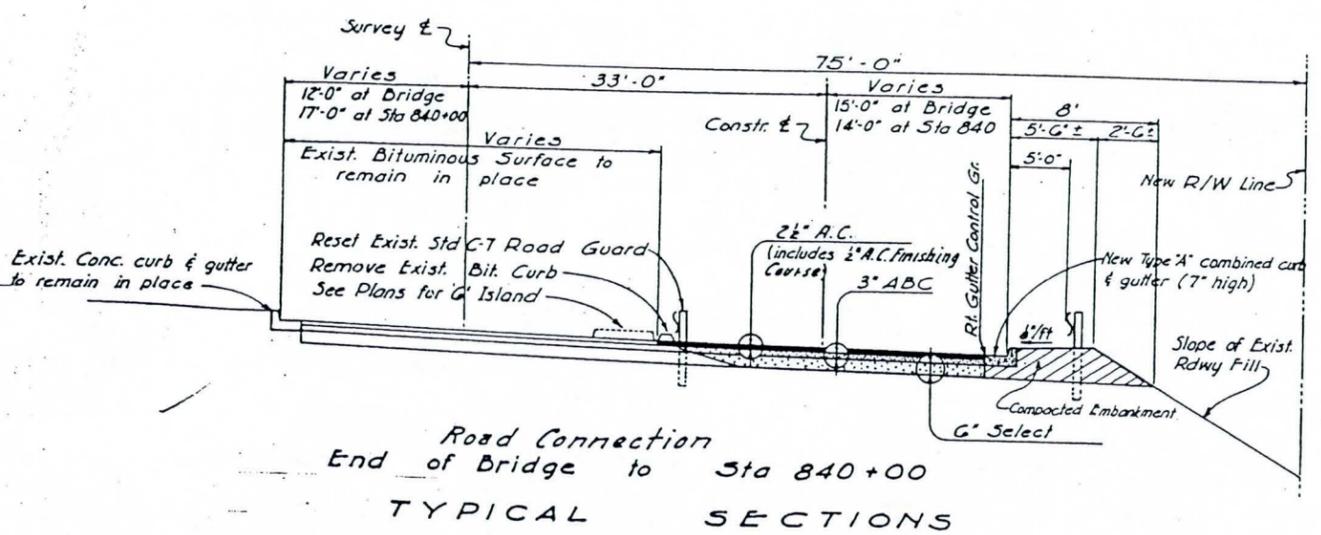
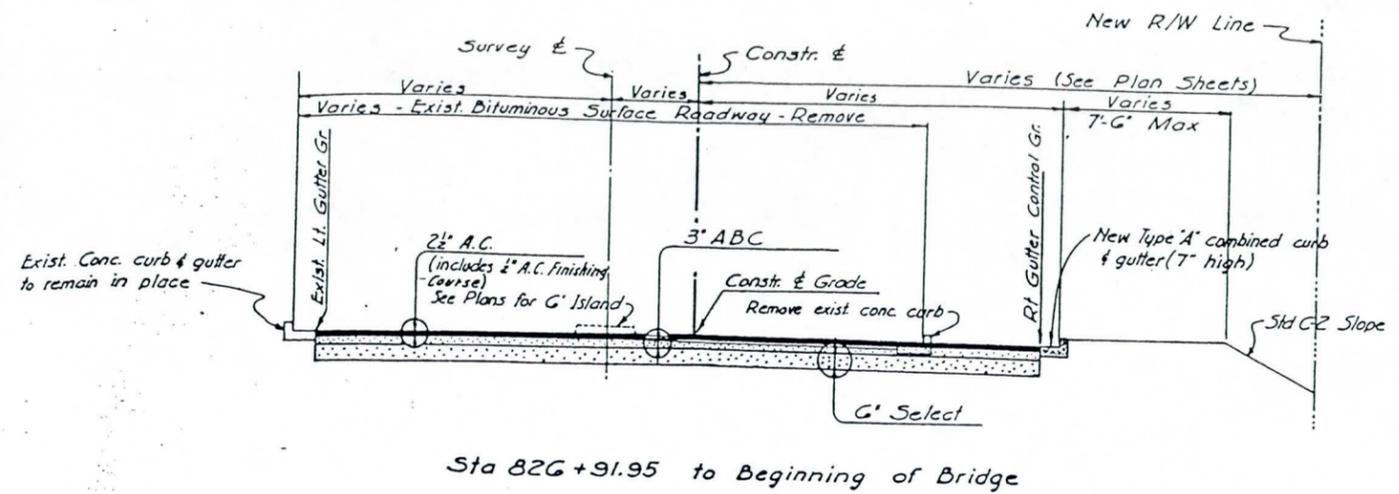
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REGIONAL ENGINEER



FED. ROAD DIV. NO.	STATE	PROJECT	SHEET NO.	TOTAL SHEETS	AS BUILT
7	ARIZ.	W-022-2(1)A	2	15	MH

HOFFMAN-MILLER ENGRS. INC.  
FOR THE CONSULTING ENGINEER  
DESIGN: DRAWN: W.L.M. CHK'D: H.E.G.



RIGHT OF WAY MARKERS  
3 Required - Std. C-1

CONCRETE CURB and GUTTER

- 797 Lin. Ft. New Combined Curb & Gutter Type 'A' (7" high) Std. C-20
- 399 Lin. Ft. New Single Curb Type 'A' (3" high) Std. C-20
- 75 Lin. Ft. Concrete Valley Gutter (4') Std. C-20

CONCRETE SIDEWALK

- Rt Sta 826+90 to Sta 831+00
- Rt Sta 835+82.78 to End of Dado
- 2170 Sq. Ft. New 5" Conc. Sidewalk Std. C-20
- Lt Sta 835+90
- 96 Sq. Ft. New Conc. Sidewalk Std. C-20

CATCH BASIN

- Rt. Sta 827+84 New No. 3 Catch Basin
- Standard C-27-1

ROAD GUARD

- 400 Lin. Ft. Required Type 'A' & 'B'
- Standard C-7-1

STRUCTURE OVER 20' CLEAR SPAN

- Sta 830+99.62 to Sta 835+82.78
- New 6'-80" Spans - Steel Girder Bridge
- See Bridge Sheets

RESET MANHOLE FRAME & COVER

- Rt. Sta 827+57 Reset Exist. Manhole Frame & Cover to New Grade

RESET SURVEY MONUMENT FRAME & COVER

- Rt Sta 828+85 Reset Exist. Monument Frame & Cover to New Grade

NEW C.M.P. & R.C.P.

- Sta 827+53 New 12" x 10" Stub for catch basin. Type I Install, C' Bedding, Class III R.C.P.
- Sta 831+ Exist. 36" R.C.P. Extend 3', Class III R.C.P.
- Rt Sta 835+ Exist. 24" C.M.P. Extend 8', 14 ga.

LENGTH OF PROJECT

Sta 826+91.95 to Sta 828+92.33 = 200.38'

Sta 828+91.40 to Sta 835+95 = 703.60'

Total length Proj. Non-F-022-2(1)A = 903.98' or 0.171 Mi.

Mile Post # 110.45 to Mile Post # 110.62

GENERAL NOTES

- All encroachments within Right of Way to be removed by Order of State.
- Engineer shall check Right of Way Agreements and see that same are complied with before job acceptance.
- Utilities, disturbed by new construction, shall be reset or replaced by the interested utility.
- Bench Markers will be furnished by the State and placed by the Contractor as per Standard C-38
- Project Markers will be furnished by the State and placed by the Engineer as per Standard C-38.
- R/W Markers shall be furnished and placed by the Contractor as per Standard C-1.
- Changes in location or length of depressed curbs may be made by the Engineer in accordance with Standard D-5-5.

ROADWAY STANDARDS 1959

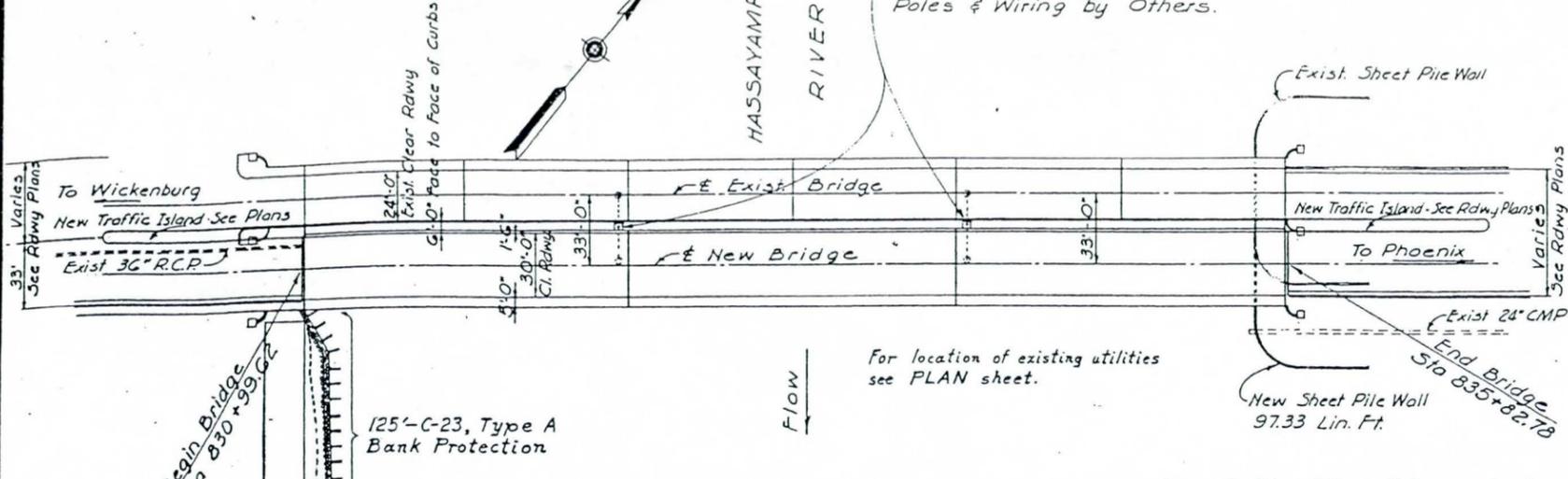
- C-1 Right of Way Markers
- C-2 Slopes
- C-7-1 Road Guard
- C-20 Concrete Curbs, Gutters & Sidewalks
- C-21 Curb & Gutter Measurements.
- C-27-1 No. 3 Catch Basin.
- C-33-1 Reinforced Concrete Pipe & Installation.
- C-38 Project, Bench & Construction Markers.
- C-43 Plans Symbols.

INDEX OF SHEETS

Sheet	Title	Hoffman-Miller Drawing No.
1	Face Sheet	
2	Summary Sheet (This Sheet)	1
3	Plan & Profile	2
4	Plan & Profile	3
5	Location Plan	4
6	Abutment No. 1	5
7	Abutment No. 2	6
8	Sheet Pile Wall	7
9	Pier Details	8
10	Pier Details	9
11	Deck Details	10
12	Structural Steel Details	11
13	Structural Steel Details	12
14	Roadway Joint Standard RJ-2	
15	Handrail Standard H-1	

REDUCED SIZE  
DO NOT SCALE

WICKENBURG - PHOENIX HIGHWAY  
Maricopa County



NOTE~  
The Contractor shall use care not to disturb the sand & gravel material around the existing footings of present bridge.

STA 833+  
LOCATION PLAN  
New G Span Steel Girder Bridge  
Scale: 1" = 40'-0"

Approach Rdwy. fill shall be constructed to El. 2047.50 and thoroughly compacted after sheet pile wall is in place and prior to driving abut. brg. piles.

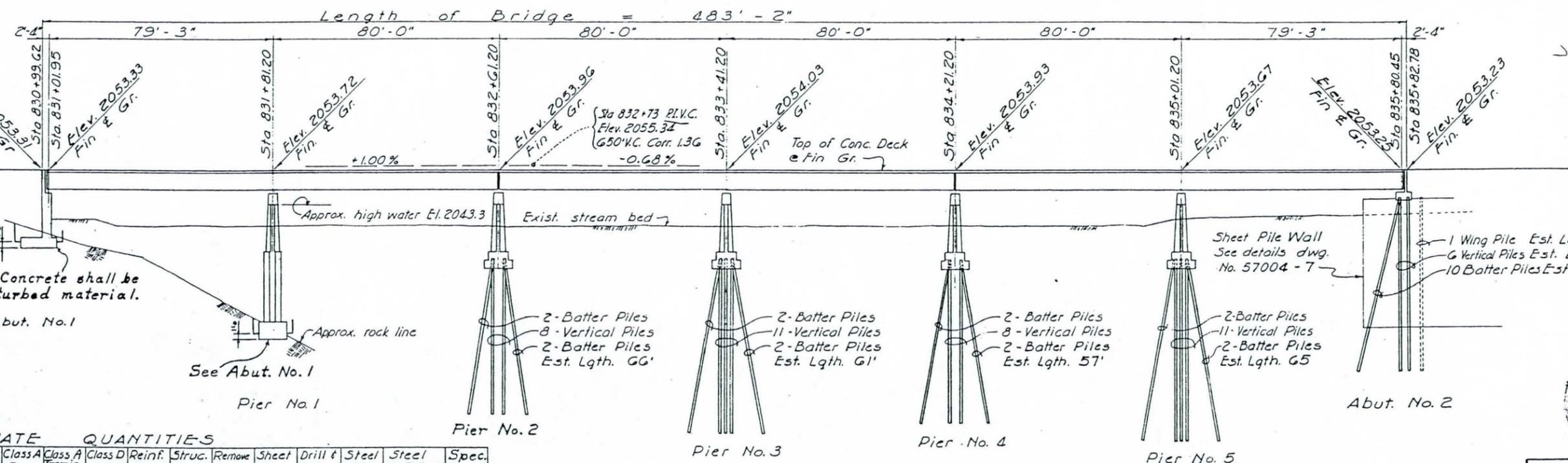
GENERAL NOTES

Construction - Standard Specifications Arizona Highway Department, Edition of 1960.  
Design - AASHTO Specs. of 1957, revised to date.  
Loading Class - H 20 - S16 - 1944  
Stresses: Structural steel  $f_s = 18,000 \text{ psi}$   
Class A Conc:  $f_c = 20,000 \text{ psi}$   $f_t = 1000 \text{ psi}$   $n=12$   
Class D Conc:  $f_c = 20,000 \text{ psi}$   $f_t = 1200 \text{ psi}$   $n=10$   
No wearing surface allowance in deck slab design.  
Reinforcing steel: A.S.T.M. A-15 Intermediate grade and A.S.T.M. A-305 High bond.  
Structural steel (including H piling and sheet piling) - A.S.T.M. A-7  
Welding shall conform to American Welding Society Specs. for welded Hwy. & Railway Bridges.  
Paint and painting shall conform to Std. Specs.  
Shop paint: One coat paint No. 1A or 1B  
Field paint: First coat paint -- No. 3  
Second coat paint -- No. 10  
Contact surfaces shall not be painted.  
Payment for the structural steel item shall be made on the basis of computed weights in accordance with Standard Specs., Edition of 1960.  
All pile cutoff shall be hauled to Durango Yard, Phoenix, for storage.  
Tremie Concrete: Class "A" Concrete plus 10% added Cement.

Proj. No.	State	Project No.	Sheet No.	Total Sheets	As Built
7	ARIZONA	Non F-022-2(61)A	5	5	J.R.P.

Steel sheet piles shall be an arch web section as per manufacturer's standard - See details, dwg  
Used sheet piling may be furnished subject to approval on the following conditions:  
1. Piles shall be free from thick, loose, scaly rust.  
2. Piles shall be in a satisfactory condition for redriving; straight, free of battered or torn ends and with interlocks true and unbroken.  
3. Weight of piles shall be at least 95% of original section.  
Sheet pile wall shall be painted from 2' below low stream bed to top of wall, both faces:  
Inside Face - 2 coats #50 Koppers Bitumastic or approved equal.  
Outside Face - Same as structural steel. (Paint exist. sheet pile wall)

REDUCED SIZE  
DO NOT SCALE



Neat line excavation. Concrete shall be placed against undisturbed material.

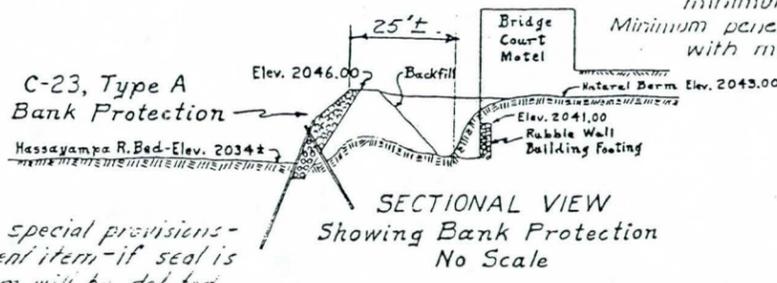
APPROXIMATE QUANTITIES

ITEM	Std No	Sheet No.	Struc. C.Y.	Class A Conc. C.Y.	Class D Conc. C.Y.	Reinf. Steel Lbs.	Struc. Steel Lbs.	Remove Ex. Conc. C.Y.	Sheet Pile Lin. Ft.	Drill & Set Down Hdr'l Ea	Steel H-Piling Lin. Ft.	Steel Piling No.	Spec. Comp. C.Y.		
Abutment No.1	-	6	710	230.97	-	13,755	-	3	7	-	-	-	680		
Pier No.1	-	9 & 10	580	186.13	-	14,545	-	-	-	-	-	-	-		
- No.2	-	9	170	64.40	30	8,680	-	-	-	-	12	792	-		
- No.3	-	9	170	64.40	30	8,680	-	-	-	-	15	915	-		
- No.4	-	9	170	64.40	30	8,680	-	-	-	-	12	684	-		
- No.5	-	9	170	64.40	30	8,680	-	-	-	-	15	975	-		
Abutment No.2	-	7 & 8	30	54.47	-	4,500	-	3	2565	-	17	1020	60		
Deck & Hdrl.	RJ-2 H-1	11, 12, 13, 14 & 5	-	-	404.61	77,565	454,481	-	-	-	961	-	-		
<b>BRIDGE TOTALS</b>			<b>2000</b>	<b>729.17</b>	<b>20.00</b>	<b>404.61</b>	<b>145,085</b>	<b>454,481</b>	<b>6</b>	<b>2565</b>	<b>7</b>	<b>961</b>	<b>71</b>	<b>4386</b>	<b>740</b>

SECTION on E ROADWAY  
Scale: 1" = 20'-0"

PILE NOTE -

All abut. & pier brg. piles shall be 12" BP 53# - Est. Lqths as shown.  
Minimum penetration all pier piles to Elev. 1975.0 with minimum bearing 43 Tons.  
Minimum penetration all abutment brg. piles to Elev. 1990.0 with minimum bearing 21 Tons.



SECTIONAL VIEW  
Showing Bank Protection  
No Scale

Std. Rdwy. Jt. RJ-2 Sheet No. 10 of 11  
Std. Hdrl H-1 Sheet No. 11 of 11  
Note: Payment for 3rd hdrl. post anchor bars shall be included in unit price bid for handrail.

125 lin. ft. Bank Protection Type A C-23  
NOTE - See construction special provisions - This is a contingent item - if seal is not required, item will be del.-ed.



HOFFMAN-MILLER ENGINEERS

DESIGN	LWM	7-57
DRAWN	WLM	8-57
CHK'D	PEK	10-57

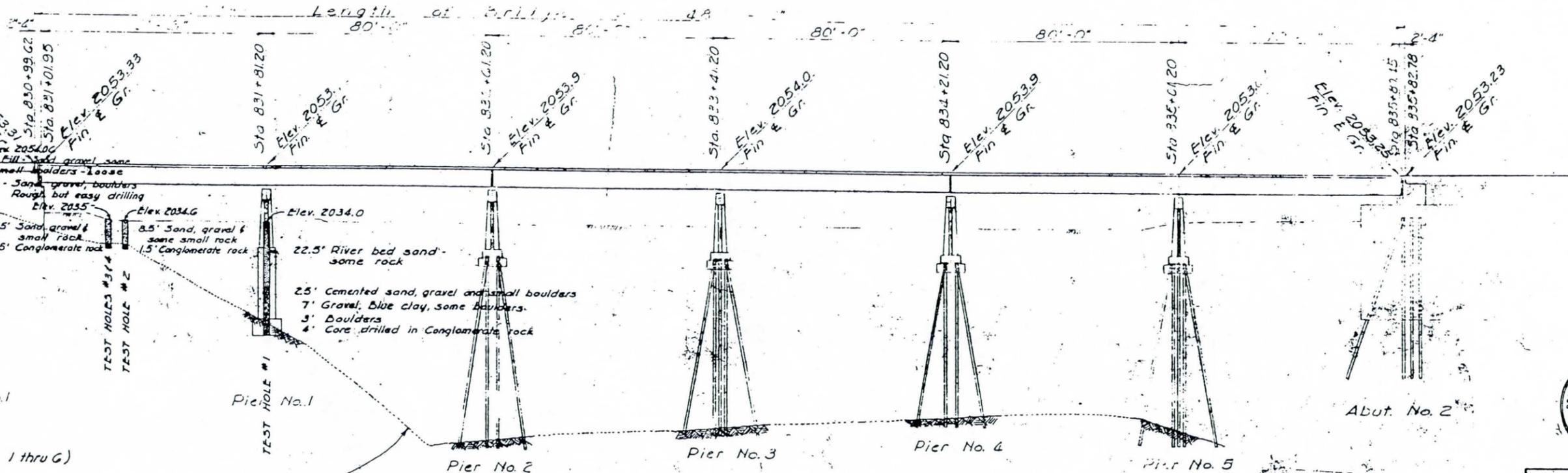
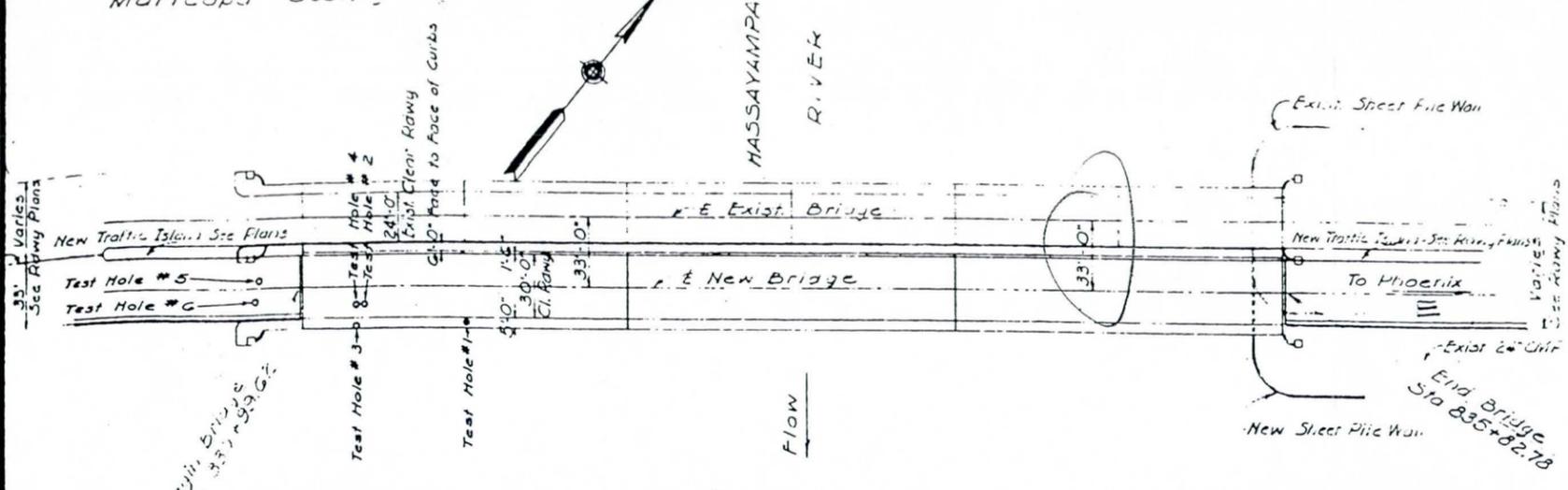
LAYOUT	DATE	ARIZONA-HIGHWAY DEPARTMENT
DESIGN		<b>BRIDGE DIVISION</b>
ARCHITECTURE		STA 833+ HASSAYAMPA RIVER BRIDGE
DRAWN		LOCATION PLAN
TRACED		
CHECKED		
SHEET NO.	1 of 11	BRIDGE NUMBER 737 DRAWING NUMBER

GENERAL NOTES  
Construction Standards Specific to Arizona  
Highway Department, Edition of 1960.  
Design - AASHTO Specs. of 1957, revised to date.  
Loading Class - H 20 - S16 - 1944  
Stresses: Structural steel  $f_s = 19,000 \text{ psi}$   
Class A Conc:  $f_c = 20,000 \text{ psi}$   $f_e = 1000 \text{ psi}$   $n=12$   
Class D Conc:  $f_c = 20,000 \text{ psi}$   $f_e = 1200 \text{ psi}$   $n=10$   
No wearing surface allowance in deck slab design.  
Reinforcing steel: ASTM A-15 Intermediate grade  
and ASTM A-305 High bond.  
Structural steel (including H piling and  
sheet piling) - ASTM A-7  
Welding shall conform to American Welding Society  
Specs. for welded Hwy. & Railway Bridges.  
Paint and painting shall conform to Std. Spec.  
Shop paint: One coat paint No. 1A or 1B  
Field paint: First coat paint - No. 3  
Second coat paint - No. 1A  
Contact surfaces shall not be painted.  
Payment for the structural steel item shall be  
made on the basis of computed weights  
in accordance with Standards Specs.

PROJECT NO.	STATE	PROJECT NO.	DATE	AS BUILT
7	ARIZONA	Non F-022-2(61)A	5A	5-28-62

Steel sheet piles shall be in good well  
section as per manufacturer's  
standards - See details away.  
Used sheet piling may be furnished but not  
to approval on the following conditions:  
1. Piles shall be free from holes, loose,  
scaly rust.  
2. Piles shall be in a satisfactory condi-  
tion for redriving; straight, free of  
battered or torn ends and with inter-  
locks true and unbroken.  
3. Weight of piles shall be at least  
95% of original section.  
Sheet pile wall shall be painted from 2' below  
low stream bed to top of wall, both  
tides, with 2 field coats of Koppers -  
Bitumastic or approved equal.  
1st coat: Koppers #50, both tides  
2nd coat: Koppers #50 inside tides  
#25 outside tides

STA 833+  
LOCATION PLAN  
New G Span Steel Girder Bridge  
Scale: 1" = 40'-0"



SECTION on E ROADWAY  
Scale: 1" = 20'-0"

Test Hole Data (Holes 1 thru G)  
per borings of 1957.

Assumed rock line per Rock Topography  
Sheet (sheet #10a) NRM Project #31

THIS IS NOT A CONTRACT DRAWING  
FOR INFORMATIONAL PURPOSES ONLY

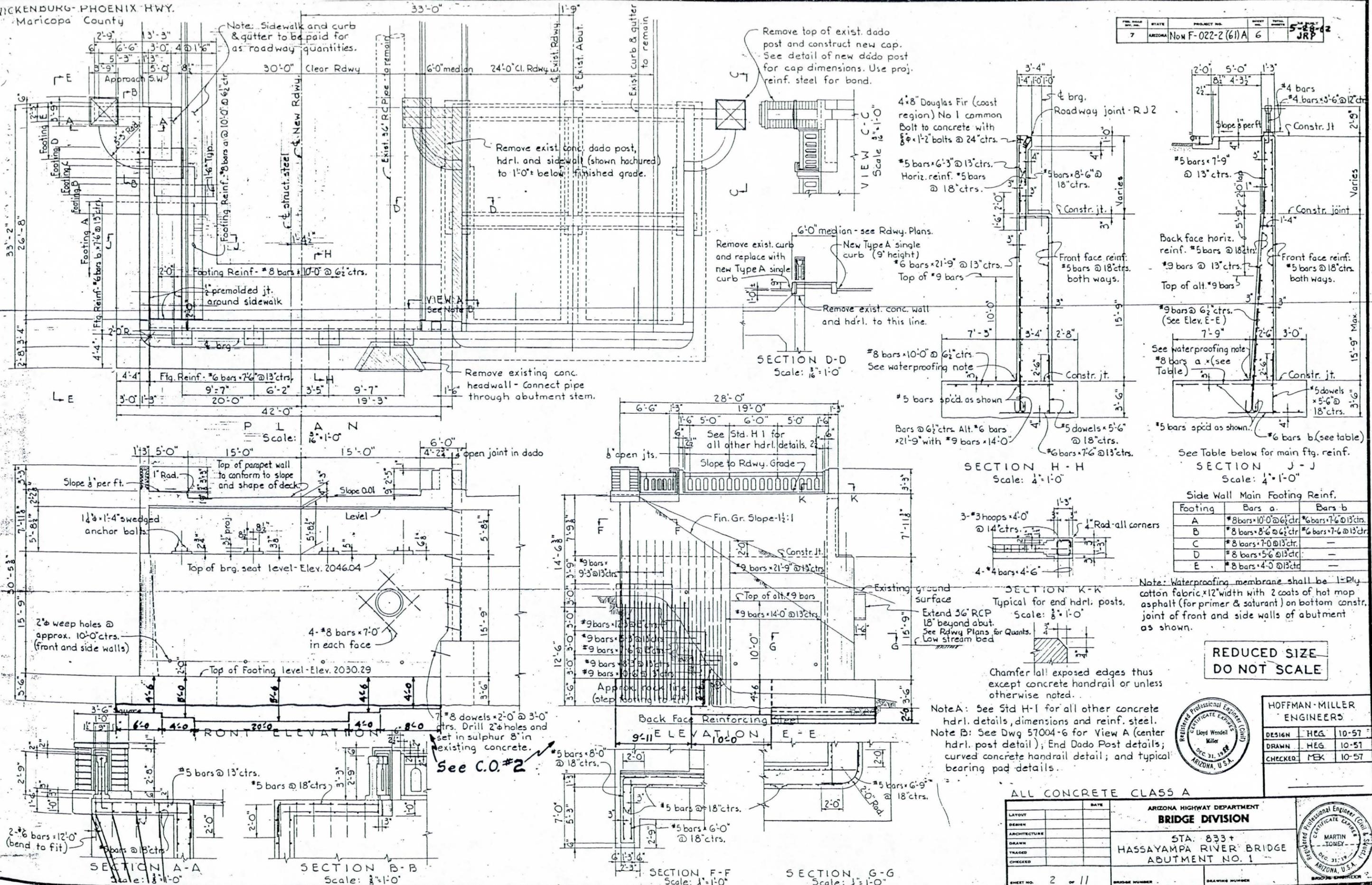
REDUCED SIZE  
DO NOT SCALE



HOFFMAN-MILLER  
ENGINEERS

DESIGN	WLM	8-57
DRAWN	PEK	10-57
CHK'D		

LAYOUT				
DESIGN				
ARCHITECTURE				
DRAWN				
TRACED				
CHECKED				
DATE	ARIZONA HIGHWAY DEPARTMENT BRIDGE DIVISION			
	STA 833+ HASSAYAMPA RIVER BRIDGE			
	A			
PROJECT NO.	DATE	DRAWING NO.	BRIDGE ENGINEER	
Non F-022-2(61)A	57004-4A			



Side Wall Main Footing Reinf.

Footing	Bars a	Bars b
A	#8 bars 10'-0" @ 6" ctrs.	#6 bars 7'-6" @ 13" ctrs.
B	#8 bars 8'-6" @ 6" ctrs.	#6 bars 7'-6" @ 13" ctrs.
C	#8 bars 7'-0" @ 13" ctrs.	—
D	#8 bars 5'-6" @ 13" ctrs.	—
E	#8 bars 4'-0" @ 13" ctrs.	—

Note: Waterproofing membrane shall be 1-Ply cotton fabric 12" width with 2 coats of hot mop asphalt (for primer & saturant) on bottom constr. joint of front and side walls of abutment as shown.

**REDUCED SIZE  
DO NOT SCALE**



HOFFMAN-MILLER  
ENGINEERS  
DESIGN: HEG 10-57  
DRAWN: HEG 10-57  
CHECKED: MEK 10-57

Note A: See Std H-1 for all other concrete hdrl. details, dimensions and reinf. steel.  
Note B: See Dwg 57004-6 for View A (center hdrl. post detail); End Dado Post details; curved concrete handrail detail; and typical bearing pad details.

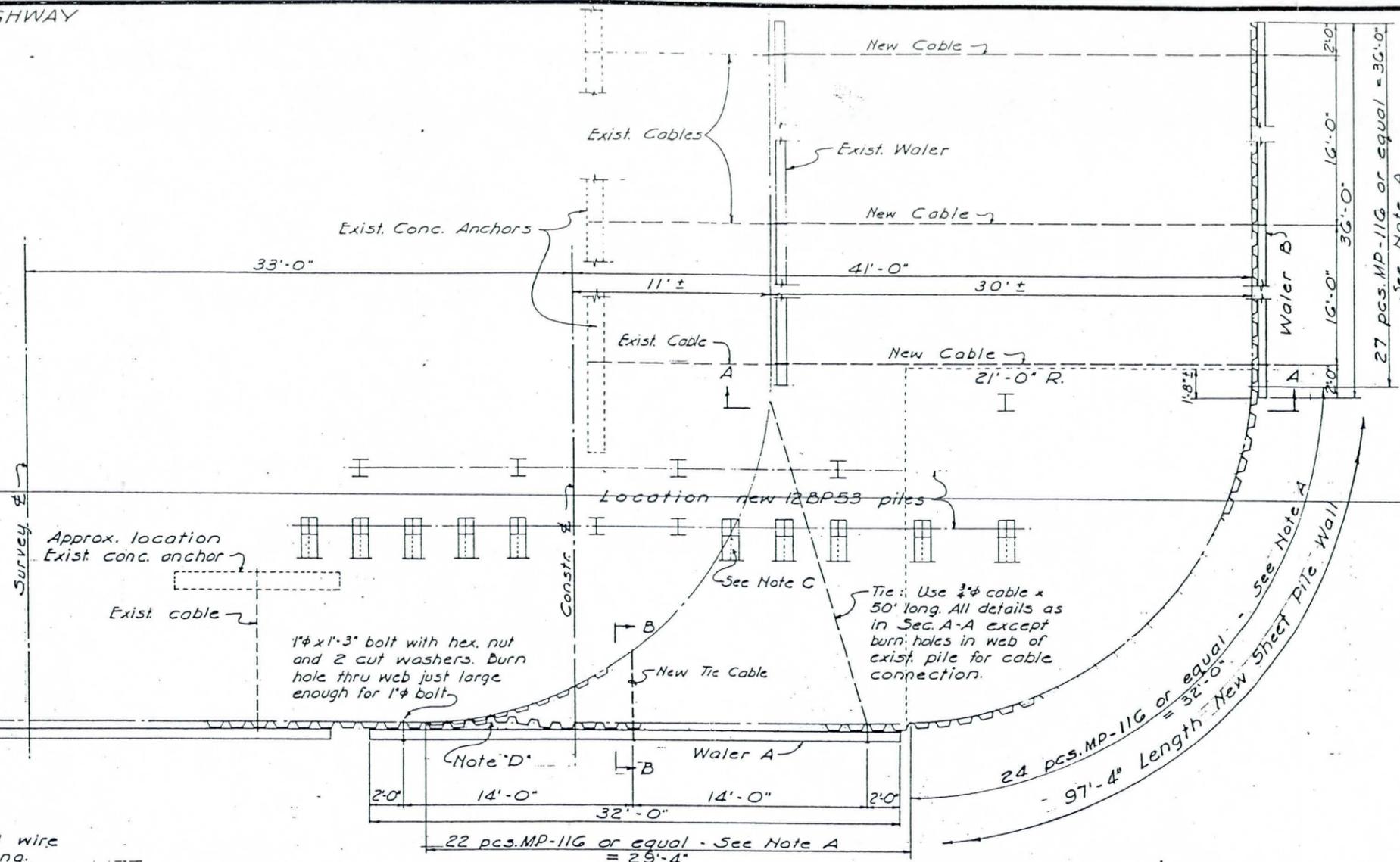
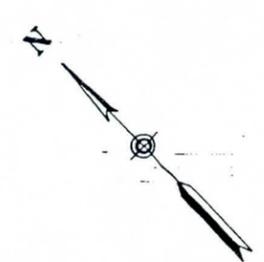
ALL CONCRETE CLASS A

LAYOUT	DATE	BRIDGE NUMBER	DRAWING NUMBER
DESIGN		NON F-022-2(61)A	57004-5
ARCHITECTURE			
DRAWN			
TRACED			
CHECKED			

ARIZONA HIGHWAY DEPARTMENT  
**BRIDGE DIVISION**  
STA. 833+  
HASSAYAMPA RIVER BRIDGE  
ABUTMENT NO. 1



FED. ROAD DIST. NO.	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
7	ARIZONA	Non F-022-2(61)A	8		JRP



PART PLAN OF SHEET PILE WALL AT ABUTMENT No. 2  
Scale: 1" = 1'-0"

**Note "A"**  
Sheet pile wall to be built from 37 pcs. 45'-0" long and 36 pcs. 25'-0" long. Alternate 45'-0" and 25'-0" lengths to be driven to top Elev. 2043.2 (elev. of top of exist. sheet pile wall) Sheet piling shall be of such SECTION as req'd in PLAN.  
After bulkhead is completed 3"φ weep holes are to be cut thru web of piling 1'-0" above ground line and @ 10'-0" ctrs.

**Note "B"**  
Punch hole for 1"φ bolt in 1/2" R. of Water "A" - one end R. only.

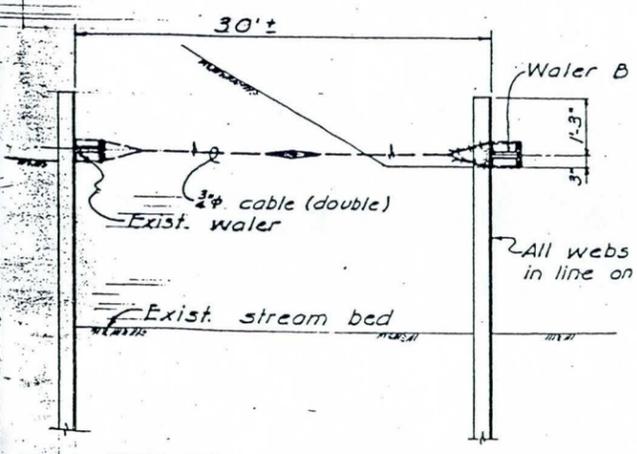
**Note "C"**  
Burn out part of exist. sheet pile wall as is necessary to drive batter pile as shown.

**Note "D"**  
Lap 3 new pile sections over exist. sections as snug as possible. Remainder of sheet pile wall to conform to dimensions shown in PLAN.

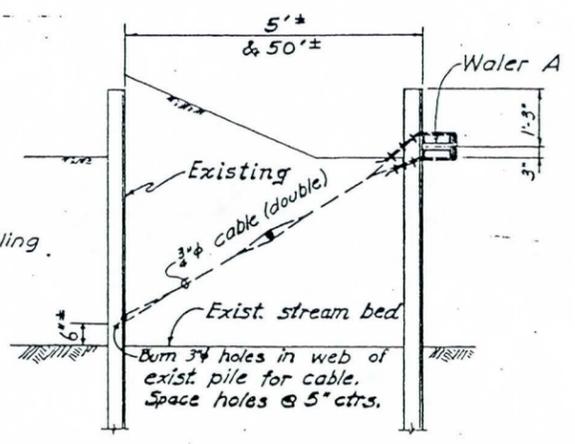
See Sheet No. 5 for Paint Note.

Horiz. Tie - Use 3/4"φ galv. plow steel wire rope (Class G x 19 wire core) x 66' long. Double wrap around new Water B and secure with G cable clamps as shown. Tension wire rope by twisting with 1"φ x 6' long bar. Drive bar 3" into ground after twisting. Burn holes thru web of pile for tie cable.

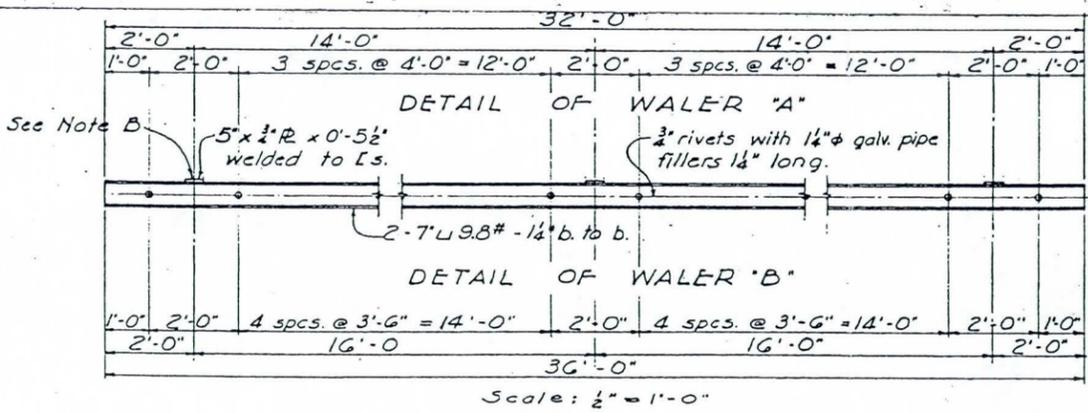
Tie - Use 3/4"φ galv. plow steel wire rope (Class G x 19 wire core) x 20' long. For all other details see SECTION A-A



SECTION A-A  
Scale: 1/2" = 1'-0"



SECTION B-B  
Scale: 1/2" = 1'-0"

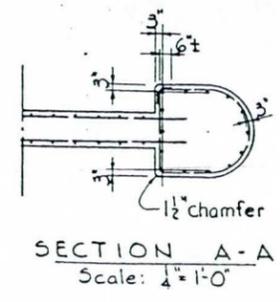
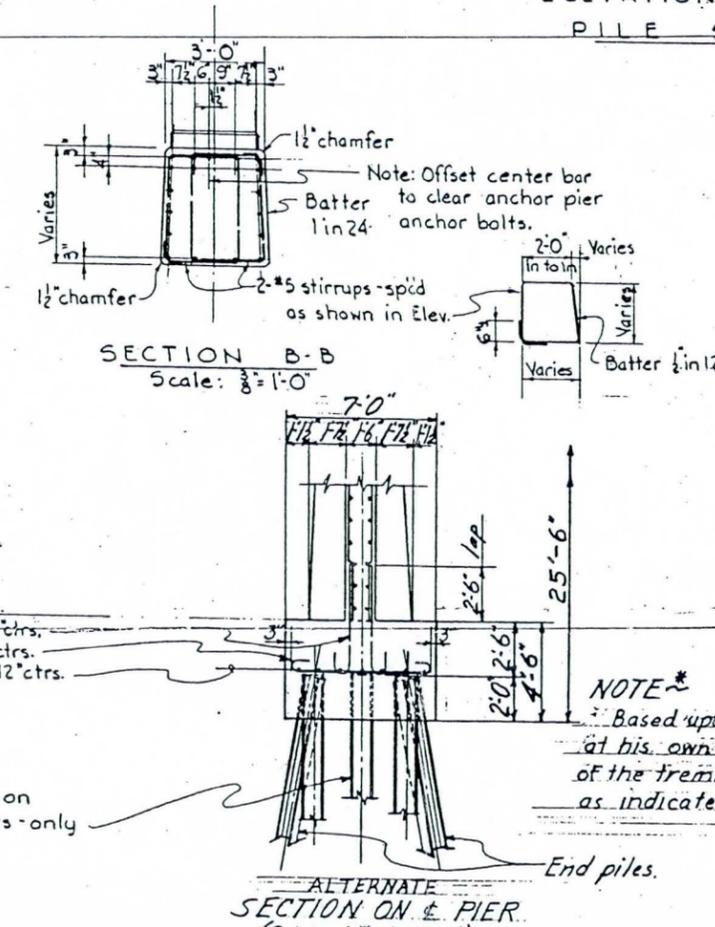
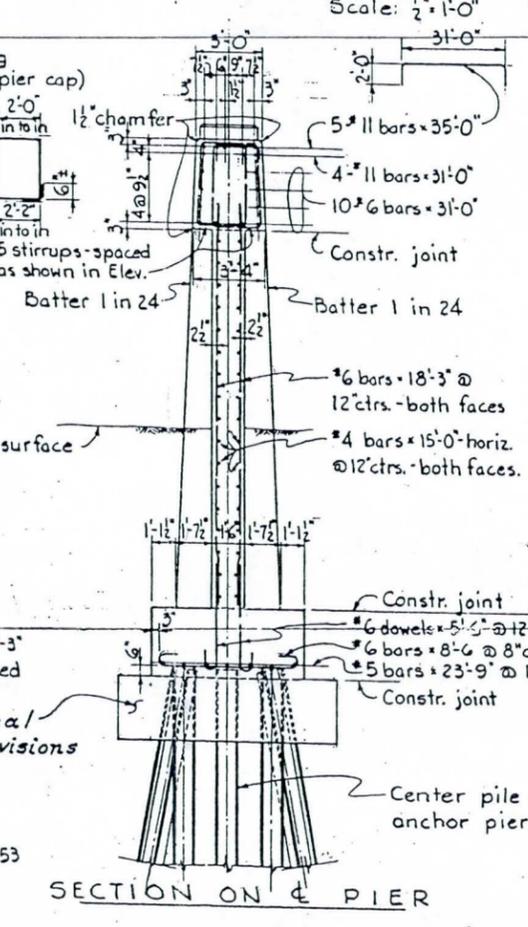
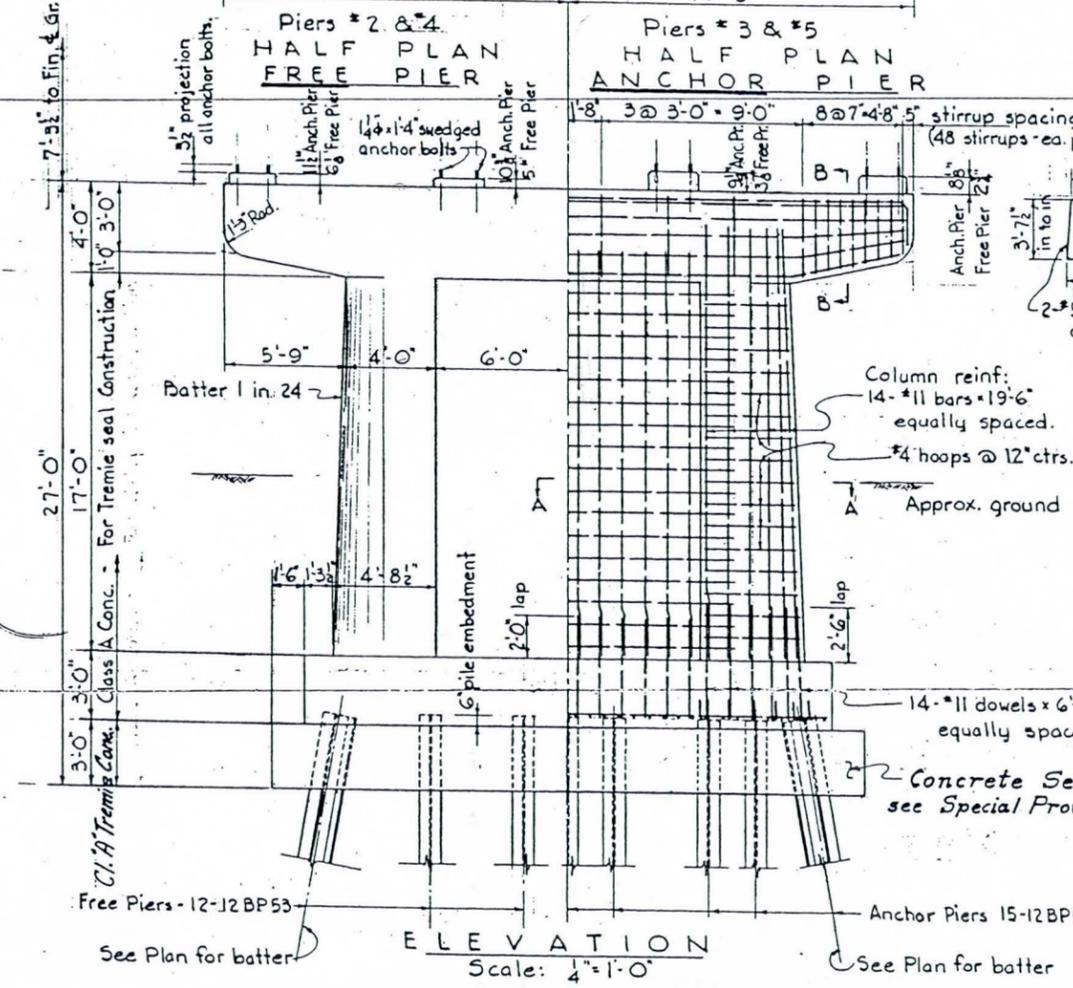
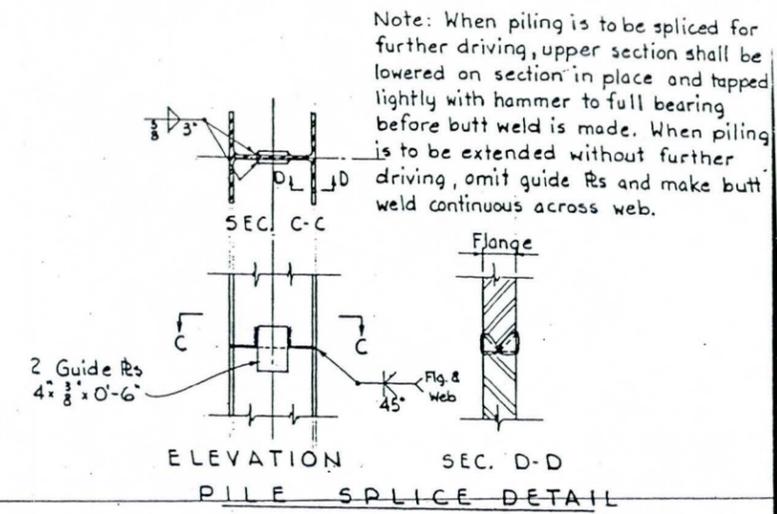
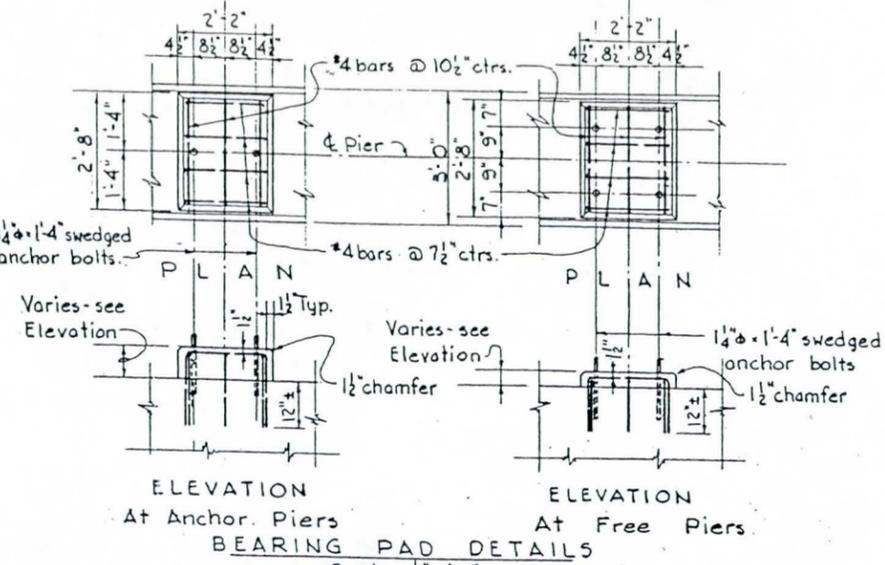
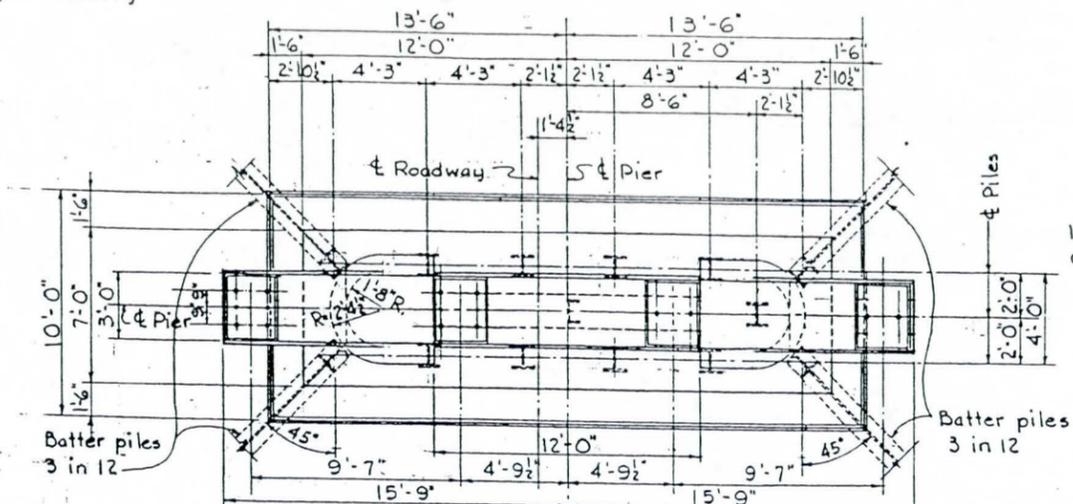


Scale: 1/2" = 1'-0"

REDUCED SIZE  
DO NOT SCALE

LAYOUT	DATE	ARIZONA HIGHWAY DEPARTMENT <b>BRIDGE DIVISION</b>  STA 833+ HASSAYAMPA RIVER BRIDGE SHEET PILE WALL - ABUT. No. 2	
DESIGN			
ARCHITECTURE			
DRAWN			
TRACED			
CHECKED		BRIDGE NUMBER	DRAWING NUMBER

FED. ROAD DIST. NO.	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
7	ARIZONA	Non F-022-2(61)A	9	5-25-42	JRP



Note: All details, reinforcing steel, and dimensions for Free Piers and Anchor Piers are identical unless noted.

REDUCED SIZE DO NOT SCALE

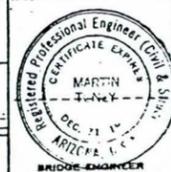
NOTE - See Dwg. 57004-9 for special details of Pier No. 1.

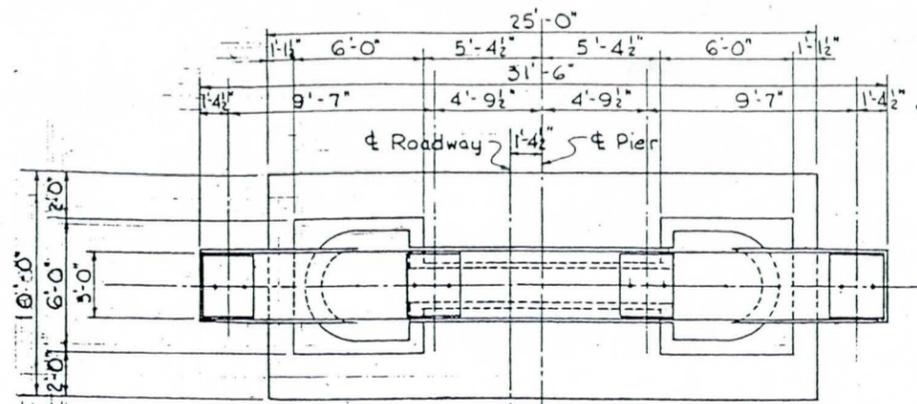
TREMIE CONCRETE - CLASS 'A' CONCRETE PLUS 10% ADDED CEMENT. ALL OTHER PIER CONCRETE CLASS 'A'.

LAYOUT	DATE	ARIZONA HIGHWAY DEPARTMENT
DESIGN		BRIDGE DIVISION
ARCHITECTURE		STA. 833+
DRAWN		HASSAYAMPA RIVER BRIDGE
TRACED		PIERS # 2, 3, 4 & 5 DETAILS.
CHECKED		
SHEET NO. 5 of 11	BRIDGE NUMBER	DRAWING NUMBER

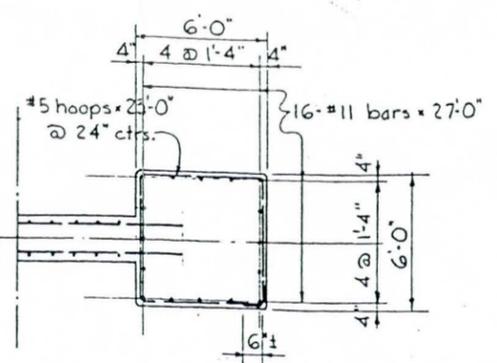


HOFFMAN-MILLER ENGINEERS		
DESIGN	LWM HEG	B-57
DRAWN	HEG	9-57
CHECKED	MEK	10-57

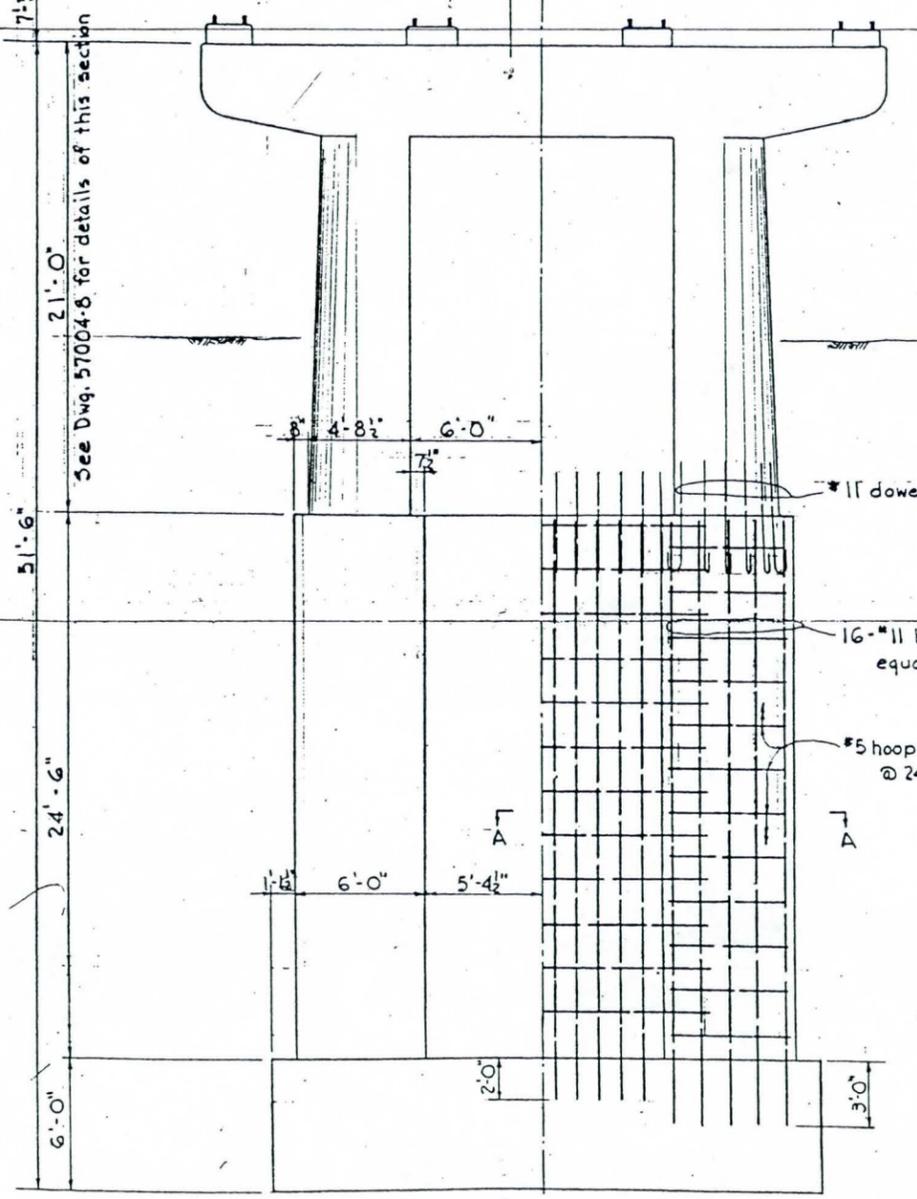




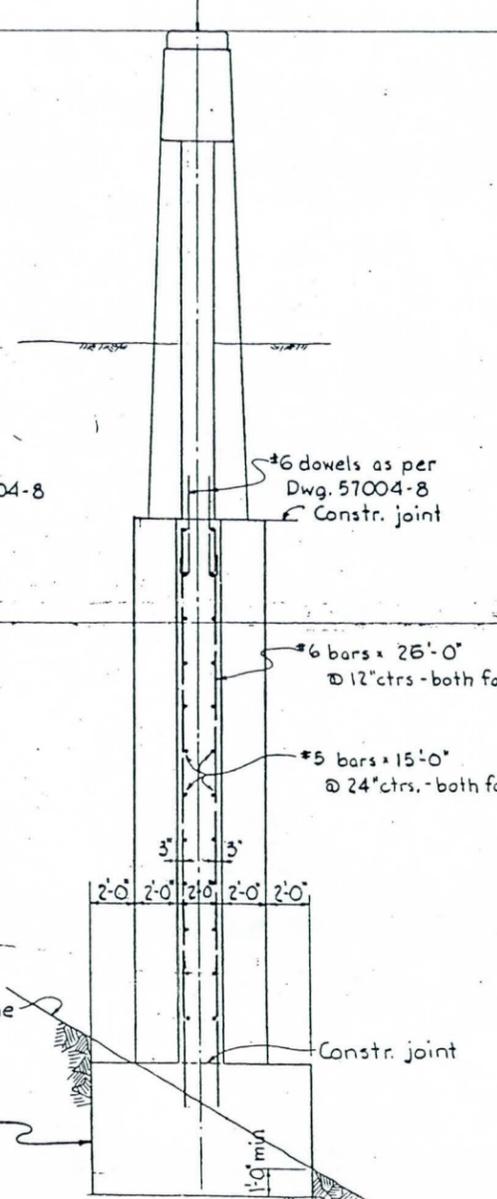
PLAN  
PIER NO. 1  
Scale: 4" = 1'-0"



SECTION A-A  
Scale: 4" = 1'-0"



ELEVATION



SECTION ON PIER

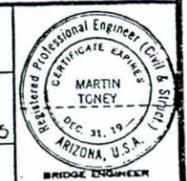
REDUCED SIZE  
DO NOT SCALE

See Dwg. 57004-8 for all other Pier Details.

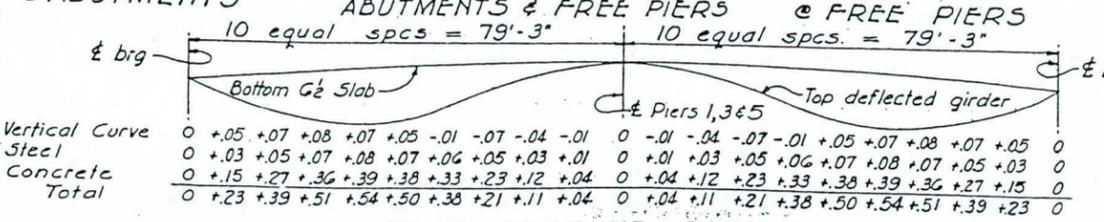
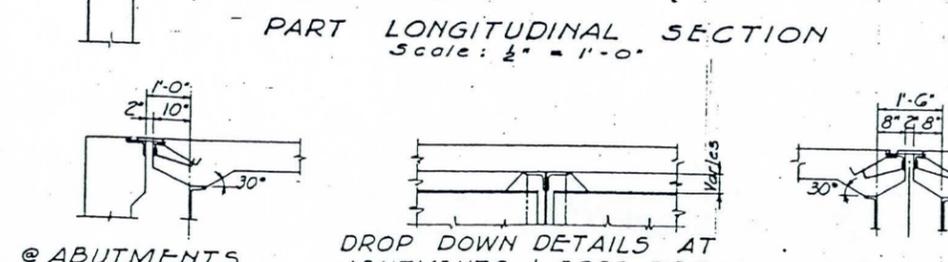
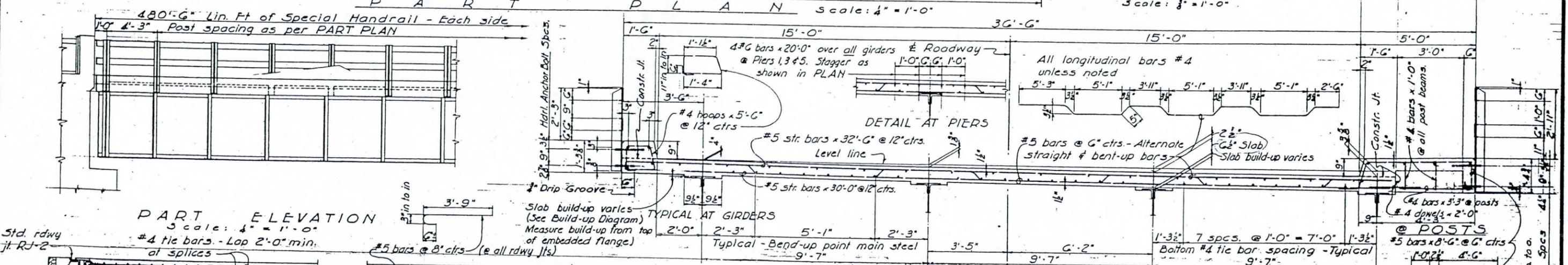
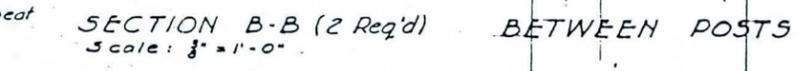
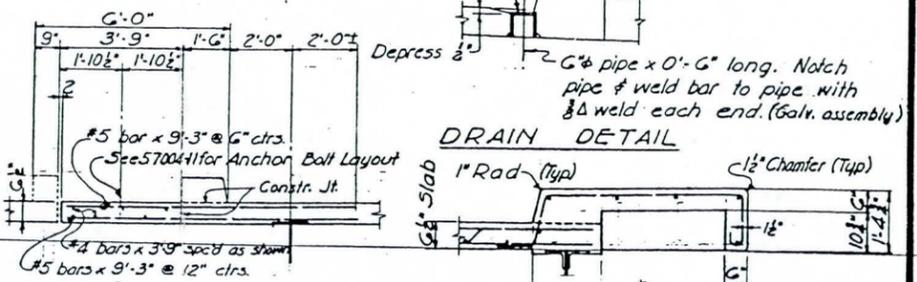
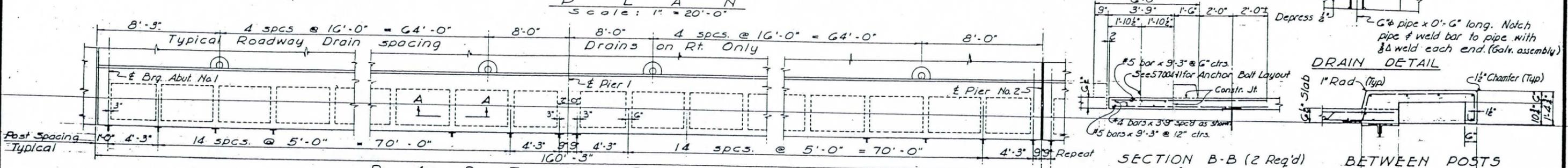
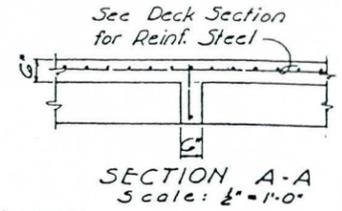
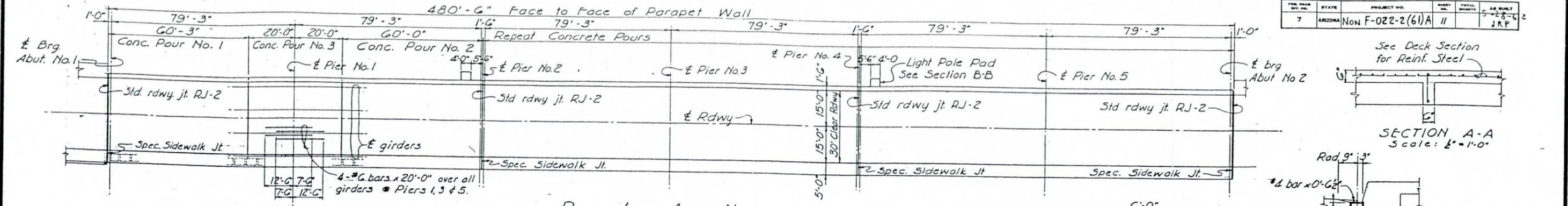


HOFFMAN-MILLER ENGINEERS		
DESIGN	HEG	10-57
DRAWN	HEG	10-57
CHECKED	MEK	10-57

ALL PIER CONCRETE CLASS A	
LAYOUT	DATE
DESIGN	
ARCHITECTURE	
DRAWN	
TRACED	
CHECKED	
SHEET NO. 6 of 11	BRIDGE NUMBER
ARIZONA HIGHWAY DEPARTMENT BRIDGE DIVISION	
STA. 833+ HASSAYAMPA RIVER BRIDGE PIER NO. 1 - SPECIAL DETAILS	
DRAWING NUMBER	



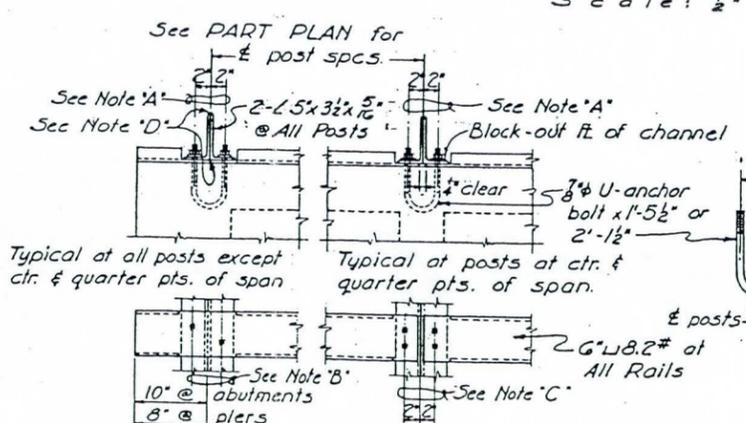
FED. ROAD DIST. NO.	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
7	ARIZONA	Non F-022-2(61)A	11	5	JRP



SLAB BUILD-UP DIAGRAM (In Inches)

Vertical Curve	0	+05	+07	+08	+07	+05	-01	-07	-04	-01	0	-01	-04	-07	-01	+05	+07	+08	+07	+05	0
Steel	0	+03	+05	+07	+08	+07	+06	+05	+03	+01	0	+01	+03	+05	+06	+07	+08	+07	+05	+03	0
Concrete	0	+15	+27	+36	+39	+38	+33	+23	+12	+04	0	+04	+12	+23	+33	+38	+39	+36	+27	+15	0
Total	0	+23	+39	+51	+54	+50	+38	+21	+11	+04	0	+04	+11	+21	+38	+50	+54	+51	+39	+23	0

\* Girder deflections shall be checked and build-up adjusted in field. (Not to Scale)



HANDRAIL DETAILS  
Scale: 1" = 1'-0"  
Note: Post details of Rt. & Lt. Hndl. vary. See Deck Section.  
Hndl. point to be same as for Structural Steel.

REDUCED SIZE  
DO NOT SCALE

- Note "A" - 3/8" U-Anchor Bolts (See detail) with 2-hex. nuts & cut washers. Cinch tight & burr threads.
- Note "B" - 2-3" corr. bolts with hex. nuts & cut washers. Sq. holes in rail [ 1/2" holes in post. Cinch tight & burr threads.
- Note "C" - 4-8" corr. bolts with hex. nuts & cut washers. Sq. holes in rail [ 1/2" x 1/2" slotted holes in posts. Fit snug & burr threads.
- Note "D" - Tack weld post Ls 1" @ 12" & grind smooth.

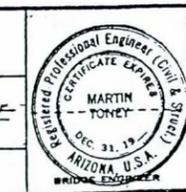
Chamfer all exposed corners & edges 1/2" unless otherwise noted.  
ALL CONCRETE CLASS D



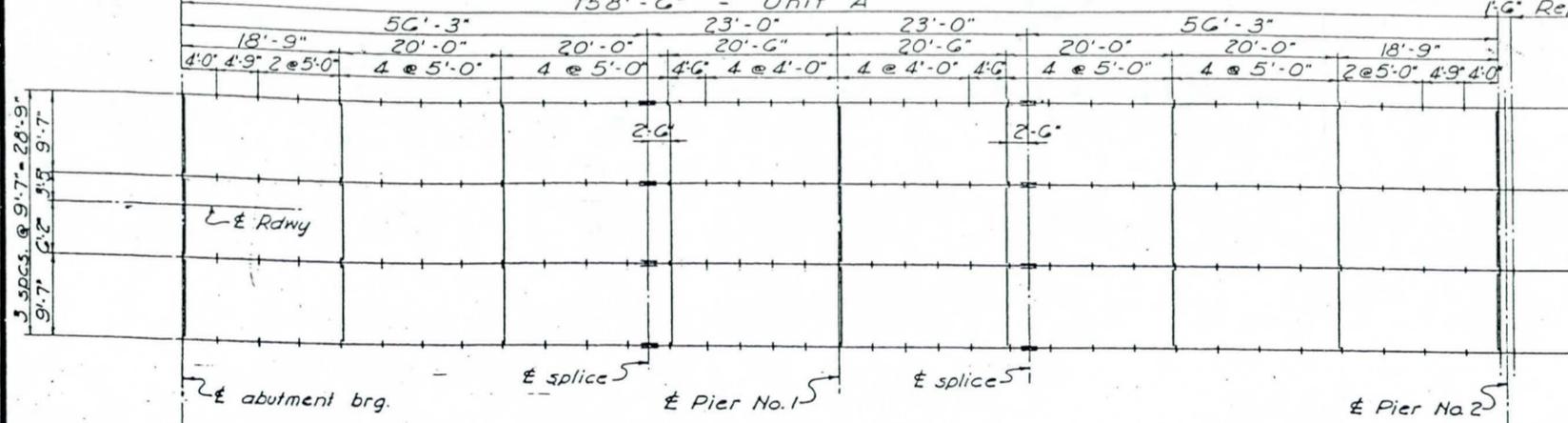
HOFFMAN - MILLER ENGINEERS

DESIGN	L.W.M.	10-57
DRAWN	W.L.M.	10-57
CHK'D	MEK	10-57

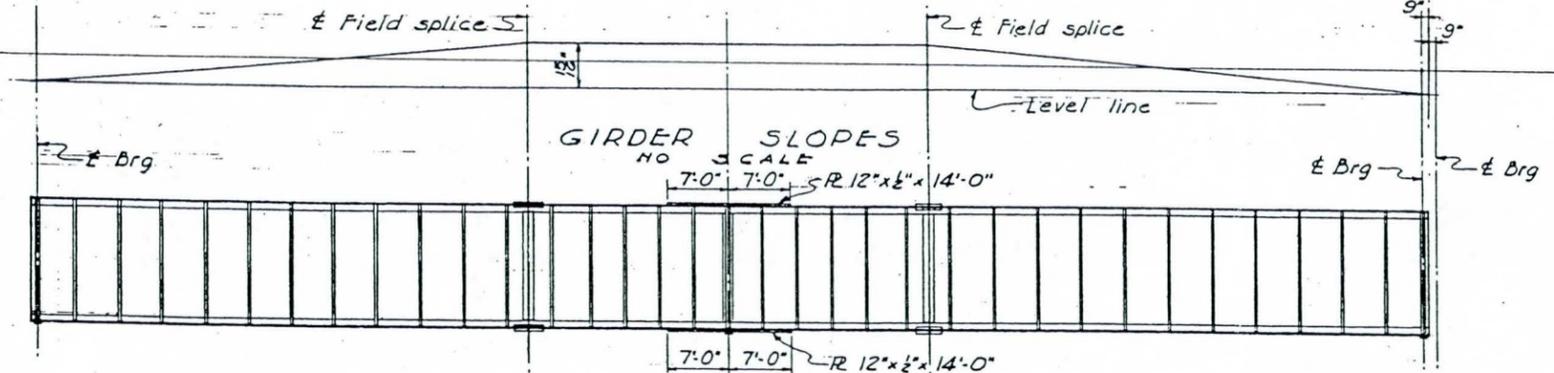
LAYOUT	DATE	ARIZONA HIGHWAY DEPARTMENT
DESIGN		BRIDGE DIVISION
ARCHITECTURE		STA 833+
DRAWN		HASSAYAMPA RIVER BRIDGE
TRACED		DECK DETAILS
CHECKED		
SHEET NO.	7 of 11	BRIDGE NUMBER
		DRAWING NUMBER



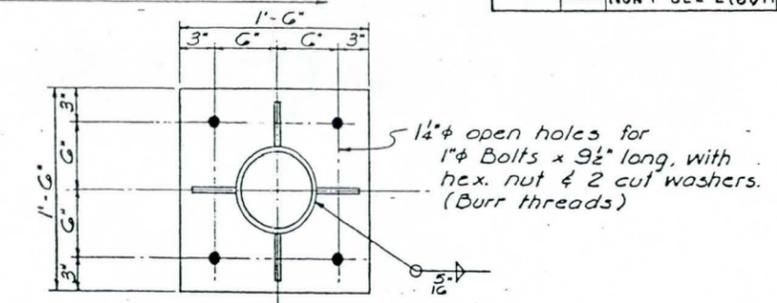
FILE NO.	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	DATE
7	ARIZONA	Non F-022-2(6)A	12	5	JRP



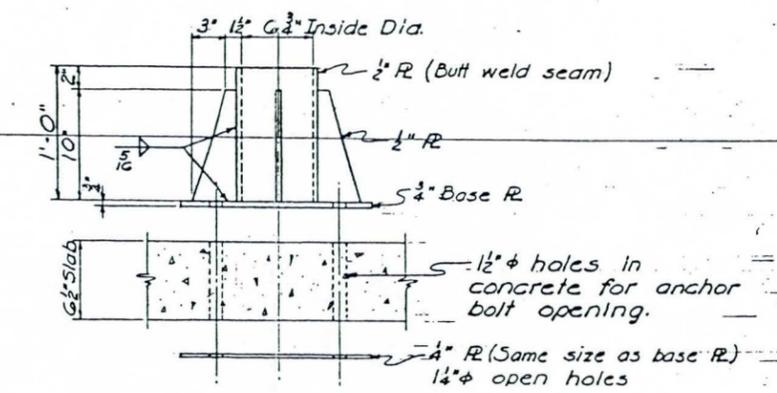
STEEL LAYOUT  
Scale: 1" = 10'-0"



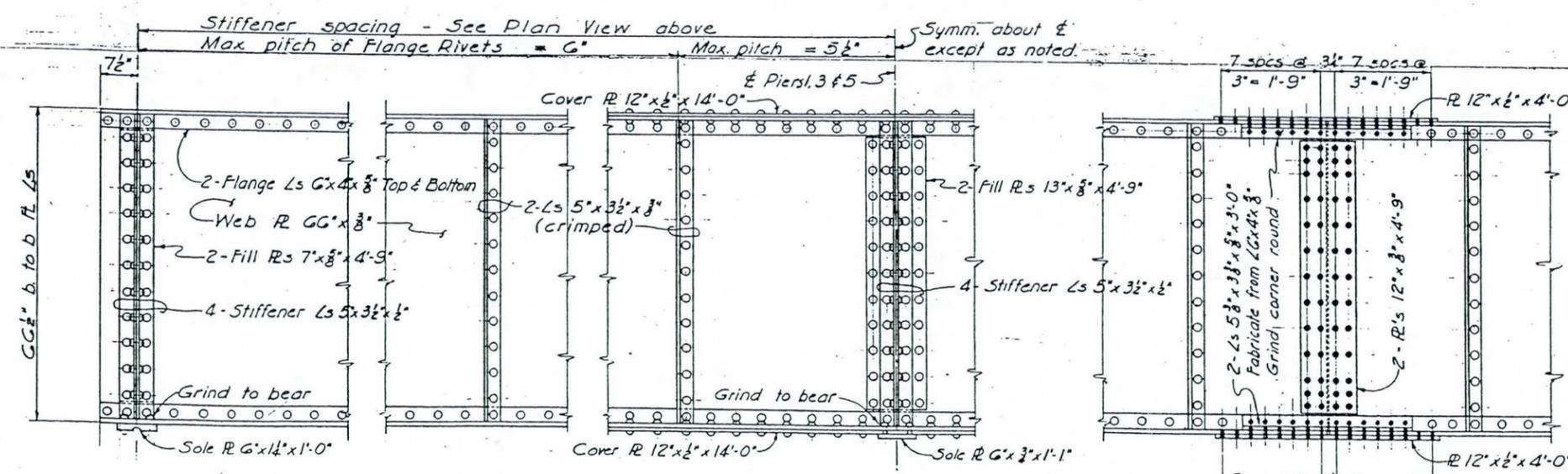
TYPICAL GIRDER ELEVATION  
Scale: Horiz. 1" = 10'-0"  
Vert. 1/2" = 1'-0"



PLAN



ELEVATION  
DETAILS OF LIGHT POLE ANCHOR (2 REQ'D)  
See Deck Sheet for Location  
Scale: 1/2" = 1'-0"



AT ABUTMENTS & FREE PIERS  
AT INTERMEDIATE STIFFENERS  
AT FIXED PIERS  
AT FIELD SPLICES  
GIRDER DETAILS  
Scale: 3/4" = 1'-0"

NOTE - High-tensile-strength bolts and nuts with hardened washers may be substituted for rivets of the same number and diameter as specified in the splice detail. All details of bolts, washers and assembly shall conform to A.A.S.H.O. specifications for high-strength bolts. (Use clipped washers).

REDUCED SIZE  
DO NOT SCALE

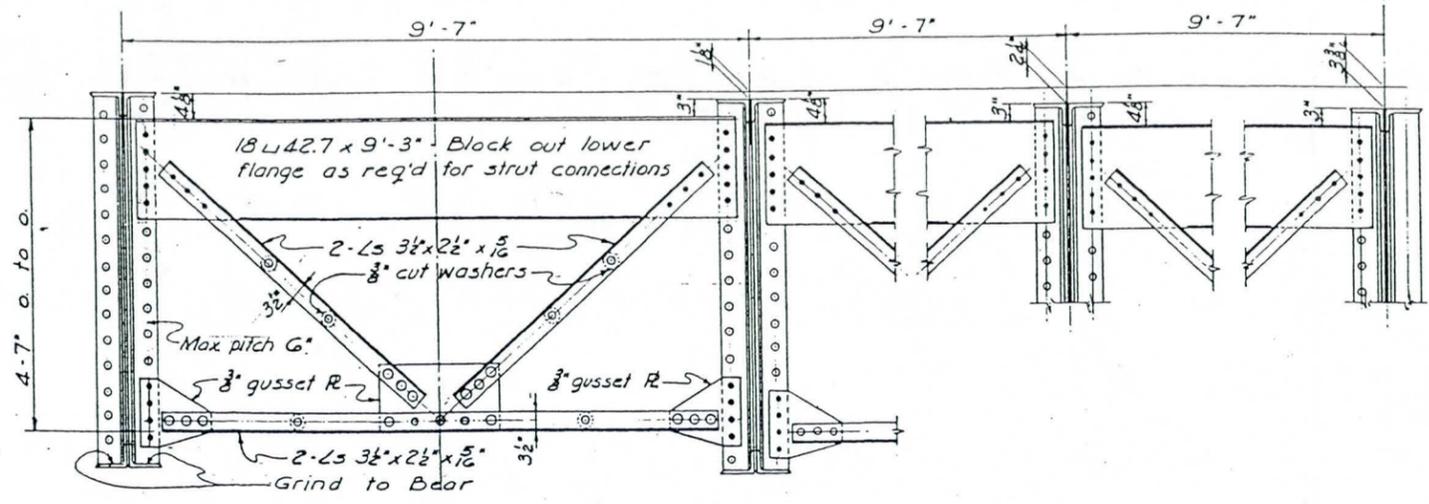


HOFFMAN-MILLER ENGINEERS		
DESIGN	LWM	9-57
DRAWN	WLM	10-57
CHK'D	HEG	10-29-58

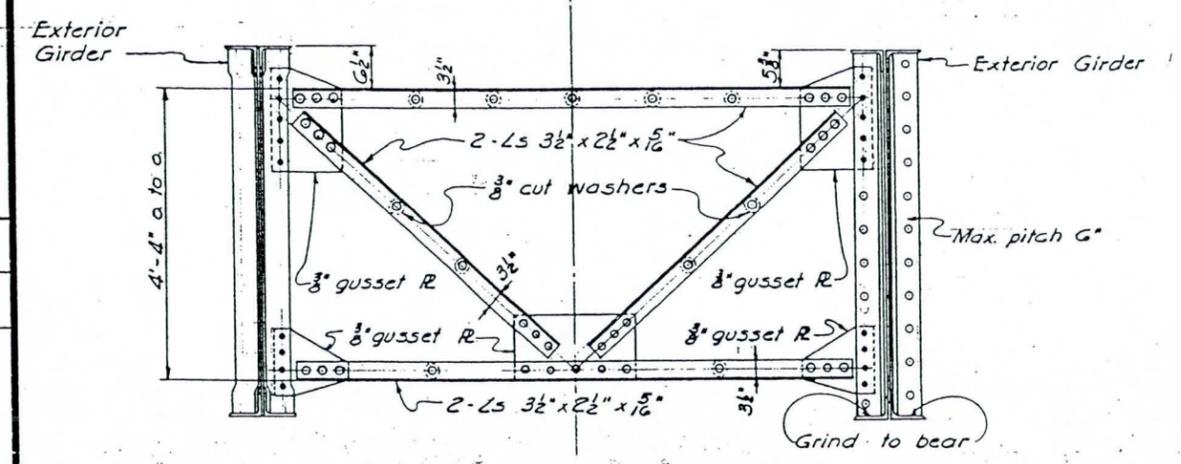
ALL RIVETS 3/8 inch  
OPEN HOLES 1/2 inch Unless Noted

ARIZONA HIGHWAY DEPARTMENT BRIDGE DIVISION		STA 833+ HASSAYAMPA RIVER BRIDGE STRUCTURAL STEEL	MARTIN TONEY DEC 31, 1958 ARIZONA, U.S.A.
LAYOUT	DATE		
DESIGN			
ARCHITECTURE			
DRAWN			
TRACED			
CHECKED			
SHEET NO. 8 of 11	BRIDGE NUMBER	DRAWING NUMBER	

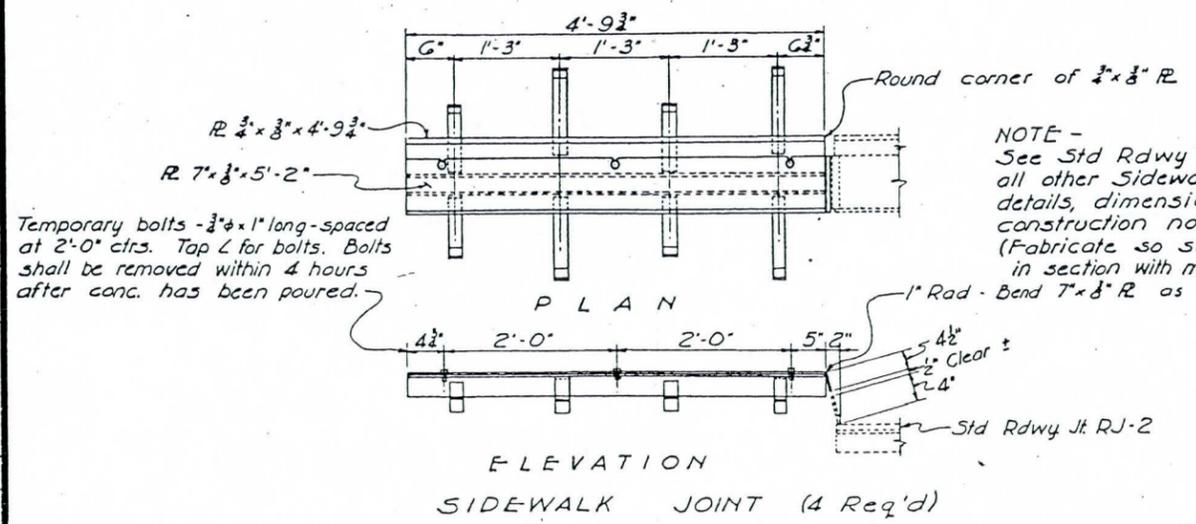
FED. ROAD DIST. NO.	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
7	ARIZONA	Non F-022-2(61)A	13	5	1 R P



CROSS FRAMES AT EXPANSION BEARINGS  
Scale: 3/4" = 1'-0"

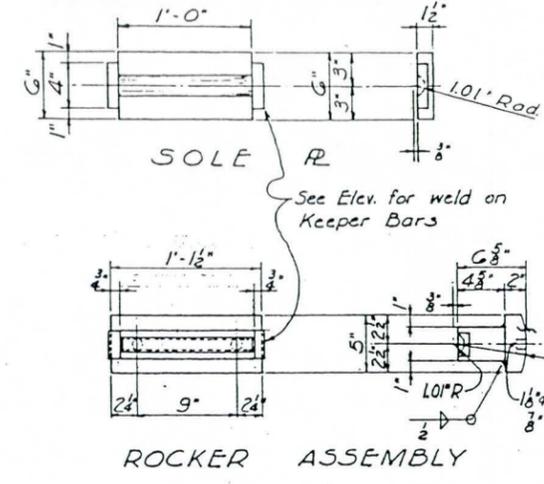


CROSS FRAMES AT INTERMEDIATE POINTS AND FIXED PIERS  
Scale: 3/4" = 1'-0"

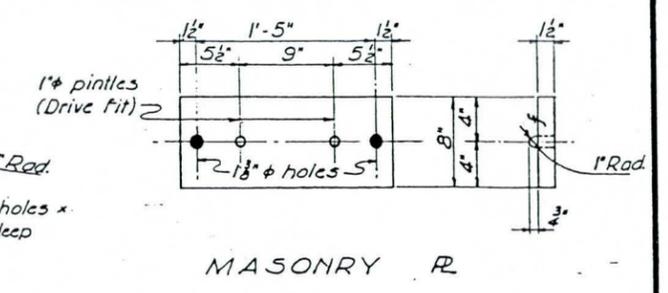


SIDEWALK JOINT (4 Req'd)

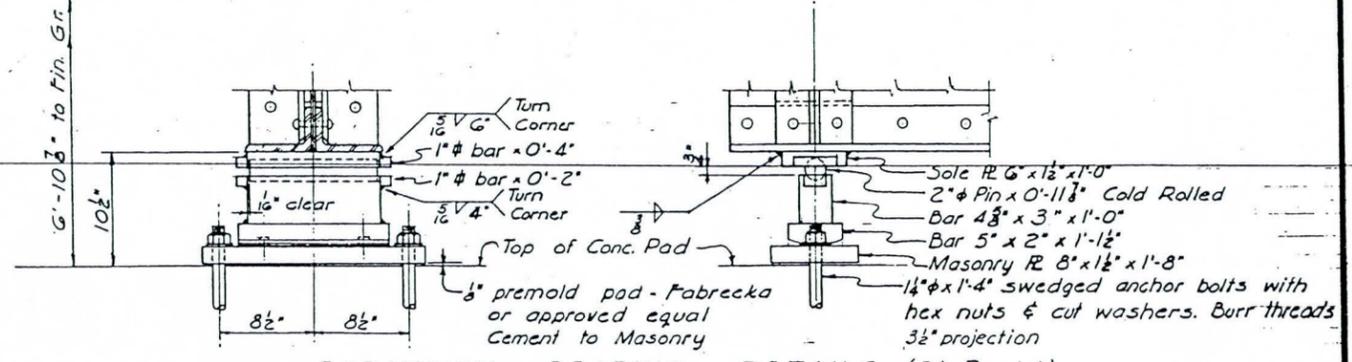
NOTE - See Std Rdwy Jt. RJ-2 for all other Sidewalk Jt. details, dimensions & construction notes. (Fabricate so sidewalk jts agree in section with matching rdwy. jt.)



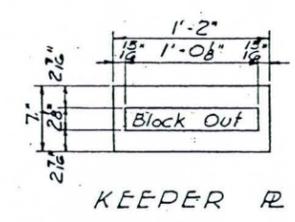
ROCKER ASSEMBLY



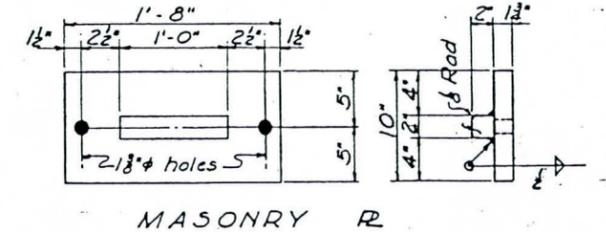
MASONRY R



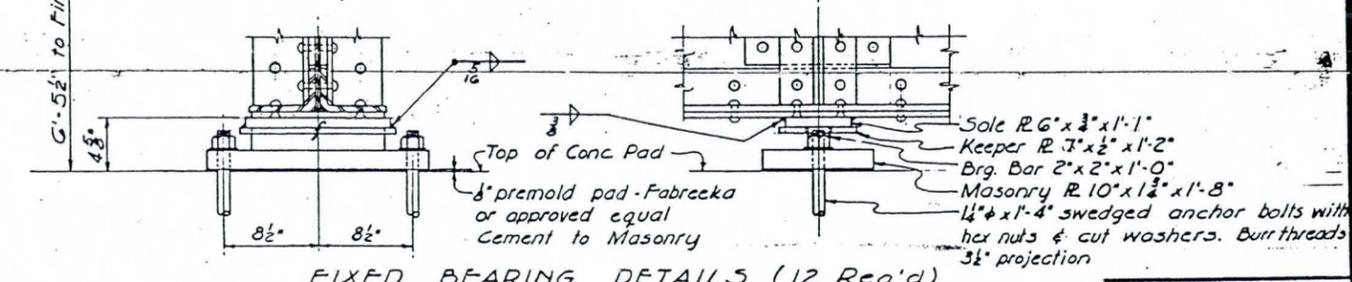
EXPANSION BEARING DETAILS (24 Req'd) @ Abutments & Free Piers  
Scale: 1/2" = 1'-0"



KEEPER R



MASONRY R



FIXED BEARING DETAILS (12 Req'd) @ Fixed Piers  
Scale: 1/2" = 1'-0"



HOFFMAN-MILLER ENGINEERS		
DESIGN	LWM	10-57
DRAWN	WLM	10-57
CHK'D	HEG	10/29/57

ALL RIVETS 3/8" OPEN HOLES 1/2" UNLESS NOTED

ARIZONA HIGHWAY DEPARTMENT		BRIDGE DIVISION	STA 833 + HASSAYAMPA RIVER BRIDGE STRUCTURAL STEEL
LAYOUT	DATE		
DESIGN			
ARCHITECTURE			
DRAWN			
TRACED			
CHECKED			
SHEET NO.	9 of 11	BRIDGE NUMBER	DRAWING NUMBER



REDUCED SIZE DO NOT SCALE





## **E.5 Hydraulic Calculations**

### Hassayampa River 100-Year Water Surface Profiles (NGVD 1929)

Cross-Section	Equivalent FIS Section	Effective Model (ft)	Corrected Effective Model (ft)	Existing Conditions Model (ft)	Proposed Conditions Model (ft)	Proposed Minus Existing (ft)
53.160	53.16	2088.39	2088.4	2088.32	2088.32	0.00
53.130				2087.53	2087.53	0.00
53.097				2086.77	2086.77	0.00
53.063	53.06	2085.3	2085.3	2085.86	2085.86	0.00
53.026				2084.90	2084.9	0.00
52.986				2084.15	2084.15	0.00
52.949				2083.58	2083.58	0.00
52.916				2083.17	2083.17	0.00
52.881	52.87	2081.92	2081.93	2082.72	2082.72	0.00
52.847				2081.61	2081.61	0.00
52.813				2080.24	2080.24	0.00
52.778				2079.22	2079.22	0.00
52.740				2077.87	2077.87	0.00
52.693				2076.28	2076.28	0.00
52.650				2074.31	2074.31	0.00
52.606				2072.81	2072.9	0.09
52.558				2071.68	2071.97	0.29
52.508				2070.48	2071.09	0.61
52.467				2069.67	2070.29	0.62
52.440				2069.10	2069.8	0.70
52.410	52.4	2069.87	2069.87	2068.64	2069.34	0.70
52.384				2068.23	2068.89	0.66
52.345				2067.58	2068.22	0.64
52.316	52.3	2068.09	2068.09	2066.92	2067.60	0.68
52.284				2066.41	2066.88	0.47
52.250				2065.80	2066.1	0.30
52.224	52.21	2065.22	2065.22	2064.87	2065.48	0.61
52.196				2064.20	2064.8	0.60
52.170				2063.26	2063.7	0.44
52.147				2062.62	2063.08	0.46
52.121				2061.70	2062.02	0.32
52.100				2060.82	2061.11	0.29
52.078				2060.05	2060.5	0.45
52.054				2059.72	2059.91	0.19
52.029				2059.06	2059.18	0.12
52.006				2058.70	2058.79	0.09
51.983				2058.10	2058.18	0.08
51.957				2057.69	2057.75	0.06
51.932				2057.26	2057.33	0.07
51.895				2056.30	2056.53	0.23
51.854	51.83	2056.04	2056.01	2055.62	2055.51	-0.11
51.829				2055.31	2055.03	-0.28
51.807				2055.10	2054.42	-0.68
51.782				2054.87	2054	-0.87
51.757	51.74	2052.45	2052.51	2054.63	2053.61	-1.02
51.734				2054.57	2053.4	-1.17
51.709				2054.51	2053.17	-1.34
51.682				2054.46	2053.01	-1.45
51.656	51.64	2051.68	2051.8	2054.42	2052.94	-1.48
51.638				2054.38	2052.87	-1.51
51.618				2054.36	2052.83	-1.53
51.601				2054.26	2052.64	-1.62
51.581				2054.20	2052.49	-1.71

Cross-Section	Equivalent FIS Section	Effective Model (ft)	Corrected Effective Model (ft)	Existing Conditions Model (ft)	Proposed Conditions Model (ft)	Proposed Minus Existing (ft)
51.558	51.55	2051.06	2051.2	2054.12	2052.39	-1.73
51.536				2054.09	2052.28	-1.81
51.516				2054.09	2052.19	-1.90
51.497				2054.01	2051.96	-2.05
51.477				2053.93	2051.9	-2.03
51.453	51.45	2050.73	2050.89	2053.69	2051.43	-2.26
51.436				2053.60	2051.11	-2.49
51.418				2053.58	2051.01	-2.57
51.398	51.4	2050.41	2050.37	2053.42	2050.36	-3.06
51.375				2053.21	2048.84	-4.37
51.355				2053.15	2046.62	-6.53
51.345	51.34	2049.01	2048.85	2052.57	2046.59	-5.98
51.338					2046.46	
51.331	51.33	2044.95	2045.75	2045.22	2044.17	-1.05
51.303				2042.82	2042.97	0.15
51.275				2041.36	2041.4	0.04
51.208	51.2	2039.38	2039.4	2039.39	2039.39	0.00
51.130	51.13	2037.45	2037.47	2037.45	2037.45	0.00

**Increase in Water Surface Elevations between Existing Conditions Model and Effective Model**

Existing Conditions Cross-Section	Equivalent FIS Cross-Section	Existing Conditions Water Surface Elevations (ft)	Effective FIS Water Surface Elevations (ft)	Existing Conditions Minus Effective (ft)
53.160	53.16	2088.32	2088.39	-0.07
53.063	53.06	2085.86	2085.30	0.56
52.881	52.87	2082.72	2081.92	0.80
52.410	52.40	2068.64	2069.87	-1.23
52.316	52.30	2066.92	2068.09	-1.17
52.224	52.21	2064.87	2065.22	-0.35
51.854	51.83	2055.62	2056.04	-0.42
51.757	51.74	2054.63	2052.45	2.18
51.656	51.64	2054.42	2051.68	2.74
51.558	51.55	2054.12	2051.06	3.06
51.453	51.45	2053.69	2050.73	2.96
51.398	51.40	2053.42	2050.41	3.01
51.345	51.34	2052.57	2049.01	3.56
51.331	51.33	2045.22	2044.95	0.27
51.208	51.20	2039.39	2039.38	0.01
51.130	51.13	2037.45	2037.45	0.00

### Freeboard along the Levee for 100-Year Profile (Proposed Conditions)

Cross-Section	Road Station	Road Elevation	Top of Soil Cement Elevation	Water Surface Elevation	Freeboard to Top of Road	Freeboard to Top of Soil Cement	Comments
	171+00.00	2093.87	2073.00	2072.82	21.05	0.18	Upstream limit
52.558	169+40.08	2091.49	2072.21	2071.97	19.52	0.24	
52.508	167+62.82	2088.18	2071.35	2071.09	17.09	0.26	
52.467	166+08.55	2085.16	2070.68	2070.29	14.87	0.39	
52.440	164+57.58	2082.46	2070.10	2069.80	12.66	0.3	
52.410	163+31.31	2080.40	2069.69	2069.34	11.06	0.35	
52.384	162+00.67	2078.46	2069.18	2068.89	9.57	0.29	
52.345	160+03.42	2075.91	2068.42	2068.22	7.69	0.20	
52.316	158+54.00	2074.27	2067.83	2067.60	6.67	0.23	
52.284	157+06.17	2072.91	2067.26	2066.88	6.03	0.38	
52.250	155+55.29	2071.66	2066.52	2066.10	5.56	0.42	
52.224	154+32.16	2070.65	2065.76	2065.48	5.17	0.28	
52.196	153+19.67	2069.77	2065.4	2064.80	4.97	0.60	
52.170	151+92.63	2068.85	2065.00	2063.70	5.15	1.30	
52.147	150+90.68	2068.16	2064.68	2063.08	5.08	1.60	
52.121	149+88.29	2067.52	2064.36	2062.02	5.50	2.34	
52.100	148+75.63	2066.86	2064.01	2061.11	5.75	2.90	
52.078	147+67.05	2066.27	2063.67	2060.50	5.77	3.17	
52.054	146+27.95	2065.60	2063.15	2059.91	5.69	3.24	
52.029	144+91.44	2065.01	2062.51	2059.18	5.83	3.33	
52.006	14+398.9	2064.64	2062.08	2058.79	5.85	3.29	
51.983	142+97.00	2064.24	2061.60	2058.18	6.06	3.42	
51.957	141+93.19	2063.82	2061.12	2057.75	6.07	3.37	
51.932	140+85.45	2063.39	2060.62	2057.33	6.06	3.29	
51.895	139+02.32	2062.66	2059.74	2056.53	6.13	3.21	
51.854	137+30.86	2061.97	2058.86	2055.51	6.46	3.35	
51.829	136+08.02	2061.48	2058.23	2055.03	6.45	3.20	
51.807	134+81.17	2060.97	2057.78	2054.42	6.55	3.36	
51.782	133+37.72	2060.40	2057.49	2054.00	6.40	3.49	
51.757	132+02.92	2059.86	2057.23	2053.61	6.25	3.62	
51.734	130+59.33	2059.28	2056.95	2053.40	5.88	3.55	
51.709	128+73.98	2058.54	2056.58	2053.17	5.37	3.41	
51.682	126+91.40	2057.81	2056.33	2053.01	4.80	3.32	
51.656	125+44.81	2057.22	2056.22	2052.94	4.28	3.28	
51.638	124+27.15	2056.75	2056.13	2052.87	3.88	3.26	
51.618	123+10.04	2056.29	2056.04	2052.83	3.46	3.21	
51.601	122+11.84	2055.98	2055.97	2052.64	3.34	3.33	
51.581	120+93.57	2055.71	2055.88	2052.49	3.22	3.39	
51.558	119+52.76	2055.54	2055.74	2052.39	3.15	3.35	
51.536	118+22.95	2055.53	2055.55	2052.28	3.25	3.27	
51.516	117+04.78	2055.63	2055.37	2052.19	3.44	3.18	
	116+75.00	2055.67	2055.33	2052.12	3.55	3.21	Near north end of Sols Wash bridge

### Freeboard to Top of Soil Cement for 100-Year Profile (Proposed Conditions)

Cross-Section	Location of intersection of cross-section and top of soil cement		Top of Soil Cement Elevation	Water Surface Elevation	Freeboard to Top of Soil Cement	Comments
	Easting	Northing				
	453,881.6	1,082,301.8	2055.10	2051.68	3.42	Just downstream of Sols Wash bridge opening
51.453	453,943.3	1,082,246.1	2055.10	2051.43	3.67	
51.436	454,010.9	1,082,185.0	2055.10	2051.11	3.99	
51.418	454,088.1	1,082,115.3	2055.10	2051.01	4.09	
	454,106.7	1,082,098.5	2055.10	2050.87	4.23	100 feet upstream of proposed bridge
51.398	454,169.2	1,082,032.5	2055.10	2050.36	4.74	Freeboard is to top of wall
51.375	454,179.4	1,082,017.3	2055.10	2048.84	6.26	Upstream bounding section; Freeboard is top of wall
51.355	454,237.4	1,081,931.2	2051.00	2046.62	4.38	Downstream bounding section of bridge, freeboard is to top of wall
51.345	454,327.3	1,081,774.5	2051.00	2046.59	4.41	
	454,330.0	1,081,769.9	2051.00	2046.57	4.43	Downstream limit of soil cement

### Summary of Floodway (Encroached) Water Surface Profiles

Cross-Section	Existing Conditions Model (ft)	Proposed Conditions Model (ft)	Effective (FIS) Encroached Profile (ft)	Encroached Existing Conditions (with existing floodway) (ft)	Encroached Existing Conditions (with proposed floodway) (ft)	Encroached Proposed Conditions (with proposed floodway) (ft)	Encroached Proposed Minus Base Flood Proposed (ft)
53.160	2088.32	2088.32	2089.13	2089.11	2089.11	2089.11	0.79
53.130	2087.53	2087.53		2088.45	2088.45	2088.45	0.92
53.097	2086.77	2086.77		2087.64	2087.65	2087.65	0.88
53.063	2085.86	2085.86	2086.18	2086.79	2086.8	2086.8	0.94
53.026	2084.90	2084.9		2085.55	2085.63	2085.63	0.73
52.986	2084.15	2084.15		2084.56	2084.67	2084.67	0.52
52.949	2083.58	2083.58		2083.79	2083.92	2083.92	0.34
52.916	2083.17	2083.17		2083.16	2083.33	2083.33	0.16
52.881	2082.72	2082.72	2081.95	2082.66	2082.83	2082.83	0.11
52.847	2081.61	2081.61		2081.55	2081.68	2081.68	0.07
52.813	2080.24	2080.24		2080.3	2080.41	2080.41	0.17
52.778	2079.22	2079.22		2079.37	2079.28	2079.28	0.06
52.740	2077.87	2077.87		2078.02	2078.04	2078.04	0.17
52.693	2076.28	2076.28		2076.22	2076.33	2076.33	0.05
52.650	2074.31	2074.3		2074.3	2074.32	2074.32	0.01
52.606	2072.81	2072.9		2073.03	2072.94	2072.97	0.16
52.558	2071.68	2071.97		2072.26	2072.09	2072.16	0.49
52.508	2070.49	2071.1		2071.47	2071.13	2071.27	0.79
52.467	2069.67	2070.29		2070.75	2070.37	2070.41	0.85
52.440	2069.09	2069.8		2070.25	2069.91	2070.03	0.93
52.410	2068.63	2069.34	2070.75	2069.79	2069.52	2069.56	0.92
52.384	2068.21	2068.87		2069.19	2069.03	2068.98	0.75
52.345	2067.59	2068.22		2068.53	2068.27	2068.32	0.74
52.316	2066.92	2067.59	2068.78	2067.95	2067.79	2067.72	0.80
52.284	2066.41	2066.88		2067.08	2066.9	2066.87	0.46
52.250	2065.80	2066.1		2066.42	2066.16	2066.14	0.34
52.224	2064.87	2065.48	2065.78	2065.87	2065.55	2065.56	0.69
52.196	2064.20	2064.8		2065.18	2064.88	2064.87	0.67
52.170	2063.26	2063.7		2063.94	2063.76	2063.77	0.51
52.147	2062.62	2063.08		2063.37	2063.16	2063.16	0.54
52.121	2061.70	2062.02		2062.2	2062.23	2062.22	0.52
52.100	2060.82	2061.11		2061.46	2061.5	2061.48	0.66
52.078	2060.05	2060.5		2060.99	2061.08	2061.04	0.99
52.054	2059.72	2059.91		2060.51	2060.64	2060.57	0.85
52.029	2059.06	2059.18		2059.86	2059.98	2059.86	0.8
52.006	2058.70	2058.79		2059.4	2059.57	2059.4	0.7
51.983	2058.10	2058.18		2058.62	2058.99	2058.62	0.52
51.957	2057.69	2057.75		2058.12	2058.64	2058.12	0.43
51.932	2057.26	2057.33		2057.66	2058.33	2057.66	0.40
51.895	2056.30	2056.53		2056.6	2057.82	2056.64	0.34
51.854	2055.62	2055.51	2056.05	2055.47	2057.44	2055.56	-0.06
51.829	2055.31	2055.02		2054.91	2057.3	2055.02	-0.29
51.807	2055.10	2054.42		2054.42	2057.16	2054.49	-0.61
51.782	2054.87	2054		2054.09	2057.1	2054.12	-0.75
51.757	2054.63	2053.61	2052.77	2053.8	2057.04	2053.8	-0.83
51.734	2054.57	2053.4		2053.66	2057	2053.58	-0.99

Cross-Section	Existing Conditions Model (ft)	Proposed Conditions Model (ft)	Effective (FIS) Encroached Profile (ft)	Encroached Existing Conditions (with existing floodway) (ft)	Encroached Existing Conditions (with proposed floodway) (ft)	Encroached Proposed Conditions (with proposed floodway) (ft)	Encroached Proposed Minus Base Flood Proposed (ft)
51.709	2054.51	2053.17		2053.56	2056.95	2053.38	-1.13
51.682	2054.46	2053.01		2053.47	2056.91	2053.22	-1.24
51.656	2054.42	2052.94	2052.2	2053.42	2056.88	2053.12	-1.3
51.638	2054.38	2052.87		2053.34	2056.86	2053.04	-1.34
51.618	2054.36	2052.83		2053.29	2056.83	2052.97	-1.39
51.601	2054.26	2052.64		2053.15	2056.77	2052.8	-1.46
51.581	2054.20	2052.49		2053.08	2056.7	2052.64	-1.56
51.558	2054.12	2052.39	2051.64	2052.93	2056.63	2052.49	-1.63
51.536	2054.09	2052.28		2052.86	2056.58	2052.36	-1.73
51.516	2054.09	2052.19		2052.82	2056.54	2052.25	-1.84
51.497	2054.01	2051.96		2052.79	2056.45	2052.02	-1.99
51.477	2053.93	2051.9		2052.66	2056.43	2051.97	-1.96
51.453	2053.69	2051.43	2051.23	2052.13	2056.24	2051.43	-2.26
51.436	2053.60	2051.11		2052.02	2056.14	2051.18	-2.42
51.418	2053.58	2051.01		2051.93	2056.07	2051.11	-2.47
51.398	2053.42	2050.36	2050.82	2051.59	2055.71	2050.46	-2.96
51.375	2053.21	2048.84		2050.74	2054.98	2048.88	-4.33
51.355	2053.15	2046.62		2050.52	2054.91	2046.57	-6.58
51.345	2052.57	2046.59	2049.75	2050.41	2055	2046.59	-5.98
51.338		2046.46				2046.46	
51.331	2045.22	2044.17	2045.72	2045.58	2044.97	2044.97	-0.25
51.303	2042.82	2042.97		2043.18	2043.1	2043.1	0.28
51.275	2041.36	2041.4		2041.98	2041.98	2041.98	0.62
51.208	2039.39	2039.39	2040.17	2040.17	2040.17	2040.17	0.78
51.130	2037.45	2037.45	2037.62	2037.62	2037.62	2037.62	0.17

### HEC-RAS Output (Proposed Conditions)

River	River Sta	Q Total (cfs)	W.S. Elev (ft)	Crit W.S. (ft)	Vel Chnl (ft/s)	Top Width (ft)	Hydr Depth (ft)	Froude # Chl	Sta W.S. Lft (ft)	Sta W.S. Rgt (ft)
Hassayampa	53.16	71000	2088.32	2087.7	10.05	2506.09	3.74	0.78	1653.73	4178.82
Hassayampa	53.13	71000	2087.53	2086.5	8.84	2428.95	4.06	0.69	420.03	2874.91
Hassayampa	53.097	71000	2086.77	2085.74	8.49	2714.9	4.06	0.66	98.56	2850.59
Hassayampa	53.063	71000	2085.86	2084.81	8.88	2465.56	4.23	0.7	115.37	2742.21
Hassayampa	53.026	71000	2084.9	2083.77	8.6	2122.85	4.48	0.69	127.15	2309.52
Hassayampa	52.986	71000	2084.15	2082.38	7.34	2334.09	5.12	0.57	117.32	2451.4
Hassayampa	52.949	71000	2083.58	2081.7	7.58	2163.39	5.42	0.55	107.85	2365.42
Hassayampa	52.916	71000	2083.17	2081.11	7.55	1975.56	5.57	0.52	33.67	2009.23
Hassayampa	52.881	71000	2082.72	2080.36	7.59	1744.42	6.22	0.5	96.07	1840.49
Hassayampa	52.847	71000	2081.61	2080.36	10.08	1529.41	5.53	0.67	106.71	1666.31
Hassayampa	52.813	71000	2080.24	2079.65	11.92	1413.58	5.15	0.81	119.49	1569.04
Hassayampa	52.778	71000	2079.22	2078.36	11.4	1389.28	5.47	0.75	130.33	1546.42
Hassayampa	52.74	71000	2077.87	2077.17	12.02	1339.17	5.38	0.81	140.95	1507.54
Hassayampa	52.693	71000	2076.28	2075.83	12.27	1540.66	4.88	0.86	140.2	1689.92
Hassayampa	52.65	71000	2074.31	2074.14	12.72	1689.71	4.43	0.97	179.73	1891.18
Hassayampa	52.606	71000	2072.9	2071.96	9.76	1893.48	4.78	0.77	217.91	2142.34
Hassayampa	52.558	71000	2071.97	2070.65	8.88	1857.13	5.05	0.68	203.74	2060.87
Hassayampa	52.508	71000	2071.09	2069.33	8.18	1806.54	5.49	0.59	245.42	2234.28
Hassayampa	52.467	71000	2070.29	2068.64	8.63	1742	5.56	0.61	145.68	2055.61
Hassayampa	52.44	71000	2069.8	2068.09	8.55	1781.1	5.61	0.6	66.66	2010.74
Hassayampa	52.41	71000	2069.34	2067.46	8.36	1746.83	5.99	0.56	259.38	2153.49
Hassayampa	52.384	71000	2068.89	2067.09	8.58	1830.98	5.86	0.57	168.82	2141.38
Hassayampa	52.345	71000	2068.22	2066.24	8.67	1686.23	5.97	0.58	125.67	1951.54
Hassayampa	52.316	71000	2067.6	2065.88	9.3	1501.76	6.31	0.59	289.05	1922.22
Hassayampa	52.284	71000	2066.88	2065.64	10.26	1804.42	5.74	0.64	85.32	2019.42
Hassayampa	52.25	71000	2066.1	2064.8	10.84	1429.62	6.17	0.67	229.15	1786.14
Hassayampa	52.224	71000	2065.48	2064.22	11.19	1306.59	6.2	0.69	171.03	1609.5
Hassayampa	52.196	71000	2064.8	2063.67	11.29	1353.97	5.83	0.71	134.88	1618.01
Hassayampa	52.17	71000	2063.7	2063.05	12.52	1296.02	5.51	0.82	144.67	1601.65
Hassayampa	52.147	71000	2063.08	2062.27	12.02	1297.23	5.72	0.78	186.98	1612.82
Hassayampa	52.121	71000	2062.02	2061.63	12.89	1301.44	5.33	0.86	192.91	1624.96
Hassayampa	52.1	71000	2061.11	2060.86	12.98	1324.07	5.13	0.89	181.59	1637.43
Hassayampa	52.078	71000	2060.5	2059.99	12.1	1347.88	5.28	0.83	180.96	1660.29
Hassayampa	52.054	71000	2059.91	2058.92	10.88	1619.13	5.5	0.75	153.88	1905.38
Hassayampa	52.029	71000	2059.18	2058.32	10.97	1665.96	5.33	0.77	116.88	1916.09
Hassayampa	52.006	71000	2058.79	2057.44	9.92	1886.58	5.66	0.69	108.11	2206.29
Hassayampa	51.983	71000	2058.18	2057.05	10.24	1961.51	5.45	0.72	132.74	2227.16
Hassayampa	51.957	71000	2057.75	2056.14	9.41	1943.12	5.91	0.64	162.52	2243.61
Hassayampa	51.932	71000	2057.33	2055.56	9.16	1813.19	6.11	0.61	116.96	2066.9
Hassayampa	51.895	71000	2056.53	2054.98	9.82	1640.43	6.09	0.63	103.05	1884.84
Hassayampa	51.854	71000	2055.51	2054.25	10.71	1553.05	5.98	0.68	195.05	1877.68
Hassayampa	51.829	71000	2055.03	2053.55	10.34	1447	6.27	0.66	79.98	1659.04
Hassayampa	51.807	71000	2054.42	2053.09	10.64	1548.57	6.17	0.69	204.42	2019.63

River	River Sta	Q Total (cfs)	W.S. Elev (ft)	Crit W.S. (ft)	Vel Chnl (ft/s)	Top Width (ft)	Hydr Depth (ft)	Froude # Chl	Sta W.S. Lft (ft)	Sta W.S. Rgt (ft)
Hassayampa	51.782	71000	2054	2052.28	9.93	1439.09	6.5	0.63	210.78	1785.5
Hassayampa	51.757	71000	2053.61	2051.73	9.58	1437.61	6.58	0.6	213.09	1787.39
Hassayampa	51.734	71000	2053.4	2051.06	8.62	1623.94	6.6	0.52	55.86	1816.44
Hassayampa	51.709	71000	2053.17	2050.33	7.91	1623.43	7.4	0.47	117.57	1876.37
Hassayampa	51.682	71000	2053.01	2049.57	7.18	1888.58	7.93	0.42	58.73	2078.06
Hassayampa	51.656	71000	2052.94	2048.77	6.37	2021.42	8.38	0.36	167.02	2312.22
Hassayampa	51.638	71000	2052.87	2048.36	6.08	2064.36	8.69	0.34	212.69	2397.56
Hassayampa	51.618	71000	2052.83	2047.68	5.67	2267.1	9.22	0.31	212.61	3074.76
Hassayampa	51.601	71000	2052.64	2047.66	6.29	2265.79	8.8	0.34	234.57	3071.47
Hassayampa	51.581	71000	2052.49	2047.32	6.61	2286.41	9.31	0.35	113.44	2941.49
Hassayampa	51.558	71000	2052.39	2046.92	6.65	2137.67	9.74	0.35	217.43	2820.36
Hassayampa	51.536	71000	2052.28	2046.44	6.68	2334.2	10.3	0.34	245.56	2692.32
Hassayampa	51.516	71000	2052.19	2046.08	6.63	2096.53	10.75	0.33	279.91	2489.48
Hassayampa	51.497	71000	2051.96	2046.58	7.36	1849.42	10.62	0.36	312.38	2240.29
Hassayampa	51.477	71000	2051.9	2045.4	6.92	1861.4	11.67	0.33	261.04	2200.94
Hassayampa	51.453	71000	2051.43	2046.01	7.91	1813.95	10.78	0.38	257.85	2183.01
Hassayampa	51.436	71000	2051.11	2046.1	8.54	1782.95	11.07	0.41	244.85	2155.92
Hassayampa	51.418	71000	2051.01	2045.12	8.24	1650.5	12.69	0.39	269.35	2101.43
Hassayampa	51.398	71000	2050.36	2045.11	9.67	1470.97	12.9	0.46	257.66	1858.15
Hassayampa	51.375	71000	2048.84	2045.42	12.2	470.76	12.36	0.61	821.39	1292.15
Hassayampa	51.37	Proposed Bridge								
Hassayampa	51.355	71000	2046.62	2044.89	14.18	470.76	10.63	0.77	821.39	1292.15
Hassayampa	51.345	71000	2046.59	2043.92	13.16	459.33	11.75	0.68	1086.27	1545.6
Hassayampa	51.338	71000	2046.46	2043.67	13.06	462.6	11.75	0.67	1083	1545.6
Hassayampa	51.335	1962 Bridge								
Hassayampa	51.331	71000	2044.17	2043.91	16.51	462.6	9.29	0.95	1083	1545.6
Hassayampa	51.303	71000	2042.97	2042.97	16.73	1288.1	8.13	0.95	258.16	1549.87
Hassayampa	51.275	71000	2041.4	2041.4	16.3	1378	7.67	0.95	264.89	2208.05
Hassayampa	51.208	71000	2039.39	2038.95	14.56	1878.2	6.48	0.85	1358.32	3315.63
Hassayampa	51.13	71000	2037.45	2036.61	12.31	1622.71	5.04	0.79	1425.3	3048

### Floodway Data

Flooding Source	Floodway			Base Flood Water Surface Elevation <sup>1</sup>		
	Cross-Section	Width (ft)	Section Area (sq ft)	Mean Velocity (ft/s)	Floodway <sup>2</sup> (ft)	Floodplain <sup>2</sup> (ft)
53.160	1701.96	8567.5	8.3	2089.11	2088.32	0.80
53.130	1640.7	8961.4	7.9	2088.45	2087.53	0.93
53.097	1512.5	8525.8	8.3	2087.65	2086.77	0.88
53.063	1446.9	8136.9	8.7	2086.80	2085.86	0.94
53.026	1411.1	7635.5	9.3	2085.63	2084.90	0.73
52.986	1507.7	8326.9	8.5	2084.67	2084.15	0.52
52.949	1519.6	8642.6	8.2	2083.92	2083.58	0.34
52.916	1514.8	8856.8	8.0	2083.33	2083.17	0.16
52.881	1490.3	9371.1	7.6	2082.83	2082.72	0.10
52.847	1365.7	7850.2	9.0	2081.68	2081.61	0.07
52.813	1281.1	7084.0	10.0	2080.41	2080.24	0.17
52.778	1270.3	7189.7	9.9	2079.28	2079.22	0.06
52.740	1238.8	7061.8	10.1	2078.04	2077.87	0.17
52.693	1344.8	6906.2	10.3	2076.33	2076.28	0.05
52.650	1471.6	6583.0	10.8	2074.32	2074.31	0.01
52.606	1641.4	8106.4	8.8	2072.97	2072.90	0.07
52.558	1692.1	9071.0	7.8	2072.16	2071.97	0.19
52.508	1660.6	9439.1	7.5	2071.27	2071.09	0.18
52.467	1594.2	9295.8	7.6	2070.52	2070.29	0.23
52.440	1570.7	9324.0	7.6	2070.03	2069.80	0.23
52.410	1529.0	9464.2	7.5	2069.56	2069.34	0.22
52.384	1483.1	8961.7	7.9	2068.98	2068.89	0.09
52.345	1414.0	8986.9	7.9	2068.32	2068.22	0.10
52.316	1363.7	8759.8	8.1	2067.72	2067.60	0.12
52.284	1314.3	8056.2	8.8	2066.87	2066.88	0.00
52.250	1265.7	7983.4	8.9	2066.14	2066.10	0.04
52.224	1238.1	7936.4	9.0	2065.56	2065.48	0.08
52.196	1214.3	7659.9	9.3	2064.87	2064.80	0.07
52.170	1159.4	6842.6	10.4	2063.77	2063.70	0.07
52.147	1179.0	7105.6	10.0	2063.16	2063.08	0.08
52.121	1187.1	6773.8	10.5	2062.22	2062.02	0.20
52.100	1184.3	6742.0	10.5	2061.48	2061.11	0.36
52.078	1212.2	7279.6	9.8	2061.04	2060.50	0.54
52.054	1217.5	7777.1	9.1	2060.57	2059.91	0.66
52.029	1228.5	7538.6	9.4	2059.86	2059.18	0.69
52.006	1239.0	7770.6	9.1	2059.40	2058.79	0.61
51.983	1244.4	7286.6	9.7	2058.62	2058.18	0.44
51.957	1234.4	7754.6	9.2	2058.12	2057.75	0.37
51.932	1241.0	8079.4	8.8	2057.66	2057.33	0.33
51.895	1220.8	7645.2	9.3	2056.64	2056.53	0.11
51.854	1189.3	7405.1	9.6	2055.56	2055.51	0.05
51.829	1200.3	7609.1	9.3	2055.02	2055.03	0.00

Flooding Source	Floodway			Base Flood Water Surface Elevation <sup>1</sup>		
	Cross-Section	Width (ft)	Section Area (sq ft)	Mean Velocity (ft/s)	Floodway <sup>2</sup> (ft)	Floodplain <sup>2</sup> (ft)
51.807	1215.6	7687.9	9.2	2054.49	2054.42	0.07
51.782	1264.1	8430.3	8.4	2054.12	2054.00	0.12
51.757	1332.2	9037.0	7.9	2053.80	2053.61	0.19
51.734	1372.1	9860.5	7.2	2053.58	2053.40	0.18
51.709	1358.1	10505.7	6.8	2053.38	2053.17	0.21
51.682	1350.3	11289.3	6.3	2053.22	2053.01	0.21
51.656	1356.3	12218.0	5.8	2053.12	2052.94	0.18
51.638	1337.7	12499.3	5.7	2053.04	2052.87	0.17
51.618	1292.4	12991.1	5.5	2052.97	2052.83	0.14
51.601	1238.1	12210.8	5.8	2052.80	2052.64	0.16
51.581	1154.2	12081.0	5.9	2052.64	2052.49	0.15
51.558	1060.5	11668.6	6.1	2052.49	2052.39	0.10
51.536	999.2	11553.8	6.2	2052.36	2052.28	0.08
51.516	965.9	11472.7	6.2	2052.25	2052.19	0.07
51.497	958.2	10937.7	6.5	2052.02	2051.96	0.06
51.477	938.1	11689.8	6.1	2051.97	2051.90	0.07
51.453	877.4	9826.9	7.2	2051.43	2051.43	0.00
51.436	804.3	9202.9	7.7	2051.18	2051.11	0.07
51.418	737.3	9438.6	7.5	2051.11	2051.01	0.10
51.398	607.4	7896.6	9.0	2050.46	2050.36	0.10
51.375	463.9	5763.4	12.3	2048.88	2048.84	0.03
51.370	Proposed Bridge					
51.355	463.9	4934.3	14.4	2046.57	2046.62	0.00
51.345	459.3	5396.3	13.2	2046.59	2046.59	0.00
51.338	462.6	5435.1	13.1	2046.46	2046.46	0.00
51.335	1962 Bridge					
51.331	462.6	4734.5	15.2	2044.97	2044.17	0.79
51.303	525.6	4513.5	15.7	2043.10	2042.97	0.13
51.275	539.6	4697.7	15.1	2041.98	2041.40	0.58
51.208	722.3	5833.6	12.2	2040.17	2039.39	0.78
51.130	935.0	6087.6	11.7	2037.62	2037.45	0.17

<sup>1</sup>Vertical Datum: NGVD 1929

<sup>2</sup> As reported by HEC-RAS except that negative surcharges were converted to zero surcharge. The difference between the floodway and floodplain elevations may differ from surcharge due to rounding errors.



**F Erosion and Sediment Transport Analysis  
Supporting Documentation**

5035 South 33<sup>rd</sup> Street, Phoenix AZ 85040 ♦ Phone 602/243-1600 ♦ Fax 602/243-2699 ♦ www.ninyoandmoore.com

To: Mr. George Wallace, P.E.

Date: May 28, 2004

Firm: Jacobs Civil, Inc.

Fax No:

Address: 825 W. Elliot Road, Suite 201 Tempe, Arizona 85284

Telephone No:

From: John Niedzielski

Total Pages Including Transmittal:

Subject: Sieve Analysis Results

Project No: 600503001

Urgent       For Approval       For Your Use       Please Reply       As Requested  
Original Document:       Will Not Follow       Will Follow       By U.S. Mail       By Other

George,

Leo Kreyborg of West Consultants asked at the progress meeting last week if he could get a copy of the available sieve analysis results performed by Ninyo and Moore. Therefore, we have enclosed 3 copies of sieve analysis results performed on boring samples within the Hassayampa River and Sols Wash areas. Borings B-3, B-9 and B-14 were drilled at the abutments and Pier 3 of the proposed Hassayampa River bridge, and borings B-18 and B-22 were drilled at the abutments for the proposed Sols Wash structure. Hand samples HS-1 through HS-4 were taken from Sols Wash and the Hassayampa River bed at locations determined by West Consultants. The approximate stations and surface elevations at the boring locations are indicated below:

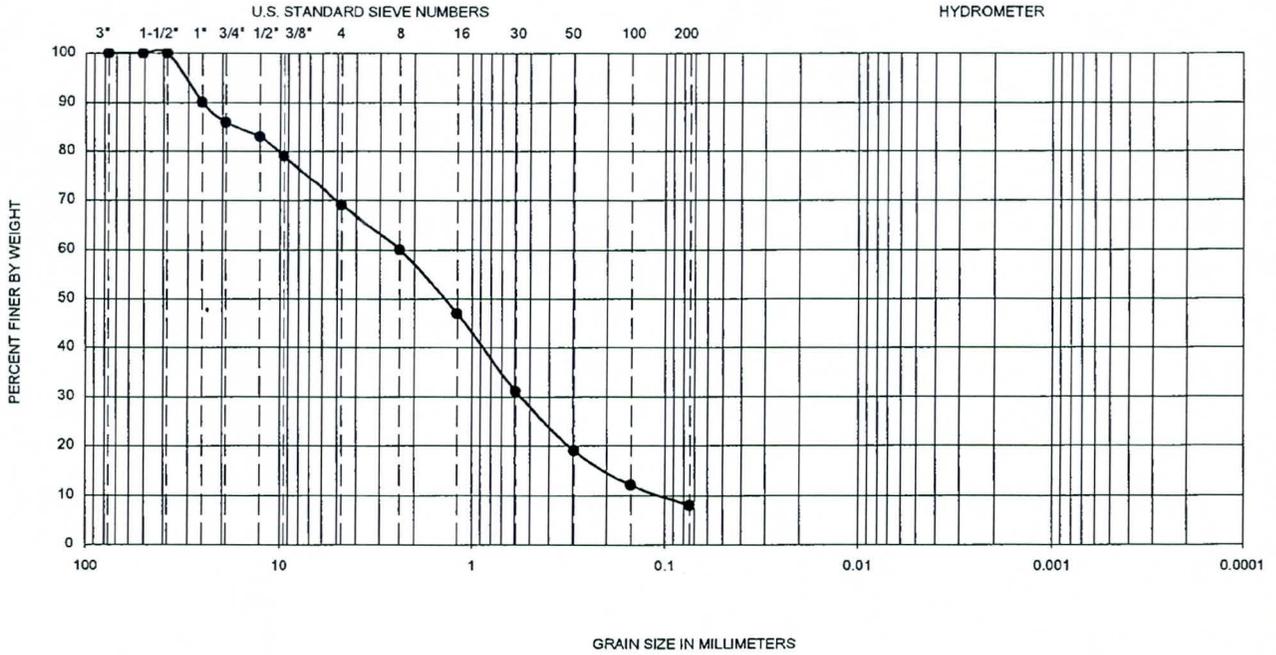
<u>Boring No.</u>	<u>Location</u>	<u>Station/Offset</u>	<u>Surface Elevation</u>
B-3	Abut. 1	104+30±/45' R±	2051±
B-9	Pier 3	107+49±/50' R±	2037±
B-14	Abut. 2	108+90±/60' L±	2036±
B-18	Abut. 1 (Sols)	114+20±/0' ±	2046±
B-22	Abut. 2 (Sols)	116+76±/34' R±	2042±

Please call if you have any questions.

John C. Niedzielski, P.E.

- Geotechnical Engineering
- Engineering Geology
- Materials Testing and Inspection
- Construction Management
- Engineering Design
- Environmental Engineering
- Environmental Site Assessments
- Regulatory Compliance and Permitting
- Water Quality and Resource Evaluations
- Hazardous Waste Management
- Soil and Groundwater Remediation
- Asbestos and Lead-Based Paint Surveys
- Geophysical Studies
- Mineral Resource Evaluations
- Value Engineering
- Forensic Studies
- Expert Witness Testimony

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay



Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D <sub>10</sub>	D <sub>30</sub>	D <sub>60</sub>	C <sub>u</sub>	C <sub>c</sub>	Passing No. 200 (%)	U.S.C.S
●	B-3	33.5-35	--	NP	NP	0.12	0.56	2.40	20.0	1.1	8	SW-SM

**DRAFT**

NP INDICATES NON-PLASTIC IN ATTERBERG LIMITS TEST  
 PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63

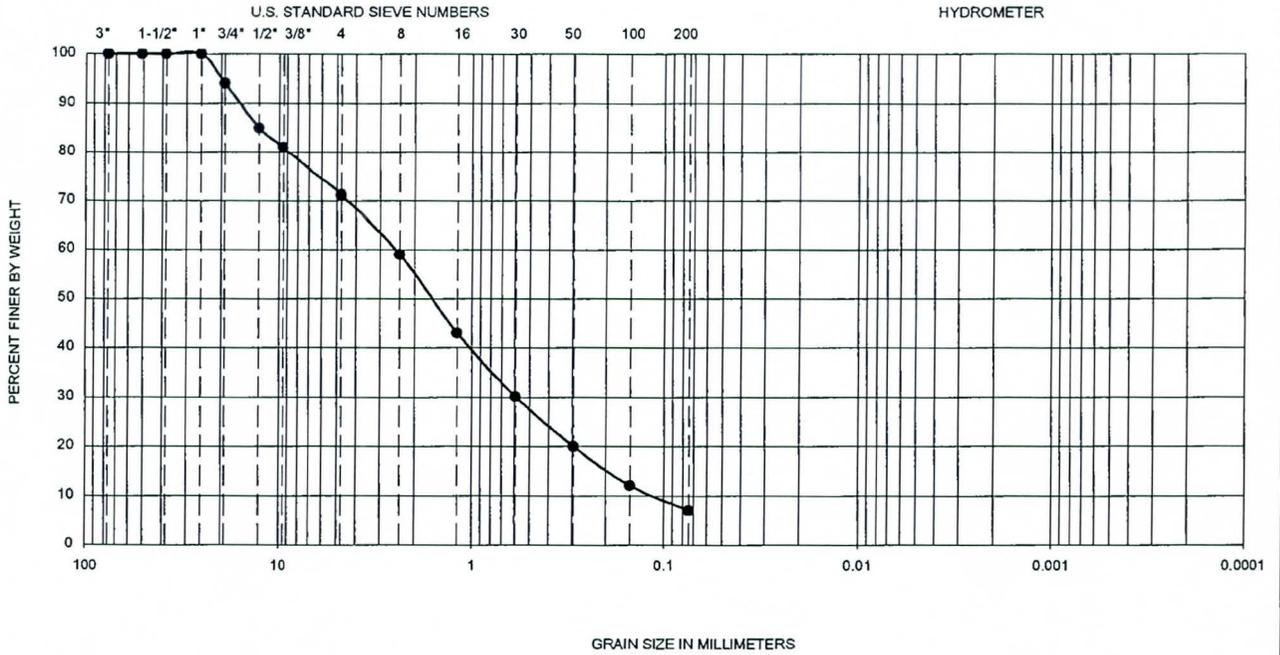


**GRADATION TEST RESULTS**  
 WICKENBURG INTERIM BYPASS (US-93)  
 WICKENBURG, ARIZONA

PROJECT NO.	DATE
600503001	05/04

FIGURE  
 B-X

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay



Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D <sub>10</sub>	D <sub>30</sub>	D <sub>60</sub>	C <sub>u</sub>	C <sub>c</sub>	Passing No. 200 (%)	U.S.C.S
●	B-9	18.5-20	--	NP	NP	0.12	0.60	2.60	21.7	1.2	7	SW-SM

**DRAFT**

NP INDICATES NON-PLASTIC IN ATTERBERG LIMITS TEST  
 PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63

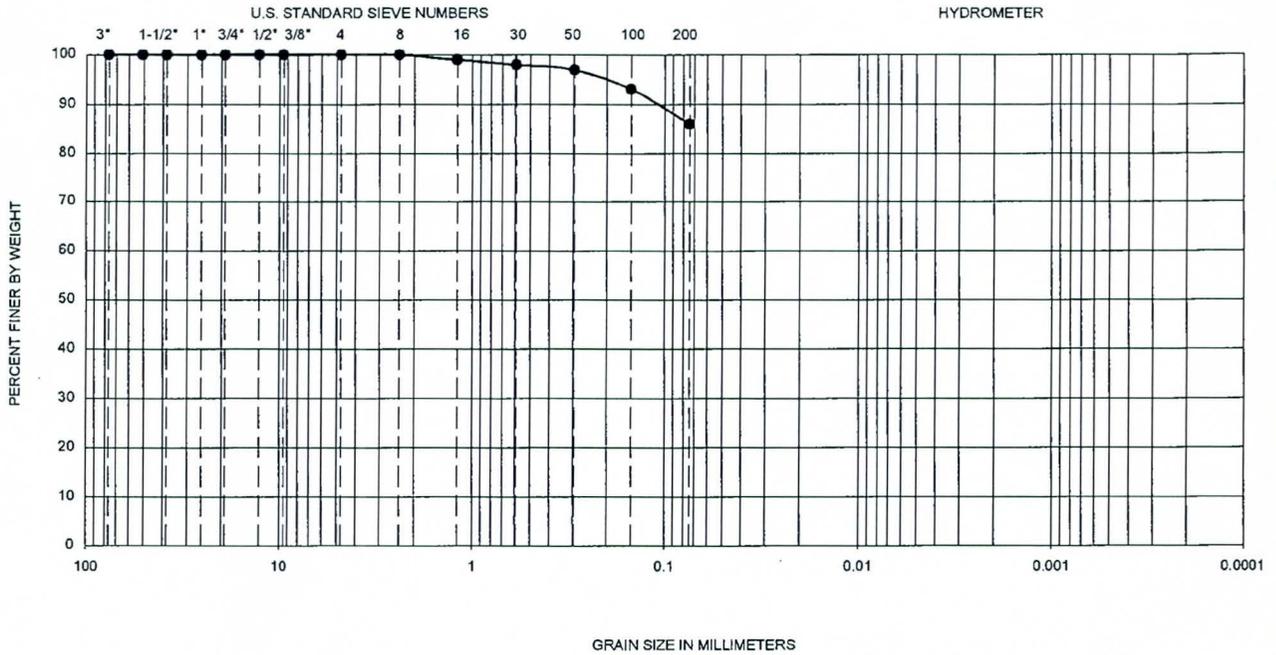


**GRADATION TEST RESULTS**  
 WICKENBURG INTERIM BYPASS (US-93)  
 WICKENBURG, ARIZONA

PROJECT NO.	DATE
600503001	05/04

FIGURE  
 B-X

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay



Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D <sub>10</sub>	D <sub>30</sub>	D <sub>60</sub>	C <sub>u</sub>	C <sub>c</sub>	Passing No. 200 (%)	U.S.C.S
●	B-14	23.5-25	41	23	18	--	--	--	--	--	86	CL

**DRAFT**

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63

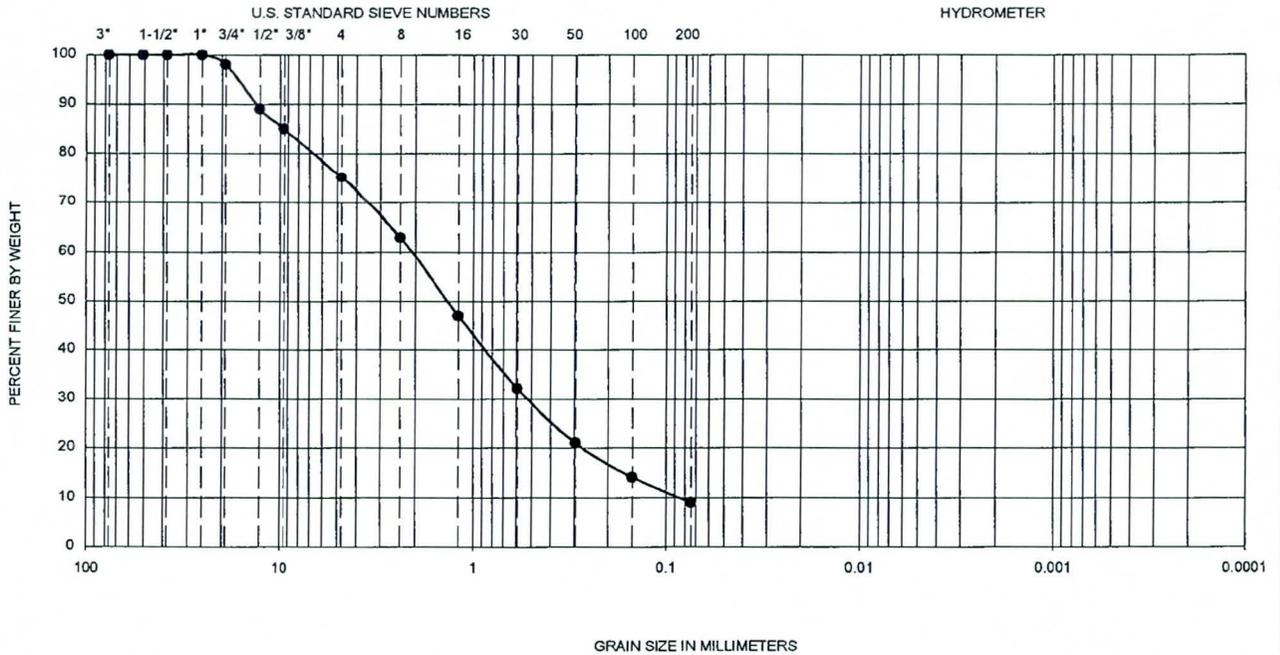


**GRADATION TEST RESULTS**  
 WICKENBURG INTERIM BYPASS (US-93)  
 WICKENBURG, ARIZONA

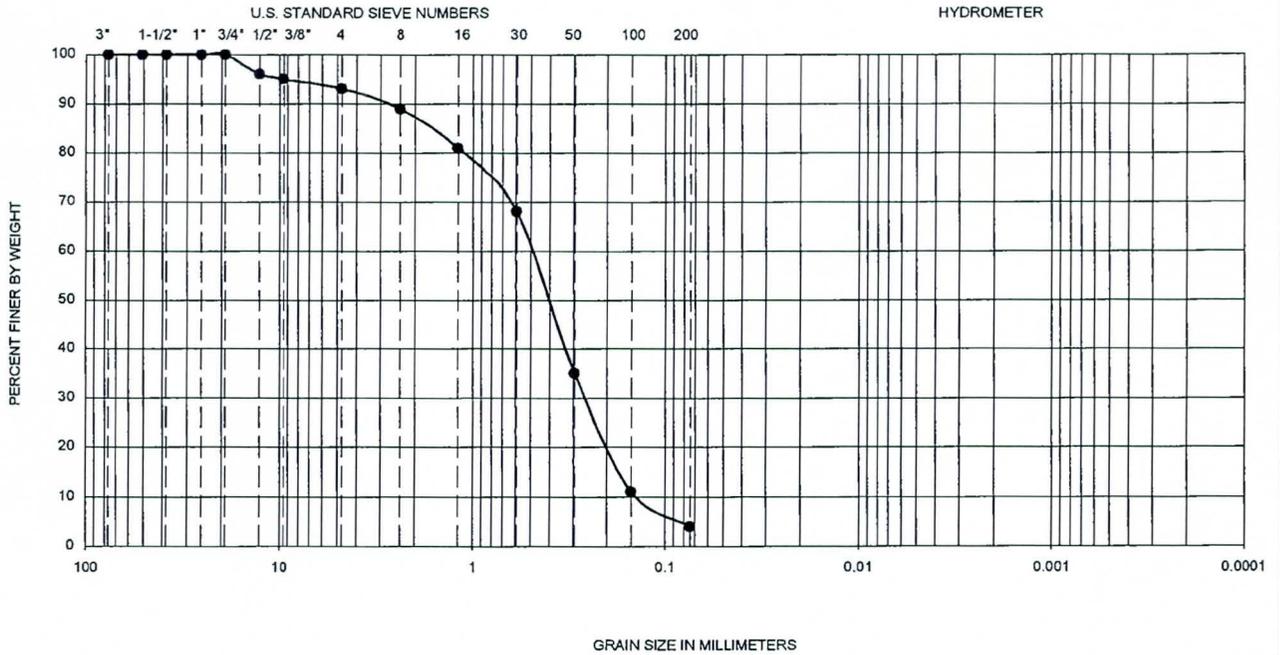
PROJECT NO.	DATE
600503001	05/04

FIGURE  
B-X

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay



GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay



Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D <sub>10</sub>	D <sub>30</sub>	D <sub>60</sub>	C <sub>u</sub>	C <sub>c</sub>	Passing No. 200 (%)	U.S.C.S
●	B-22	3.5-5	--	NP	NP	0.16	0.27	0.49	3.1	0.9	4	SP

**DRAFT**

NP INDICATES NON-PLASTIC ON ATTERBERG LIMITS TEST  
 PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63

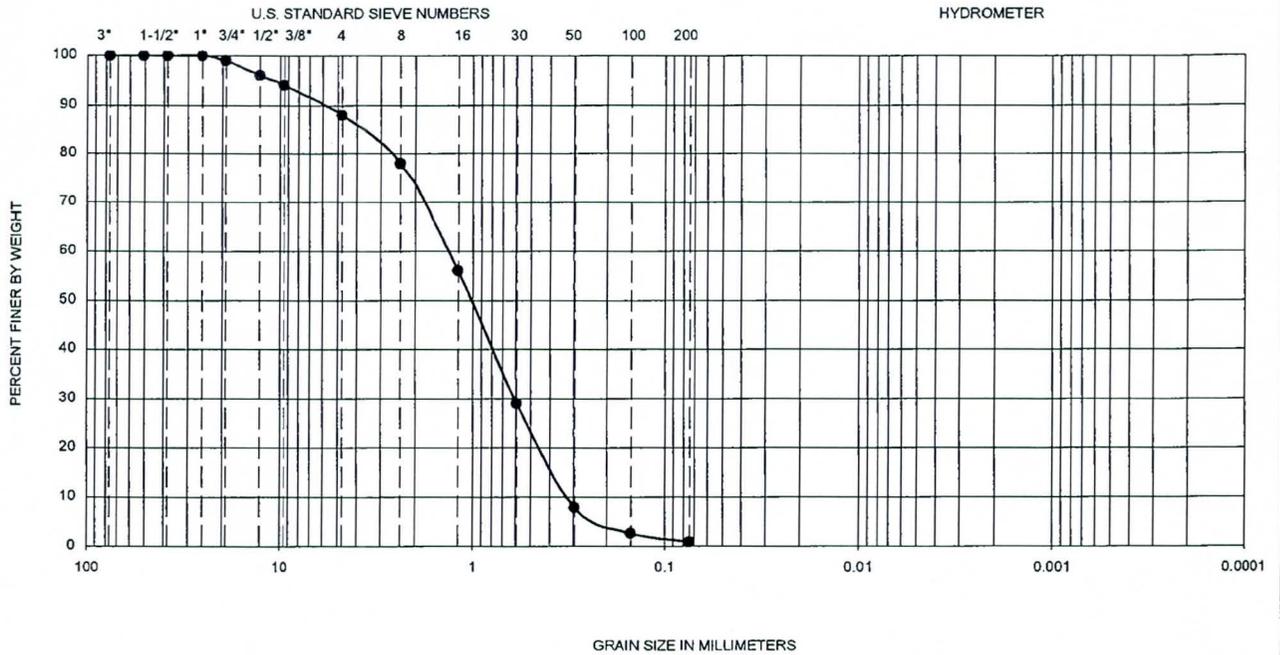


**GRADATION TEST RESULTS**  
 WICKENBURG INTERIM BYPASS (US-93)  
 WICKENBURG, ARIZONA

PROJECT NO.	DATE
600503001	05/04

FIGURE  
 B-X

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay



Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D <sub>10</sub>	D <sub>30</sub>	D <sub>60</sub>	C <sub>u</sub>	C <sub>c</sub>	Passing No. 200 (%)	U.S.C.S
●	HS-1	0-3	--	--	--	0.32	0.60	1.40	4.4	0.8	1	SP

**DRAFT**

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-98



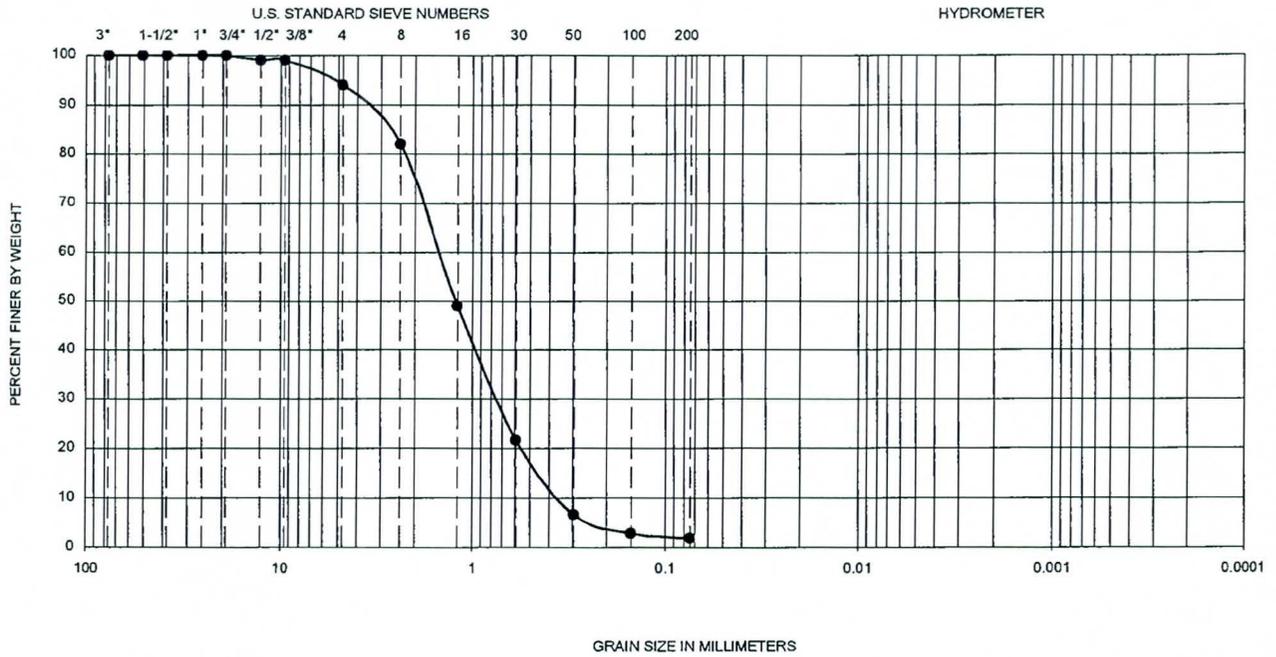
**GRADATION TEST RESULTS**  
 WICKENBURG INTERIM BYPASS (US-93)  
 WICKENBURG, ARIZONA

PROJECT NO. 600503001	DATE 05/04
--------------------------	---------------

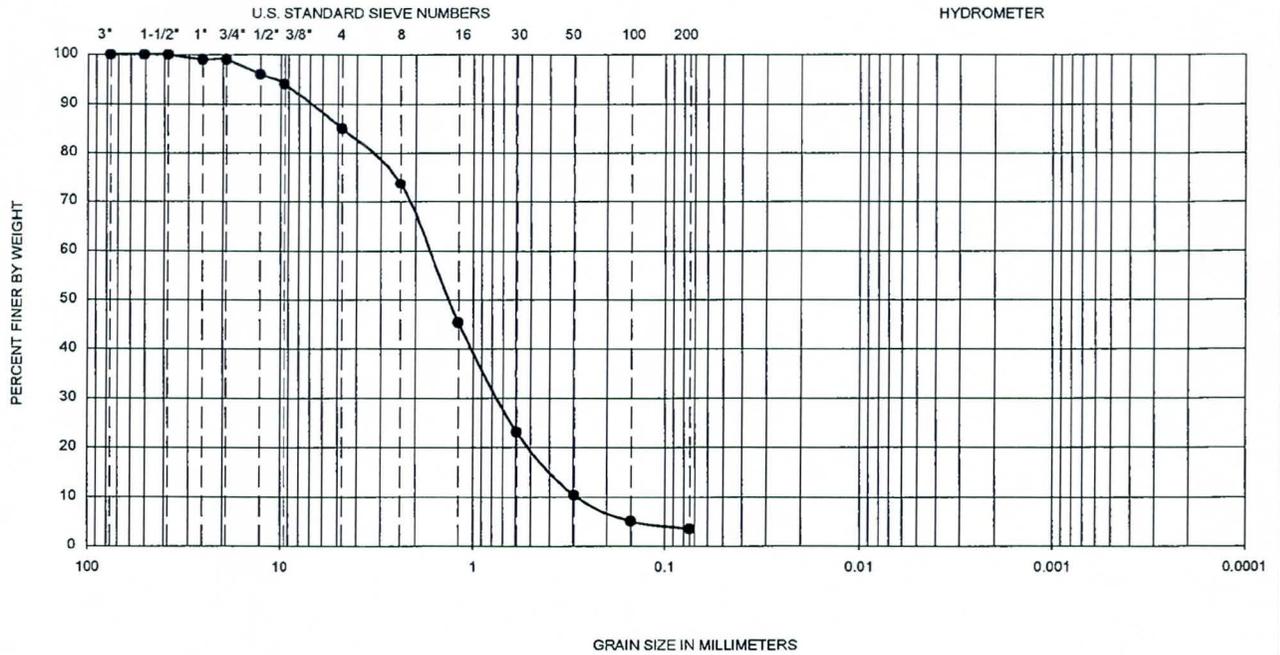
FIGURE  
B-X



GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay



GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay



Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D <sub>10</sub>	D <sub>30</sub>	D <sub>60</sub>	C <sub>u</sub>	C <sub>c</sub>	Passing No. 200 (%)	U.S.C.S
●	HS-3	3-5	--	--	--	0.29	0.77	1.70	5.9	1.2	3	SP

**DRAFT**

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-98



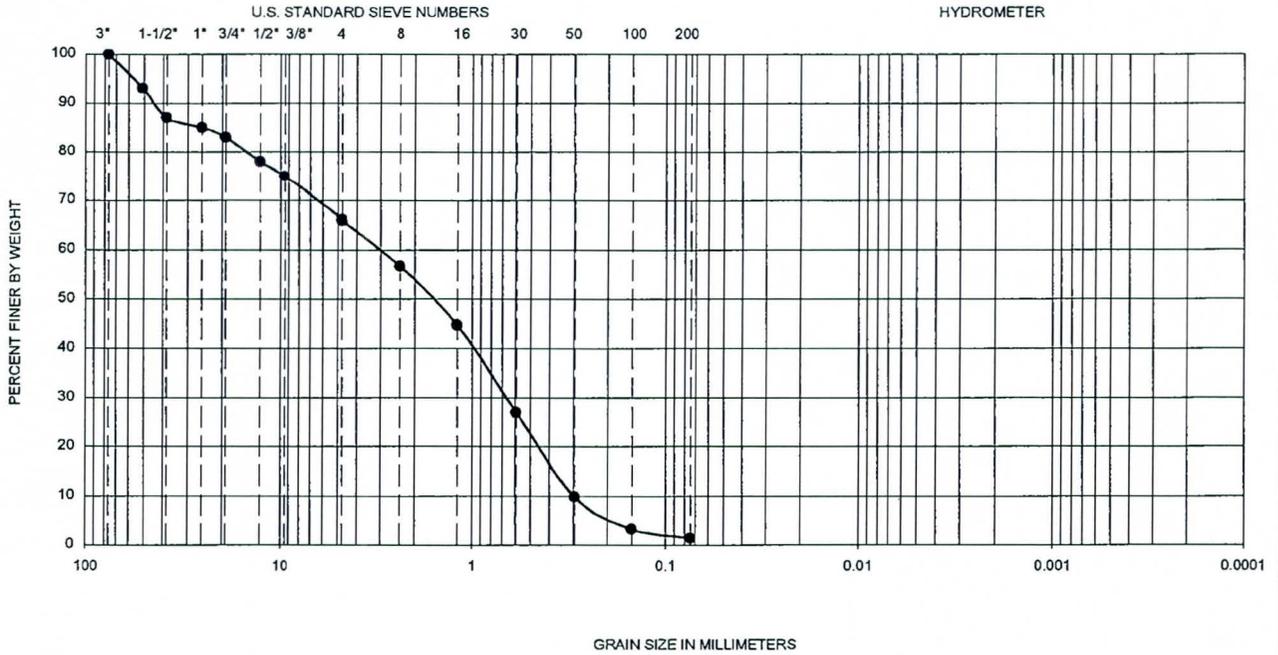
**GRADATION TEST RESULTS**  
 WICKENBURG INTERIM BYPASS (US-93)  
 WICKENBURG, ARIZONA

PROJECT NO.  
600503001

DATE  
05/04

FIGURE  
B-X

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay



Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D <sub>10</sub>	D <sub>30</sub>	D <sub>60</sub>	C <sub>u</sub>	C <sub>c</sub>	Passing No. 200 (%)	U.S.C.S
●	HS-4	0-3	--	--	--	0.30	0.68	3.00	10.0	0.5	1	SP

**DRAFT**

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-98

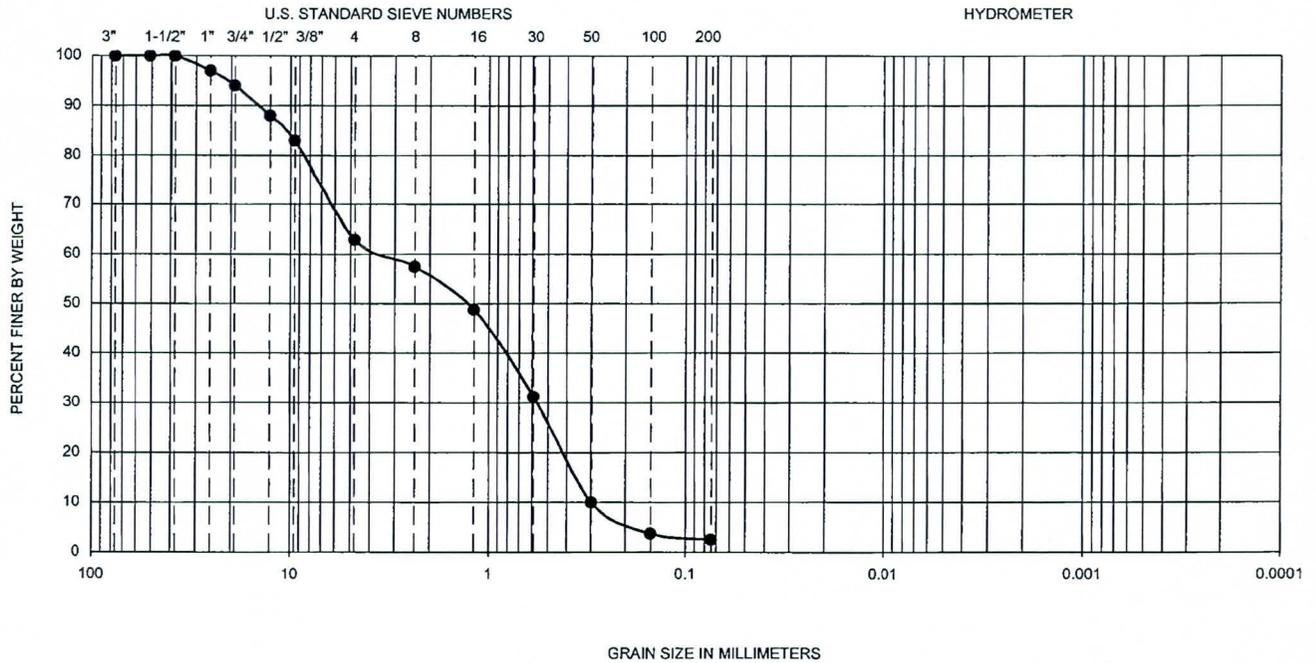


**GRADATION TEST RESULTS**  
 WICKENBURG INTERIM BYPASS (US-93)  
 WICKENBURG, ARIZONA

PROJECT NO.	DATE
600503001	05/04

FIGURE  
B-X

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay



Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D <sub>10</sub>	D <sub>30</sub>	D <sub>60</sub>	C <sub>u</sub>	C <sub>c</sub>	Passing No. 200 (%)	U.S.C.S
●	HS-5	0-3	--	--	--	0.30	0.48	3.60	12.0	0.2	3	SP

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-98

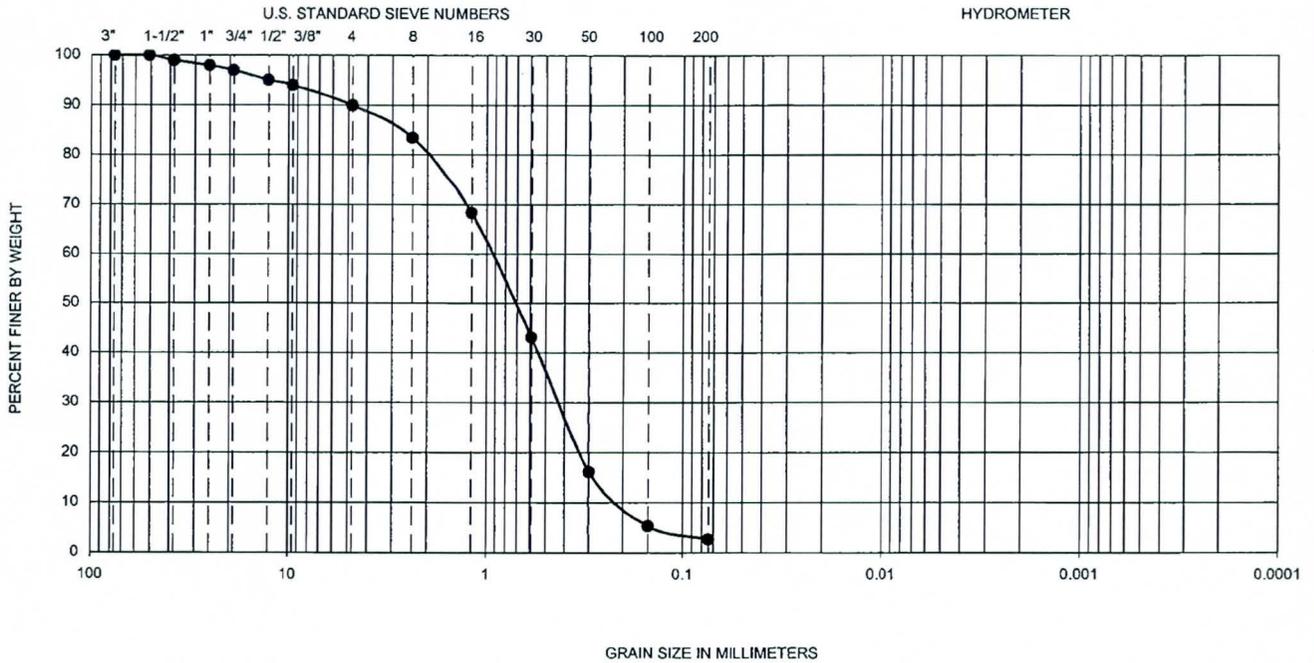


**GRADATION TEST RESULTS**  
**WICKENBURG INTERIM BYPASS (US-93)**  
**WICKENBURG, ARIZONA**

PROJECT NO.	DATE
600503001	06/04

FIGURE  
B-X

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay



Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D <sub>10</sub>	D <sub>30</sub>	D <sub>60</sub>	C <sub>u</sub>	C <sub>c</sub>	Passing No. 200 (%)	U.S.C.S
●	HS-6	0-3	--	--	--	0.22	0.43	0.91	4.1	0.9	3	SP

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-98

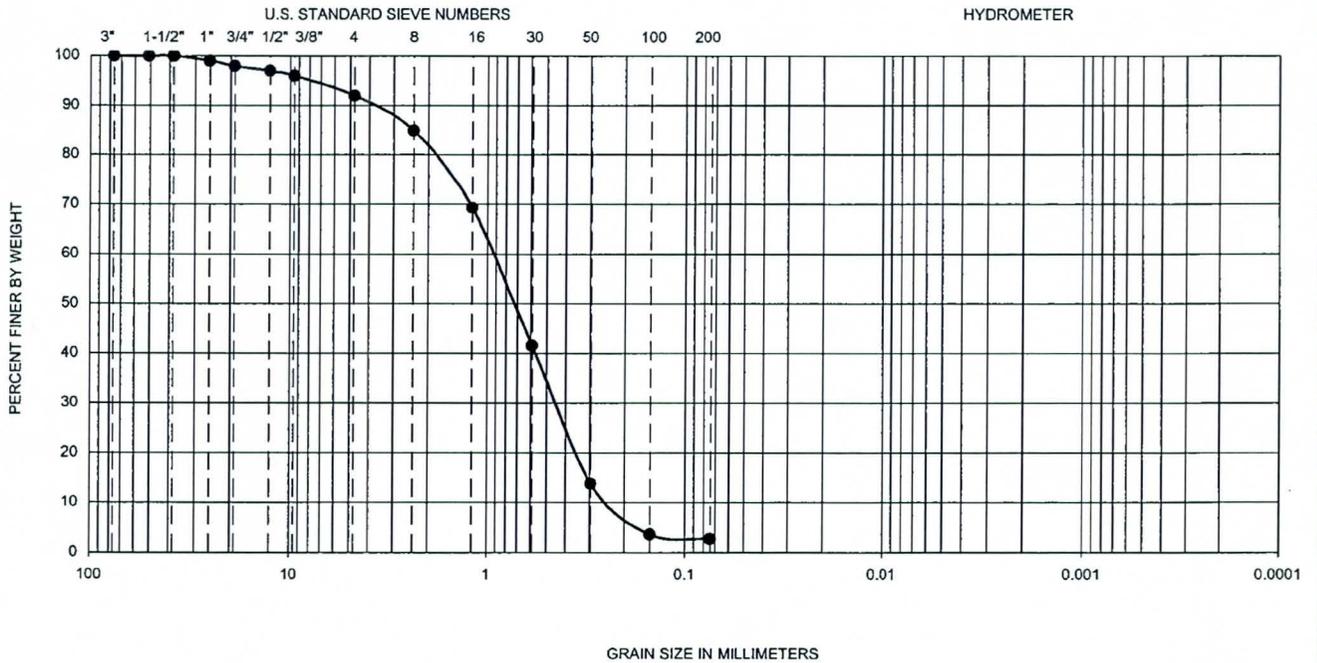


**GRADATION TEST RESULTS**  
**WICKENBURG INTERIM BYPASS (US-93)**  
**WICKENBURG, ARIZONA**

PROJECT NO.	DATE
600503001	06/04

FIGURE  
B-X

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay



Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D <sub>10</sub>	D <sub>30</sub>	D <sub>60</sub>	C <sub>u</sub>	C <sub>c</sub>	Passing No. 200 (%)	U.S.C.S
●	HS-7	0-3	--	--	--	0.26	0.45	0.91	3.5	0.9	3	SP

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-98

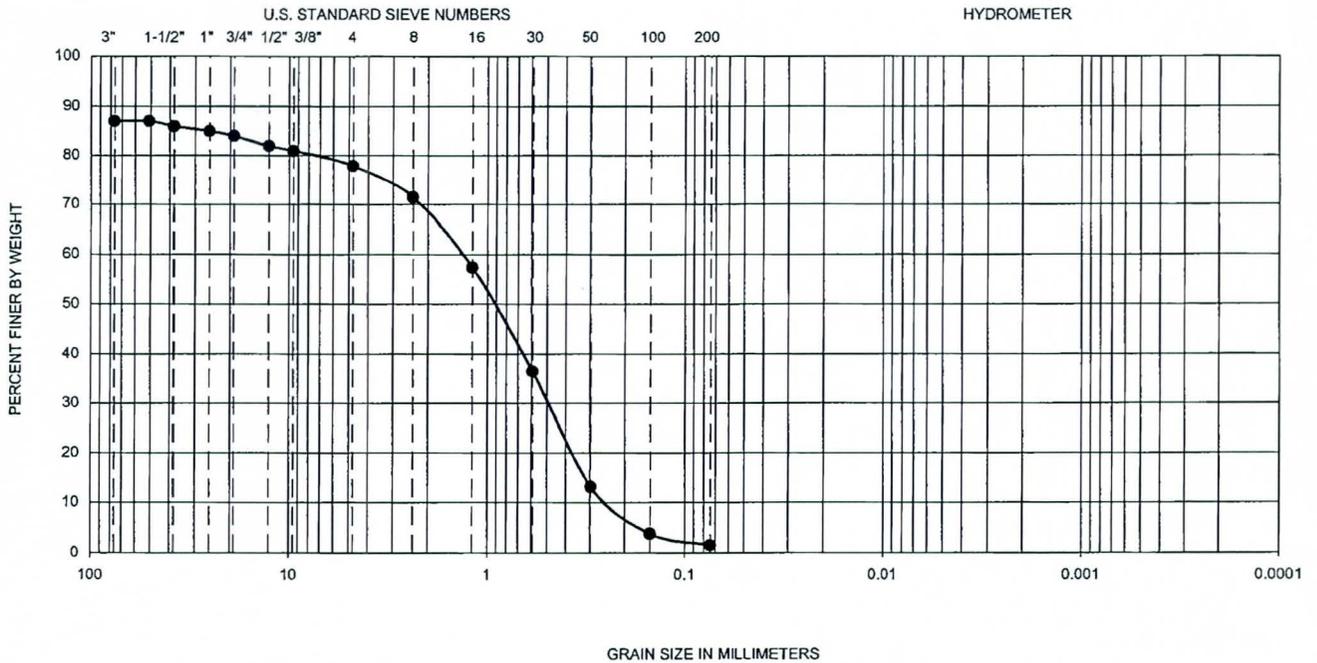


**GRADATION TEST RESULTS**  
**WICKENBURG INTERIM BYPASS (US-93)**  
**WICKENBURG, ARIZONA**

PROJECT NO.	DATE
600503001	06/04

FIGURE  
B-X

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay



Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D <sub>10</sub>	D <sub>30</sub>	D <sub>60</sub>	C <sub>u</sub>	C <sub>c</sub>	Passing No. 200 (%)	U.S.C.S
●	HS-8	0-3	--	--	--	0.26	0.49	1.30	5.0	0.7	2	SP

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-98

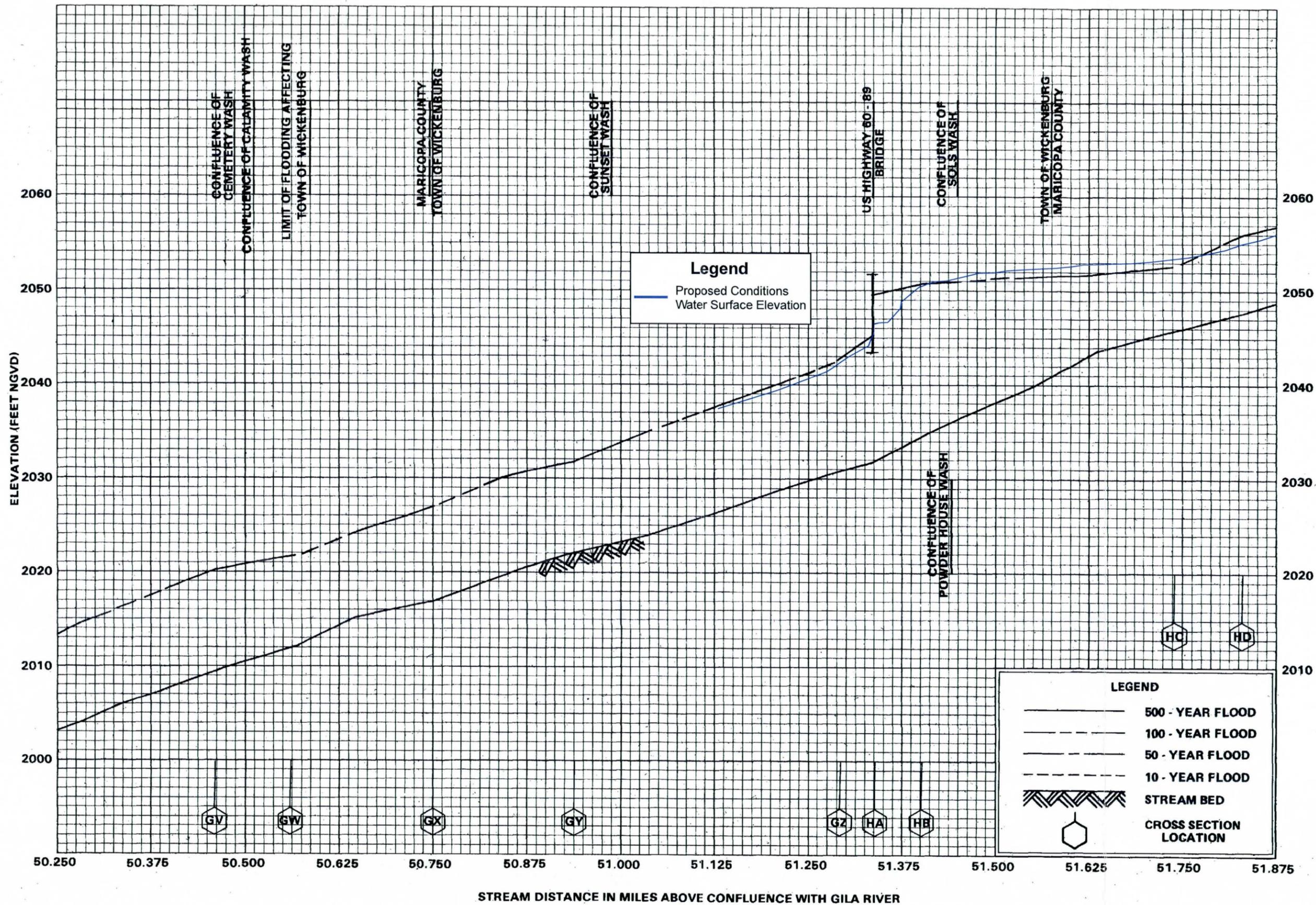


**GRADATION TEST RESULTS**  
**WICKENBURG INTERIM BYPASS (US-93)**  
**WICKENBURG, ARIZONA**

PROJECT NO.	DATE
600503001	06/04

FIGURE  
B-X

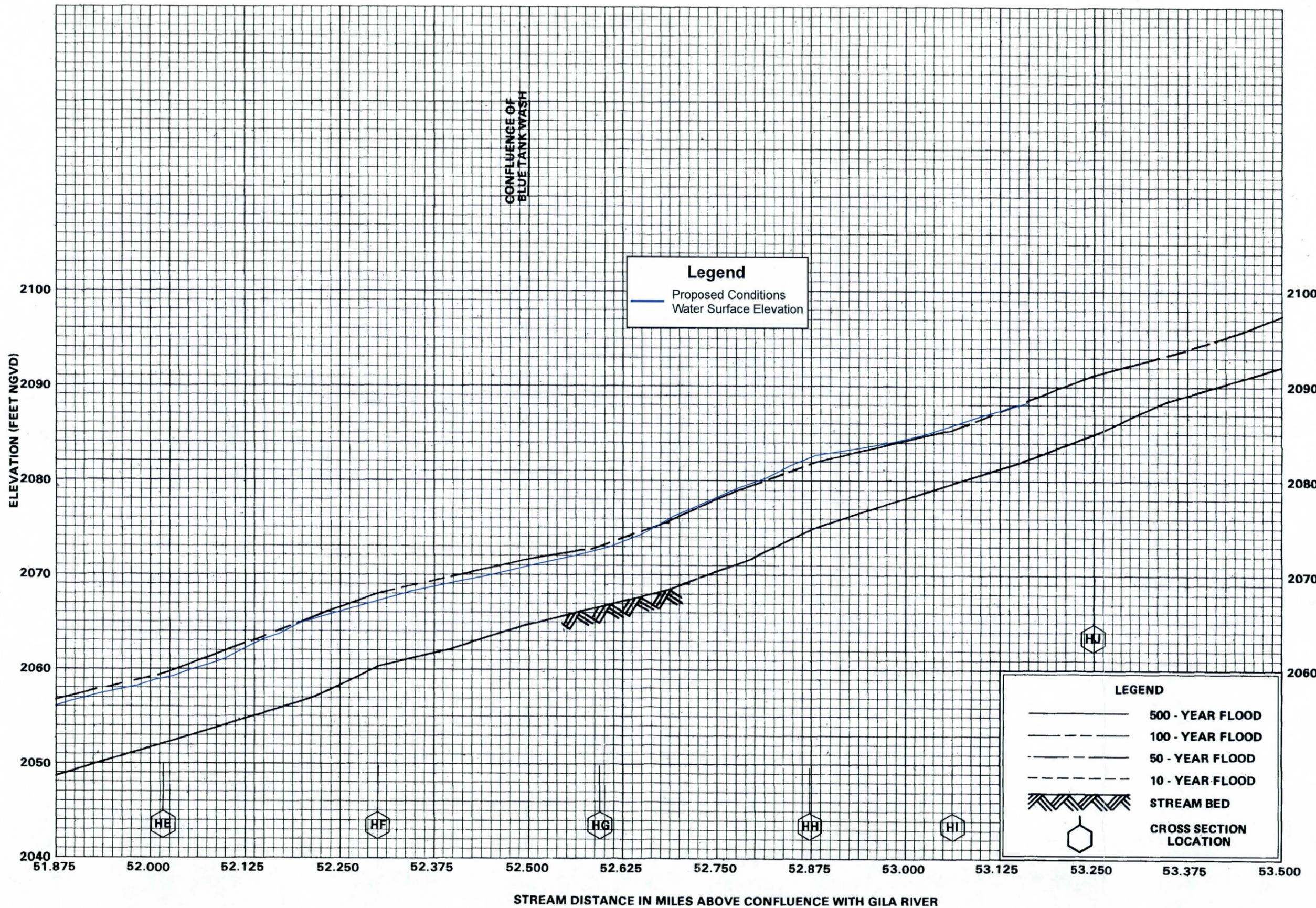




**ANNOTATED FLOOD PROFILE**

**HASSAYAMPA RIVER**

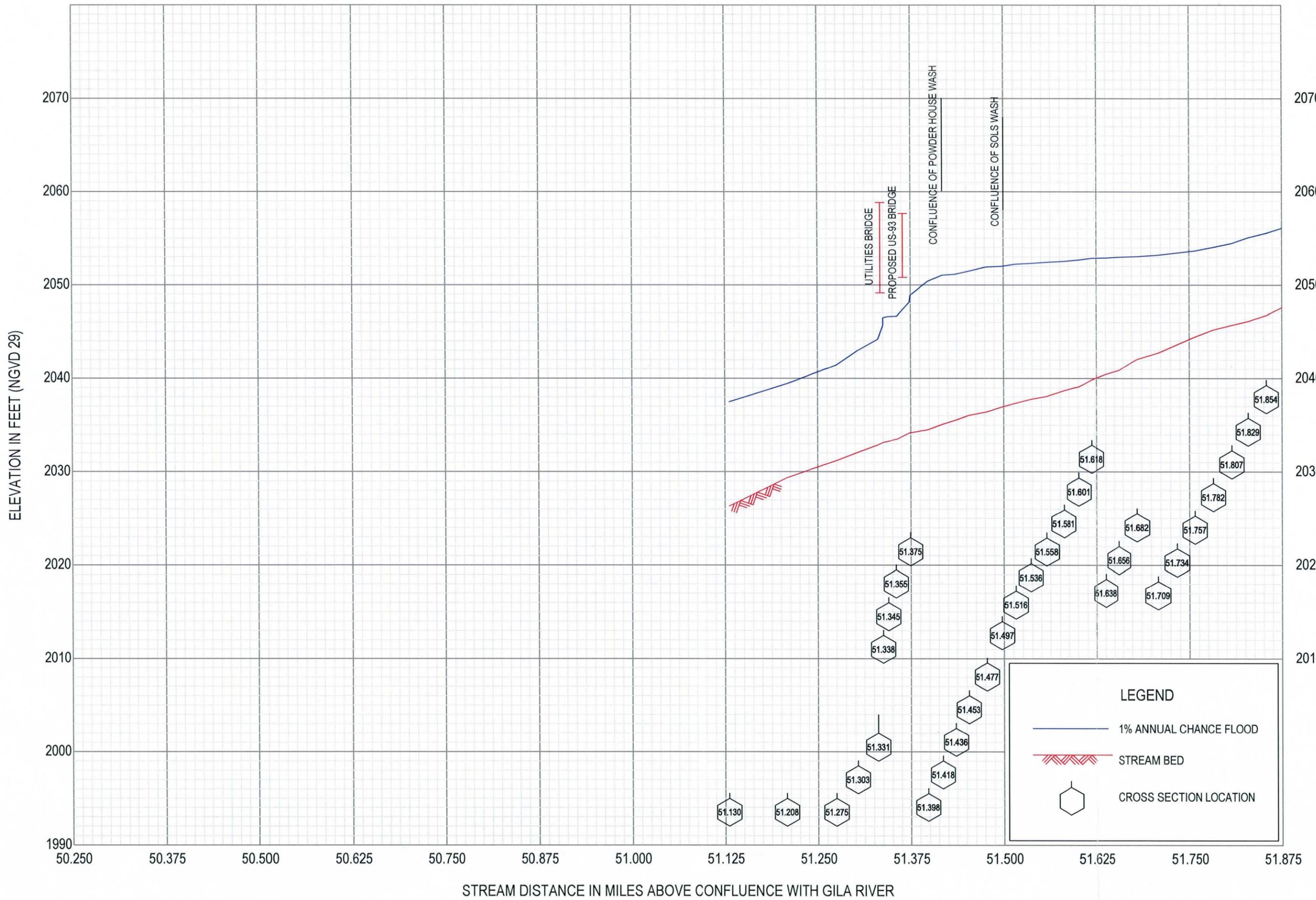
FEDERAL EMERGENCY MANAGEMENT AGENCY  
**MARICOPA COUNTY, AZ  
 AND INCORPORATED AREAS**



**ANNOTATED FLOOD PROFILE**

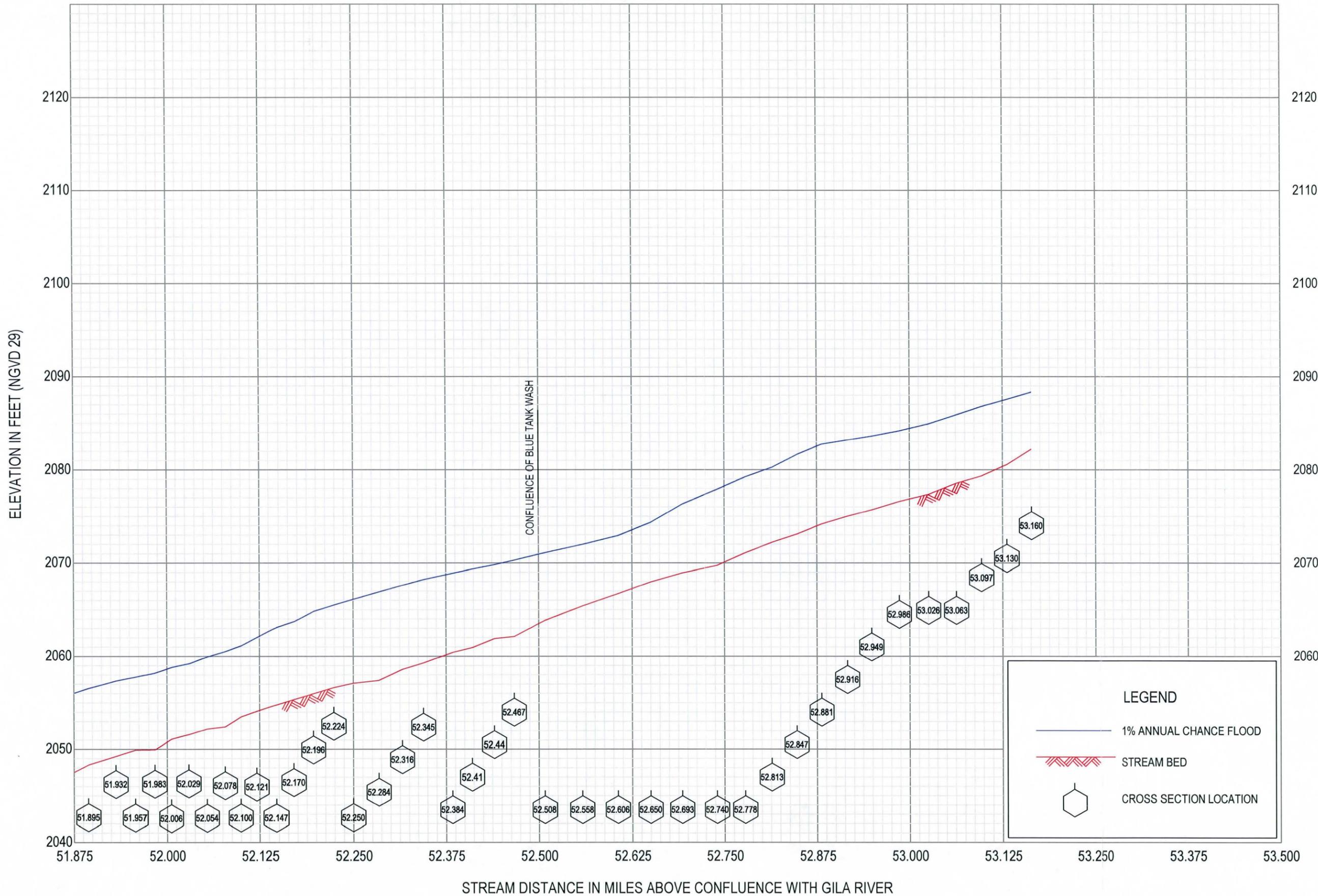
**HASSAYAMPA RIVER**

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



**FLOOD PROFILES**  
HASSAYAMPA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY  
MARICOPA COUNTY, AZ  
AND UNINCORPORATED AREAS



**FLOOD PROFILES**  
**HASSAYAMPA RIVER**

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

**NOTES TO USERS**

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where Base Flood Elevations (BFEs) and/or Floodways have been determined, users are encouraged to consult the Flood Profiles, Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only to landward of 6.0' National Geodetic Vertical Datum of 1929 (NGVD 29). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the Floodways were computed at cross sections and interpolated between cross sections. The Floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Arizona State Plane Zone 3176 (Central Arizona). The horizontal datum was NAD83. GPS80 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

Social Reference System Division  
National Geodetic Survey, NOAA  
Silver Spring Metro Center  
1315 East-West Highway  
Silver Spring, Maryland 20910  
(301) 713-3191

To obtain current elevation, description and/or location information for bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by Maricopa County. Orthophoto images were produced at a scale of 1:5000 using HARN for control. Aerial photography is dated December 2000 to December 2002.

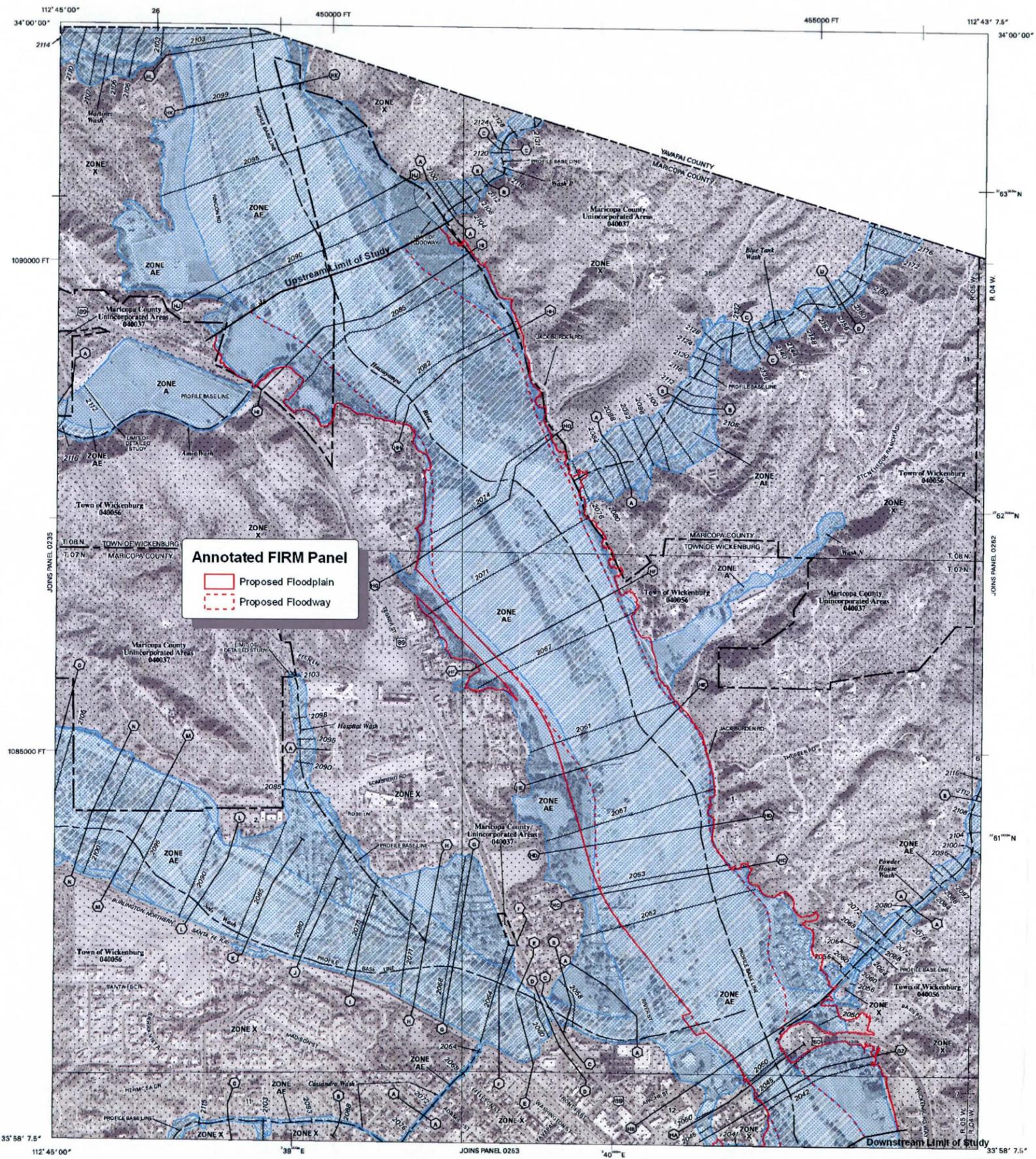
This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The Floodways and Floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report, which contains authoritative hydraulic data, may reflect stream channel changes that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed Map Index for an overview map of the county showing the layout of map panels, community map repository addresses, and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the FEMA Map Service Center at 1-800-358-9616 for information on available products associated with this FIRM. Alternate products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://www.fema.gov>.

If you have questions about this map or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMAMAP (1-877-336-2927) or visit the FEMA website at <http://www.fema.gov>.



**Annotated FIRM Panel**  
 Proposed Floodplain  
 Proposed Floodway

**LEGEND**

**SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD**

The 1% annual chance flood (100-year flood), as shown on the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Areas by Floodway System are shown in blue. Areas of Special Flood Hazard include Zones A, AE, AH, AD, AR, ADV, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

**ZONE A** No Base Flood Elevations determined.

**ZONE AE** Base Flood Elevations determined.

**ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding). Base Flood Elevations determined.

**ZONE AD** Flood depths of 1 to 3 feet (usually areas of ponding). Base Flood Elevations determined. For areas of alluvial fan flooding, velocities also determined.

**ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was substantially destroyed. Zone AR indicates that the former flood control system is being replaced to provide protection from the 1% annual chance flood by a Federal flood protection system under construction. No Base Flood Elevations determined.

**ZONE ADV** Areas to be protected from the 1% annual chance flood by a Federal flood protection system under construction. No Base Flood Elevations determined.

**ZONE V** Coastal flood zone with velocity hazard (wave action). No Base Flood Elevations determined.

**ZONE VE** Coastal flood zone with velocity hazard (wave action). Base Flood Elevations determined.

**FLOODWAY AREAS IN ZONE AE**

The boundary is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

**OTHER FLOOD AREAS**

**ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage capacity less than 1 square mile, and areas protected by levees from 1% annual chance flood.

**OTHER AREAS**

**ZONE K** Areas determined to be outside the 0.2% annual chance floodplain.

**ZONE D** Areas in which flood hazards are undetermined, but possible.

**COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**

**OTHERWISE PROTECTED AREAS (OPAs)**

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary  
 0.2% annual chance floodplain boundary  
 Floodway boundary  
 Zone A boundary  
 Zone AE boundary  
 CBRS and OPA boundary  
 Boundary dividing Special Flood Hazard Areas and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities  
 Base Flood Elevation line and value, elevation in feet  
 (BL 887)  
 Base Flood Elevation value where uniform within zone, elevation in feet

\* Referenced to the National Geodetic Vertical Datum of 1929

(A) (A) Cross section line  
 (2) (2) Truncated line

112° 07' 08", 33° 25' 41" Geographic coordinates referenced to the North American Datum of 1983 (NAD83), WGS84 Hemisphere

76' MSL 1606-meter (5269-foot) Transverse Mercator grid (NAD83) values zone 17

875000 FT 5000-foot grid (1606-meter) Arizona State Plane coordinate system, central zone (FIPS ZONE 3176) NAD83 (Transverse Mercator)

XDV2313 Bench mark (see explanation in Notes to Users section of this FIRM panel)

\* MSL Mean Sea Level

MAP DEPOSITORY  
 Refer to Reproduction Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP  
 April 16, 1986

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL  
 September 29, 1989, September 4, 1991, July 19, 2001

September 30, 2005: to update corporate limits, to change Base Flood Elevations, to add Special Flood Hazard Areas, to add Special Flood Hazard Areas to change Special Flood Hazard Areas, to change zone designations, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to incorporate previously issued Letters of Map Amendment.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

**NFIP**

**PANEL 0251H**

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

**PANEL 251 OF 4350**

SEE MAP INDEX FOR FIRM PANEL LAYOUT

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	04037	0251	H
WICKENBURG, TOWN OF	04056	0251	H

Notice to User: The Map Number shown above should be used when placing map orders. The Community Number shown above should be used on insurance applications for the subject community.

**MAP NUMBER 04013C0251H**

**MAP REVISED**

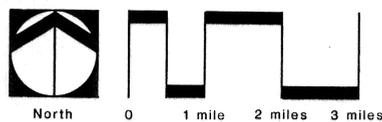
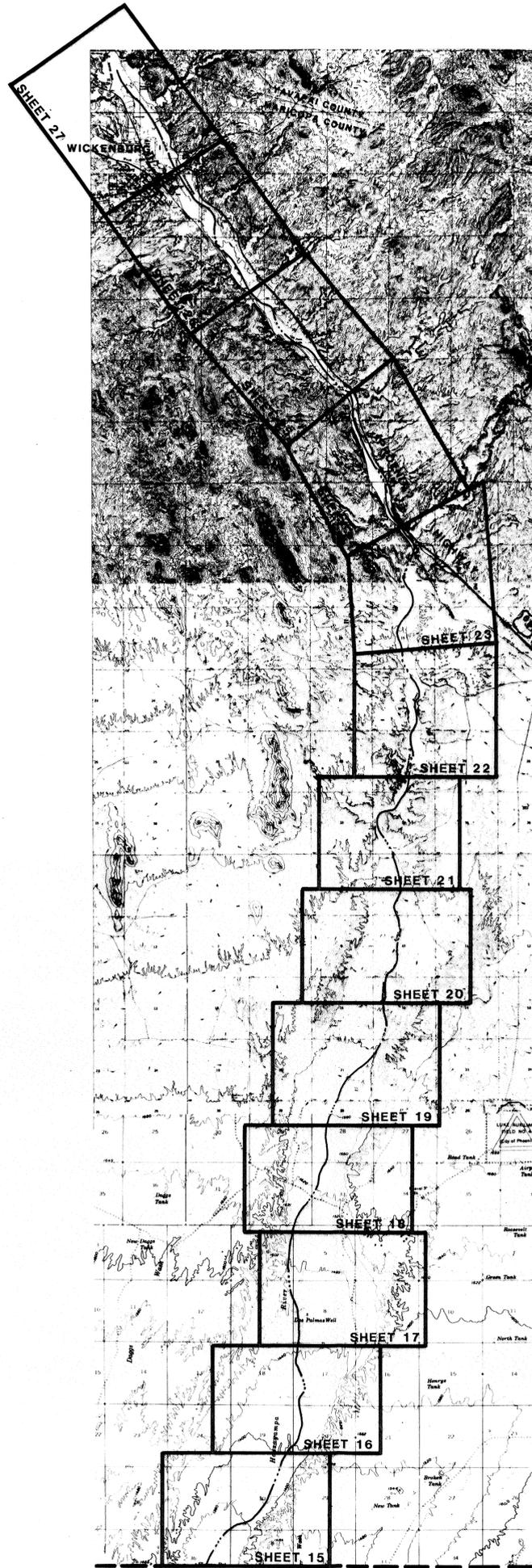
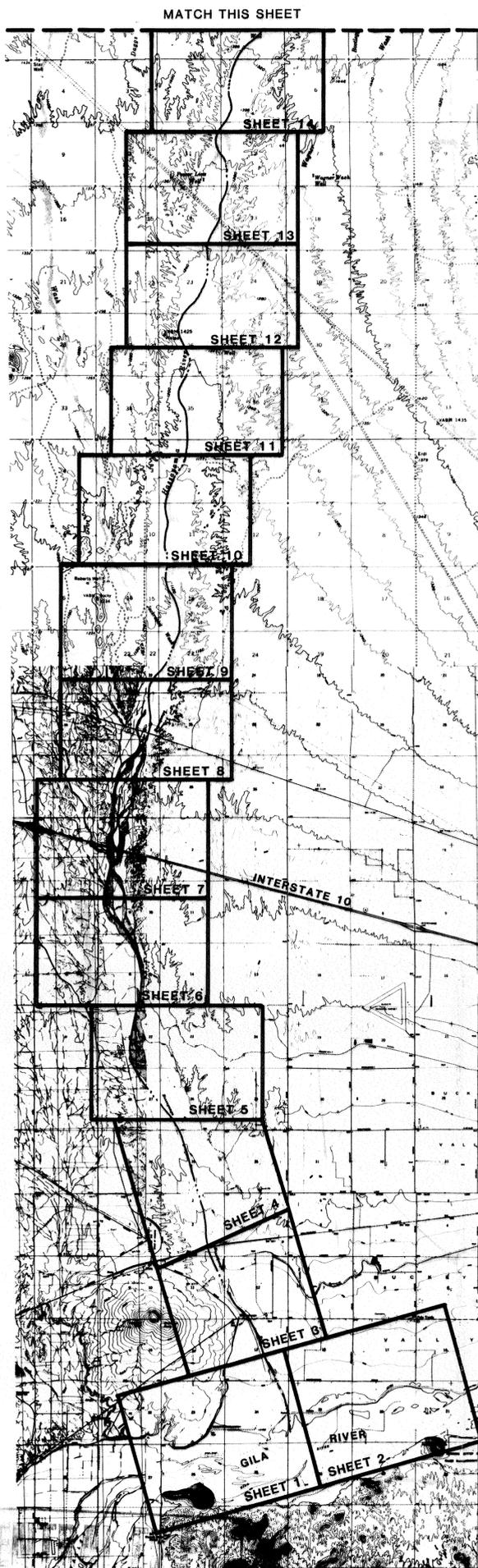
**SEPTEMBER 30, 2005**

Federal Emergency Management Agency



# FLOOD INSURANCE RE-STUDY FOR HASSAYAMPA RIVER IN MARICOPA COUNTY, ARIZONA

## WORK MAP INDEX



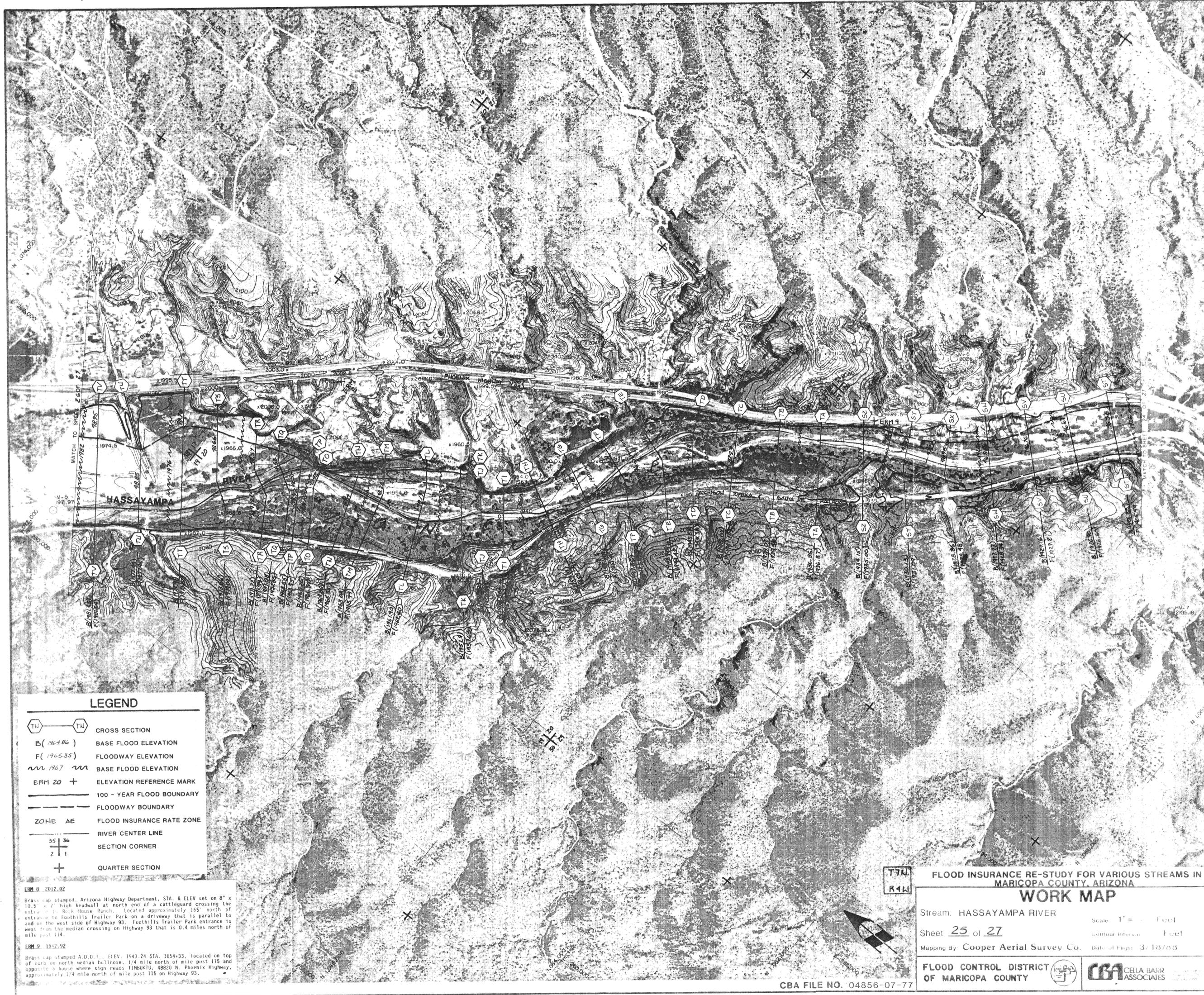
304

FLOOD CONTROL DISTRICT  
OF MARICOPA COUNTY

**CBA** CELLA BARR  
ASSOCIATES  
Engineering • Planning • Surveying • Landscape Architecture • Hydrology

5062 North 19th Avenue Phoenix, Arizona 85015 (602) 242-2999

CBA JOB NO.: 04856-07-78



**LEGEND**

- CROSS SECTION
- BASE FLOOD ELEVATION
- FLOODWAY ELEVATION
- BASE FLOOD ELEVATION
- ELEVATION REFERENCE MARK
- 100 - YEAR FLOOD BOUNDARY
- FLOODWAY BOUNDARY
- FLOOD INSURANCE RATE ZONE
- RIVER CENTER LINE
- SECTION CORNER
- QUARTER SECTION

ERM 8 2012.02  
 Brass cap stamped, Arizona Highway Department, STA. & ELEV set on 8" x 10.5" x 2" high headwall at north end of a cattleguard crossing the entrance to Rock House Ranch. Located approximately 165' north of entrance to Foothills Trailer Park on a driveway that is parallel to and on the west side of Highway 93. Foothills Trailer Park entrance is west from the median crossing on Highway 93 that is 0.4 miles north of mile post 114.

ERM 9 1952.92  
 Brass cap stamped A.D.O.T., ELEV. 1943.24 STA. 1054+33, located on top of curb on north median bullnose, 1/4 mile north of mile post 115 and opposite a house where sign reads 1150000, 48820 N. Phoenix Highway, approximately 1/4 mile north of mile post 115 on Highway 93.

T7A  
 R4W

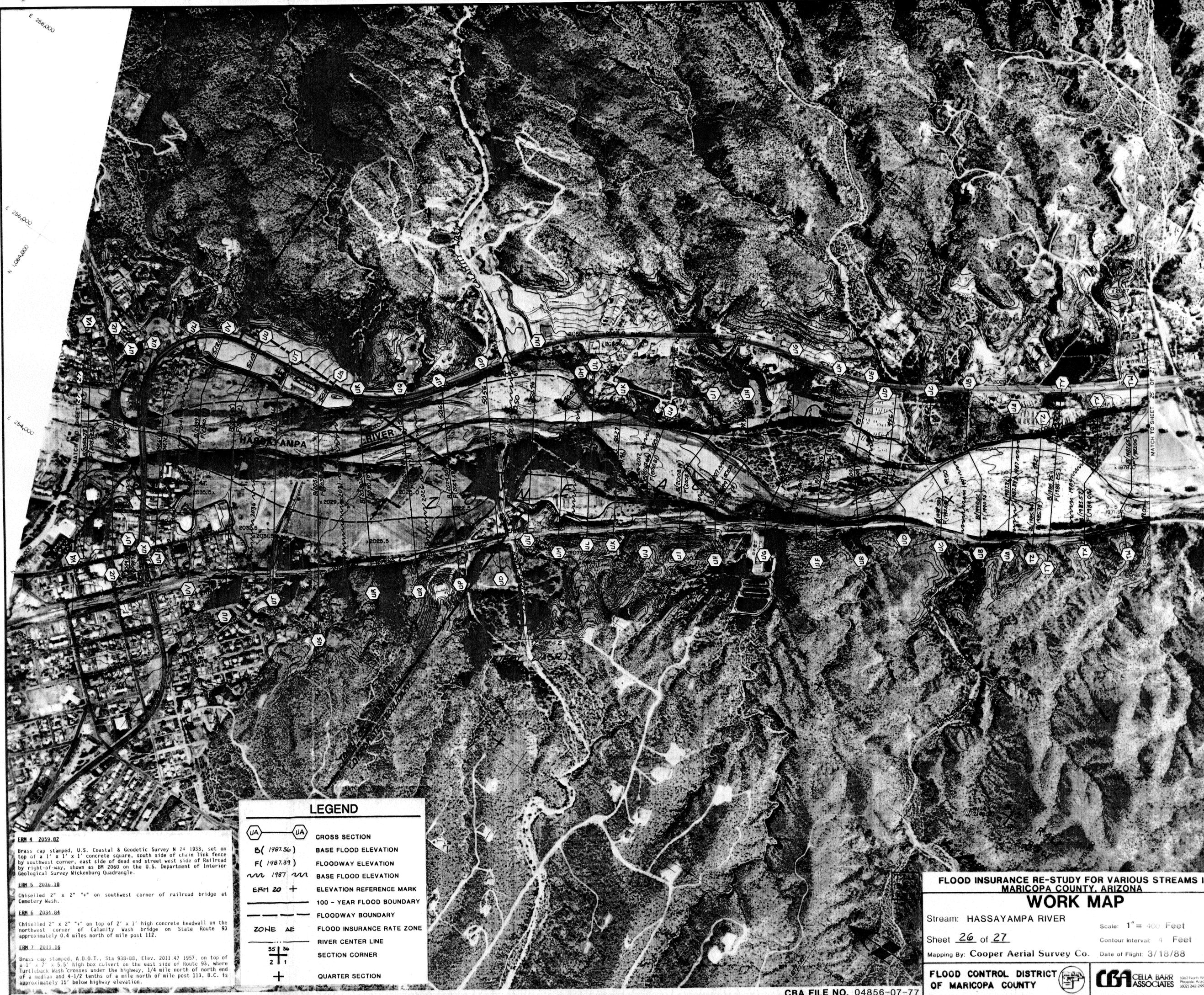
**FLOOD INSURANCE RE-STUDY FOR VARIOUS STREAMS IN MARICOPA COUNTY, ARIZONA**

**WORK MAP**

Stream: HASSAYAMPA RIVER  
 Scale: 1" = 400 Feet  
 Sheet: 25 of 27  
 Contour Interval: 10 Feet  
 Mapping By: Cooper Aerial Survey Co. Date of Flight: 3/18/68

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY





E 258,000  
E 256,000  
E 254,000  
N 1,084,000  
E 254,000

**ERM 4 2059.82**  
Brass cap stamped, U.S. Coastal & Geodetic Survey N 24 1933, set on top of a 1' x 1' x 1' concrete square, south side of chain link fence by southwest corner, east side of dead end street west side of Railroad by right-of-way, shown as BM 2060 on the U.S. Department of Interior Geological Survey Wickenburg Quadrangle.

**ERM 5 2039.18**  
Chiselled 2" x 2" "+" on southwest corner of railroad bridge at Cemetery Wash.

**ERM 6 2034.84**  
Chiselled 2" x 2" "+" on top of 2' x 1' high concrete headwall on the northwest corner of Calamity Wash bridge on State Route 93 approximately 0.4 miles north of mile post 112.

**ERM 7 2011.16**  
Brass cap stamped, A.D.O.T., Sta 938+88, Elev. 2011.47 1957, on top of a 1' x 7' x 5.5' high box culvert on the east side of Route 93, where Turtleback Wash crosses under the highway, 1/4 mile north of north end of a median and 4-1/2 tenths of a mile north of mile post 113, B.C. is approximately 15' below highway elevation.

LEGEND	
	CROSS SECTION
	BASE FLOOD ELEVATION
	FLOODWAY ELEVATION
	BASE FLOOD ELEVATION
	ELEVATION REFERENCE MARK
	100 - YEAR FLOOD BOUNDARY
	FLOODWAY BOUNDARY
	FLOOD INSURANCE RATE ZONE
	RIVER CENTER LINE
	SECTION CORNER
	QUARTER SECTION

**FLOOD INSURANCE RE-STUDY FOR VARIOUS STREAMS IN MARICOPA COUNTY, ARIZONA**

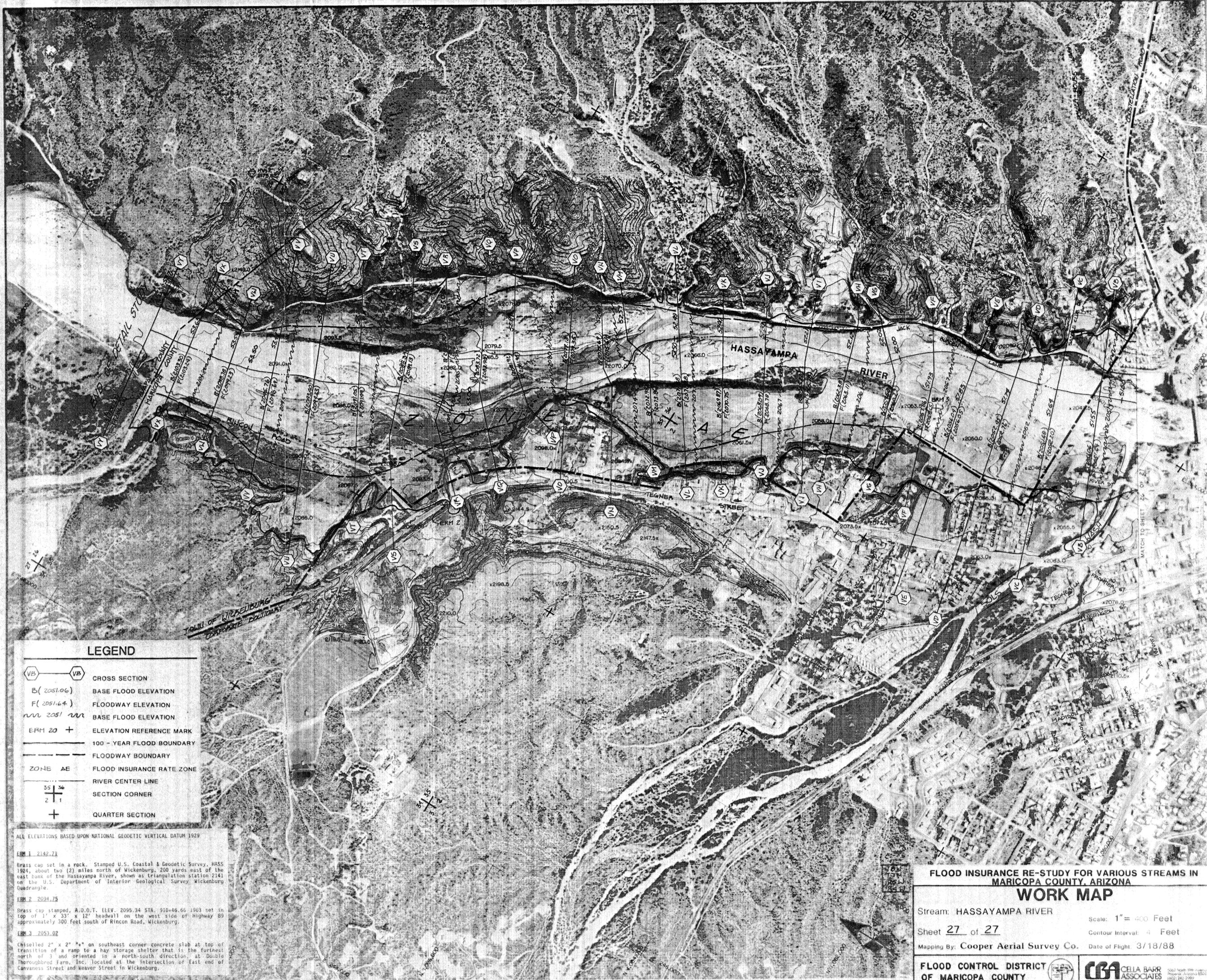
**WORK MAP**

Stream: HASSAYAMPA RIVER      Scale: 1" = 400 Feet

Sheet 26 of 27      Contour Interval: 4 Feet

Mapping By: Cooper Aerial Survey Co.      Date of Flight: 3/18/88

**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY**           **CBA CELIA BARR ASSOCIATES**      5002 North 90th Avenue, Phoenix, Arizona 85016 (602) 242-2999



**LEGEND**

- CROSS SECTION
- BASE FLOOD ELEVATION
- FLOODWAY ELEVATION
- BASE FLOOD ELEVATION
- ELEVATION REFERENCE MARK
- 100 - YEAR FLOOD BOUNDARY
- FLOODWAY BOUNDARY
- FLOOD INSURANCE RATE ZONE
- RIVER CENTER LINE
- SECTION CORNER
- QUARTER SECTION

ALL ELEVATIONS BASED UPON NATIONAL GEODETIC VERTICAL DATUM 1929

**ERM 1 2142.71**  
 Brass cap set in a rock. Stamped U.S. Coastal & Geodetic Survey, HASS 1924, about two (2) miles north of Wickenburg, 200 yards east of the east bank of the Hassayampa River, shown as triangulation station 2141 on the U.S. Department of Interior Geological Survey Wickenburg Quadrangle.

**ERM 2 2094.75**  
 Brass cap stamped, A.D.O.T. ELEV. 2095.34 STA. 910+46.66 1963 set in top of 1' x 33' x 12' headwall on the west side of Highway 89 approximately 300 feet south of Rincon Road, Wickenburg.

**ERM 3 2053.02**  
 Chiselled 2" x 2" "x" on southeast corner concrete slab at top of transition of a ramp to a hay storage shelter that is the furthest north of 3 and oriented in a north-south direction, at Double Thoroughbred Farm, Inc. located at the intersection of East end of Canvess Street and Weaver Street in Wickenburg.

**FLOOD INSURANCE RE-STUDY FOR VARIOUS STREAMS IN MARICOPA COUNTY, ARIZONA**  
**WORK MAP**

Stream: HASSAYAMPA RIVER  
 Sheet 27 of 27  
 Mapping By: Cooper Aerial Survey Co.  
 Scale: 1" = 400 Feet  
 Contour Interval: 4 Feet  
 Date of Flight: 3/18/88

**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY**  
**CBA CELLA BARR ASSOCIATES**



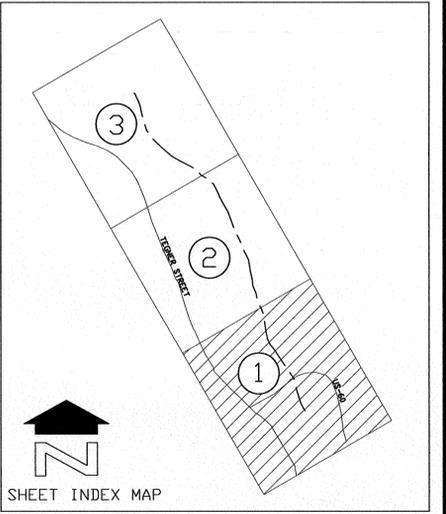
### LEGEND

PROPOSED 100-YR FLOODPLAIN	—————									
PROPOSED FLOODWAY	-----									
HYDRAULIC BASE LINE	~~~~~									
EFFECTIVE STUDY CROSS-SECTIONS	Effective Section 51.29									
EFFECTIVE FLOODPLAIN LIMITS	-----									
EFFECTIVE FLOODWAY LIMITS	-----									
CROSS SECTION	<table border="0"> <tr> <td>FP= 2037.45</td> <td>△</td> <td>51.130</td> </tr> <tr> <td>FW= 2037.62</td> <td>△</td> <td></td> </tr> <tr> <td>Q = 71000</td> <td>△</td> <td></td> </tr> </table>	FP= 2037.45	△	51.130	FW= 2037.62	△		Q = 71000	△	
FP= 2037.45	△	51.130								
FW= 2037.62	△									
Q = 71000	△									
PHOTOGRAMMETRIC CONTROL POINT	P.C.P. 10017									
BASE FLOOD ELEVATIONS	~~~~~									
ZONE DESIGNATIONS	ZONE AE, ZONE AH									
CORPORATE LIMITS	Town of Wickenburg Maricopa County									

PHOTOGRAMMETRIC CONTROL POINTS  
NOTE: ALL ELEVATIONS ARE NGVD 1929

I.D. NUMBER	ELEVATION (FT)
10012	2058.330
10013	2045.381
10014	2070.709
10016	2053.327
10017	2029.754
10018	2062.677
10019	2029.029
10020	2050.636

- ### NOTES
- FLOODPLAIN ON INTERIOR SIDE OF EMBANKMENT TO BE DELINEATED IN FUTURE STUDY
  - ALL MAPPING BY AERIAL MAPPING COMPANY, INC. EXCEPT AREAS LABELED FCDMC TOPOGRAPHY WHERE MAPPING WAS DONE BY STEWART GEO TECHNOLOGIES AND CONTROL POINTS WERE PROVIDED BY A-TEAM

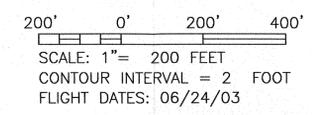


NO.	REVISION	BY	DATE
2			
1			

ARIZONA DEPARTMENT OF TRANSPORTATION  
U.S. 93 INTERIM WICKENBURG BYPASS

WEST CONSULTANTS, INC.

	BY	DATE
DESIGN	—	—
DESIGN CHK.	—	—
PLANS	LRK	1/2006
PLANS CHK.	DLR	1/2006



THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS.

Aerial Mapping By: Aerial Mapping Co., Inc., Phoenix, AZ (see note 2)  
GROUND CONTROL SURVEY DATA PROVIDED BY WILSON AND COMPANY (see note 2)



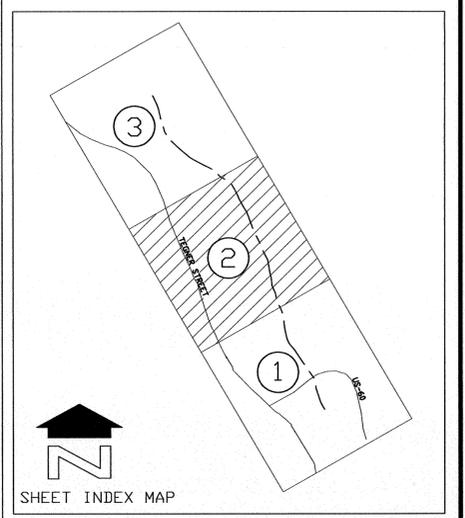
**LEGEND**

100-YR FLOODPLAIN BOUNDARY	—————
FLOODWAY BOUNDARY	—————
HYDRAULIC BASE LINE	—————
EFFECTIVE STUDY CROSS-SECTIONS	Effective Section 51.29
EFFECTIVE FLOODPLAIN LIMITS	—————
EFFECTIVE FLOODWAY LIMITS	—————
CROSS SECTION	FP = 2071.97 FW = 2072.03 Q = 71000
PHOTOGRAMMETRIC CONTROL POINT	P.C.P. 10006
BASE FLOOD ELEVATIONS	2072
ZONE DESIGNATIONS	ZONE AE, ZONE AH
CORPORATE LIMITS	Town of Wickenburg Maricopa County

**PHOTOGRAMMETRIC CONTROL POINTS**  
NOTE: ALL ELEVATIONS ARE NGVD 1929

I.D. NUMBER	ELEVATION (FT)
10008	2084.846
10009	2058.258
10010	2072.320

**NOTES**



NO.	REVISION	BY	DATE
1			

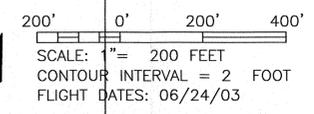
**ARIZONA DEPARTMENT OF TRANSPORTATION**

**U.S. 93 INTERIM WICKENBURG BYPASS**

**WEST CONSULTANTS, INC.**

	BY	DATE
DESIGN	—	—
DESIGN CHK.	—	—
PLANS	LRK	1/2006
PLANS CHK.	DLR	1/2006

21860 DENNIS L. RICHARDS  
Professional Engineer  
No. 213  
Arizona, U.S.A.



THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS.

Aerial Mapping By: Aerial Mapping Co., Inc., Phoenix, AZ

GROUND CONTROL SURVEY DATA PROVIDED BY WILSON AND COMPANY

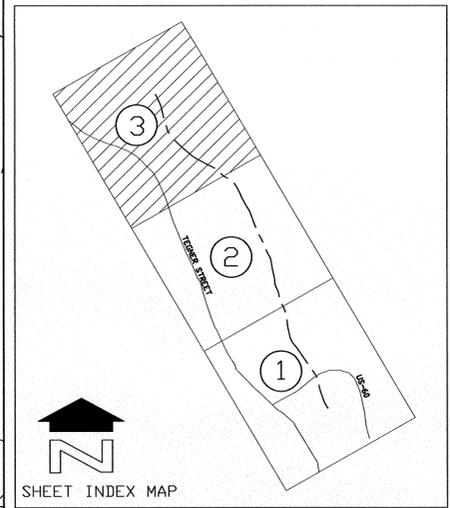
LEGEND

- 100-YR FLOODPLAIN BOUNDARY
- FLOODWAY BOUNDARY
- HYDRAULIC BASE LINE
- EFFECTIVE STUDY CROSS-SECTIONS
- EFFECTIVE FLOODPLAIN LIMITS
- EFFECTIVE FLOODWAY LIMITS
- CROSS SECTION FP= 2088.32  
FW= 2089.11  
Q = 71000
- PHOTOGRAMMETRIC CONTROL POINTS P.C.P. 10001  
2088
- BASE FLOOD ELEVATIONS 2088
- ZONE DESIGNATIONS ZONE AE, ZONE AH
- CORPORATE LIMITS Town of Wickenburg  
Maricopa County
- PHOTOGRAMMETRIC CONTROL POINTS

NOTE: ALL ELEVATIONS ARE NGVD 1929

I.D. NUMBER	ELEVATION (FT)
10000	2098.530
10001	2086.056
10002	2090.446
10004	2138.612
10005	2095.515
10006	2070.691

NOTES



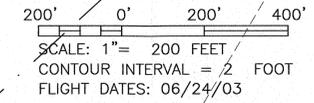
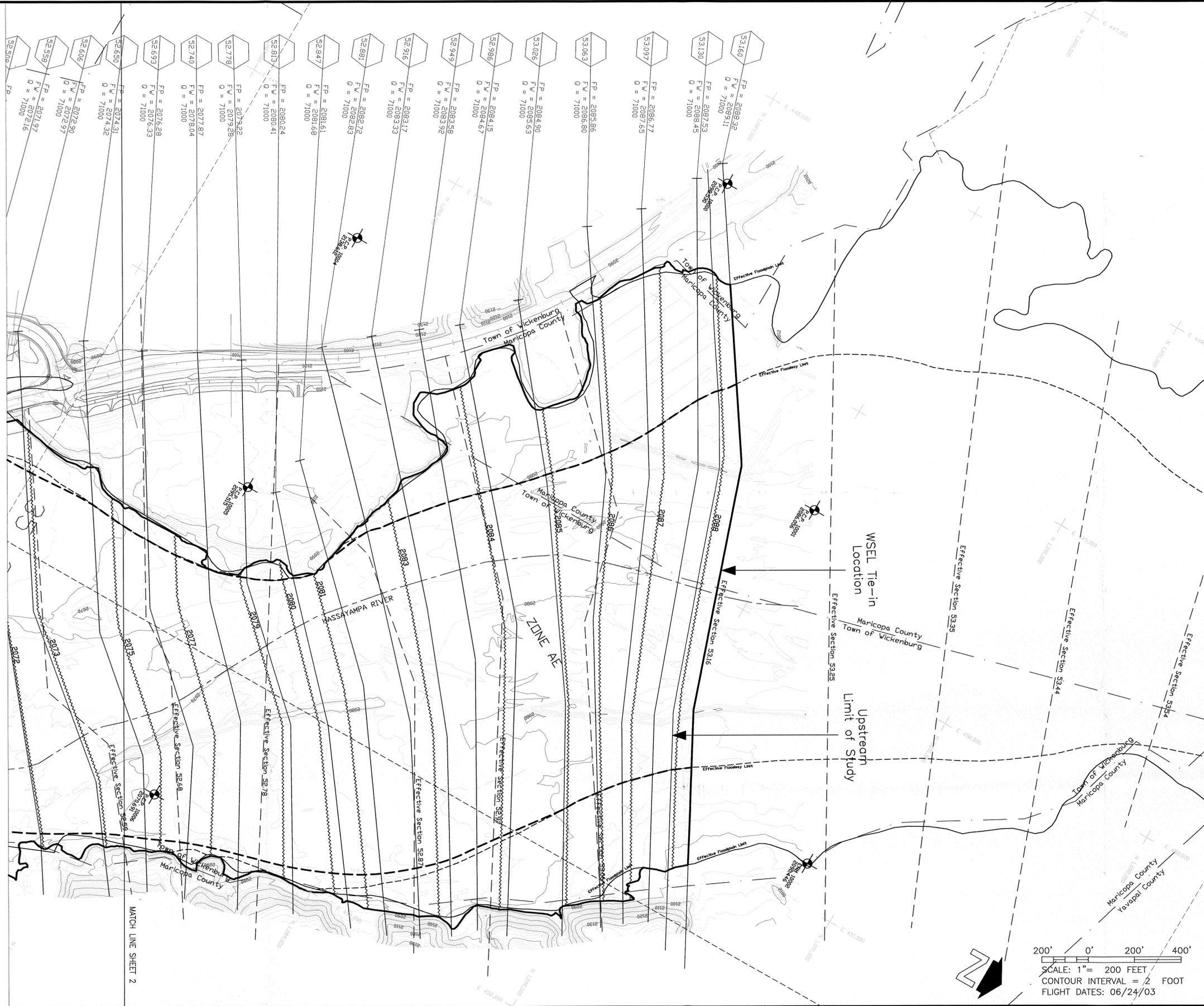
NO.	REVISION	BY	DATE
2			
1			

ARIZONA DEPARTMENT OF TRANSPORTATION

U.S. 93 INTERIM WICKENBURG BYPASS

WEST CONSULTANTS, INC.

	BY	DATE
DESIGN	-	-
DESIGN CHK.	-	-
PLANS	LRK	1/2006
PLANS CHK.	DLR	1/2006



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