FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
PHOENIX, ARIZONA

SOLS WASH
CONDITIONAL LETTER OF MAP REVISION
FCD 2005C006

Prepared by:

Engineering and Environmental Consultants, Inc.
3003 North Central, Suite 600
Phoenix, Arizona 85012-2905
Phone: (602) 248-7702
FAX: (602) 248-7851

December 2006

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December 2006

Registered Professional Engineer (Civil)
CERTIFICATE NO. 37890
LLOYD A. VICK
Date Signed 12/20/06
ARIZONA, U.S.A.

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Hydraulic Cross Section Map (Exhibit 2)	Map Pockets
Hydraulics Work Study Maps (1 through 10)	Map Pockets
Annotated FIRM Map	Map Pockets
Hydraulic Profiles (half-size 11x17)	Section 7
Half Size –Design Plans	Under Separate Cover

SECTION 1: INTRODUCTION

1.1 Purpose of Report and Authorization of Report

The purpose of this report is to obtain a Conditional Letter Of Map Revision (CLOMR) for proposed changes to the floodplain and floodway of Sols Wash for a distance of approximately 6,000 feet upstream of the confluence with the Hassayampa River. The basis of the CLOMR will be design plans and bank protection plans that are proposed by the Flood Control District of Maricopa County (FCDMC).

The authority for this project is:

Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009
Project Manager: Scott Vogel, P.E.
Contract No. FCD 2005C006 (Work Assignment No. 2)

1.2 Project Description

The study area is Sols Wash from its confluence with the Hassayampa River to approximately 1.25 miles upstream.

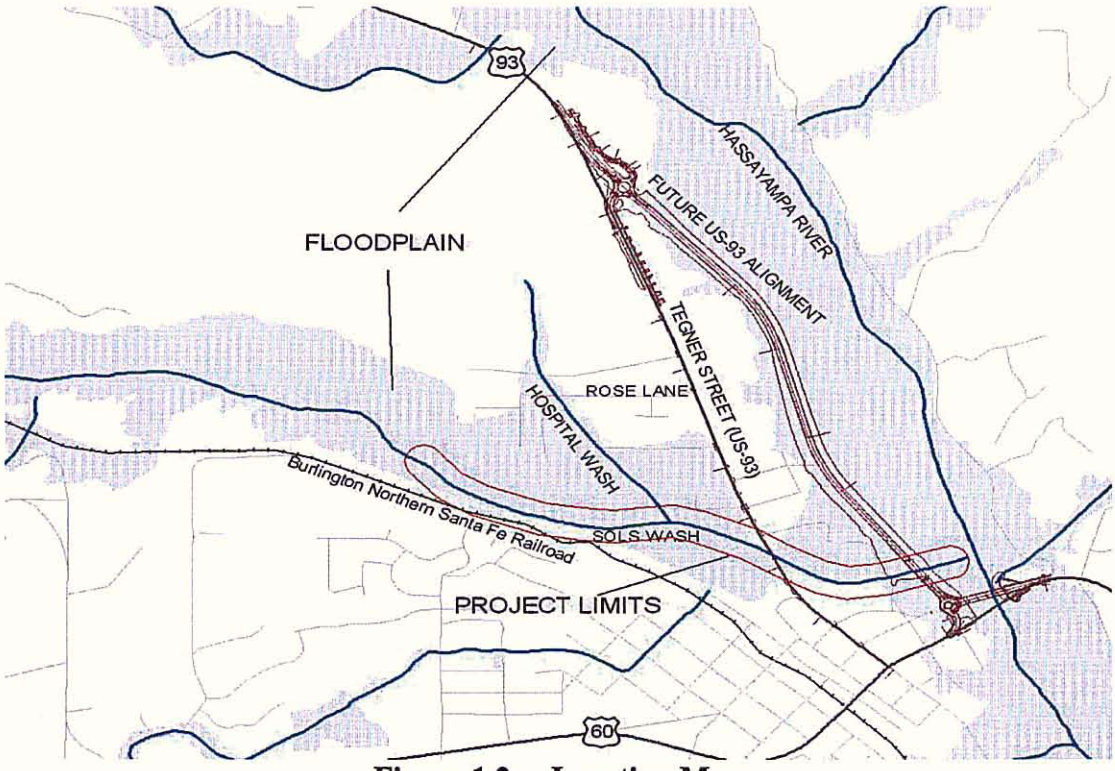

Figure 1.2a Location Map

The following figure shows locations of various points of interest that are described in this report. Of particular notice is Coffinger Park, Basha's and Goldmine Village which are described as being located adjacent to Sols Wash.

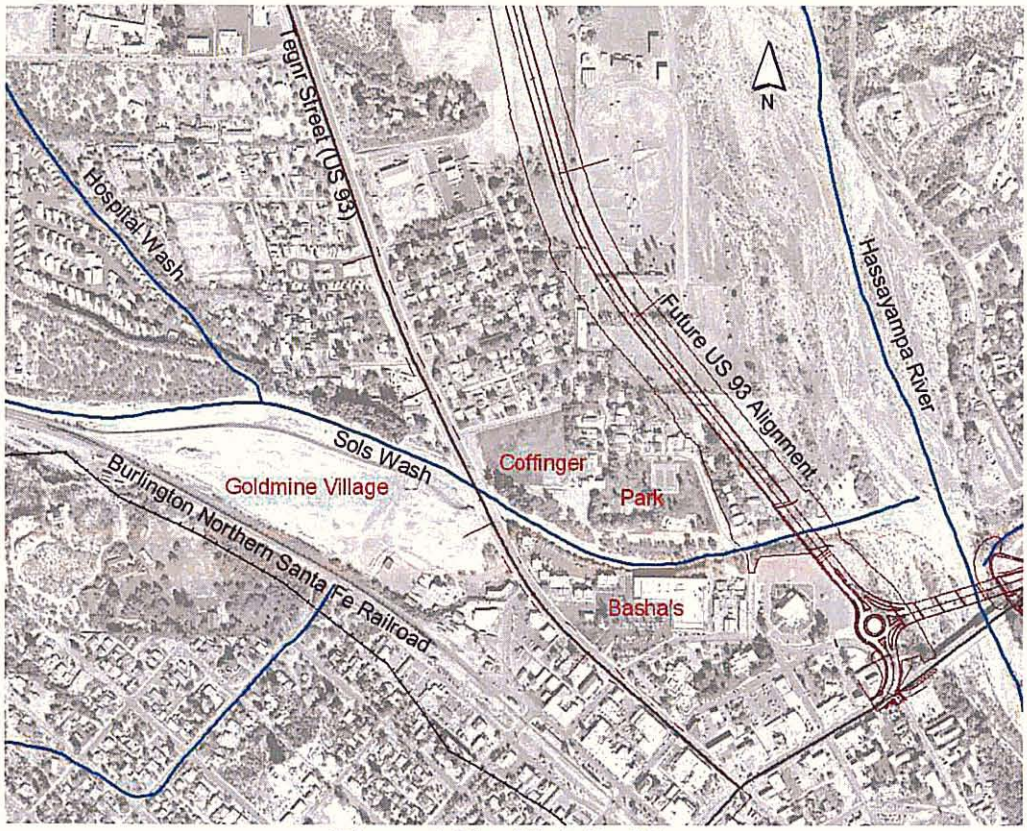

Figure 1.2b Vicinity Map

The Arizona Department of Transportation is currently developing plans for the US-93 Bypass that will divert traffic around the Town of Wickenburg. The Bypass includes new bridge crossings of the Hassayampa River and of Sols Wash, a new traffic circle at the entrance to the Town, and a raised roadway section (levee) separating the town from the river. As ADOT's plans developed the Town of Wickenburg and the Flood Control District recognized that there was an opportunity to reduce flood hazard conditions along Sols Wash as an extension to the ADOT project.

The Flood Control District pursued the idea of structural improvements to Sols Wash that would contain the 100-year discharge and reduce flood hazards to properties adjacent to the wash. To that end the District contracted the preparation of a study and design plans that would achieve these goals.

The drainage improvements proposed by this project work in conjunction with ADOT's new SR-93 Bypass project and it should be noted that the CLOMR prepared for ADOT, by West Consultants Inc., and this project's CLOMR are integral with one another and that by themselves neither is adequate to remove the flood hazards.

This project will also redefine the floodplain on Hospital Wash based upon new information regarding the size of the contributing watershed discovered when reviewing new contour mapping.

1.3 Floodplain History

1.3.1 Effective FIS

The effective Flood Insurance Study (FIS) establishing the current Sols Wash floodplain and floodway limits was based on a 1986 floodplain delineation study (Cella Bar and Associates, 1986) contracted by the FCDMC.

1.3.2 Recent Flooding

Sols Wash experienced serious flooding in October of 2000. The peak discharge of the storm was approximately11,000 cfs (the 100-year peak discharge for Sols Wash is approximately 15,000 cfs). The following photograph was taken at the Tegner Street Bridge (US 93) during this storm.

Figure 1.3 Sols Wash at Tegner Street Bridge during 2000 storm event

In the 2000 flood, flow overtopped the north prong of Sols Wash and inundated Hospital Wash which caused its banks to overflow as result. The mobile home park and homes east of Hospital Wash flooded due to this breakout of flow. The floodwater also overtopped Tegner Street and flooded houses in the neighborhood north of Coffinger Park.

Coffinger Park is located on the north side of Sols Wash between the existing US-93 (Tegner Street) and the proposed US-93 Bypass. The park has experienced flooding both from the flow in Sols Wash and from the overtopping of Tegner Street.

1.3.3 Watercourse Changes

Since the original study, significant changes have occurred to the watercourse. The changes include:

- Replacement of the US-93 (Tegner Street) Bridge by ADOT in 1998.
- Widening and re-paving of US-93 by ADOT.
- Construction of a floodwall by the Town of Wickenburg on the north bank directly downstream of the bridge and extending 300 feet downstream.
- Goldmine Village improvements (per Goldmine Village CLOMR) including rip-rap on the north bank, trimming of the south bank upstream of the US-93 bridge, and bank protection on the south bank.

There is also the planned US-93 Bypass Plan that includes a bridge crossing of Sols Wash just upstream of the confluence with the Hassayampa River.

Section 2: FEMA FORMS

2.1 Study Documentation Abstract for FEMA Submittals

2.1.1 Date Study Accepted
To be filled in upon acceptance by FEMA

2.1.2 Study Contractor
Engineering and Environmental Consultants, Inc.
3003 N. Central Avenue, Suite 600
Phoenix, Arizona 85012-2905
Tel: (602) 248-7702
Fax: (602) 248-7851
Contacts: Lloyd A. Vick, P.E.
Charles T. Griffith, E.I.T.

EEC Contract Number: 305020.02

2.1.3 FEMA Technical Review Contractor
Michael Baker Jr., Inc.
3601 Eisenhower Avenue
Alexandria, Virginia 22304-6425
Tel: (703) 960-8800
Fax: (703) 960-9125

2.1.4 FEMA Regional Reviewer

2.1.5 State Technical Reviewer

2.1.6 Local Technical Reviewer

Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, Arizona 85009
Tel: (602) 506-1501
Fax: (602) 506-4601
Contact: Scott Vogel, P.E., Project Manager

Town of Wickenburg
155 N. Tegner Street, Suite A
Wickenburg, Arizona 85390
Tel: (928) 684-5451
Contact: Shane Dille, Town Manager

2.1.7 Reach Description
Revisions to the existing FIRM maps can be found in the Map Section of Book 1.

Sols Wash – The wash will receive improvements for approximately 4,450 feet (project length) beginning in the Hassayampa River overbank at the confluence with Sols Wash and continuing upstream in Sols Wash to river mile 0.955. The existing floodplain and floodway are located on FIRM panel 040130251.

Hospital Wash – The wash is being redelineated based on new hydrology developed from more detailed topographic data. The redelineation spans the entire effective limits, from the confluence with Sols Wash to approximately 3,000 feet upstream. Located on FIRM panel 040130251.

2.1.8 USGS Quad Sheets

7.5 minute Series (Topographic)

Wickenburg	1973	Aerial Photographs taken in 1972

2.1.9 Unique Conditions and Problems

2.1.10 Coordination of Peak Discharges

The peak discharges were taken from the effective model in a report entitled "Sols Wash, Wickenburg, Arizona (FIS)" prepared by Cella Barr in 1986

2.2 FEMA Forms

This section contains the FEMA Forms for both Sols Wash and Hospital Wash.

DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

O.M.B. No. 1660-0016
Expires August 31, 2007

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, U.S Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington, DC 20472, Paperwork Reduction Project (1660-0016. Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

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	Katy, City Harris County	TX TX	480301 48201C	0005D 0220G	02/08/83 09/28/90

2. Flooding Source: Sols Wash and Hospital Wash

3. Project Name/Identifier: Downtown Wickenburg Flooding Hazard Mitigation Project/FCD2005C006

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

Ha[illegible] review fee for the appropriate request category been included? ☒ Yes Fee amount: $ _____

☐ No, Attach Explanation

Please see FEMA website at http://www.fema.gov/mit/tsd/frm_fees.htm 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:	
Catherine Regester	Flood Control District of Maricopa County	
Mailing Address:	Daytime Telephone No.:	Fax No.:
	602-506-4001	602-506-4601
2801 W. Durango St; Phoenix, AZ 85009	E-Mail Address: cwr@mail.maricopa.gov	
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 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.

Co[illegible]nity Official's Name and Title:		Telephone No.:
Timothy S. Phillips, Chief Engineer and General Manager		602-506-1501
Community Name:	Community Official's Signature: (required)	Date:
Maricopa County		

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:
Lloyd Vick	37890	
Company Name:	Telephone No.:	Fax No.:
Engineering and Environmental Consultants, Inc.	602-248-7002	602-248-7851
Signature: Lloyd A Vick		Date: 10/4/06

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

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

Seal (optional)

DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

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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	Katy, City	TX	480301	0005D	02/08/83
480287	Harris County	TX	48201C	0220G	09/28/90

2. Flooding Source: Sols Wash and Hospital Wash

3. Project Name/Identifier: Downtown Wickenburg Flooding Hazard Mitigation Project/FCD2005C006

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

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☒ 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

Ha[illegible] review fee for the appropriate request category been included? ☐ Yes Fee amount: $ _____

☐ No, Attach Explanation

Please see FEMA website at http://www.fema.gov/mit/tsd/frm_fees.htm for Fee Amounts and Exemptions.

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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.

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Catherine Regester	Flood Control District of Maricopa County	
Mailing Address:	Daytime Telephone No.:	Fax No.:
	602-506-4001	602-506-4601
2801 W. Durango St; Phoenix, AZ 85009	E-Mail Address: csv@mail.maricopa.gov	
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 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.:
Lyle Murdock, Floodplain Manager		
Community Name:	Community Official's Signature: (required)	Date:
Town of Wickenburg		

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:
Lloyd Vick	37890	
Company Name:	Telephone No.:	Fax No.:
Engineering and Environmental Consultants	602-248-7002	602-248-7851
Signature: Lloyd A Vick		Date: 10/4/06

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

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

Seal (optional)

DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE HYDROLOGY & HYDRAULICS FORM

O.M.B. No. 1660-0016
Expires August 31, 2007

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Flooding Source: Sols Wash

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

A. HYDROLOGY

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

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

2. Comparision 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
- [ ] Regional Regression Equations
- [ ] Precipitation/Runoff Model _____ [TR-20, HEC-1, HEC-HMS, etc.]
- [ ] 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/mit/tsd/en_modl.htm.

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? [x] Yes [ ] No If Yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation or 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	Hassayampa River	0.011	2052.48	2054.17
Upstream Limit	X-Section "M"	1.319	2098.98	2098.62

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/mit/tsd/frm_soft.htm. 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	sol206pa.prj	Floodway File Name	sol206pa.prj
Corrected Effective Model*	Natural File Name		Floodway File Name	
Existing or Pre-Project Conditions Model	Natural File Name		Floodway File Name	
Revised or Post-Project Conditions Model	Natural File Name	sols_clomr	Floodway File Name	sols_clomr
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" list the models accepted by FEMA. This document can be found at: http://www.fema.gov/mit/tsd/en_modl.htm.

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 acknowledge that the area to be removed from the special flood hazard area, to include any structures or proposed structures, meets (will meet) all of the standards of the the local floodplain ordinances, and is (will be) reasonably safe from flooding in accordance with NFIP regulation 44 CFR 65.2(c). 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.

DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE HYDROLOGY & HYDRAULICS FORM

O.M.B. No. 1660-0016
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Flooding Source: Hospital Wash

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

A. HYDROLOGY

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

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

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

Location	Drainage Area (Sq. Mi.)	FIS (cfs)	Revised (cfs)
At con. with Sols Wash	0.5	900	
Revised	0.4		500

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

- ☐ Statistical Analysis of Gage Records
- ☐ Regional Regression Equations
- ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS, etc.]
- ☐ 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/mit/tsd/en_modl.htm.

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 or 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	Sols Wash	0.070	2072.68	2069.34
Upstream Limit	X-Section "A"	0.703	2104.98	2102.70

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/mit/tsd/frm_soft.htm. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS. If you disagree with a message, please attach an explanation of why the message is not valid in this case. Review of your submittal and resolution of valid modeling discrepancies will result in reduced review time.

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

4. Models Submitted

Duplicate Effective Model*	Natural File Name		Floodway File Name	
Corrected Effective Model*	Natural File Name		Floodway File Name	
Existing or Pre-Project Conditions Model	Natural File Name		Floodway File Name	
Revised or Post-Project Conditions Model	Natural File Name	hospitalclomr	Floodway File Name	hospitalclom
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" list the models accepted by FEMA. This document can be found at: http://www.fema.gov/mit/tsd/en_modl.htm.

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 acknowledge that the area to be removed from the special flood hazard area, to include any structures or proposed structures, meets (will meet) all of the standards of the the local floodplain ordinances, and is (will be) reasonably safe from flooding in accordance with NFIP regulation 44 CFR 65.2(c). 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.

Explanations provided for FEMA Forms.

Sols Wash

Form 1, Section B, #4&5
The proposed Sols Wash levee and the new SR-93 Bypass levee interconnect at the new SR-93 Bypass Bridge. The local drainage area isolated by the two levees concentrates flow in a detention basin behind the two levees and discharges to Sols Wash via two 48-inch pipes (with flap gates). The high water ponding elevation is 2050.4 and exceeds the capacity of the detention basin. A new AH zone is identified on the work maps showing the extent of the new flood pool.

Form 2, Section A, #4
Not Required.

Form 2, Section B, #1
The proposed downstream water surface elevation is based upon the Hassayampa River peak stage taken from the CLOMR prepared by West Consultants, Inc. dated January 2006 (FEMA Case # 06-09-B575R). Elevations in this section are based upon NAVD 1988 datum.

Form 3, Section F
Sediment transport was not considered to have a significant impact due to the gradual nature of the slopes and the grade stabilizing structures located within the wash. These structures include the Tegner Street Bridge (superbox), the drop structure, and the SR-93 Bypass Bridge (superbox).

Hospital Wash

Form 2, Section A, #4
Not Required.

Form 2, Section B, #1
Elevations in this section are based upon NAVD 1988 datum.

Form 3, Section F
Sediment transport was not considered to have a significant effect since the upstream reach consists of a rock lined incised channel that appears stable and the lower reach is a man made trapezoidal grass lined channel with a gradual slope.

US-93 Bridge (Tegner Street Bridge)

Form 3, Section C, #4
Sediment transport was not considered an issue because the bridge is a superbox with upstream and downstream cutoff walls.

Proposed US-93 Bypass Bridge

Form 3, Section C, #4
This bridge (superbox) was designed with the West Consultants, Inc CLOMR (Case # 06-09-B575R). Hydraulic analysis was conducted to determine WSEL only.

Proposed Channelization

Form 3, Section B, #3
A hydraulic jump was designed into the channel at the drop structure where a stilling basin on the downstream side is used to transition from super critical back to sub critical flow regime.

Form 3, Section E, #8
Costal wave overtopping was not a concern of the existing conditions. Historical ponding probability was not analyzed other than as a comparison of the existing and proposed floodplains.

Form 3, Section F
Sediment transport was not considered to have a significant impact due to the gradual nature of the slopes and the grade stabilizing structures located within the wash. These structures include the Tegner Street Bridge (superbox), the drop structure, and the SR-93 Bypass Bridge (superbox).

Proposed Levee/Floodwalls

Form 3, Section E, #4

Structural calculations can be found under a separate cover: *Final Structural Calculations – Wickenburg Downtown Flooding Hazard Mitigation Project* (FCD Project No. 2005C006) prepared by Gannett Fleming, Inc., dated September 6, 2006.

Stationing
Sols Wash Structures

North Bank	*Station*		Station
Levee	112+46.76	to	115+00
Retaining Wall	115+00	to	116+00
Floodwall	116+00	to	124+25.36
Retaining Wall	124+25.36	to	127+21.20
FLoodwall	129+13.29	to	140+62.20
South Bank			
Levee	210+45.69	to	215+50
Floodwall	215+50	to	225+47.80
Retaining Wall	226+76.81	to	231+20.13
Floodwall	231+20.13	to	236+00
Gabion Mattress	236+00	to	243+00

Inlets and Connector Pipes

Channel Station	Left or Right Bank	Opening Type	Highest Elevation for Opening Invert	Type of Closure Device
213+30	Right	2 - 30" RCP's	2043.50	Flap Gate
215+24	Right	18" RCP	2047.00	Flap Gate
218+60	Right	24" RCP	2054.00	Flap Gate
218+75	Right	24" RCP	2054.40	Flap Gate
218+85	Right	24" RCP	2054.40	Flap Gate
223+56	Right	30" RCP	2057.30	Flap Gate
112+80	Left	2 - 42" RCP's	2042.50	Flap Gate
139+20	Left	18" RCP	2064.52	Flap Gate
133+60	Left	24" RCP	2057.90	Flap Gate

Note - Left overbank is the north overbank and right overbank is the south overbank

DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

O.M.B. No. 1660-0016
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Flooding Source: Sols Wash

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

A. GENERAL

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

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

Description Of Structure

1. **Name of Structure:** US-93 Bridge (Tegner Street Bridge)

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

Location of Structure: 0.423

Downstream Limit/Cross Section: 0.412

Upstream Limit/Cross Section: 0.442

2. **Name of Structure:** US-93 Bypass Bridge

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

Location of Structure: river mile 0.121

Downstream Limit/Cross Section: river mile 0.111

Upstream Limit/Cross Section: river mile 0.132

3. **Name of Structure:** Channelization

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

Location of Structure: river mile 0.132 through 0.746

Downstream Limit/Cross Section: river mile 0.132

Upstream Limit/Cross Section: river mile 0.746

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

B. CHANNELIZATION

Flooding Source: Sols Wash

Name of Structure: Sols Wash Channelization

1. Accessory Structures

The channelization includes (check one):

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

2. Drawing Checklist

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

3. Hydraulic Considerations

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

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

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

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

☐ Inlet to channel ☐ Outlet of channel ☒ At Drop Structures ☐ At Transitions

Other locations (specify): ____

4. Sediment Transport Considerations

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

C. BRIDGE/CULVERT

Flooding Source: Sols Wash

Name of structure: US-93 Bridge (existing Tegner Street Bridge), US-93 Bypass Bridge (new bridge)

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
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

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

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

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why 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: Sols Wash

Name of Structure: Channelization, US-93 (Tegner Street Bridge), US-93 Bypass Bridge (new bridge)

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

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

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

Sediment transport rate _____ (percent concentration by volume)

Method used to estimate sediment transport: see Note sheets

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

Method used to estimate scour and/or deposition: _____

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

_____

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

DEPARTMENT OF HOMELAND SECURITY
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Flooding Source: Sols Wash

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

A. GENERAL

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

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

Description Of Structure

1. **Name of Structure:** Levee/Floodwalls

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

Location of Structure: Beginning at river mile 0.132 upstream to river mile 0.746

Downstream Limit/Cross Section: RM 0.132

Upstream Limit/Cross Section: RM 0.746

2. **Name of Structure:**

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

Location of Structure:

Downstream Limit/Cross Section:

Upstream Limit/Cross Section:

3. **Name of Structure:**

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

Location of Structure:

Downstream Limit/Cross Section:

Upstream Limit/Cross Section:

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

E. LEVEE/FLOODWALL

1. System Elements

his 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 111+50	to 115+0
☒ structural floodwall	Station 115+00	to 244+40
☐ Other (describe): _____	Station _____	to _____

c. Structural Type (check one):

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

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

☐ Yes ☐ No

If Yes, by which agency? _____

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

1. Plan of the levee embankment and floodwall structures — Sheet Numbers: see index
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: see index
3. A profile of the BFE, closure opening outlet and inlet invert elevations, type and size of opening, and kind of closure — Sheet Numbers: see index
4. A layout detail for the embankment protection measures. — Sheet Numbers: see index
5. Location, layout, and size and shape of the levee embankment features, foundation treatment, floodwall structure, closure structures, and pump stations. — Sheet Numbers: see index

2. Freeboard

a. The minimum freeboard provided the BFE is:

Riverine

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

Coastal

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

2. Freeboard (continued)

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

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

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

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

3. Closures

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

If opening exists, list all closures:

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

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

Note: Geotechnical and geologic data

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

4. Embankment Protection

a. The maximum levee *slope landside is:* 3H : 1V

b. The maximum levee *slope floodside is:* 0.5H : 1V

c. The range of velocities along the levee during the *base flood is:* 7 cfs (min.) to 12 cfs (max.)

d. Embankment material is protected by (describe what kind) Gabion matress/baskets with geotextile liner

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

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

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

4. Embankment Protection (continued)

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):
External stability (i.e. sliding, overturning and bearing capacity). Global stability. Tractive force analysis.

Attach engineering analysis to support construction plans.

5. Embankment and Foundation Stability

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

☒ Overall height: Sta. 212+50 , height 21 ft.

☐ Limiting foundation soil strength:

Sta. 212+50 , depth 0' to 31' to

strength ϕ = 31 degrees, c = 0 psf

slope: SS = 0.5 (h) to 1 (v)

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

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

c. Summary of stability analysis results:

Case	Loading Conditions	Critical Safety Factor	Critical (Min.)
I	End of construction	1.3	1.3
II	Sudden drawdown	1.3	1.0
III	Critical flood stage	n/a (not a load condition per USACE)	1.4
IV	Steady seepage at flood stage	n/a (steady seepage does not occur)	1.4
VI	Earthquake (Case I)	n/a (at flood stage)	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: SEEP/W numerical anlaysis

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 24 hours.

Attach engineering analysis to support construction plans.

6. Floodwall and Foundation Stability

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

☐ UBC (1988) or ☒ Other (specify): USACE EM 1110-02-2502

b. Stability analysis submitted provides for:

☒ Overturning ☒ Sliding If not, explain: _____

c. Loading included in the analyses were:

☐ Lateral earth @ P_A = 0.32 psf; P_p = 3.12 psf

☐ Surchage-Slope @ _____ , ☐ surface _____ psf

☐ Wind @ P_w = _____ psf

☒ Seepage (Uplift); yes ☐ Earthquake @ P_{eq} = <0.05 %g

☐ 1%-annual-chance significant wave heightft. _____

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

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

Itemize for each range in site lay out 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	See Attached Table			
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	1978	
Maximum allowable	>2000	

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)

6 d.

Flood Wall Stability Analysis Results

Loading Condition	Criteria (Min)			Type A Wall		Type B Wall	
	Overturning		Sliding	Sta. 124+25.36	To 129+13.29	Sta. 115+00	To 140+47.20
	Min base area in compression	Resultant ratio = $\frac{x_R}{\text{Base}}$		Sta. 227+13.09	To 231+20.13	Sta. 215+50	To 236+00
				Overturning	Sliding	Overturning	Sliding
Design Flood	100%	0.50 to 0.33	1.50	0.39	4.87	0.44	– (iii)
Water to top of wall	75%	0.25	1.33	0.27	1.55	0.25	1.61
Earthquake (i)		> 0	1.10				
Construction (ii)	75%	0.25	1.33	0.4	5.33	0.46	3.14

(i) Earthquake not considered since P_{eq} = 0.05 g i.e. very small seismic force

(ii) Walls actually checked for full base area in compression and min FS in sliding of 1.50

(iii) Landside passive forces greater than waterside forces; hence no sliding condition

7. Settlement

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

b. The computed range of settlement is 0.04 ft. to 0.08 ft.

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

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

Majority of settlement is immediate, during construction.

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: 135 cfs

e. Which flooding conditions were analyzed?

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

If No for any of the above, attach explanation.

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

If No, attach explanation.

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

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

8. Interior Drainage (continued)

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 electronic, 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.

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. the planned/installed works in full compliance with Part 65.10 of the NFIP regulations? ☒ Yes ☐ No

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

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

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

11. Maintenance Plan

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

12. Operations and Maintenance Plan

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

F. SEDIMENT TRANSPORT

Flooding Source: _____

Name of Structure: _____

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

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

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

Sediment transport rate _____ (percent concentration by volume)

Method used to estimate sediment transport: _____

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

Method used to estimate scour and/or deposition: _____

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

_____

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

DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

O.M.B. No. 1660-0016
Expires August 31, 2007

PAPERWORK BURDEN DISCLOSURE NOTICE

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Flooding Source: Hospital Wash

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

A. GENERAL

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

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

Description Of Structure

1. **Name of Structure:** Cavaness Avenue Box Culverts

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

Location of Structure: RM 0.080

Downstream Limit/Cross Section: RM 0.074

Upstream Limit/Cross Section: RM 0.081

2. **Name of Structure:**

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

Location of Structure:

Downstream Limit/Cross Section:

Upstream Limit/Cross Section:

3. **Name of Structure:**

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

Location of Structure:

Downstream Limit/Cross Section:

Upstream Limit/Cross Section:

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

B. CHANNELIZATION

Flooding Source: Hospital Wash

Name of Structure: Cavaness Avenue Box Culverts

1. Accessory Structures

The channelization includes (check one):

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

2. Drawing Checklist

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

3. Hydraulic Considerations

The channel was designed to carry 500 (cfs) and/or the 100 -year flood.

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

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

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

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

4. Sediment Transport Considerations

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

C. BRIDGE/CULVERT

Flooding Source: Hospital Wash

Name of structure: Cavaness Avenue Box Culverts

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
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

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

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

4. Sediment Transport Considerations

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

SECTION 3: SURVEY AND MAPPING INFORMATION

3.1

Mapping for Sols Wash was provided by the Flood Control District who used Southwest Mapping Technologies, Inc. to perform the service. The survey was performed under FCD2003C050 (Assignment 8). The aerial date is 9/5/05 and the scale is 1:2400. The mapping was performed using local datum (NAVD 88) and the mapping has a 1' contour interval.

The new Sols Wash mapping also covered Hospital Wash from the confluence with Sols Wash upstream to cross section 0.215. Upstream of cross section 0.215 the District provided mapping prepared by Stewart Geotechnologies having a 2-foot contour interval.

3.2 Field Survey Information

Six structures were field surveyed within the project boundary. The field survey was sub-contracted to Brady Rich and Associates who performed the survey under FCD2003C050 (Assignment 9). The survey was performed on October 25, 2005. Local GDAC points were used as control points.

The structures surveyed were as follows:

1. Tegner Street Bridge – NW retaining wall (extension from Abutment #1)
2. Tegner Street Bridge – SW retaining wall
3. Tegner Street Bridge – SE retaining wall (extension from Abutment #2)
4. Hospital Wash – 4-2'x2' Box Culverts at Cavaness Avenue
5. Coffinger Park retaining wall
6. Basha's/Apartment Complex retaining wall

The surveyed points for the Tegner Street Bridge were used to determine the difference in elevation between the ADOT plans for the bridge and the NAVD 88 vertical datum used for the design of this project. The difference was determined as adding 1.51 feet to the ADOT plans to meet NAVD 88. The Tegner Street Bridge elevations were revised for the HEC-RAS modeling of Sols Wash.

Proposed improvements to existing structures include:

- Improvements to the upstream side of the Tegner Street Bridge include new pier extensions and a raised parapet wall.
- The existing retaining wall along the apartment complex and Basha's will be removed and replaced with a new wall built on the wash side.
- The existing retaining wall along the southwest side of Coffinger Park will be removed and replaced with a new retaining wall.
- The existing box culverts on Hospital wash, at Cavaness Avenue, will be removed and replaced with new larger culverts.

3.3 Conversion to NAVD 1988

Conversion from NGVD 1929 to NAVD 1988 is accomplished by adding 1.98 feet. This conversion was obtained from the VERTCON program.

3.4 ADOT US-93 Interim Bypass

The datum difference between the ADOT plans for the interim bypass project (Jacobs and Assoc.) and the Sols Wash improvement plans was determined by referencing two monuments common to each project. These monuments are described in the following table:

Table 3.4 Monument Datum Comparison Between ADOT and NAVD 1988

Control Point No.	Description	ADOT Elevation [feet]	FCD Elevation [feet]	delta [feet]
1	Brass Cap Flush, #19817, South 1/4 Corner	2042.50	2044.47	1.97
2	Brass Cap, Intersection of Mohave & Jefferson	2065.49	2067.47	1.98

The elevation difference of 1.98 feet is added to ADOT's plans to reach the NAVD 1988 datum which is the basis for the Sols Wash improvements.

SECTION 4 HYDROLOGY

No new hydrology was performed for Sols Wash; however, new hydrology was prepared for Hospital Wash based upon new mapping that resulted in a smaller contributing watershed. Also, new hydrology was developed for the local drainage area located between the Hospital Wash watershed and ADOT's new SR-93 Bypass levee.

4.1 Method Description

The Corps of Engineer's HEC-1 computer hydrograph program version 4.1 was used to evaluate hydrology at various concentration points. The HEC-1 input data was generated from 10-foot contour mapping, aerial photographs, the ArcView GIS program, and the Flood Control District of Maricopa County's *Drainage Design Management System for Windows* (DDMSW) version 2.1.0.

Both the 100-year 6-hour and 24-hour storms were evaluated with the more conservative model being chosen. For this study the 6-hour storm has the highest peak discharge. Green-Ampt is used to calculate loss parameters. The Clark method was selected as the unit hydrograph for both Hospital Wash and the local hydrology models.

4.1.1 Sols Wash

The peak discharge used for the design is the effective discharges taken from the Flood Insurance Study (FIS). The following table shows the peak discharges:

Table 4.1.1 100-year Peak Discharge (FEMA)

Location	Contributing Drainage Area [sq. miles]	Peak 100-year Discharge [cfs]
Sols Wash, at confluence with Hassayampa River	147.2	15,045
Sols Wash, above confluence of Casandro Wash	145.2	14,459
Sols Wash, above confluence of Hospital Wash	145.1	14,413
Sols Wash, above confluence of Flying E Wash	134.8	12,945

4.1.2 Hospital Wash

According to the FEMA issued FIS, the regulatory discharge for Hospital Wash is 900 cfs. A discrepancy in the watershed area was identified during an examination of the new mapping. The newly delineated area is 0.38 square miles versus 0.5 square miles in the effective FIS. The difference is an approximately 25 percent reduction in the contributing drainage area. Therefore, the existing FIS is believed to overestimate the regulatory discharge and was reevaluated for this study.

The watershed was redelineated following Flood Control District of Maricopa County methodology. The soil, land use, and sub-basin parameters were input in the FCD's DDMSW modeling program. Green-Ampt was used to estimate loss parameters. The watershed is less than 5 square miles so Clark was used as the runoff hydrograph, and HEC-1 models were created for the 10-year and 100-year peak discharge.

Table 4.1.2 Peak Discharge for Hospital Wash

Location	Drainage Area [acres]	10-Year Peak Discharge [cfs]	100-year (24-Hr) Peak Discharge [cfs]	100-year (6-Hr) Peak Discharge [cfs]
Hospital Wash at confluence with Sols Wash	242.5	168	369	502

4.1.3 Sols Wash – Local Hydrology

This drainage area is created, by confining previously uncontained flows, with the embankment for the ADOT US-93 Bypass and the channel improvements on Sols Wash. The contributing drainage area extends west to the ridge that separates the Hospital Wash watershed and north to where a natural ridge line intersects with the US-93 Bypass improvements (see the Hydrology and Drainage Area Map in Appendix G).

The drainage area is broken down into eight contributing sub-basins. The Water Quality Assurance Revolving Fund (WQARF) site has a discharge pipe used exclusively to drain the site to the Hassayampa River, however, the pipe is insufficient to drain the 100-year local runoff so excess flow is routed south to CP-4 and ultimately into the detention basin at CP-6 (see Exhibit 1).

There are several different modeling conditions that must be looked at to determine the most conservative condition that results in the highest water surface elevation. To meet FEMA requirements only the 100-year storm would be modeled without looking at adjacent flow conditions, however, the Flood Control District requires a comparison of flow conditions to determine the most conservative result. These conditions are as follows:

1. 100-year runoff in the local watershed with 10-year flow in the receiving waters.
2. 10-year runoff in the local watershed with 100-year flow in the receiving waters.

The HEC-1 Model was setup with three outfalls. The first two outfalls discharge storm water to the Hassayampa River via culverts that extend through the US-93 Bypass embankment.

1. The first outfall is a 60-inch pipe with flap gate in Sub-basin 1. The flap gate on the outlet prevents water flowing in the Hassayampa River from backing up to the inlet. A small amount of storage is available at the inlet in the case that water cannot be discharged into the Hassayampa River. Flow in excess of the provided storage will spill along the levee to the concentration point at Sub-basin 2.
2. The second outfall is a 66-inch pipe in Sub-basin 2. This pipe is located just upstream of the WQARF site and conveys stormwater out to the Hassayampa River. No flap gate is provided on this pipe so stormwater can backup into the flood pool located around the inlet as can be seen in the CLOMR prepared by West Consultants.
3. The third outfall is at the south end of the drainage area just east of Coffinger Park and adjacent to Sols Wash. This outfall discharges storm water from a proposed detention basin into Sols Wash via two 42-inch pipes with flap gates.

All of the hydrology models, storage volumes, pipe calculations and rating curves can be found in Appendix D.

Outfall 1: Subbasin 1

This condition of the hydrology model occurs just downstream of ADOT's second traffic circle where it joins Tegner Street. Stormwater runoff from Subbasin 1 is concentrated in a storm drain pipe that discharges into a short section of channel prior to entering the 60-inch pipe culvert that conveys the storm water under the SR-93 Bypass levee. The outlet of the 60-inch pipe has a flap gate to prevent stormwater in the Hassayampa River from backing up through the pipe.

Both design conditions were analyzed to determine which has the most conservative result. Since the 10-year on the Hassayampa does not affect the outlet of the 60-inch pipe the local 100-year runoff is conveyed under the SR-93 Bypass levee unimpeded through the 60-inch pipe. However, with the 100-year flow on the Hassayampa River the flap gate is submerged so that no water is discharged into the river. The local 10-year runoff ponds at the inlet and within the right-of-way until it exceeds the local storage capacity then it flows south to the next downstream concentration point located on the north side of the WQARF Site. The following table shows the calculated water surface elevations for each condition.

Table 4.1.3a Peak Flow Condition at 60-inch Pipe Outlet (Subbasin 1)

Location	Calculated WSEL (NGVD 29) [elev]
100-yr Local, 10-yr Hassayampa River	2068.36
10-yr Local, 100-yr Hassayampa River	2068.80

Outfall 2: Subbasin 2 (North of WQARF Site)

This condition of the hydrology models occurs upstream of the Water Quality Assurance Revolving Fund site (WQARF) where a 66-inch pipe crosses through ADOT's SR-93 Bypass levee. At this location the CLOMR prepared by West Consultants shows a zone AE floodplain (2066.1 – NGVD 29) on the west side of the US 93 Bypass roadway caused by stormwater backing up through the discharge pipe. The roadway plans by Jacobs Engineering shows a dike adjacent to the WQARF site with a top elevation of 2070.0. The flood pool created by local drainage and/or backflow from the Hassayampa River causes water to pond to the following elevations based upon existing storage capacity.

Table 4.1.3b WSEL's at 66-inch Outlet Pipe (North of WQARF Site)

Storm Frequency	WQARF Site High Water Elevation (NGVD 29) [Elev.]	WQARF Site Dike Elevation (NGVD 29) [Elev.]	Current Freeboard [ft]
100-yr local, 10-yr Hassayampa River	2064.26	2070.0	5.74
10-yr local, 100-yr Hassayampa River	2066.89	2070.0	3.11

While maintaining 3-feet of freeboard on the downstream dike (north end of WQARF site); there is sufficient storage volume in the flood pool, above the 100-year WSEL (Hassayampa River), to store the 10-year local inflow. The current freeboard is more than the 3.0 feet required by FEMA and the area is covered by a Town of Wickenburg floodplain regulations stating that *"no new development (including fill) shall be permitted within any "A" zone unless the cumulative effect of the proposed development, when combined with all other existing and anticipated developments, will not increase the water surface of the base flood more than one foot (1')".*

It is important for this ordinance to be enforced to prevent owners/developers from filling the proposed floodplain shown on West Consultant's Floodplain work maps. There is insufficient freeboard to allow the base flood to be raised one foot per the Town's adopted regulations and still maintain the 3-feet of freeboard on the WQARF site dike.

Outfall 3: Subbasin 6 (Detention Basin)

The detention basin will be built with the US 93 Bypass project except at the southern end where the contours will be blended into the existing contours along Sols Wash. When the Sols Wash project begins the levee and outfall pipes will be constructed which will then enclose the basin.

Storm water that ponds in the detention basin discharges, to Sols Wash, through two 42-inch pipes located at the southeast corner of Subbasin 6. The pipes have flap gates on the Sols Wash side to prevent backflow into the basin. During the local 10-year event (100-year event on Sols wash) the basin does not discharge to Sols Wash since there is a negative hydrostatic head, therefore, the basin must retain all local runoff until the water depth in Sols Wash recedes allowing the basin to drain through the discharge pipes. However, during the local 100-year event (10-year flow on Sols Wash) a positive hydrostatic head develops which allows a discharge of flows into Sols Wash through the outlet pipes.

To determine the controlling conditions and the stage-storage-discharge relationship for the outlet pipes the following flow conditions were looked at to determine which was the most conservative resulting in the highest ponding elevation within the detention basin. These conditions were identified and can be found in the following table.

Table 4.1.3c WSEL's at Detention Basin Outlet Pipes

Condition	Starting WSEL (NAVD 88) [ft]	Description	Resulting Detention Basin Ponded WSEL (NAVD 88) [ft]
1	2052.55	100-yr on Sols Wash, 10-yr in Local Drainage Area	2049.2
2	2048.83	10-yr on Sols Wash, 100-yr in Local Drainage Area	2050.4
3	2054.28	100-yr on Hassayampa River, 10-yr in Local Drainage Area	2049.2

Conditions 1 and 3 both exceed the top of the outlet pipes, therefore, the flap gates will prevent storm water from flowing either way through the pipes such that the local 10-year runoff must be stored within the proposed detention basin. Condition 2 discharges flow based upon a rating curve, however, the inflow exceeds the outflow and the resultant peak water surface within the detention basin is higher. Therefore, Condition 2 controls the outlet.

Based upon the criteria established by the Flood Control District of Maricopa County in the hydrology, the peak storage elevation was determined to be 2050.4. The detention basin has a maximum storage capacity of approximately 7.1 acre-feet at an elevation of 2047.0. Therefore, the runoff is not fully contained within ADOT right-of-way as excess storm water that exceeds the basin capacity will pond in the area around the east end of Coffinger Park as well as adjacent to the US 93 Bypass embankment.

The lowest finished floor elevation of the residences adjacent to the new detention basin is 2052.76. The design flood pool elevation is more than 2-feet lower (2050.4) than that finished floor. However, one structure is inundated by ponded storm water near the upstream end of the basin. This structure is a storage shed located at the rear of the lot of the property at 188 Swilling Avenue. Flowage easements will be obtained from the property owners at locations where the flood pool extends outside the ADOT right-of-way. The following table lists the addresses and flowage easements required by this project.

Table 4.1.3d Flowage Easement Summary Table

County Assessor Data				Total Parcel Area [acres]	Extent of Flood Pool on Parcel [acres]
BOOK	MAP	PARCEL	Property Address		
505	09	052	205 N WEAVER ST	0.473	0.112
505	09	053	MUNICIPAL OWNED	0.044	0.010
505	09	054A	761 N WEAVER ST	0.340	0.016
505	09	063	203 N WEAVER ST	0.163	0.045
505	15	023	188 SWILLING AVE	0.431	0.182
505	15	024	398 N CHESTNUT ST	0.622	0.354
505	15	044	MUNICIPAL OWNED	0.255	0.092
505	16	012B	488 N WEAVER RD	0.258	0.050
505	16	012C	132 W SWILLING AVE	0.641	0.003

4.1.4 Sols Wash – Onsite Hydrology

Currently local drainage on both sides of Sols Wash is conveyed into Sols Wash. Once the levee/floodwalls are in place, the runoff will be cut off and unable to reach Sols Wash. This runoff is collected at local low points and conveyed into Sols Wash via storm drain inlets and connector pipes.

The local sub-basins are all less than 10 acres so the rational method was used to calculate peak discharges. The calculations were completed using methodology in the County's Hydraulic Design Manual. The following are the peak discharges for the local drainage areas located adjacent to Sols Wash. Calculations can be found in Appendix D.2.

Table 4.1.4 Local Drainage Peak Discharge Summary

Sub-basin ID	Drainage Area [acres]	Q_{10} [cfs]	Q_{100} [cfs]
1	3.6	15.2	31.1
2	6.1	24.9	50.1
3	10.3	53.0	95.4
A	2.7	12.2	23.4
B	6.9	26.6	50.7
C	7.1	33.9	65.5
E	0.8	4.0	7.2
N1	0.3	0.8	1.6
N2	3.9	10.5	21.5

4.2 Parameter Estimation

4.2.1 Drainage Area Boundary

The Hospital Wash watershed is approximately 0.38 square miles. The watershed is bowl shaped with a single outlet channel. Due to its size and shape only one sub-basin was used to model the watershed.

The local drainage area located between Hospital Wash and the proposed ADOT SR-93 Bypass was divided into seven sub-basins based upon flow splits and concentration points. The largest and smallest sub-basin areas are 43.7 and 21.6 acres with the average basin size of 30.4 acres. There is also a 10.0 acres site dedicated for the Water Quality Assurance Revolving Fund (WQARF) site. The WQARF site discharges directly to the Hassayampa River through a dedicated drainage pipe.

The Aguila-Carefree soil survey from the Natural Resources Conservation Service (NRCS) was used. Using a shapefile of the sub-basin boundary in ArcView, it was possible to cut the soil data for the sub-basin. The soil data was exported to a database file and then imported into the District's DDMSW program. Land use was developed from aerial photographs, parcel information and zoning maps.

4.2.2 Watershed Work Maps

A Drainage boundary map is included in the map pocket as well as soils maps and land use maps. The HEC-1 schematic (hydrologic workmap) for both Hospital Wash and the local drainage area are shown on the Drainage Boundary Map.

4.2.3 Precipitation

NOAA Atlas II, *Precipitation Frequency Atlas of the Western United States, Volume VIII, Arizona* was the source of the isopluvial maps used to determine the 2-year and 100-year, 6-hour and 24-hour rainfall. The point rainfalls were input into Prefre (which is part of the District's DDMSW program).

4.2.4 Physical Parameters

The following sections describe how the physical parameters were estimated for sub-basins within the watershed. DDMSW output can be found in Appendix D.

4.2.4.1 Rainfall Losses

Rainfall infiltration losses were calculated using the District's DDMSW software. The rainfall loss method was Green and Ampt. Soil parameters were taken from three NRCS soil surveys. The soils data was input into the DDMSW model which partially bases rainfall losses on soils. Appendix D includes output tables for soils, land use and a combined basin data table that documents parameter estimation for each sub-basin.

Surface retention losses include all rainfall losses not associated with infiltration. These losses include depression storage, interception and evaporation. The District has a prepared table in their *Drainage Design Manual for Maricopa County, Arizona, Volume I Hydrology* covering land use and surface retention loss. These values, for the initial abstraction (IA), were applied to the sub-basins in the DDMSW program.

The percent impervious input data is based upon land use and the representative values described within the District's Drainage Design Manual. The data is included in the default parameters of the District's DDMSW program.

4.2.4.2 Unit Hydrograph

The Clark method was selected as the unit hydrograph to model Hospital Wash since it is a small area. The majority of the watershed is undeveloped desert with some residential.

4.2.4.3 T_c and Lag

Basin lag was estimated from watershed characteristics using the following equation:

$$Lag = C\{(L^*L_{ca})/S^{0.5}\}^m$$

where L = length of the longest watercourse in miles
Lca = length along the watercourse to a point opposite the centroid in miles
S = watercourse slope in feet per mile
C = 24Kn and m =0.38 (USACE, 1982)
or C = 26Kn and m = 0.33 (USBR, 1987)
and Kn = variable dependant upon the selection of S-Graph type

When necessary the DDMSW program automatically adjusts the slope for unreasonably large average slopes by determining the mean slope for the sub-basin in question. This process can by done by hand and input into the DDMSW program by inserting a customized value, however, it was not necessary for this project.

4.3 Problems Encountered During the Study

4.3.1 Special Problems and Solutions

The only special hydrologic problems dealt with during the design of the Sols Wash Channel Improvements was determining the conditions that provides the most conservative estimate of the peak discharge or peak stage. This problem was solved by analyzing each condition and then comparing the results to identify the control for which the design is based upon. Sections 4.1.3 goes into this problem in greater detail.

4.3.2 Warning and Error Messages (Hydrology)

There were no error or warning messages from the HEC-1 output file.

4.4 Calibration

There was no data available to calibrate these models.

4.5 Final Results

4.5.1 Hydrologic Analysis Results

The following tables summarize discharges based upon the output from the HEC-1 models.

Table 4.5.1a Peak Discharge for Hospital Wash (SB-A1)

Location	Drainage Area [sq. mi.]	10-Year Peak Discharge [cfs]	100-year (24-Hour) [cfs]	100-year (6-hour) [cfs]	Effective FIS 100-yr [cfs]
Hospital Wash, Honeysuckle Avenue	0.5	-	-	-	900
Hospital Wash, confluence with Sols Wash	0.38	168	369	502	-

Note: Honeysuckle Avenue could not be located on a map or in the field.

Table 4.5.1b Peak Discharge for the Local Drainage Area

Subbasin/CP ID	Drainage Area [acres]	Drainage Area [sq. mi.]	10-Yr Discharge [cfs]	100-Yr Discharge [cfs]	10-Yr Peak Stage [elev]	100-Yr Peak Stage [elev]	Highest Peak Stage Event
SB01	34.9	0.05	98	177	2068.8	2068.4	10-yr Local, 100-yr Hassayampa River
SB01A	21.6	0.03	72	121			
SB02	25.4	0.04	87	141			
CP02	47.0	0.07	194	260	2066.9	2064.3	10-yr Local, 100-yr Hassayampa River
SB03	30.6	0.05	84	142			
SB04	26.8	0.04	58	107			
CP04	57.4	0.09	135	265			
SB05	29.7	0.05	45	100			
SB06	43.7	0.07	51	122			
CP06	130.8	0.20	211	449	2049.2	2050.4	100-yr Local, 10-yr on Sols Wash

Note: SB01 and CP02 elevations are on the NGVD 29 datum. CP06 elevations is on the NAVD 88 datum.

4.5.2 Verification of Results

Peak runoff values were compared with those from the FIS. Therefore, the hydrologic results from this model are compared to those of the original study.

Table 4.5.2 Comparison of Peak Discharges for Hospital Wash

Location Description		10-year	50-year	100-year	500-year
EEC Peak Discharges	Discharge (cfs) Area (sq. mi.)	170 0.38	390	500	845*
FIS Peak Discharges	Discharge (cfs) Area (sq. mi.)	150 0.5	600	900	2000

*Source – Malvick 500-year Q = (100-year Q) x (1.69)

The newly modeled values shown in the table are clearly lower than those developed for the effective FIS. This was expected since the drainage area is 24-percent smaller than what is reported in the effective FIS.

SECTION 5: HYDRAULICS

This section of the report describes and documents the channel improvements to Sols Wash and Hospital Wash. The channel improvements to Sols Wash tie into ADOT's new SR-93 Bypass project and thereby the two projects join together and complete this project's overall goal; which was to mitigate the existing Sols Wash floodplain by providing a conveyance corridor for the 100-year discharge. Refer to the Sols Wash plans or for details of this project.

5.1 Method Description

For this CLOMR, the delineation was calculated using the Army Corps of Engineer's *Hydrologic Engineering Center - River Analysis System* (HEC-RAS) version 3.1.3 (May 2005).

5.1.1 Duplicate Effective Model

The FEMA Project Library was contacted to locate the digital input HEC-2 models of the effective FIS for both Sols Wash and Hospital Wash. These models could not be located so instead PDFs of some of the output was delivered by the library and included in Appendix E.3 of this report.

In an effort to provide, at a minimum, a duplicate effective model the Flood Control District obtained the duplicate effective model used by Gold Mine Village for the CLOMR submitted by JE Fuller Inc. in July, 2002. This HEC-RAS model was manipulated to extend it upstream so as to tie into a common point of reference, that being cross section M of the effective FIS. The Duplicate Effective model can be found in Appendix E.4.

5.1.2 100-Year Discharges

The 100-year discharges for Sols Wash was taken from the current FIS (see Section 4.1.1). New hydrology was developed for Hospital Wash based upon better data (see Section 4.1.2).

5.1.3 Starting Water Surface Elevations

For Sols Wash normal depth was used as the starting condition at the downstream confluence with the Hassayampa River. Downstream of the drop structure the effective WSEL as shown in the flood profiles is equal to the backwater from the Hassayampa River at an elevation of 2054.17.

Normal depth was also used as the starting condition for starting Hospital Wash at the confluence with Sols Wash.

5.1.4 Sols Wash

Cross sections of Sols Wash were developed with improvements to the wash banks as a basis of design in the Wickenburg Downtown Flooding Mitigation Hazard Project Final Design Report. To justify the design the cross sectional data was imported and modeled

in HEC-RAS. Additional information including roughness coefficients, expansion and contraction coefficients, and bank stations were input to the HEC-RAS model at each cross section. The thalweg from the current FIS was used as a guide but was not followed exactly because of changes in the wash. Once the HEC-RAS model was complete, the floodplain was drawn on the digital work maps.

The proposed conditions HEC-RAS model is terminated on the downstream side of the proposed US 93 Bypass bridge at the confluence with the Hassayampa River floodplain. At this point the floodplain will tie into the proposed floodplain from the CLOMR prepared by WEST Consultants, Inc. for the Hassayampa River.

The HEC-RAS model, of the proposed conditions, was extended upstream two cross sections beyond the limits of improvements to match the effective floodplain. The following table shows the comparison between the new and effective floodplain models at a cross section located in the same position.

Table 5.1.4 Upstream Tie-in of New and Effective Floodplain

	River Mile	Section ID	WSEL (FP) (NGVD 29)	WSEL (NAVD 88)	delta [ft]	WSEL (FW) (NGVD 29)	WSEL (NAVD 88)	delta [ft]
FEMA FIS	1.3	M	2097.0	2098.98	0	2097.0	2098.98	0
EEC	1.315	1.315	-	2098.62	0.36	-	2098.60	0.38

At cross section 0.955, on Sols Wash, the left bank is exceeded with flow breaking out into the overbank area. The breakout of flow is limited to a short section as the downstream channel has conveyance without overtopping the banks. The breakout flow makes its way through the mobile home community located on the north bank of Sols Wash as the discharge works its way back to Sols Wash. The flow in the overbank is characterized as shallow sheet flow with average depths of less than 1-foot, and is thus classified as an AO flood zone. This flow ultimately returns to Sols Wash near the Hospital Wash confluence.

5.1.5 Hospital Wash

The HEC-RAS model for Hospital Wash begins at the confluence with Sols Wash and extends upstream to the distance as the effective floodplain. There is no tie in or comparison of water surface elevations due to the revisions of the hydrology.

5.2 Work Study Maps

Work study maps were prepared at 1" = 60' scale and cover Sols Wash from the Hassayampa River to approximately 7,000 feet upstream and Hospital Wash from Sols Wash to approximately 2,500 feet upstream.

5.3 Parameter Estimation

5.3.1 Manning's Roughness Coefficients

5.3.1.1 Existing Conditions

The n-value worksheets, found in Appendix E.1, include photographs and calculations for the grouping of cross sections as well as a worksheet for the remaining non-constructed reaches. The horizontal variation in n-value function was used in HEC-RAS to assign an n-value to particular locations in a cross section. If it was necessary, a point was interpolated to place an n-value at a particular location.

5.3.1.2 Proposed Conditions

Manning's roughness coefficients can be determined from observation of the existing conditions, however, with the channel improvements comes a widened channel and/or new bank materials. The Manning's "n" value is adjusted to reflect the proposed future conditions.

5.3.2 Contraction and Expansion Coefficients

Generally the contraction and expansion coefficients are set at 0.1 and 0.3 respectively. At the bridges and in areas where there are significant blocks, the contraction and expansion coefficients were changed to 0.3 and 0.5.

5.4 Cross Section Description

Cross sections for the HEC-RAS model were created using plans from the Wickenburg Downtown Flooding Mitigation Hazard Project Final Design. The cross sections were cut perpendicular to the flow across the estimated floodplains. The cross sections from the current FIS were used as a guide when the cross sections were laid out. Cross section locations and width varied, from the effective study, because of the new design and new methodology. Cross sections are spaced roughly every 200 feet except at the drop structure where the sections are roughly spaced 15 to 20 feet apart.

Cross section profiles are fairly consistent. The channel bottom remains mostly in its native condition except where the island trimming will occur. The channel banks are either stacked gabion baskets, floodwalls, or levees. There are, however, several natural cross sections that are located primarily on the north prong west of the Tegner Street Bridge.

5.5 Modeling Considerations

5.5.1 Hydraulic Jump and Drop Analysis

There is a drop structure being added as part of the design plan. A drop structure has been added to the design plans to adjust the profile of the wash between the Tegner Street Bridge and the new SR-93 Bypass Bridge. This profile adjustment reduces the channel velocity to less than 15 fps thereby reducing channel scour and longitudinal forces acting on the gabion bank protection. The drop occurs between River Miles 0.201 and 0.182

(Station 15+19 to 14+18). Calculations for the drop structure and stilling basin can be found in Appendix E.6.

5.5.2 Bridges and Culverts

There are two bridges being modeled. The first is the existing Tegner Street Bridge. It is composed of 6 – 25' x 10' cells. The second is the proposed US-93 Bypass Sols Wash Bridge. It consists of 7 – 35' x 20' boxes. Both bridges are actually superbox culverts in that there is a floor under each cell which is covered by deposited sediment to the equilibrium flow line. For purposes of modeling the existing Tegner Street Bridge was modeled with the invert being the existing flow line while the new bridge was modeled with the invert at the proposed flow line which matches the existing ground. Both bridges were modeled in HEC-RAS using four-cross section bridge routines.

The west side of the Tegner Street Bridge will receive new pier extensions that continue upstream. These pier extensions serve two purposes; the first is to calm and channelized flow in the wash prior to that flow entering the bridge, and the second is to provide debris run-up on the sloped vanes so that the bridge cells are free from blockage. Additionally, a new extension of the parapet wall will provide additional freeboard on the upstream side of the bridge. Calculations can be found in Appendix G and refer to the design plans for details.

On Hospital Wash the existing culverts at Cavaness Road are undersized and will be removed. They will be replaced with two 10'x4' concrete box culverts. The road profile will be raised to tie into the north bank Sols Wash floodwall. A new floodwall will extend up the east side of Hospital Wash to provide freeboard from backwater on Sols Wash. Calculations can be found in Appendix G and refer to the design plans for details.

5.5.3 Levees and Dikes

The proposed design includes earthen levees, floodwalls and retaining walls as improvements to the wash channel banks. The following summary table identifies the improvement type and location for each section. Structural calculations are located in Appendix G.

Table 5.5.3a Structural Section Summary

	from Station	to Station	Structural Type
North Bank-	112+46.76	115+00	*Levee*
	115+00	116+00.00	*Retaining Wall*
	116+00.00	124+25.36	*Floodwall*
	124+25.36	127+21.20	*Retaining Wall*
	129+13.29	140+62.20	*Floodwall*
South Bank-	210+45.69	215+50	*Levee*
	215+50.00	225+47.80	*Floodwall*
	226+76.81	231+20.13	*Retaining Wall*
	231+20.13	236+00	*Floodwall*
	236+00	243+00	*Gabion Mattress*

The wash side of the earthen levee is protected by stacked gabion baskets and the toe of the levee is protected from scour by a gabion mattress that projects out into the wash. The bottom of each retaining wall extends below scour depth. The footings of the floodwalls are protected from scour by a stacked gabion basket and gabion mattress combination. Refer to the design plans for structural sections and details.

The following table summarizes the design requirements regarding freeboard. In addition to the required freeboard a bend in the channel downstream of the Tegner Street Bridge causes super elevated flow on the south bank. A complete summary of the freeboard provided by the improvements for both the north and south banks can be found in Appendix F.1.

Table 5.5.3b Freeboard Constraints Summary Table

	Required Freeboard (FEMA) [ft]
Levee, at a Structure	4.0
Levee, at upstream end	3.5

5.5.4 Islands and Flow Splits

Upstream of the Tegner Street Bridge, Sols Wash splits into two channels as it passes around an island. The channels are identified as the north and south prongs for the purposes of this report. The island is susceptible to overtopping as flow moves between the north and south prongs. Near vertical banks were observed, during a physical inspection of the island, show that the island is also susceptible to erosion. The overtopping and erosion indicate that the island should remain within the floodplain/floodway.

Island trimming is included in the improvement pans for Sols Wash. The trimming of the island will help increase the conveyance capacity of both the north and south prongs as well as increase the efficiency of flow conveyance into the improved downstream channel section.

5.5.5 Ineffective Flow Areas

Since the improvements to Sols Wash confine the flow within the wash the only locations where ineffective flow is appropriate is on the island upstream of the Tegner Street Bridge. Ineffective flow limits were set up to model the island within the HEC-RAS model.

5.5.6 Supercritical Flow

The existing terrain is relatively uniformly graded with average slopes typically less than one-percent (approximately 0.0075 ft/ft) which is indicative of low to medium velocity flows. The HEC-RAS models were run with both sub-critical and mixed flow regimes. The sub-critical model was used to determine the highest water surface elevations; while

the mixed flow regime was used to determine the highest velocities which were then used to calculate the maximum scour.

5.6 Floodway Modeling

The floodway for both Sols Wash and Hospital Wash were developed using the equal conveyance reduction method and then imported into Method 1. Once within Method 1 adjustments were made to prevent any encroachment in the new channel and therefore, in many cases the floodway was set coincident with the new floodplain.

For Hospital Wash, upstream of cross section 0.270, the floodplain and floodway are not coincident. The floodway was delineated by setting limits at or near the cross section banks to prevent encroachment in the wash. Between cross sections the floodway boundary was drawn parallel to the wash centerline and gradually increases or decreases based upon interpolated midpoints between cross sections.

5.7 Problems encountered during the Study

5.7.1 Special Problems and Solutions

There were no special problems encountered during the course of this study.

5.7.2 Model Warning and Error Messages

The following warning messages were encountered in the hydraulic models.

- *"The energy loss was greater than 1.0 ft (0.3 m) between the current and previous cross section. This may indicate the need for additional cross sections."*
- *"The velocity head has changed by more than 0.5 ft (0.15 M). This may indicated the need for additional cross sections."*
- *"The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross-sections."*
- *"The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface elevation and continued on with the calculations."*
- *"During the standard step iterations, when the assumed water surface elevation was set to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid sub-critical answer. The program defaulted to critical depth."*
- *"Divided flow computed for this cross-section."*

The first five messages relate to the hydraulics of the model and generally indicated when cross sections are too far apart. This is not the case as the sections are typically spaced about 200 feet apart and closer at the drop structure (about 15 feet apart).

The last message deals with divided flow. We have several cross sections that show divided flow since there is an island located between the north and south prongs.

5.8 Calibration

No observed stage/discharge relationship is available for the study washes, so no hydraulic calibration was performed.

5.9 Final Results

5.9.1 Hydraulic Results for Sols Wash

The final HEC-RAS analysis is presented in Appendix E. The following table contains the floodplain and floodway data.

Table 5.9.1 Sols Wash Floodplain/Floodway Summary Table

Reach	River Sta	Q Total	W.S. Elev FP	W.S. Elev FW	Profile Delta
		(cfs)	(ft)	(ft)	(ft)
Sols Wash	1.319	14013	2098.62	2098.60	-0.02
Sols Wash	1.224	14013	2092.89	2092.89	0.00
Sols Wash	1.141	14459	2089.09	2089.09	0.00
Sols Wash	1.081	14459	2086.48	2086.47	-0.01
Sols Wash	1.021	14459	2083.09	2083.09	0.00
Sols Wash	0.955	14459	2079.85	2079.85	0.00
Sols Wash	0.886	14459	2076.77	2076.77	0.00
Sols Wash	0.822	14459	2074.79	2074.80	0.01
Sols Wash	0.785	14459	2072.86	2072.85	-0.01
Sols Wash	0.746	14459	2070.59	2070.59	0.00
Sols Wash	0.708	14459	2069.15	2069.15	0.00
Sols Wash	0.668	14459	2068.95	2068.94	-0.01
Sols Wash	0.642	14459	2068.53	2068.52	-0.01
Sols Wash	0.614	14459	2067.27	2067.27	0.00
Sols Wash	0.592	14459	2066.89	2066.88	-0.01
Sols Wash	0.557	14459	2066.79	2066.79	0.00
Sols Wash	0.529	14459	2066.78	2066.78	0.00
Sols Wash	0.505	14459	2066.50	2066.50	0.00
Sols Wash	0.485	15045	2065.98	2065.98	0.00
Sols Wash	0.467	15045	2065.80	2065.80	0.00
Sols Wash	0.447	15045	2065.87	2065.87	0.00
Sols Wash	0.442	15045	2065.73	2065.73	0.00
Sols Wash	0.412	15045	2061.01	2061.01	0.00
Sols Wash	0.389	15045	2060.76	2060.76	0.00
Sols Wash	0.359	15045	2060.08	2060.08	0.00
Sols Wash	0.306	15045	2059.42	2059.42	0.00
Sols Wash	0.288	15045	2059.30	2059.30	0.00
Sols Wash	0.227	15045	2057.96	2057.96	0.00
Sols Wash	0.220	15045	2057.53	2057.53	0.00
Sols Wash	0.212	15045	2057.22	2057.22	0.00
Sols Wash	0.204	15045	2056.67	2056.67	0.00

Sols Wash	0.201	15045	2055.03	2055.04	0.01
Sols Wash	0.198	15045	2051.71	2051.71	0.00
Sols Wash	0.195	15045	2052.37	2052.37	0.00
Sols Wash	0.192	15045	2052.49	2052.49	0.00
Sols Wash	0.189	15045	2052.60	2052.60	0.00
Sols Wash	0.187	15045	2052.75	2052.75	0.00
Sols Wash	0.184	15045	2052.82	2052.82	0.00
Sols Wash	0.182	15045	2051.61	2051.61	0.00
Sols Wash	0.180	15045	2051.73	2051.73	0.00
Sols Wash	0.169	15045	2052.14	2052.14	0.00
Sols Wash	0.159	15045	2052.33	2052.33	0.00
Sols Wash	0.150	15045	2052.45	2052.45	0.00
Sols Wash	0.140	15045	2052.49	2052.49	0.00
Sols Wash	0.132	15045	2052.45	2052.45	0.00
Sols Wash	0.111	15045	2049.75	2049.74	-0.01

5.9.2 Hydraulic Results for Hospital Wash

The final HEC-RAS analysis is presented in Appendix E. The following table contains the floodplain and floodway data.

Table 5.9.2 Hospital Wash Floodplain/Floodway Summary Table

River Sta	Q Total	W.S. Elev FP	W.S. Elev FW	Profile Delta
	(cfs)	(ft)	(ft)	(ft)
0.703	500	2102.71	2102.75	0.04
0.643	500	2098.06	2098.54	0.48
0.577	500	2093.16	2093.28	0.12
0.530	500	2089.98	2090.54	0.56
0.458	500	2085.82	2085.88	0.06
0.388	500	2079.14	2079.59	0.45
0.343	500	2077.26	2077.79	0.53
0.270	500	2073.98	2073.98	0.00
0.215	500	2072.07	2072.08	0.01
0.153	500	2070.98	2071.02	0.04
0.097	500	2070.35	2070.35	0.00
0.082	500	2069.17	2069.17	0.00
0.081	500	2068.94	2068.94	0.00
0.074	500	2066.66	2066.66	0.00
0.070	500	2066.37	2066.37	0.00

5.9.3 Verification of Results

5.9.3.1 Duplicate and Corrected Effective Model Comparison

An effective model was not obtainable from a search of the FEMA Library. Therefore, a corrected effective model is not provided with this report. A duplicate effective model

was developed by JE Fuller, Inc. for the Goldmine Village CLOMR and is included with this report.

5.9.3.2 Proposed Hydraulic Model – Sols Wash

There are significant physical differences between existing and proposed conditions that would make the comparison meaningless. Therefore, no comparison was done between the proposed conditions model and any previous conditions model.

5.9.3.3 New Hydraulic Model – Hospital Wash

The reduction in the peak discharge between the effective and new hydrologic models precludes any verification of results in this floodplain.

SECTION 6: EROSION AND SEDIMENT TRANSPORT

On Sols Wash the reach between the Hassayampa River and the Tegner Street Bridge appears to be stable with no appreciable erosion or sedimentation. Upstream of the Tegner Street Bridge the south bank has been trimmed by the developer of Gold Mine Village based upon the approved CLOMR for that site while the north bank shows little sign of erosion or sedimentation. Field reconnaissance and examination of aerial photography indicates that erosion is occurring on the island between the north and south prongs upstream of the confluence of Hospital Wash.

The propose improvements to Sols Wash include significant island trimming to increase the capacity of the wash such that the only location, within the project area, that shows signs of erosion will be excavated and removed from the wash. The bank, on the portion of the island that will remain, will be graded to 3:1 side slopes to provide stability.

6.1 Scour Depth

Sols Wash is broken into the following two reaches with regards to sediment transport:

- From upstream of Gold Mine Village to the Tegner Street Bridge
- From Tegner Street Bridge downstream to the US 93 Bypass Bridge

The new structural components of the project will be protected from failure by providing adequate scour protection. To determine the scour depth, of the two reaches, a sediment transport analysis was prepared based upon methodology found in the *Design Manual for Engineering Analysis of Fluvial Systems* (Arizona Department of Water Resources). The calculated scour depth for each reach can be found in the following table. A 1.3 factor of safety is applied to determine the final toe down (calculations can be found in Appendix F.2).

Table 6.1 Required Toe Down Summary

Reach ID	Description	Calculated Scour Depth [ft]	Toe Down Depth w/Factor of Safety [ft]
1	Tegner Street Bridge to US 93 Bypass Bridge	8.01	10.5
2	Upstream end of Project to Tegner Street Bridge	6.93	9.0

SECTION 7: STRUCTURAL ANALYSIS OF LEVEE AND FLOODWALLS

New structures are part of the proposed design plan. These structures are described below with structural calculations located in Appendix G.

7.1 Analysis of Levee

The proposed levees in this project are earthen with a stacked gabion basket wall on the wash side. A geotextile membrane is located behind the gabions to prevent fines from washing away. The gabions are held in position with tie-backs that extend into the levee. The footing of the levee is protected from scour by a gabion mattress that extends out into the wash.

7.2 Analysis of Type A Floodwall

The Type-A floodwall is a retaining wall that extends from below scour depth up to the calculated freeboard height. This wall is used in locations where fill is located behind the wall.

7.3 Analysis of Type B Floodwall

The Type-B floodwall is a grout-solid masonry wall placed on a wide footing. The footing of the wall is protected from scour by stacked gabion baskets and a gabion mattress that extends out into the wash.

7.4 Analysis of Drop Structure

The proposed drop structure is located between the Tegner Street Bridge and the new proposed SR-93 Bypass Bridge. The intent of the drop structure is to raise the wash grade upstream of the drop and thereby reduce the channel velocity. The drop structure will be constructed entirely out of concrete and has a 4.5 foot drop and a 100 foot long stilling basin.

7.5 Analysis of Pier Extensions and Raised Parapet Wall

The upstream side of the Tegner Street Bridge will also be modified. New pier extensions and a raised parapet wall are proposed to funnel flows, deflect debris from the box barrels, and to provide additional freeboard.

SECTION 8: DRAFT FIS REPORT DATA

8.1 Summary of Discharges

A table containing a summary of peak discharges at major outfall locations can be found on the following pages.

8.2 Floodway Data

Floodway data can be found in the Appendices. In most cases the floodway is equal to the floodplain. Tables with the floodway data can be found on the following pages.

8.3 Annotated Flood Insurance Rate Maps

Annotated Flood Insurance Rate Maps prepared with this study can be found in the map pockets at the end of the report. New floodplain and floodway work maps can also be found in the map pockets.

8.4 Flood Profiles

The flood profiles are located in the appendix.

Stream	Drainage	Peak Discharge (cfs)			
	Area (sq. mi)	10-year	50-year	100-year	500-year
Hospital Wash	0.4	170	250	500	895
At the Confluence with Sols Wash					
Sols Wash	147.2	7019	12453	15045	20836
At Confluence with Hassayampa River					
Sols Wash	145.5	6758	11964	14459	20005
Above Confluence of Casandro Wash					
Sols Wash	145.1	6725	11927	14413	19986
Above Confluence of Hospital Wash					

HEC-RAS Plan: Sols River: Sols Wash Reach: Sols Wash Main

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Sols Wash Main	1.319	100-Sols	14413.00	2093.30	2098.62	2098.62	2099.76	0.008626	8.58	1681.75	742.24	0.99
Sols Wash Main	1.319	100-Sols FW	14413.00	2093.30	2098.60	2098.60	2099.76	0.008638	8.65	1664.33	708.15	1.00
Sols Wash Main	1.319	10-yr	6725.00	2093.30	2097.25	2097.25	2098.14	0.009667	7.59	886.64	501.97	1.00
Sols Wash Main	1.319	50-yr	11927.00	2093.30	2098.15	2098.15	2099.31	0.009787	8.64	1385.05	614.85	1.00
Sols Wash Main	1.319	500-yr	19986.00	2093.30	2099.34	2099.34	2100.44	0.008098	8.43	2400.66	1126.73	1.00
Sols Wash Main	1.224	100-Sols	14413.00	2088.01	2092.89	2092.50	2093.58	0.006346	6.67	2160.34	995.33	0.80
Sols Wash Main	1.224	100-Sols FW	14413.00	2088.01	2092.89	2092.50	2093.58	0.006341	6.67	2161.07	995.85	0.80
Sols Wash Main	1.224	10-yr	6725.00	2088.01	2091.75	2091.39	2092.26	0.006631	5.70	1180.34	691.10	0.77
Sols Wash Main	1.224	50-yr	11927.00	2088.01	2092.52	2092.22	2093.19	0.006854	6.59	1811.05	913.42	0.82
Sols Wash Main	1.224	500-yr	19986.00	2088.01	2093.58	2093.07	2094.29	0.005734	6.74	2963.59	1254.42	0.77
Sols Wash Main	1.141	100-Sols	14459.00	2082.21	2089.09	2089.09	2090.14	0.009714	8.20	1762.48	881.17	1.02
Sols Wash Main	1.141	100-Sols FW	14459.00	2082.21	2089.09	2089.09	2090.14	0.009719	8.21	1762.04	881.16	1.02
Sols Wash Main	1.141	10-yr	6758.00	2082.21	2087.41	2087.31	2088.44	0.011560	8.14	830.30	360.17	0.94
Sols Wash Main	1.141	50-yr	11964.00	2082.21	2088.84	2088.84	2089.78	0.008777	7.77	1539.39	670.81	1.03
Sols Wash Main	1.141	500-yr	20005.00	2082.21	2089.59	2089.59	2090.87	0.010827	9.09	2200.01	884.48	1.02
Sols Wash Main	1.081	100-Sols	14459.00	2080.00	2086.48	2085.82	2087.64	0.005233	8.86	1670.14	785.64	1.05
Sols Wash Main	1.081	100-Sols FW	14459.00	2080.00	2086.47	2085.82	2087.64	0.005235	8.66	1669.75	785.30	1.05
Sols Wash Main	1.081	10-yr	6758.00	2080.00	2084.14	2084.05	2085.30	0.008593	8.61	784.75	306.32	0.95
Sols Wash Main	1.081	50-yr	11964.00	2080.00	2085.58	2085.26	2087.00	0.006758	9.56	1248.29	355.35	0.90
Sols Wash Main	1.081	500-yr	20005.00	2080.00	2087.66		2088.49	0.003838	7.29	2756.49	924.59	0.74
Sols Wash Main	1.021	100-Sols	14459.00	2077.00	2083.09	2082.94	2085.12	0.012502	11.44	1264.56	297.92	0.97
Sols Wash Main	1.021	100-Sols FW	14459.00	2077.00	2083.09	2082.95	2085.12	0.012498	11.44	1264.78	297.94	0.97
Sols Wash Main	1.021	10-yr	6758.00	2077.00	2081.17	2080.94	2082.40	0.009755	8.91	758.81	248.46	0.90
Sols Wash Main	1.021	50-yr	11964.00	2077.00	2082.51	2082.30	2084.34	0.010542	10.86	1101.80	267.18	0.94
Sols Wash Main	1.021	500-yr	20005.00	2077.00	2084.81	2084.76	2086.05	0.021669	9.03	2281.09	877.66	0.96
Sols Wash Main	0.955	100-Sols	14459.00	2073.50	2079.85	2079.85	2081.85	0.007175	11.35	1273.71	329.22	1.01
Sols Wash Main	0.955	100-Sols FW	14459.00	2073.50	2079.85	2079.85	2081.85	0.007178	11.36	1273.22	321.51	1.01
Sols Wash Main	0.955	10-yr	6758.00	2073.50	2077.65	2077.65	2079.12	0.008838	9.75	692.92	237.36	1.01
Sols Wash Main	0.955	50-yr	11964.00	2073.50	2079.12	2079.12	2081.10	0.008035	11.31	1057.61	287.46	1.00
Sols Wash Main	0.955	500-yr	20005.00	2073.50	2081.59	2081.59	2082.96	0.004709	9.51	2308.30	871.45	0.97
Sols Wash Main	0.886	100-Sols	14459.00	2071.10	2076.77		2078.17	0.007047	9.49	1525.89	383.51	0.80
Sols Wash Main	0.886	100-Sols FW	14459.00	2071.10	2076.77		2078.16	0.007060	9.49	1523.07	349.81	0.80
Sols Wash Main	0.886	10-yr	6758.00	2071.10	2074.82		2075.73	0.007010	7.65	882.85	309.73	0.80
Sols Wash Main	0.886	50-yr	11964.00	2071.10	2076.20		2077.46	0.007031	9.01	1327.47	337.92	0.80
Sols Wash Main	0.886	500-yr	20005.00	2071.10	2077.95	2077.13	2079.55	0.007169	10.18	2048.77	608.31	0.79
Sols Wash Main	0.822	100-Sols	14459.00	2069.40	2074.79		2076.20	0.004920	9.52	1526.18	381.55	0.79
Sols Wash Main	0.822	100-Sols FW	14459.00	2069.40	2074.80	2074.02	2076.21	0.004889	9.50	1521.74	339.87	0.79
Sols Wash Main	0.822	10-yr	6758.00	2069.40	2072.97		2073.77	0.004781	7.19	939.60	303.42	0.72
Sols Wash Main	0.822	50-yr	11964.00	2069.40	2074.26		2075.50	0.004891	8.92	1341.66	322.18	0.77
Sols Wash Main	0.822	500-yr	20005.00	2069.40	2075.76	2075.25	2077.50	0.005176	10.62	1965.79	547.41	0.86
Sols Wash Main	0.785	100-Sols	14459.00	2068.00	2072.86	2072.86	2074.88	0.008316	11.41	1271.84	342.38	1.00
Sols Wash Main	0.785	100-Sols FW	14459.00	2068.00	2072.85	2072.85	2074.88	0.008412	11.45	1262.50	310.73	1.00
Sols Wash Main	0.785	10-yr	6758.00	2068.00	2071.08	2071.08	2072.38	0.010028	9.17	737.20	286.13	1.01
Sols Wash Main	0.785	50-yr	11964.00	2068.00	2072.32	2072.32	2074.15	0.008781	10.86	1101.58	301.02	1.00
Sols Wash Main	0.785	500-yr	20005.00	2068.00	2074.06	2074.06	2076.28	0.006994	11.95	1793.01	535.53	0.96
Sols Wash Main	0.746	100-Sols	14459.00	2066.63	2070.59		2071.89	0.006016	9.14	1582.43	427.73	0.83
Sols Wash Main	0.746	100-Sols FW	14459.00	2066.63	2070.59		2071.89	0.006014	9.14	1582.42	425.20	0.83
Sols Wash Main	0.746	10-yr	6758.00	2066.63	2069.29		2069.95	0.005263	6.55	1032.00	416.80	0.73
Sols Wash Main	0.746	50-yr	11964.00	2066.63	2070.34		2071.36	0.005188	8.12	1473.73	423.58	0.77
Sols Wash Main	0.746	500-yr	20005.00	2066.63	2071.69		2073.18	0.004951	9.73	2071.82	489.73	0.79
Sols Wash Main	0.708	100-Sols	14459.00	2065.00	2069.15	2068.82	2070.61	0.006657	9.70	1490.38	395.47	0.88
Sols Wash Main	0.708	100-Sols FW	14459.00	2065.00	2069.15	2068.82	2070.61	0.006662	9.70	1489.97	395.40	0.88
Sols Wash Main	0.708	10-yr	6758.00	2065.00	2067.38	2067.38	2068.47	0.010441	8.37	807.68	377.49	1.01
Sols Wash Main	0.708	50-yr	11964.00	2065.00	2068.39	2068.39	2069.95	0.009275	10.02	1193.68	387.76	1.01
Sols Wash Main	0.708	500-yr	20005.00	2065.00	2071.07		2072.27	0.003377	8.80	2272.07	419.76	0.67
Sols Wash Main	0.668	100-Sols	14459.00	2063.30	2068.95		2069.67	0.001993	6.83	2117.99	383.73	0.51
Sols Wash Main	0.668	100-Sols FW	14459.00	2063.30	2068.94		2069.67	0.001994	6.83	2117.52	383.67	0.51
Sols Wash Main	0.668	10-yr	6758.00	2063.30	2066.16		2066.79	0.004206	6.38	1059.32	375.11	0.67
Sols Wash Main	0.668	50-yr	11964.00	2063.30	2068.02		2068.73	0.002484	6.79	1763.28	381.36	0.56
Sols Wash Main	0.668	500-yr	20005.00	2063.30	2070.95		2071.69	0.001386	6.92	2891.51	388.84	0.45
Sols Wash Main	0.642	100-Sols	14459.00	2062.10	2068.53		2069.38	0.002040	7.43	1945.28	314.12	0.53
Sols Wash Main	0.642	100-Sols FW	14459.00	2062.10	2068.52		2069.38	0.002041	7.43	1944.82	314.04	0.53
Sols Wash Main	0.642	10-yr	6758.00	2062.10	2065.68		2066.30	0.003105	6.32	1069.24	304.27	0.59
Sols Wash Main	0.642	50-yr	11964.00	2062.10	2067.58		2068.40	0.002355	7.24	1651.53	309.17	0.55
Sols Wash Main	0.642	500-yr	20005.00	2062.10	2070.55		2071.47	0.001580	7.71	2594.23	326.85	0.48
Sols Wash Main	0.614	100-Sols	14459.00	2060.80	2067.27		2068.89	0.003961	10.23	1413.77	230.63	0.73
Sols Wash Main	0.614	100-Sols FW	14459.00	2060.80	2067.27		2068.89	0.003958	10.23	1413.20	230.17	0.73
Sols Wash Main	0.614	10-yr	6758.00	2060.80	2064.40		2065.61	0.006208	8.81	766.87	221.84	0.84
Sols Wash Main	0.614	50-yr	11964.00	2060.80	2066.19		2067.82	0.004974	10.24	1168.14	226.37	0.79
Sols Wash Main	0.614	500-yr	20005.00	2060.80	2069.39		2071.08	0.002973	10.43	1918.34	244.91	0.66

HEC-RAS Plan: Sols River: Sols Wash Reach: Sols Wash Main (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Sols Wash Main	0.592	100-Sols	14459.00	2059.70	2066.89		2068.43	0.003339	9.99	1447.96	213.71	0.68
Sols Wash Main	0.592	100-Sols FW	14459.00	2059.70	2066.88		2068.43	0.003340	9.99	1447.38	213.49	0.68
Sols Wash Main	0.592	10-yr	6758.00	2059.70	2063.22	2063.08	2064.73	0.008021	9.85	685.80	203.06	0.94
Sols Wash Main	0.592	50-yr	11964.00	2059.70	2065.70		2067.25	0.004177	10.01	1195.43	209.24	0.74
Sols Wash Main	0.592	500-yr	20005.00	2059.70	2069.05		2070.74	0.002649	10.44	1918.23	220.51	0.62
Sols Wash Main	0.557	100-Sols	14459.00	2058.30	2066.79		2067.85	0.001865	8.26	1750.12	220.72	0.52
Sols Wash Main	0.557	100-Sols FW	14459.00	2058.30	2066.79		2067.85	0.001866	8.26	1749.56	220.47	0.52
Sols Wash Main	0.557	10-yr	6758.00	2058.30	2061.97	2061.70	2063.34	0.007021	9.39	719.49	207.18	0.89
Sols Wash Main	0.557	50-yr	11964.00	2058.30	2065.54		2066.56	0.002191	8.10	1476.54	217.60	0.55
Sols Wash Main	0.557	500-yr	20005.00	2058.30	2069.00		2070.23	0.001661	8.89	2250.78	232.23	0.50
Sols Wash Main	0.529	100-Sols	14459.00	2057.20	2066.78		2067.54	0.001152	6.99	2068.83	233.52	0.41
Sols Wash Main	0.529	100-Sols FW	14459.00	2057.20	2066.78		2067.54	0.001152	6.99	2068.71	233.27	0.41
Sols Wash Main	0.529	10-yr	6758.00	2057.20	2061.86		2062.49	0.003256	7.33	922.51	215.89	0.62
Sols Wash Main	0.529	50-yr	11964.00	2057.20	2065.52		2066.22	0.001254	6.73	1778.80	227.04	0.42
Sols Wash Main	0.529	500-yr	20005.00	2057.20	2069.02		2069.94	0.001080	7.69	2602.81	240.00	0.41
Sols Wash Main	0.505	100-Sols	14459.00	2056.40	2066.50		2067.37	0.001265	7.47	1938.15	211.02	0.43
Sols Wash Main	0.505	100-Sols FW	14459.00	2056.40	2066.50		2067.37	0.001262	7.47	1938.07	210.59	0.43
Sols Wash Main	0.505	10-yr	6758.00	2056.40	2061.05		2062.03	0.003615	7.94	850.93	189.85	0.66
Sols Wash Main	0.505	50-yr	11964.00	2056.40	2065.25		2066.04	0.001329	7.14	1676.63	203.08	0.44
Sols Wash Main	0.505	500-yr	20005.00	2056.40	2068.69		2069.77	0.001222	8.33	2402.11	213.00	0.44
Sols Wash Main	0.485	100-Sols	15045.00	2055.50	2065.98		2067.19	0.001699	8.82	1705.28	170.42	0.49
Sols Wash Main	0.485	100-Sols FW	15045.00	2055.50	2065.98		2067.19	0.001699	8.82	1705.28	170.42	0.49
Sols Wash Main	0.485	10-yr	7019.00	2055.50	2060.34		2061.60	0.004404	9.01	778.68	161.80	0.72
Sols Wash Main	0.485	50-yr	12453.00	2055.50	2064.81		2065.87	0.001680	8.26	1507.95	165.73	0.48
Sols Wash Main	0.485	500-yr	20836.00	2055.50	2067.95		2069.57	0.001842	10.20	2043.06	171.30	0.52
Sols Wash Main	0.467	100-Sols	15045.00	2054.70	2065.80		2067.02	0.001626	8.87	1696.96	161.00	0.48
Sols Wash Main	0.467	100-Sols FW	15045.00	2054.70	2065.80		2067.02	0.001626	8.87	1696.96	161.00	0.48
Sols Wash Main	0.467	10-yr	7019.00	2054.70	2059.96		2061.18	0.003848	8.86	792.66	151.50	0.68
Sols Wash Main	0.467	50-yr	12453.00	2054.70	2064.65		2065.70	0.001579	8.23	1512.60	157.99	0.47
Sols Wash Main	0.467	500-yr	20836.00	2054.70	2067.69		2069.38	0.001848	10.41	2001.78	161.00	0.52
Sols Wash Main	0.447	100-Sols	15045.00	2052.88	2065.87		2066.82	0.001021	7.79	1931.68	160.70	0.40
Sols Wash Main	0.447	100-Sols FW	15045.00	2052.88	2065.87		2066.82	0.001021	7.79	1931.68	160.70	0.40
Sols Wash Main	0.447	10-yr	7019.00	2052.88	2060.03		2060.79	0.001863	7.01	1000.65	155.40	0.49
Sols Wash Main	0.447	50-yr	12453.00	2052.88	2064.72		2065.51	0.000970	7.13	1745.44	160.70	0.38
Sols Wash Main	0.447	500-yr	20836.00	2052.88	2067.79		2069.13	0.001219	9.30	2239.43	160.70	0.44
Sols Wash Main	0.442	100-Sols	15045.00	2052.78	2065.73	2060.21	2066.76	0.002162	8.12	1851.84	155.50	0.41
Sols Wash Main	0.442	100-Sols FW	15045.00	2052.78	2065.73	2060.21	2066.76	0.002162	8.12	1851.84	155.50	0.41
Sols Wash Main	0.442	10-yr	7019.00	2052.78	2059.90	2057.50	2060.72	0.003111	7.26	966.85	149.25	0.50
Sols Wash Main	0.442	50-yr	12453.00	2052.78	2064.59	2059.40	2065.45	0.002047	7.43	1674.97	155.50	0.40
Sols Wash Main	0.442	500-yr	20836.00	2052.78	2067.58	2061.86	2069.06	0.002609	9.74	2139.27	155.50	0.46
Sols Wash Main	0.423		Bridge									
Sols Wash Main	0.412	100-Sols	15045.00	2051.44	2061.01		2062.80	0.002905	10.75	1399.94	155.00	0.63
Sols Wash Main	0.412	100-Sols FW	15045.00	2051.44	2061.01		2062.80	0.002905	10.75	1399.94	155.00	0.63
Sols Wash Main	0.412	10-yr	7019.00	2051.44	2056.97		2058.25	0.004271	9.06	774.41	155.00	0.71
Sols Wash Main	0.412	50-yr	12453.00	2051.44	2059.76		2061.42	0.003203	10.32	1206.72	155.00	0.65
Sols Wash Main	0.412	500-yr	20836.00	2051.44	2063.49		2065.60	0.002581	11.68	1783.50	155.00	0.61
Sols Wash Main	0.389	100-Sols	15045.00	2051.30	2060.76		2062.40	0.002573	10.28	1463.01	158.27	0.60
Sols Wash Main	0.389	100-Sols FW	15045.00	2051.30	2060.76		2062.40	0.002573	10.28	1463.01	158.27	0.60
Sols Wash Main	0.389	10-yr	7019.00	2051.30	2056.55		2057.72	0.003728	8.71	806.12	154.50	0.67
Sols Wash Main	0.389	50-yr	12453.00	2051.30	2059.48		2060.99	0.002788	9.86	1262.50	156.00	0.61
Sols Wash Main	0.389	500-yr	20836.00	2051.30	2063.29		2065.21	0.002310	11.12	1872.91	163.00	0.58
Sols Wash Main	0.359	100-Sols	15045.00	2050.10	2060.08		2061.93	0.003249	10.92	1377.30	162.00	0.66
Sols Wash Main	0.359	100-Sols FW	15045.00	2050.10	2060.08		2061.93	0.003250	10.92	1377.26	162.00	0.66
Sols Wash Main	0.359	10-yr	7019.00	2050.10	2055.45		2057.02	0.004979	10.07	697.35	132.00	0.77
Sols Wash Main	0.359	50-yr	12453.00	2050.10	2058.67		2060.48	0.003433	10.80	1153.20	144.00	0.67
Sols Wash Main	0.359	500-yr	20836.00	2050.10	2062.77		2064.82	0.002592	11.49	1812.99	162.00	0.61
Sols Wash Main	0.306	100-Sols	15045.00	2047.20	2059.42		2061.13	0.002314	10.51	1431.63	135.50	0.57
Sols Wash Main	0.306	100-Sols FW	15045.00	2047.20	2059.42		2061.13	0.002314	10.51	1431.59	135.50	0.57
Sols Wash Main	0.306	10-yr	7019.00	2047.20	2054.90		2055.95	0.002299	8.22	853.88	118.75	0.54
Sols Wash Main	0.306	50-yr	12453.00	2047.20	2058.07		2059.61	0.002365	9.95	1251.10	131.72	0.57
Sols Wash Main	0.306	500-yr	20836.00	2047.20	2062.03		2064.14	0.002221	11.67	1785.68	135.50	0.57
Sols Wash Main	0.288	100-Sols	15045.00	2046.80	2059.30		2060.87	0.002035	10.08	1495.50	136.50	0.54
Sols Wash Main	0.288	100-Sols FW	15045.00	2046.80	2059.30		2060.87	0.002036	10.08	1495.47	136.50	0.54
Sols Wash Main	0.288	10-yr	7019.00	2046.80	2054.77		2055.70	0.001967	7.74	906.54	122.76	0.50
Sols Wash Main	0.288	50-yr	12453.00	2046.80	2057.95		2059.34	0.002063	9.49	1312.15	133.37	0.53
Sols Wash Main	0.288	500-yr	20836.00	2046.80	2061.93		2063.89	0.001993	11.24	1853.98	136.50	0.54
Sols Wash Main	0.227	100-Sols	15045.00	2046.50	2057.96		2060.03	0.003145	11.52	1305.52	134.45	0.65
Sols Wash Main	0.227	100-Sols FW	15045.00	2046.50	2057.96		2060.03	0.003145	11.52	1305.48	134.44	0.65

HEC-RAS Plan: Sols River: Sols Wash Reach: Sols Wash Main (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Sols Wash Main	0.227	10-yr	7019.00	2046.50	2053.63		2054.90	0.003037	9.04	776.18	115.45	0.61
Sols Wash Main	0.227	50-yr	12453.00	2046.50	2056.66		2058.52	0.002971	10.89	1143.04	123.00	0.63
Sols Wash Main	0.227	500-yr	20836.00	2046.50	2060.69		2063.10	0.002770	12.45	1674.19	135.00	0.62
Sols Wash Main	0.220	100-Sols	15045.00	2046.40	2057.53		2059.87	0.003384	12.26	1227.61	120.00	0.68
Sols Wash Main	0.220	100-Sols FW	15045.00	2046.40	2057.53		2059.87	0.003384	12.26	1227.58	120.00	0.68
Sols Wash Main	0.220	10-yr	7019.00	2046.40	2053.33		2054.76	0.003545	9.58	731.63	111.64	0.66
Sols Wash Main	0.220	50-yr	12453.00	2046.40	2056.30		2058.37	0.003475	11.54	1079.52	120.00	0.68
Sols Wash Main	0.220	500-yr	20836.00	2046.40	2060.09		2062.93	0.003361	13.53	1540.00	127.03	0.68
Sols Wash Main	0.212	100-Sols	15045.00	2046.40	2057.22		2059.71	0.003750	12.67	1187.64	118.00	0.70
Sols Wash Main	0.212	100-Sols FW	15045.00	2046.40	2057.22		2059.71	0.003751	12.67	1187.53	118.00	0.70
Sols Wash Main	0.212	10-yr	7019.00	2046.40	2052.98		2054.58	0.004500	10.16	690.79	116.50	0.74
Sols Wash Main	0.212	50-yr	12453.00	2046.40	2055.99		2058.21	0.003865	11.94	1043.28	118.00	0.71
Sols Wash Main	0.212	500-yr	20836.00	2046.40	2059.70		2062.77	0.003646	14.05	1482.87	119.50	0.70
Sols Wash Main	0.204	100-Sols	15045.00	2046.30	2056.67	2055.33	2059.50	0.005017	13.51	1113.78	123.00	0.79
Sols Wash Main	0.204	100-Sols FW	15045.00	2046.30	2056.67	2055.33	2059.50	0.005020	13.51	1113.51	123.00	0.79
Sols Wash Main	0.204	10-yr	7019.00	2046.30	2052.00	2051.62	2054.29	0.007021	12.13	578.42	103.00	0.90
Sols Wash Main	0.204	50-yr	12453.00	2046.30	2055.20	2054.24	2057.98	0.005880	13.35	933.10	120.86	0.85
Sols Wash Main	0.204	500-yr	20836.00	2046.30	2059.39	2057.20	2062.59	0.004287	14.37	1449.85	124.50	0.74
Sols Wash Main	0.201	100-Sols	15045.00	2046.30	2055.03	2055.03	2059.29	0.002567	16.56	908.45	107.50	1.00
Sols Wash Main	0.201	100-Sols FW	15045.00	2046.30	2055.04	2055.04	2059.28	0.002561	16.55	909.13	107.50	1.00
Sols Wash Main	0.201	10-yr	7019.00	2046.30	2051.59	2051.59	2054.19	0.002285	12.94	542.49	104.50	1.00
Sols Wash Main	0.201	50-yr	12453.00	2046.30	2054.03	2054.03	2057.78	0.002525	15.55	800.71	107.50	1.00
Sols Wash Main	0.201	500-yr	20836.00	2046.30	2057.19	2057.19	2062.34	0.002615	18.22	1150.91	123.68	0.99
Sols Wash Main	0.198	100-Sols	15045.00	2042.55	2051.71	2051.71	2055.95	0.002275	16.53	910.21	108.40	1.01
Sols Wash Main	0.198	100-Sols FW	15045.00	2042.55	2051.71	2051.71	2055.95	0.002274	16.52	910.47	108.40	1.00
Sols Wash Main	0.198	10-yr	7019.00	2042.55	2048.16	2048.16	2050.80	0.001779	13.05	537.77	102.00	1.00
Sols Wash Main	0.198	50-yr	12453.00	2042.55	2050.63	2050.63	2054.43	0.002035	15.84	796.29	105.20	1.00
Sols Wash Main	0.198	500-yr	20836.00	2042.55	2053.76	2053.76	2059.02	0.002385	18.41	1131.88	108.40	1.00
Sols Wash Main	0.195	100-Sols	15045.00	2037.80	2052.37		2054.17	0.000614	10.76	1397.86	112.00	0.54
Sols Wash Main	0.195	100-Sols FW	15045.00	2037.80	2052.37		2054.17	0.000614	10.76	1397.86	112.00	0.54
Sols Wash Main	0.195	10-yr	7019.00	2037.80	2049.04		2049.76	0.000271	6.81	1030.59	109.00	0.39
Sols Wash Main	0.195	50-yr	12453.00	2037.80	2051.45		2052.89	0.000515	9.62	1295.07	112.00	0.50
Sols Wash Main	0.195	500-yr	20836.00	2037.80	2054.17		2056.80	0.000895	13.02	1600.41	115.00	0.62
Sols Wash Main	0.192	100-Sols	15045.00	2037.74	2052.49		2054.11	0.000541	10.19	1475.80	114.00	0.50
Sols Wash Main	0.192	100-Sols FW	15045.00	2037.74	2052.49		2054.11	0.000541	10.19	1475.80	114.00	0.50
Sols Wash Main	0.192	10-yr	7019.00	2037.74	2049.10		2049.74	0.000238	6.43	1091.94	111.00	0.38
Sols Wash Main	0.192	50-yr	12453.00	2037.74	2051.55		2052.84	0.000452	9.10	1368.50	114.00	0.46
Sols Wash Main	0.192	500-yr	20836.00	2037.74	2054.35		2056.71	0.000783	12.32	1691.00	117.00	0.57
Sols Wash Main	0.189	100-Sols	15045.00	2037.67	2052.80		2054.05	0.000498	9.67	1555.17	117.50	0.47
Sols Wash Main	0.189	100-Sols FW	15045.00	2037.67	2052.80		2054.05	0.000498	9.67	1555.17	117.50	0.47
Sols Wash Main	0.189	10-yr	7019.00	2037.67	2049.14		2049.71	0.000209	6.07	1156.60	113.00	0.33
Sols Wash Main	0.189	50-yr	12453.00	2037.67	2051.64		2052.79	0.000399	8.63	1443.70	116.00	0.43
Sols Wash Main	0.189	500-yr	20836.00	2037.67	2054.50		2056.63	0.000691	11.69	1781.92	119.00	0.53
Sols Wash Main	0.187	100-Sols	15045.00	2037.60	2052.75		2053.98	0.000418	8.87	1695.53	125.50	0.43
Sols Wash Main	0.187	100-Sols FW	15045.00	2037.60	2052.75		2053.98	0.000418	8.87	1695.53	125.50	0.43
Sols Wash Main	0.187	10-yr	7019.00	2037.60	2049.20		2049.68	0.000189	5.58	1258.34	122.50	0.31
Sols Wash Main	0.187	50-yr	12453.00	2037.60	2051.76		2052.73	0.000326	7.92	1571.71	122.50	0.39
Sols Wash Main	0.187	500-yr	20836.00	2037.60	2054.73		2056.52	0.000556	10.72	1944.14	125.50	0.48
Sols Wash Main	0.184	100-Sols	15045.00	2037.56	2052.82		2053.94	0.000381	8.52	1765.57	128.00	0.40
Sols Wash Main	0.184	100-Sols FW	15045.00	2037.56	2052.82		2053.94	0.000381	8.52	1765.57	128.00	0.40
Sols Wash Main	0.184	10-yr	7019.00	2037.56	2049.23		2049.67	0.000172	5.34	1313.22	125.00	0.29
Sols Wash Main	0.184	50-yr	12453.00	2037.56	2051.81		2052.71	0.000320	7.61	1636.66	128.00	0.37
Sols Wash Main	0.184	500-yr	20836.00	2037.56	2054.82		2056.47	0.000539	10.30	2023.42	131.00	0.48
Sols Wash Main	0.182	100-Sols	15045.00	2041.80	2051.61		2053.82	0.001179	11.93	1260.91	134.00	0.69
Sols Wash Main	0.182	100-Sols FW	15045.00	2041.80	2051.61		2053.82	0.001179	11.93	1260.91	134.00	0.69
Sols Wash Main	0.182	10-yr	7019.00	2041.80	2048.57		2049.60	0.000735	8.16	859.84	131.00	0.56
Sols Wash Main	0.182	50-yr	12453.00	2041.80	2050.78		2052.60	0.000984	10.83	1149.73	131.00	0.64
Sols Wash Main	0.182	500-yr	20836.00	2041.80	2053.22		2056.31	0.001437	14.12	1475.65	134.00	0.75
Sols Wash Main	0.180	100-Sols	15045.00	2041.80	2051.73		2053.75	0.003212	11.38	1321.80	138.50	0.65
Sols Wash Main	0.180	100-Sols FW	15045.00	2041.80	2051.73		2053.75	0.003212	11.38	1321.80	138.50	0.65
Sols Wash Main	0.180	10-yr	7019.00	2041.80	2048.62		2049.57	0.002328	7.83	896.56	135.50	0.54
Sols Wash Main	0.180	50-yr	12453.00	2041.80	2050.88		2052.54	0.002961	10.35	1203.22	138.50	0.62
Sols Wash Main	0.180	500-yr	20836.00	2041.80	2053.40		2056.20	0.003713	13.42	1553.12	138.50	0.71
Sols Wash Main	0.169	100-Sols	15045.00	2041.80	2052.14		2053.37	0.001963	8.88	1693.36	183.87	0.52
Sols Wash Main	0.169	100-Sols FW	15045.00	2041.80	2052.14		2053.37	0.001965	8.88	1693.36	183.87	0.52
Sols Wash Main	0.169	10-yr	7019.00	2041.80	2048.73		2049.37	0.001454	6.40	1097.19	182.06	0.43
Sols Wash Main	0.169	50-yr	12453.00	2041.80	2051.17		2052.22	0.001872	8.21	1516.95	180.74	0.50
Sols Wash Main	0.169	500-yr	20836.00	2041.80	2054.08		2055.68	0.002076	10.16	2051.51	186.94	0.54
Sols Wash Main	0.159	100-Sols	15045.00	2041.80	2052.33		2053.17	0.001192	7.36	2043.77	204.48	0.41

HEC-RAS Plan: Sols River: Sols Wash Reach: Sols Wash Main (Continued)

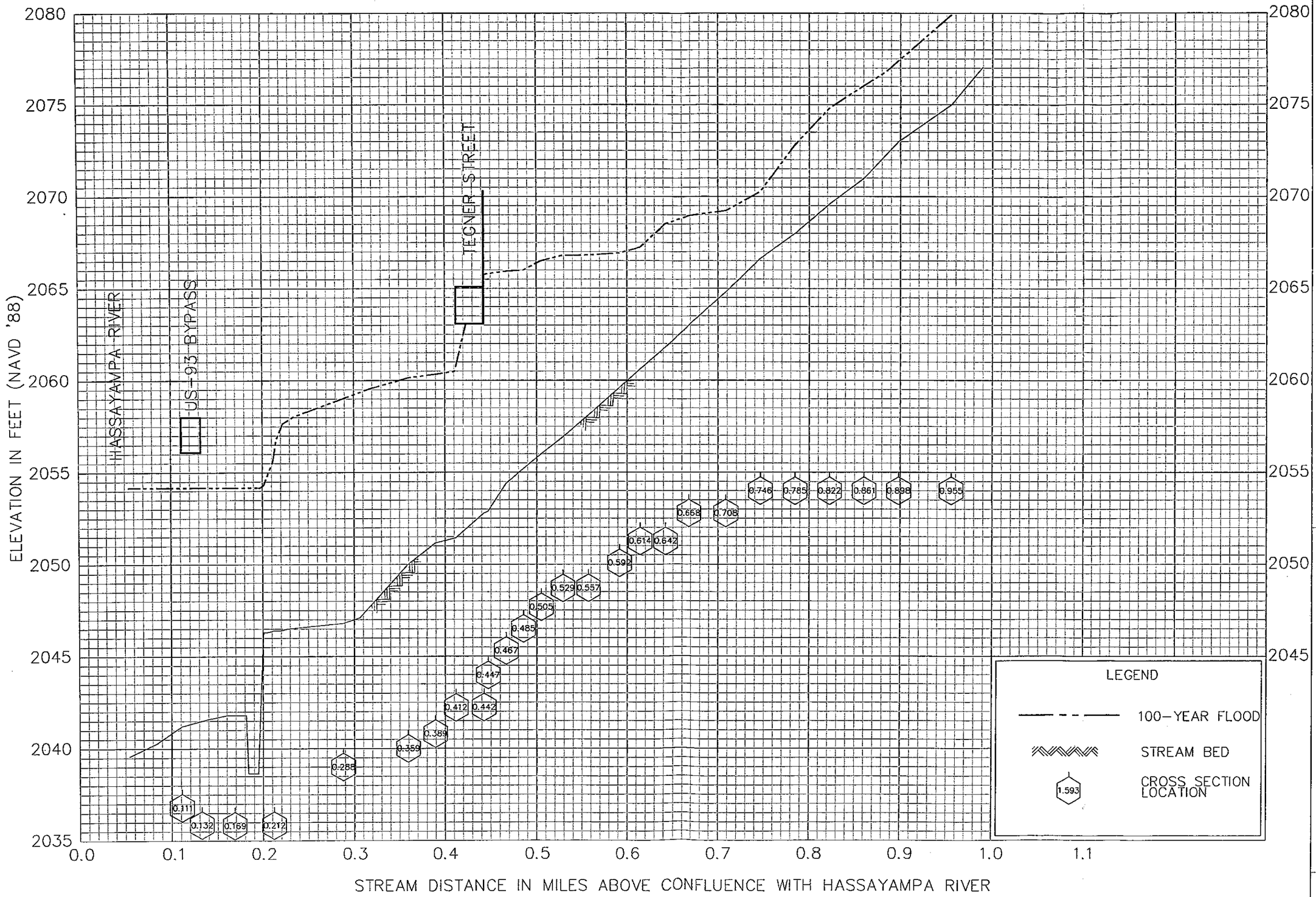
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Sols Wash Main	0.159	100-Sols FW	15045.00	2041.80	2052.33		2053.17	0.001192	7.38	2043.77	204.48	0.41
Sols Wash Main	0.159	10-yr	7019.00	2041.80	2048.81		2049.25	0.001025	5.28	1328.96	201.40	0.36
Sols Wash Main	0.159	50-yr	12453.00	2041.80	2051.34		2052.05	0.001144	6.77	1840.04	204.48	0.40
Sols Wash Main	0.159	500-yr	20836.00	2041.80	2054.34		2055.45	0.001290	8.48	2456.43	207.56	0.43
Sols Wash Main	0.150	100-Sols	15045.00	2041.70	2052.45		2053.06	0.000783	6.27	2399.75	227.97	0.34
Sols Wash Main	0.150	100-Sols FW	15045.00	2041.70	2052.45		2053.06	0.000783	6.27	2399.75	227.97	0.34
Sols Wash Main	0.150	10-yr	7019.00	2041.70	2048.86		2049.17	0.000640	4.42	1587.06	224.95	0.29
Sols Wash Main	0.150	50-yr	12453.00	2041.70	2051.43		2051.94	0.000744	5.74	2167.95	227.96	0.33
Sols Wash Main	0.150	500-yr	20836.00	2041.70	2054.49		2055.31	0.000859	7.26	2870.27	230.98	0.36
Sols Wash Main	0.140	100-Sols	15045.00	2041.60	2052.49		2052.99	0.000632	5.71	2635.79	246.84	0.31
Sols Wash Main	0.140	100-Sols FW	15045.00	2041.60	2052.49		2052.99	0.000632	5.71	2635.79	246.84	0.31
Sols Wash Main	0.140	10-yr	7019.00	2041.60	2048.87		2049.12	0.000514	4.02	1747.92	243.76	0.28
Sols Wash Main	0.140	50-yr	12453.00	2041.60	2051.46		2051.88	0.000600	5.23	2382.39	246.83	0.30
Sols Wash Main	0.140	500-yr	20836.00	2041.60	2054.55		2055.23	0.000693	6.61	3150.70	249.92	0.33
Sols Wash Main	0.132	100-Sols	15045.00	2041.50	2052.45	2046.50	2052.97	0.000633	5.73	2623.54	244.00	0.31
Sols Wash Main	0.132	100-Sols FW	15045.00	2041.50	2052.45	2046.52	2052.97	0.000633	5.73	2623.54	244.00	0.31
Sols Wash Main	0.132	10-yr	7019.00	2041.50	2048.85	2044.52	2049.10	0.000507	4.02	1747.91	241.00	0.28
Sols Wash Main	0.132	50-yr	12453.00	2041.50	2051.43	2045.92	2051.86	0.000600	5.25	2373.82	244.00	0.30
Sols Wash Main	0.132	500-yr	20836.00	2041.50	2054.52	2047.73	2055.20	0.000698	6.65	3131.16	247.00	0.33
Sols Wash Main	0.121		Bridge									
Sols Wash Main	0.111	100-Sols	15045.00	2041.21	2049.75	2048.80	2051.79	0.006001	12.13	1425.55	289.44	0.80
Sols Wash Main	0.111	100-Sols FW	15045.00	2041.21	2049.74	2048.80	2051.79	0.006004	12.13	1425.33	289.43	0.80
Sols Wash Main	0.111	10-yr	7019.00	2041.21	2047.16	2046.45	2048.36	0.006009	9.18	869.97	282.42	0.75
Sols Wash Main	0.111	50-yr	12453.00	2041.21	2049.02	2048.13	2050.81	0.006004	11.30	1261.12	287.51	0.79
Sols Wash Main	0.111	500-yr	20836.00	2041.21	2051.17	2050.28	2053.76	0.006004	13.70	1749.83	293.23	0.82

HEC-RAS Plan: Hospital River: Hospital Wash Reach: Hospital Wash

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Hospital Wash	0.703	100-yr	500.00	2100.45	2102.71	2102.47	2102.94	0.012813	4.13	141.34	136.58	0.63
Hospital Wash	0.703	100-yr FW	500.00	2100.45	2102.75	2102.46	2103.12	0.016806	4.84	103.29	74.44	0.72
Hospital Wash	0.703	10-yr	170.00	2100.45	2102.06	2101.87	2102.22	0.016951	3.20	55.14	100.77	0.66
Hospital Wash	0.703	50-yr	250.00	2100.45	2102.27	2102.08	2102.44	0.014379	3.46	82.06	133.36	0.63
Hospital Wash	0.703	500-yr	845.00	2100.45	2103.12	2102.80	2103.45	0.012622	4.95	199.10	139.67	0.66
Hospital Wash	0.643	100-yr	500.00	2095.69	2098.06	2097.95	2098.41	0.015920	5.15	123.09	126.20	0.72
Hospital Wash	0.643	100-yr FW	500.00	2095.69	2098.54	2097.97	2098.92	0.010548	4.93	102.66	52.28	0.61
Hospital Wash	0.643	10-yr	170.00	2095.69	2097.49	2097.09	2097.66	0.012150	3.37	55.62	91.26	0.59
Hospital Wash	0.643	50-yr	250.00	2095.69	2097.67	2097.45	2097.90	0.013966	3.98	75.13	116.61	0.65
Hospital Wash	0.643	500-yr	845.00	2095.69	2098.50	2098.34	2098.94	0.015675	6.03	180.90	135.64	0.75
Hospital Wash	0.577	100-yr	500.00	2091.17	2093.16		2093.38	0.013216	4.22	152.75	176.36	0.64
Hospital Wash	0.577	100-yr FW	500.00	2091.17	2093.28	2093.11	2093.79	0.022456	5.71	87.51	60.44	0.84
Hospital Wash	0.577	10-yr	170.00	2091.17	2092.59	2092.40	2092.74	0.016971	3.28	56.56	134.74	0.66
Hospital Wash	0.577	50-yr	250.00	2091.17	2092.78	2092.63	2092.95	0.014616	3.54	86.09	166.18	0.64
Hospital Wash	0.577	500-yr	845.00	2091.17	2093.51		2093.81	0.013966	5.06	214.15	178.13	0.69
Hospital Wash	0.530	100-yr	500.00	2087.99	2089.98	2089.80	2090.18	0.012264	4.10	169.13	257.42	0.62
Hospital Wash	0.530	100-yr FW	500.00	2087.99	2090.54	2089.83	2090.78	0.007126	3.92	128.87	68.39	0.50
Hospital Wash	0.530	10-yr	170.00	2087.99	2089.48	2089.14	2089.60	0.009587	2.80	68.99	140.00	0.51
Hospital Wash	0.530	50-yr	250.00	2087.99	2089.64	2089.41	2089.79	0.010863	3.24	95.49	175.92	0.56
Hospital Wash	0.530	500-yr	845.00	2087.99	2090.29	2090.14	2090.53	0.012135	4.68	246.62	259.39	0.64
Hospital Wash	0.458	100-yr	500.00	2083.21	2085.82	2085.67	2086.03	0.009945	4.33	164.18	191.47	0.58
Hospital Wash	0.458	100-yr FW	500.00	2083.21	2085.88	2085.65	2086.49	0.020495	6.27	79.81	45.43	0.83
Hospital Wash	0.458	10-yr	170.00	2083.21	2085.09	2084.76	2085.30	0.013711	3.72	46.34	84.77	0.63
Hospital Wash	0.458	50-yr	250.00	2083.21	2085.37	2085.20	2085.58	0.011500	3.88	82.23	147.90	0.60
Hospital Wash	0.458	500-yr	845.00	2083.21	2086.22	2085.95	2086.47	0.009607	4.89	240.94	194.79	0.59
Hospital Wash	0.388	100-yr	500.00	2075.30	2079.14	2079.14	2080.05	0.030103	7.67	65.27	36.70	1.01
Hospital Wash	0.388	100-yr FW	500.00	2075.30	2079.59		2080.17	0.014477	6.12	81.94	36.73	0.72
Hospital Wash	0.388	10-yr	170.00	2075.30	2077.97	2077.84	2078.47	0.026180	5.63	30.20	23.86	0.88
Hospital Wash	0.388	50-yr	250.00	2075.30	2078.28	2078.24	2078.95	0.031367	6.60	37.89	27.02	0.98
Hospital Wash	0.388	500-yr	845.00	2075.30	2079.99	2079.99	2081.14	0.023030	8.67	102.26	53.22	0.94
Hospital Wash	0.343	100-yr	500.00	2073.00	2077.26		2077.40	0.003802	3.41	186.00	109.81	0.38
Hospital Wash	0.343	100-yr FW	500.00	2073.00	2077.79		2078.10	0.005442	4.49	111.99	37.87	0.45
Hospital Wash	0.343	10-yr	170.00	2073.00	2076.22	2075.30	2076.32	0.004058	2.61	81.03	91.14	0.36
Hospital Wash	0.343	50-yr	250.00	2073.00	2076.54		2076.64	0.004005	2.87	110.65	97.48	0.37
Hospital Wash	0.343	500-yr	845.00	2073.00	2077.93		2078.12	0.004039	4.11	263.19	124.59	0.41
Hospital Wash	0.270	100-yr	500.00	2071.51	2073.98	2073.98	2074.77	0.014938	7.16	69.88	44.75	1.01
Hospital Wash	0.270	100-yr FW	500.00	2071.51	2073.98	2073.98	2074.77	0.014938	7.16	69.88	44.74	1.01
Hospital Wash	0.270	10-yr	170.00	2071.51	2072.93	2072.93	2073.43	0.017545	5.63	30.20	31.29	1.01
Hospital Wash	0.270	50-yr	250.00	2071.51	2073.25	2073.25	2073.83	0.016480	6.14	40.74	35.35	1.01
Hospital Wash	0.270	500-yr	845.00	2071.51	2074.78	2074.78	2075.72	0.010423	7.86	117.20	85.00	0.90
Hospital Wash	0.215	100-yr	500.00	2067.77	2071.38		2071.76	0.004433	4.94	101.28	45.05	0.58
Hospital Wash	0.215	100-yr FW	500.00	2067.77	2071.38		2071.76	0.004429	4.94	101.31	45.06	0.58
Hospital Wash	0.215	10-yr	170.00	2067.77	2069.75		2070.04	0.006737	4.26	39.89	30.42	0.66
Hospital Wash	0.215	50-yr	250.00	2067.77	2070.26		2070.57	0.005380	4.38	57.02	35.12	0.61
Hospital Wash	0.215	500-yr	845.00	2067.77	2072.35		2072.84	0.004433	5.67	148.98	53.73	0.60
Hospital Wash	0.153	100-yr	500.00	2065.99	2070.43		2070.67	0.002459	3.95	126.71	50.50	0.44
Hospital Wash	0.153	100-yr FW	500.00	2065.99	2070.43		2070.67	0.002444	3.94	127.02	50.57	0.44
Hospital Wash	0.153	10-yr	170.00	2065.99	2068.97		2069.08	0.001521	2.60	65.37	33.89	0.33
Hospital Wash	0.153	50-yr	250.00	2065.99	2069.42		2069.56	0.001885	3.06	81.63	38.92	0.37
Hospital Wash	0.153	500-yr	845.00	2065.99	2071.82		2072.02	0.001377	3.71	307.12	186.95	0.35
Hospital Wash	0.097	100-yr	500.00	2066.00	2069.66	2068.60	2069.91	0.002633	4.00	127.35	62.48	0.45
Hospital Wash	0.097	100-yr FW	500.00	2066.00	2069.66	2068.60	2069.91	0.002671	4.01	125.61	53.45	0.46
Hospital Wash	0.097	10-yr	170.00	2066.00	2068.05	2067.68	2068.26	0.006094	3.65	46.58	41.84	0.61
Hospital Wash	0.097	50-yr	250.00	2066.00	2068.50	2067.95	2068.72	0.004649	3.78	66.11	45.89	0.56
Hospital Wash	0.097	500-yr	845.00	2066.00	2071.55		2071.69	0.000813	3.27	336.37	132.32	0.28
Hospital Wash	0.083	100-yr	500.00	2066.00	2068.47	2068.47	2069.58	0.004222	8.45	59.14	26.92	1.01
Hospital Wash	0.083	100-yr FW	500.00	2066.00	2068.47	2068.47	2069.58	0.004222	8.45	59.14	26.92	1.01
Hospital Wash	0.083	10-yr	170.00	2066.00	2067.24	2067.24	2067.82	0.004892	6.12	27.77	23.96	1.00
Hospital Wash	0.083	50-yr	250.00	2066.00	2067.58	2067.58	2068.32	0.004659	6.90	36.21	24.79	1.01
Hospital Wash	0.083	500-yr	845.00	2066.00	2070.95		2071.57	0.001137	6.34	133.34	32.88	0.55
Hospital Wash	0.081	100-yr	500.00	2064.90	2068.94	2067.44	2069.33	0.000883	5.04	99.28	28.88	0.48
Hospital Wash	0.081	100-yr FW	500.00	2064.90	2068.94	2067.44	2069.33	0.000883	5.04	99.28	28.88	0.48
Hospital Wash	0.081	10-yr	170.00	2064.90	2066.59	2066.19	2066.92	0.001954	4.60	36.98	24.18	0.66
Hospital Wash	0.081	50-yr	250.00	2064.90	2067.25	2066.54	2067.59	0.001379	4.68	53.39	25.50	0.57
Hospital Wash	0.081	500-yr	845.00	2064.90	2071.10	2068.43	2071.50	0.000575	5.07	174.03	111.00	0.40
Hospital Wash	0.080		Culvert									
Hospital Wash	0.074	100-yr	500.00	2064.41	2066.66	2066.60	2067.72	0.012176	8.27	60.44	47.27	0.97

HEC-RAS Plan: Hospital River: Hospital Wash Reach: Hospital Wash (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev.	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Hospital Wash	0.074	100-yr FW	500.00	2064.41	2066.66	2066.63	2067.72	0.012176	8.27	60.44	47.27	0.97
Hospital Wash	0.074	10-yr	170.00	2064.41	2065.89	2065.48	2066.17	0.005679	4.27	39.77	41.06	0.62
Hospital Wash	0.074	50-yr	250.00	2064.41	2066.12	2065.81	2066.58	0.007513	5.42	46.09	42.50	0.73
Hospital Wash	0.074	500-yr	845.00	2064.41	2067.54	2067.54	2069.10	0.011604	10.03	84.23	54.72	1.00
Hospital Wash	0.070	100-yr	500.00	2064.40	2066.37	2066.37	2067.25	0.014794	7.50	66.69	37.59	0.99
Hospital Wash	0.070	100-yr FW	500.00	2064.40	2066.37	2066.37	2067.25	0.014794	7.50	66.69	37.59	0.99
Hospital Wash	0.070	10-yr	170.00	2064.40	2065.38	2065.38	2065.84	0.018229	5.47	31.09	33.75	1.00
Hospital Wash	0.070	50-yr	250.00	2064.40	2065.65	2065.65	2066.24	0.017047	6.16	40.61	34.82	1.00
Hospital Wash	0.070	500-yr	845.00	2064.40	2067.15	2067.15	2068.30	0.014146	8.61	98.17	42.98	1.00



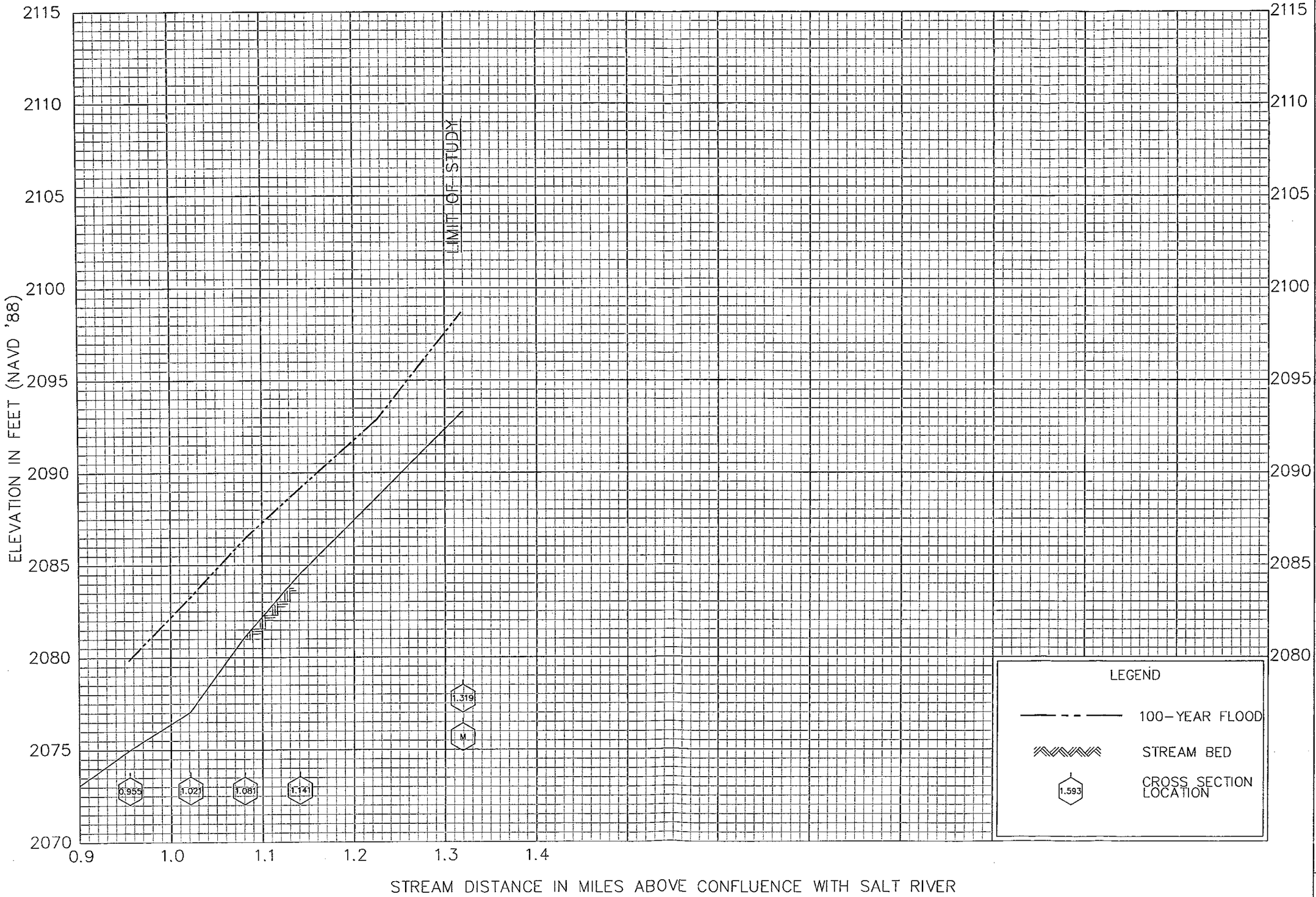
FLOOD PROFILES

SOLS WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY
UNINCORPORATED MARICOPA COUNTY, ARIZONA

MARICOPA COUNTY

01P



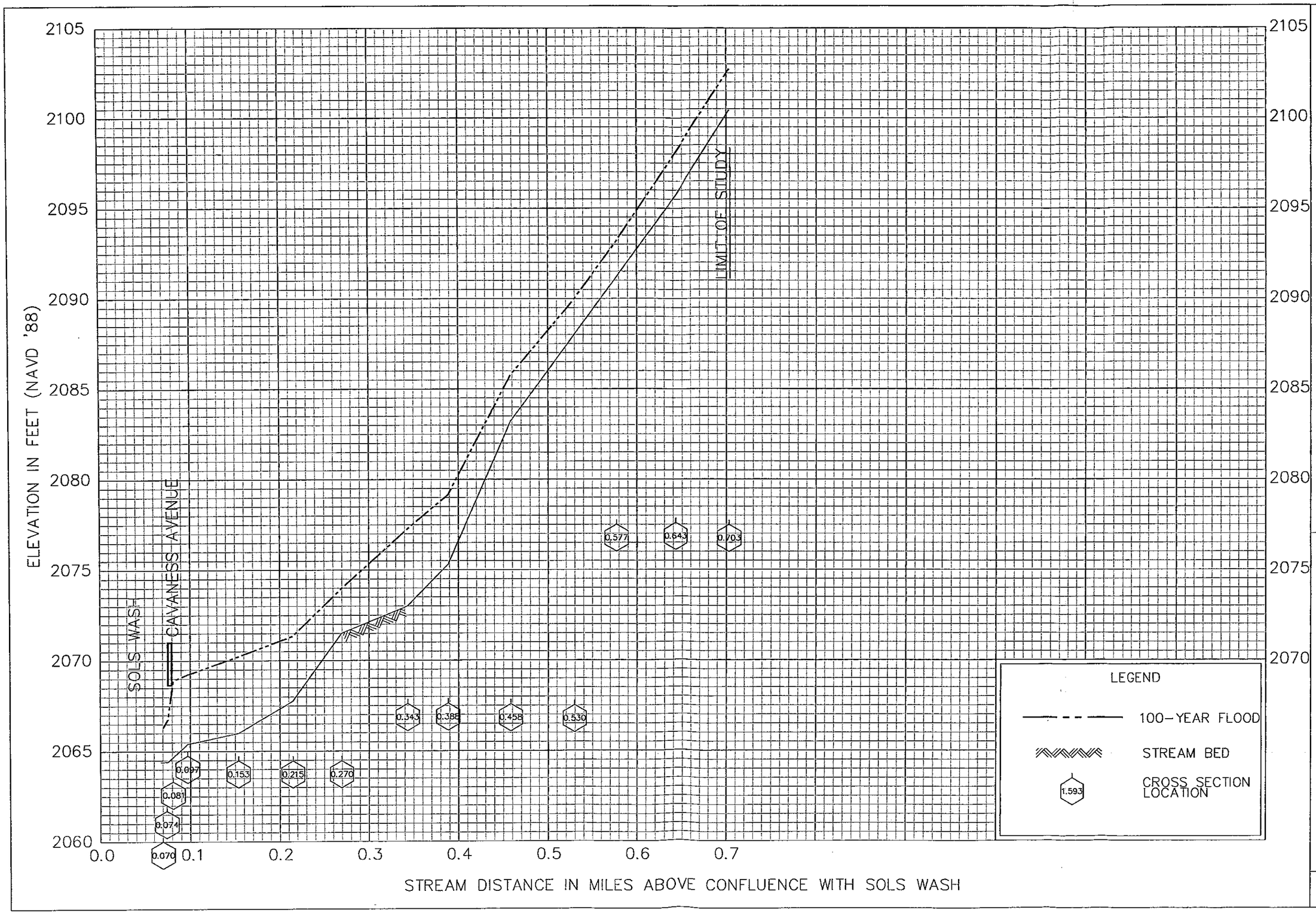
FLOOD PROFILES

SOLS WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY
UNINCORPORATED MARICOPA COUNTY, ARIZONA

MARICOPA COUNTY

02P



FLOOD PROFILES

HOSPITAL WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY
UNINCORPORATED MARICOPA COUNTY, ARIZONA

MARICOPA COUNTY

01P

Appendix A
REFERENCES

APPENDIX A: REFERENCES

A.1 Data Collection Summary

1. US-93 Interim Wickenburg Bypass – Bridge Hydraulics and Bank Protection Report. For ADOT by West Consultants, Inc. March 28, 2005.

2. Sols Wash, Wickenburg Arizona (FIS). Cella Barr and Associates. 1986.

3. State Highway, Kingman-Wickenburg Highway (US 93) Wickenburg Bypass (90% Plans). Jacobs Engineering. March 2005.

4. Sols Wash: Final Candidate Assessment Report. AZTEC. August 16, 2004.

5. Goldmine Village, Conditional Letter of Map Revision. JE Fuller. July 2002.

6. Hassayampa River US-93 Interim Wickenburg Bypass, Conditional Letter of Map Revision Package for Zone AE Floodplain and Floodway Analysis. FEMA Case Number 06-09-B575R. WEST Consultants. January 2006.

7. Design Manual for Engineering Analysis of Fluvial Systems. Arizona Department of Water Resources. 1985.

A.2 Referenced Documents

1. Flood Control District of Maricopa County. January 1995. Drainage Design Manual for Maricopa County, Volume 1 Hydrology.

2. Flood Control District of Maricopa County. January 1996. Drainage Design Manual for Maricopa County, Volume 2 Hydraulics.

3. U.S. Army Corps of Engineers, May 2005. Hydrologic Engineering Center-River Analysis System, Version 3.1.3.

4. HEC-RAS River Analysis System, User's Manual Version 3.1.3. US Army Corps of Engineers. May 2005.

5. U.S. Army Corps of Engineers, September 1990. Hydrologic Engineering Center HEC-1, Flood Hydrograph Package.

6. Haestad Methods Inc. August 2000. FlowMaster, Version 6.1.

7. Federal Emergency Management Agency. Guidelines and Specifications for Flood Hazard Mapping Partners. April 2003. Available Online.

8. Federal Emergency Management Agency, 1995. FIA Document 12 – Appeals, Revisions, and Amendments to Flood Insurance Maps.

9. U.S. Geological Survey, Water Resources Division, April 1991. Manning's Roughness Coefficients for Streams, Channels, and Floodplains in Maricopa County, Arizona.

10. Federal Emergency Management Agency, Dec. 1993. Flood Insurance Study, Maricopa County, Arizona. Volume 1 of 9.

11. Allan J. Malvick. Department of Civil Engineering, University of Arizona, January 1980. A Magnitude-Frequency-Area Relation for Floods In Arizona.

Appendix B

GENERAL DOCUMENTATION & CORRESPONDENCE

Appendix B.1
SPECIAL PROBLEM REPORTS

The appendix is intentionally left blank.

Appendix B.2

GENERAL CORRESPONDENCE

MEETING MINUTES

PROJECT: Wickenburg Downtown Flooding Hazard Mitigation Project – Final Design
FCDMC No.: FCD 2005C006
EEC No.: 305020.01

PLACE: FCDMC, Buckhorn-Mesa Conference Room
TIME: 1:30 PM
DATE: June 29, 2006

ATTENDEES:

Scott Vogel	– FCDMC
Catherine Regester	– FCDMC
Larry Doescher	– ADOT
Dennis Crandall	– ADOT
David Benton	– ADOT
Lon McDermott	– TOW
Miles Johnson	– TOW
Berwyn Wilbrink	– Jacobs Civil
Mark Gavan	– EEC
Lloyd Vick	– EEC
Florin Braileanu	– EEC

DISCUSSION:

Agenda Items

1. Introductions

2. US 93 Bypass Coordination

   a. Local Drainage along US 93 Bypass Embankment.

   Scott Vogel pointed out that there are local drainage flows coming in from the north and the west to the Bypass project and ADOT/Jacobs and FCDMC/TOW/EEC need to coordinate with respect to the Hydrology and Hydraulics design in this area.

   EEC (Lloyd Vick) mentioned that EEC and Jacobs design teams met and agreed to upsize the farthest north bypass culvert from 48-inch to 60-inch. EEC revised calculations and concluded that the pipe requires a flap gate because of the difference in the Water Surface Elevation between this pipe and the next pipe downstream. The two pipes create a flood pool west of the bypass embankment; a high water level at the upstream pipe would force the water to the downstream pipe and fill up the flood pool, without leaving detention

volume available for the local runoff. With local runoff coming in, the dike adjacent to the WQARF site is not high enough and water would spill to the south over its crest and into the large detention basin at Coffinger Park.

Dennis Crandall and Larry Doescher asked if the adding a second dike at the upstream culvert would be an option, and if true, where should it be located. Lloyd Vick responded that lack of Right-of-Way prevented such a solution. Berwyn Wilbrink agreed and added that the dike would need to extend well beyond the existing Right-of-Way to meet existing ground.

Lloyd Vick pointed out that adding a flap gate to the pipe in question would provide enough volume to contain the 10-Year local runoff in the flood pool, in addition to the volume backing up from Hassayampa River through the 66-inch pipe at the WQARF site and provide the 3-foot freebord required by FEMA. Raising the top of the dike is not possible because of lack of Right-of-Way. Dennis Crandall questioned whether this area is in the Hassayampa River floodplain. Lloyd Vick responded that the site is in the floodplain.

Berwyn Wilbrink questioned the need of a flap gate as the ADOT project provides means of connecting the two sides of the roadway embankment in the existing floodplain. Lloyd Vick responded that the roadway embankment confines the local runoff; according to the design criteria, 10-Year local runoff has to be stored during a 100-Year flow in Hassayampa River. Mark Gavan and Cathy Regester emphasized that without the flap gate at the upstream pipe, the water spills into the large detention basin at Coffinger Park and the excess volume cannot be contained. Dennis Crandall said that ADOT is concerned with the maintenance of the flap gate. Berwyn Wilbrink added that the only flap gate on the Bypass project is at the roundabout at the Community Center, which falls within the TOW maintenance responsibilities. Dennis Crandall asked if the flap gate would be included into the Maintenance Plan for the Sols Wash project. Lon McDermott responded that TOW would assume such maintenance responsibility. Therefore, Dennis Crandall and Berwyn Wilbrink agreed to provide the flap gate to the culvert and use a model similar to the one used for the Sols Wash project.

b. ADOT-FCDMC Project Matchline

Berwyn Wilbrink expressed his disappointment with the fact that the two projects are on different datum and coordinate system; that prevented Jacobs from having a thorough review of the 70% design for the Sols Wash project. He pointed out that the ADOT bridge does not provide an exterior barrier and the top of the Sols Wash levee exceeds the top of the slab at the tie-in location. Berwyn Wilbrink also mentioned that the revised sewer alignment at the Community Center was not included in the plans. Mark Gavan responded that three section points from the ADOT project were surveyed and translated into FCDMC coordinate system and datum.

Action Items

Jacobs Civil to provide a flap gate at the 60-inch culvert and change the flap gate at the Community Center roundabout to a model similar to the one used for the Sols Wash project..

EEC to

MEETING MINUTES

PROJECT: Wickenburg Downtown Flooding Hazard Mitigation Project – Final Design
FCDMC No.: FCD 2005C006
EEC No.: 305020.01

PLACE: FCDMC, Buckhorn-Mesa Conference Room
TIME: 1:30 PM
DATE: June 22, 2006

ATTENDEES:

Scott Vogel	– FCDMC
Kumar Hanumaiah	– FCDMC
Mark Lewis	– FCDMC
Gary Maiers	– FCDMC
Catherine Regester	– FCDMC
Jeff Riddle	– FCDMC
Gary Shapiro	– FCDMC
Richard Waskowsky	– FCDMC
Lon McDermott	– TOW
Miles Johnson	– TOW
Lyle Murdock	– TOW
Mark Gavan	– EEC
Florin Braileanu	– EEC
John Gleason	– Gannett Fleming
Frank Namatka	– Gannett Fleming

DISCUSSION:

Agenda Items

2. Design team answering questions about 70% Design

Mark Gavan opened the meeting saying that the design team compiled the comments that were received but EEC was not prepared for a comment resolution meeting, as it did not have sufficient time to evaluate the comments. However, EEC was ready to discuss and answer questions about comments or issues that were considered critical by the reviewers. Also, Gannett Fleming was ready to provide answers to the comments pertaining to the structural aspects of the project. Mark Gavan suggested to schedule a Comment Resolution Meeting later.

Scott Vogel pointed out that delaying the comment resolution meeting might adversely affect the compressed project schedule and he suggested the meeting to take place on July 6th. Mark Gavan agreed on the date and suggested 2:00 pm for the time. All parties agreed on that.

John Gleason ~~began~~ addressing ~~the~~ structural comments by Kumar Hanumaiah as follows:

Comment No. 177 – Approximate Quantities for cubic yards of concrete and pounds of steel will be shown in the plans ~~structural elements (~~for the floodwalls (Types A and B), drop structure and Tegner Street Bridge~~)~~. ~~will be expressed in cubic yards of concrete and pounds of steel.~~

Comment No. 178 – A note or notes will be provided on the plans for the ADOT standard detail for box culvert for the contractor to increase the top slab thickness by ½" over the standard and to increase the concrete cover for the ~~top and~~ bottom ~~slabs~~ steel of the top slab from 1 inch to 1 ½ inches.

Comment No. 180 – A detail will be added that shows how the parapet floodwall ties into the debris fins.

Comment No. 181 – A check of the existing Tegner Street Bridge wing walls to remain but under new loading conditions was performed and is included in the structural calculations provided in the submittal. The northwest and southeast walls are to remain. The northeast wall will be removed and replaced with a Type A floodwall. Gold Mine Village has added a headwall at the southwest. The northwest wall and the Gold Mine Village walls are satisfactory; the southeast wall requires some footing modifications to remain stable.~~and only the northeast wing wall was found that it could not take the additional load. This wall will be removed and rebuilt as part of the floodwall.~~

Comment No. 182

a. Drawings ~~ST5~~ ST6 ~~to~~ through ~~ST9~~ ST8 will be provided at the 100% submittal;

b. Will provide reinforcing steel size and spacing;

c. Will evaluate the need for an additional lap and/or construction joint to optimize design and facilitate construction;

d. Four load cases were considered per USACOE methodology for floodwalls;

e. Rustication allowance shown on the land side of the wall on the wall batter is a graphical error and will be corrected. ~~Will provide rustication detail;~~ No Rustication will be shown to extend below finished grade a minimum of one foot~~;~~.

Comment No. ~~182~~ 183

a. Will revise construction note as suggested;

b. Will revise construction note as suggested;

Comment No. 184

a. Same response as to comments a. and b. under 183;

b. Will revise reinforcing steel size and spacing as needed.

Comment No. 185

The requirement for use of ~~*General Comment (not included in summary)*~~ water stops at both construction and expansion joints will be removed. A detail for the water stop will remain for use by the contractor when needed. Expansion joints ~~will be replaced by construction joints for the new walls. However, expansion joints~~ will not be used for new wall construction but may be needed where vertical extensions of existing wingwalls occur as those walls were provided with such joints.

John Gleason addressed structural comments provided by Mark Lewis in the meeting. The comments and responses are paraphrased as follows:

Comment~~s~~: Sheet 61 (ST4). Will hairpin stirrups be used in the parapet floodwall section? They are easier to install in the field.~~by Mark Lewis (not included in summary)~~

Response: Yes. The detail will be revised accordingly.

Comment: Sheet 61 (ST4). Section 1, typical debris wall section; Use 90 degree hooks at base of #9 flexural bars to facilitate placement.

Response: Will revise detail to show 90 degree standard hooks.

Comment: Sheet 61 (ST4). In Section 1, what is the concrete cover over the footing steel?

Response: Typically it is 3-inches but will use 6-inches on the top as suggested by the Team based on anticipated potential for sand-laden scour.

Comment: Sheet 61 (ST4). In Section 1, will there be confinement steel provided at nose of debris fin?

Response: Yes. Detail will be revised accordingly.

Comment: Sheets 60 and 61 (ST 3 and ST4). Suggest using sleeves through the debris fins to simplify forming of the parapet wall and fins (sketch was provided).

Response: Suggestion noted. Details of parapet attachment to floodwall will reflect constructability concern and provide direction to contractor.

Comment: Sheet 62 (ST5). In Section 3; clarify detail for drilling and epoxying into existing wing walls.

Response: Will clarify.

Gary Shapiro chose to discuss some of his comments, as follows:

Comment No. 49 – EEC will remove the drainage blankets from typical sections; Frank Namatka agreed that they are not necessary;

Comment No. 52 – EEC will provide a bend in the alignment of the 2-42" detention basin pipes instead of using a curved alignment.

Comment No. 67i – EEC will provide an access point to the wash west of Tegner Street Bridge; it will likely be located on the south bank, close to the west end of the project.

In that context, an access point for the island was discussed. TOW (Lon McDermott) stated that it would be difficult to have Goldmine Village owner accept an access easement through their property. After a general discussion on the subject, Scott Vogel suggested TOW (Lon McDermott) to contact the trailer park owner and persuade him to grant permanent access to the island through his property. Lon McDermott accepted to talk to the trailer park owner.

Comment No. 70a – EEC will identify Cassandro Wash Drainage System and provide detail for the bolt-down cover at one manhole.

Comment No. 70d – Per Lon McDermott, TOW would contract out the drilling of the new water well and abandonment of the existing well. The Engineer/Contractor for the well relocation would cap the existing well bellow the bottom of the floodwall footing.

Comment No. 90 – EEC will revise the Section 219.3.2 of Special Provisions to include a paragraph that talks about anchor pins for the filter fabric and their spacing.

General Comment about Top Soil – EEC would revise and simplify the top soil specifications and restrict top soil to select material that is available locally. The top soil would be dumped on top of the gabions to provide conditions for native plants to develop.

General Comment about headwalls at Drainage Connector Pipes – EEC will provide outlet treatment details that would be specific to each pipe and its location. EEC (Florin Braileanu) stated that headwalls are not appropriate in any condition and not necessarily required for bolting a flap gate; there are flap gates designed to be set directly on the pipe end. In addition, outlet pipes may go through gabion walls or mattresses as the wire mesh and rock wrap the pipe around tightly without leaving voids larger than the porosity of the gabion rock. Examples of such treatments would be provided in the 70% Comment Resolution Meeting on July 6.

General Comment about Haul Route – EEC will revise the corresponding section in Special Provisions to include the Haul Route.

Cathy Regester chose to mention some of her concerns, as follows:

Comment No. 7 – Issue must be discussed with ADOT; FCDMC (Scott Vogel) would try to arrange a coordination meeting with ADOT/Jacobs on June 29 ant FCDMC.

Comment No. 12 – EEC will verify the calculations.

Scott Vogel chose to mention some of his concerns, with respect to information that should be provided in the plans and specs:

Comment No. 102 – EEC/GF to provide Shear Stress calculations for several cases. GF (Frank Namatka) presented the procedure and responded that he has begun performing those calculations. He obtained a rock size average (D50) of 9" for the length of the project. Calculations would be completed and included in the design report. A general discussion took place with respect to the need of having different average rock sizes in different places along the project. Scott Vogel suggested that a minimum unit weight for rock be provided in the Special Provisions to ensure that the Shear Stress calculations would be correct for the type of rock being used.

Comment No. 118c – Electric and Water Hookups will be abandoned in place instead of being removed.

Comment No. 124c – Concrete floodwall will be the back wall to the well site.

Comment No. 124d – TOW to provide FCDMC/EEC their suggestion of where the sewer manhole in the wash should be relocated.

Comment No. 170c – Traffic control plans will be submitted to TOW and ADOT for approval.

Comment No. 173c – Per TOW (Lyle Murdock) suggestion, EEC will specify that the color of the Decomposed Granite should be "Palomino Gold"; the color matches the material existing at the Community Center. EEC will specify that the Contractor is required to submit samples for approval. Also, EEC will specify pre-emergent treatment for the slope prior to application of Decomposed Granite.

General Comment– Need to clarify that the flood wall thickness of 10-inches includes the aesthetic treatment allowance. John Gleason confirmed that the wall thickness includes the rustication and that a detail will be provided when the treatment to be used is selected.

3. Design Issues

a. Coordination with developments

TOW (Lyle Murdock) pointed out that the site south of the BNSF Railroad is being developed (several buildings have been or are being completed) and the EEC flooding maps show the area being inundated. EEC (Mark Gavan) said that the flooding occurs because of the two 48-inch drainage pipes that convey local runoff through Goldmine Village. Mark Gavan presented the situation, pointing out that there are two possible scenarios:

- If no flap gates were considered for the pipes, the area south of BNSF Railroad would flood at an elevation higher than the elevation corresponding to the existing 100-Year storm in Sols wash; that is due to the increase in 100-Year Water Surface Elevation in Sols Wash that the Sols Wash project induces.
- If flap gates were set on the pipes, flooding would occur because of the local runoff that is restricted to reaching Sols Wash during a major storm event in Sols Wash.

TOW (Lyle Murdock) pointed out that the development south of the railroad has been graded high with respect to the road that leads to the railroad underpass. EEC (Mark Gavan) requested the Grading and Drainage plans for the development to asses the drainage condition and stated that the contour map available to EEC in the area is not as good as the mapping provided north of the railroad. FCDMC (Cathy Regester) suggested using the paper mapping for the Black & Veatch/ Coe Van Loo 1994 floodplain delineation to asses the condition of the area. FCDMC (Scott Vogel) pointed out that eliminating the flap gates on the two 48-inch pipes is an acceptable option, if the flooding from Sols Wash could be contained within the right-of-way. TOW (Lyle Murdock) agreed to provide Grading and Drainage plans for the development to EEC, and EEC agreed to asses (based on revised mapping provided by FCDMC from the 1994 study) whether the local flooding could be contained within the right-of-way / drainage easement or not.

b. Local Drainage: Southwest Gas site.

The Southwest Gas site lies very low with respect to its surroundings; the only drainage relief out of the area is provided by two grated catch basin inlets and a 24-inch HDPE pipe that discharges into Sols Wash. As the existing conditions show, the site would be flooded by the 100-year flow in Sols Wash. As a flap gate would be set on the 24-inch pipe outlet to protect the site from being flooded by Sols Wash, flooding could occur due to local runoff during a flood event on Sols Wash that closes the flap gate. EEC will define the drainage area around the site, calculate the peak runoff, obtain Finished Floor elevations for the main building and Maintenance facility and provide the retention volume required to keep the site dry.

c. Local Drainage: Detention Basin

EEC will prepare the Right-of-Way map for the area affected by local ponding along the US 93 Bypass embankment and provide it to FCDMC. The map should show individual parcels, right-of-way and easement limits.

4. Other Issues: CLOMR

General discussion took place about the impact the FCDMC CLOMR has on advancing the ADOT LOMR though the approval process. FCDMC (Scott Vogel and Cathy Regester) pointed out that the review of ADOT LOMR stalled because the reviewer requested more hydraulic information about Sols Wash. Without the LOMR being approved, the ADOT project losses its Federal funding. Therefore, it seems that the Sols Wash CLOMR has to be completed rapidly and submitted to FEMA for review. EEC (Mark Gavan) pointed out that it would be difficult to advance a completion date while EEC's Lloyd Vick (that would be in charge of completing the CLOMR) was not present at the meeting, but that may be possible at the end of July, beginning of August at the earliest. However, EEC would begin working on the CLOMR immediately.

Action Items

EEC to prepare for the 70% Comment Resolution Meeting set for July 6th at 2:00 pm;

EEC to re-evaluate the drainage conditions at the development site south of BNSF Railroad;

EEC to re-evaluate the drainage conditions at the Southwest Gas site;

TOW to provide feedback to FCDMC/EEC with respect to the sewer manhole relocation at the well site;

EEC to provide FCDMC the digital Right-of-Way map for the area affected by local ponding along the US 93 Bypass embankment;

EEC to begin working on the CLOMR immediately;

some discussion as to the economics of establishing plant for soil cement, it was agreed that a reinforced concrete type will be reviewed by Gannett Fleming and the concept refined.

3. *Water Management* - District construction personnel brought up the issue of the high water table and ask that we provide a water management special provision in the specification that requires the Contractor to keep water out of the excavations during construction. EEC will add water management specification to the project deliverables for the 70% submittal.

4. *Rustication on Concrete Walls* – The rustication of the concrete walls was discussed. Scott Vogel (FCDMC) would like to reduce the ¾" thick allowance provided on each face shown in the 40% plan submittal in order to conserve wall thickness to bare structural need. It was decided that rustication would be limited to the top 2 feet of both sides of all concrete walls (Types A and B inclusive). In addition, the wash side of the taller wall (Wall Type A) would receive a rustication allowance not to exceed ¾" in thickness for the exposed height of wall on the wash side. Scott presented the aesthetic concept of a wave, using vertical fluted elements above a wavy band of smooth concrete. This wave concept or similar is what will be proposed on the 70% submittal set. EEC to prepare sketches showing the rustication and distribute to the team in PDF format. Walls will not be painted.

5. *Floodwall Design Criteria* – John Gleason (GF) indicated that the design criteria being used for the floodwalls is from the Army Corps of Engineers. Cathy Regester (FCDMC) pointed out that FEMA criteria have to be followed for the design criteria of the floodwalls; otherwise a LOMR might not be attainable. GF to verify FEMA requirements for floodwall design.

6. *Gravel Blanket* –District engineering and construction personnel question the need for the gravel blanket behind the gabion gravity wall. EEC and GF to verify need for gravel blanket.

7. *Ramp Location/Detention Basin Outlet* – Gary Shapiro wanted the design team to keep the end of the access ramp at least 15 to 20 feet away from the end of the outlet pipes from the detention basin.

8. *Park Road Relocation* – Lon McDermott said we could align the park road around the transformer, on the park side of the transformer, to avoid the effort to relocate it.

9. *House in Flooded Area Upstream of the Detention Basin* – Lon McDermott said that the house has been flooded numerous times and is uninhabitable.

MEETING MINUTES

PROJECT: Wickenburg Downtown Flooding Hazard Mitigation Project – Final Design
FCDMC No.: FCD 2005C006
EEC No.: 305020.01

PLACE: Flood Control District
TIME: 2:00 PM
DATE: April 18, 2006

ATTENDEES:

Scott Vogel	– FCDMC
Catherine Regester	– FCDMC
Mark Lewis	– FCDMC
Fritz Huber	– FCDMC
Jeff Riddle	– FCDMC
Gary Shapiro	– FCDMC
Kumar Hanumaiah	– FCDMC
Lon McDermott	– TOW
Mark Gavan	– EEC
John Gleason	– GF

DISCUSSION:

1. *Soil Cement Alternative* – Mike Towers of the FCDMC construction group suggested that the design team consider soil cement in the portions of the project where levees are proposed in order to save cost. Mark Gavan (EEC) prepared a rough cost estimate during the meeting that indicated that the cost of soil cement is roughly equivalent to the cost of gabions, but that the soil cement requires a wider cross section, which would further encroach into the channel section that is already narrower then desirable. In addition, the gabions provide some opportunity for re-vegetation, which was presented in earlier public meetings. Therefore, it was decided to stay with the gabion design, but EEC was asked to refine the comparative cost estimate to verify the equivalent cost of gabions vs. soil cement.

2. *Grade Control (Drop) Structure* - Fritz Huber (FCDMC) raised the issue of the design concept for the drop structure in conjunction with the discussion of the use of soil cement for the channel lining. Specifically, he felt it may be cheaper to use either soil cement or RCC; even a lean slurry covered in a thin shell of structural concrete versus reinforced concrete especially if other sections were constructed with soil cement. Mark Gavan (EEC) noted that the assumptions for floor slab thickness shown in the 40% plans were conservative and that no time had been devoted to determining the structural requirements of the facility. After

10. *Hilfiker Wall System* – Lon McDermott (Town) was contacted by *Hilfiker,* a proprietary wall manufacturer, and presented with an alternative mechanically stabilized earth system for use in the levee sections of the project that would replace the current tied-back gabion concept. The system provided a more vertical face and advertised a savings in embankment encroachment on the land side. The option of allowing the Hilfiker wall system as an alternative to gabions was discussed. Scott Vogel (FCDMC) will call the Hilfiker Company to determine if it has been used in similar applications.

11. *Flow in North Prong* – The potential for upstream flows to concentrate in the north prong was discussed. Scott Vogel (FCDMC) asked EEC to verify that excess flows in the north prong will flow across to the south prong before they flood the tailor park area along the north bank.

12. *Coordination with Goldmine Village* – The 40% plans are based on the assumption that the excavated material from the island trimming will be used to fill the Goldmine Village site. If this isn't done, the floodwall will have to be extended farther upstream on the south bank. Lon McDermott; to talk to the owner of Goldmine Village to set up a meeting to discuss the plan of spoiling material on the Goldmine village site.

13. *Gabion Stability* – Scott Vogel (FCDMC) pointed out that the channel velocities (approximately 12 feet per second) exceed what is normally allowed for gabions (9 fps) and therefore a shear stress analysis will be required to verify that the rock will remain stable during the design flood.

ACTION ITEMS:

- EEC to refine the soil cement vs. gabion cost estimate.
- EEC to include a water management spec in 70% submittal.
- EEC to prepare rustication sketch for review by the Town and the design team.
- GF to verify that FEMA design criteria are being followed for the design of the floodwalls.
- GF to review need for gravel blanket behind the gabion gravity wall.
- Scott Vogel to contact Hilfiker.

- EEC to verify that excess flows in north prong can flow back to south prong before flooding trailer park.

- Lon McDermott to set up meeting with Goldmine Village owner.

- EEC/GF to verify that gabions can resist expected sheer stress during design flood.

DISTRIBUTION: All attendees and File

Appendix B.3
CONTRACT DOCUMENTS

EXHIBIT A

SCOPE OF WORK

CONTRACT FCD 2005C006
Work Assignment No. 2

Wickenburg Downtown Flooding Hazard Mitigation Project – CLOMR Preparation

1.0 DESCRIPTION

The CONSULTANT shall generate the CLOMR technical data notebook and delineation work maps for the Project, for Sols Wash from ADOT's Proposed Interim Bypass to upstream of the proposed excavation in Sols Wash, as necessary to tie into the existing floodplain mapping; and for Hospital Wash from the confluence with Sols Wash to the upstream limit of the effective delineation. All work will be per the ADWR State Standards Attachment 1-97 (SSA 1-97) using the ADWR/FEMA submittals outline. The CLOMR package will include, but not be limited to the existing hydrology, the hydraulic analysis (including cross-section identification), new floodway/Floodplain delineation, and FEMA forms and miscellaneous information.

The hydrologic and hydraulic information being prepared as part of the final design shall be utilized in the CLOMR preparation. Per FEMA requirements, a subcritical analysis shall be performed for the CLOMR. The hydraulic modeling will be set up to address the 100-year discharges, but will also contain profiles for the 10-, 50- and 500-year discharges.

The DISTRICT will take the lead to submit the CLOMR information to FEMA.

2.0 TASKS

2.1 Coordination with District and FEMA Reviewers

The CONSULTANT shall attend coordination meetings with the District, as necessary, during the preparation of the CLOMR. The CONSULTANT shall also coordinate with the FEMA reviewers after submittal of the CLOMR to respond to the reviewer's comments.

2.2 Hydraulic Analysis of Sols Wash and Hospital Wash

The CONSULTANT shall prepare a duplicate effective model to compare the original HEC-2 floodplain model with the newer HEC-RAS model. In lieu of the corrected effective model, the CONSULTANT shall submit an existing conditions model to FEMA. The CONSULTANT shall obtain the effective HEC-2 models for both Sols Wash and Hospital Wash from FEMA. The DISTRICT shall pay any FEMA costs for the models.

2.3 Hydraulic Analysis of Sols Wash and Hospital Wash

The CONSULTANT shall prepare hydraulic flow models for each wash based upon slope-area starting conditions. Each wash will be analyzed for the 100-yr flood using HEC-RAS to perform the hydraulic modeling. The resulting HEC-RAS models will be used to calculate the profiles for the 10, 50, and 500-year floods.

2.4 Hydrologic modeling

The CONSULTANT shall document the rainfall runoff model for the Hospital Wash watershed and the detention basin watershed using HEC-1. The CONSULTANT shall also document the runoff for the local inflow points using the Rational method.

2.5 Document Improvements to Sols Wash

The CONSULTANT shall prepare all documents regarding the design improvements of Sols Wash for distribution to the FEMA Reviewers. This documentation includes the following:

- Notification to the Affected Community and Property Owners
- Structural Stability of the Levees
- Operation and Maintenance Plan/Agreement

2.6 Prepare Floodplain Work Maps for Sols Wash and Hospital Wash

The CONSULTANT shall prepare all workmaps for revisions to the 100-year floodplain for both Sols Wash and Hospital Wash. The workmaps will be prepared at 1"= 200'.

2.7 Prepare FEMA Forms for the Hydrologic and Hydraulic Revisions

The CONSULTANT shall complete the required FEMA forms for revisions to the hydrologic conditions of Hospital Wash and for the Hydraulic changes to both Sols and Hospital Washes.

2.8 Prepare CLOMR Report

The CONSULTANT shall prepare a report documenting the request for the CLOMR. Digital copies of all report information shall be provided to the DISTRICT on CD.

2.9 Revise CLOMR per FEMA Review (Optional Task)

The CONSULTANT shall make all revisions, based upon FEMA review comments, to ensure that the CLOMR is approved. If FEMA requests changes/revisions that result in a change to the scope of work for the CLOMR, the DISTRICT may authorize the use of this optional task to cover the changes requested by FEMA.

Appendix B.4

OPERATION AND MAINTENANCE PLAN

Subject: Chain of Command
***Purpose:* Define reporting responsibility within the Town Of Wickenburg (TOW) and the Operations and Maintenance Division (O&M)**

PROCEDURE A: Organization Structure

1. The Town of Wickenburg (TOW) is a municipal corporation and political subdivision of the State of Arizona, an entity that reports to and is governed by Common Council, the members of which are elected officials.

2. The TOW Town Manager directs the Town's operations. The reporting responsibility of this office is to the Town Council.

A schematic organizational chart is attached (Attachment A) that depicts both the authorized position title and vertical/horizontal relationship definitions.

PROCEDURE B: Personnel Responsibility

1. Each employee's responsibilities is to be made in accordance with the vertical chain of command as presented herein.

   A. Daily assignments and project goals will be given by the immediate supervisor.

   B. In the event that an assignment is given by another supervisor of equal or higher level, the assignment shall be undertaken with the priority given by the assignor, notifying the employee's immediate supervisor as soon as possible of the situation.

   C. The employee's position responsibilities may necessitate directing employee activity for personnel not his subordinate(s); such direction may be deemed necessary by an emergency or work conditions.

2. When such assignments are made, it is the responsibility of the assignor to make known the reason for such direction to the assignee's immediate supervisor as soon as possible.

3. Each employee is to discharge, to the best of his ability, the responsibility of his position, and report to his immediate supervisor.

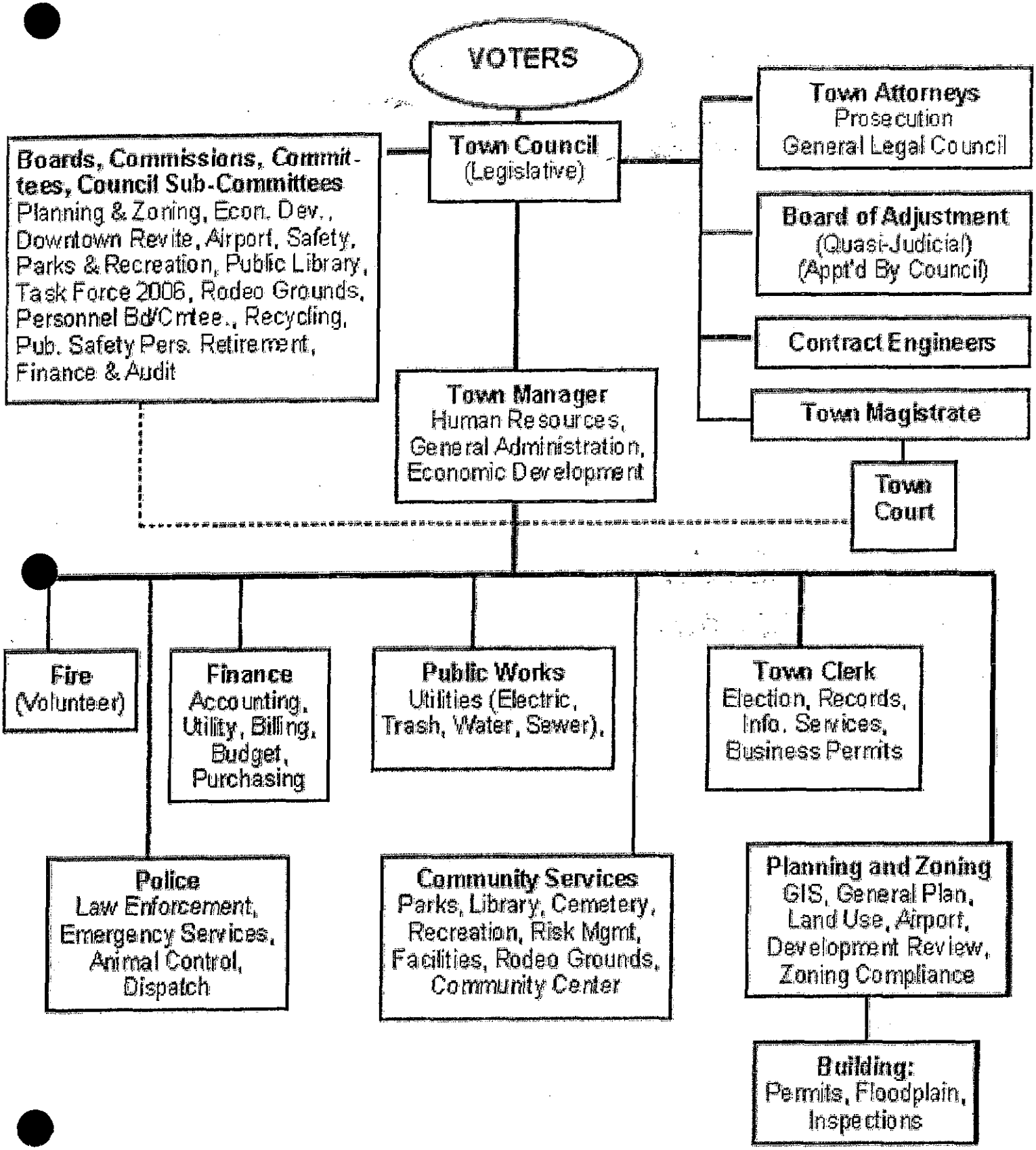
   A. Questions regarding position duties shall be directed to the immediate supervisor.

   B. Any deviations from the established chain of command initiated by the employee, shall be reported to the employee's immediate supervisor at the first available opportunity, along with an explanation of the reason(s) for such action.

4. No one is authorized to bypass the chain of command, which is shown on attachment. (Attachment: A: Schematic Organizational Chart)

ATTACHMENT "A"

Schematic Organizational Chart



Subject: Inspections and Documentation
Purpose: Document the Procedure for Tracking MFR Measures

PROCEDURE:
1. Annual Inspections:

The Work Control Center will conduct annual inspections of all of the Town's flood control facilities on an annual basis. The annual inspection will be documented in report form and reviewed by the Public Works Director. The report will include a statement concerning whether or not the structure will operate as designed. The inspection report will be filed away as a hard copy and an electronic form will also be documented and saved in the TOW share drive. Applicable copies of the inspection report will be mailed to the projects sponsoring agency, the Flood Control District of Maricopa County.

2. Maintenance Inspections:
The Maintenance Inspections also occur on an annual basis. This inspection precedes the Annual inspection by six to eight weeks. The Public Works Department conducts the maintenance inspections. The inspection staff will provide a detailed report noting any maintenance deficiencies, continuous monitored concerns, and any dam safety anomalies observed during the inspection. From this report, work orders will be generated, some deferred and assigned accordingly. The maintenance inspection report will be filed away as a hard copy and an electronic form will also be documented and saved in the TOW share drive. Each work order will be assigned a priority rating (see Sheet 1-3).

Managing for Results (MFR) Measure:

All priority #**1 work orders** generated from the maintenance inspections shall be completed before the start of the scheduled annual inspections. When this condition is met, the structure has been maintained to District and sponsoring agencies standards.

See attached priorities and inspection schedule.

Deficiency Levels and Maintenance Standards (Priorities)
(During Inspections and Routine Maintenance)
SUBJECT: Index
PURPOSE: List titles of deficiency levels and maintenance standards
Function & Integrity - Priority #1
Standard Number and Title
#1 Dams
#2 Flap Gates
#3 Inlet & Outlet Structures
#4 Inverts Channels & Storm Drains
#5 Levees
#6 Reservoirs Dams
#7 Channel & Storm Drain Walls
Security & Liability - Priority #2
Standard Number and Title
#8 Access Gates
#9 Retention Basins
#10 Buildings
#11 Bridges & Catwalks
#12 Catch Basins
#13 Handrails
Aesthetics - Priority #3
Standard Number and Title
#14 Access Roads
#15 Fencing
#16 Right-of-Way Vacant
#17 Signs & Staff Gages
#18 Trails

MONTH	DATE	DAM	FEDERAL AGENCY	DISTRICT RESPONSIBLE ENGINEER	FY 05/06 INSPECTING ENGINEER

Subject: Flood Emergency Operations
Purpose: To Define Duties and Responsibilities for O&M Personnel during Flood Emergency Conditions

Procedure A:
1. Each employee will be assigned to one of the defined observation teams to serve as "Flood Water Personnel." Each team will have specific observation points assigned, for which the team member will observe and report data as observed.

A. The observation points are established by the Police and Fire departments.
B. The police and fire personnel may define additional task(s) for any observation point at the time of team activation.
C. All personnel shall evaluate their personnel safety consideration when undertaking both defined and special assignments.

2. Police and Fire personnel will be assigned a TOW vehicle equipped with the following items:

A. Mobile 2-way radio
B. Rotating warning light
C. Most TOW vehicles are also equipped with a commercial radio for use in monitoring local emergency frequency available to the general public.
D. For off highway locations, a four-wheel drive vehicle will be assigned.

3. Police and Fire personnel will maintain radio contact at all times beginning with a preliminary radio check to "TOW Headquarters" prior to departing the TOW complex.

A. Refer to "Radio Usage Procedures" for additional instruction.
B. Upon arrival at assigned observation point, Police and Fire personnel will observe, record, and report by radio the following data:

- Team number
- Observation point
- Stream flow characteristics:
  a. Stream and/or staff gage reading(s) to be measured in feet or elevation depending on the structure.
  b. Stream gage condition, (rising, falling, or steady).
  c. Estimated velocity, feet per second.
  d. Weather conditions (raining or not; light or hard).

C. The need for extended conversations should be made by cellular phone, if practical. REMEMBER, THE PUBLIC AND THE NEWS MEDIA ARE MONITORING YOUR RADIO TRANSMISSION.
D. Prior to departing from your assigned observation area notify the TOW headquarters that you are leaving and to receive any special instructions and clearance.

4. Any unusual or changing conditions having a significant potential to be life threatening or dangerous to the general public will be reported immediately.
5. When the TOW vehicle is so equipped, the local AM radio station shall be monitored for general public broadcasts that may conflict with observed conditions. Should conflicting information be heard it shall be reported to "61 Flood Control."
6. In severe situations, personnel will be required to go on twelve-hour shifts, generally from 0600 to 1800 hours. Personnel will report to TOW Headquarters at the beginning of the shift.
7. If a life-threatening situation occurs in your vicinity and you can assist without endangering yourself, do so, but use good judgment and keep safety in mind at all times.
8. Police and Fire personnel must understand and be experienced with the hazards of driving in rainy/foggy/snowing weather. Typical hazards can include:

A. Downed power/utility lines.
B. Flooded dip crossings.
C. General public vehicle accidents.

9. Flooded steams or dip crossings and impounded water behind structures at road crossings where a potential hazard exists for public traffic will be reported by radio to the TOW police dispatch and Public Works so that traffic control devices can be installed.
10. Do not divulge any information or give opinions to the news media or the general public; refer them to TOW Public Information office.
11. Maintain adequate vehicle fuel reserve during your shift and fill the fuel tank at the end of your shift.

FLOOD WATCH ASSIGNMENT AND RESPONIBILITES

Public Works Field Supervisor

- To assign areas that have been repaired or reconstructed to senior operators for transport on rotating schedule. Review and evaluate all assigned reports.
- Flood Watch Team Leaders will inspect drainage of various locations and structures that have been repaired or reconstructed and will complete a report on performance of repair work and note and prioritized any deficiencies.

Team Leaders

These field supervisors will update flood emergency staff list at least three times a year; all areas will be fully manned at all times. Each area is assigned a monitoring crew and the supervisor will make certain any emergency equipment is ready for use. Members of each team must be familiar with their areas. Storm surveillance and any work request forms must be properly completed, and each report checked to verify that all areas have been reported. Before each team departs, the supervisor is to verify that all members are present or substituted and the proper paper work is in their possession.

Police and Fire Dispatch
The Police and Fire Dispatch will assist the field observers in obtaining equipment, materials, and other resources for emergency repairs to District structures and will keep accurate logs of incoming calls. In addition, the TOW headquarters will monitor the various team locations movements as they make observations and inspections during the emergency.

This memo in no way supersedes the TOW procedures and policies that must be met during storm surveillance.

Subject: Removal of Unwanted or Nuisance Vegetation
Purpose: To standardize the removal of unwanted, deep-rooted, or nuisance vegetation on TOW structures and right-of-way.

PROCEDURE: Deep-Rooted Vegetation

1. The following species have been determined to be deep-rooted and will not be acceptable on all TOW dams, dikes, levees, and earthen slopes:

a) Desert Broom
b) Ironwood Trees
c) Mesquite Trees
d) Palo Verde Trees
e) Salt Cedar

Deep-rooted vegetation is defined as trees and shrubs having a woody structure penetrating below a 3' ft. depth.

Plants will be stump cut flush with the soil surface and a suitable herbicide will be applied to the stump immediately.

All trees will be kept a minimum of 20' ft. from the toe of the dams, levees, and dikes.

Any tree branches or foliage canopy that reduce the roadway clearance to less than 14' ft. above the road surface or which reduce the width to less than 12' feet, must be trimmed or removed.

2. Deep rooted trees must not be allowed on embankments because they limit access and visibility, and can pose potential hazards by toppling in windstorms, fill cracking by root invasion, or openings of seepage paths by root decay. Any vegetation with an extensive root system or prevents a clear view of the embankment or abutment areas should be removed.

3. ***Maintenance of unlined floodways.*** To ensure that the integrity of the structure is preserved and that the floodway will function as designed.
a) Unwanted vegetation will be removed or destroyed within the flow line of the floodway, collection ditches, or side inlet basins. Remove any trash or debris that may impede flows. If grasses are established, maintain to a height of 6" inches.

Subject: To insure that the integrity of the structure is preserved and that the Floodway will function as designed.
Purpose: Procedures for the maintenance of unlined floodways

PROCEDURE A.

1. Nuisance or high unwanted vegetation.

   Remove and or destroy any woody vegetation within the flow area of the floodway, of the floodway, collection ditches, or side inlet basins. Also, remove trash/debris that will impede flows in these areas. If grasses are established, maintain to the height to six inches.

2. Sediment/silt deposits.

   Remove accumulated deposits of loose material to obtain designed grades and cross sections Loose deposited materials shall not be used for repairs within the floodway unless tested and meets the earth fill criteria in the construction specifications. Depending on the amount of accumulation in the invert, a sediment survey may be required. Ensure any 404 permits are in order to perform the job. The lead operator shall keep a copy the 404 with him at all times.

3. Erosion/deep rills. Contact the Work Control Center for job assessment.

   A sample of the stockpiled material that will be used for the repair of the erosion/rills will be submitted for a proctor test through coordination by the Work Control Center. Once the proctor test is completed, repairs of eroded areas may begin by replacing displaced material with approved proctored material. Moisture conditioned material will be placed in lifts not to exceed 6" inches. Each lift will have a compaction test required to meet 95% density or in accordance with the project's specified requirements. If the compaction lift does not meet the 95% criteria, the tested lift will be removed, reprocessed and reinstalled accordingly and re-tested. 5 ea. nuclear compaction tests to 1 ea. sand cone test will be the normal. A daily field report(s) will be submitted by the consultant once the job scope is completed along with the density results report. Compaction equipment to be used will be approved through coordination with the Work Control Center as the job plan dictates.

#1. ACCESS GATES

Deficiency Noted

Maintenance Standard

A. General

1. Damaged or missing members.

a. Missing gates, panels, or locks

a. Replace with standard panel and appropriate locks (3E59 or 3E56)

b. Broken or missing gate hinges

b. Replace or repair as needed

c. Members bent or out of alignment causing the gate not to function properly.

c. Repair members and align accordingly

d. Large space or opening under gate panel

d. Standard calls for 4" inches of clearing

e. Large voids or erosion around gate post/braces

e. Fill in holes flush & compact to grade with natural fill

B. Chain-link & Wire gates

1. Rusty surfaces

a. Rusty surfaces that affect the integrity of the existing gate fabric or wire.

a. Remove damaging rust and either repaint or replace damaged gate fabric or wire.

b. Holes in chain link gate fabric of more than 6" wide and 12" long

b. Repair or replace damaged section as needed

c. Chain link gate fabric stretched or bent out more than 6" inches

c. If possible refurbish stretched out chain link fabric or replace sections as needed.

d. Gates out of adjustment more than 2" inches

d. Adjust gates to within ½" inch.

e. Loose or sagging smooth or barbed wire more than a 2" inch sag

e. Re-stretch wire to remove sag in wire fence.

f. Missing strands of wire.

f. Reinstall missing strands to match up to existing fence.

C. Pipe Gate

1. Surface paint.

a. 25% of overall surface of pipe gate needing repainting

a. Remove any peeling paint, primer and repaint as needed.

b. Rusty surface

b. Remove rust, primer and paint.

#2. ACCESS ROADS

Deficiency Noted

Maintenance Standard

A. General

1. Unsightly condition visible to public (paralleling residences, streets, bridge crossings, etc....).

a. Trash/debris, or litter along an access road.

a. Remove trash & debris

b. Unwanted or high vegetation.

b. Cut, remove, or chemical spray and follow up if needed for control

c. Large rocks or debris.

c. Remove rocks/debris

2. Health hazard

a. Animal droppings

a. Remove and dispose of accordingly

b. Garbage, dead animals causing unpleasant odors or attracting insects

b. Remove and dispose of accordingly

2. Restricted roadway

a. Any storm debris, or trash that reduces the driving width to less than 10' ft.

a. Clear debris /trash from roadway for access

3. Shoulder erosion

a. Erosion within 1' ft. of the roadway more than 8" inches wide and 12" deep

a. Repair with natural fill and compact as needed

B. Asphaltic Concrete

1. Vegetation concerns

a. Unwanted or high vegetation

a. Cut, remove and chemical spray if needed

2.Cracks

b. Cracks wider than a ¼" inch.

b. Repair cracks with a suitable fill material

3. Potholes

c. Potholes no larger than 6" inch in diameter

c. Repair & compact potholes with SS1 oil and cold-patch mix

4. Depressions or settlement.

a. Depressions on the surface deeper than 4" inches.

a. Clean area and fill and compact with SS1 oil & cold-patch material as to reestablish surface area to flush conditions with existing road

C. Concrete & Grouted Rip-rap ramps

1. Cracks

a. Cracks wider than ½" inch

a. Fill with a suitable filler material

#3. RETENTION BASINS

Deficiency Noted

Maintenance Standard

A. Earthen

1. Vegetation

a. High or unwanted vegetation taller than 2' ft.

a. Mower operations or hand cut to manage high vegetation to acceptable standard of 6" inches

b. Deep-rooted vegetation (Palo Verde, Mesquite, Ironwood, and Salt Cedar trees). Remove or destroy all woody vegetation within the sediment basin.

b. Any volunteer growth that is not part of the original project landscape will be cut, stump treated and removed if needed. All herbicide treatment should be environmentally friendly (consult with Ecology Branch)

c. Citizen concerns regarding unpleasant odors from stagnant water or annoying insects or other pests.

c. Treat area for insects and schedule follow up treatments as needed. Remove any stagnant water by pumping out with water truck or portable pump.

d. Dead animals.

d. Remove and dispose of dead animal accordingly.

e. Trash & debris.

e. Remove trash/debris and dispose of accordingly.

2. Pollutants

a. Oil, gas, or other contaminants.

a. Contact Public Works Department @ (928)-684-2761 & Fire Department @ (928)-684-7702 for instructions and dispose of accordingly.

3. Sediment

a. Accumulated silt/sediment in basin invert that adversely affects the integrity of the structure.

a. Remove silt/sediment to restore basin to original or baseline conditions.

B. Concrete Lined Basin

1. Sediment

1. Concrete lined basins are generally self-cleaning, although excess sediment should be removed for the inspection of the concrete
works.

a. Accumulated sediment/silt on the concrete apron.

a. Remove & dispose of accordingly.

2. Stagnant water

b. Citizen concerns regarding unpleasant odors from stagnant water or annoying insects or other pests.

b. Treat area for insects and schedule follow up treatments as needed. Remove any stagnant water by pumping out with water truck or portable pump.

3. Cracks

a. Cracks wider than a ¼"

a. Cracks should be cleaned out and sealed with a suitable filler material.

#6. CATCH BASINS

Deficiency Noted

Maintenance Standard

A. General

1. Trash & Debris

a. Trash & debris located at the inlet of the catch basin opening.

a. Remove obstructions so flows are not restricted.

b. Unwanted vegetation restricting the catch basin inlet.

b. Remove unwanted vegetation from inlet.

2. Settlement or movement

a. Settlement or movement of walls or invert that has a difference or separation more than ½" inch.

a. Stabilize condition to no more than ¼" inch difference or separation. This could involve repairing voids and or erosion sheet flow damage.

3. Fire Hazard

a. Presence of chemicals, such as gasoline or oil

a. Contact Public Works Department @ (928)-684-2761 & Fire Department @ (928)-684-7702 for instructions and dispose of accordingly.

4. Vegetation

a. Vegetation growth in the joints that is more than 6" tall

a. Cut and remove vegetation from joints and if applicable treat with proper herbicide.

B. Steps 1. Defective or missing steps

a. Defective or missing step(s) that are broken or missing.

a. Repair or replace so that step(s) are structurally adequate.

C. Catch basins with metal grates

1. Safety hazard

a. Safety hazard where grate opening is wider than design

a. Restore to design condition.

b. High or lower than design elevation

b. Correct to elevation difference of no more than ¼" inch than surrounding area

2. Settlement or movement

a. Separation of more than ½" between apron & frame

a. Stabilize condition to no more than ¼" inch.

3. Trash & debris

a. Trash/debris that is restricting more than 20% of the grate surface

a. Remove obstructions so that flows are not restricted

4. Damaged or missing

a. Broken member of the grate

a. Repair or replace as needed.

b. Missing grate

b. Reinstall or replace as needed.

#9. FLAP GATES

Deficiency Noted

Maintenance Standard

General

1. Loose anchor bolts

a. Loose anchor bolts

a. Refasten bolts securely in place

b. Missing, broken or bent frame or parts that prevent the gate from functioning properly

b. Repair or replace damaged parts & ensure the frame is structurally sound & functioning properly

c. Flap gate "frozen" and not able to open & close freely

c. Service and lubricate to function properly

2. Trash/debris

a. Trash/debris that prevents the flap gate from opening or closing

a. Remove as needed to function as designed.

3. Painted flap gates

a. Paint is peeling off the flap gate.

a. Clean, remove any rust and re-apply a protective coating.

4. Graffiti

a. Graffiti present on the flap gate metal works.

a. Remove or paint over to match in kind.

#11. INLET & OUTLET STRUCTURES:

Deficiency Noted

Maintenance Standard

A. General

1. Trash & debris

a. Trash & debris that obstructs the inlet or outlet more than ¼ the height or diameter of the structure.

a. Inlet/outlet clear & free of restriction so as not to restrict flows.

2. Rodents/animals

a. Holes or diggings caused by burrowing animals.

a. Area adjacent to structure free of holes and burrowing animals by initial treatment and follow up for control.

3. Erosion

a. Erosion around the wing-walls or headwalls that create voids leading to the result of undermining or unwanted settlement.

a. Fill & compact voids or holes with proper moisture conditioned material. Lifts should not exceed 6" inches and density results at 95%.

4. Settlement or movement.

a. Settlement or movements that have dropped or uplifted the structure facing or base more than 3" inches.

a. Structure should be reinstalled firmly and bedded in place.

5. Vegetation

a. Vegetation 18" tall closer than 2 feet apart located on the apron or within 5' ft. of the structure.

a. Remove vegetation as needed. If applicable, apply proper herbicide to control unwanted vegetation growth.

B. Concrete

1. Structural damage

a. Parts of the structure that is cracked, chipped, broken off, or spalled more than 2" deep & 6" in diameter.

a. Remove any damaged pieces or sections; clean thoroughly, patch, replace, or repair as needed.

2. Graffiti

a. Obscenities

a. Repaint areas of surface affected to match in kind the surroundings.

C. Rock or masonry

1. Structural damage

a. Any missing and loose rock or block sections of the structure.

a. Remove any damaged pieces or sections; clean thoroughly, patch, replace, or repair as needed.

D. Metal

1. Worn or deteriorated

a. Eroded, rusted, or worn conditions that affect the structural integrity of the inlet/outlet.

a. Repair, refurbish, or replace as needed.

#12. CHANNEL & STORM DRAIN INVERTS

Deficiency Noted

Maintenance Standard

A. General

1. Trash, litter, & debris

a. Trash & debris restricting the intake into a storm drain.

a. Remove any obstructions from inlets and dispose of accordingly.

b. Debris/trash which impedes flows in a channel invert.

b. Remove any obstructions from the invert and dispose of accordingly.

c. Citizen concerns involving foul odors or unsightliness.

c. Remove trash, litter, or debris from premises that are causing concern.

d. Mud or sediment deposits which restrict 10% or more of the structure.

d. Remove accumulated sediment and dispose of accordingly.

d. Vegetation in excess of 2" inches high protruding through cracks or expansion joints.

d. Cut & remove protruding vegetation and chemically treat if applicable.

e. Ponded water complaints of foul odors or insects.

e. Pump out water with water truck or portable pump. If not practical, treat for vector concerns and schedule follow up treatments as needed.

f. Dead animals.

f. Remove dead animal and dispose of accordingly.

g. Pollution – any hazardous materials.

g. Contact Public Works Department @ (928)-684-2761 & Fire Department @ (928)-684-7702 for instructions and dispose of accordingly.

B. Improved channels

1. Deterioration concerns

a. Reinforcement exposed.

a. Remove exposed rust, refurbish, and or repair by patching areas of exposed reinforcement.

2. Cracks

a. Cracks wider than 3/8" wide x 6" inches deep

a. Cracks in the invert and slopes should be cleaned out and sealed with a suitable filler material.

b. Cracks wider than ¼" wide that go completely through the concrete less than 6" inches thick.

b. Cracks in the invert and slopes should be cleaned out and sealed with a suitable filler material.

3. Settlement or movement

a. Movement or settlement that has displaced the invert facing more than 4" from grade elevation.

a. Attempt to restore securely bedded within ¼" of grade. If not, remove either by saw putting or jack hammer methods. Repair damaged section.

C. Grouted rip-rap

1. Missing rip-rap or dislodged rip-rap

a. Missing grouted rip-rap

a. Clean out area where rock is missing; reinstall missing or dislodged rip-rap with proper grout application. Ensure to use a concrete glue to assist in repair.

D. Unimproved channel invert

1. Obstructions

a. Deep-rooted vegetation (Palo Verde, Mesquite, Ironwood, and Salt Cedar trees). Remove or destroy all woody vegetation within the sediment basin.

a. Any volunteer growth that is not part of the original project landscape will be cut, stump treated and removed if needed. All herbicide treatment should be environmentally friendly (consult with Ecology Branch).

b. Vegetation or debris which restricts more than 10% of channel capacity.

b. Remove restrictions and dispose of accordingly.

E. Asphaltic concrete

1. Erosion concerns

a. Sheet flow erosion causing damage to the asphalt structure.

a. Repair erosion by filling and compacting with proper moisture conditioned material. If needed, re-grade shoulder to drain properly.

b. Settlement or movement causing damage to asphalt structure.

b. Cut out damaged section of asphalt and replace accordingly by using SS1 oil and cold patch or hot mix asphalt.

F. Concrete low flow

1. Vegetation

a. High vegetation growing in joints.

a. Remove vegetation so joints are free of vegetation and root growth. Chemically treat if applicable.

b. Damage from flows to the curbing, which does not confine flows as designed.

b. Repair or replace damaged curbing to contain designed flows.

G. Low flow channel

1. Trash, debris or silt

a. Trash, debris or silt plugs that cause flows to divert out of defined low flow.

a. Remove restrictions so that flows stay within defined area.

#13. LEVEES

Deficiency Noted

Maintenance Standard

A. General right-of-way

1. Trash & Debris

a. Trash, litter, and debris creating an unsightly condition

a. Remove & dispose of accordingly.

2. Fencing damage

a. Nuisance vegetation taller than 18" inches

a. Cut vegetation and chemically spray treatment if applicable.

b. Cut or damaged fencing or gates.

b. Repair or replace damaged fencing or gates to set standards.

c. Damaged signs or stationing.

c. Refurbish or replace, as needed, any damaged signs.

3. Rodents

a. Rodents/animals creating holes or burrows on the crest or embankments.

a. Treat with proper rodenticides and schedule follow up treatments as needed.

B. Concrete/soil cement structures

1. Structural damage.

a. Cracks 1/8" inch or wider on the concrete which can expose reinforcement.

a. Clean out and fill in cracks with suitable fill material.

b. Erosion, spalling, or deterioration which affects the structural integrity.

b. Repair erosion from runoff/sheetflow. Repair areas where spalling or deterioration has occurred.

c. Broken or missing protective facing, which could allow water or rust to become a concern to the structure.

c. Repair or patch as needed to stabilize concerns.

2. Graffiti

a. Obscene material /writings

a. Remove or repaint as needed to match to existing conditions.

Earthen levee

1.Structural Damage

a. Erosion from sheet runoff is causing deep rills on crest or slopes of levee.

a. If erosion/rill is deeper than 2' ft. deep, a proctor test must be taken. Install moisture-conditioned material in lifts not to exceed more than 6" high and compaction tests will be administered on every lift and a 95% result or better must be obtained to continue each lift. Unless otherwise specified nuclear compaction tests will be suffice.

b. Plating material on the access road on the crest of the levee is displaced or missing. Plating missing on the access ramps.

b. Re-grade to design elevation with motor grader by bringing back into place any displaced material from the shoulder. If needed, reinstall ABC material on the crest as needed to reestablish safe all-weather access.

c. Slope protection missing or displaced.

c. Reinstall gravel mulch, loose rip-rap, or grouted rip-rap as needed.

2. Deep-rooted vegetation

a. Deep-rooted vegetation located on the crest or slopes.

a. Cut & stump treat as need. Remove any large root systems. Fill & compact holes accordingly.

3.Transverse or longitudinal cracks

a. Transverse or longitudinal cracks located on the crest or toe of the levees.

a. Record the station of the crack. Give location; crest, upstream shoulder, downstream shoulder, mid-slope, or toe of levee. Take measurements to include; diameter size, and depth of crack. Include photograph, inspector, date, and structure.

4. Other

a. Report any other levee safety related concerns (sink holes, depressions, slides, or other anomalies).

a. Record the station of the concern. Give location; crest, upstream shoulder, downstream shoulder, mid-slope, or toe of levee. Take measurements to include; diameter size, and depth of depression. Include photograph, inspector, date, and structure.

#19. CHANNEL & STORM DRAIN WALLS

Deficiency Noted

Maintenance Standard

A. Concrete

1. Structural Damage

a. Cracks wider than ¼" inch.

a. Clean out the crack and apply suitable filler material.

b. Spalling or chipping that is greater than 2" deep or which exposes reinforcement.

b. Remove any rust that may be present, clean damaged portion thoroughly, and patch accordingly with an approved product (dry patch product, rockite, etc.). Ensure the usage of a concrete glue to assist in adhering to the wall.

c. Chipping or spalling along an expansion joint or edge which is more than 1" deep.

c. Properly clean & remove damaged section along expansion joint. Patch damaged area to restore to original condition.

d. Missing expansion material or separation at the joint which permits passage of filler or backfill material.

d. Clean out the joint and replace missing expansion material (if needed, add "backerrod" to fill any large gaps).

2. Voids behind walls.

a. Voids behind concrete walls.

a. Excavate the void to the termination point. If the void is less than 4' feet deep; remove any loose material, add moisture to the void by wetting the cavity, install moisture conditioned material in lifts not to exceed 6" and compact to 95% density. If voids are deeper than 4' feet deep, contact Engineering and they will recommend a repair method.

3. Vegetation

a. Vegetation in the expansion joints.

a. Cut and remove vegetation, if applicable, apply proper herbicide to control vegetation.

4. Grouted rip-rap

a. Loose or missing rip-rap.

a. Clean out areas where rip-rap is missing, reinstall rock and grout in place. Ensure to use a concrete glue in the mix.

5. Weep holes

a. Animal guards missing.

a. Reinstall missing animal guards.

b. Blockage

b. Remove any restrictive material and clean out as needed.

Appendix C
SURVEY FIELD NOTES

CONTRACT 2003C050 – TASK ASSIGNMENT #9
SOLS WASH DESIGN
STRUCTURE SURVEYS Amended 3-6-06

A total of 6 structures within the project boundary were located and measured. BR&S was not supplied with any roadway plans or other documents for structure location. Therefore all structures were found by site reconnaissance. Structures are located along Sols Wash and the Hassayampa River in Wickenburg Arizona. The following data files, sketches and photographs document our findings. All coordinate triplet values are based on the GDACS points as identified on the structure sketches. The tabular data (hardcopy and electronic is coded by data collector point number, XYZ coordinates, and descriptor. Note that because of the lack of other control the stationing was developed along a line between FCD1 and FCD5 (monuments set for control on this project) with the station at FCD5 being 10+00 and increasing in an easterly direction. Also note that the file includes "shots" on structure "centerline" where appropriate. Descriptor "codes" refer to the structure names: i.e., "BF" = wall south of Ball Field, "mh" = manhole, "Basha rw" = Retaining wall north of Bashas, TB = Tegner Bridge, HW = Hospital Wash. The coding can be cross-referenced to the sketches by point number and structure location.

Sols Wash Structure Surveys 3-6-06

1010	82164.56	53144.88	2059.76	BASHA top ret wall
1011	82165.42	53162.19	2059.65	BASHA top ret wall
1012	82165.75	53141.58	2058.96	BASHA top pipe 8in pvc
1013	82160.76	53077.49	2060.09	BASHA top rw step
1014	82161.71	53080.34	2058.71	BASHA top 8in pvc
1015	82159.39	53030.11	2057.97	BASHA top 8in pvc
1016	82157.1	53008.67	2059.53	BASHA top rw
1017	82160.5	53008.38	2059.35	BASHA top rw
1018	82160.35	53008.17	2057.63	BASHA top rw
1019	82160.9	52977.07	2056.86	BASHA top rw
1020	82160.92	52973.94	2056.94	BASHA top rw
1021	82161.06	52969.78	2056.76	BASHA top rw
1022	82163.95	52951.53	2057.19	BASHA top rw
1023	82165.5	52942.84	2057.3	BASHA top rw
1024	82174.39	52890.03	2057.95	BASHA top rw
1025	82178.93	52845.2	2058.97	BASHA top rw
1026	82198.22	52760.57	2060	BASHA top rw
1027	82211.05	52673.46	2062.81	BASHA top rw
1028	82316.84	52508.59	2060.77	BASHA top rw
1029	82355.12	52448.39	2060.55	BASHA top rw
1030	82350.28	52427.28	2060.58	BASHA top rw
1031	82197.63	52765.34	2059.41	BASHA bot rw
1032	82179.55	52845.25	2055.68	BASHA bot rw
1033	82177.5	52866.46	2053.84	BASHA bot rw

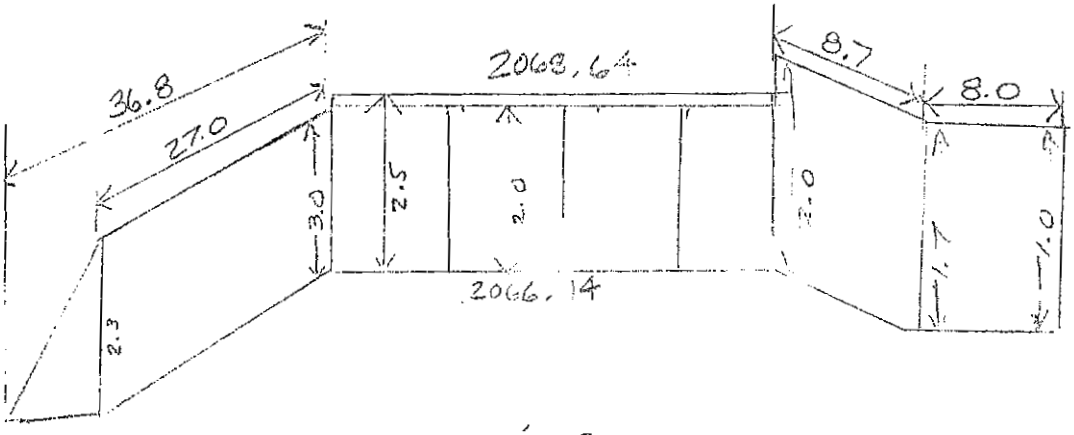
5006	82510.65	52596.72	2061.555	71 mh 4
5007	82599.57	52314.04	2062.522	71 mh 3
5008	82774.67	52181.21	2063.738	71 mh 2a
5009	82721.38	52079.9	2069.329	71 mh 2
5010	82639.29	51921.85	2063.14	71 mh 1
5011	83116.58	51265.33	2071.587	71 mh 10

4OI2,85154.32,61556.25,2285.34,GDACS

Type of Structure: Box Culvert Date: 3-6-06
File Name: _____ Description Name: Hospital Wash
Party Chief: DRS GDAC Control Pt # _____

(UPSTREAM)

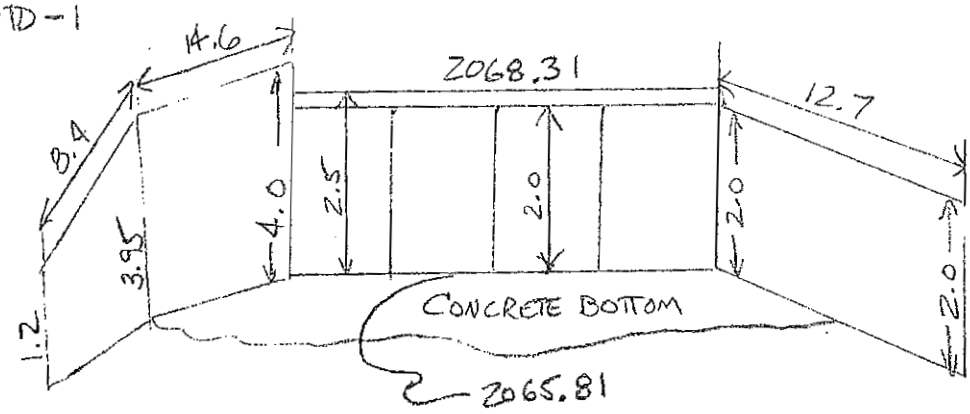
☒ Photo Taken HW-U-1, HW-U-2



General Condition of the Structure: Good

(DOWNSTREAM)

☒ Photo Taken
HW-D-1



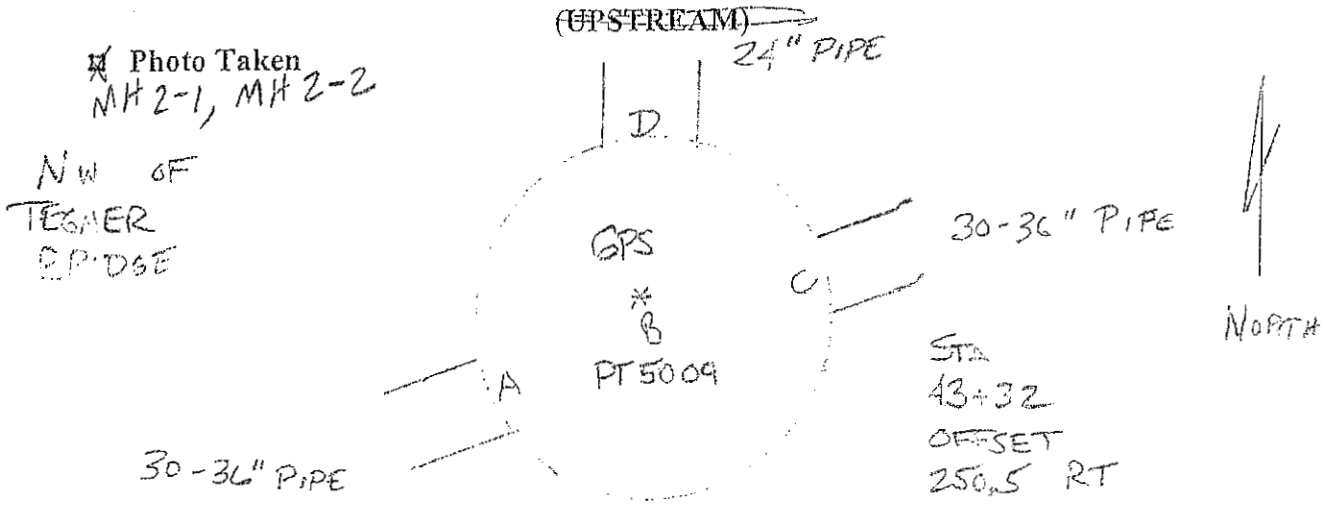
General Condition of the Structure: Good

FCDMC Contract 2005 C057
Task 3 Sois Wash Survey
Structure Detail Worksheet
SW Mapping Project 05-0031

Type of Structure: MANHOLE **Date:** 2-19-06
File Name: _____ **Description Name:** MH # 2
Party Chief: DRS **GDAC Control Pt #** _____

~~(UPSTREAM)~~

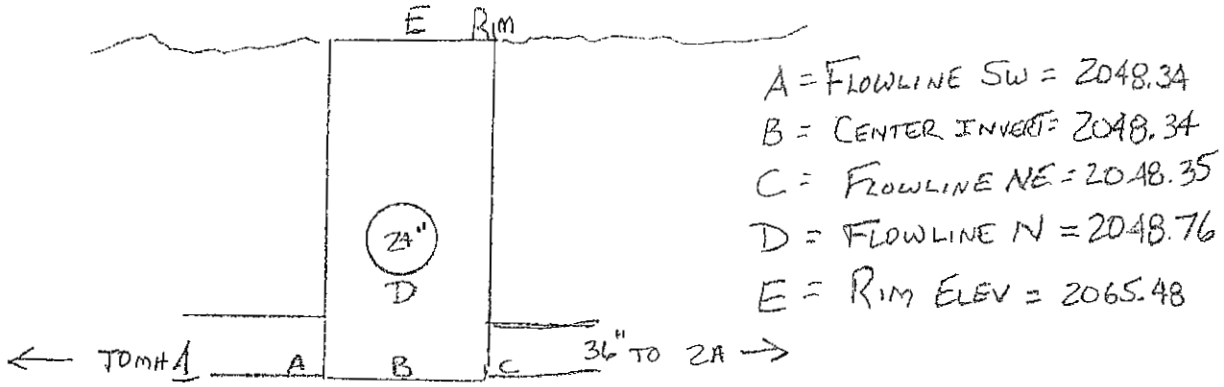
☒ **Photo Taken**
MH 2-1, MH 2-2



General Condition of the Structure: SIZES APPROXIMATE

~~(DOWNSTREAM)~~

☐ **Photo Taken**



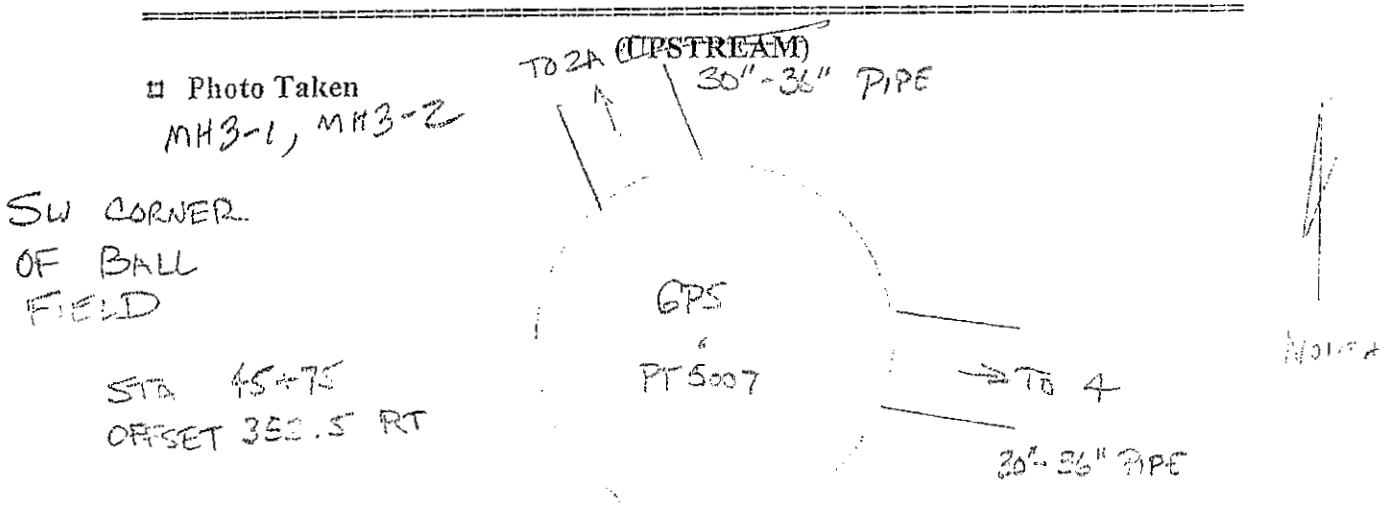
General Condition of the Structure: _____

[illegible]
Task 3 Sole Wash Survey
Structure Detail Worksheet
SW Mapping Project 05-0031

Type of Structure: MANHOLE Date: 2-19-06
File Name: _____ Description Name: MH # 3
Party Chief: DRS GDAC Control Pt # _____

☐ Photo Taken
MH3-1, MH3-2

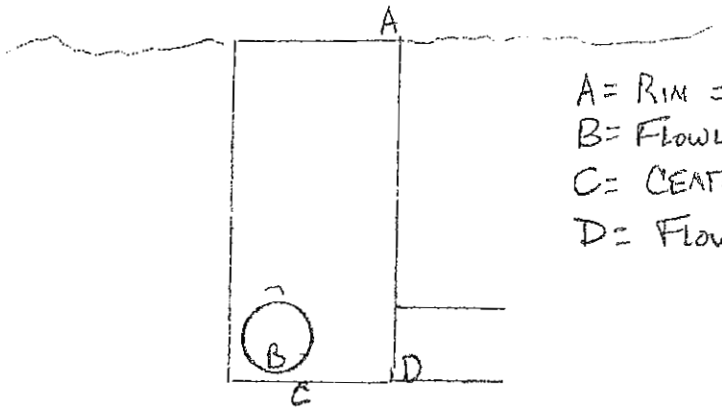
(UPSTREAM)



General Condition of the Structure: SIZES APPROXIMATE

(DOWNSTREAM)

☐ Photo Taken



A = RIM = 2058.74
B = FLOWLINE NW = 2046.20
C = CENTER INV = 2046.23
D = FLOWLINE SE = 2046.14

General Condition of the Structure: _____

ROEMCO Contract 4993-0350
Task 9 Sois Wash Survey
Structure Detail Worksheet
SW Mapping Project 05-0031

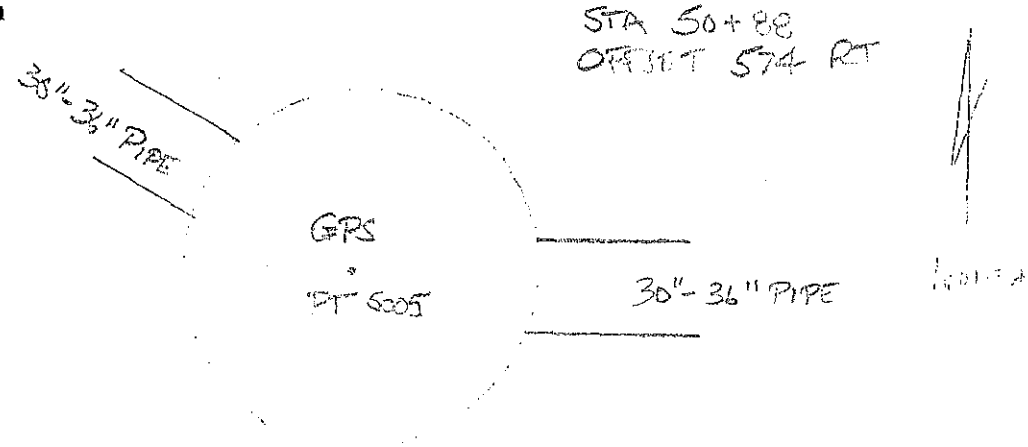
Type of Structure: MANHOLE **Date:** 2-19-06
File Name: _____ **Description Name:** MH # 5
Party Chief: DRS **GDAC Control Pt #** _____

~~(UPSTREAM)~~

☐ Photo Taken
MH5-1, MH5-2

STA 50+88
OFFSET 57' RT

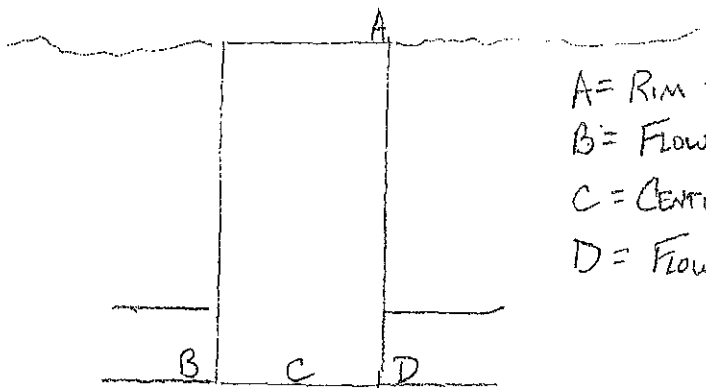
SE OF
BALL FIELD
NORTH OF
WASH



General Condition of the Structure: SIZES APPROXIMATE

~~(DOWNSTREAM)~~

☐ Photo Taken



A = RIM = 2055.19
B = FLOWLINE NW = 2043.29
C = CENTER INV = 2043.13
D = FLOWLINE SE = 2043.04

General Condition of the Structure: _____

Structure Detail Worksheet
SW Mapping Project 05-0031

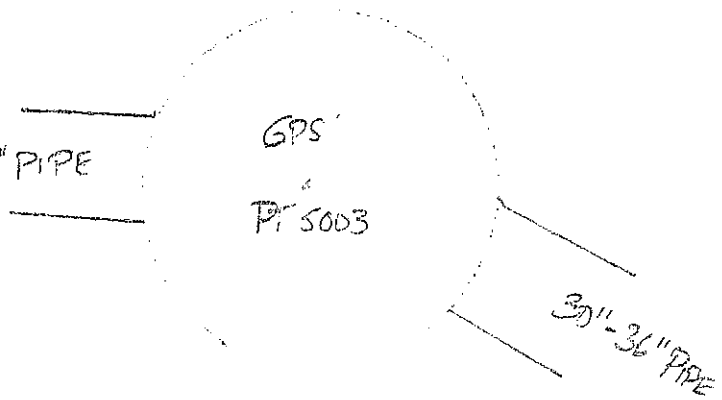
Type of Structure: MANHOLE Date: 2-19-06
File Name: Description Name: MH # 7
Party Chief: DRS GDAC Control Pt #

~~(UPSTREAM)~~

☒ Photo Taken MH7-1, MH7-2

STA 55+99
OFFSET 538 RT

SE OF SKATE PARK WEST OF RIVER ST. CROSSING

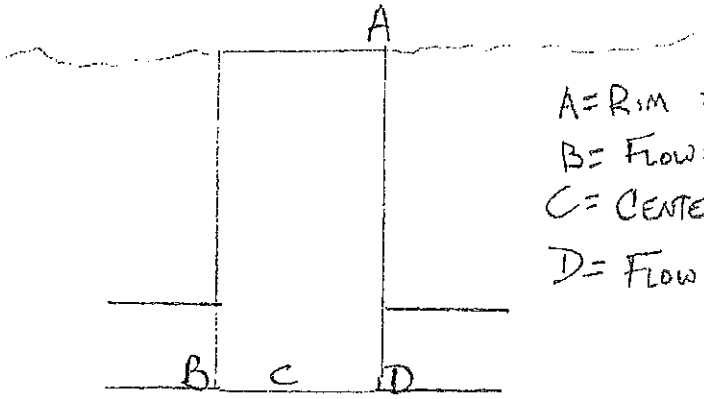


NORTH

General Condition of the Structure: SIZES APPROXIMATE

~~(DOWNSTREAM)~~

☐ Photo Taken



A = RIM = 2048.39
B = FLOWLINE NW = 2040.14
C = CENTER INV = 2039.89
D = FLOWLINE SE = 2039.54

General Condition of the Structure:

FCDMC Contract: 2[illegible]
Task 2 Sols Wash Survey
Structure Detail Worksheet
SW Mapping Project 05-0031

Type of Structure: MANHOLE **Date:** 2-19-06
File Name: _____ **Description Name:** MH # 9
Party Chief: DRS **GDAC Control Pt #** _____

~~(UPSTREAM)~~

☒ **Photo Taken** MH9-1, MH9-2

STA 61+23
OFFSET 6 11 RT

NE COR
REC BLDG
PARKING LOT

30"-36" PIPE

GPS

PT 5001

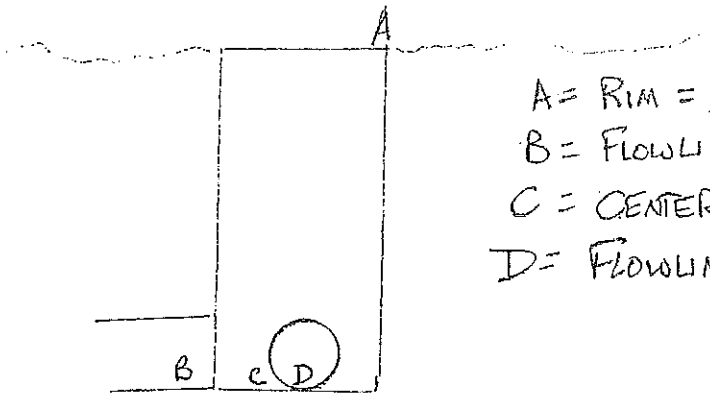
WEST OF
FCD 2
SOUTH OF
WASH

30"-36" PIPE

General Condition of the Structure: SIZES APPROXIMATE

~~(DOWNSTREAM)~~

☐ **Photo Taken**



A = RIM = 2048.06
B = FLOWLINE NW = 2037.01
C = CENTER INV. = 2036.94
D = FLOWLINE SE = 2036.91

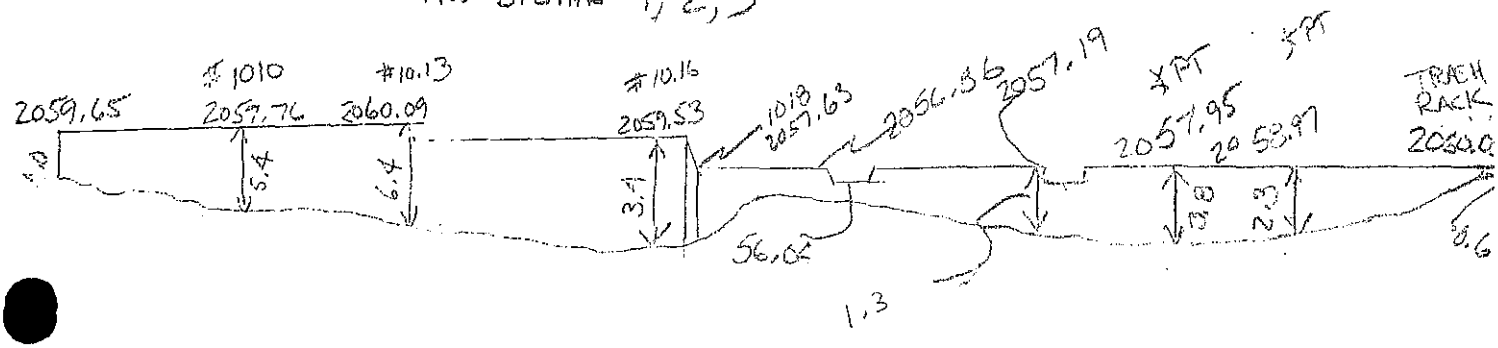
General Condition of the Structure: _____

FCDMC Contract 2003C050
Task 9 Sols Wash Survey
Structure Detail Worksheet
SW Mapping Project 05-0031

Type of Structure: RETAINING WALL Date: 3-6-06
File Name: _____ Description Name: BASHAS RW
Party Chief: TDRS GDAC Control Pt # _____

(UPSTREAM)

☐ Photo Taken RW BASHAS 1, 2, 3



LOOKING SOUTH

General Condition of the Structure: _____

(DOWNSTREAM)

☐ Photo Taken

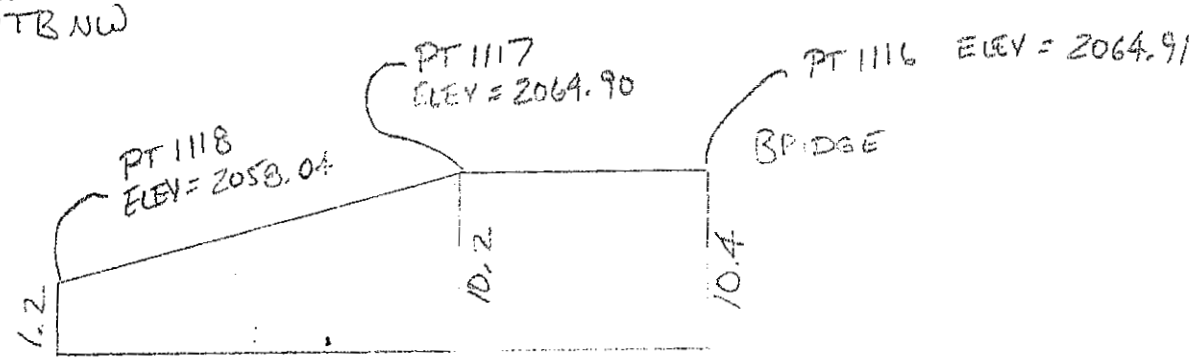
General Condition of the Structure: _____

[illegible]
[illegible]
Structure Detail Worksheet
PW Mapping Project 05-003[illegible]

Type of Structure: WING WALL Date: 3-6-06
File Name: Description Name: WWTB NW
Party Chief: DRS GDAC Control Pt # _____

(UPSTREAM)

☒ Photo Taken
WWTB NW



General Condition of the Structure: WING WALL NW CORNER
TEGNER STREET BRIDGE – GOOD

(DOWNSTREAM)

☐ Photo Taken

General Condition of the Structure: _____

[illegible]
[illegible]
Structure Detail Worksheet
SW Mapping Project 05-003[illegible]

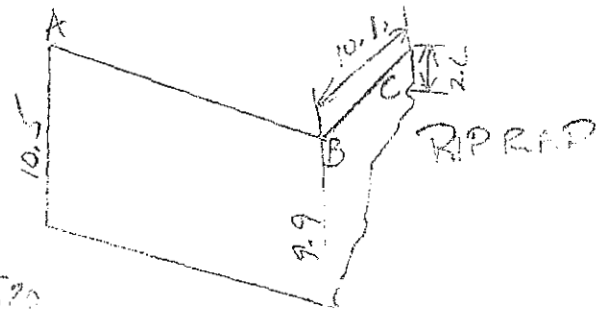
Type of Structure: WING WALL Date: 3-6-06
File Name: _____ Description Name: WWTB SW
Party Chief: DRC GDAC Control Pt # _____

(UPSTREAM)

☒ Photo Taken

BRIDGE

TBSWWW



	PT #	ELEV
A	1119	2063.20
B	1120	2063.14
C	1121	2063.16

General Condition of the Structure: WING WALL SW CORNER OF TEGNER ST. BRIDGE - GOOD

(DOWNSTREAM)

☐ Photo Taken

General Condition of the Structure: _____

TEGNER STREET BRIDGE

Appendix C

Datum Conversion for Tegner Street Bridge and the future US 93 Bypass Bridge

The existing SR-93 bridge which crosses Sols Wash is also locally known as the Tegner Street bridge. When ADOT completes their Interim SR-93 Bypass they will relinquish ownership of the Tegner Street Bridge to the Town of Wickenburg.

During the pre-design study the existing bridge needed to be hydraulically modeled in both the existing and proposed conditions. To simplify the modeling of this structure a previous study was referenced which included the modeling of this bridge. The study prepared by JE Fuller was completed in July of 2002 and entitled *Goldmine Village Conditional Letter of Map Revision*. In order to create the hydraulic model JE Fuller's study included survey and as-built information of the SR-93 bridge. That data was based upon the National Geodetic Vertical Datum of 1929 (NGVD 29).

In the pre-Design report EEC converted the bridge data to the North American Vertical Datum of 1988 (NAVD 88) to match the District's contour mapping. Using the internet web-based conversion program VERTCON the bridge data was converted from NGVD 29 to NAVD 88, at the Tegner Street bridge, by adding 2.18 feet to each elevation point.

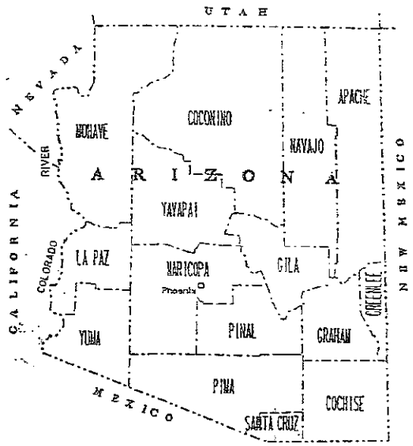
During final design surveyed points on the Tegner Street Bridge (NAVD 88) showed that the bridge was still not on the correct datum. The datum difference was determined by comparing NAVD 88 surveyed control points with ADOT plans and as-built information. The datum difference between existing conditions and the new survey was determined to be 1.51 feet not the 2.18 feet originally determined. The bridge was adjusted in the HEC-RAS model to match the difference in the new datum.

During final design two known ADOT monuments were surveyed and compared to the plans for the US 93 Bypass. The datum difference between ADOT and NAVD 88 was determined to be 1.98 feet. The future US 93 Bypass bridge was accordingly adjusted to match the 1.98 foot datum difference.

1.97

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
WICKENBURG PROJECT
TIES TO ARIZONA DEPARTMENT OF TRANSPORTATION
SECTION CORNERS
Job No. 05-11-14

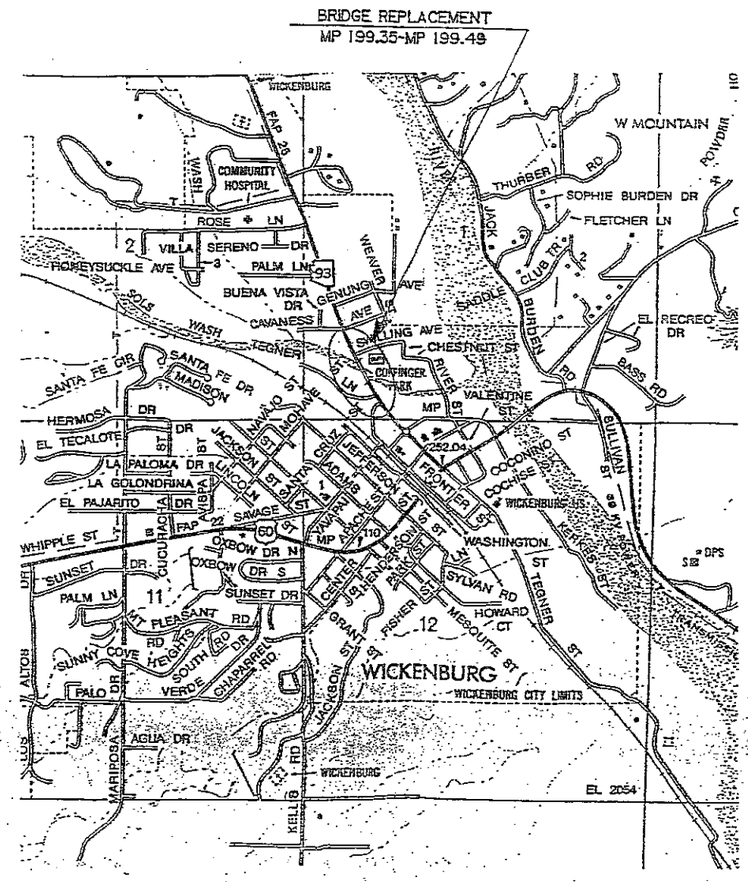
POINT LISTING	CGF MAP SCALE (F.C.D.M.C.)	NORTHING	EASTING	ELEVATION	FEATURE CODE
9501A	1.000124515	1081868.397	451363.666	2067.47 2065.49 Δ = 1.98	FOUND BRASS CAP EAST OF 2 FOUND SOUTHEAST CORNER OF SECTION ADOT #1
9502A	1.000124515	1081859.190	453972.1323	2044.47 2042.50 Δ = 1.97	FOUND BRASS CAP FLUSH #19817 SOUTH QUARTER CORNER ADOT #2
9503A	1.000124515	1084511.731	451365.7418	2080.90 2078.35	FOUND MARICOPA COUNTY BRASS CAP EAST QUARTER CORNER #37174 ADOT #3
FCD1	1.000124515	1082755.57	454689.34	2045.09	BRASS CAP FLUSH – MARICOPA COUNTY FLOOD CONTROL DISTRICT #1 BRADY-AULERICH & ASSOCIATES #9201
FCD2	1.000124515	1082236.69	453994.745	2049.50	BRASS CAP FLUSH – MARICOPA COUNTY FLOOD CONTROL DISTRICT #2 BRADY-AULERICH & ASSOCIATES #9202
FCD3	1.000124515	1082622.155	451775.715	2065.10	BRASS CAP FLUSH – MARICOPA COUNTY FLOOD CONTROL DISTRICT #3 BRADY-AULERICH & ASSOCIATES #9203
FCD4	1.000124515	1082750.525	450780.245	2071.62	BRASS CAP FLUSH – MARICOPA COUNTY FLOOD CONTROL DISTRICT #4 BRADY-AULERICH & ASSOCIATES #9004
FCD5 #1629	1.000124515	1083245.65	448783.275	2098.97	BRASS CAP FLUSH – MARICOPA COUNTY FLOOD CONTROL DISTRICT #5 BRADY-AULERICH & ASSOCIATES #9205
FCD6	1.000124515	1084666.205	449091.405	2122.34	BRASS CAP FLUSH – MARICOPA COUNTY FLOOD CONTROL DISTRICT #6 BRADY-AULERICH & ASSOCIATES #9206

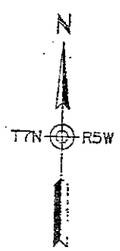


STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

PLAN AND PROFILE OF PROPOSED

STATE HIGHWAY
WICKENBURG-KINGMAN HIGHWAY(US-93)
BR-035-1(56)P
093 MA 199





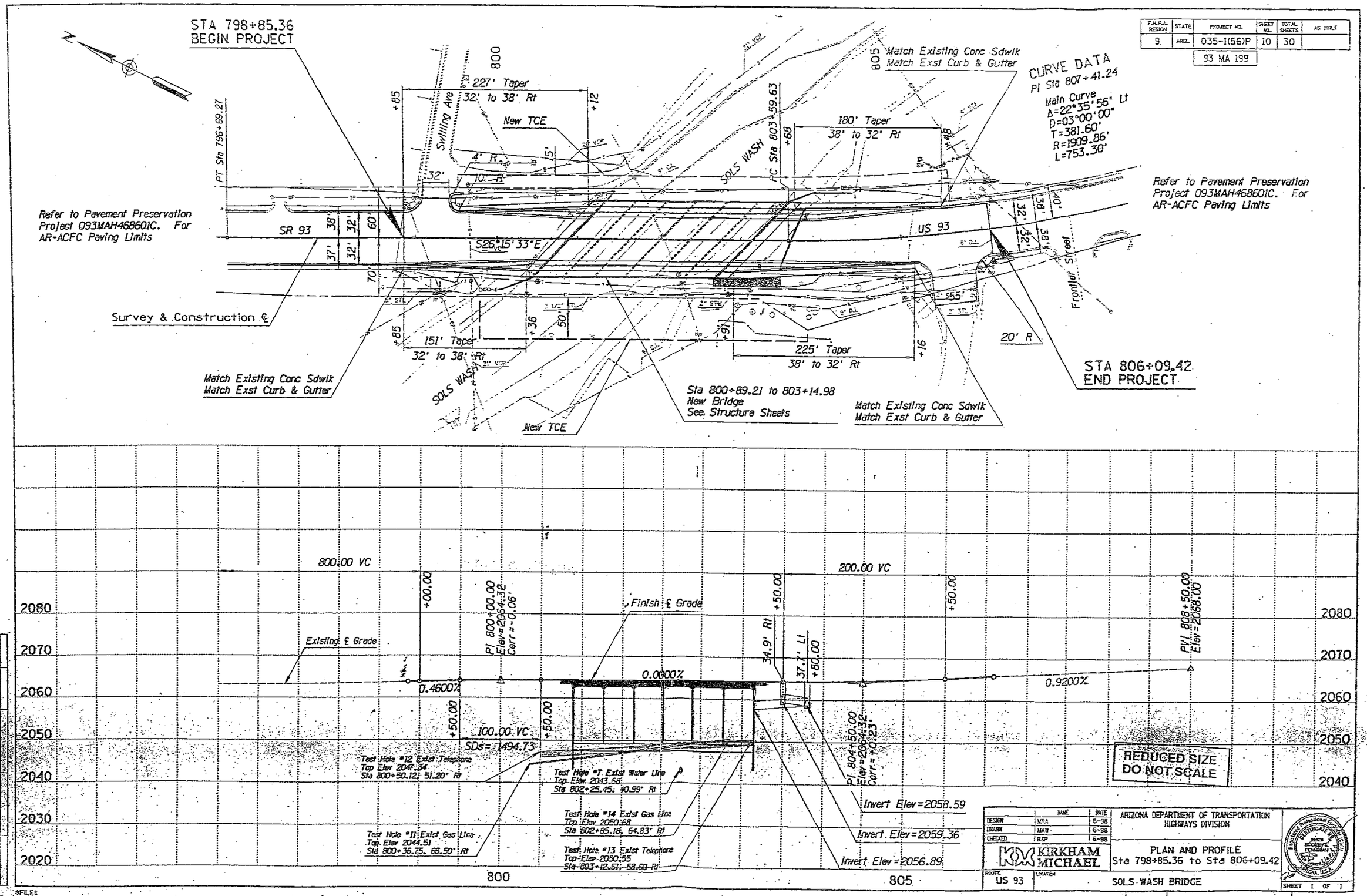
SOLS WASH BRIDGE

REDUCED SIZE
DO NOT SCALE

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
APPROVED: THOMAS G. SCHMITT
STATE ENGINEER

APPROVED DATE 7-2-93
ASSISTANT STATE ENGINEER

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	035-1(56)P	10	30	
		93 MA 199			



	NAME	DATE
DESIGN	MRA	6-98
DRAWN	MAW	6-98
CHECKED	RSP	6-98

KIRKHAM MICHAEL

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PLAN AND PROFILE
Sta 798+85.36 to Sta 806+09.42

ROUTE: US 93
LOCATION: SOLS WASH BRIDGE

SHEET 1 OF 1

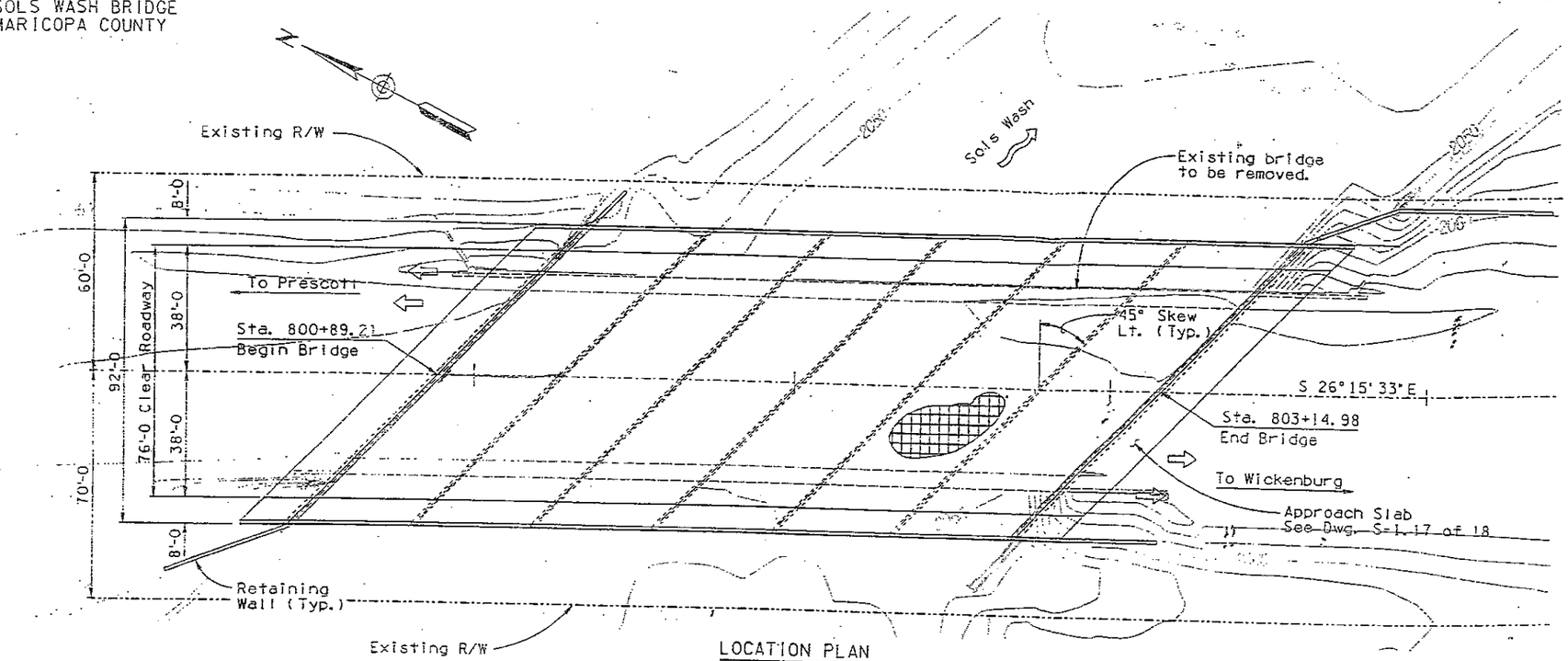
TRACS NO. H 4169 01C

BR-035-1(56)P

$FILE$
$DATE$ $TIME$

WICKENBURG - KINGMAN HWY. (US 93)
SOLS WASH BRIDGE
MARICOPA COUNTY

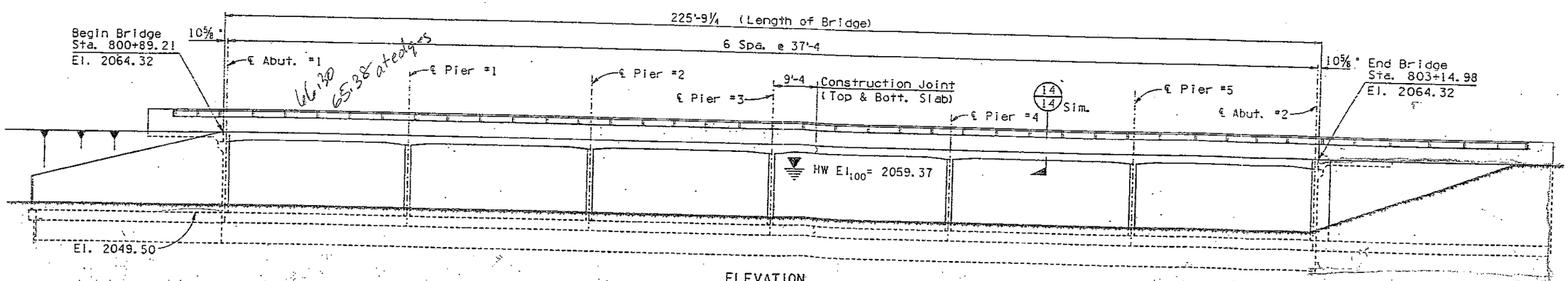
FEDERAL REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	-035-1(56)P	11	30	
		93 MA 199			



LOCATION PLAN
New 6 Span R.C. Box Culvert Bridge
Skew 45° Rt.
Scale: 1"=20'-0

SHEET LIST

TITLE	NO.
General Plan	1
General Notes & Quantities	2
Construction Phasing Details	3
Foundation Layout	4
Foundation Details	5
Abutment Details - 1	6
Abutment Details - 2	7
Abutment Details - 3	8
Wingwall Details	9, 10, 11
Pier Details	12
Deck Details 1	13
Retaining Wall Details	14
Miscellaneous Details	15
Excavation and Backfill Details	16



ELEVATION
Sta.'s & Elev.'s on℄ US 93
Scale: 1"=10'-0

HYDRAULIC DATA

Q_{50} = 12,453 cfs
Q_{500} = 20,836 cfs

REDUCED SIZE
DO NOT SCALE

BRIDGE DESIGN SECTION 'B'		DATE
DESIGN	C. Hubbard	11-97
DESIGN CKD	K. Ruffenach	11-97
DRAWN	J. Kessler	11-97
DWG CKD	K. Ruffenach	11-97
APPROVED-PROJ. ENGINEER	K. Ruffenach	6-98
APPROVED-DESIGN LEADER	S. Hassan	6-98

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
BRIDGE GROUP

STA. 800+
SOLS WASH BRIDGE
GENERAL PLAN

ROUTE	MILEPOST	STRUCTURE NO.	LOCATION
US 93	199.56	2688	SOLS WASH BRIDGE

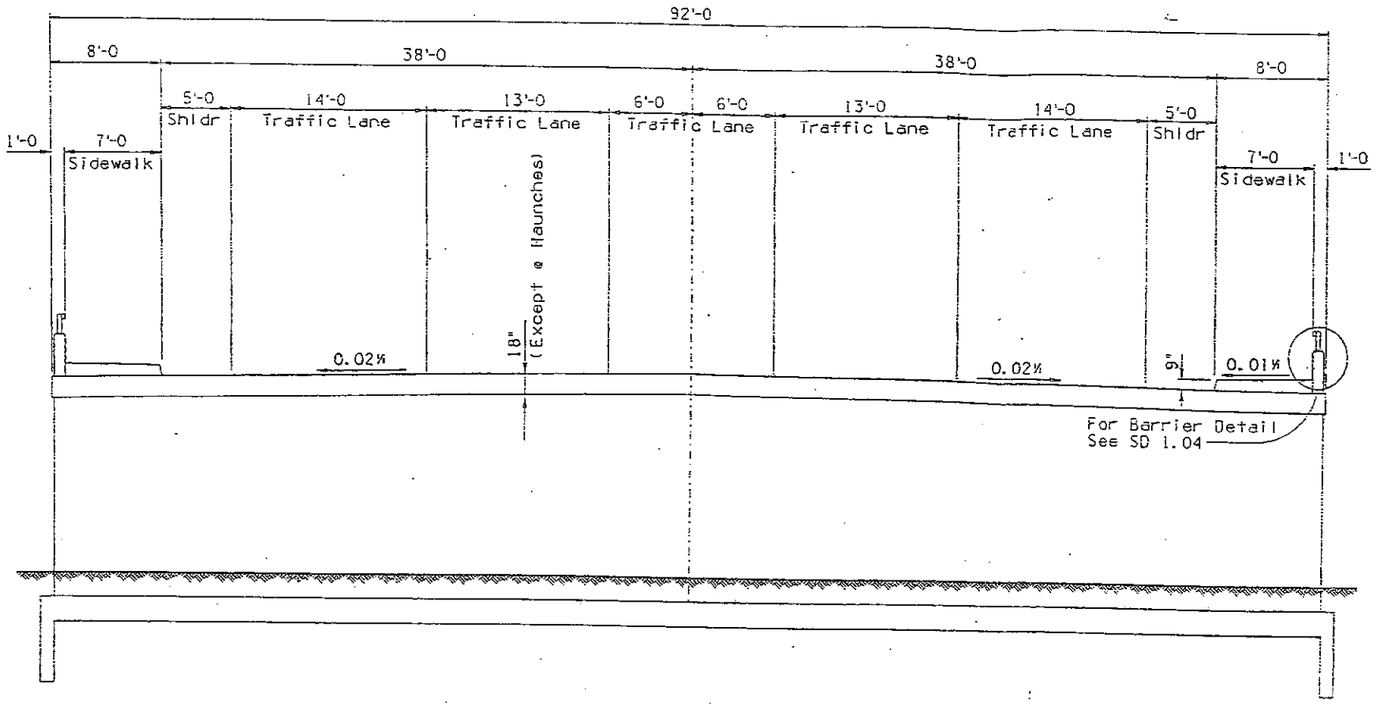
BRIDGE ENGINEER

DWG. S-1.1 OF 16

TRACS NO. H4169 01 C | -035-1(56)P | OF

/usr3/br205/s2688gp.dgn
25-JUN-1998 12:57
VIEW NAME:

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	-035-1(56)P	12	30	
		93 MA 199			



TYPICAL SECTION
Scale: 1"=15'-0

APPROXIMATE QUANTITIES						
ITEM	STRUC. EXCAV.	STRUC. BKFILL.	CLASS 'S' CONCRETE		REINFORCING STEEL	DOWEL PLACEMENT
			f'c=3000psi	f'c=4500psi		
	C.Y.	C.Y.	C.Y.	C.Y.	LBS.	EACH
Abutment #1	840	400	156		50,050	20
Pier #1 - #5	4200	325	377		184,975	
Abutment #2	840	400	218		56,915	20
Superstructure				1207	247,595	
Bottom Slab			1639		261,970	
Sidewalk			111		3500	
TOTAL	5880	1125	2501	1207	805,005	40
As-built Total						

Combination Pedestrian - Traffic Bridge Railing (SD-1.04) ..... 542 L.F.
Approach Slab (B-19.11 Modified) ..... 2760 S.F.
Remove Existing Bridge ..... 1 Lump Sum

LEGEND:

Title/Detail Marker — 1/2 — Detail Number; Drawing Number (S-1.**OF**)

Section Marker — 1/2 — Section Number; Drawing Number (S-1.**OF**)

Elevation Marker — 1/2 — Elevation Number; Drawing Number (S-1.**OF**)

REDUCED SIZE
DO NOT SCALE

GENERAL NOTES:

Construction Specification - Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, Edition of 1990.

Design Specifications -
AASHTO Standard Specifications for Highway Bridges, 16th Edition 1996 and 1997 Interim.

Dead Load - Dead Load includes allowance of 25 pounds per square foot for future wearing surface.

Seismic Performance Category A (Acc = 0.04 g)

Inventory and operating ratings for HS20-44 are in accordance with AASHTO Manual for Condition Evaluation of Bridges, Edition of 1994.

Inventory Rating HS- 20.0
Operating Rating HS- 48.1

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 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
(Deck ...	fc	=	1400 psi)
Barriers	f'c	=	4000 psi
Abutments	f'c	=	3000 psi
Pier	f'c	=	3000 psi
Bottom Slab	f'c	=	3000 psi
All other Class "S" concrete	f'c	=	3000 psi
Grade 60 Reinforcement	fs	=	24000 psi

Barriers shall not be slip formed.

Chamfer all exposed corners ¾" unless noted otherwise.

Dimensions shall not be scaled from drawings.

JOINT NOTE:

All Retaining Walls shall have construction joints spaced at not more than 30'-0 apart or as shown. Reinforcing steel shall project through the joint. Footings may be continuous with no joint.

STANDARDS LIST

Structures Section Standards, June 1992:
B-19.11
Standard Detail Drawings (SD):
SD 1.04.

BRIDGE DESIGN SECTION 'B'		DATE
DESIGN	C. Hubbard	11-97
DESIGN CKD	K. Ruffennach	11-97
DRAWN	J. Kessler	11-97
DWG CKD	K. Ruffennach	11-97
APPROVED-PROJ. ENGINEER	K. Ruffennach	6-98
APPROVED-DESIGN LEADER	S. Hasan	6-98

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
BRIDGE GROUP

STA. 800+
SOLS WASH BRIDGE
GENERAL NOTES & QUANTITIES

ROUTE	MILEPOST	STRUCTURE NO.	LOCATION
US 93	199.56	2688	SOLS WASH BRIDGE

24861 KENNETH G. RUFFENNACH CERTIFICATE NO. ARIZONA
BRIDGE ENGINEER

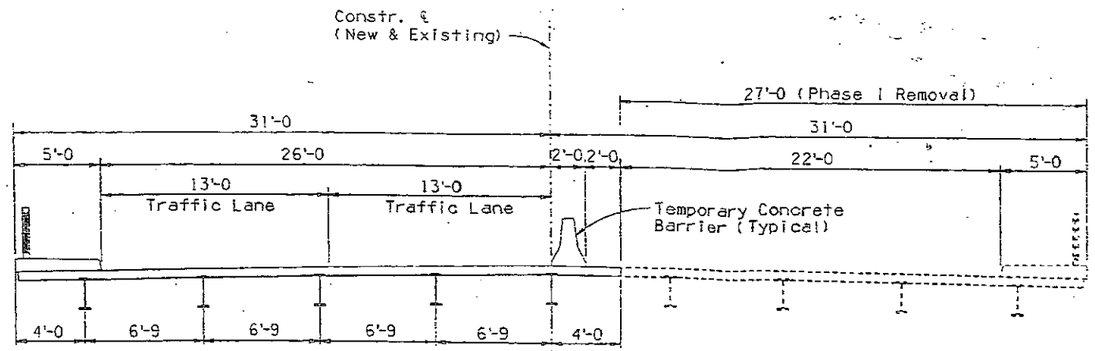
DWG. S-1.2 OF 16

TRACS NO. H4169 01 C | -035-1(56)P | OF

/usr3/br205/s2688nq.dgn
25-JUN-1998 13:00
VIEW NAME:

F.A.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	-035-1(56)P	13	30	

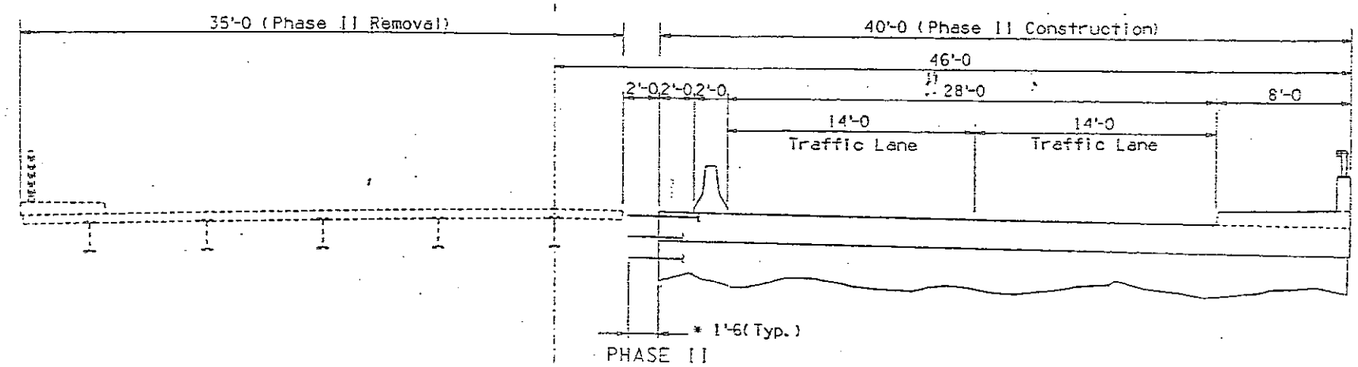
93 MA 199



PHASE I

CONSTRUCTION PROCEDURE

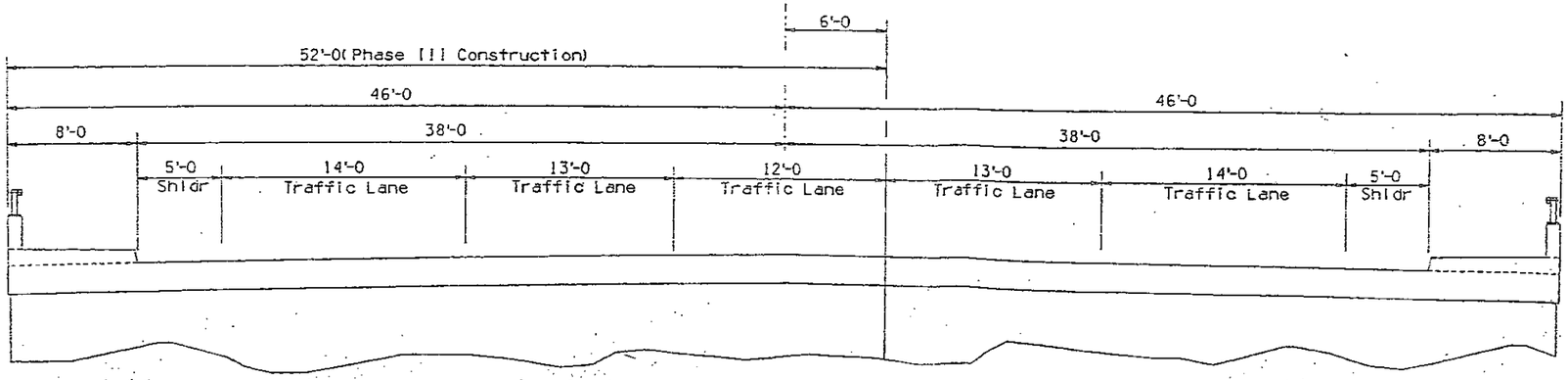
1. Remove portion of existing bridge.
2. Reroute traffic on remaining portion of existing bridge.
3. Construct first portion of new bridge.
4. Reroute traffic to first portion of new bridge.
5. Remove remaining portion of existing bridge.
6. Construct remaining portion of new bridge.
7. Reroute traffic to the completed new bridge.



PHASE II

NOTE:

* Provide 1'-6 (min.) lap splice for transverse reinforcements at construction joints (Typ.).



PHASE III

REDUCED SIZE
DO NOT SCALE

BRIDGE DESIGN SECTION ⅊		DATE
DESIGN	C. Hubbard	11-97
DESIGN CKD	R. Ruffennach	11-97
DRAWN	J. Kessler	11-97
DWG CKD	R. Ruffennach	11-97
APPROVED-PROJ. ENGINEER	R. Ruffennach	6-98
APPROVED-DESIGN LEADER	S. Hasan	6-98

ROUTE	MILEPOST	STRUCTURE NO.
US 93	199.56	2688

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
BRIDGE GROUP

STA. 800+
SOLS WASH BRIDGE
CONSTRUCTION PHASING

LOCATION: SOLS WASH BRIDGE

BRIDGE ENGINEER

DWG. S-1.3 OF 16

/usr3/br205/s2688cp.dgn
25-JUN-1998 13:02

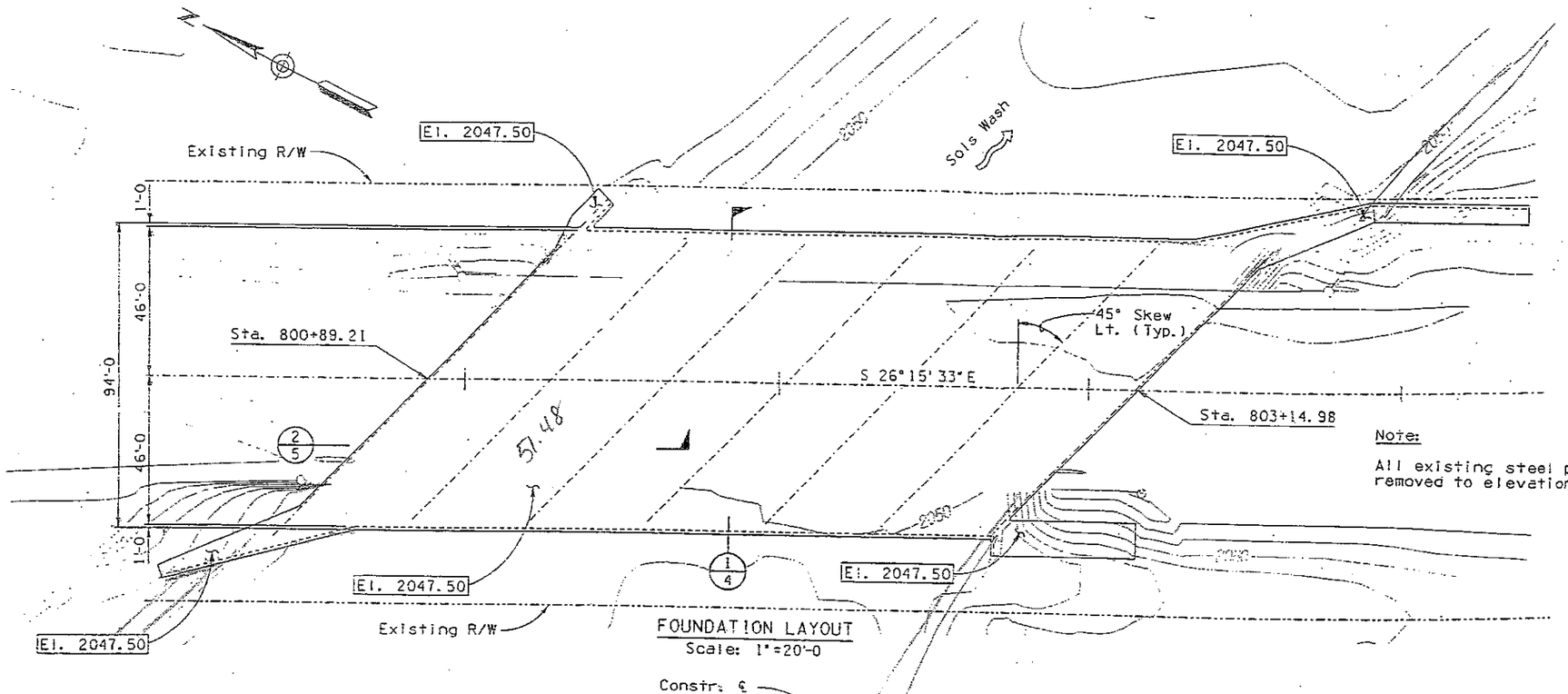
VIEW NAME:

TRACS NO. H4169 01 C

-035-1(56)P

OF

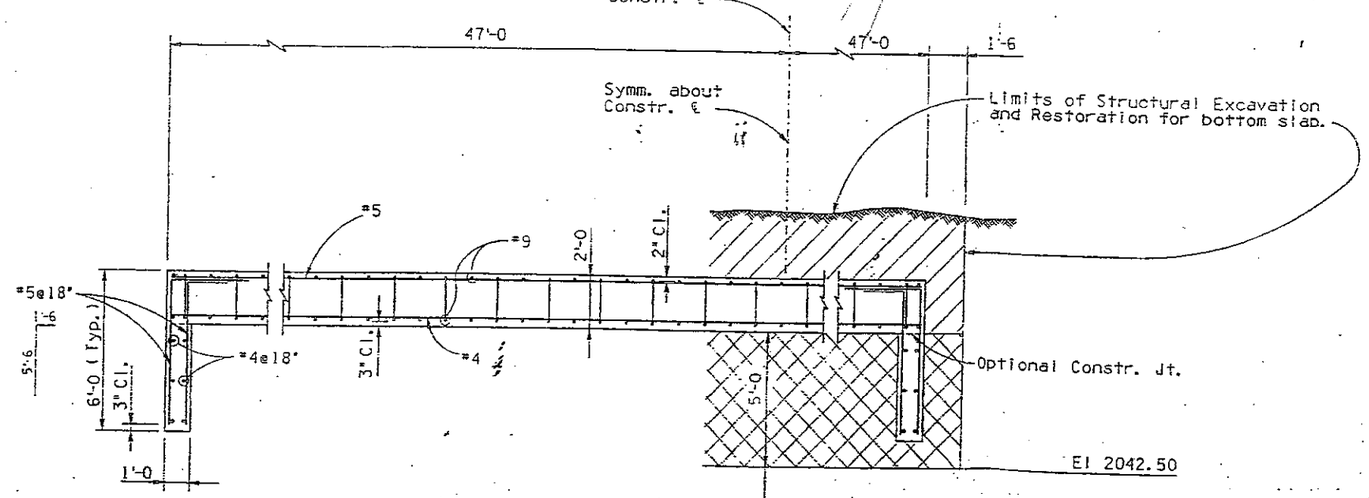
FEDERAL REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	-035-1(56)P	14	32	
		93 MA 199			



FOUNDATION LAYOUT
Scale: 1"=20'-0

Note:

All existing steel piles shall be removed to elevation 2042.50.



BOTTOM SLAB SECTION (TRANSVERSE) (1)
Scale: 3/8" = 1'-0

Recompact a minimum of 5'-0 depth under the bottom slab as shown to minimum 95% of ASTM D698 maximum dry density.

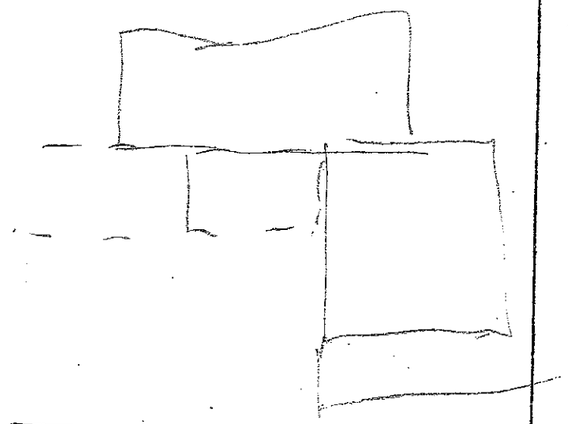
NOTE:

Allowable Bearing Pressure = 1.2 ksf
Modulus of Subgrade Reaction = 350 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.



REDUCED SIZE
DO NOT SCALE

BRIDGE DESIGN SECTION "B"		DATE
DESIGN	C. Bubbard	11-97
DESIGN CKD	K. Ruffenach	11-97
DRAWN	J. Kessler	11-97
DWG CK'D	K. Ruffenach	11-97
APPROVED-PROJ. ENGINEER	K. Ruffenach	6-98
APPROVED-DESIGN LEADER	S. Hasan	6-98

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
BRIDGE GROUP

STA. 800+
SOLS WASH BRIDGE
FOUNDATION LAYOUT

US 93	199.56	2688
ROUTE	MILEPOST	STRUCTURE NO.

LOCATION: SOLS WASH BRIDGE

BRIDGE ENGINEER

DWG. S-1.4 OF 16

TRACS NO. H4169 01 C

-035-1(56)P

/usr3/br205/s2688fd.dgn
25-JUN-1998 13:04

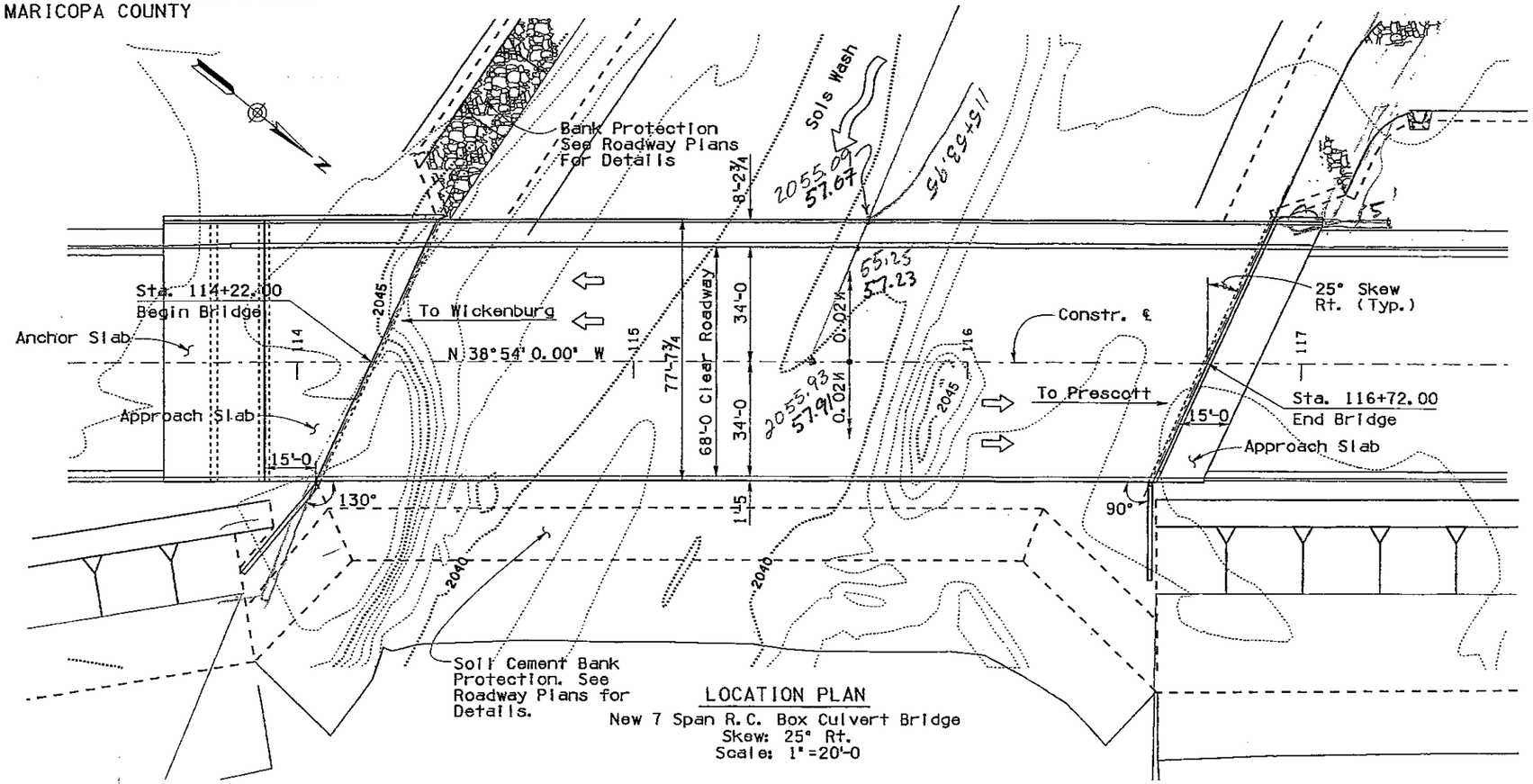
VIEW NAME:

US-93 INTERIM BYPASS BRIDGE

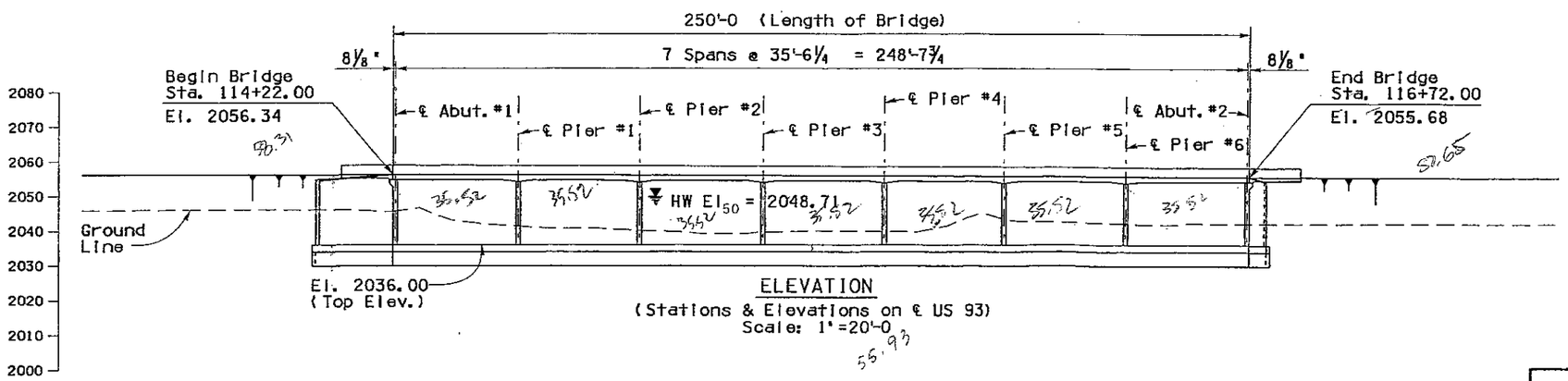
WICKENBURG - KINGMAN HWY. (US 93)
WICKENBURG INTERIM BYPASS
MARICOPA COUNTY

3445

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)	230		
		093 YV 198			



LOCATION PLAN
New 7 Span R.C. Box Culvert Bridge
Skew: 25° Rt.
Scale: 1"=20'-0



ELEVATION
(Stations & Elevations on ℄ US 93)
Scale: 1"=20'-0

SHEET LIST

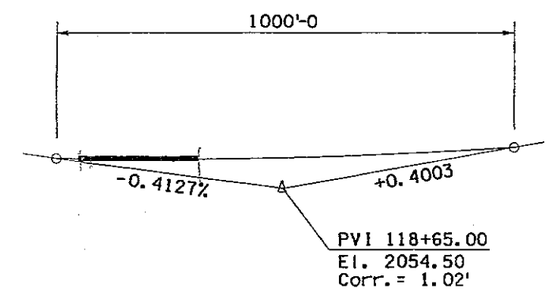
TITLE	DRAWING NO.
GENERAL PLAN	S-2.1
QUANTITIES AND TYPICAL SECTION	S-2.2
FOUNDATION LAYOUT	S-2.3
FOUNDATION DETAILS	S-2.4
ABUTMENT #1 PLAN AND ELEVATION.	S-2.5
ABUTMENT #2 PLAN AND ELEVATION	S-2.6
ABUTMENT WINGWALL ELEVATIONS	S-2.7
WINGWALL DETAILS	S-2.8
PIER PLAN & ELEVATION	S-2.9
DECK PLAN	S-2.10
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
THRIE-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



US93 PROFILE GRADE

HYDRAULIC DATA

Q_{50} = 12,453 cfs
Q_{100} = 15,045 cfs
HW_{50} = 2048.71 ft.
HW_{100} = 2049.60 ft.

TOP OF DECK STATIONS & ELEVATIONS ALONG CONSTR. ℄

	℄ ABUT. #1	℄ PIER #1	℄ PIER #2	℄ PIER #3	℄ PIER #4	℄ PIER #5	℄ PIER #6	℄ 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		DATE
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	
APPROVED-DESIGN LEADER	H. Sung	

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
BRIDGE GROUP

STA. 114+
SOLS WASH BRIDGE
GENERAL PLAN

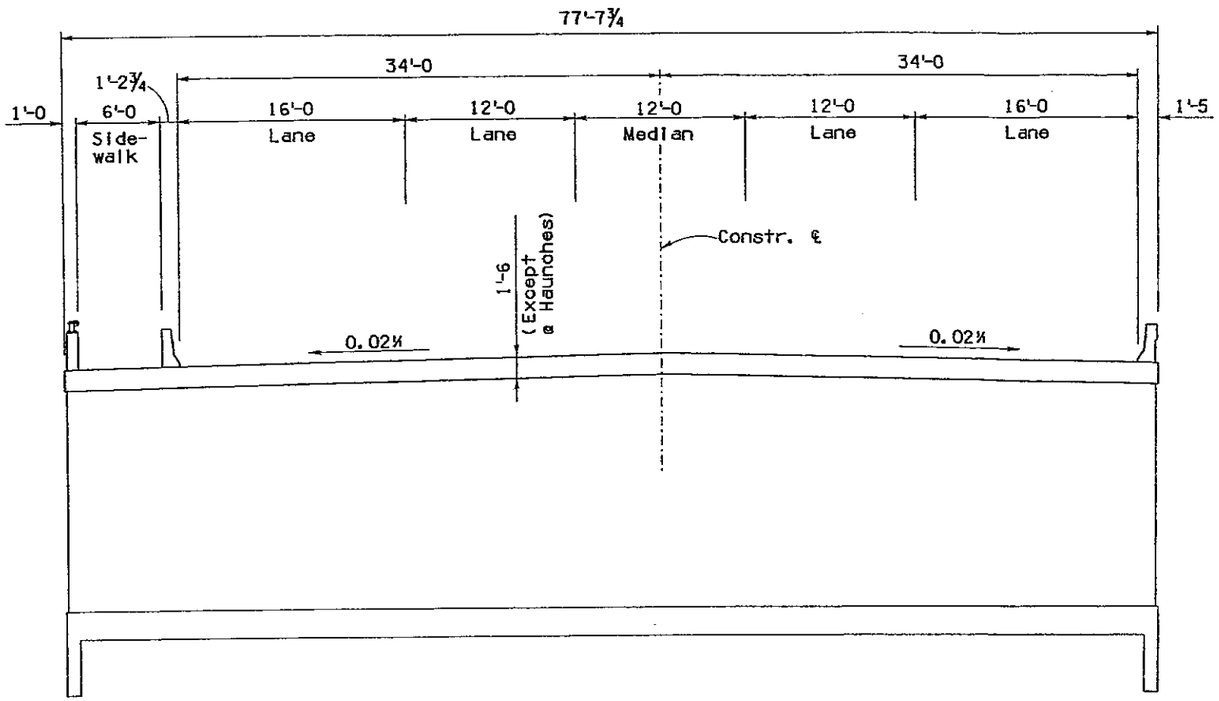
PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

US93 ROUTE	199.50 MILEPOST	2819 STRUCTURE NO.	LOCATION WICKENBURG INTERIM BYPASS	DWG. S-2.1 OF

TRACS NO. H 5825 01C | 093-B-(008) | ___ OF ___

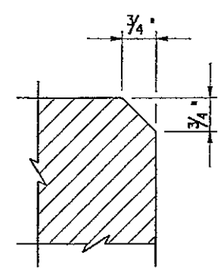
07-MAR-2005 13:17 S:\Bridge\Users\a1091\s2819solswash\s2819gp.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)	231		
		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.

APPROXIMATE QUANTITIES

ITEM	STRUC. EXCAV.	STRUC. BKFILL.	CLASS 'S' CONCRETE			REINFORCING STEEL
			f'c=3000psi	f'c=3500psi	f'c=4500psi	
	C.Y.	C.Y.	C.Y.	C.Y.	C.Y.	LBS.
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
Thrie Beam Guard Rail Transition System (SD-1.03)..... 2 EA
Type 2 Anchor Slab (SD-2.03)..... 2330 SF

BRIDGE DESIGN SECTION 'B'		DATE
DESIGN	L. Altuna	7-04
DESIGN CKD	D. Benton	
DRAWN	S. Nickel	7-04
DWG CKD	D. Benton	
APPROVED-FROJ. ENGINEER	L. Altuna	
APPROVED-DESIGN LEADER	H. Sung	

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
BRIDGE GROUP

STA. 114+
SOLS WASH BRIDGE
GENERAL NOTES AND QUANTITIES

US93 ROUTE	199.50 MILEPOST	2819 STRUCTURE NO.	LOCATION WICKENBURG INTERIM BYPASS

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

DWG. S-2.2 OF ___ OF ___

TRACS NO. H 5825 01C | 093-B-(008)

07-MAR-2005 12:49 S:\bridge\users\a1091\s2819solswash\s2819nq.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
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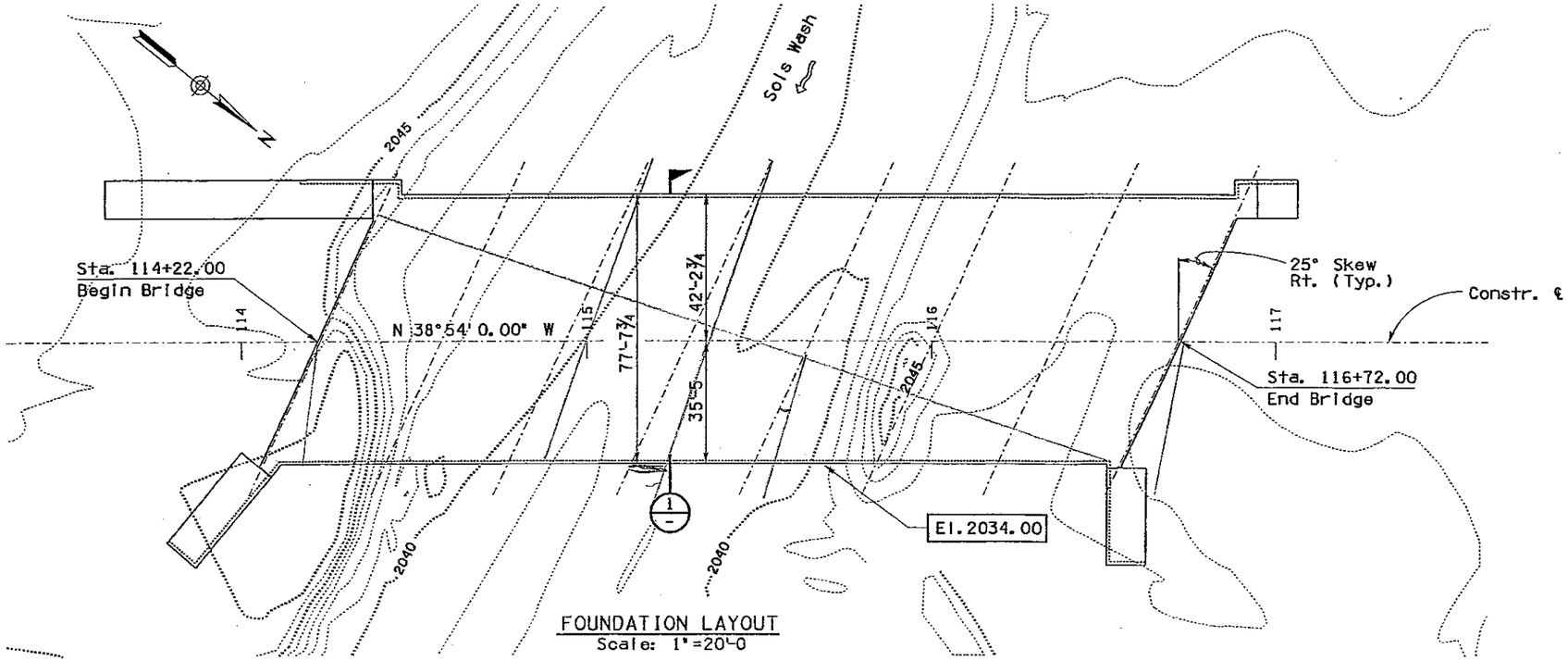
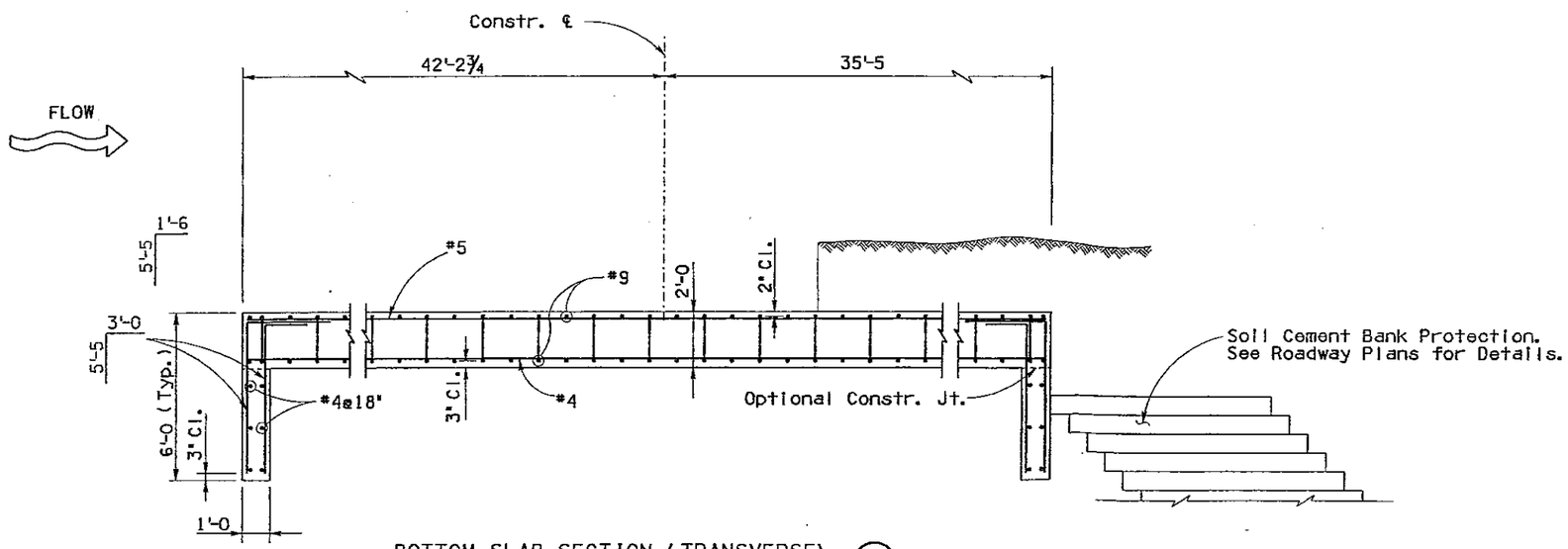
093 YV 198

42 .2292



FOUNDATION LAYOUT
Scale: 1"=20'-0



BOTTOM SLAB SECTION (TRANSVERSE) (1)
Scale: ⅜" = 1'-0

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 "B"		DATE
DESIGN	D. Benton	7-04
DESIGN CKD	L. Ariuna	7-04
DRAWN	C. D'Andrea	7-04
DWG CKD	D. Benton	7-04
APPROVED-PROJ. ENGINEER	D. Benton	
APPROVED-DESIGN LEADER	H. Sung	

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
BRIDGE GROUP

STA. 114+
SOLS WASH BRIDGE
FOUNDATION LAYOUT

ROUTE	MILEPOST	STRUCTURE NO.	LOCATION
US93	199.50	2819	WICKENBURG INTERIM BYPASS

TRACS NO. H 5825 01C | 093-B-(008)

PRELIMINARY
NOT FOR
CONSTRUCTION
OR
RECORDING

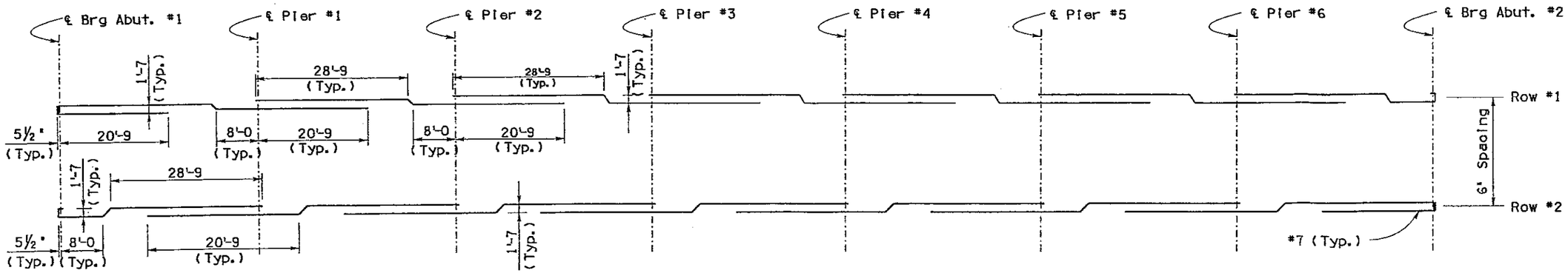
DWG. S-2.3 OF ___ OF ___

NO.	DESCRIPTION OF REVISIONS	MADE BY	DATE

07-MAR-2005 13:13 S:\bridge\users\a1091\s2819solswash\s2819fd.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	093-B-(008)	233		

093 YV 198

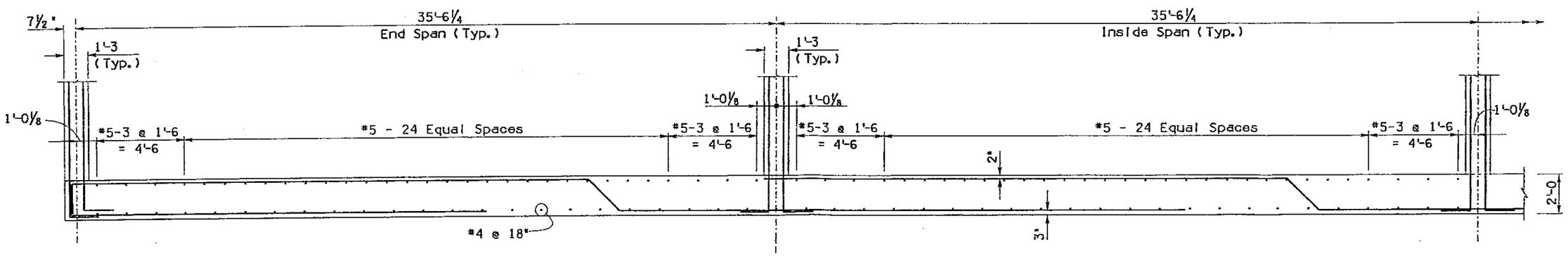


REINFORCING PLACING DIAGRAM

Scale: 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) (2)

(Row #1 shown, for Row #2 see REINFORCING PLACING DIAGRAM)
Scale: ⅜" = 1'-0

BRIDGE DESIGN SECTION 'S'		DATE
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	
APPROVED-DESIGN LEADER	H. Sung	

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
BRIDGE GROUP

STA. 114+
SOLS WASH BRIDGE
FOUNDATION DETAILS

PRELIMINARY
NOT FOR
CONSTRUCTION
OR
RECORDING

US93 ROUTE	199.50 MILEPOST	2819 STRUCTURE NO.	LOCATION WICKENBURG INTERIM BYPASS	DWG. S-2.4 OF
TRACS NO. H 5825 01C			093-B-(008)	OF

07-MAR-2005 09:55 S:\bridge\users\a1091\s2819solswash\s2819f1.dgn

Appendix D

HYDROLOGIC ANALYSIS SUPPORTING DOCUMENTATION

Appendix D.1

HYDROLOGIC CALCULATIONS – HOSPITAL WASH

Hospital Wash Peak
Discharge Summary

HEC-1 Model	Peak Discharge (cfs)
100-year, 24-hour	369
100-year, 6-hour	502
10-year, 6-hour	168

Land Use Data

Sub Basin ID	Land Use Code	Area	Area Pct (%)	DTHETA Condition	Vegetation Cover (%)	RTIMP (%)	IA (in)	Kn	Kb Type	Kb
Major Basin: 01										
SB01	L.D.R.	0.031	8.1	Normal	50.0	15	0.30	0.050	Low	0.062
	COMM	0.003	0.9	Normal	75.0	80	0.10	0.020	Min	0.038
	M.F.R.	0.010	2.7	Normal	50.0	45	0.25	0.050	Low	0.069
	V.L.D.R.	0.031	8.1	Normal	20.0	5	0.30	0.050	Low	0.062
	DESERT	0.304	80.2	Dry	25.0		0.35	0.030	Low	0.049

* Custom Value (not default value)

Soil Data

	Sub Basin ID	Soil Survey	Map Unit	Area	Area Pct (%)	XKSAT	Rock Outcrop (%)	Effective (%)
Major Basin 01								
	SB01	Maricopa	A_7	0.019	5.0	0.62		
		Maricopa	A_120	0.001	0.2	0.06		
		Maricopa	A_6	0.016	4.1	0.62		
		Maricopa	A_94	0.011	2.9	0.33		
		Maricopa	A_38	0.212	55.7	0.13		
		Maricopa	A_94	0.122	32.1	0.33		

* Custom Value (not default value)

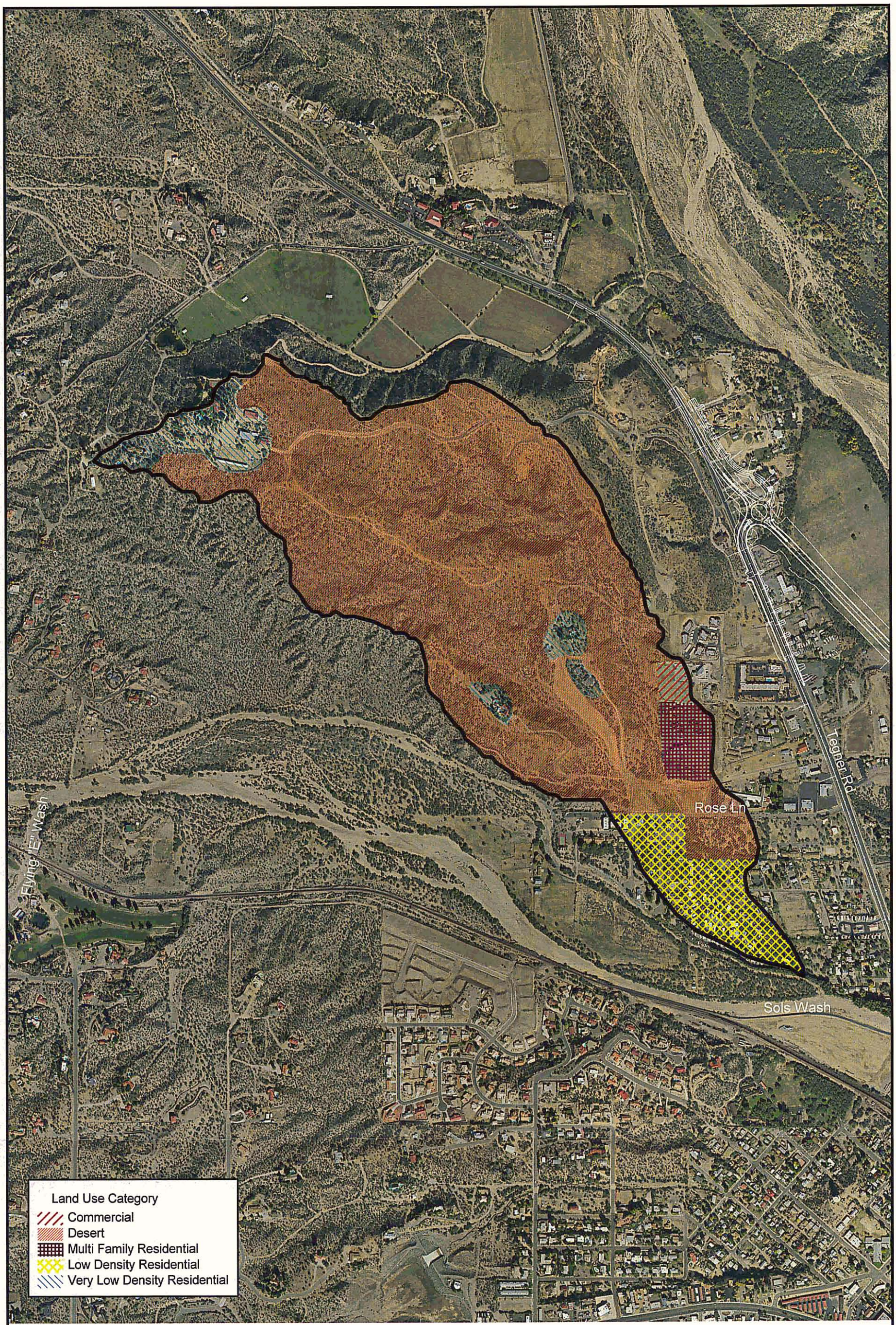
Sub Basin Data

8/9/2006

Basin: 01 | Storms: Single | Duration: 6 Hour | Loss Method: Green-Ampt | Unit Hydrograph: Clark

	Sub Basin Parameters						Rainfall Losses						Return Period (Years)					
Sub Basin ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2	5	10	25	50	100
SB01	0.38	1.79	106.0	106.0	Natural	0.052	0.34	0.35	5.20	0.26	4	**Tc (hrs)**	1.50	0.92	0.78	0.63	0.55	0.50
												Vel (f/s)	1.75	2.85	3.39	4.15	4.74	5.21
												R (hrs)	1.61	0.94	0.77	0.62	0.53	0.48

* Non default value



Downtown Wickenburg
Flood Hazard Mitigation Project
CLOMR

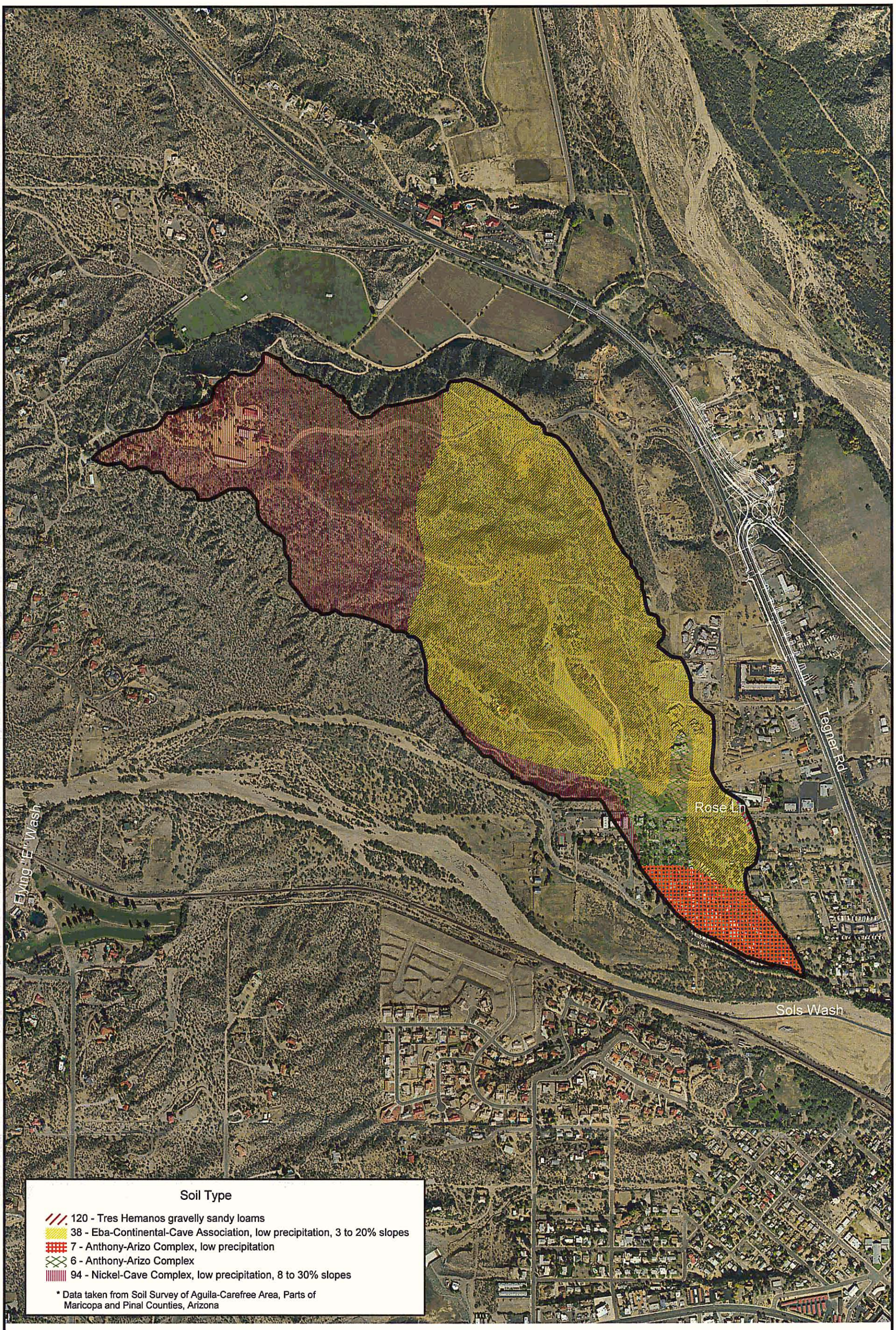
FCD2005C006

Hospital Wash Land Use Map

N

800 0 800 1600 Feet

1" = 800'



Downtown Wickenburg
Flood Hazard Mitigation Project
CLOMR

FCD2005C006

Hospital Wash Soils Map

N

800 0 800 1600 Feet

1" = 800'

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 *              JUN   1998                    *
 *            VERSION 4.1                     *
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*                                            *
*    U.S. ARMY CORPS OF ENGINEERS            *
*    HYDROLOGIC ENGINEERING CENTER           *
*          609 SECOND STREET                 *
*       DAVIS, CALIFORNIA 95616              *
*           (916) 756-1104                   *
*                                            *
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XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   1          ID   FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
   2          ID   SOLS WASH FINAL DESIGN - Contract # 2005C006
   3          ID
   4          ID   Prepared by:
   5          ID   Engineering and Environmental Consultants
   6          ID   3003 N. Central, Suite 600
   7          ID   Phoenix, Arizona   85012
   8          ID   Phone: 602-248-7702  FAX: 602-248-7851
   9          ID
  10          ID
  11          ID
  12          ID
  13          ID   2/15/06  Filename:  HOSPITAL.IH1
  14          ID                Last Revised: 02/15/06
  15          ID
  16          ID   1. The storm used was 100-year, 24-hour.
  17          ID   2. Clark was the unit hydrograph.
  18          ID   3. Time step of 2 minutes.
  19          ID   4. Green-Ampt loss methods were used. Normal depth Channel routing.
  20          ID   5. The sub-basin parameters were generated using FCDMC's DDMSW software.
  21          ID
  22          ID
              *DIAGRAM
  23          IT       2                    2000
  24          IO       3
```

```
                *
25              KK    SB01
26              KM        Runoff subbasin SB01
27              BA   0.379
28              IN      15
29              PB   4.141
30              PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
31              PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
32              PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
33              PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
34              PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
35              PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
36              PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
37              PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
38              PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
39              PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
40              LG    0.34    0.35    5.20    0.26       4
41              UC   0.529   0.506
42              UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
43              UA     100
                *
44              ZZ
1
            SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    25        SB01
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	SB01	369.	12.37	53.	14.	5.	.38		

*** NORMAL END OF HEC-1 ***

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*              JUN  1998                      *
*           VERSION 4.1                       *
*                                             *
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*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*    HYDROLOGIC ENGINEERING CENTER  *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*           (916) 756-1104          *
*                                   *
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X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX X
X     X  X        X              X
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X     X  XXXXXXX   XXXXX        XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
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NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID   FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
  2           ID   SOLS WASH FINAL DESIGN - Contract # 2005C006
  3           ID
  4           ID   Prepared by:
  5           ID   Engineering and Environmental Consultants
  6           ID   3003 N. Central, Suite 600
  7           ID   Phoenix, Arizona   85012
  8           ID   Phone: 602-248-7702  FAX: 602-248-7851
  9           ID
 10           ID
 11           ID
 12           ID
 13           ID   2/15/06  Filename:  HOSPITAL-6.IH1
 14           ID                Last Revised: 02/15/06
 15           ID
 16           ID   1. The storm used was 100-year, 6-hour.
 17           ID   2. Clark was the unit hydrograph.
 18           ID   3. Time step of 2 minutes.
 19           ID   4. Green-Ampt loss methods were used. Normal depth Channel routing.
 20           ID   5. The sub-basin parameters were generated using FCDMC's DDMSW software.
 21           ID
 22           ID
              *DIAGRAM
 23           IT       2                    2000
 24           IO       3
```

```
                *
25              KK    SB01
26              KM        Runoff subbasin SB01
27              BA   0.379
28              IN      15
29              PB   3.314
30              PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
31              PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
32              PC   0.962   0.972   0.983   0.991   1.000
33              LG    0.34    0.35    5.20    0.26       4
34              UC   0.504   0.479
35              UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
36              UA     100
                *
37              ZZ
1
            SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    25        SB01

                                   RUNOFF SUMMARY
                              FLOW IN CUBIC FEET PER SECOND
                            TIME IN HOURS,  AREA IN SQUARE MILES

                                     PEAK   TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME OF
          OPERATION        STATION   FLOW    PEAK                                          AREA      STAGE     MAX STAGE
+                                                        6-HOUR      24-HOUR      72-HOUR

          HYDROGRAPH AT
+                          SB01      502.   4.33          68.          17.          6.        .38


 *** NORMAL END OF HEC-1 ***
```

```
1*************************************
*                                   *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN  1998            *
*            VERSION 4.1            *
*                                   *
*  RUN DATE   15FEB06  TIME  11:12:31   *
*                                   *
*************************************
```

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

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   1          ID   FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
   2          ID   SOLS WASH FINAL DESIGN - Contract # 2005C006
   3          ID
   4          ID   Prepared by:
   5          ID   Engineering and Environmental Consultants
   6          ID   3003 N. Central, Suite 600
   7          ID   Phoenix, Arizona   85012
   8          ID   Phone: 602-248-7702  FAX: 602-248-7851
   9          ID
  10          ID
  11          ID
  12          ID
  13          ID   2/15/06  Filename:  HOSPITAL-10-6.IH1
  14          ID                Last Revised: 02/15/06
  15          ID
  16          ID   1. The storm used was 10-year, 6-hour.
  17          ID   2. Clark was the unit hydrograph.
  18          ID   3. Time step of 2 minutes.
  19          ID   4. Green-Ampt loss methods were used. Normal depth Channel routing.
  20          ID   5. The sub-basin parameters were generated using FCDMC's DDMSW software.
  21          ID
  22          ID
              *DIAGRAM
  23          IT       2                    2000
  24          IO       3
```

```
                *
25              KK    SB01
26              KM        Runoff subbasin SB01
27              BA   0.379
28              IN      15
29              PB   2.169
30              PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
31              PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
32              PC   0.962   0.972   0.983   0.991   1.000
33              LG    0.34    0.35    5.20    0.26       4
34              UC   0.775   0.772
35              UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
36              UA     100
                *
37              ZZ
1
            SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    25        SB01

                                        RUNOFF SUMMARY
                                   FLOW IN CUBIC FEET PER SECOND
                                 TIME IN HOURS,  AREA IN SQUARE MILES

                                  PEAK   TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME OF
          OPERATION       STATION  FLOW    PEAK                                          AREA      STAGE     MAX STAGE
+                                                     6-HOUR      24-HOUR      72-HOUR

          HYDROGRAPH AT
+                          SB01    168.    4.57         32.          8.           3.        .38


 *** NORMAL END OF HEC-1 ***
```

```
1**********************************************
*                                            *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)        *
*              JUN   1998                    *
*            VERSION 4.1                     *
*                                            *
*  RUN DATE   12JUL06  TIME  15:18:49        *
*                                            *
**********************************************
```

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

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX        XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   1          ID   FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
   2          ID   SOLS WASH FINAL DESIGN - Contract # 2005C006
   3          ID
   4          ID   Prepared by:
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   6          ID   3003 N. Central, Suite 600
   7          ID   Phoenix, Arizona   85012
   8          ID   Phone: 602-248-7702  FAX: 602-248-7851
   9          ID
  10          ID
  11          ID
  12          ID
  13          ID   2/15/06  Filename:  HOSPITAL-50-6.IH1
  14          ID                Last Revised: 02/15/06
  15          ID
  16          ID   1. The storm used was 50-year, 6-hour.
  17          ID   2. Clark was the unit hydrograph.
  18          ID   3. Time step of 2 minutes.
  19          ID   4. Green-Ampt loss methods were used. Normal depth Channel routing.
  20          ID   5. The sub-basin parameters were generated using FCDMC's DDMSW software.
  21          ID
  22          ID
              *DIAGRAM
  23          IT       2                    2000
  24          IO       3
```

```
                *
25              KK    SB01
26              KM        Runoff subbasin SB01
27              BA   0.379
28              IN      15
29              PB   2.965
30              PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
31              PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
32              PC   0.962   0.972   0.983   0.991   1.000
33              LG    0.34    0.35    5.20    0.26       4
34              UC   0.554   0.532
35              UA       0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
36              UA     100
                *
37              ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    25        SB01

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
                                          RUNOFF SUMMARY
                                     FLOW IN CUBIC FEET PER SECOND
                                  TIME IN HOURS,  AREA IN SQUARE MILES

                                   PEAK   TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM    TIME OF
          OPERATION       STATION  FLOW    PEAK                                          AREA      STAGE    MAX STAGE
+                                                     6-HOUR     24-HOUR     72-HOUR

          HYDROGRAPH AT
+                          SB01     390.   4.37        56.         14.         5.        .38


 *** NORMAL END OF HEC-1 ***
```

Appendix D.2

HYDROLOGIC CALCULATIONS – LOCAL DRAINAGE

Rainfall Data

Primary Zone Number: **7** Latitude: **0.0** Elevation: **0**

Short Duration Zone Number: **8** Longitude: **0.0**

	Point Values (in)					
Duration	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
5 MIN	0.38	0.47	0.54	0.63	0.71	0.78
10 MIN	0.57	0.71	0.82	0.97	1.08	1.19
15 MIN	0.69	0.89	1.03	1.23	1.38	1.53
30 MIN	0.91	1.19	1.39	1.66	1.87	2.08
1 HOUR	1.11	1.47	1.72	2.06	2.33	2.60
2 HOUR	1.20	1.61	1.89	2.27	2.57	2.87
3 HOUR	1.26	1.70	2.00	2.41	2.73	3.05
6 HOUR	1.38	1.88	2.21	2.68	3.04	3.40
12 HOUR	1.49	2.06	2.44	2.96	3.37	3.78
24 HOUR	1.60	2.23	2.66	3.24	3.70	4.15

Soil Data

Sub Basin ID	Soil Survey	Map Unit	Area	Area Pct (%)	XKSAT	Rock Outcrop (%)	Effective (%)
Major Basin 01							
SB01	Maricopa	A_38	0.054	98.7	0.13		
	Maricopa	A_120	0.001	1.3	0.06		
SB02	Maricopa	A_38	0.000	1.0	0.13		
	Maricopa	A_54	0.005	13.4	0.29		
	Maricopa	A_120	0.034	85.6	0.06		
SB03	Maricopa	A_38	0.001	1.9	0.13		
	Maricopa	A_38	0.005	10.6	0.13		
	Maricopa	A_120	0.042	87.5	0.06		
SB04	Maricopa	A_38	0.024	58.0	0.13		
	Maricopa	A_54	0.004	9.5	0.29		
	Maricopa	A_54	0.005	12.2	0.29		
	Maricopa	A_120	0.001	2.6	0.06		
	Maricopa	A_120	0.007	17.7	0.06		
SB05	Maricopa	A_7	0.018	37.7	0.62		
	Maricopa	A_38	0.001	2.7	0.13		
	Maricopa	A_38	0.002	3.5	0.13		
	Maricopa	A_54	0.016	32.7	0.29		
	Maricopa	A_120	0.011	23.3	0.06		
SB06	Maricopa	A_7	0.004	5.4	0.62		
	Maricopa	A_8	0.001	1.3	0.96		
	Maricopa	A_38	0.002	3.1	0.13		
	Maricopa	A_54	0.062	90.2	0.29		
SB1A	Maricopa	A_38	0.021	61.7	0.13		
	Maricopa	A_120	0.013	38.3	0.06		
WQ	Maricopa	A_54	0.000	1.3	0.29		
	Maricopa	A_54	0.000	2.6	0.29		
	Maricopa	A_120	0.015	96.2	0.06		

* Custom Value (not default value)

Land Use Data

Sub Basin ID	Land Use Code	Area	Area Pct (%)	DTHETA Condition	Vegetation Cover (%)	RTIMP (%)	IA (in)	Kn	Kb Type	Kb
Major Basin: 01										
SB01	COMM	0.008	15.4	Normal	75.0	80	0.10	0.020	Min	0.035
	DESERT	0.035	63.6	Dry	25.0		0.25*	0.030	Low	0.061
	M.F.R.	0.012	21.1	Normal	50.0	45	0.25	0.050	Low	0.068
SB02	COMM	0.040	100.0	Normal	75.0	80	0.10	0.020	Min	0.031
SB03	COMM	0.028	59.3	Normal	75.0	80	0.10	0.020	Min	0.032
	M.D.R.	0.007	14.4	Normal	50.0	30	0.25	0.050	Low	0.071
	M.F.R.	0.013	26.3	Normal	50.0	45	0.25	0.050	Low	0.068
SB04	COMM	0.025	58.7	Normal	75.0	80	0.10	0.020	Min	0.033
	M.D.R.	0.013	31.5	Normal	50.0	30	0.25	0.050	Low	0.067
	ROWCROP	0.004	9.8	Normal	*		0.50	0.100	Hi	0.140
SB05	M.D.R.	0.048	100.0	Normal	50.0	30	0.25	0.050	Low	0.060
SB06	COMM	0.007	9.7	Normal	75.0	80	0.10	0.020	Min	0.036
	M.D.R.	0.050	73.4	Normal	50.0	30	0.25	0.050	Low	0.059
	PARK	0.012	17.0	Normal	90.0		0.20	0.100	Hi	0.128
SB1A	COMM	0.014	41.7	Normal	75.0	80	0.10	0.020	Min	0.034
	DESERT	0.012	35.4	Dry	25.0		0.25*	0.030	Low	0.068
	M.F.R.	0.008	22.9	Normal	50.0	45	0.25	0.050	Low	0.070
WQ	ROWCROP	0.016	100.0	Normal	*		0.50	0.100	Hi	0.125

* Custom Value (not default value)

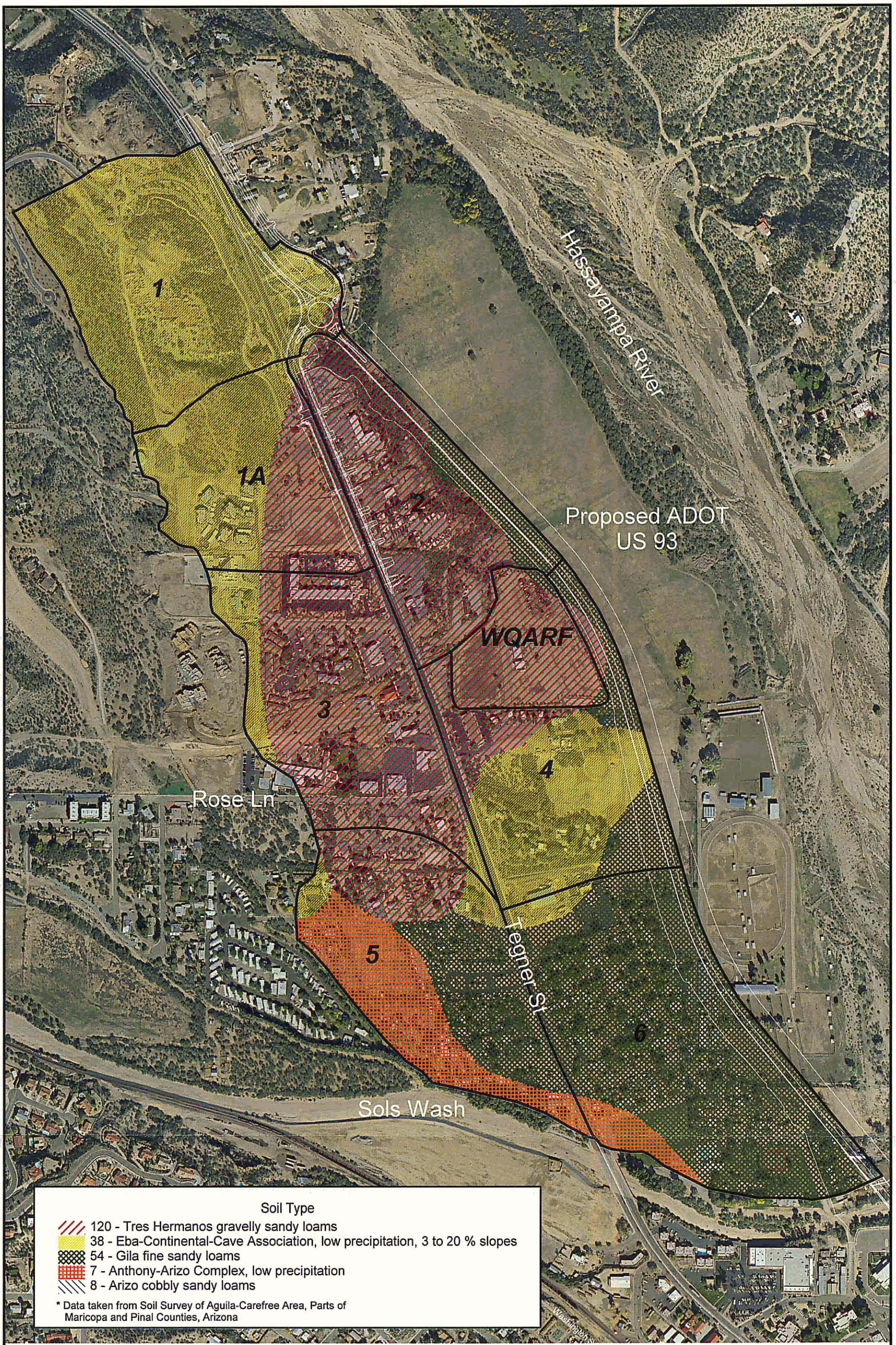
Sub Basin Data

7/12/2006

Basin: 01 | Storms: Single | Duration: 6 Hour | Loss Method:Green-Ampt | Unit Hydrograph: Clark

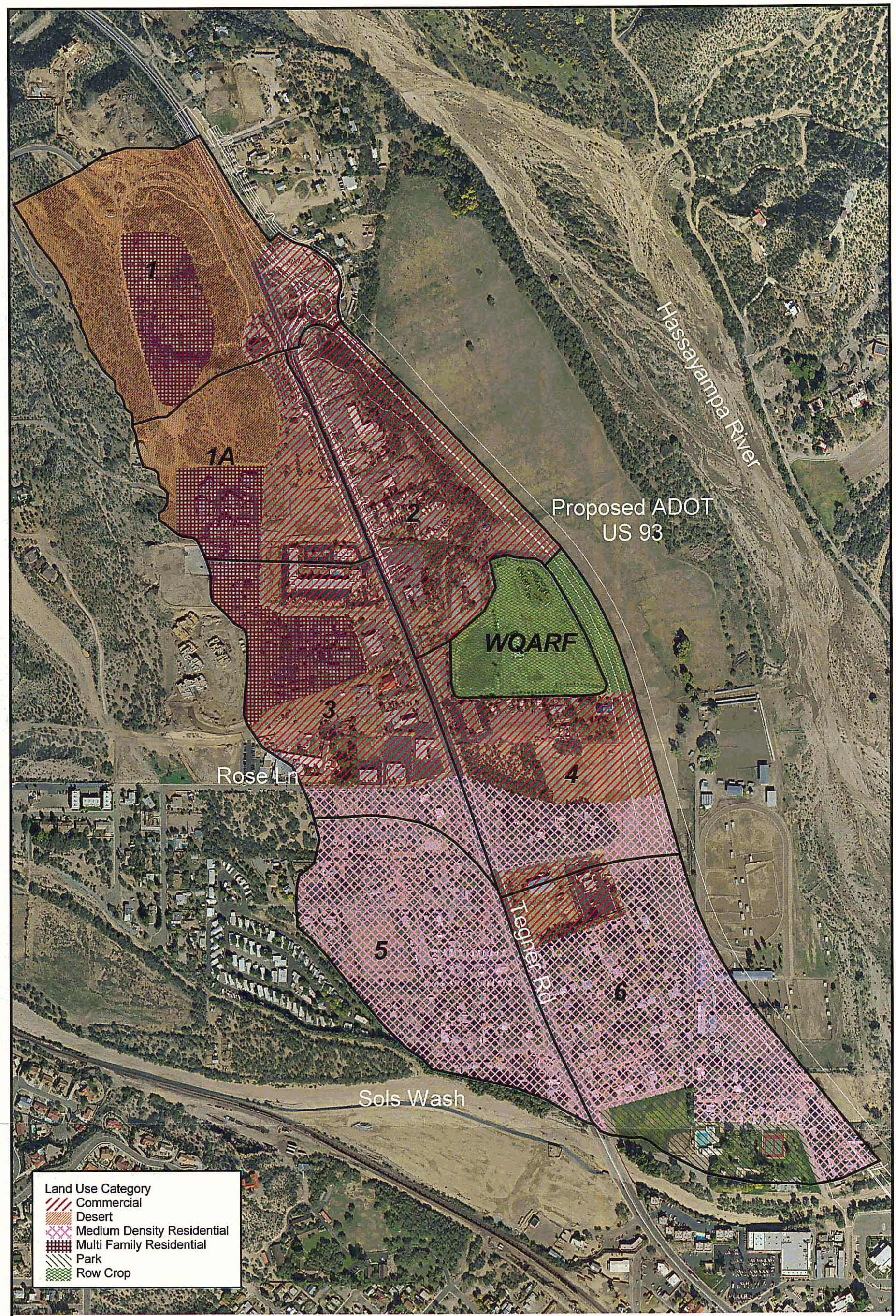
Sub Basin ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period (Years): 2	5	10	25	50	100
SB01	0.06	0.39	327.3	272.0	Urban	0.059	0.23	0.32	6.40	0.17	22	**Tc (hrs)**	0.23	0.20	0.18	0.16	0.15	0.15
												Vel (f/s)	2.45	2.92	3.20	3.51	3.71	3.81
												R (hrs)	0.18	0.15	0.14	0.12	0.11	0.11
SB1A	0.03	0.28	328.6	272.0	Urban	0.054	0.19	0.22	7.00	0.15	44	**Tc (hrs)**	0.18	0.15	0.14	0.13	0.13	0.12
												Vel (f/s)	2.35	2.74	2.89	3.18	3.29	3.51
												R (hrs)	0.13	0.11	0.11	0.10	0.09	0.09
SB02	0.04	0.35	103.7	103.7	Urban	0.031	0.10	0.15	7.60	0.14	80	**Tc (hrs)**	0.19	0.17	0.15	0.15	0.14	0.13
												Vel (f/s)	2.73	3.07	3.33	3.52	3.72	3.86
												R (hrs)	0.16	0.14	0.13	0.12	0.11	0.11
SB03	0.05	0.50	132.5	132.5	Urban	0.047	0.16	0.15	8.00	0.11	64	**Tc (hrs)**	0.26	0.23	0.22	0.20	0.19	0.18
												Vel (f/s)	2.79	3.20	3.38	3.67	3.82	4.01
												R (hrs)	0.27	0.23	0.22	0.20	0.19	0.18
SB04	0.04	0.46	65.9	65.9	Urban	0.054	0.19	0.21	6.40	0.20	56	**Tc (hrs)**	0.39	0.32	0.29	0.26	0.25	0.23
												Vel (f/s)	1.74	2.13	2.34	2.57	2.74	2.90
												R (hrs)	0.42	0.34	0.30	0.27	0.26	0.24
SB05	0.05	0.48	54.2	54.2	Urban	0.060	0.25	0.25	4.70	0.36	30	**Tc (hrs)**	0.57	0.43	0.38	0.33	0.30	0.28
												Vel (f/s)	1.23	1.63	1.86	2.14	2.32	2.49
												R (hrs)	0.62	0.46	0.40	0.34	0.31	0.29
SB06	0.07	0.51	39.5	39.5	Urban	0.069	0.23	0.25	4.50	0.45	30	**Tc (hrs)**	0.80	0.60	0.52	0.45	0.41	0.38
												Vel (f/s)	0.94	1.26	1.44	1.68	1.83	1.99
												R (hrs)	0.78	0.56	0.48	0.41	0.37	0.34
WQ	0.02	0.18	55.9	55.9	Urban	0.125	0.50	0.15	8.40	0.06		**Tc (hrs)**	0.48	0.34	0.30	0.27	0.25	0.24
												Vel (f/s)	0.55	0.77	0.88	0.97	1.04	1.09
												R (hrs)	0.44	0.30	0.26	0.23	0.22	0.21

* Non default value



Downtown Wickenburg
Flood Hazard Mitigation Project
CLOMR
FCD2005C006

Local Drainage Soils Map



Downtown Wickenburg
Flood Hazard Mitigation Project
CLOMR

FCD2005C006

Local Drainage Land Use Map

N

500 0 500 1000 Feet

1" = 500'

Sols Wash with No Hassayampa		
$WSE_{10=}$	2048.8	
$WSE_{100=}$	2052.4	
Sols Wash with Hassayampa		
$WSE_{10=}$	2054.3	(100-year on Hassayampa)
$WSE_{100=}$	2052.4	(10-year on Hassayampa)

Hassayampa Water Surface at Proposed Pipe
$WSE_{100=}$ 2058.7

Hassayampa at Proposed Bridge with No Sols Wash
$WSE_{10=}$ 2045.3
$WSE_{100=}$ 2054.2

Drainage Areas
Local = 0.33 sq. mi.
Sols Wash = 147 sq. mi.
Hassayampa = 710 sq. mi.

Sols Wash Channel Improvements - Final Design
EEC Job No. 305020

Local Detention Basin Volume

$$V_{provided} = D/3 \times [A_{top} + A_{bottom} + sqrt(A_{top} \times A_{bottom})]$$

Contour Elevation	Depth [ft]	Area [ft^2]	Area [acres]	Volume Provided [acre-ft]	Accumulative Volume [acre-ft]
2043	0	50445.4	1.16	0.0	0
2044	1	62030.0	1.42	1.3	1.3
2045	1	82902.3	1.90	1.7	2.9
2046	1	119212.1	2.74	2.3	5.3
2047	1	151044.4	3.47	3.1	8.3
2048	1	178484.0	4.10	3.8	12.1
2049	1	197312.8	4.53	4.3	16.4
2050	1	226286.4	5.19	4.9	21.3
2051	1	255522.6	5.87	5.5	26.8
2052	1	301091.8	6.91	6.4	33.2

	Peak WSEL	Volume Required (acre-ft)
Sols Wash 10yr, Local 100yr*	2050.4	23.5
Sols Wash 100yr, Local 10yr*	2049.2	17.4

Notes - *From HEC-1 Hydrology Models

Culvert Calculator Report
2-42" Pipe

Comments: Tailwater Elevation is 10-year Sols, No Hassayampa
NAVD '88

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	2,052.00 ft	Headwater Depth/Height	2.51
Computed Headwater Elevation	2,052.00 ft	Discharge	194.09 cfs
Inlet Control HW Elev.	2,048.80 ft	Tailwater Elevation	2,048.80 ft
Outlet Control HW Elev.	2,052.00 ft	Control Type	Outlet Control

Grades			
Upstream Invert	2,043.20 ft	Downstream Invert	2,043.00 ft
Length	140.00 ft	Constructed Slope	0.001429 ft/ft

Hydraulic Profile			
Profile	PressureProfile	Depth, Downstream	5.80 ft
Slope Type	N/A	Normal Depth	N/A ft
Flow Regime	N/A	Critical Depth	3.03 ft
Velocity Downstream	10.09 ft/s	Critical Slope	0.008525 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	3.50 ft
Section Size	42 inch	Rise	3.50 ft
Number Sections	2		

Outlet Control Properties			
Outlet Control HW Elev.	2,052.00 ft	Upstream Velocity Head	1.58 ft
Ke	0.20	Entrance Loss	0.32 ft

Inlet Control Properties			
Inlet Control HW Elev.	2,048.80 ft	Flow Control	N/A
Inlet Type	Beveled ring, 33.7° bevels	Area Full	19.2 ft²
K	0.00180	HDS 5 Chart	3
M	2.50000	HDS 5 Scale	B
C	0.02430	Equation Form	1
Y	0.83000		

Rating Table Report
2-42" Pipe

Range Data:

	Minimum	Maximum	Increment
Discharge	0.00	400.00	10.00 cfs

Discharge (cfs)	HW Elev. (ft)
0.00	2,048.83
10.00	2,048.84
20.00	2,048.86
30.00	2,048.91
40.00	2,048.97
50.00	2,049.04
60.00	2,049.14
70.00	2,049.25
80.00	2,049.37
90.00	2,049.52
100.00	2,049.68
110.00	2,049.86
120.00	2,050.05
130.00	2,050.27
140.00	2,050.49
150.00	2,050.74
160.00	2,051.00
170.00	2,051.28
180.00	2,051.58
190.00	2,051.90
200.00	2,052.23
210.00	2,052.58
220.00	2,052.94
230.00	2,053.32
240.00	2,053.72
250.00	2,054.14
260.00	2,054.57
270.00	2,055.02
280.00	2,055.49
290.00	2,055.97
300.00	2,056.48
310.00	2,056.99
320.00	2,057.53
330.00	2,058.08
340.00	2,058.65
350.00	2,059.24
360.00	2,059.84
370.00	2,060.46
380.00	2,061.10
390.00	2,061.75
400.00	2,062.42

10-local, 10-Sols, 100-Hassayampa [2054.28]

SV	0	1.3	2.9	5.3	8.3	12.1	16.4	21.3	26.8	33.2
SE	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052
SQ	0	0	0	0	0	0	0	0	0	1

100-local, 10-Sols [2048.80]

SV	0	5.3	8.3	12.1	15.7	16.4	21.3	26.8	33.2
SE	2043	2046	2047	2048	2048.8	2049	2050	2051	2052
SQ	0	0	0	0	0	43	117	160	193

Culvert Calculator Report
24" Pipe from WQARF Site

Comments: Tailwater came from West 100-yr, NGVD '29
Inverts estimated off of Jacobs plans on NGVD '29

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	2,071.00	ft	Headwater Depth/Height	7.50	
Computed Headwater Eleva	2,071.00	ft	Discharge	53.90	cfs
Inlet Control HW Elev.	2,064.81	ft	Tailwater Elevation	2,056.53	ft
Outlet Control HW Elev.	2,071.00	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	2,056.00	ft	Downstream Invert	2,055.00	ft
Length	150.00	ft	Constructed Slope	0.006667	ft/ft

Hydraulic Profile					
Profile	CompositeM2PressureProfile		Depth, Downstream	1.99	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	1.99	ft
Velocity Downstream	17.18	ft/s	Critical Slope	0.052854	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	2,071.00	ft	Upstream Velocity Head	4.57	ft
Ke	0.20		Entrance Loss	0.91	ft

Inlet Control Properties					
Inlet Control HW Elev.	2,064.81	ft	Flow Control	Submerged	
Inlet Type	Beveled ring, 33.7° bevels		Area Full	3.1	ft²
K	0.00180		HDS 5 Chart	3	
M	2.50000		HDS 5 Scale	B	
C	0.02430		Equation Form	1	
Y	0.83000				

DI	0	12.7	65.2	1000
DQ	0	12.7	14.7	14.7

Excess Flow is routed to CP 4

Project Engineer: Engineering & Environmental Consultants Inc

Sols Wash Channel Improvements - Final Design
EEC Job No. 305020.01

Detention Volume at 66" Pipe, north of WQARF site

$$V_{provided} = D/3 \times [A_{top} + A_{bottom} + sqrt(A_{top} \times A_{bottom})]$$

Contour Elevation	Depth [ft]	Area [ft^2]	Area [acres]	Volume Provided [acre-ft]	Accumulative Volume [acre-ft]	Volume Available Above 100-yr Hassayampa [acre-ft]
60	0	479.2	0.01	0.0	0	0
62	2	83025.4	1.91	1.4	1.4	0
64	2	143486.6	3.29	5.1	6.5	0
66	2	180469.1	4.14	7.4	13.9	0
68	2	214053.8	4.91	9.0	23.0	9.0
70	2	251428.3	5.77	10.7	33.7	19.7

* Includes Storage Outside of ADOT R-O-W
* Only uses volume above 100yr Hassayampa

Note 1) Top of dike elev at WQARF Site (2070.0)

2) NGVD '29 Elevations (per Jacobs plans)

Culvert Calculator Report
66" Pipe - North of WQARF 10-yr Local, 100-yr Hassayampa

Comments: Inverts taken from Jacobs plan (NGVD '29)
Tailwater Elevation taken from West (RM 52.250 - WSE=2066.1) NGVD '29

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	70.00 ft	Headwater Depth/Height	1.89
Computed Headwater Elev	70.00 ft	Discharge	263.23 cfs
Inlet Control HW Elev.	68.15 ft	Tailwater Elevation	66.10 ft
Outlet Control HW Elev.	70.00 ft	Control Type	Outlet Control

Grades			
Upstream Invert	59.59 ft	Downstream Invert	59.22 ft
Length	169.00 ft	Constructed Slope	0.002189 ft/ft

Hydraulic Profile			
Profile	PressureProfile	Depth, Downstream	6.88 ft
Slope Type	N/A	Normal Depth	N/A ft
Flow Regime	N/A	Critical Depth	4.51 ft
Velocity Downstream	11.08 ft/s	Critical Slope	0.006130 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	5.50 ft
Section Size	66 inch	Rise	5.50 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	70.00 ft	Upstream Velocity Head	1.91 ft
Ke	0.50	Entrance Loss	0.95 ft

Inlet Control Properties			
Inlet Control HW Elev.	68.15 ft	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	23.8 ft^2
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Rating Table Report
66" Pipe - North of WQARF 10-yr Local, 100-yr Hassayampa

Range Data:			
	Minimum	Maximum	Increment
Discharge	0.00	500.00	50.00 cfs

Discharge (cfs)	HW Elev. (ft)
0.00	66.10
50.00	66.24
100.00	66.66
150.00	67.37
200.00	68.35
250.00	69.62
300.00	71.17
350.00	73.00
400.00	75.11
450.00	77.55
500.00	80.90

SV	0	0	4	9
SE	2059	2066.1	2067	2068
SQ	0	0	125.7	182.7

Culvert Calculator Report
66" Pipe - North of WQARF 100-yr Local, 10-yr Hassayampa

Comments: Inverts taken from Jacobs plan (NGVD '29)
Tailwater Elevation data was not available, assumed 2/3 of pipe height

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	70.00 ft	Headwater Depth/Height	1.89
Computed Headwater Elev	70.00 ft	Discharge	308.97 cfs
Inlet Control HW Elev.	70.00 ft	Tailwater Elevation	62.89 ft
Outlet Control HW Elev.	69.79 ft	Control Type	Inlet Control

Grades			
Upstream Invert	59.59 ft	Downstream Invert	59.22 ft
Length	169.00 ft	Constructed Slope	0.002189 ft/ft

Hydraulic Profile			
Profile	CompositeM2PressureProfile	Depth, Downstream	4.82 ft
Slope Type	Mild	Normal Depth	N/A ft
Flow Regime	Subcritical	Critical Depth	4.82 ft
Velocity Downstream	14.00 ft/s	Critical Slope	0.007656 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	5.50 ft
Section Size	66 inch	Rise	5.50 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	69.79 ft	Upstream Velocity Head	2.63 ft
Ke	0.50	Entrance Loss	1.31 ft

Inlet Control Properties			
Inlet Control HW Elev.	70.00 ft	Flow Control	Submerged
Inlet Type	Square edge w/headwall	Area Full	23.8 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Rating Table Report

66" Pipe - North of WQARF 100-yr Local, 10-yr Hassayampa

Range Data:			
	Minimum	Maximum	Increment
Discharge	0.00	400.00	10.00 cfs

Discharge (cfs)	HW Elev. (ft)
0.00	62.89
10.00	62.90
20.00	62.94
30.00	63.00
40.00	63.08
50.00	63.18
60.00	63.31
70.00	63.46
80.00	63.62
90.00	63.81
100.00	64.00
110.00	64.22
120.00	64.44
130.00	64.66
140.00	64.89
150.00	65.12
160.00	65.35
170.00	65.58
180.00	65.82
190.00	66.06
200.00	66.30
210.00	66.55
220.00	66.80
230.00	67.07
240.00	67.35
250.00	67.68
260.00	68.04
270.00	68.41
280.00	68.80
290.00	69.20
300.00	69.61
310.00	70.05
320.00	70.49
330.00	70.95
340.00	71.42
350.00	71.91
360.00	72.41
370.00	72.92
380.00	73.45
390.00	73.99
400.00	74.55

SV	0	0.1	0.4	3.7	6.5	13.9	23.0
SE	2059	2060	2062	2062.9	2064	2066	2068
SQ	0	0	0	0	100	187.5	258.9

Job No. 305020.01

Upstream Flood Pool
60-inch Discharge Pipe

$$V = d/3*[A_{top}+A_{bottom}+sqrt(A_{top}*A_{bottom})]$$

60-inch pipe (L = 226 ft.)
inlet invert = 2062.42
outlet invert = 2061.97
Roadside High Grade Elevation = 2068.00

Elev	Area [acres]	Differential Depth [ft]	Incremental Volume [acre-ft]	Accumulative Volume
2062	0.102	0	0.00	0.00
2064	0.174	2	0.27	0.27
2066	0.289	2	0.46	0.73
2068	0.399	2	0.69	1.42
2069	0.457	1	0.43	1.84
2070	0.514	1	0.49	2.33

*Floodpool storage volume limited to storage contained within ADOT R-O-W

Culvert Calculator Report
60" Pipe 100-year Local, 10-year Hassayampa

Comments: Inverts taken from Jacobs plan (NGVD '29)
Tailwater Elevation data was not available, assumed 2/3 of pipe height

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	2,070.00	ft	Headwater Depth/Height	1.52	
Computed Headwater Elev	2,070.00	ft	Discharge	194.71	cfs
Inlet Control HW Elev.	2,069.68	ft	Tailwater Elevation	2,065.30	ft
Outlet Control HW Elev.	2,070.00	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	2,062.42	ft	Downstream Invert	2,061.97	ft
Length	226.00	ft	Constructed Slope	0.001991	ft/ft

Hydraulic Profile					
Profile	CompositeM2PressureProfile		Depth, Downstream	3.99	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	3.99	ft
Velocity Downstream	11.60	ft/s	Critical Slope	0.005885	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	5.00	ft
Section Size	60 inch		Rise	5.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	2,070.00	ft	Upstream Velocity Head	1.53	ft
Ke	0.50		Entrance Loss	0.76	ft

Inlet Control Properties					
Inlet Control HW Elev.	2,069.68	ft	Flow Control	Submerged	
Inlet Type	Square edge w/headwall		Area Full	19.6	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Rating Table Report
60" Pipe 100-year Local, 10-year Hassayampa

Range Data:

	Minimum	Maximum	Increment
Discharge	0.00	400.00	10.00 cfs

Discharge (cfs)	HW Elev. (ft)
0.00	2,065.30
10.00	2,065.32
20.00	2,065.38
30.00	2,065.48
40.00	2,065.62
50.00	2,065.79
60.00	2,065.99
70.00	2,066.22
80.00	2,066.47
90.00	2,066.72
100.00	2,066.99
110.00	2,067.26
120.00	2,067.53
130.00	2,067.81
140.00	2,068.09
150.00	2,068.38
160.00	2,068.68
170.00	2,069.00
180.00	2,069.37
190.00	2,069.80
200.00	2,070.23
210.00	2,070.68
220.00	2,071.13
230.00	2,071.60
240.00	2,072.08
250.00	2,072.58
260.00	2,073.09
270.00	2,073.61
280.00	2,074.15
290.00	2,074.71
300.00	2,075.28
310.00	2,075.87
320.00	2,076.47
330.00	2,077.09
340.00	2,077.73
350.00	2,078.41
360.00	2,079.14
370.00	2,079.90
380.00	2,080.67
390.00	2,081.47
400.00	2,082.28

10-yr WSEL on Hassayampa downstream

Assume TW = 2/3 height of outlet pipe

2061.97 + 2/3 (5.5') = 2065.64

SV	0	0.69	2.73	1.42	1.84	2.33
SE	2062.4	2065.6	2066	2068	2069	2070
SQ	0	0	60.0	136.8	170.0	194.7

Culvert Calculator Report
60" Pipe 10-year Local, 100-year Hassayampa

Comments: Inverts taken from Jacobs plan (NGVD '29)
Tailwater Elevation taken from West (RM 52.467 - WSE=2070.29) NGVD '29

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	72.00	ft	Headwater Depth/Height	1.92	
Computed Headwater Elev	72.00	ft	Discharge	135.03	cfs
Inlet Control HW Elev.	70.29	ft	Tailwater Elevation	70.29	ft
Outlet Control HW Elev.	72.00	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	62.42	ft	Downstream Invert	61.97	ft
Length	226.00	ft	Constructed Slope	0.001991	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	8.32	ft
Slope Type	N/A		Normal Depth	N/A	ft
Flow Regime	N/A		Critical Depth	3.33	ft
Velocity Downstream	6.88	ft/s	Critical Slope	0.004395	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	5.00	ft
Section Size	60 inch		Rise	5.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	72.00	ft	Upstream Velocity Head	0.73	ft
Ke	0.50		Entrance Loss	0.37	ft

Inlet Control Properties					
Inlet Control HW Elev.	70.29	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	19.6	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Rating Table Report
60" Pipe 10-year Local, 100-year Hassayampa

Range Data:			
	Minimum	Maximum	Increment
Discharge	0.00	270.00	27.00 cfs

Discharge (cfs)	HW Elev. (ft)
0.00	70.29
27.00	70.36
54.00	70.56
81.00	70.91
108.00	71.38
135.00	72.00
162.00	72.75
189.00	73.64
216.00	74.67
243.00	75.83
270.00	77.13

HASSAYAMPA 100-YR WSEL = 2070.29

SV	0	0.27	0.73	1.42	1.84	2.33
SE	2062.4	2064	2066	2068	2069	2070
SQ	0	0	0	0	0	1

Above 2068.0 Divert all flow South To CP-2

Channel Diversion to the South (see following page)

SE	2068	2069	2070
SQ	0	111	685

Combined [10-10-100.IH1, (DO1)]

SV	0	0.27	0.73	1.42	1.84	2.33
SE	2062.4	2064	2066	2068	2069	2070
SQ	0	0	0	0	111	685

US-93 Bypass, Sta. 165+00
Worksheet for Irregular Channel

10-10-100 Model

Project Description	
Worksheet	US 93 Bypass, Sta. 1
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Slope	016670	ft/ft
Water Surface Elev	,069.00	ft

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weighting	Horton's Method

Results		
Mannings Coeffic	0.040	
Elevation Range	38.00 to 2,070.00	
Discharge	111.66	cfs
Flow Area	37.0	ft²
Wetted Perimeter	74.13	ft
Top Width	74.00	ft
Actual Depth	1.00	ft
Critical Elevation	2,068.89	ft
Critical Slope	0.030582	ft/ft
Velocity	3.02	ft/s
Velocity Head	0.14	ft
Specific Energy	2,069.14	ft
Froude Number	0.75	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+95	0.040

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	2,070.00
0+04	2,069.00
0+08	2,068.00
0+78	2,069.00
0+95	2,070.00

Notes: Discharge at even foot increments

weir flow from the Storage Area At the 60" pipe ~ STA 165+00

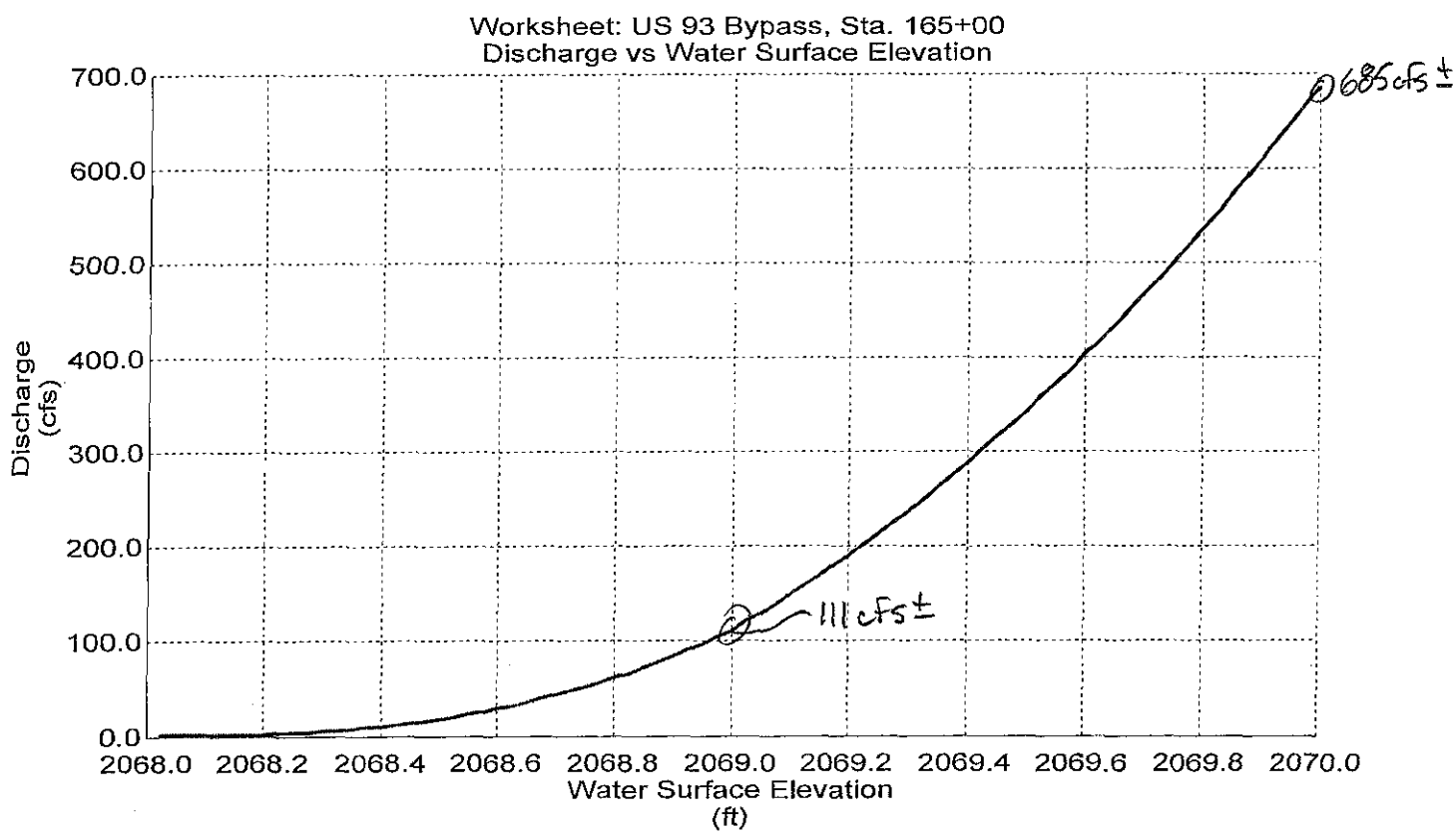
Curve
Plotted Curves for Irregular Channel

Project Description	
Worksheet	US 93 Bypass, Sta. 1
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Slope	016670 ft/ft

Options	
Current Roughness Methc	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Attribute	Minimum	Maximum	Increment
Water Surface Elevat	2,068.00	2,070.00	0.03



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*
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                    *
U.S. ARMY CORPS OF ENGINEERS     *
 *               JUN   1998             *                                                    *
HYDROLOGIC ENGINEERING CENTER    *
 *            VERSION 4.1               *                                                    *
609 SECOND STREET          *
 *                                    *                                                    *
DAVIS, CALIFORNIA 95616       *
 *  RUN DATE   28NOV06  TIME  15:37:49   *                                                    *
(916) 756-1104            *
 *                                    *                                                    *
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X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
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X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS *HEC1 (JAN 73), HEC1GS,* HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.

THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION

NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,

DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION

KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

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1                                                    HEC-1 INPUT
PAGE  1

          LINE
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

             1          ID   FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
             2          ID   SOLS WASH Final Design - Contract # 2005C006
             3          ID
             4          ID   Prepared by:
             5          ID   Engineering and Environmental Consultants
             6          ID   3003 N. Central, Suite 600
             7          ID   Phoenix, Arizona   85012
             8          ID   Phone: 602-248-7702  FAX: 602-248-7851
             9          ID
            10          ID
            11          ID
            12          ID
            13          ID   7/21/05  Filename:  100-10-0.IH1
            14          ID                Last Revised: 10/19/06
            15          ID
            16          ID   1. The storm used was 100-year, 6-hour with a 10-year flow in Sols
and
            17          ID      no Hassayampa.
            18          ID   2. Clark was the unit hydrograph.
            19          ID   3. Time step of 2 minutes.
            20          ID   4. Green-Ampt loss methods were used. Normal depth Channel
routing.
            21          ID   5. The sub-basin parameters were generated using FCDMC's DDMSW
software.
            22          ID
            23          ID
                        *DIAGRAM
            24          IT       2                    2000
            25          IO       3
                        *
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```
            26          KK    SB01   BASIN
            27          BA   0.055
            28          IN      15
            29          PB   3.385
            30          PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058
0.066   0.074
            31          PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911
0.931   0.950
            32          PC   0.962   0.972   0.983   0.991   1.000
            33          LG    0.23    0.32    6.40    0.17      22
            34          UC   0.150   0.111
            35          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0
94.0    97.0
            36          UA     100
                        *

            37          KK     D01
            38          KM        Divert to Hassayampa
            39          KM        Flow diverted through a 60" pipe.
            40          KM        The 60" pipe is part of ADOT US-93 plans is in the northern
portion
            41          KM        of sub-basin 2.
            42          KM        The WSE for the 10-yr event on the Hassayampa is unknown but
much lower
            43          KM        the 100-yr WSEL (2070.29 +/- from BFE's near STa. 165+00).
            44          KM        The 10-yr flow on the Hassayampa is only 20% of 100-yr
discharge. Theref
            45          KM            the tailwater for the outlet of the 60-inch pipe was
assumed to be at 2/3 o
            46          KM            pipe outlet height (2065.30).
            47          KM        The stage-storage-discharge relationship was based on NVGD
'29 datum.
            48          KM            Storage data is based only upon the volume that could be
stored in the ADOT
            49          KM
            50          RS       1    STOR      -1
1                                                    HEC-1 INPUT
PAGE  2

          LINE
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            51          SV       0    0.27    0.64    0.73    1.42    1.84    2.33
            52          SE  2062.4  2064.0  2065.3    2066    2068    2069    2070
            53          SQ       0       0       0    60.0   136.8   170.0   194.7
                        *

            54          KK     D01
            55          KM        Divert flow through pipe
            56          DT    DV01
            57          DI       0   135.7   168.3   194.1     500
            58          DQ       0   135.7   168.3   194.1   194.1
                        *

            59          KK     R01
            60          KM        Route remainder flow from SB01 to CP02
            61          RS       1    FLOW      -1
            62          RC   0.030   0.030   0.030    1600  0.0100
            63          RX       0      12      14      16      18      20      22      34
            64          RY    2074    2070    2070    2070    2070    2070    2070    2074
                        *

            65          KK   SB01A   BASIN
            66          BA   0.034
            67          LG    0.19    0.22    7.00    0.15      44
            68          UC   0.117   0.085
            69          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0
94.0    97.0
            70          UA     100
                        *

            71          KK    R01A
            72          KM        Route flow from SB01A to CP02
            73          RS       1    FLOW      -1
            74          RC   0.030   0.030   0.030     900  0.0200
            75          RX       0      12      14      16      18      20      22      34
            76          RY    2074    2070    2070    2070    2070    2070    2070    2074
                        *

            77          KK    SB02   BASIN
            78          BA   0.040
            79          LG    0.10    0.15    7.60    0.14      80
            80          UC   0.133   0.107
            81          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0
94.0    97.0
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          82          UA     100
                      *

          83          KK    CP02
          84          KM        Combine SB01, SB01A with SB02
          85          HC       3   0.130
                      *

          86          KK    PIPE
          87          KM        Divert to Hassayampa
          88          KM        Flow diverted through a 66" pipe.
          89          KM        The pipe was called out as a part of the ADOT US-93 plans as
a 48" pipe.
          90          KM        As part of this project, the pipe will be upsized to a 66"
pipe.
          91          KM        There is a dike downstream of the pipe with an elevation of
2070, crest
1                                                    HEC-1 INPUT
PAGE  3

        LINE
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          92          KM        The pipe is located in the southeastern corner of the sub-
basin.
          93          KM        The WSE for the 10-yr event on the Hassayampa is unknown but
much lower
          94          KM        the 100-yr WSEL (2066.14).  The 10-yr flow is only 20% of
100-yr dischar
          95          KM            the tailwater for the outlet of the 66-inch pipe was
assumed to be at 2/3 o
          96          KM            pipe outlet height (2063.22).
          97          KM        The stage-storage-discharge relationship was based on NVGD
'29 datum.
          98          KM            Storage data is based upon existing volume within West's
CLOMR Floodplain
          99          KM
         100          RS       1    STOR      -1
         101          SV       0     0.1     1.4     3.7     6.5    13.9    23.0
         102          SE    2059    2060    2062  2063.2    2064    2066    2068
         103          SQ       0       0       0       0   100.0   187.5   258.9
                      *

         104          KK     D02
         105          KM        Divert flow through pipe
         106          DT    DV02
         107          DI       0     263    1000
         108          DQ       0     263     263
                      *

         109          KK     R02
         110          KM        Route remainder flow from SB02 to CP04
         111          RS       1    FLOW      -1
         112          RC   0.030   0.030   0.030    1800  0.0100
         113          RX       0       6       9      12      22      25      28      34
         114          RY    2057    2055    2054    2053    2053    2054    2055    2057
                      *

         115          KK      WQ   BASIN
         116          BA   0.016
         117          LG    0.50    0.15    8.40    0.06       0
         118          UC   0.242   0.205
         119          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0
94.0    97.0
         120          UA     100
                      *

         121          KK     DWQ
         122          KM        Divert flow through pipe
         123          DT    DVWQ
         124          DI       0    12.7    65.2    1000
         125          DQ       0    12.7    14.7    14.7
                      *

         126          KK     RWQ
         127          KM        Route remainder flow from SB02 to CP04
         128          RS       1    FLOW      -1
         129          RC   0.030   0.030   0.030    1000  0.0100
         130          RX       0       6       9      12      22      25      28      34
         131          RY    2057    2055    2054    2053    2053    2054    2055    2057
                      *
1                                                    HEC-1 INPUT
PAGE  4

        LINE
```

```
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          132          KK    SB03   BASIN
          133          BA   0.048
          134          LG    0.16    0.15    8.00    0.11      64
          135          UC   0.183   0.183
          136          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0
94.0    97.0
          137          UA     100
                       *

          138          KK     R03
          139          KM        Route flow from SB03 to CP04
          140          RS       1    FLOW      -1
          141          RC   0.045   0.045   0.045     860  0.0100
          142          RX       0      30      60      80     100     120     150     180
          143          RY    2070    2065    2060    2060    2060    2060    2065    2070
                       *

          144          KK    SB04   BASIN
          145          BA   0.042
          146          LG    0.19    0.21    6.40    0.20      56
          147          UC   0.233   0.241
          148          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0
94.0    97.0
          149          UA     100
                       *

          150          KK    CP04
          151          KM        Combine R02, RWQ, SB03 with SB04
          152          HC       4   0.108
                       *

          153          KK     R04
          154          KM        Route flow from SB04 to CP06
          155          RS       1    FLOW      -1
          156          RC   0.030   0.030   0.030    2000  0.0050
          157          RX       0       6       9      12      22      25      28      34
          158          RY    2057    2055    2054    2053    2053    2054    2055    2057
                       *

          159          KK    SB05   BASIN
          160          BA   0.048
          161          LG    0.25    0.25    4.70    0.36      30
          162          UC   0.283   0.286
          163          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0
94.0    97.0
          164          UA     100
                       *

          165          KK     R05
          166          KM        Route flow from SB05 to CP06
          167          RS       1    FLOW      -1
          168          RC   0.045   0.045   0.045    1500  0.0100
          169          RX       0      40      80      90     110     120     160     200
          170          RY    2056    2055    2054    2053    2053    2054    2055    2056
                       *
1                                                   HEC-1 INPUT
PAGE  5

          LINE
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          171          KK    SB06   BASIN
          172          BA   0.068
          173          LG    0.23    0.25    4.50    0.45      30
          174          UC   0.375   0.336
          175          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0
94.0    97.0
          176          UA     100
                       *

          177          KK    CP06
          178          KM        Combine CP04, SB05, with SB06
          179          HC       3   0.350
                       *

          180          KK   BASIN
          181          KM        BASIN DISCHARGES THROUGH 2-42" PIPES TO SOLS WASH
          182          KM        LOWEST ADJACENT FFE=2052.76 AT 649 CHESTNUT STREET
          183          KM        THIS MODEL USES 100-YEAR FOR LOCAL DRAINAGE, 10-YEAR FOR SOLS
WASH
          184          KM        WITH WSE=2048.83, NO FLOW IN THE HASSAYAMPA RIVER
```

```
185          KM        The stage-storage-discharge relationship is based on NAVD
'88.
186          KM
187          RS      1     STOR      -1
188          SV      0      5.3     8.3     12.1     15.7     16.4     21.3     26.8
33.2
189          SE   2043     2046    2047     2048   2048.8     2049     2050     2051
2052
190          SQ      0        0       0        0        0       43      117      160
193
             *
191          ZZ
1
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    26        SB01
                 V
                 V
    37         D01
                 .
                 .
    56           .-------->    DV01
    54         D01
                 V
                 V
    59         R01
                 .
                 .
    65           .        SB01A
                 .           V
                 .           V
    71           .        R01A
                 .           .
                 .           .
    77           .           .        SB02
                 .           .           .
                 .           .           .
    83        CP02.......................
                 V
                 V
    86        PIPE
                 .
                 .
   106           .-------->    DV02
   104         D02
                 V
                 V
   109         R02
                 .
                 .
   115           .          WQ
                 .           .
                 .           .
   123           .           .-------->    DVWQ
   121           .         DWQ
                 .           V
                 .           V
   126           .         RWQ
                 .           .
                 .           .
   132           .           .        SB03
                 .           .           V
                 .           .           V
   138           .           .         R03
                 .           .           .
                 .           .           .
   144           .           .           .        SB04
                 .           .           .           .
                 .           .           .           .
   150        CP04.................................
                 V
                 V
   153         R04
                 .
                 .
   159           .        SB05
                 .           V
                 .           V
   165           .         R05
                 .           .
                 .           .
```

```
171          .          .        SB06
             .          .          .
             .          .          .
177       CP06.......................
             V
             V
180       BASIN
```

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

BASIN AREA	MAXIMUM OPERATION STAGE	TIME OF MAX STAGE	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR
+	HYDROGRAPH AT							
+ .05			SB01	177.	4.03	13.	3.	1.
	ROUTED TO							
+ .05			D01	147.	4.10	12.	3.	1.
+ 2068.30	4.10							
	DIVERSION TO							
+ .05			DV01	147.	.00	12.	3.	1.
	HYDROGRAPH AT							
+ .05			D01	0.	.00	0.	0.	0.
	ROUTED TO							
+ .05			R01	0.	.00	0.	0.	0.
+ 2070.00	.00							
	HYDROGRAPH AT							
+ .03			SB01A	121.	4.00	10.	2.	1.
	ROUTED TO							
+ .03			R01A	119.	4.03	10.	2.	1.
+ 2071.24	4.03							
	HYDROGRAPH AT							
+ .04			SB02	141.	4.03	13.	3.	1.
	3 COMBINED AT							
+ .13			CP02	260.	4.03	23.	6.	2.
	ROUTED TO							
+ .13			PIPE	110.	4.20	16.	4.	1.
+ 2064.23	4.20							
	DIVERSION TO							
+ .13			DV02	110.	.00	16.	4.	1.
	HYDROGRAPH AT							
+ .13			D02	0.	.00	0.	0.	0.
	ROUTED TO							
+ .13			R02	0.	.00	0.	0.	0.
+ 2053.00	.00							
	HYDROGRAPH AT							
+ .02			WQ	43.	4.07	4.	1.	0.

```
          DIVERSION TO
+                              DVWQ        14.    4.07          2.          1.          0.
.02

          HYDROGRAPH AT
+                               DWQ        29.    4.07          2.          0.          0.
.02

          ROUTED TO
+                               RWQ        26.    4.13          2.          0.          0.
.02
+
2053.65        4.13

          HYDROGRAPH AT
+                              SB03       142.    4.03         15.          4.          1.
.05

          ROUTED TO
+                               R03       134.    4.10         15.          4.          1.
.05
+
2060.74        4.10

          HYDROGRAPH AT
+                              SB04       107.    4.07         12.          3.          1.
.04

          4 COMBINED AT
+                              CP04       265.    4.10         29.          7.          3.
.24

          ROUTED TO
+                               R04       243.    4.17         29.          7.          3.
.24
+
2055.50        4.17

          HYDROGRAPH AT
+                              SB05       100.    4.10         11.          3.          1.
.05

          ROUTED TO
+                               R05        87.    4.20         11.          3.          1.
.05
+
2054.02        4.20

          HYDROGRAPH AT
+                              SB06       122.    4.13         15.          4.          1.
.07

          3 COMBINED AT
+                              CP06       449.    4.17         56.         14.          5.
.35

          ROUTED TO
+                             BASIN       135.    4.67         35.          9.          3.
.35
+
2050.43        4.67


 *** NORMAL END OF HEC-1 ***
```

```
****************************************
*************************************
 *                                    *                                                    *
*
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                *    U.S. ARMY CORPS
OF ENGINEERS      *
 *              JUN   1998             *                                                  *    HYDROLOGIC
ENGINEERING CENTER     *
 *            VERSION 4.1              *                                                  *          609 SECOND
STREET           *
 *                                    *                                                    *       DAVIS,
CALIFORNIA 95616        *
 *  RUN DATE   24OCT06  TIME  15:38:26  *                                                  *           (916)
756-1104            *
 *                                    *                                                    *
*
 ****************************************
*************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1
PAGE 1

HEC-1 INPUT

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID   FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
  2           ID   SOLS WASH Final Design - Contract # 2005C006
  3           ID
  4           ID   Prepared by:
  5           ID   Engineering and Environmental Consultants
  6           ID   3003 N. Central, Suite 600
  7           ID   Phoenix, Arizona   85012
  8           ID   Phone: 602-248-7702  FAX: 602-248-7851
  9           ID
 10           ID
 11           ID
 12           ID
 13           ID   7/21/05  Filename:  10-10-100.IH1
 14           ID                Last Revised: 7/24/06
 15           ID
 16           ID   1. The storm used was 10-year, 6-hour with a 10-year flow in Sols and
 17           ID      100-year flow on Hassayampa River (highest WSEL condition).
 18           ID   2. Clark was the unit hydrograph.
 19           ID   3. Time step of 2 minutes.
 20           ID   4. Green-Ampt loss methods were used. Normal depth Channel routing.
 21           ID   5. The sub-basin parameters were generated using FCDMC's DDMSW software.
 22           ID
 23           ID
              *DIAGRAM
```

```
 24          IT       2                    2000
 25          IO       3
             *

 26          KK    SB01   BASIN
 27          BA   0.055
 28          IN      15
 29          PB   2.200
 30          PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
 31          PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
 32          PC   0.962   0.972   0.983   0.991   1.000
 33          LG    0.23    0.32    6.40    0.17      22
 34          UC   0.179   0.135
 35          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 36          UA     100
             *

 37          KK     D01
 38          KM        A 60" pipe is part of ADOT US-93 plans is in the northern portion
 39          KM        of Sub-basin 2 which is the outfall for Sub-basin 1.
 40          KM        The stage-storage-discharge card is based on NGVD '29 datum.
 41          KM        The 100-yr WSEL on the Hassayampa is 2070.29 which will back up through
 42          KM        the 60-inch culvert, therefore, a flap gate is installed on the outlet p
 43          KM           to prevent backwater from the Hassayampa River (therefore 0 cfs is
discharg
 44          KM        through the 60-inch pipe to the Hassayampa River).  The local 10-year
 45          KM        discharge must be stored either at the 60-inch pipe inlet or in
 46          KM        the flood pool located upstram of the WQARF site at CP02.
 47          KM        After the peak has passed on the Hassayampa River the flap gate will
 48          KM        open and the ponded water will discharge through the 60-inch pipe.
 49          KM           This stage/storage/discharge operation assumes 0 cfs through the 60-inch
 50          KM           pipe with the SV card defining the storage at the 60-inch pipe inlet and
1                                    HEC-1 INPUT
PAGE  2

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 51          KM        the SQ card defining the discharge from the storage pond (spill
 52          KM           elevation 2068.0), which is then routed to CP02.
 53          KM
 54          RS       1    STOR      -1
 55          SV       0    0.27    0.73    1.42    1.84    2.33
 56          SE  2062.4    2064    2066    2068    2069    2070
 57          SQ       0       0       0       0     111     685
             *

 58          KK     R01
 59          KM        Route remainder flow from SB01 to CP02
 60          RS       1    FLOW      -1
 61          RC   0.030   0.030   0.030    1600  0.0100
 62          RX       0      12      14      16      18      20      22      34
 63          RY    2074    2070    2070    2070    2070    2070    2070    2074
             *

 64          KK   SB01A   BASIN
 65          BA   0.034
 66          LG    0.19    0.22    7.00    0.15      44
 67          UC   0.142   0.105
 68          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 69          UA     100
             *

 70          KK    R01A
 71          KM        Route flow from SB01A to CP02
 72          RS       1    FLOW      -1
 73          RC   0.030   0.030   0.030     900  0.0200
 74          RX       0      12      14      16      18      20      22      34
 75          RY    2074    2070    2070    2070    2070    2070    2070    2074
             *

 76          KK    SB02   BASIN
 77          BA   0.040
 78          LG    0.10    0.15    7.60    0.14      80
 79          UC   0.154   0.126
 80          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 81          UA     100
```

```
                 *
 82              KK    CP02
 83              KM        Combine SB01, SB01A with SB02
 84              HC       3   0.130
                 *

 85              KK    PIPE
 86              KM        Divert to Hassayampa
 87              KM        Flow diverted through a 66" pipe.
 88              KM        The pipe was called out as a part of the ADOT US-93 plans as a 48" pipe.
 89              KM        As part of this project, the pipe will need to be upsized to a 66" pipe.
 90              KM        There is a dike downstream of the pipe with an elevation of 2070, crest
 91              KM        The pipe is located in the southeastern corner of the sub-basin.
 92              KM        The WSE for the 100-year event on the Hassayampa was taken from WEST.
 93              KM        The 100-year WSE is 2066.1 (NVGD '29).
1                                          HEC-1 INPUT
PAGE  3

LINE             ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 94              KM        The stage-storage-discharge relationship was based on NVGD '29 datum.
 95              KM           The storage volume is based upon the available volume above the 100-yr
 96              KM        floodplain elevation (2066.1) per West Consultants CLOMR.
 97              RS       1    STOR      -1
 98              SV       0       4       9
 99              SE  2066.1    2067    2068
100              SQ       0   125.7   182.7
                 *

101              KK     D02
102              KM        Divert flow through pipe
103              DT    DV02
104              DI       0     263    1000
105              DQ       0     263     263
                 *

106              KK     R02
107              KM        Route remainder flow from SB02 to CP04
108              RS       1    FLOW      -1
109              RC   0.030   0.030   0.030    1800  0.0100
110              RX       0       6       9      12      22      25      28      34
111              RY    2057    2055    2054    2053    2053    2054    2055    2057
                 *

112              KK      WQ   BASIN
113              BA   0.016
114              LG    0.50    0.15    8.40    0.06       0
115              UC   0.300   0.260
116              UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
117              UA     100
                 *

118              KK     DWQ
119              KM        Divert flow through pipe
120              DT    DVWQ
121              DI       0    12.7    65.2    1000
122              DQ       0    12.7    14.7    14.7
                 *

123              KK     RWQ
124              KM        Route remainder flow from SB02 to CP04
125              RS       1    FLOW      -1
126              RC   0.030   0.030   0.030    1000  0.0100
127              RX       0       6       9      12      22      25      28      34
128              RY    2057    2055    2054    2053    2053    2054    2055    2057
                 *

129              KK    SB03   BASIN
130              BA   0.048
131              LG    0.16    0.15    8.00    0.11      64
132              UC   0.217   0.220
133              UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
134              UA     100
                 *
1                                          HEC-1 INPUT
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 135          KK     R03
 136          KM        Route flow from SB03 to CP04
 137          RS       1    FLOW      -1
 138          RC   0.045   0.045   0.045     860  0.0100
 139          RX       0      30      60      80     100     120     150     180
 140          RY    2070    2065    2060    2060    2060    2060    2065    2070
              *

 141          KK    SB04   BASIN
 142          BA   0.042
 143          LG    0.19    0.21    6.40    0.20      56
 144          UC   0.288   0.304
 145          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 146          UA     100
              *

 147          KK    CP04
 148          KM        Combine R02, RWQ, SB03 with SB04
 149          HC       4   0.108
              *

 150          KK     R04
 151          KM        Route flow from SB04 to CP06
 152          RS       1    FLOW      -1
 153          RC   0.030   0.030   0.030    2000  0.0050
 154          RX       0       6       9      12      22      25      28      34
 155          RY    2057    2055    2054    2053    2053    2054    2055    2057
              *

 156          KK    SB05   BASIN
 157          BA   0.048
 158          LG    0.25    0.25    4.70    0.36      30
 159          UC   0.379   0.396
 160          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 161          UA     100
              *

 162          KK     R05
 163          KM        Route flow from SB05 to CP06
 164          RS       1    FLOW      -1
 165          RC   0.045   0.045   0.045    1500  0.0100
 166          RX       0      40      80      90     110     120     160     200
 167          RY    2056    2055    2054    2053    2053    2054    2055    2056
              *

 168          KK    SB06   BASIN
 169          BA   0.068
 170          LG    0.23    0.25    4.50    0.45      30
 171          UC   0.521   0.484
 172          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 173          UA     100
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 174          KK    CP06
 175          KM        Combine CP04, SB05, with SB06
 176          HC       3   0.350
              *

 177          KK   BASIN
 178          KM        BASIN DISCHARGES THROUGH 2-42" PIPES TO SOLS WASH
 179          KM        LOWEST ADJACENT FFE=2052.76 AT 649 CHESTNUT STREET
 180          KM        THIS MODEL USES 10-YEAR FOR LOCAL DRAINAGE, 10-YEAR FOR SOLS AND
 181          KM        WITH 100-YEAR ON HASSAYAMPA RIVER WITH WSE=2054.28
 182          KM        THE PIPES WILL NOT DISCHARGE DURING STORM SO 10-YR STORM MUST BE RETAINE
 183          KM        1 CFS IS DISCHARGED ON THE LAST CARD SO THAT HEC-1 DOES NOT PRODUCE AN E
 184          KM        The stage-storage-discharge relationship is based on NAVD '88.
```

```
185          KM
186          RS      1    STOR     -1
187          SV      0     1.3    2.9     5.3     8.3    12.1    16.4    21.3    26.8    33.2
188          SE   2043    2044   2045    2046    2047    2048    2049    2050    2051    2052
189          SQ      0       0      0       0       0       0       0       0       0       1
             *
190          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   26       SB01
               V
               V
   37        D01
               V
               V
   58        R01
               .
               .
   64          .        SB01A
               .           V
               .           V
   70          .         R01A
               .           .
               .           .
   76          .           .        SB02
               .           .           .
               .           .           .
   82       CP02.......................
               V
               V
   85       PIPE
               .
               .
  103          .------->    DV02
  101        D02
               V
               V
  106        R02
               .
               .
  112          .          WQ
               .           .
               .           .
  120          .           .------->    DVWQ
  118          .         DWQ
               .           V
               .           V
  123          .         RWQ
               .           .
               .           .
  129          .           .        SB03
               .           .           V
               .           .           V
  135          .           .         R03
               .           .           .
               .           .           .
  141          .           .           .        SB04
               .           .           .           .
               .           .           .           .
  147       CP04.....................................
               V
               V
  150        R04
               .
               .
  156          .        SB05
               .           V
               .           V
  162          .         R05
               .           .
               .           .
```

```
168          .          .        SB06
             .          .          .
             .          .          .
174       CP06.......................
             V
             V
177      BASIN
```

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

TIME OF MAX STAGE +	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE
+	HYDROGRAPH AT	SB01	98.	4.03	7.	2.	1.	.05	
+	ROUTED TO	D01	89.	4.10	5.	1.	0.	.05	
+ 4.10									2068.80
+	ROUTED TO	R01	73.	4.17	5.	1.	0.	.05	
+ 4.17									2071.15
	HYDROGRAPH AT	SB01A	72.	4.03	6.	1.	1.	.03	
+	ROUTED TO	R01A	70.	4.03	6.	1.	1.	.03	
+ 4.03									2070.93
+	HYDROGRAPH AT	SB02	87.	4.03	9.	2.	1.	.04	
+	3 COMBINED AT	CP02	194.	4.07	19.	5.	2.	.13	
+	ROUTED TO	PIPE	110.	4.27	19.	5.	2.	.13	
+ 4.27									2066.89
+	DIVERSION TO	DV02	110.	.00	19.	5.	2.	.13	
+	HYDROGRAPH AT	D02	0.	.00	0.	0.	0.	.13	
+	ROUTED TO	R02	0.	.00	0.	0.	0.	.13	
+ .00									2053.00
+	HYDROGRAPH AT	WQ	22.	4.10	2.	0.	0.	.02	
+	DIVERSION TO	DVWQ	13.	4.10	2.	0.	0.	.02	
	HYDROGRAPH AT	DWQ	9.	4.10	0.	0.	0.	.02	
+	ROUTED TO	RWQ	6.	4.20	0.	0.	0.	.02	
+									2053.27

20

+	HYDROGRAPH AT	SB03	84.	4.07	9.	2.	1.	.05	
+	ROUTED TO	R03	73.	4.13	9.	2.	1.	.05	2060.54
+ 4.13									
+	HYDROGRAPH AT	SB04	58.	4.10	7.	2.	1.	.04	
+	4 COMBINED AT	CP04	135.	4.13	17.	4.	2.	.24	
+	ROUTED TO	R04	123.	4.23	17.	4.	2.	.24	2054.77
+ 4.23									
+	HYDROGRAPH AT	SB05	45.	4.17	6.	2.	1.	.05	
+	ROUTED TO	R05	38.	4.30	6.	2.	1.	.05	2053.66
+ 4.30									
+	HYDROGRAPH AT	SB06	51.	4.23	8.	2.	1.	.07	
+	3 COMBINED AT	CP06	211.	4.23	32.	8.	3.	.35	
	ROUTED TO	BASIN	0.	.00	0.	0.	0.	.35	2049.16
10.17									

*** NORMAL END OF HEC-1 ***

Appendix D.3

HYDROLOGIC CALCULATIONS – SOLS WASH

FEMA MSC Viewer Page: 71 of 124 Scale: 34

Help

Zoom Win Pan Zoom In Zoom Out 1:1 Zoom In MAX Zoom Out

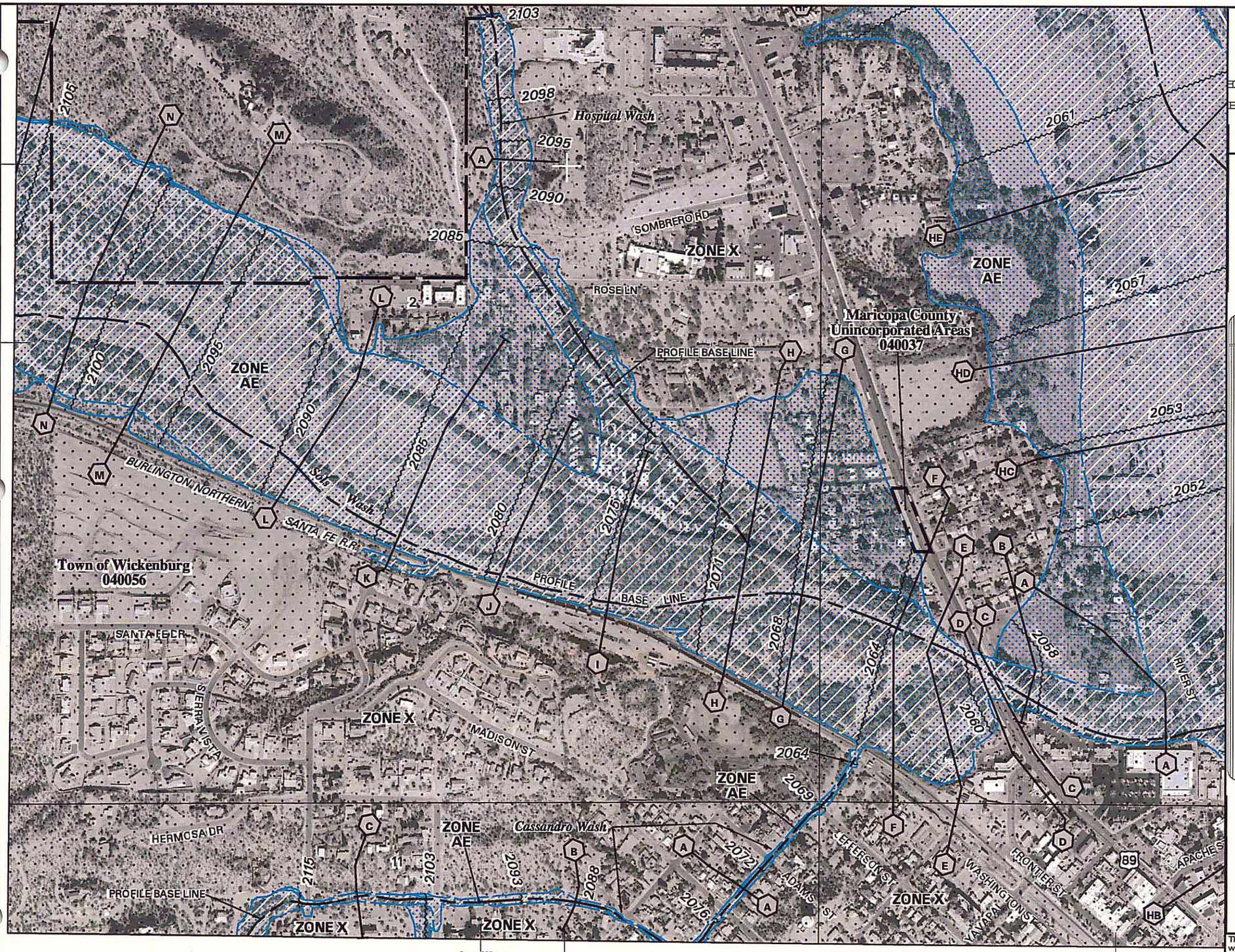
Table 3. Summary of Discharges (Continued)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
Sols Wash					
At confluence with Hassayampa River	147.2	7,019	12,453	15,015	20,836
Above confluence of Casandro Wash	145.5	6,758	11,964	14,459	20,005
Above confluence of Hospital Wash	145.1	6,725	11,927	14,413	19,986
Above confluence of Flying E Wash	124.8	5,784	10,433	12,945	18,691
At Railroad Bridge at Railroad Milepost 36	119.3	4,795	9,767	12,244	17,749
At Maricopa - Yavapai County Boundary	86.7	3,696	7,501	9,419	13,700
Casandro Wash					
At Sols Wash (including flow in outfall pipe, flow in outfall pipe of 274 cfs is diverted from Casandro Wash at the intersection of Mohave Street and Jackson Street and returns at Sols Wash)	1.58	--[1]	--[1]	406	--[1]
At Atchison, Topeka & Santa Fe Railway	1.57	--[1]	--[1]	381	--[1]
At intersection of Mohave Street and Jackson Street	1.41	--[1]	--[1]	63	--[1]
At Navajo Street	1.42	--[1]	--[1]	305	--[1]
Downstream of Casandro Wash Dam	1.24	--[1]	--[1]	30	--[1]
Upstream of Casandro Wash Dam	1.24	--[1]	--[1]	1,265	--[1]
At U.S. Highway 60 and 70	0.68	--[1]	--	714	--[1]
South Branch Casandro Wash					
Above Yaqui Drive	0.3	30	150	400	1,000
Hospital Wash					
At Honeysuckle Avenue	0.5	150	600	900	2,000

--[1] *Not Computed*

Appendix E

HYDRAULIC ANALYSIS SUPPORTING DOCUMENTATION



MAP SCALE 1" = 500'

0 500 1000 FEET

0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

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	040037	0251	H
WICKENBURG, TOWN OF	040056	0251	H

Notice to User: The **Map Number** shown below 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

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Appendix E.1

ROUGHNESS COEFFICIENT ESTIMATION

N-Value	Average
Description	Manning's n-value
	for channel
Future	0.030

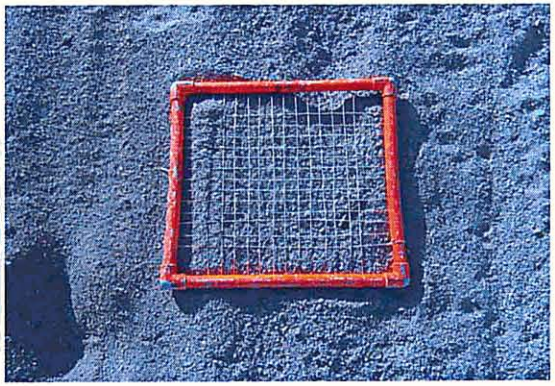
*For cross sections where improvements are occurring and bank protection is being put in place.

Future - Sandy bottom with brush and medium vegetation in the wash bottom and gabion bank protection
The purpose of the high n-value model is to determine the high WSE.

Sols Wash - 0.990 Main Channel

Left Bank-Looking Downstream
Photo 57

Right Bank-Looking Downstream
Photo 55



Main Wash-Bed Material
Photo 56

Left Overbank-Looking Downstream
Photo 59

Right Overbank-Looking Downstream
Photo 52

River Mi[illegible].990

Determination of Manning's Roughness Coefficients by FCDMC Method

Project: **Sols Wash CLOMR**
Stream: Sols Wash
Job No.: 305020.02
Section Description: Channel has a sandy bottom and vegetated banks
LOB is a vegetated island
ROB other side of R/R, channel like

Rough Sketch of
Typical Channel Cross Section

Channel Conditions		Manning's n Adjustment		Left Overbank	Main Channel (left bank -A1)	Main Channel (center -A2)	Main Channel (right bank -A3)	Right Overbank
Area [ft^2]					175	900	150	
% [decimal]					0.14	0.73	0.12	
Channel Bed Material	Concrete	n0	0.012-0.018				0.018	
	Rock Cut		0.025					
	Firm Soil		0.025-0.032	0.030	0.030			0.030
	Fine Sand		0.023-.026			0.025		
	Coarse Sand		0.026-0.036					
	Gravel		0.028-0.035					
	Cobble		0.030-0.050					
	Boulder		0.040-0.070					
Degree of Irregularity	Smooth	n1	0.000					
	Minor		0.001-0.005		0.002			
	Moderate		0.006-0.010					
	Severe		0.011-0.020					
Effects of Obstructions	Negligible	n2	0.000-0.004		0.002			
	Minor		0.005-0.015					
	Appreciable		0.020-0.030					
	Severe		0.040-0.060					
Vegetation	Small	n3	0.002-0.010					
	Medium		0.01-0.025					0.020
	Large		0.025-0.050	0.035	0.040			
	Very Large		0.050-0.100					
Variations in the Channel Cross Section	Gradual	n4	0.000					
	Alternating (occasionally)		0.001-0.005	0.002	0.002			
	Alternating (frequently)		0.010-0.015					
Sum (n0-n4)					0.076	0.025	0.018	
x (% of Area)					0.011	0.018	0.002	
Sum (left, right,center)						0.031		
Degree of Meandering	Minor	m	1	1		1		1
	Appreciable		1.15					
	Severe		1.3					
n = (n0 + n1 + n2 + n3 + n4)m				0.067		0.031		0.050

Sols Wash - 0.496 North Prong

Left Bank-Looking Downstreamstream
Photo 63

Right Bank-Looking Downstream
Photo

Main Wash-Bed Material
Photo 64

Left Overbank-Looking Upstream
Photo 62

Right Overbank-Looking Downstream
Photo 59

River Mil[illegible].496 (North Prong)

Determination of Manning's Roughness Coefficients by FCDMC Method

Project: **Sols Wash CLOMR**
Stream: Sols Wash
Job No.: 305020.02
Section Description: Channel has a sandy bottom and vegetated banks
LOB is natural desert
ROB is an island with heavy vegetation.

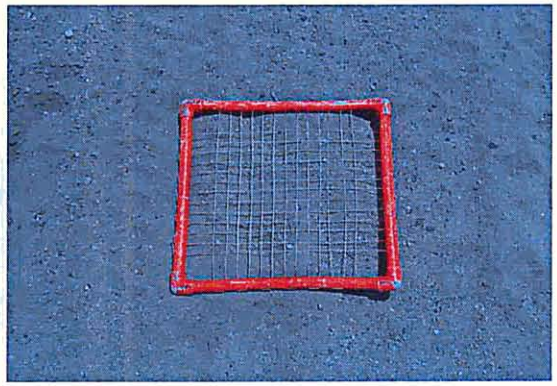
Rough Sketch of
Typical Channel Cross Section

Channel Conditions		Manning's n Adjustment		Left Overbank	Main Channel (left bank -A1)	Main Channel (center -A2)	Main Channel (right bank -A3)	Right Overbank
Area [ft²]					18	180	18	
% [decimal]					0.08	0.83	0.08	
Channel Bed Material	Concrete	n0	0.012-0.018					
	Rock Cut		0.025					
	Firm Soil		0.025-0.032	0.030			0.030	0.030
	Fine Sand		0.023-.026			0.025		
	Coarse Sand		0.026-0.036					
	Gravel		0.028-0.035					
	Cobble		0.030-0.050		0.030			
	Boulder		0.040-0.070					
Degree of Irregularity	Smooth	n1	0.000					
	Minor		0.001-0.005	0.002			0.002	
	Moderate		0.006-0.010					
	Severe		0.011-0.020					
Effects of Obstructions	Negligible	n2	0.000-0.004		0.002		0.002	
	Minor		0.005-0.015					
	Appreciable		0.020-0.030					
	Severe		0.040-0.060					
Vegetation	Small	n3	0.002-0.010					
	Medium		0.01-0.025					0.020
	Large		0.025-0.050	0.035			0.040	
	Very Large		0.050-0.100					
Variations in the Channel Cross Section	Gradual	n4	0.000					
	Alternating (occasionally)		0.001-0.005	0.002			0.002	
	Alternating (frequently)		0.010-0.015					
Sum (n0-n4)					0.032	0.025	0.076	
x (% of Area)					0.003	0.021	0.006	
Sum (left, right,center)						0.030		
Degree of Meandering	Minor	m	1	1		1		1
	Appreciable		1.15					
	Severe		1.3					
n = (n0 + n1 + n2 + n3 + n4)m				0.069	0.030			0.050

Sols Wash - 0.269 North Bank

Left Bank-Looking Downstream
Photo 49

Right Bank-Looking Upstream
Photo 48



Main Wash-Bed Material
Photo 46

Left Overbank Mobile Home Park
No photo taken

River Mile 0.269 (North Bank)

Determination of Manning's Roughness Coefficients by FCDMC Method

Project: **Sols Wash CLOMR**
Stream: Sols Wash
Job No.: 305020.02
Section Description: Channel has a sandy bottom and vegetated banks
LOB is a mobile home park.
ROB is an island with heavy vegetation.

Rough Sketch of
Typical Channel Cross Section

Channel Conditions		Manning's n Adjustment		Left Overbank	Main Channel (left bank -A1)	Main Channel (center -A2)	Main Channel (right bank -A3)	Right Overbank
Area [ft²]								
% [decimal]								
Channel Bed Material	Concrete	n0	0.012-0.018					
	Rock Cut		0.025					
	Firm Soil		0.025-0.032	0.030				
	Fine Sand		0.023-.026					
	Coarse Sand		0.026-0.036					
	Gravel		0.028-0.035					
	Cobble		0.030-0.050					
	Boulder		0.040-0.070					
Degree of Irregularity	Smooth	n1	0.000					
	Minor		0.001-0.005	0.002				
	Moderate		0.006-0.010					
	Severe		0.011-0.020					
Effects of Obstructions	Negligible	n2	0.000-0.004					
	Minor		0.005-0.015	0.005				
	Appreciable		0.020-0.030					
	Severe		0.040-0.060					
Vegetation	Small	n3	0.002-0.010	0.010				
	Medium		0.01-0.025					
	Large		0.025-0.050					
	Very Large		0.050-0.100					
Variations in the Channel Cross Section	Gradual	n4	0.000	0.000				
	Alternating (occasionally)		0.001-0.005					
	Alternating (frequently)		0.010-0.015					
Sum (n0-n4) x (% of Area) Sum (left, right,center)					0.000	0.000	0.000	
					0.000	0.000	0.000	
						0.000		
Degree of Meandering	Minor	m	1	1		1		
	Appreciable		1.15					
	Severe		1.3					
n = (n0 + n1 + n2 + n3 + n4)m				0.047	N/A			N/A

Hospital Wash - 0.388

Left Bank-Looking Downstream
Photo 36

Right Bank-Looking Downstream
Photo 34

Main Wash-Bed Material
Photo 33

Left Overbank-Looking Downstream
Photo 37

Right Overbank-Looking Downstream
Photo 35

Determination of Manning's Roughness Coefficients by FCDMC Method

Project: **Sols Wash CLOMR**
Stream: Hospital Wash - RM 0.388
Job No.: 305020.02
Section Description: Section taken just upstream of Palm Lane
Channel bottom is firm soil, banks are vegetated
LOB is consists of desert area.
ROB consists of desert area.

Rough Sketch of
Typical Channel Cross Section

Channel Conditions		Manning's n Adjustment		Left Overbank	Main Channel (left bank -A1)	Main Channel (center -A2)	Main Channel (right bank -A3)	Right Overbank
Area [ft^2]					40	88	32.5	
% [decimal]					0.25	0.55	0.20	
Channel Bed Material	Concrete	n0	0.012-0.018					
	Rock Cut		0.025					
	Firm Soil		0.025-0.032	0.030	0.028	0.026	0.028	0.030
	Fine Sand		0.023-.026					
	Coarse Sand		0.026-0.036					
	Gravel		0.028-0.035					
	Cobble		0.030-0.050					
	Boulder		0.040-0.070					
Degree of Irregularity	Smooth	n1	0.000					
	Minor		0.001-0.005	0.005	0.003	0.003	0.001	0.005
	Moderate		0.006-0.010					
	Severe		0.011-0.020					
Effects of Obstructions	Negligible	n2	0.000-0.004	0.000	0.002		0.001	0.000
	Minor		0.005-0.015			0.005		
	Appreciable		0.020-0.030					
	Severe		0.040-0.060					
Vegetation	Small	n3	0.002-0.010			0.002		
	Medium		0.01-0.025	0.025				0.020
	Large		0.025-0.050		0.030		0.033	
	Very Large		0.050-0.100					
Variations in the Channel Cross Section	Gradual	n4	0.000	0.000		0.000		0.000
	Alternating (occasionally)		0.001-0.005		0.002		0.002	
	Alternating (frequently)		0.010-0.015					
Sum (n0-n4)					0.065	0.036	0.065	
x (% of Area)					0.016	0.020	0.013	
Sum (left, right,center)						0.049		
Degree of Meandering	Minor	m	1	1		1		1
	Appreciable		1.15					
	Severe		1.3					
n = (n0 + n1 + n2 + n3 + n4)m				0.060		0.049		0.055

Hospital Wash - 0.270

Left Bank-Looking Downstream
Photo 41

Right Bank-Looking Downstream
Photo 39

Main Wash-Bed Material
Photo 38

Left Overbank-Looking Downstream
Photo 42

Right Overbank-Looking Downstream
Photo 40

Determination of Manning's Roughness Coefficients by FCDMC Method

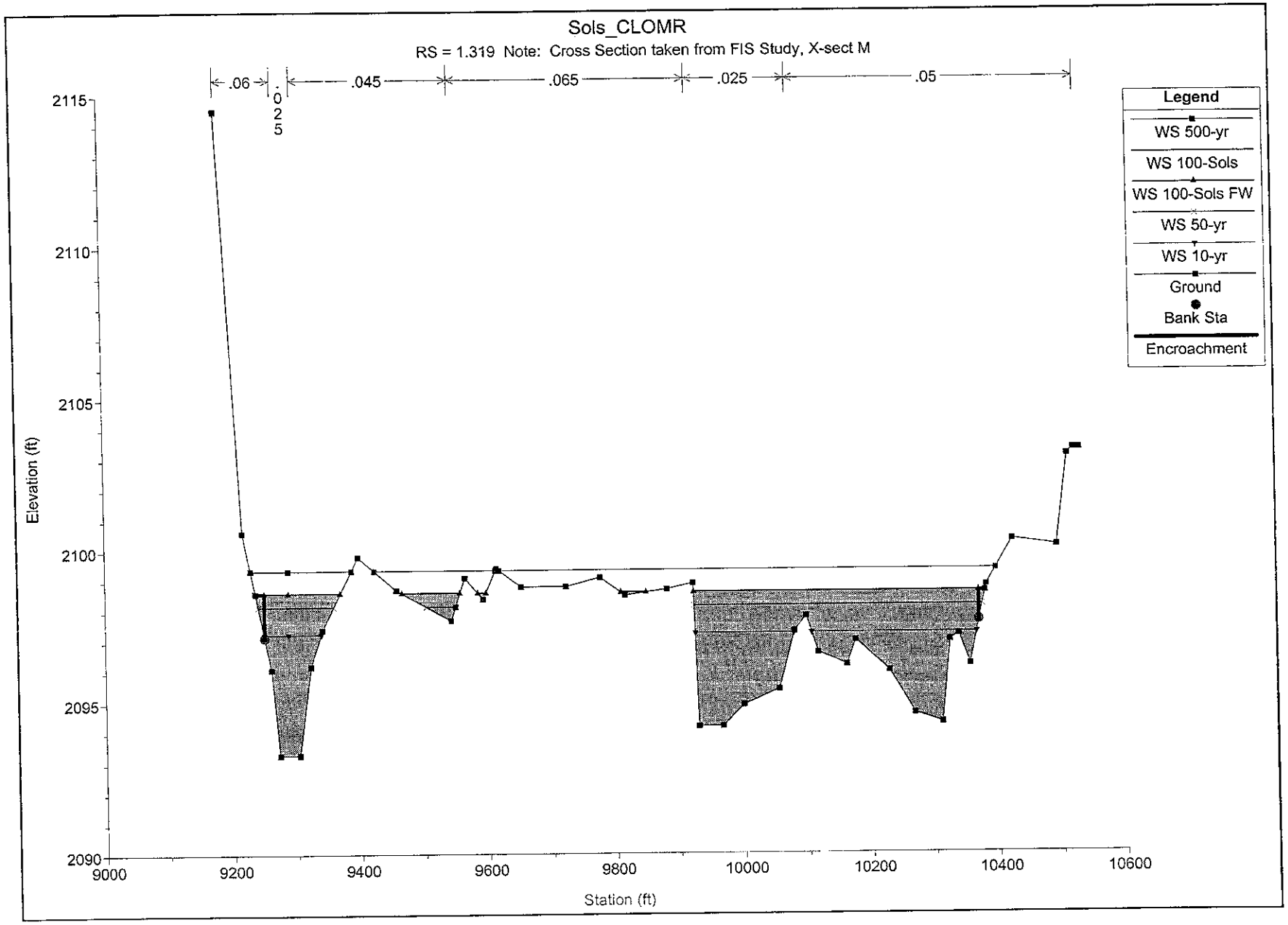
Project: **Sols Wash CLOMR**
Stream: Hospital Wash - RM 0.270
Job No.: 305020.02
Section Description: Section taken just downstream of Rose Lane
Channel is firm soil, banks are vegetated
LOB is consists of backyards and open area.
ROB consists of the mobile home park.

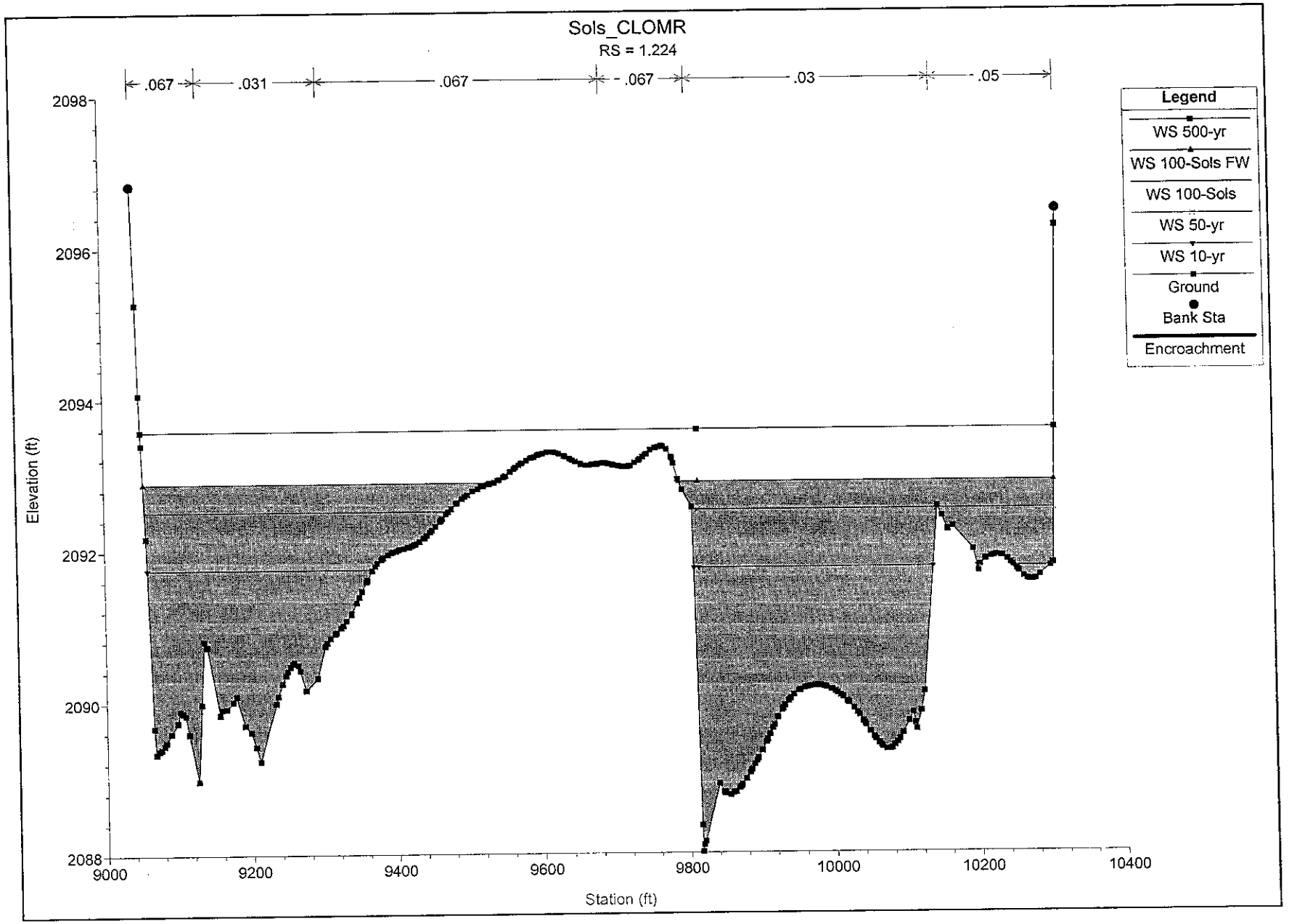
Rough Sketch of
Typical Channel Cross Section

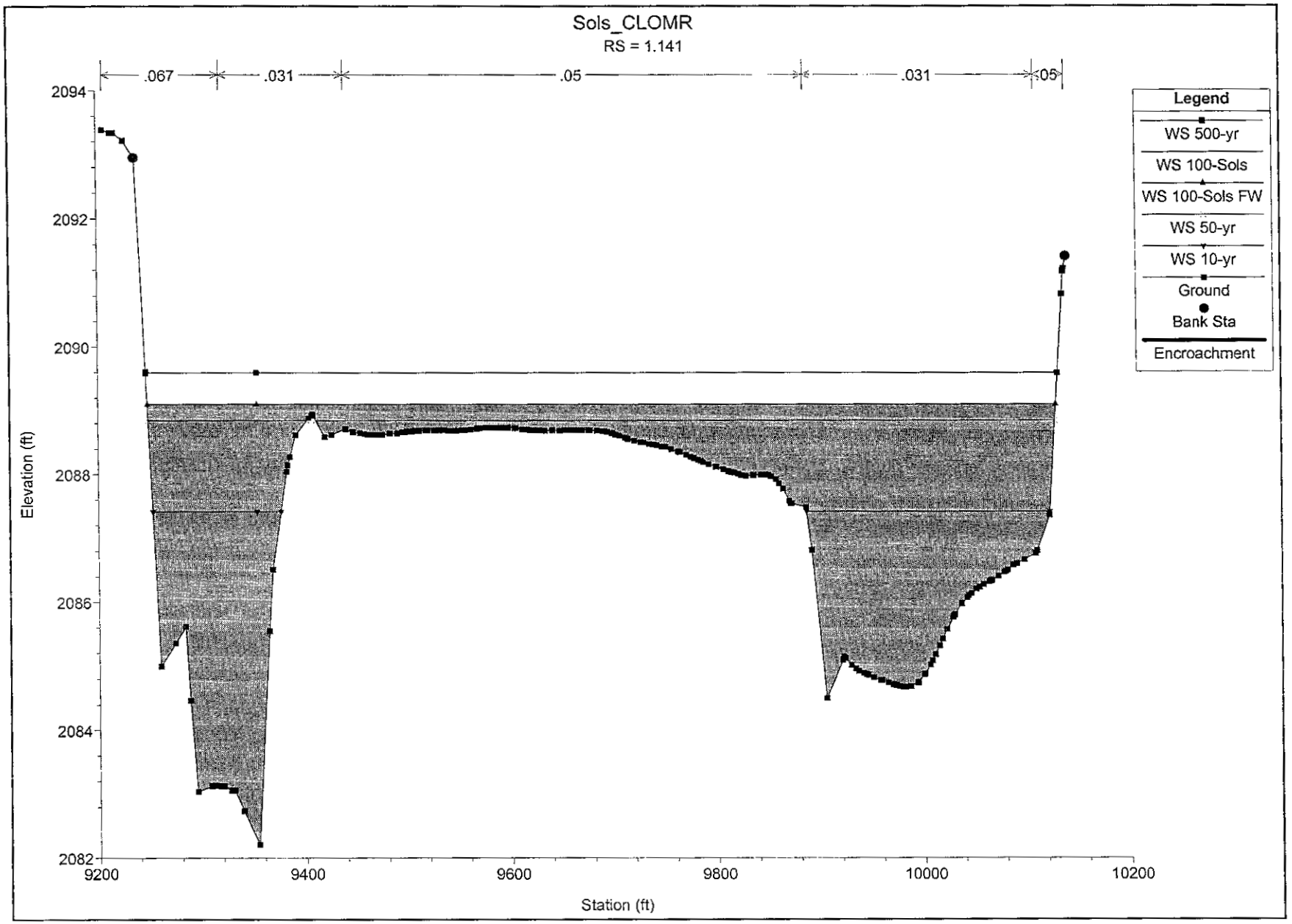
Channel Conditions		Manning's n Adjustment		Left Overbank	Main Channel (left bank -A1)	Main Channel (center -A2)	Main Channel (right bank -A3)	Right Overbank
Area [ft^2]					12.5	60	16	
% [decimal]					0.14	0.68	0.18	
Channel Bed Material	Concrete	n0	0.012-0.018					
	Rock Cut		0.025					
	Firm Soil		0.025-0.032	0.030	0.028	0.026	0.028	0.030
	Fine Sand		0.023-.026					
	Coarse Sand		0.026-0.036					
	Gravel		0.028-0.035					
	Cobble		0.030-0.050					
	Boulder		0.040-0.070					
Degree of Irregularity	Smooth	n1	0.000			0.000		
	Minor		0.001-0.005	0.005	0.002		0.002	0.005
	Moderate		0.006-0.010					
	Severe		0.011-0.020					
Effects of Obstructions	Negligible	n2	0.000-0.004		0.000	0.000	0.000	
	Minor		0.005-0.015	0.010				0.005
	Appreciable		0.020-0.030					
	Severe		0.040-0.060					
Vegetation	Small	n3	0.002-0.010			0.000		
	Medium		0.01-0.025	0.010	0.025		0.020	0.010
	Large		0.025-0.050					
	Very Large		0.050-0.100					
Variations in the Channel Cross Section	Gradual	n4	0.000		0.000	0.000	0.000	0.000
	Alternating (occasionally)		0.001-0.005	0.003				
	Alternating (frequently)		0.010-0.015					
Sum (n0-n4)					0.055	0.026	0.050	
x (% of Area)					0.008	0.018	0.009	
Sum (left, right,center)						0.034		
Degree of Meandering	Minor	m	1	1		1		1
	Appreciable		1.15					
	Severe		1.3					
n = (n0 + n1 + n2 + n3 + n4)m				0.058	0.034			0.050

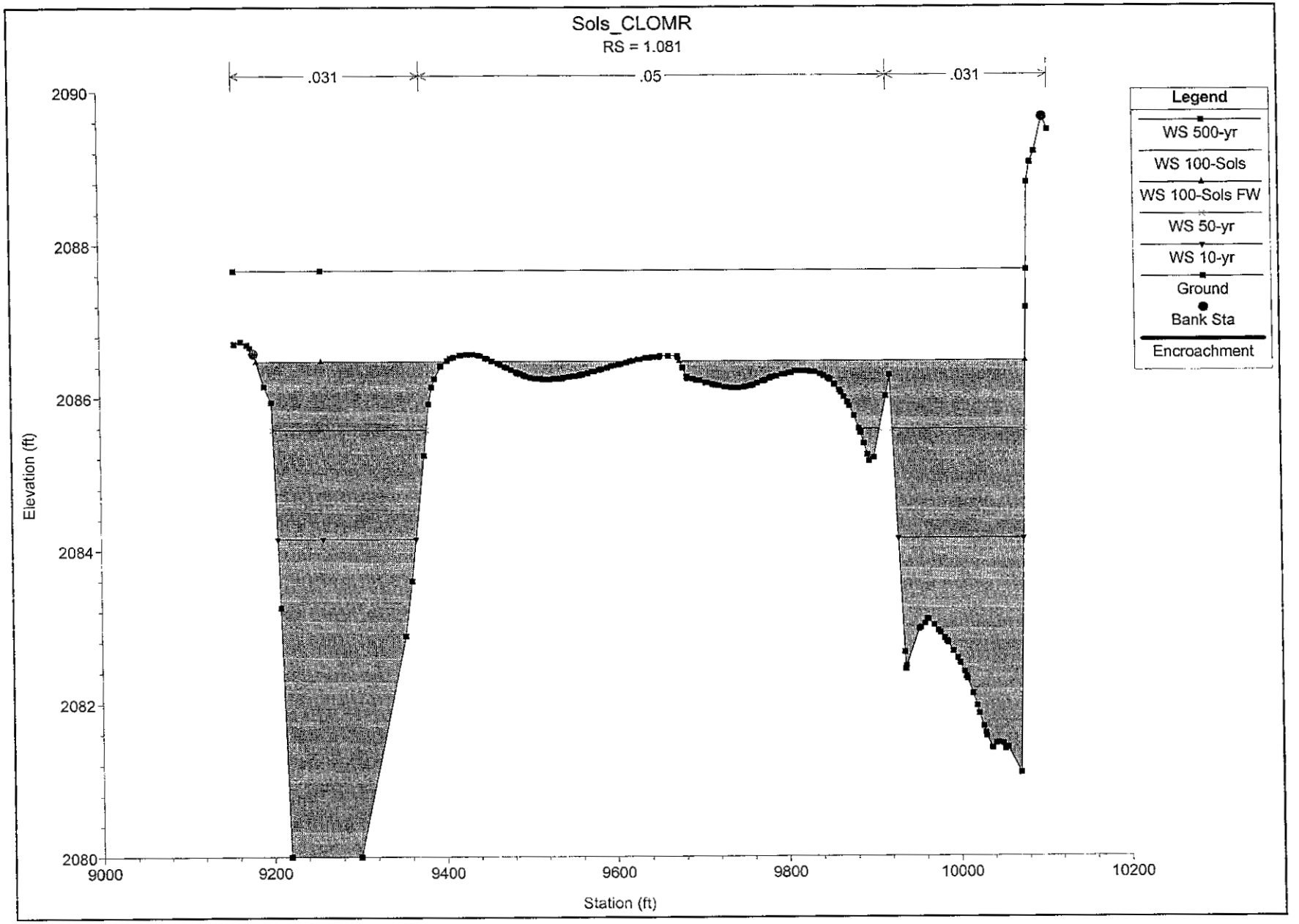
Appendix E.2

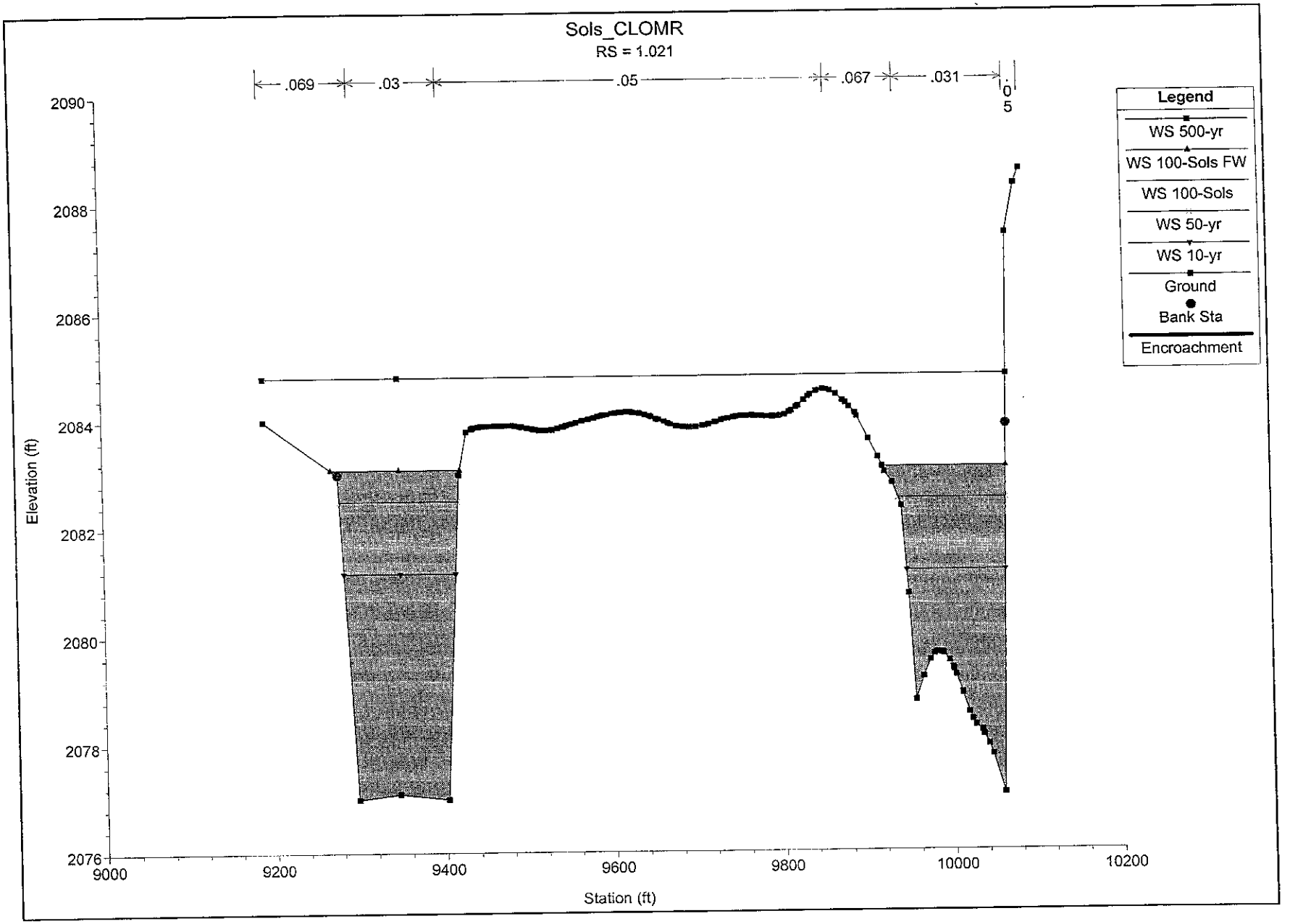
CROSS SECTIONS PLOTS

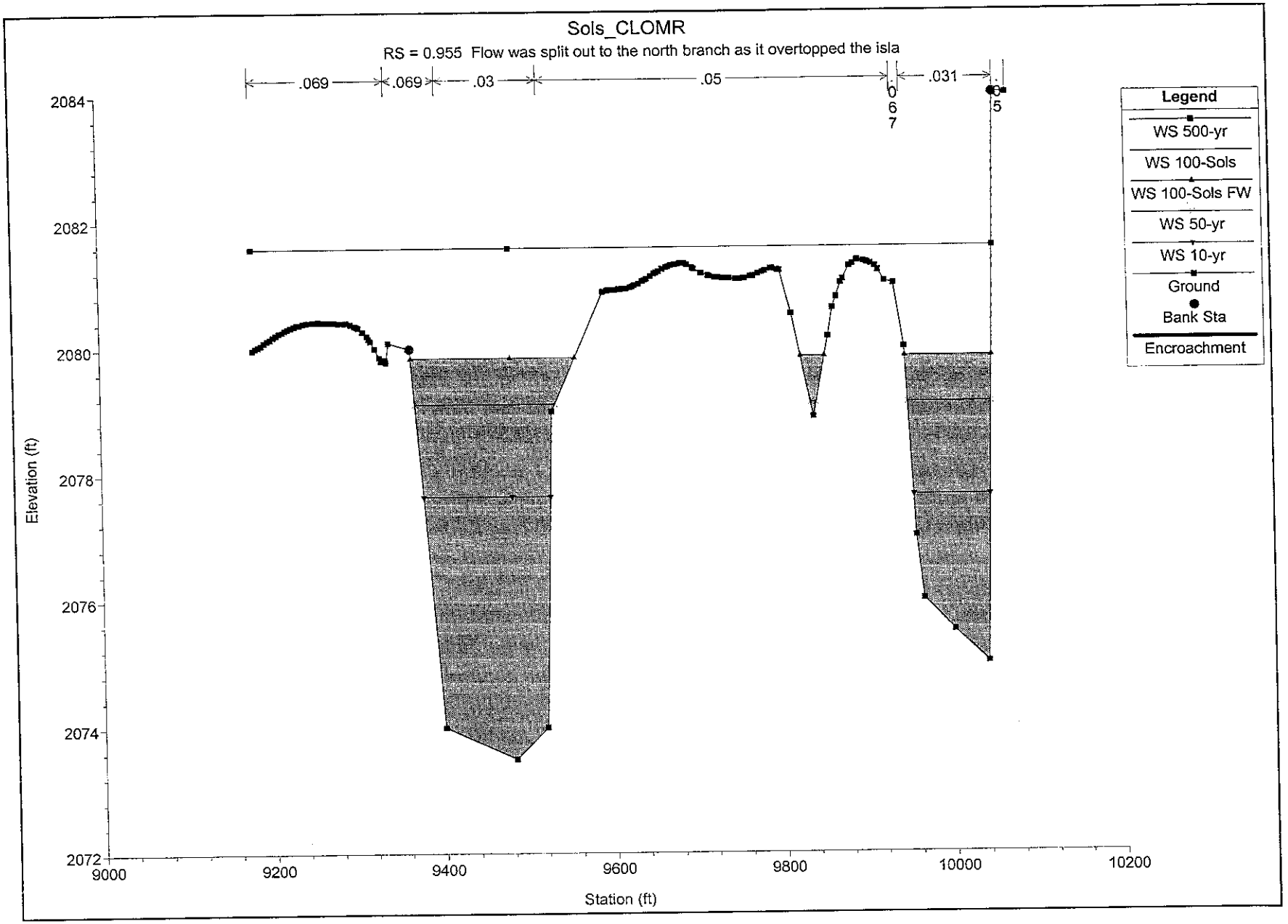

Sols_CLOMR
RS = 1.319 Note: Cross Section taken from FIS Study, X-sect M
.06
.025
.045
.065
.025
.05
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2115
2110
2105
2100
2095
2090
9000
9200
9400
9600
9800
10000
10200
10400
10600
Station (ft)

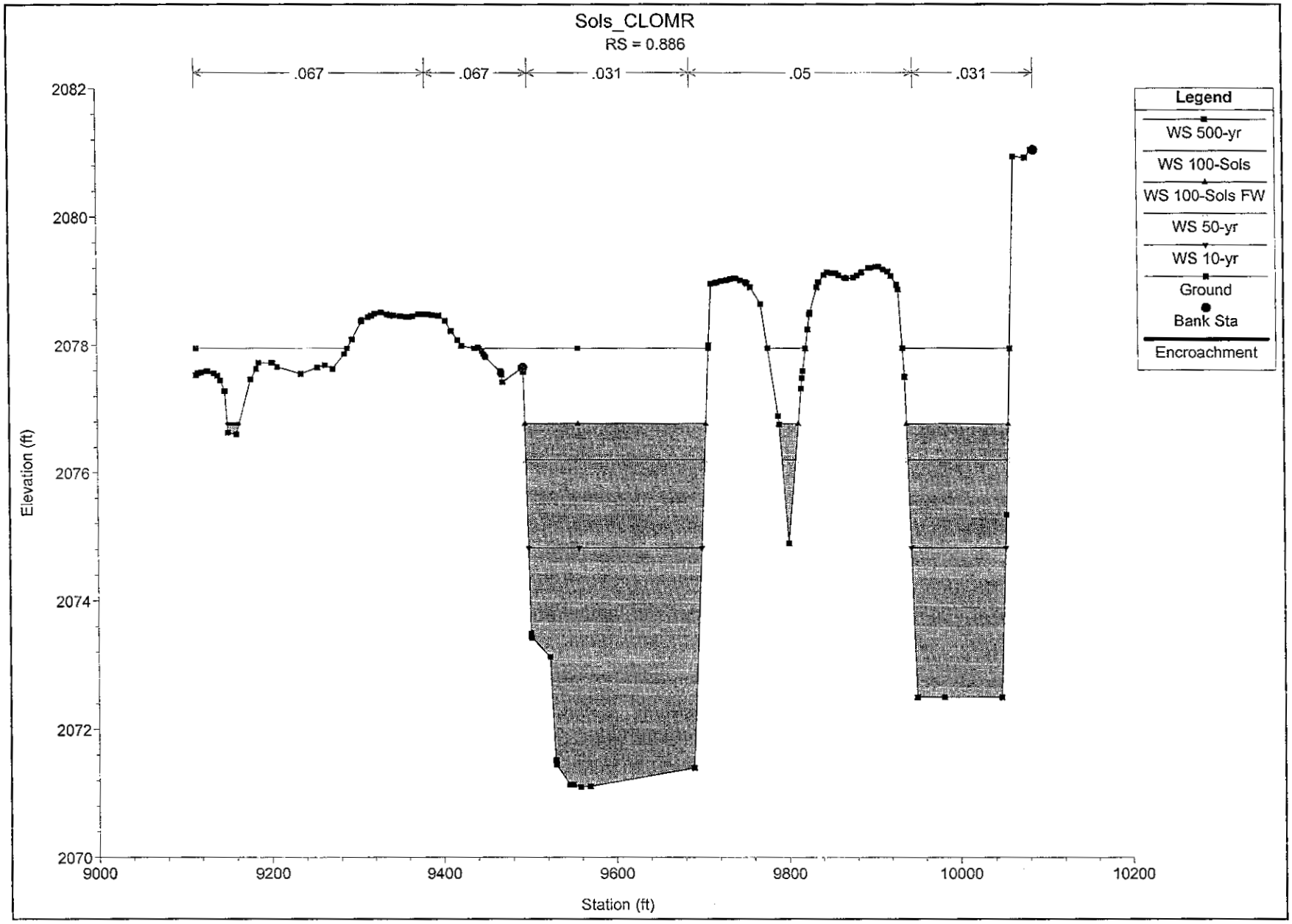

Sols_CLOMR
RS = 1.224
.067
.031
.067
.067
.03
.05
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2098
2096
2094
2092
2090
2088
9000
9200
9400
9600
9800
10000
10200
10400
Station (ft)

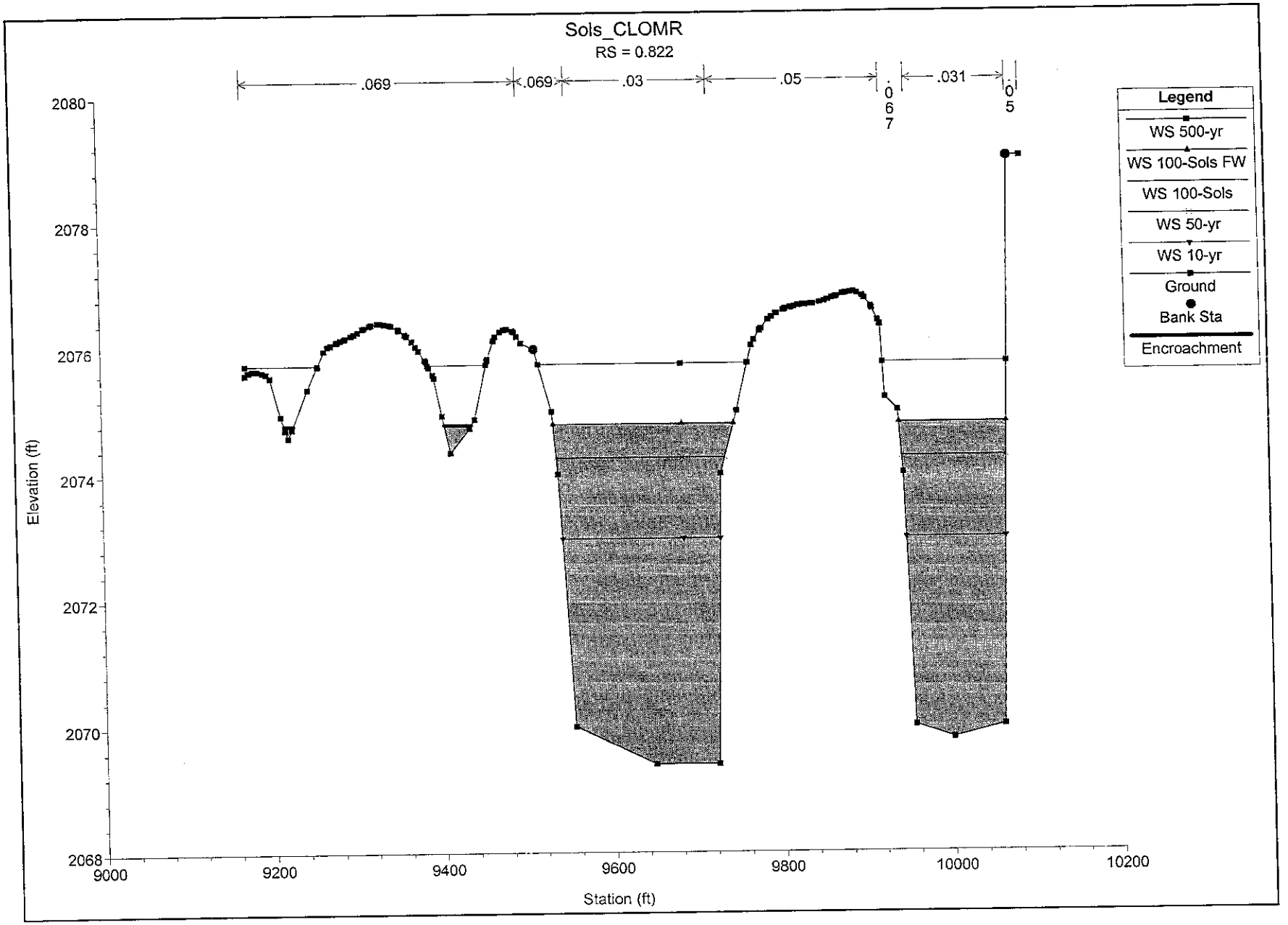

Sols_CLOMR
RS = 1.141
.067
.031
.05
.031
.05
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2094
2092
2090
2088
2086
2084
2082
9200
9400
9600
9800
10000
10200
Station (ft)

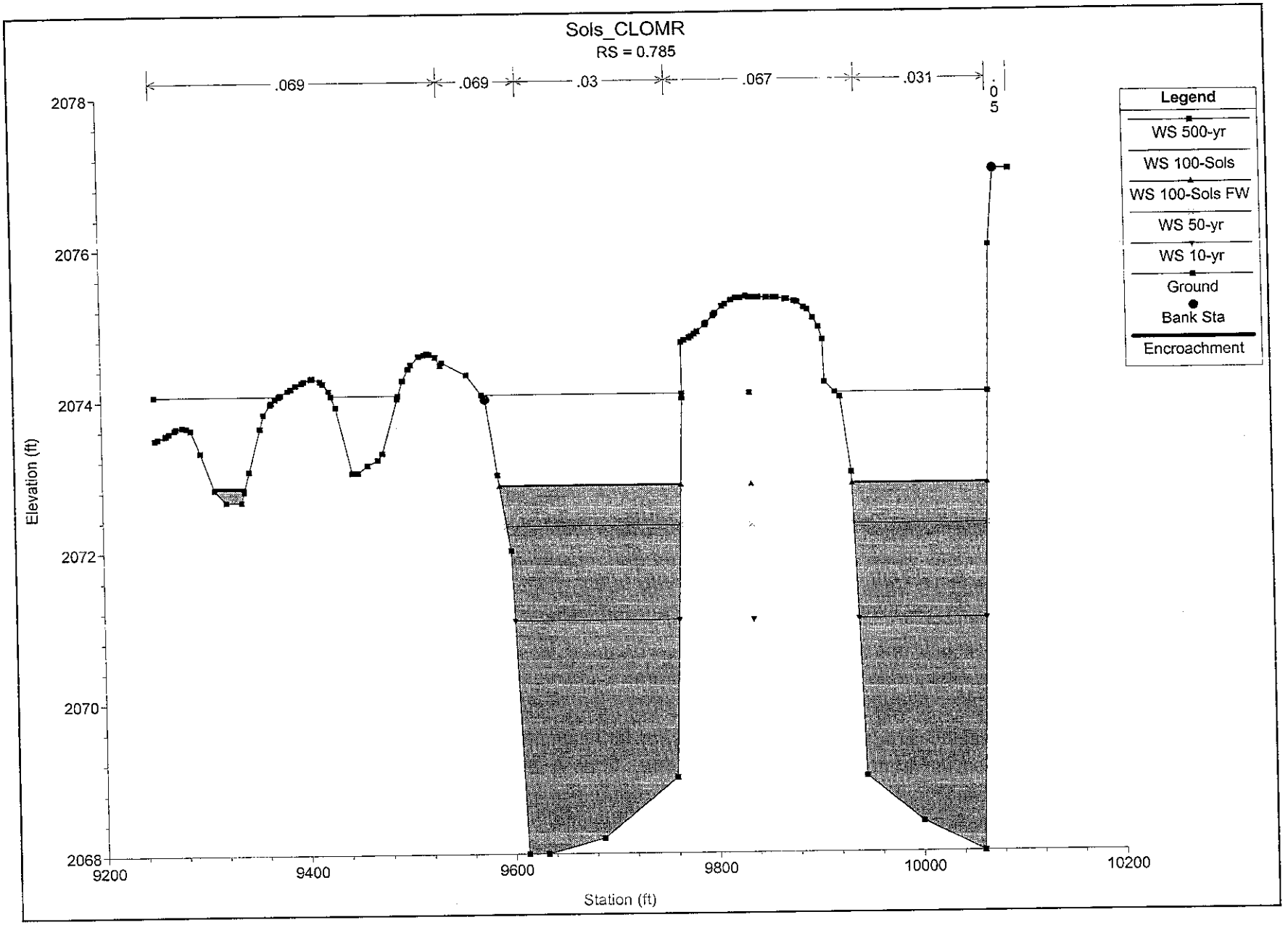

Sols_CLOMR
RS = 1.081
.031
.05
.031
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2090
2088
2086
2084
2082
2080
9000
9200
9400
9600
9800
10000
10200
Station (ft)

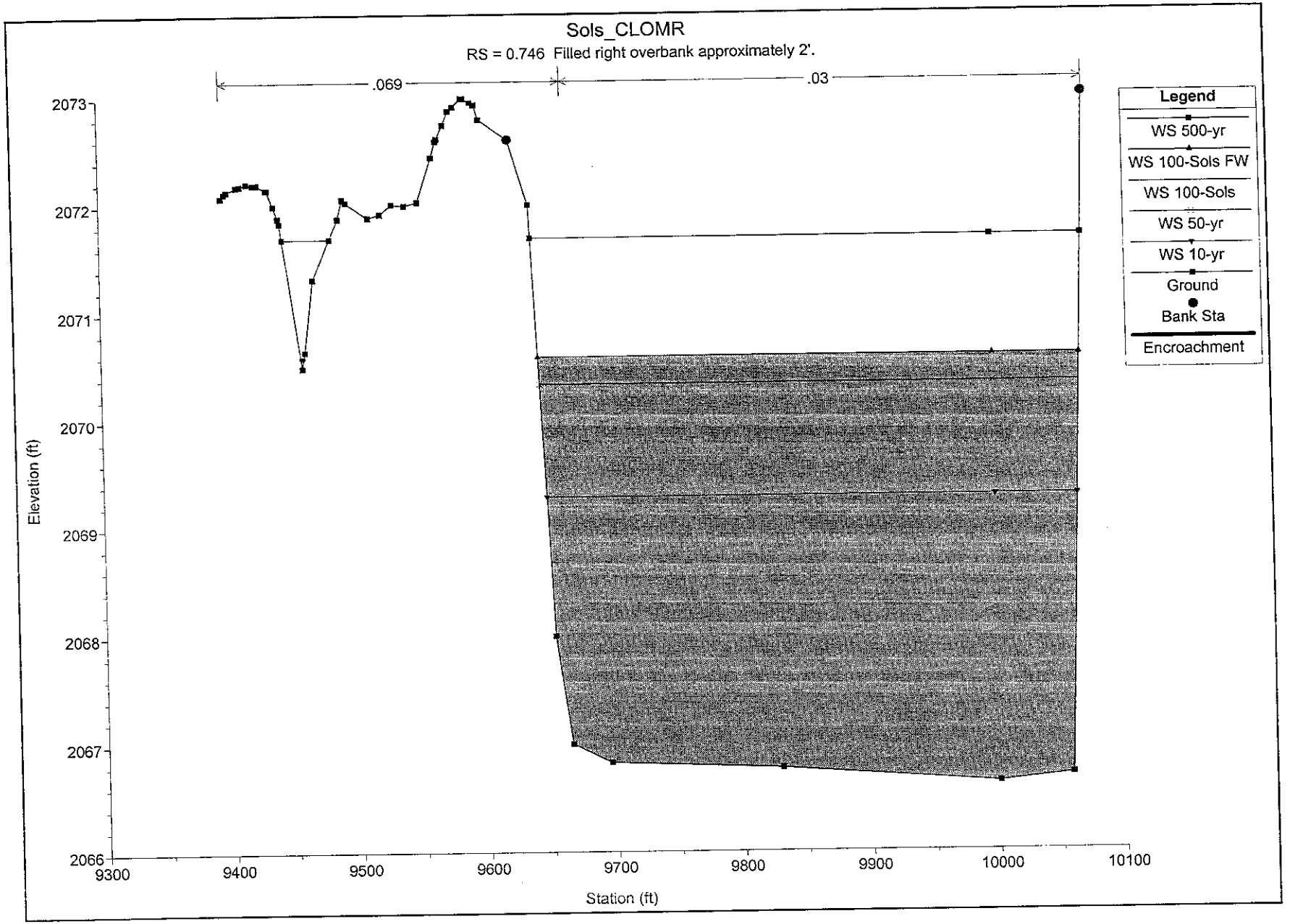

Sols_CLOMR
RS = 1.021
.069
.03
.05
.067
.031
.05
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2090
2088
2086
2084
2082
2080
2078
2076
9000
9200
9400
9600
9800
10000
10200
Station (ft)

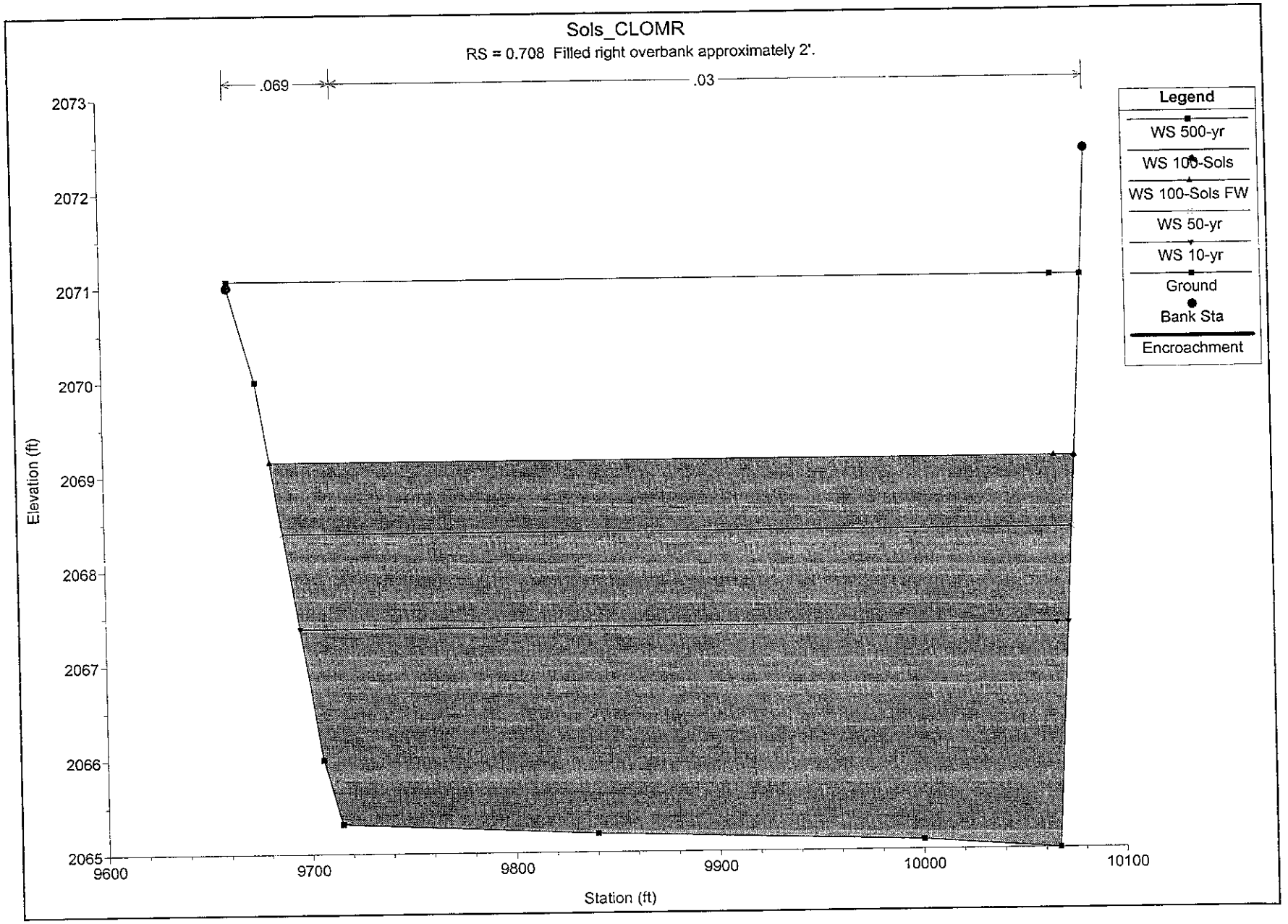

Sols_CLOMR
RS = 0.955 Flow was split out to the north branch as it overtopped the isla
.069
.069
.03
.05
.031
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2084
2082
2080
2078
2076
2074
2072
9000
9200
9400
9600
9800
10000
10200
Station (ft)

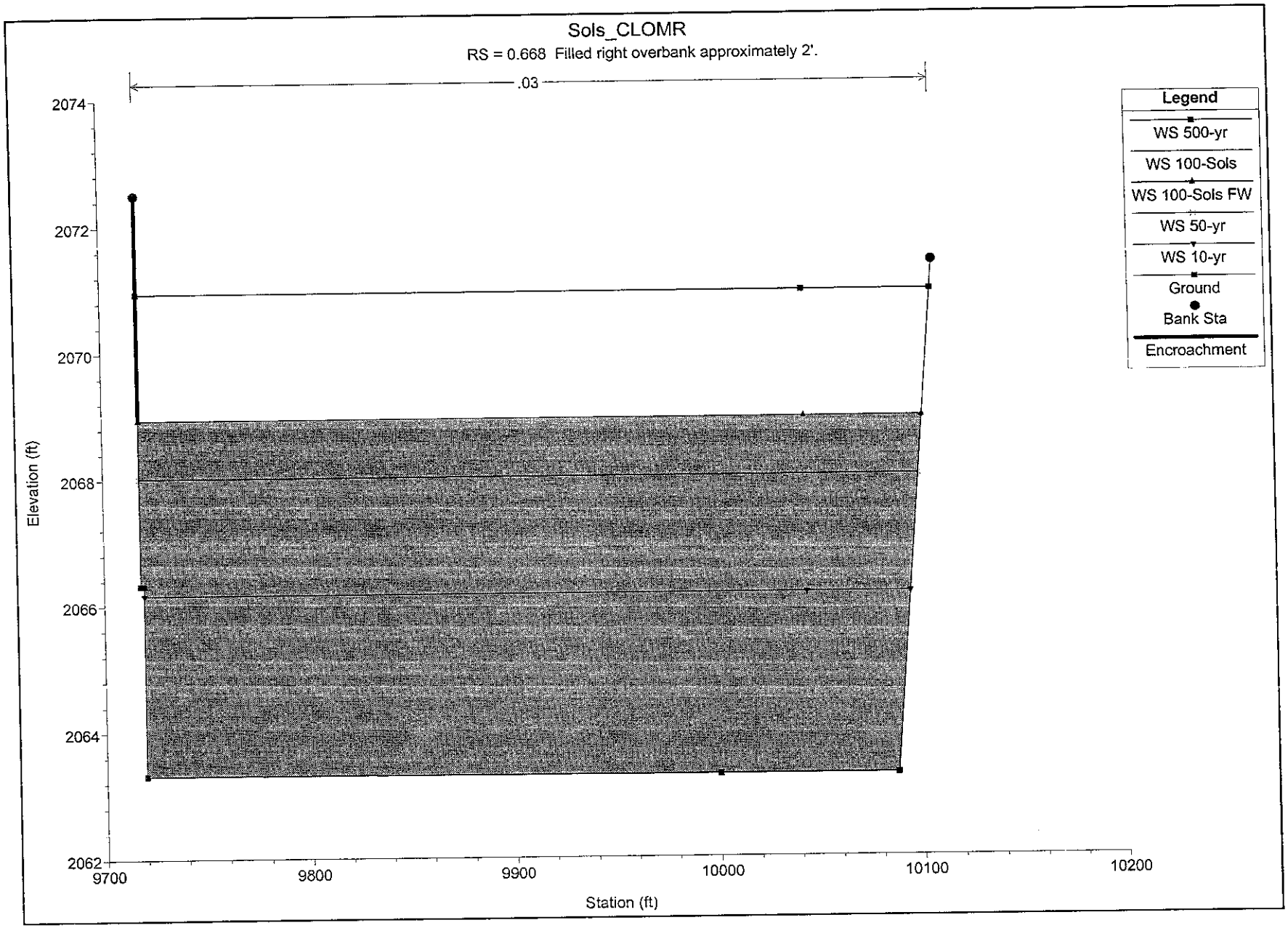

Sols_CLOMR
RS = 0.886
.067
.067
.031
.05
.031
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2082
2080
2078
2076
2074
2072
2070
9000
9200
9400
9600
9800
10000
10200
Station (ft)

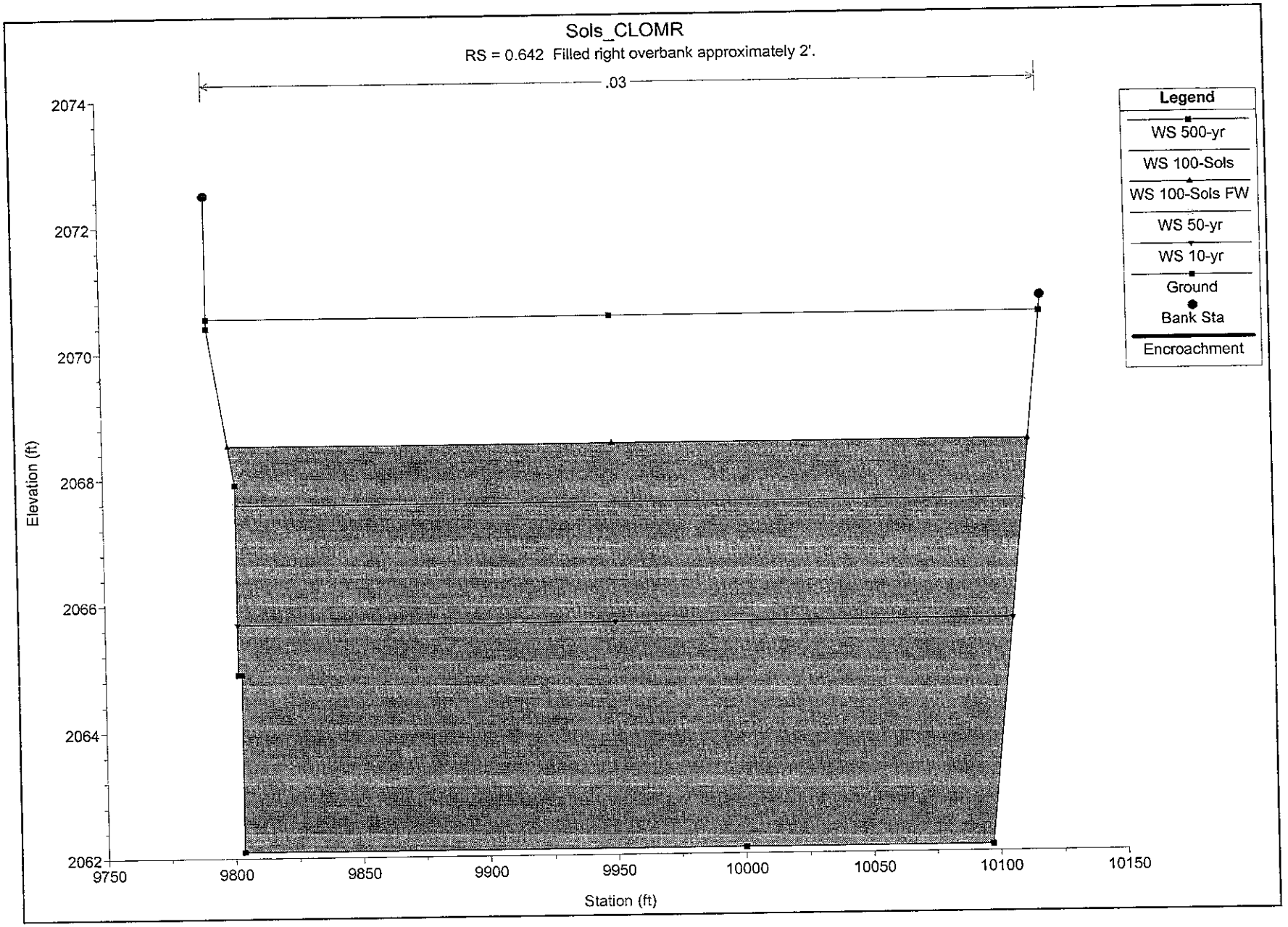

Sols_CLOMR
RS = 0.822
.069
.069
.03
.05
.067
.031
.05
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2080
2078
2076
2074
2072
2070
2068
9000
9200
9400
9600
9800
10000
10200
Station (ft)

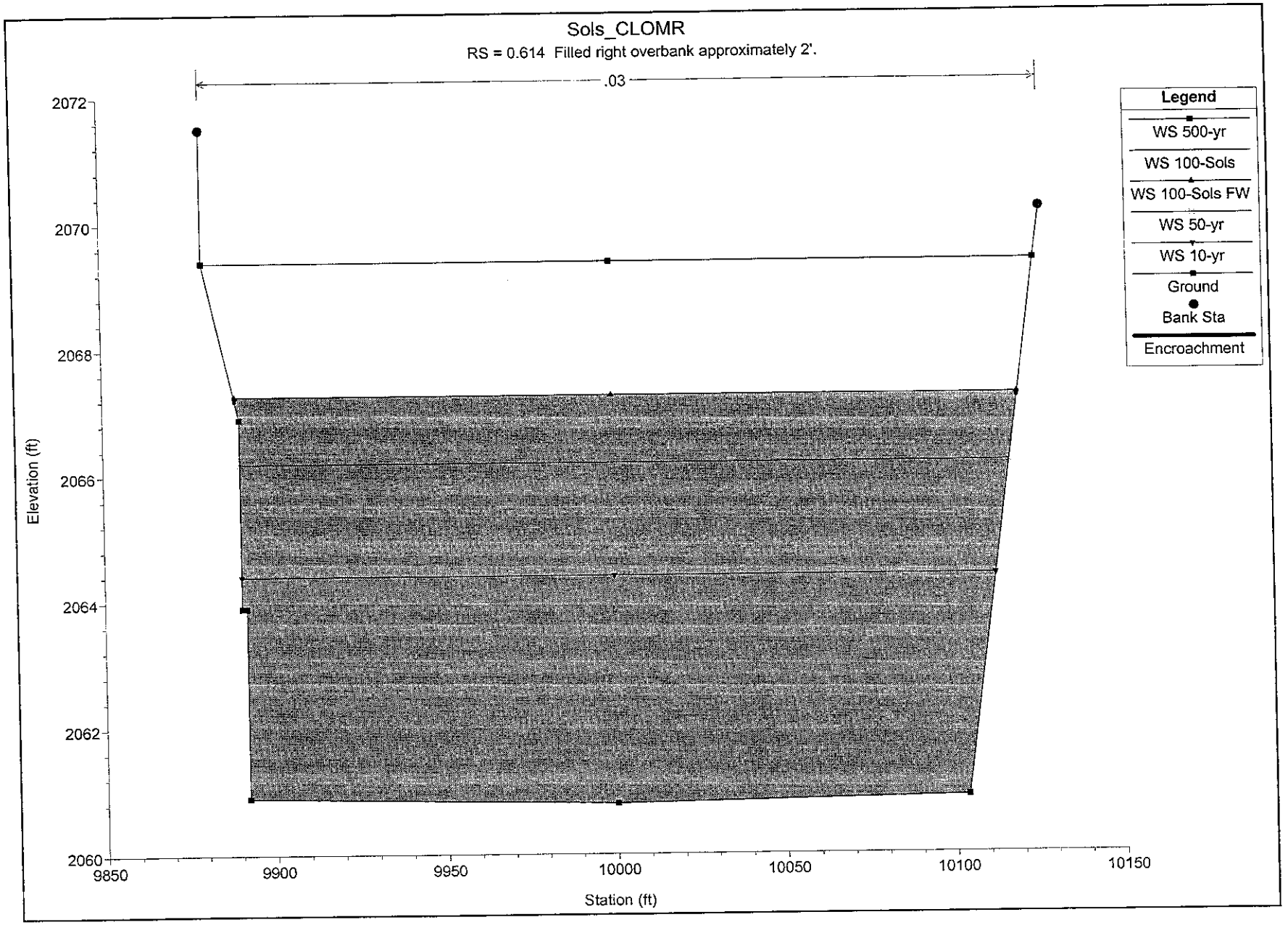

Sols_CLOMR
RS = 0.785
.069
.069
.03
.067
.031
.05
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2078
2076
2074
2072
2070
2068
9200
9400
9600
9800
10000
10200
Station (ft)

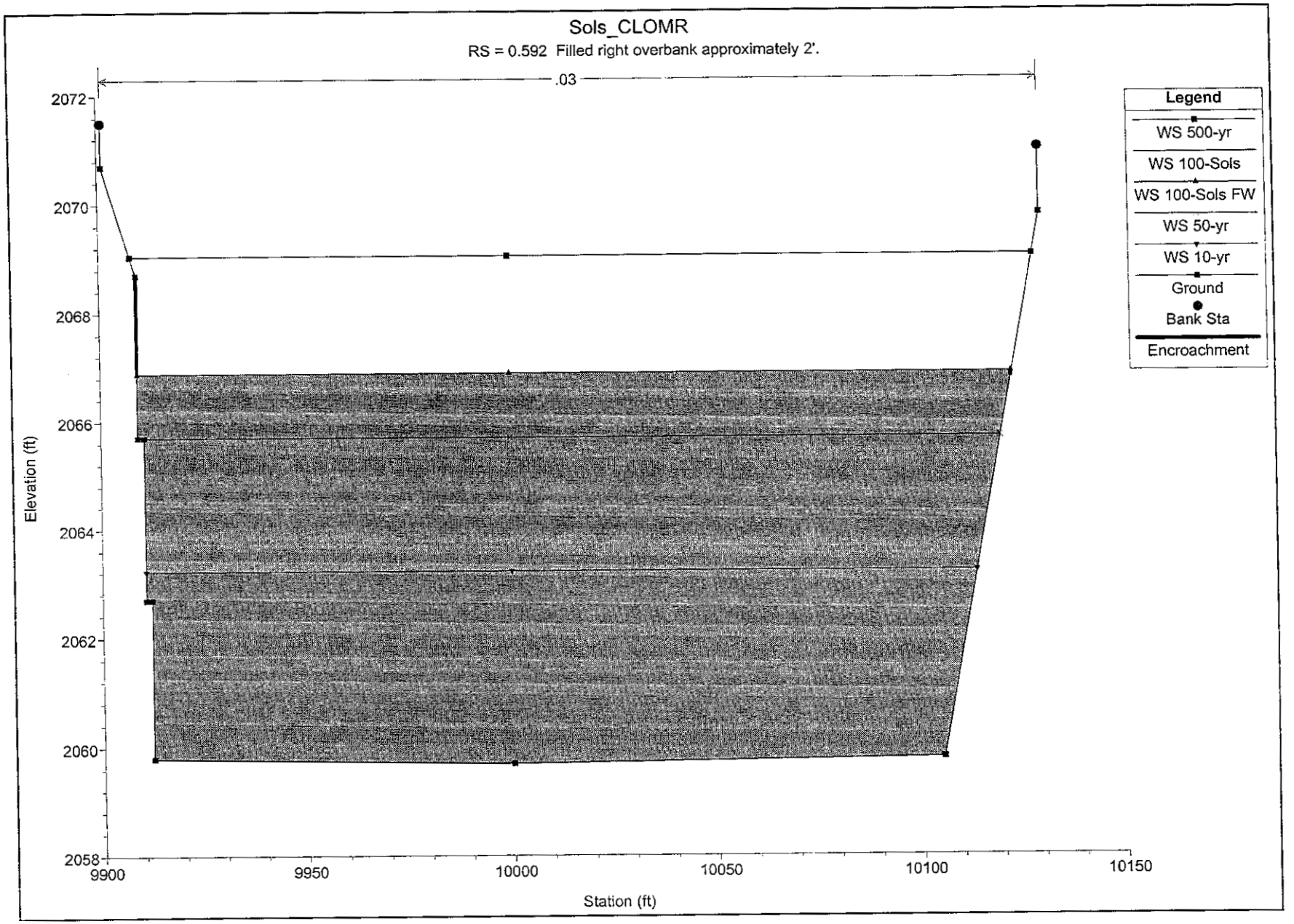

Sols_CLOMR
RS = 0.746 Filled right overbank approximately 2'.
.069
.03
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2073
2072
2071
2070
2069
2068
2067
2066
9300
9400
9500
9600
9700
9800
9900
10000
10100
Station (ft)

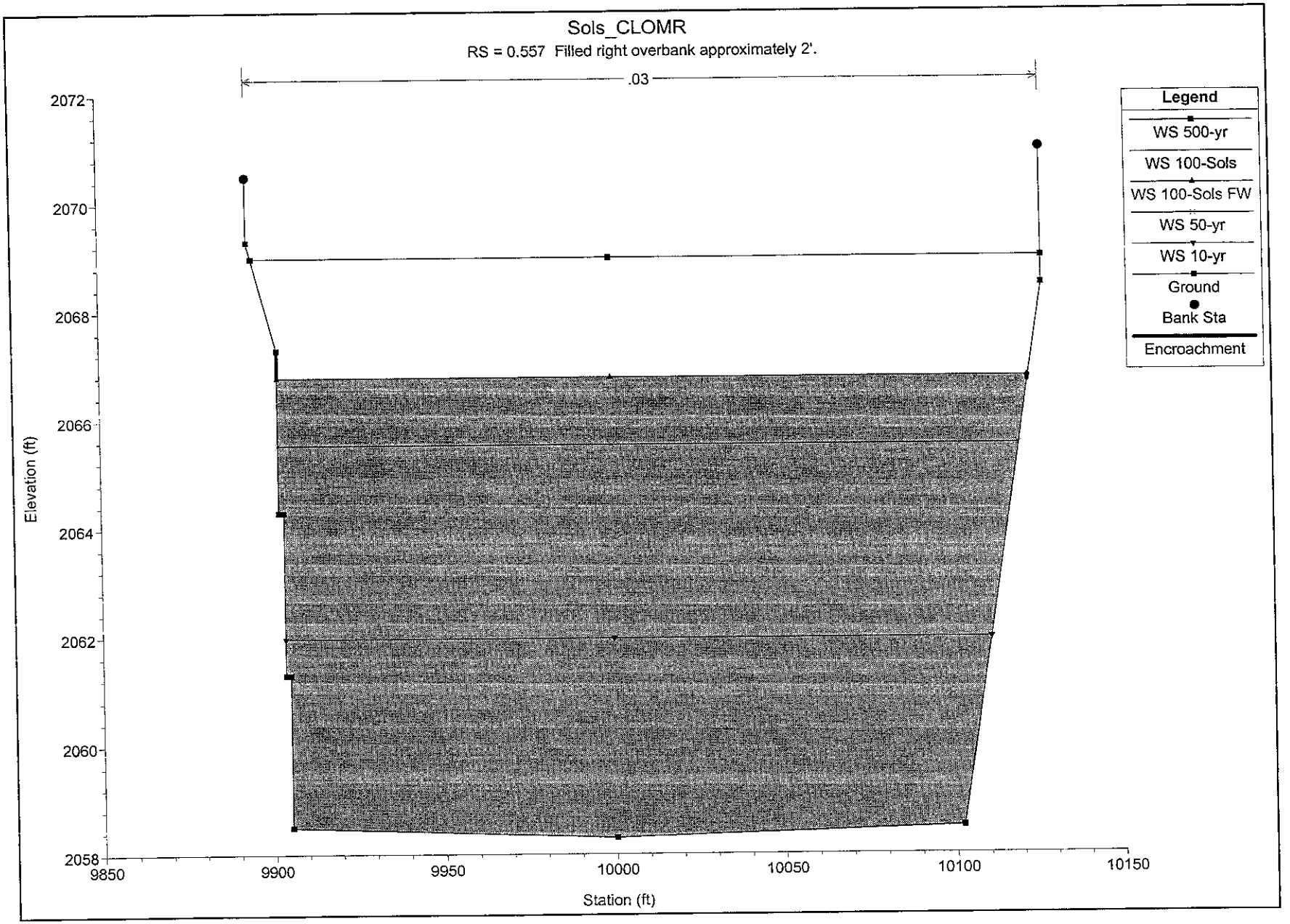

Sols_CLOMR
RS = 0.708 Filled right overbank approximately 2'.
.069
.03
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2073
2072
2071
2070
2069
2068
2067
2066
2065
9600
9700
9800
9900
10000
10100
Station (ft)

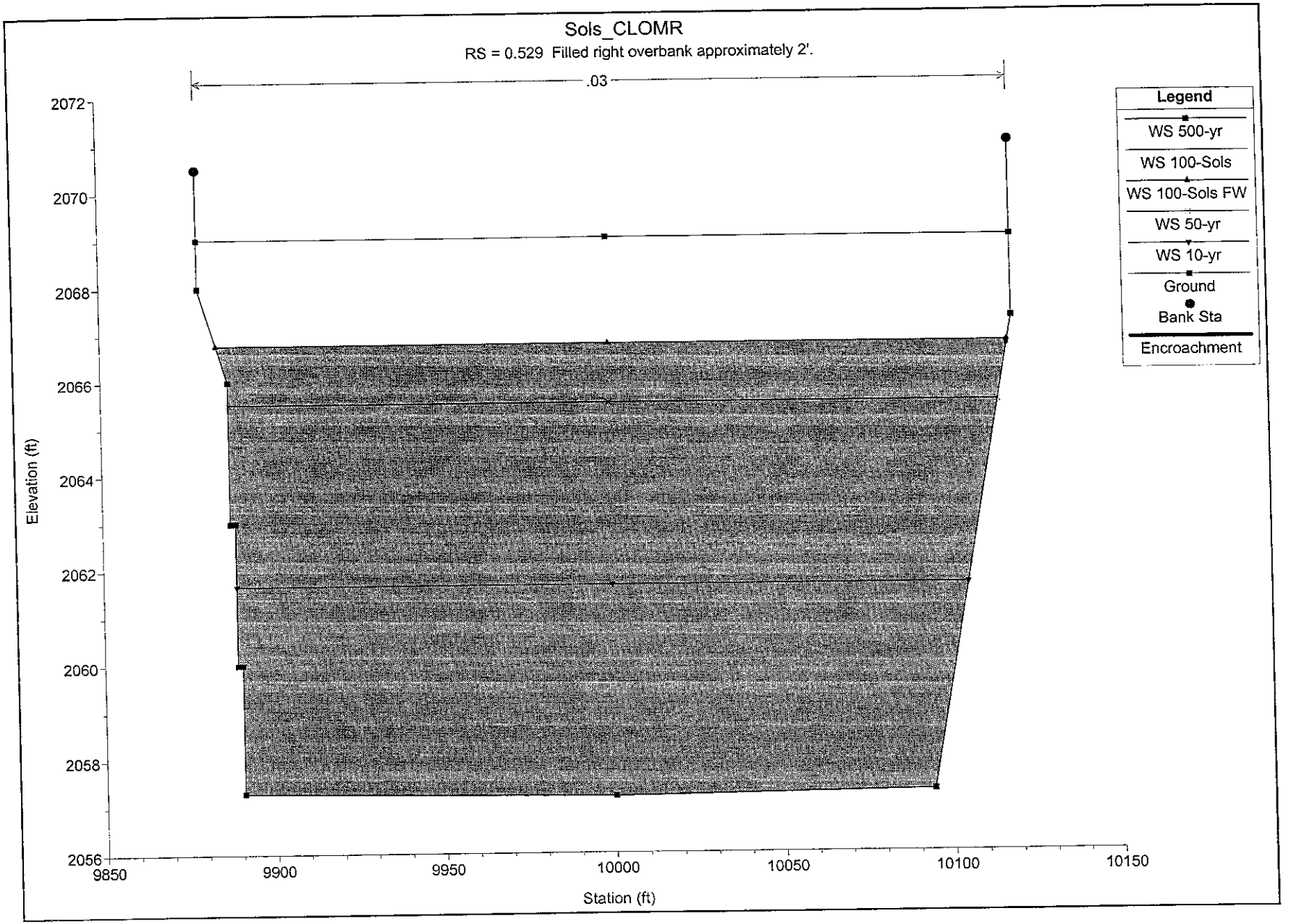

Sols_CLOMR
RS = 0.668 Filled right overbank approximately 2'.
.03
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2074
2072
2070
2068
2066
2064
2062
9700
9800
9900
10000
10100
10200
Station (ft)

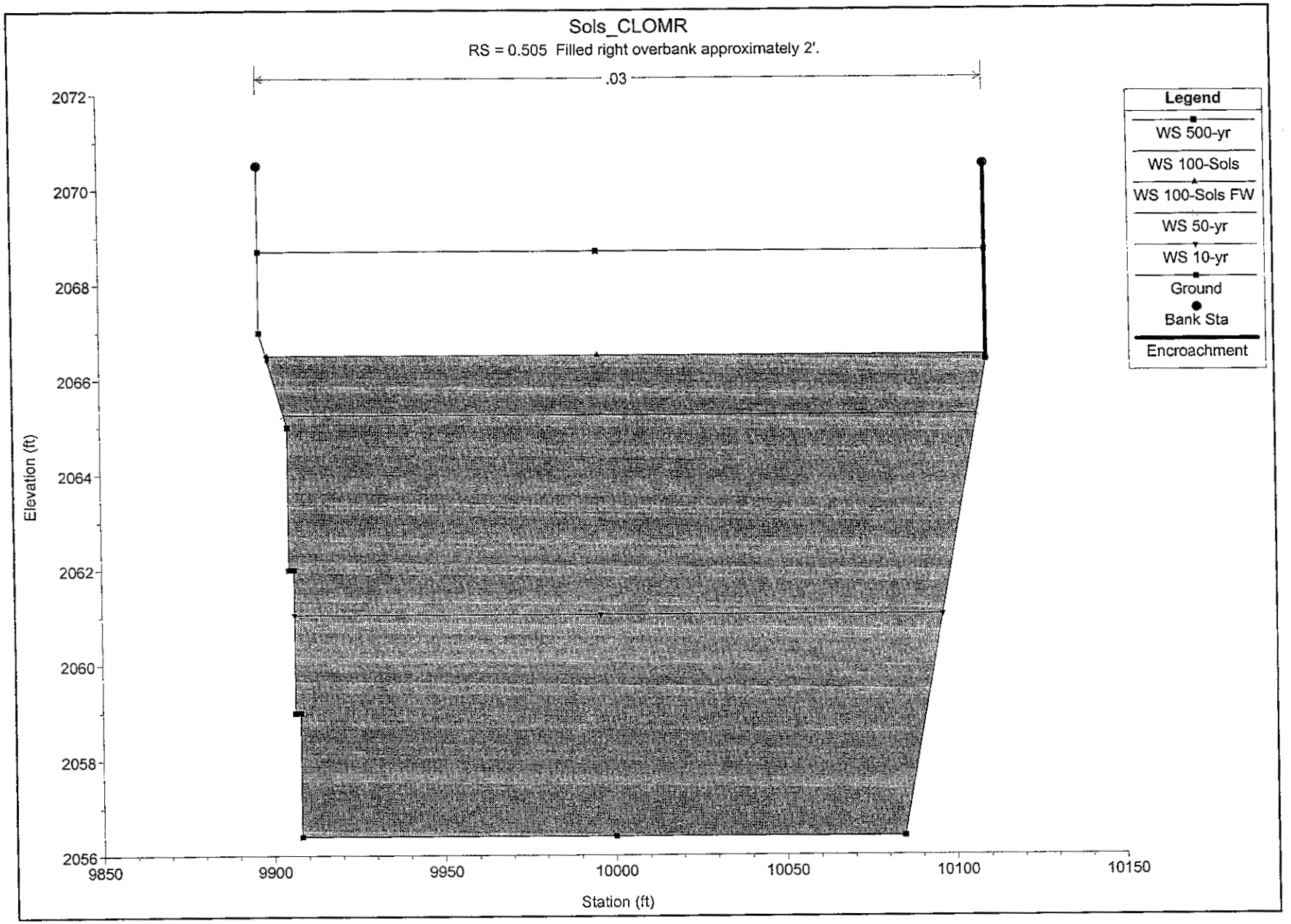

Sols_CLOMR
RS = 0.642 Filled right overbank approximately 2'.
.03
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2074
2072
2070
2068
2066
2064
2062
9750
9800
9850
9900
9950
10000
10050
10100
10150
Station (ft)

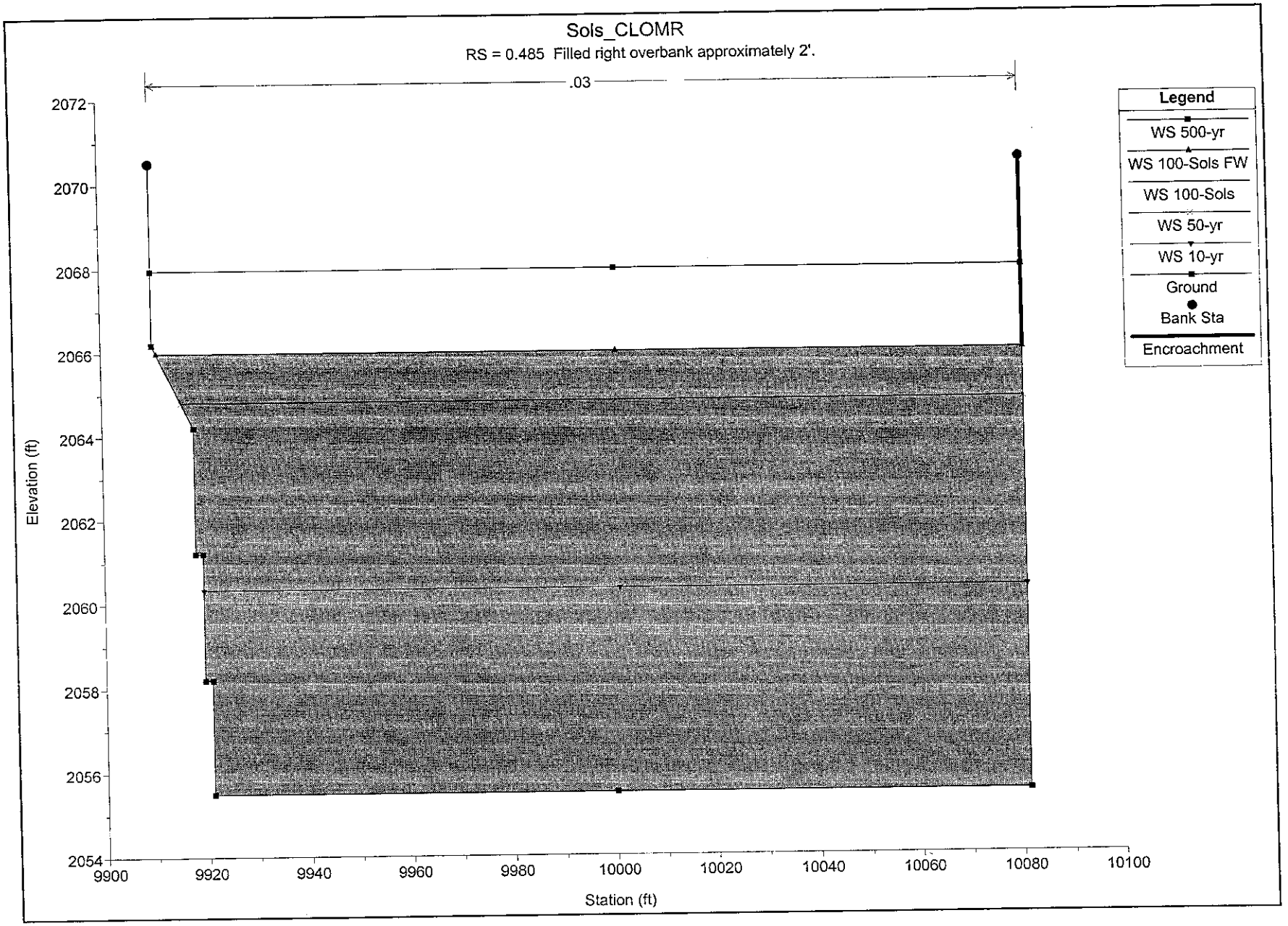

Sols_CLOMR
RS = 0.614 Filled right overbank approximately 2'.
.03
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2072
2070
2068
2066
2064
2062
2060
9850
9900
9950
10000
10050
10100
10150
Station (ft)

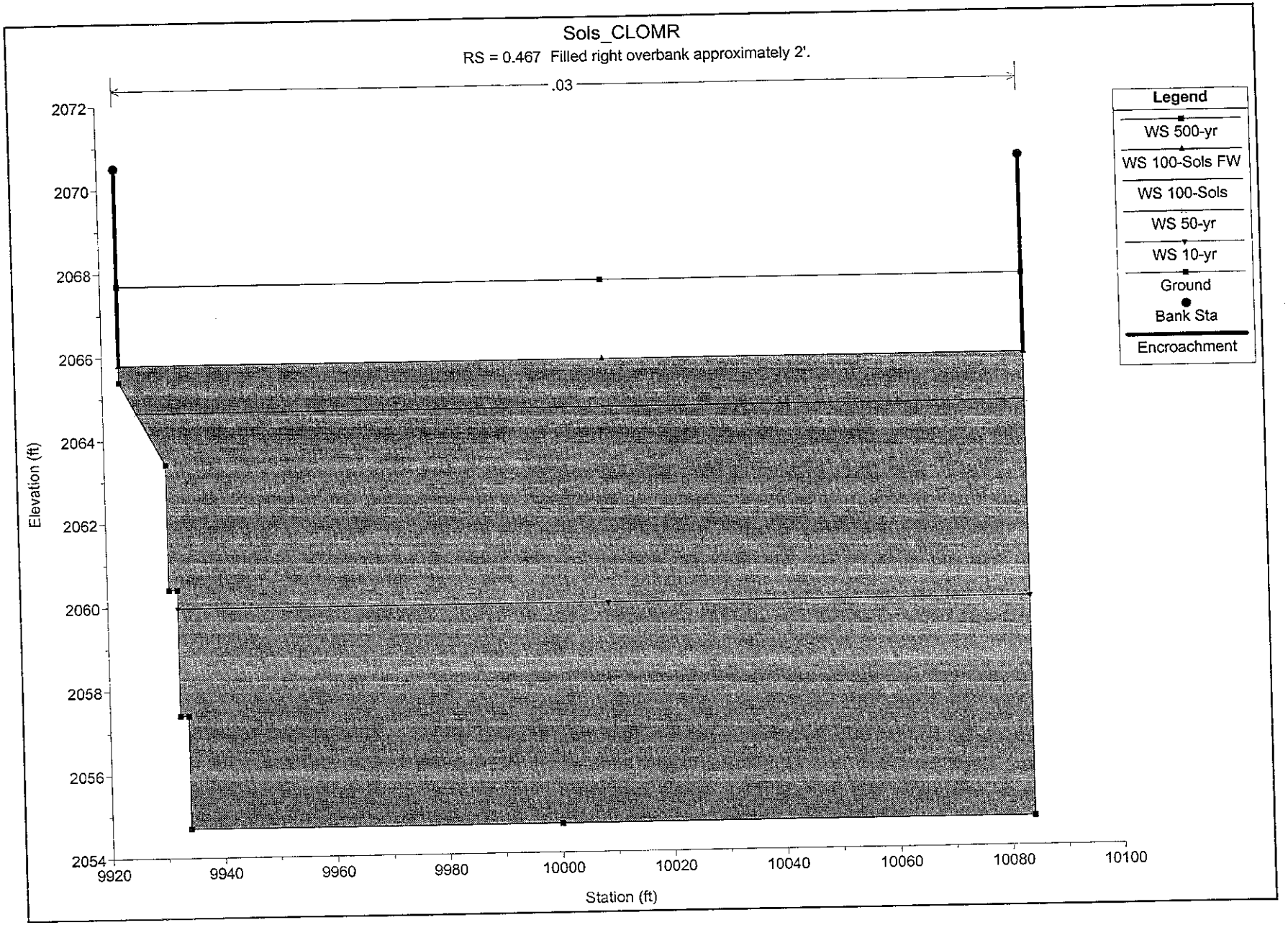

Sols_CLOMR
RS = 0.592 Filled right overbank approximately 2'.
.03
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2072
2070
2068
2066
2064
2062
2060
2058
9900
9950
10000
10050
10100
10150
Station (ft)

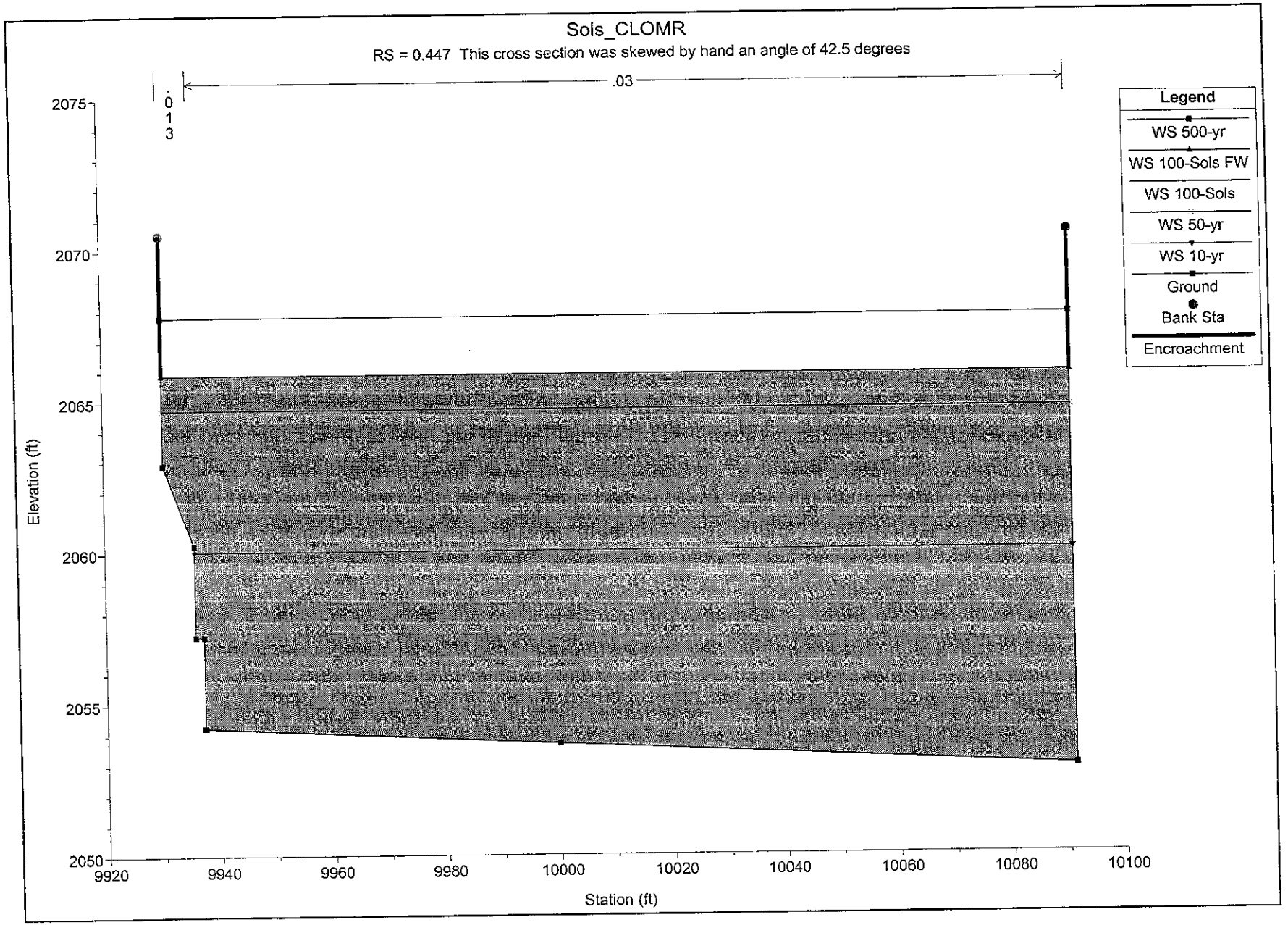

Sols_CLOMR
RS = 0.557 Filled right overbank approximately 2'.
.03
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2072
2070
2068
2066
2064
2062
2060
2058
9850
9900
9950
10000
10050
10100
10150
Station (ft)

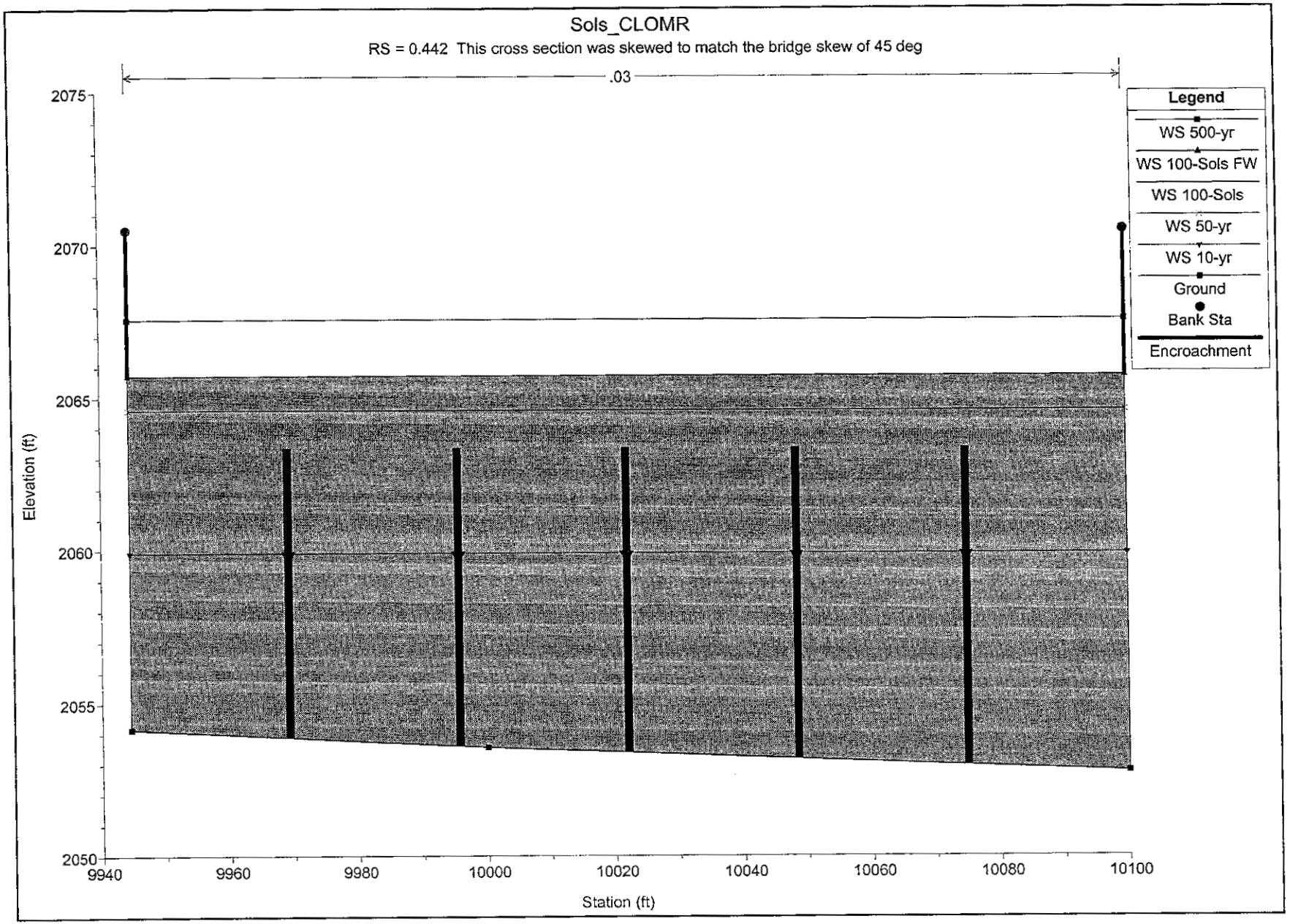

Sols_CLOMR
RS = 0.529 Filled right overbank approximately 2'.
.03
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2072
2070
2068
2066
2064
2062
2060
2058
2056
9850
9900
9950
10000
10050
10100
10150
Station (ft)

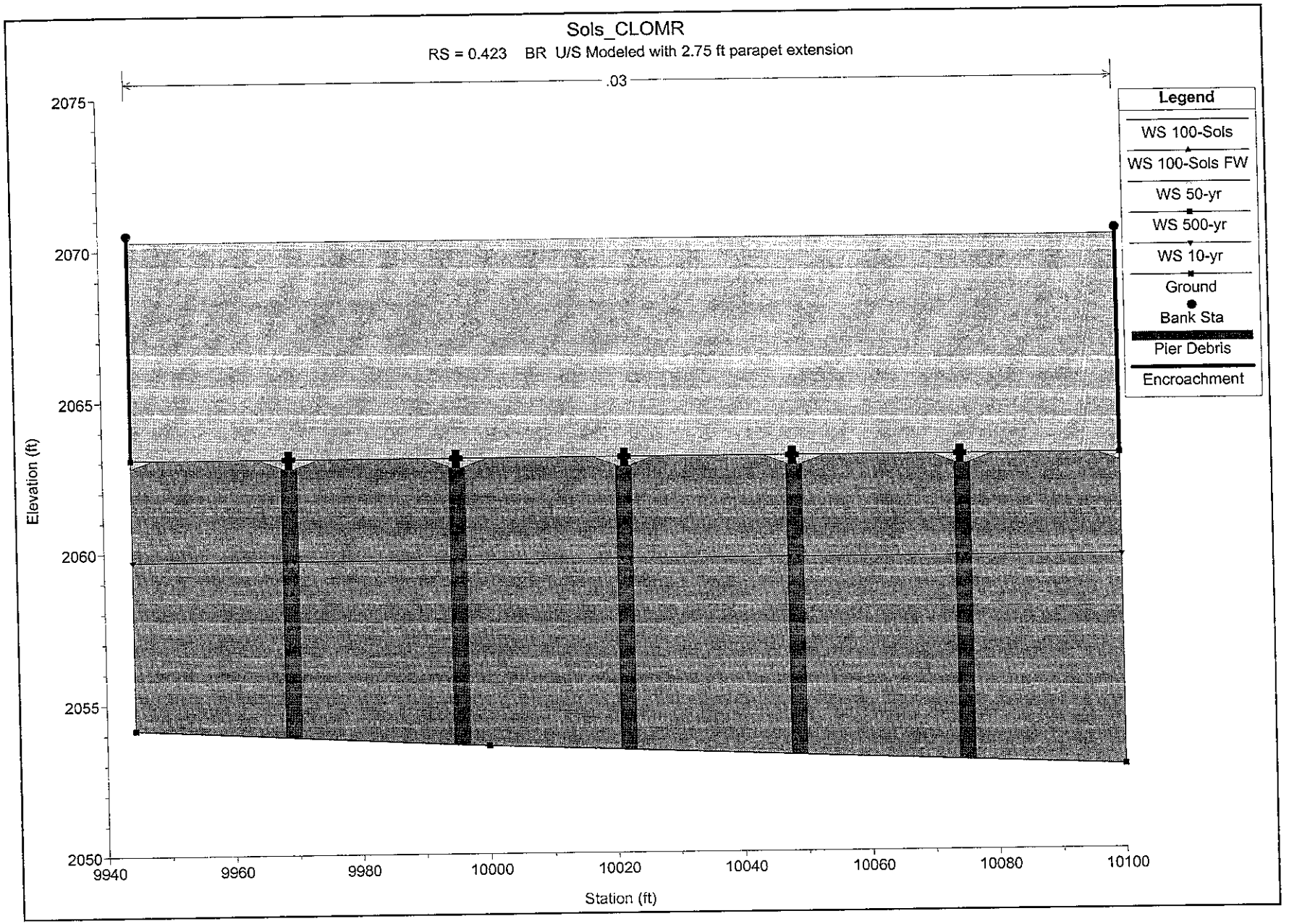

Sols_CLOMR
RS = 0.505 Filled right overbank approximately 2'.
.03
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2072
2070
2068
2066
2064
2062
2060
2058
2056
9850
9900
9950
10000
10050
10100
10150
Station (ft)

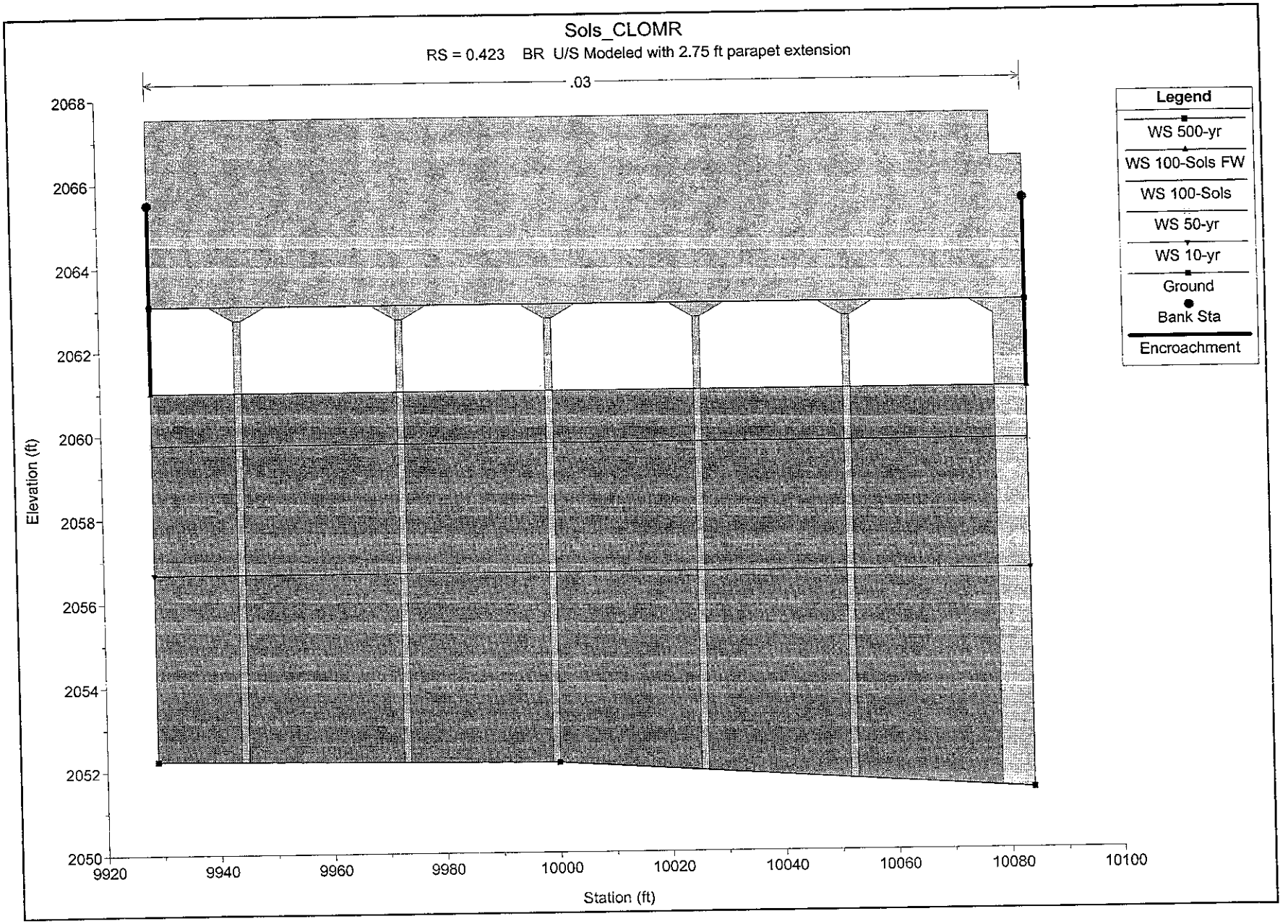

Sols_CLOMR
RS = 0.485 Filled right overbank approximately 2'.
.03
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2072
2070
2068
2066
2064
2062
2060
2058
2056
2054
9900
9920
9940
9960
9980
10000
10020
10040
10060
10080
10100
Station (ft)

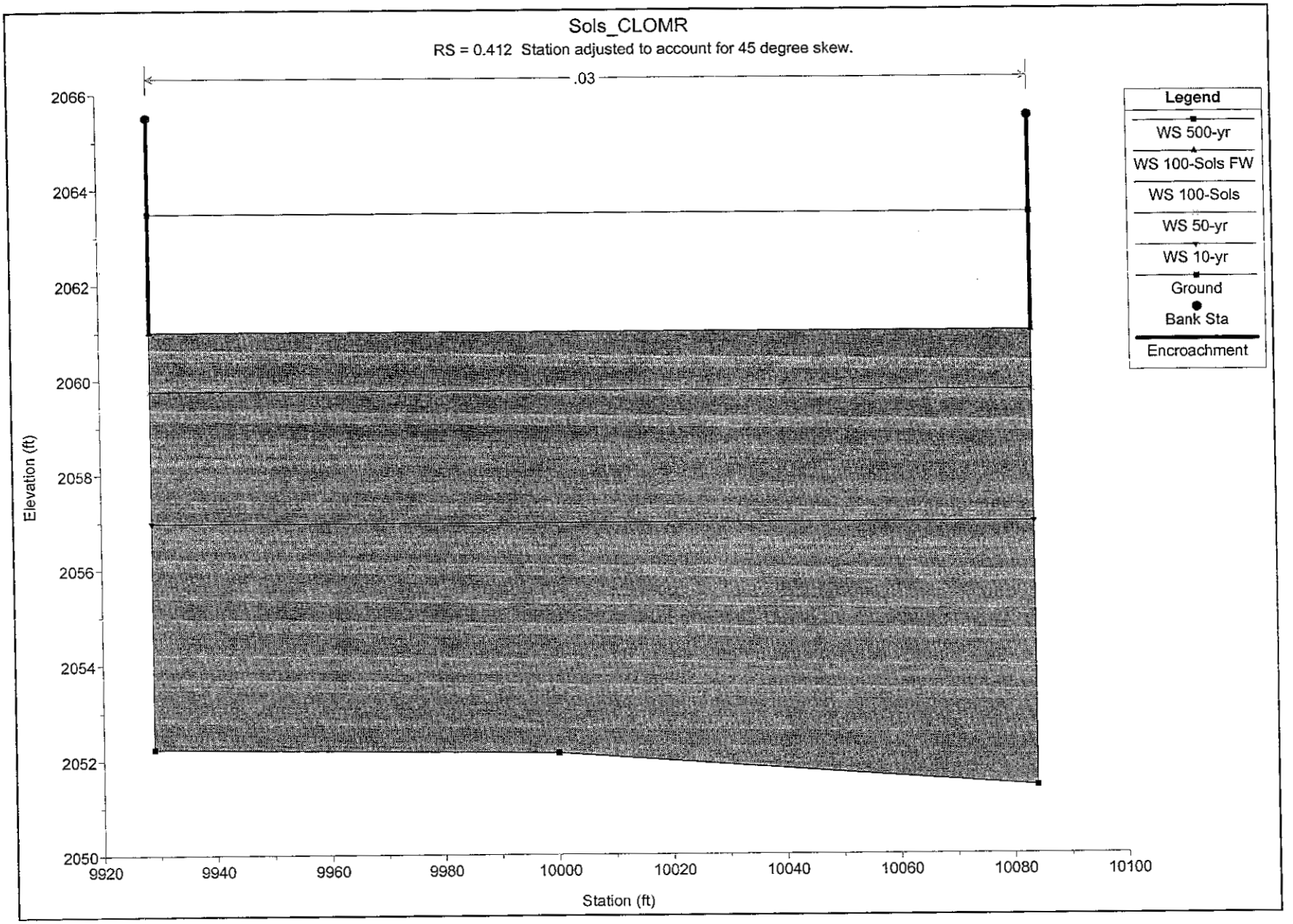

Sols_CLOMR
RS = 0.467 Filled right overbank approximately 2'.
.03
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2072
2070
2068
2066
2064
2062
2060
2058
2056
2054
9920
9940
9960
9980
10000
10020
10040
10060
10080
10100
Station (ft)

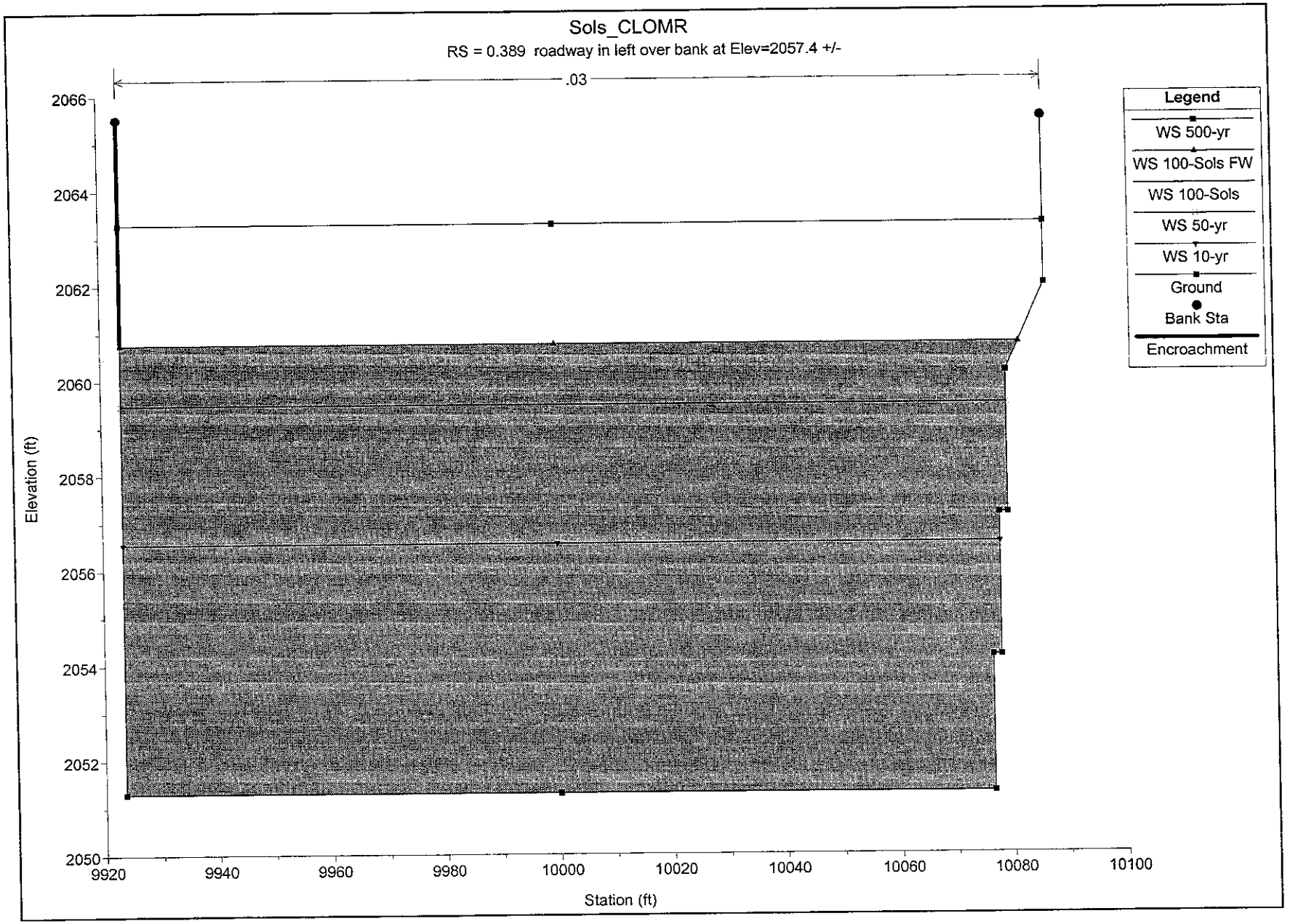

Sols_CLOMR
RS = 0.447 This cross section was skewed by hand an angle of 42.5 degrees
.03
.013
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2075
2070
2065
2060
2055
2050
9920
9940
9960
9980
10000
10020
10040
10060
10080
10100
Station (ft)

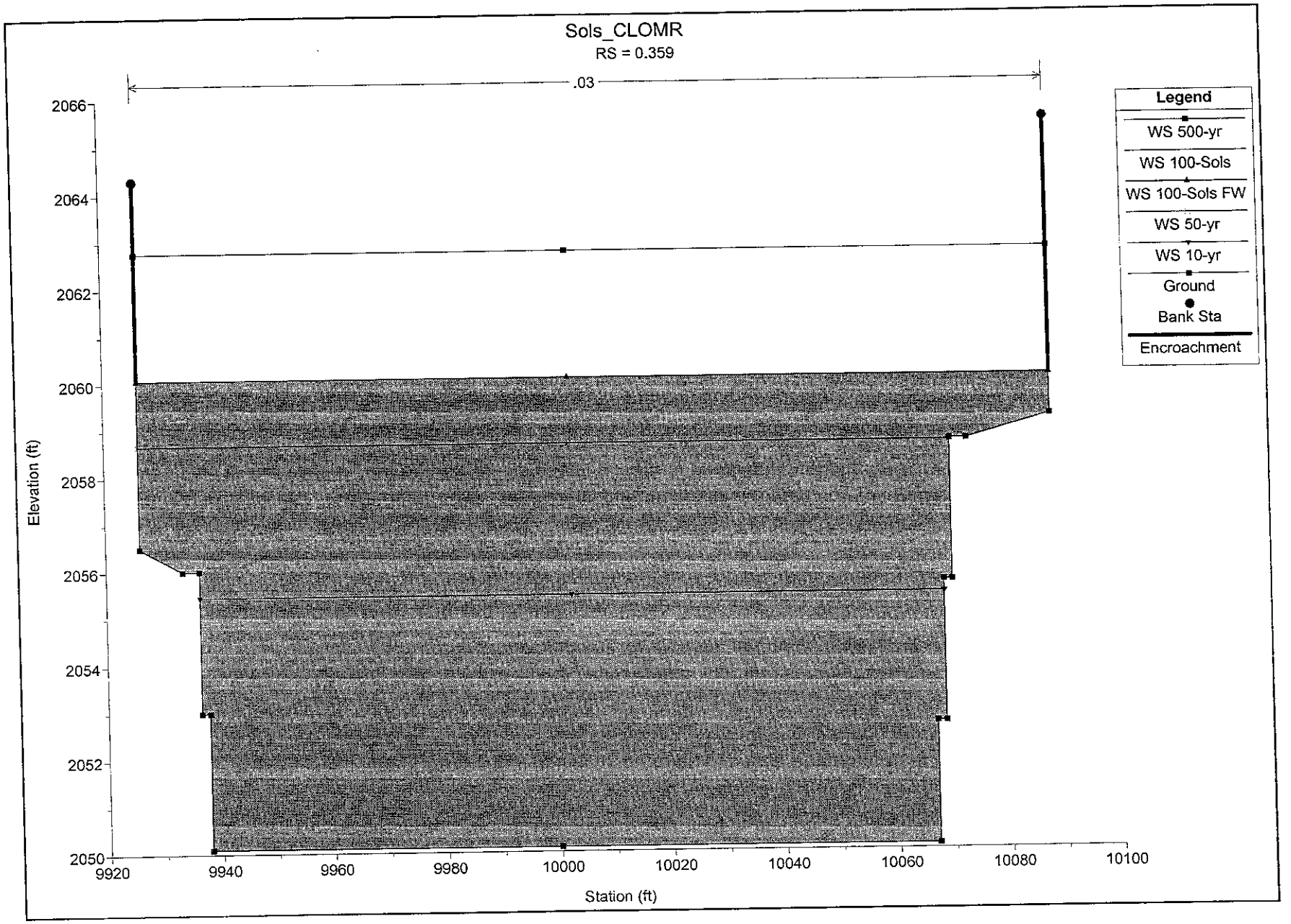

Sols_CLOMR
RS = 0.442 This cross section was skewed to match the bridge skew of 45 deg
.03
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2075
2070
2065
2060
2055
2050
9940
9960
9980
10000
10020
10040
10060
10080
10100
Station (ft)

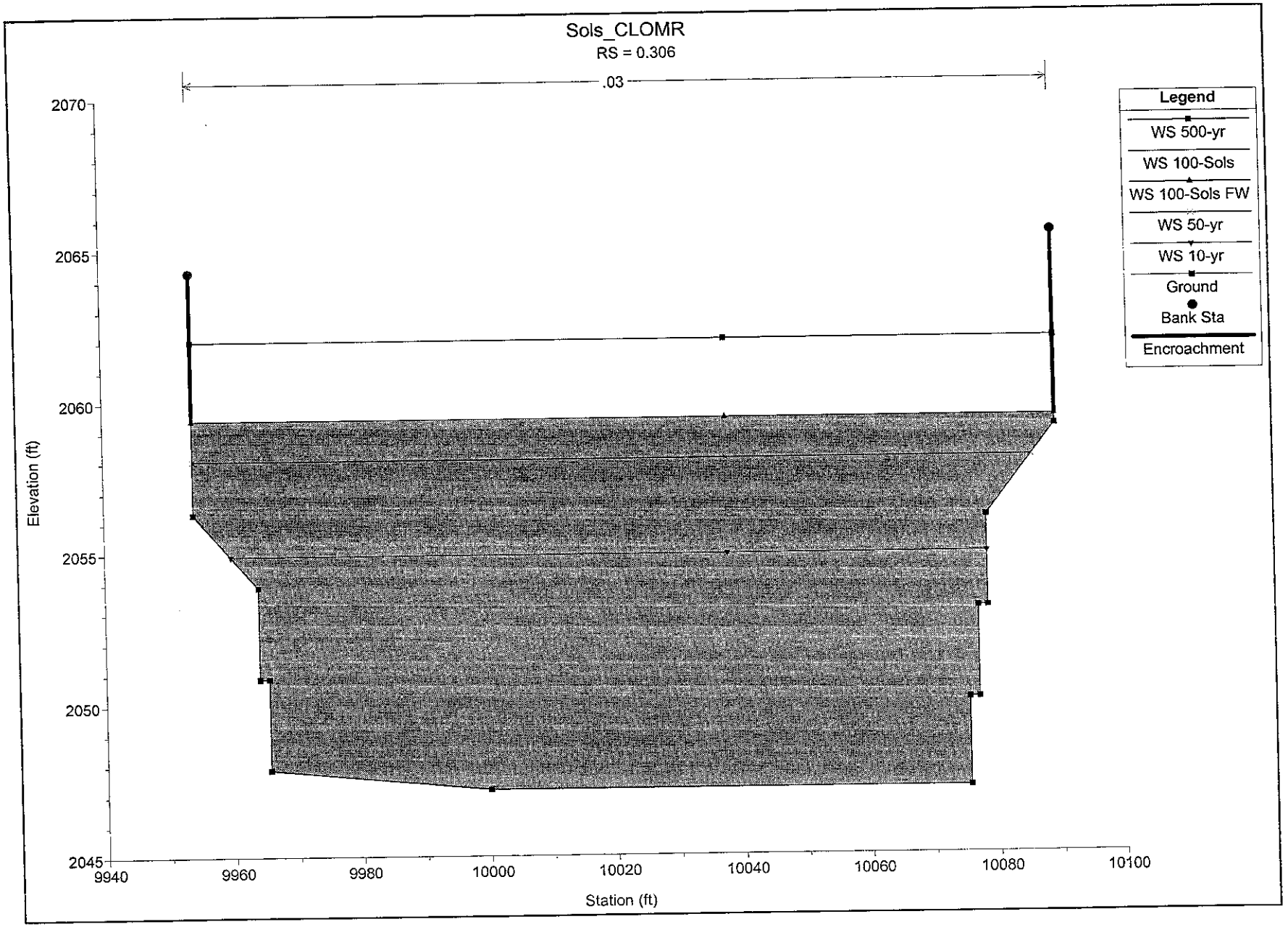

Sols_CLOMR
RS = 0.423 BR U/S Modeled with 2.75 ft parapet extension
.03
Legend
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 500-yr
WS 10-yr
Ground
Bank Sta
Pier Debris
Encroachment
Elevation (ft)
2075
2070
2065
2060
2055
2050
9940
9960
9980
10000
10020
10040
10060
10080
10100
Station (ft)

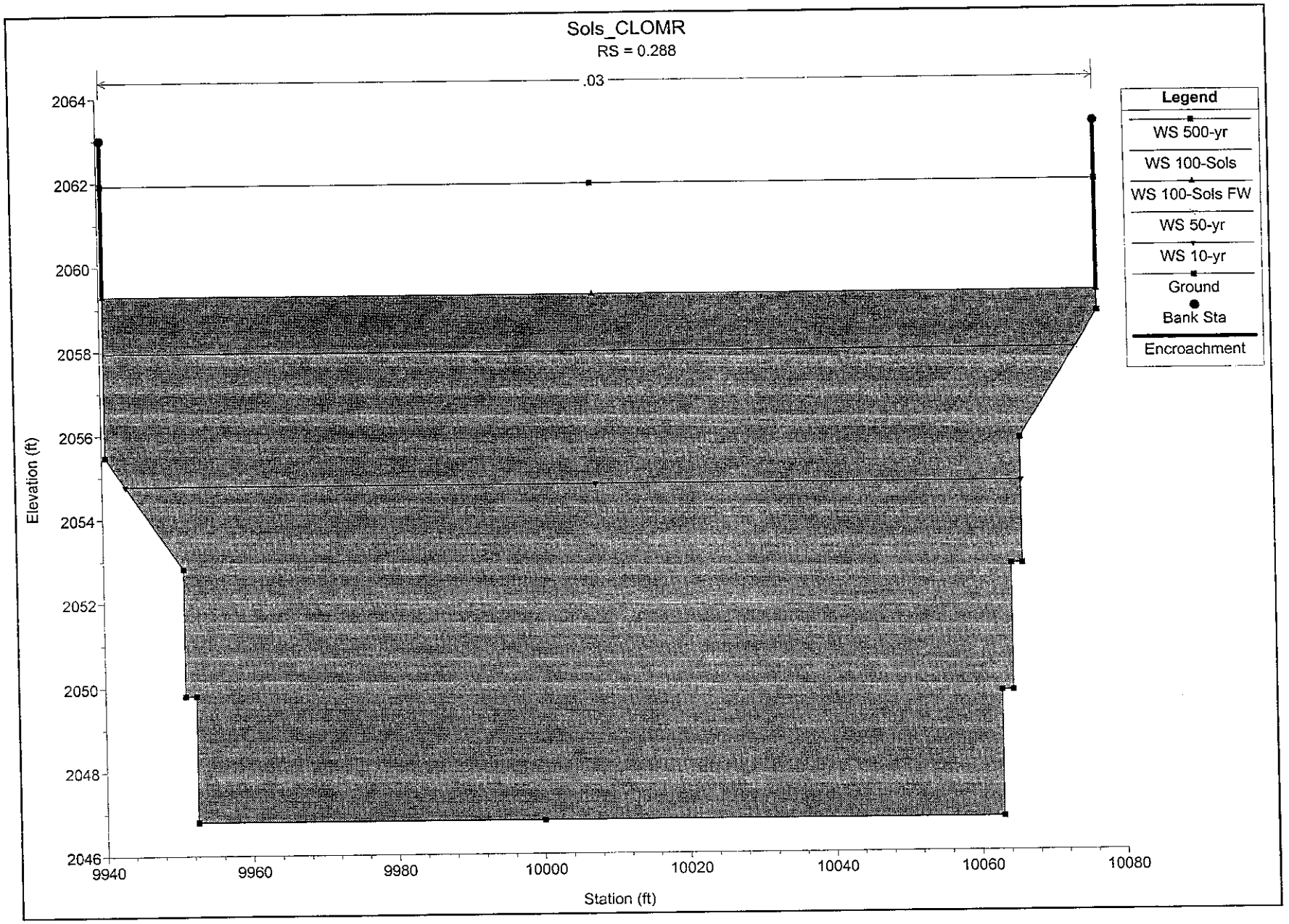

Sols_CLOMR
RS = 0.423 BR U/S Modeled with 2.75 ft parapet extension
.03
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2068
2066
2064
2062
2060
2058
2056
2054
2052
2050
9920
9940
9960
9980
10000
10020
10040
10060
10080
10100
Station (ft)

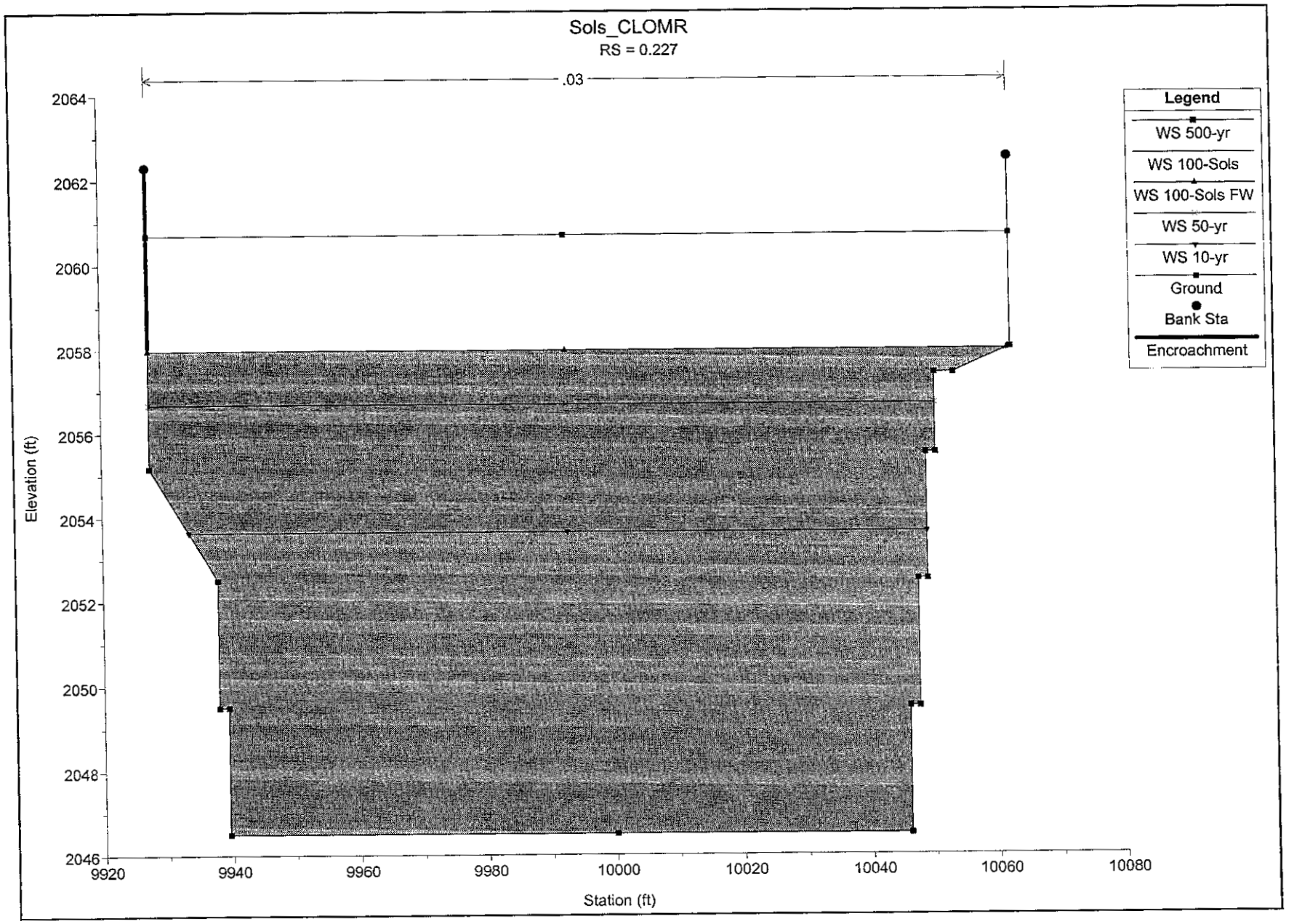

Sols_CLOMR
RS = 0.412 Station adjusted to account for 45 degree skew.
.03
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2066
2064
2062
2060
2058
2056
2054
2052
2050
9920
9940
9960
9980
10000
10020
10040
10060
10080
10100
Station (ft)

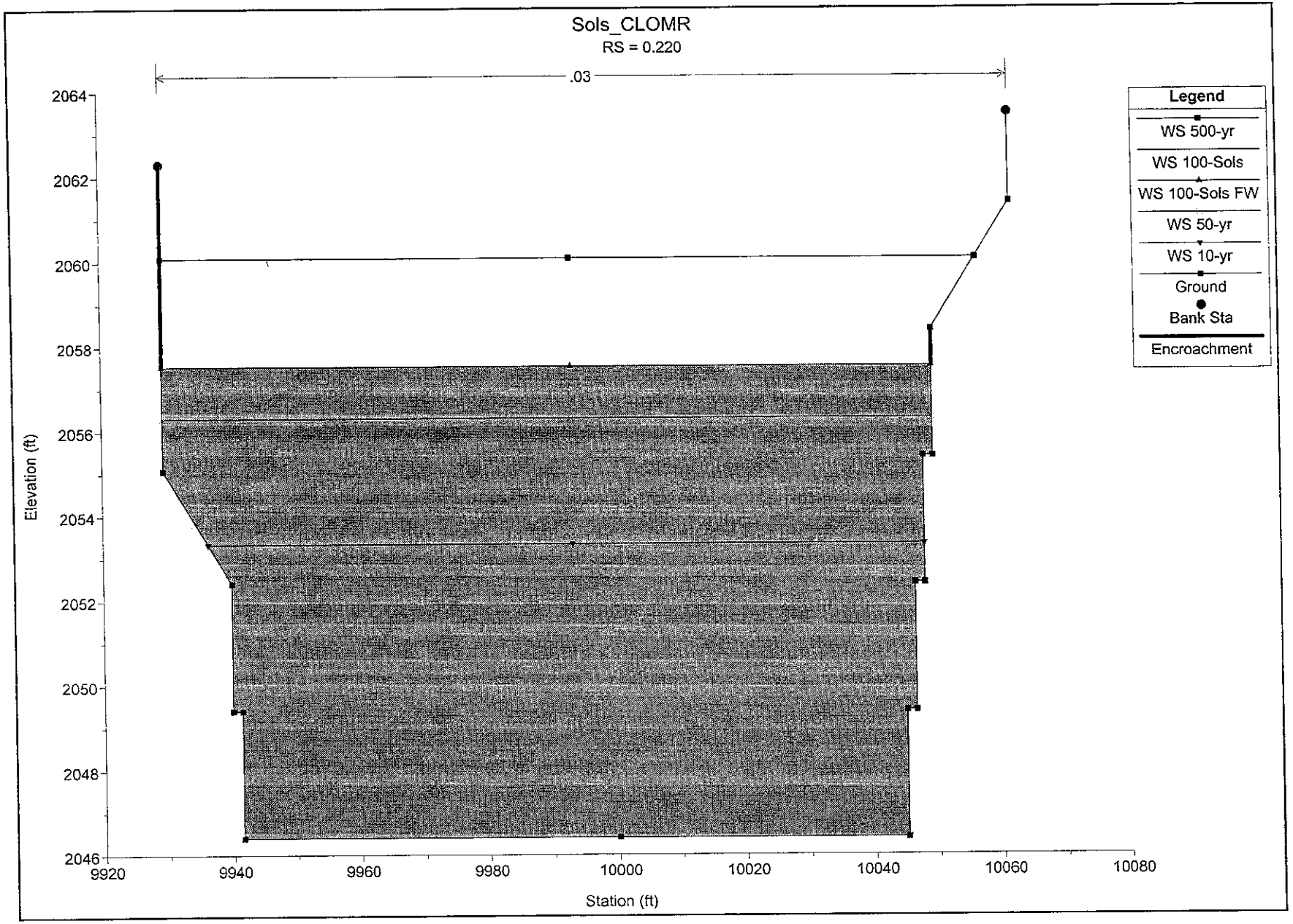

Sols_CLOMR
RS = 0.389 roadway in left over bank at Elev=2057.4 +/-
.03
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2066
2064
2062
2060
2058
2056
2054
2052
2050
9920
9940
9960
9980
10000
10020
10040
10060
10080
10100
Station (ft)

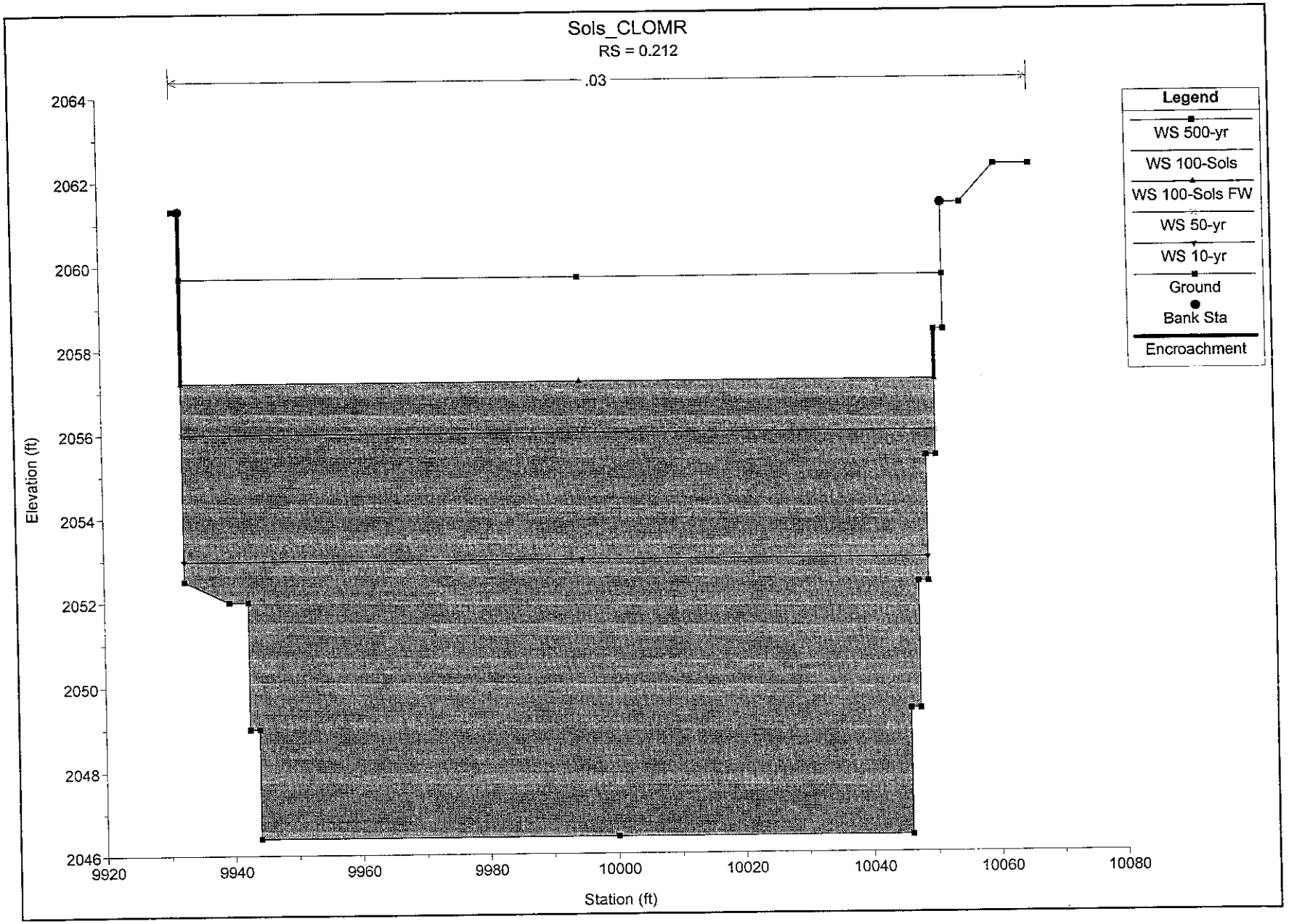

Sols_CLOMR
RS = 0.359
.03
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2066
2064
2062
2060
2058
2056
2054
2052
2050
9920
9940
9960
9980
10000
10020
10040
10060
10080
10100
Station (ft)

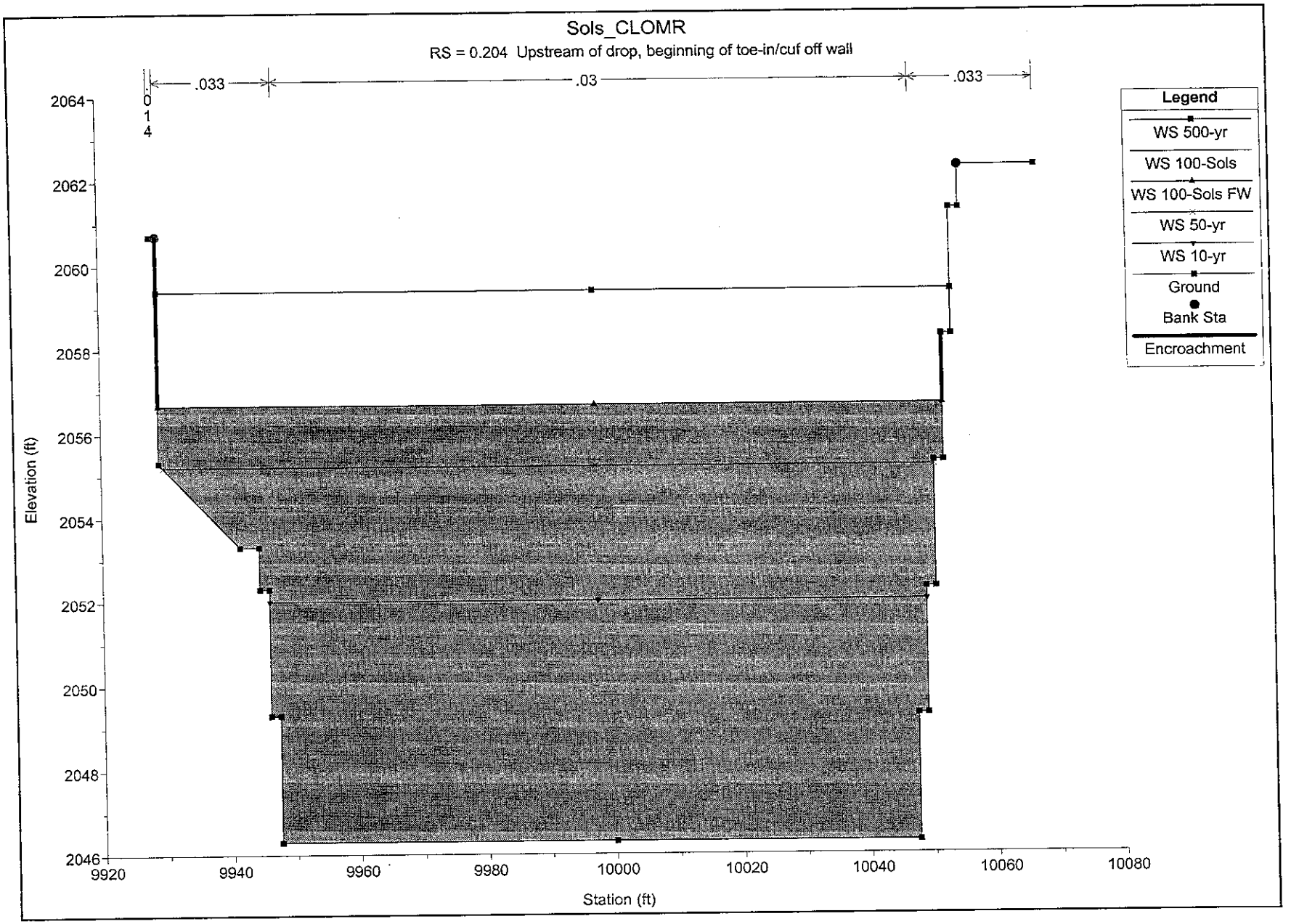

Sols_CLOMR
RS = 0.306
.03
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2070
2065
2060
2055
2050
2045
9940
9960
9980
10000
10020
10040
10060
10080
10100
Station (ft)

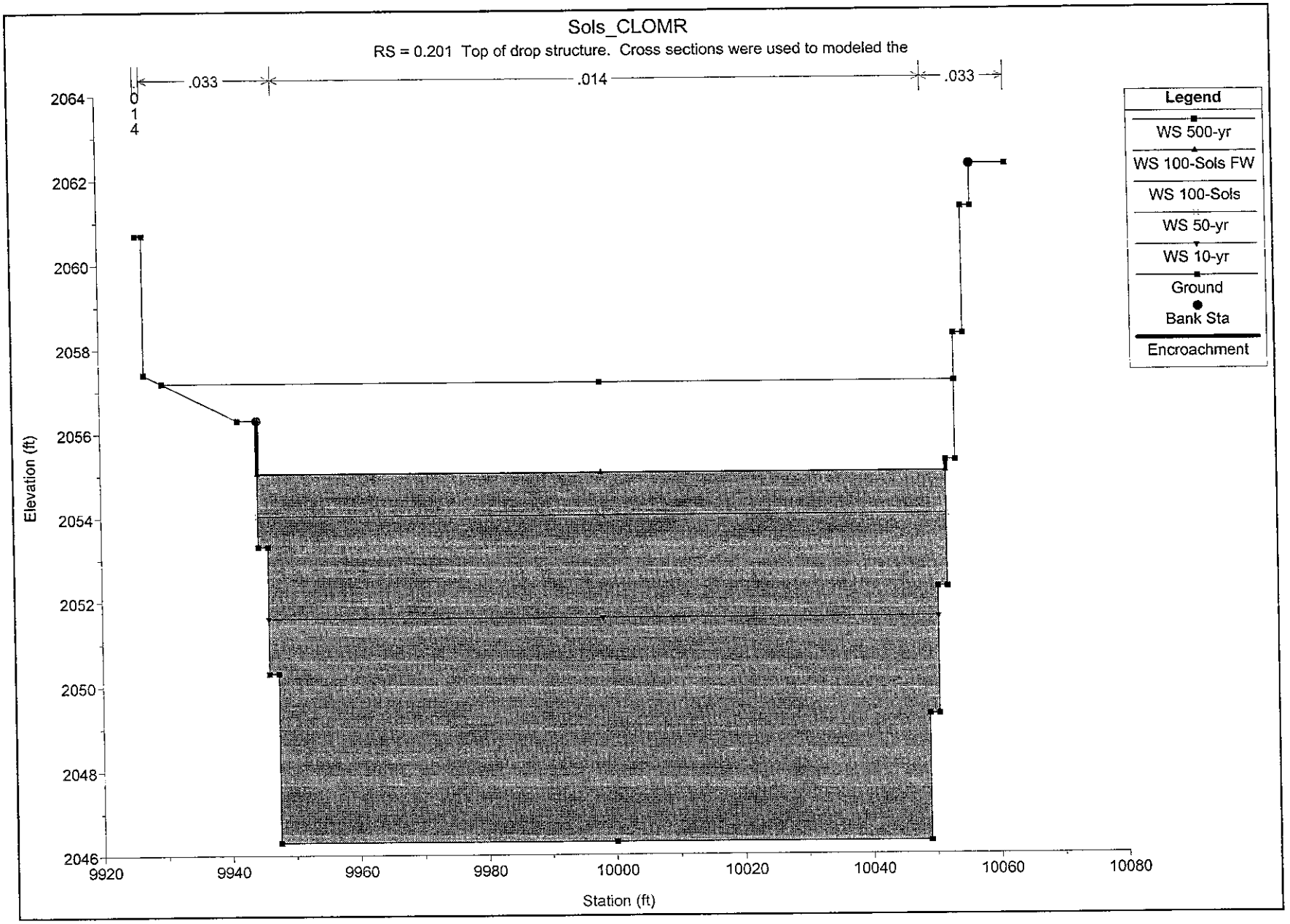

Sols_CLOMR
RS = 0.288
.03
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2064
2062
2060
2058
2056
2054
2052
2050
2048
2046
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)

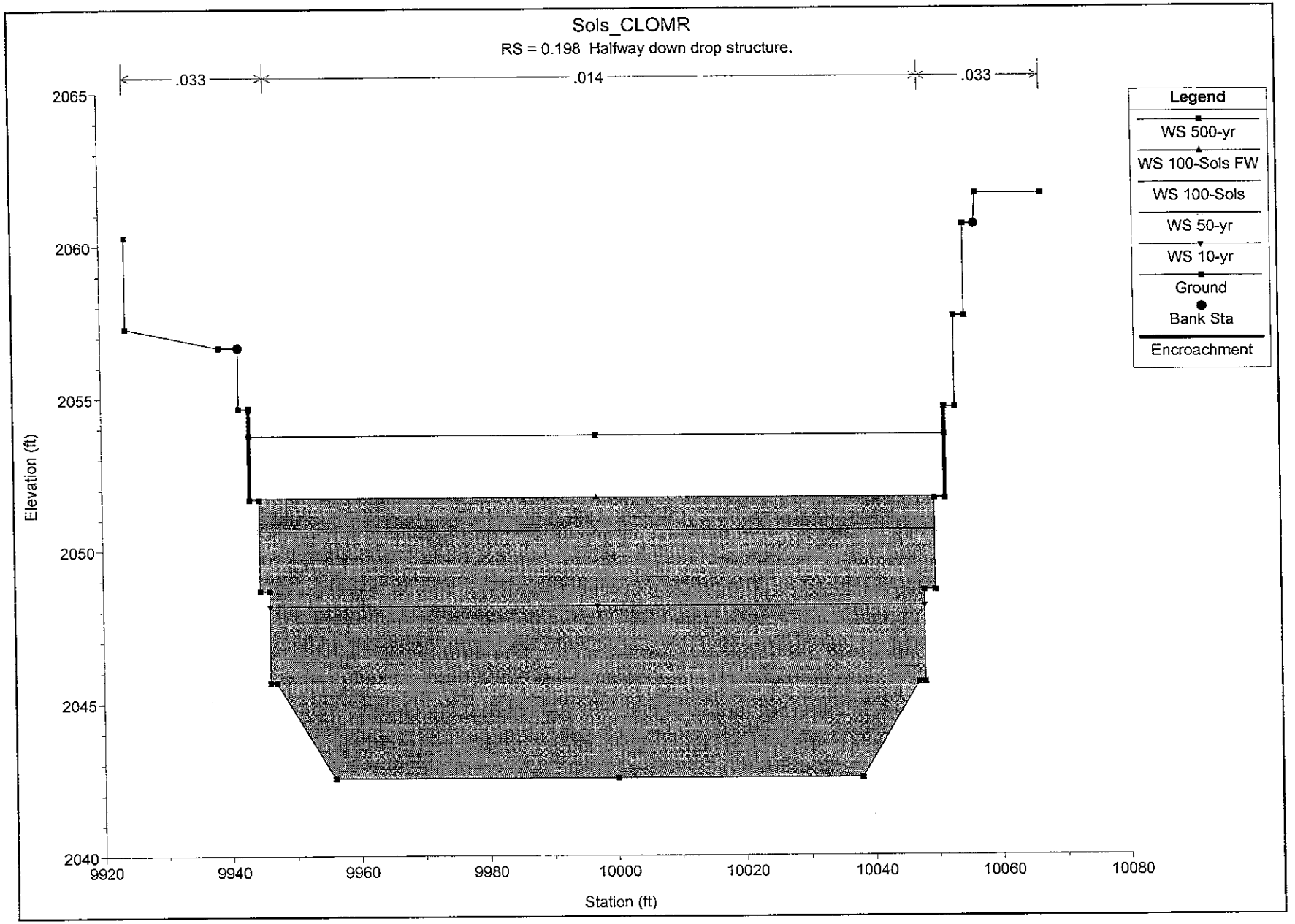

Sols_CLOMR
RS = 0.227
.03
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2064
2062
2060
2058
2056
2054
2052
2050
2048
2046
9920
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)

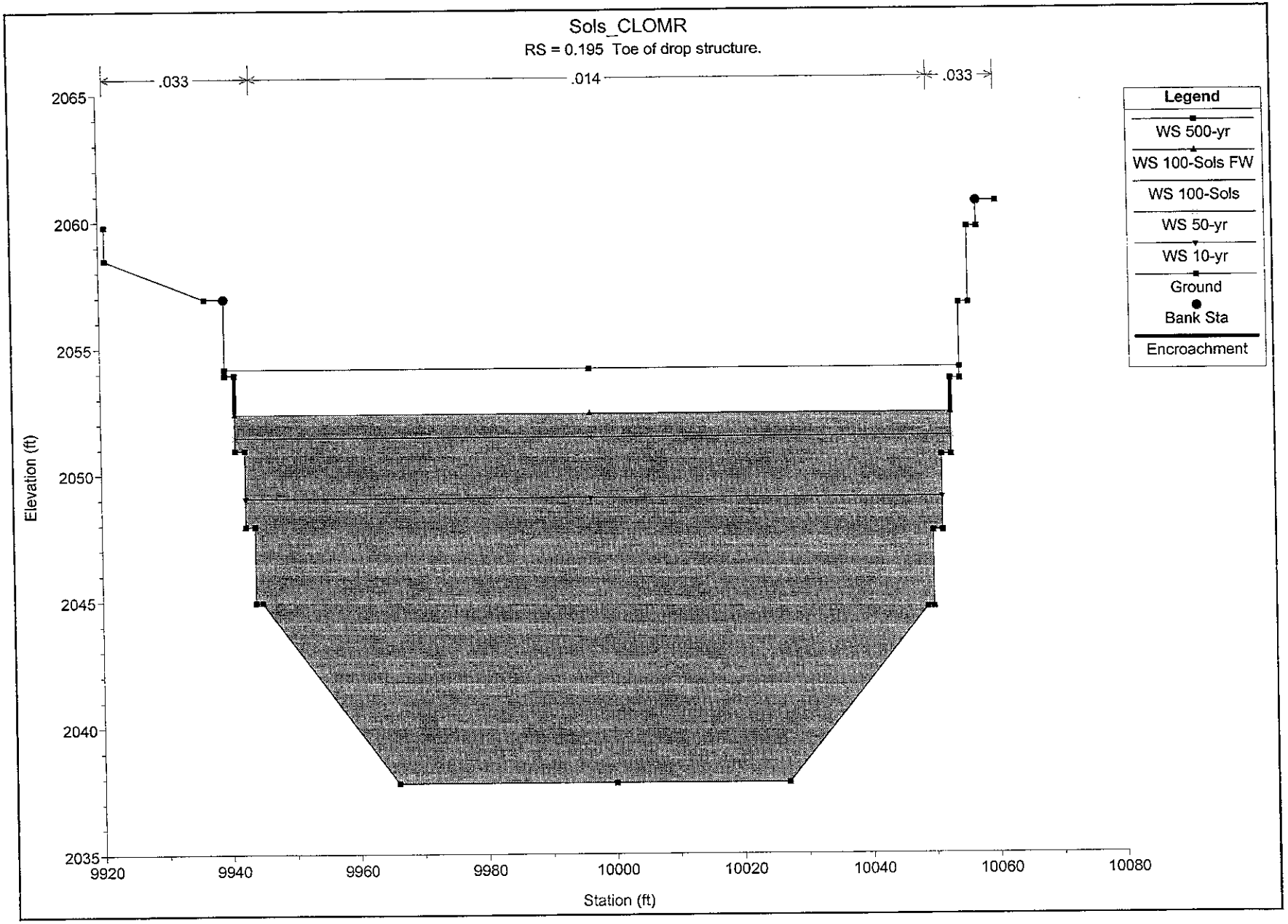

Sols_CLOMR
RS = 0.220
.03
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2064
2062
2060
2058
2056
2054
2052
2050
2048
2046
9920
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)

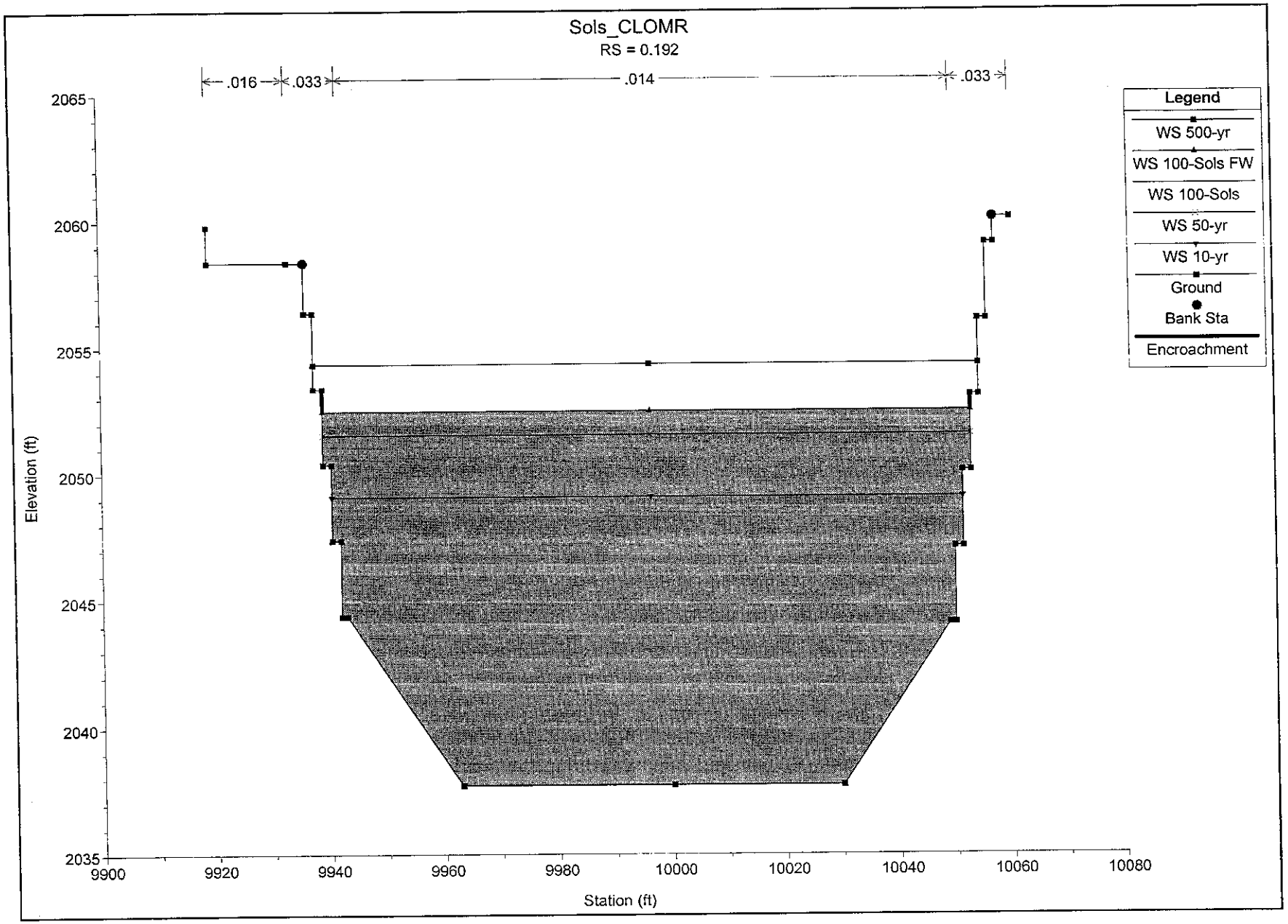

Sols_CLOMR
RS = 0.212
.03
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2064
2062
2060
2058
2056
2054
2052
2050
2048
2046
9920
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)

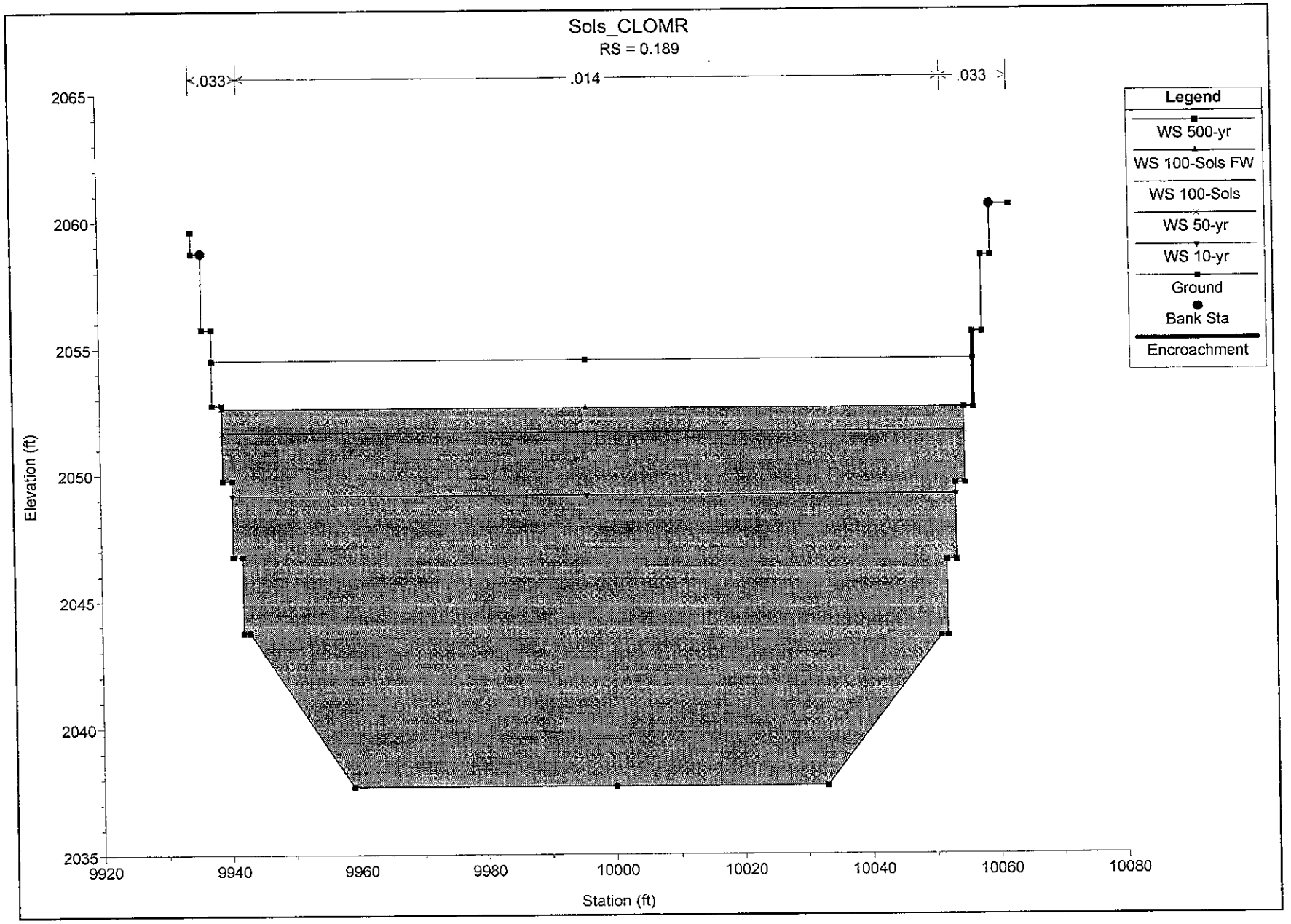

Sols_CLOMR
RS = 0.204 Upstream of drop, beginning of toe-in/cuf off wall
.014
.033
.03
.033
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2064
2062
2060
2058
2056
2054
2052
2050
2048
2046
9920
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)

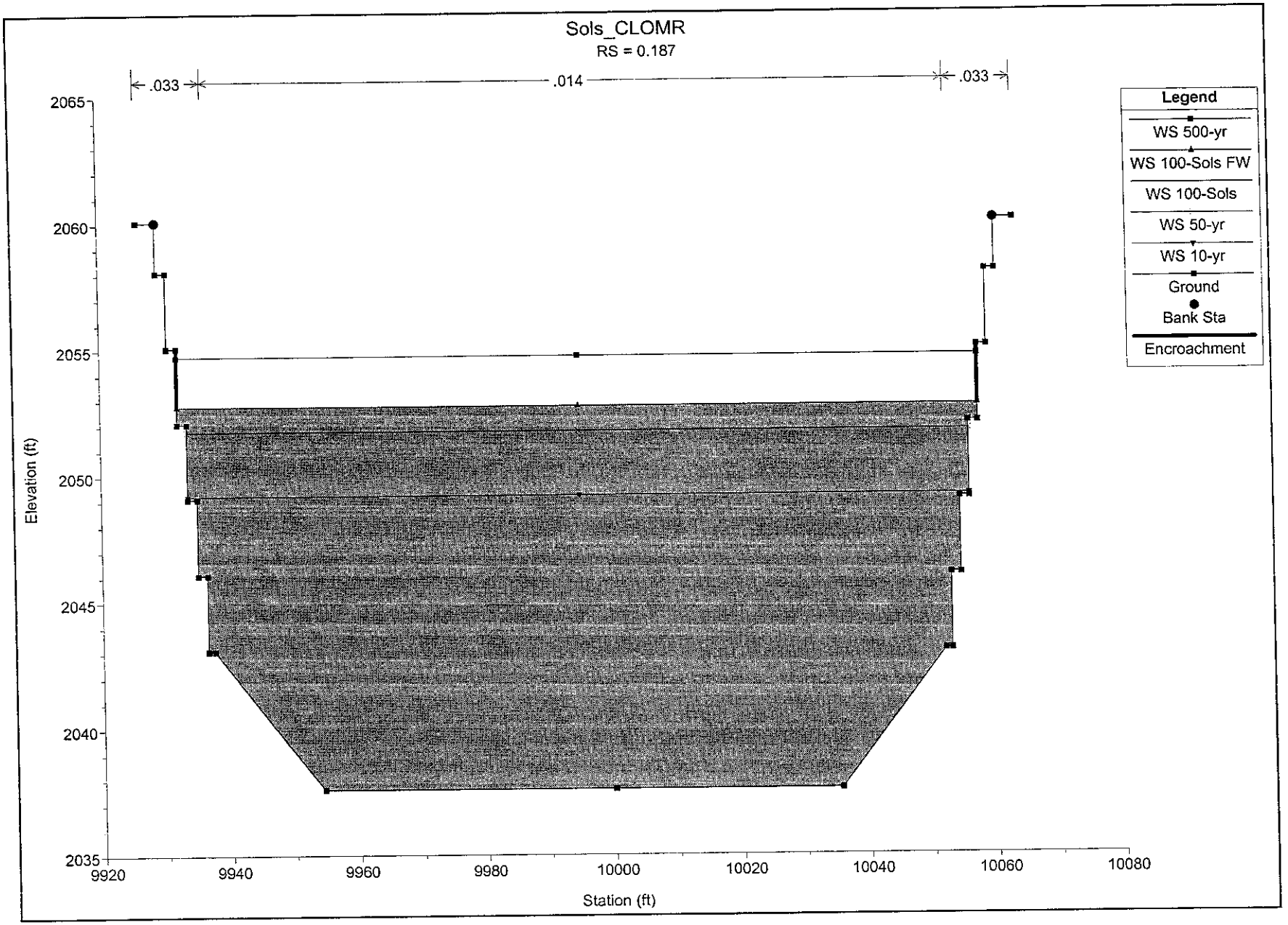

Sols_CLOMR
RS = 0.201 Top of drop structure. Cross sections were used to modeled the
.033
.014
.033
0
1
4
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2064
2062
2060
2058
2056
2054
2052
2050
2048
2046
9920
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)

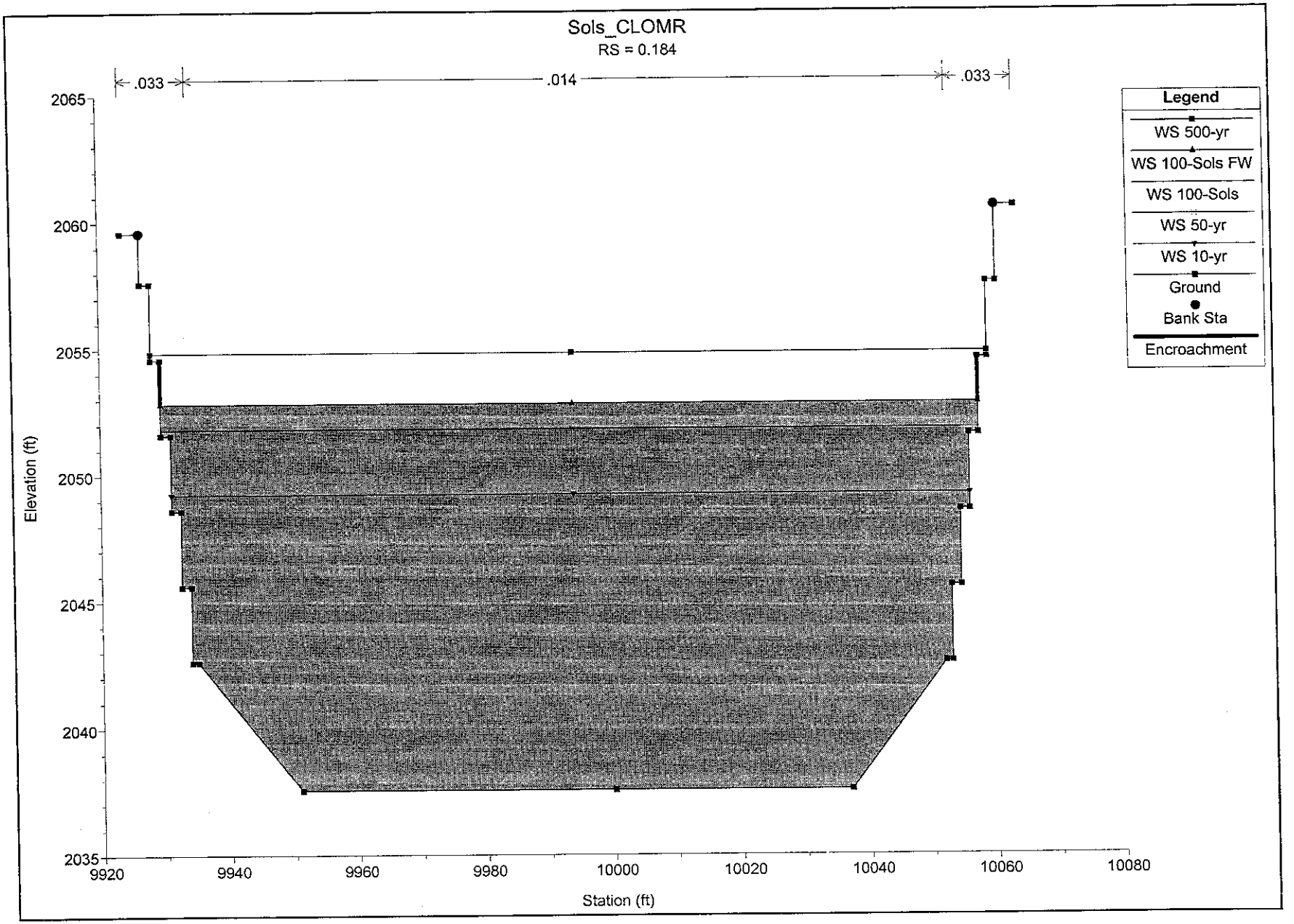

Sols_CLOMR
RS = 0.198 Halfway down drop structure.
.033
.014
.033
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2065
2060
2055
2050
2045
2040
9920
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)

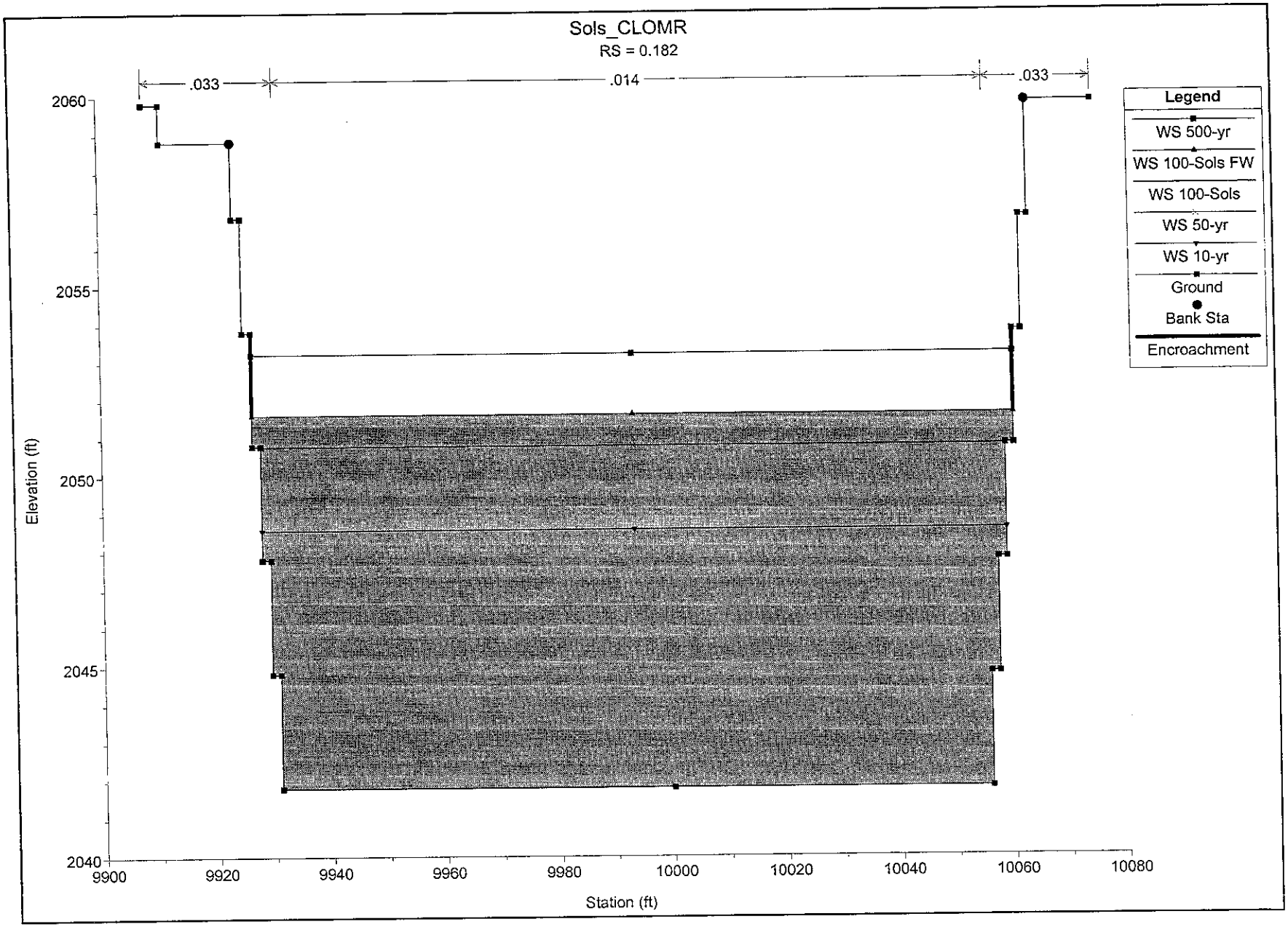

Sols_CLOMR
RS = 0.195 Toe of drop structure.
.033
.014
.033
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2065
2060
2055
2050
2045
2040
2035
9920
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)

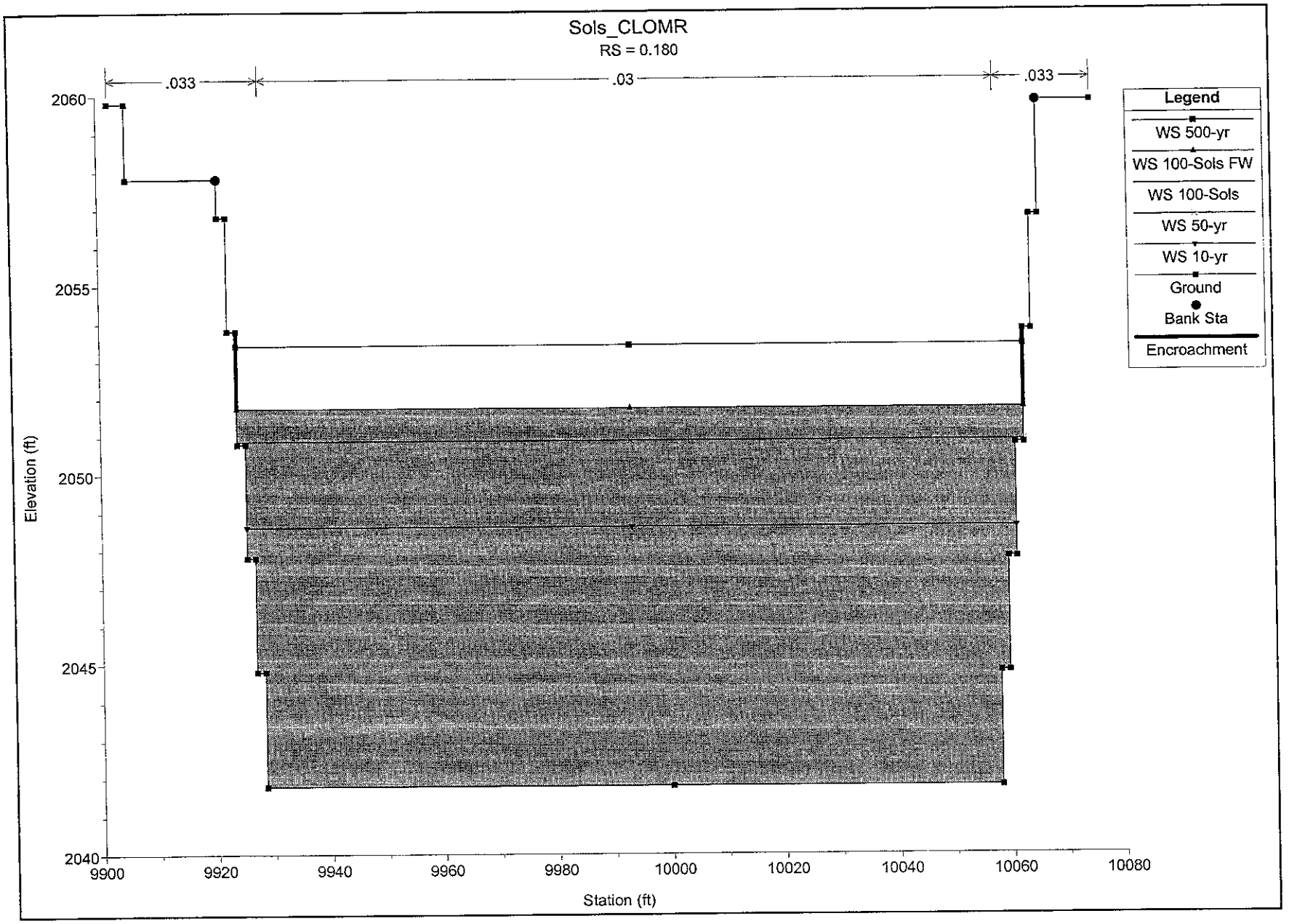

Sols_CLOMR
RS = 0.192
.016
.033
.014
.033
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2065
2060
2055
2050
2045
2040
2035
9900
9920
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)

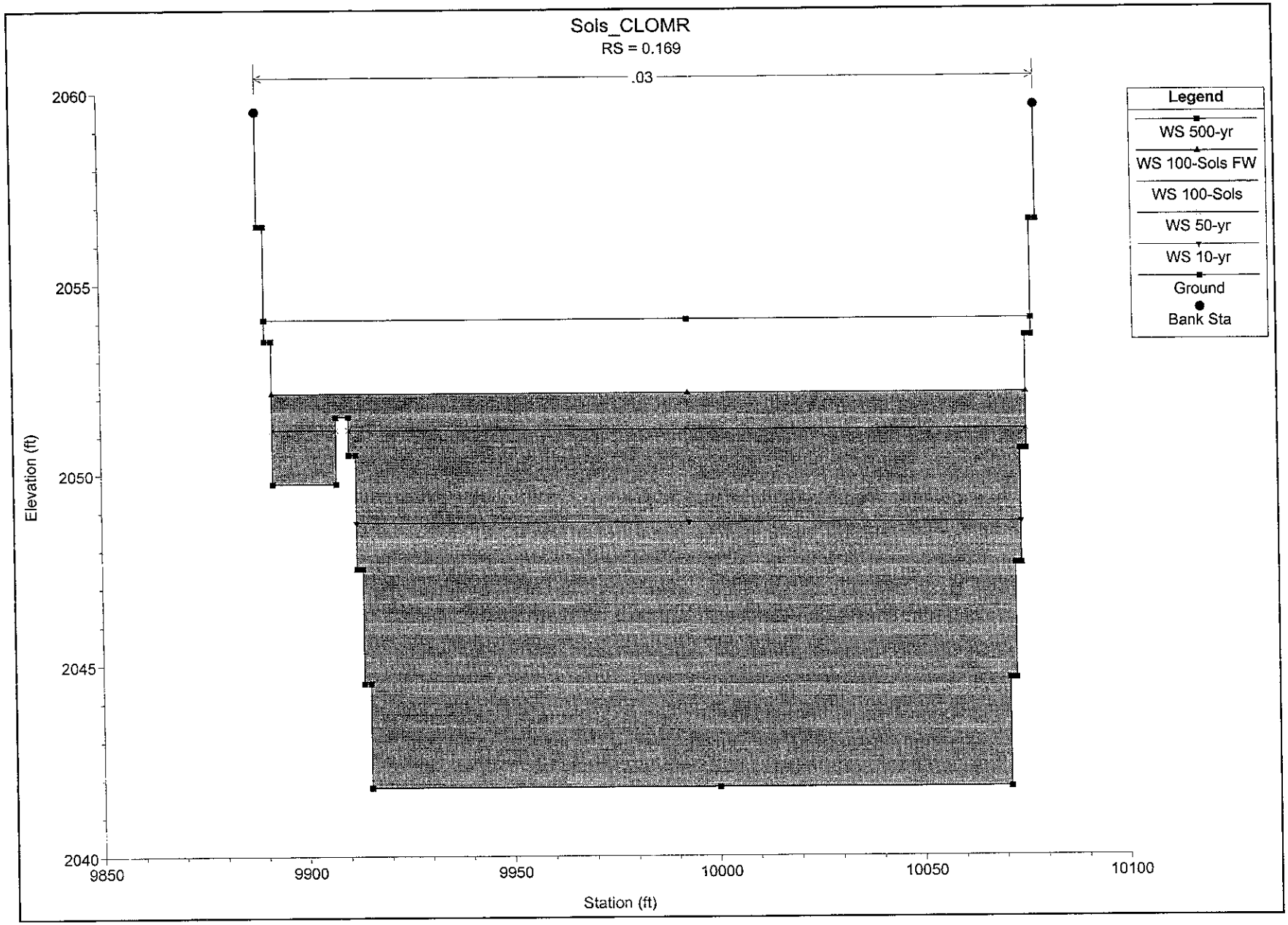

Sols_CLOMR
RS = 0.189
.033
.014
.033
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2065
2060
2055
2050
2045
2040
2035
9920
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)

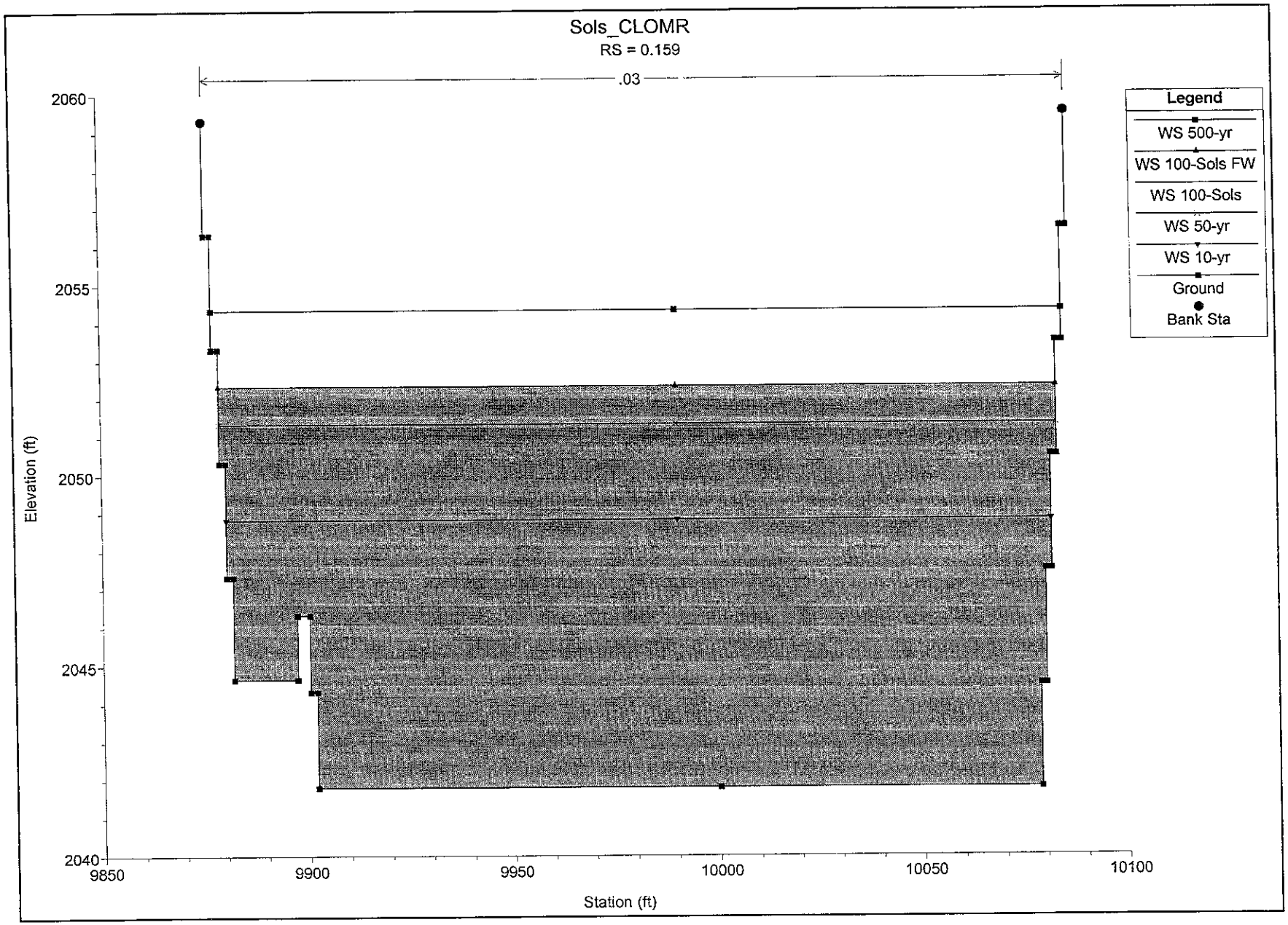

Sols_CLOMR
RS = 0.187
.033
.014
.033
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2065
2060
2055
2050
2045
2040
2035
9920
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)

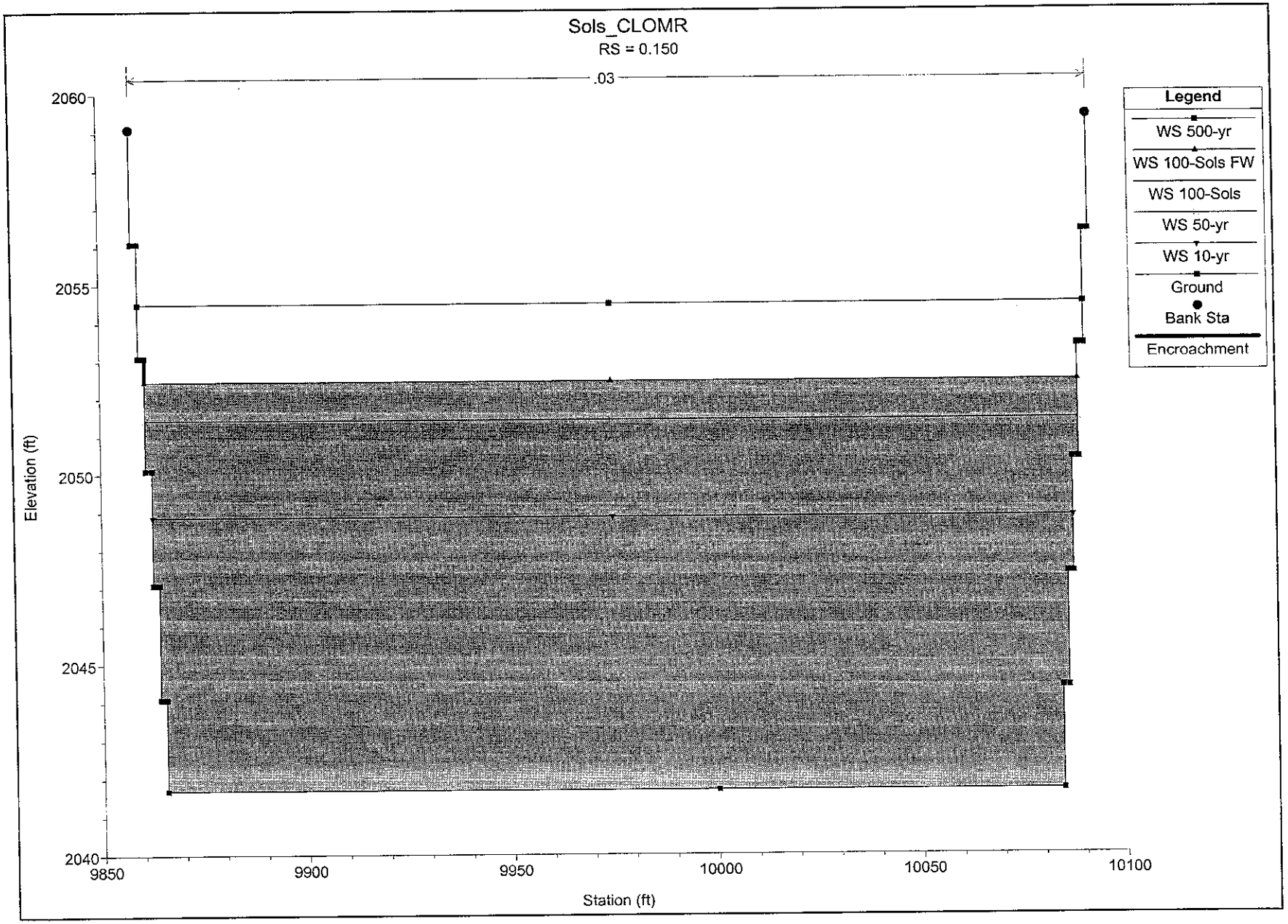

Sols_CLOMR
RS = 0.184
.033
.014
.033
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2065
2060
2055
2050
2045
2040
2035
9920
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)

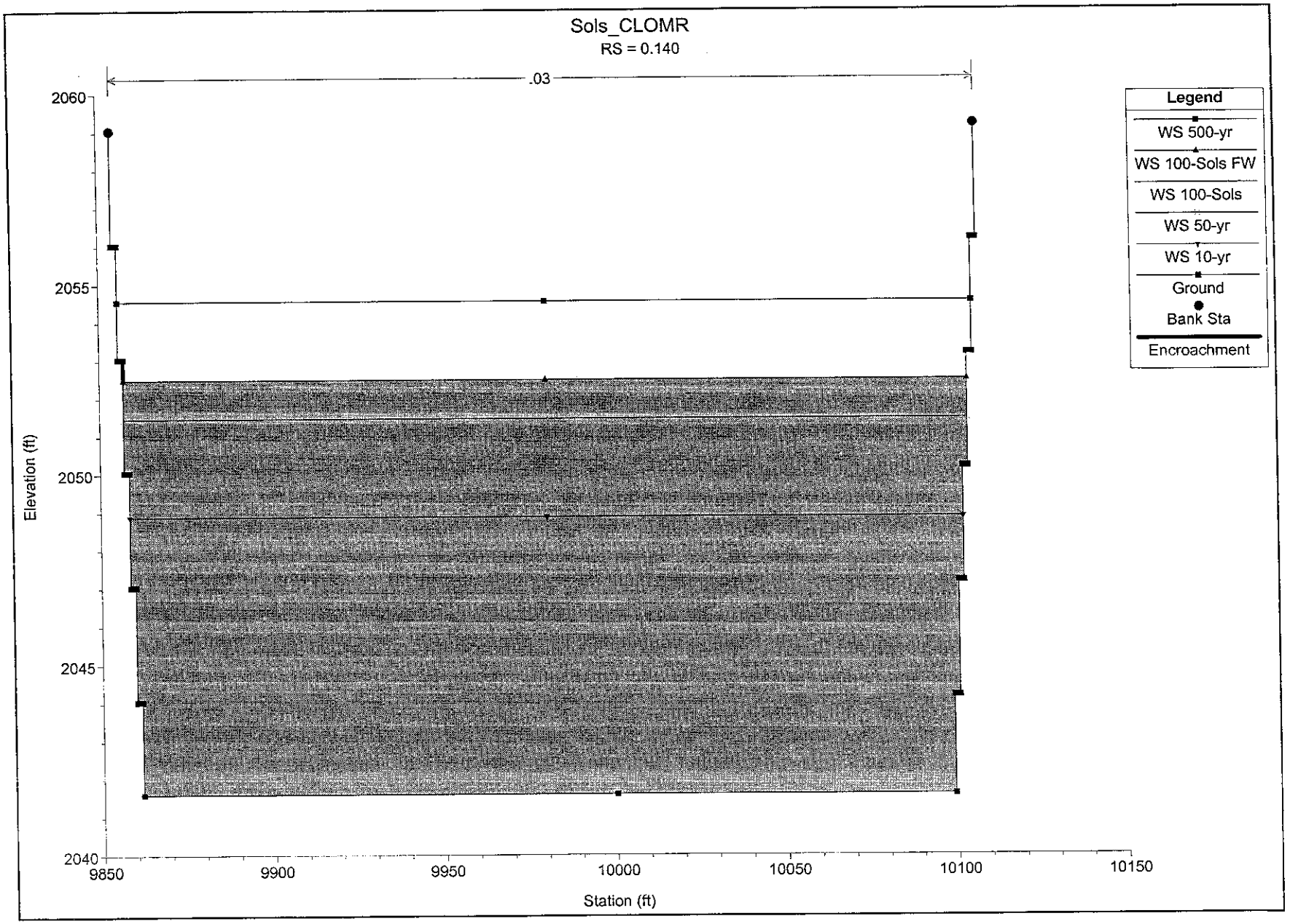

Sols_CLOMR
RS = 0.182
.033
.014
.033
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2060
2055
2050
2045
2040
9900
9920
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)

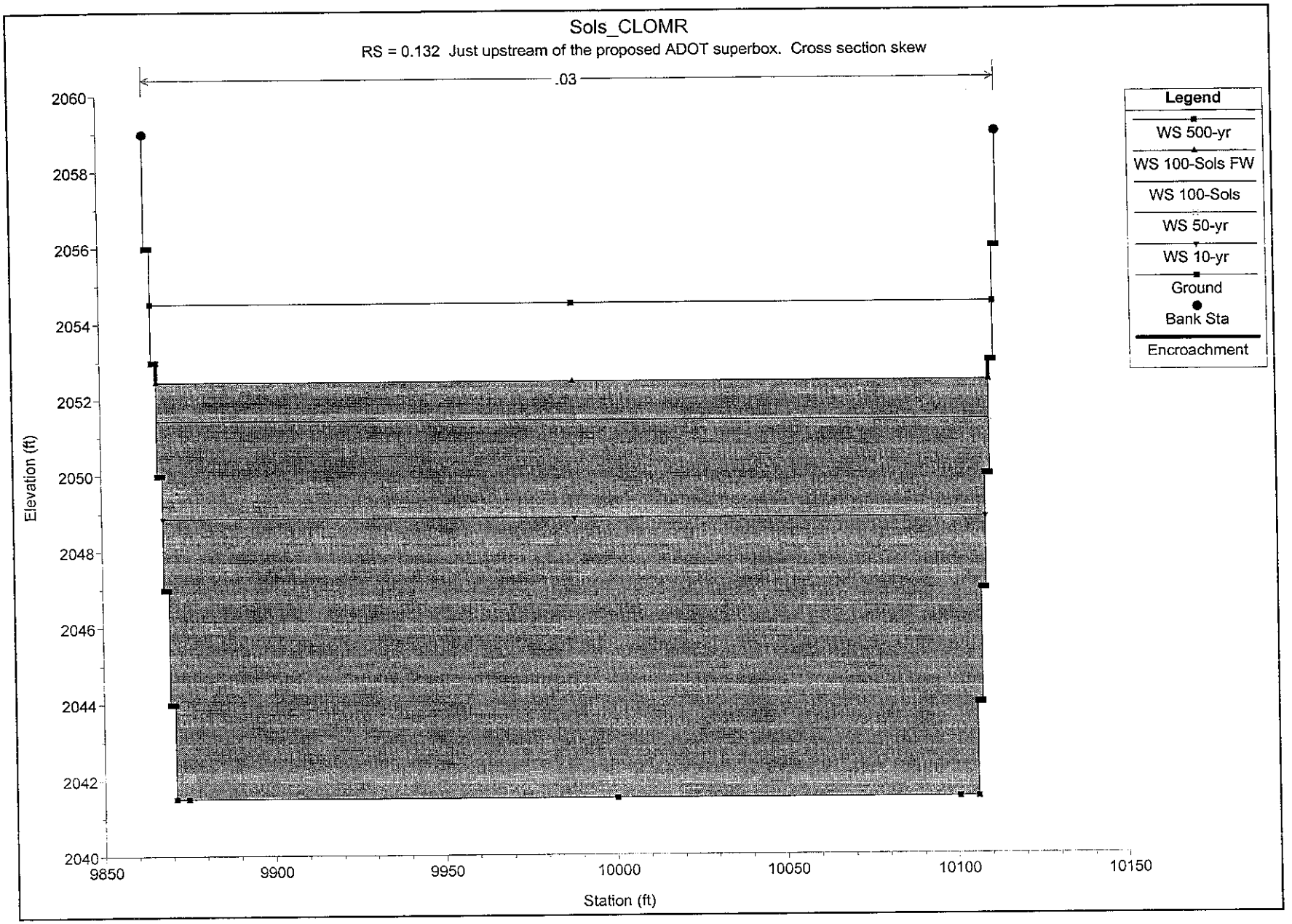

Sols_CLOMR
RS = 0.180
.033
.03
.033
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2060
2055
2050
2045
2040
9900
9920
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)

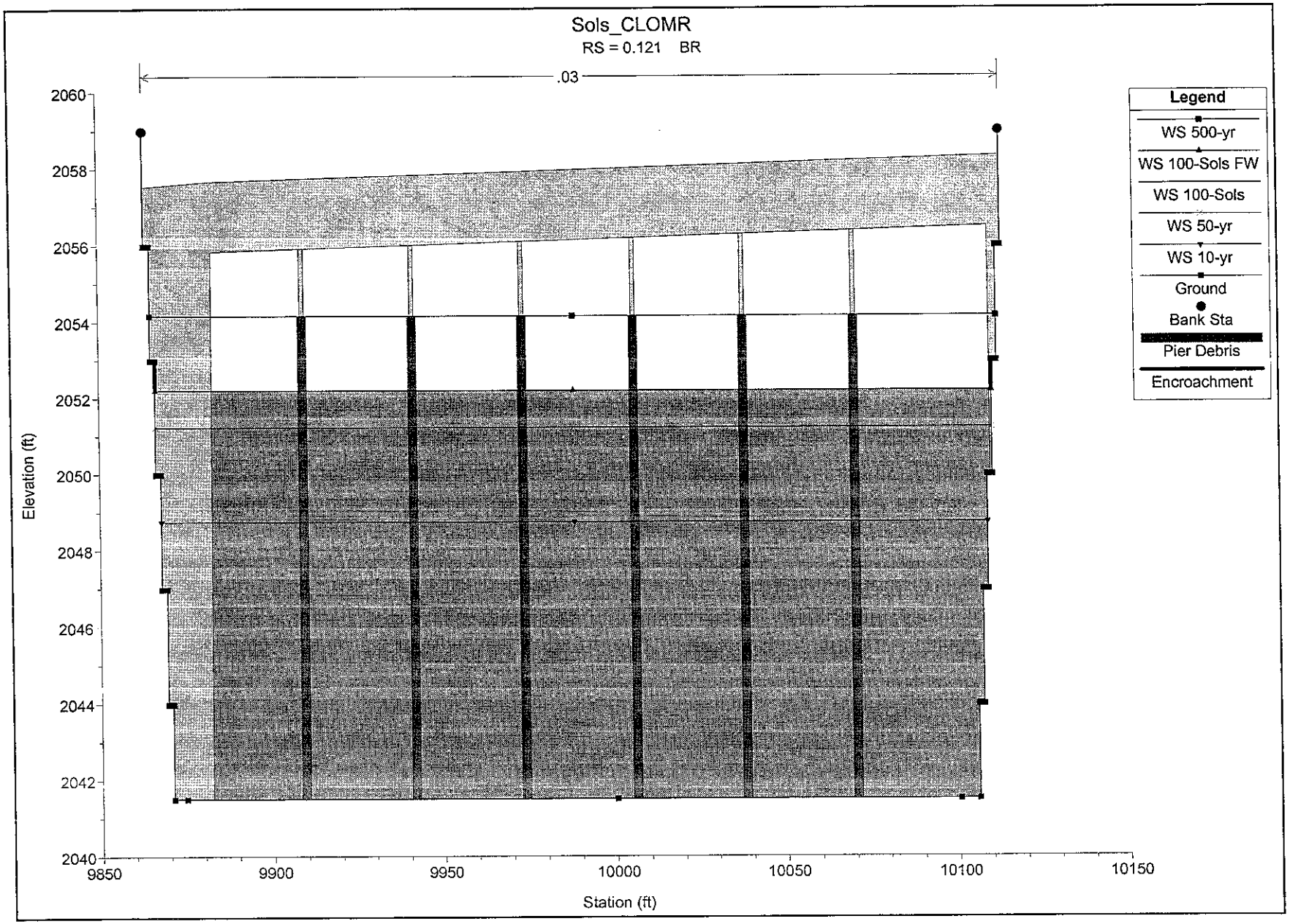

Sols_CLOMR
RS = 0.169
.03
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
2060
2055
2050
2045
2040
9850
9900
9950
10000
10050
10100
Station (ft)

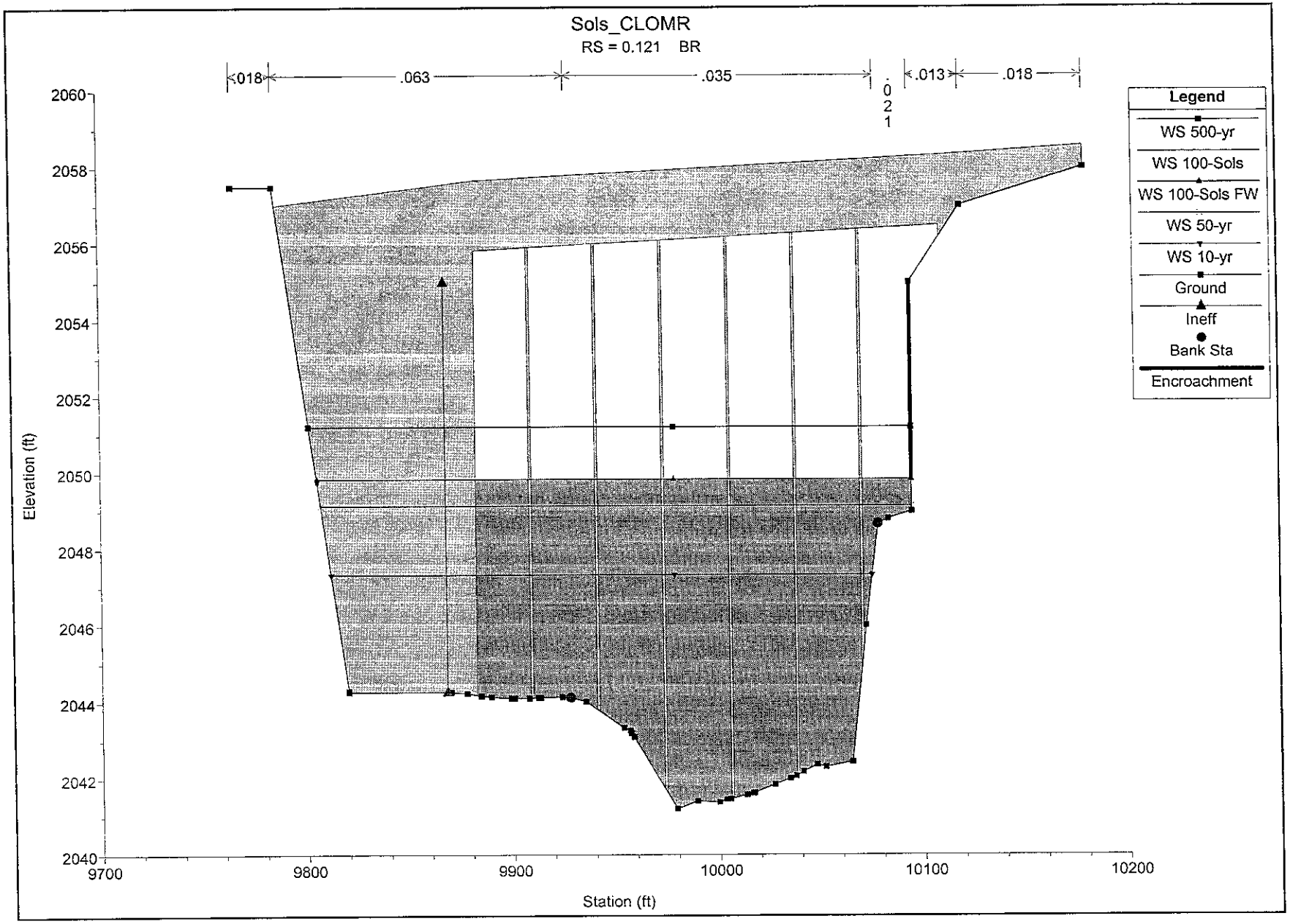

Sols_CLOMR
RS = 0.159
.03
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
2060
2055
2050
2045
2040
9850
9900
9950
10000
10050
10100
Station (ft)

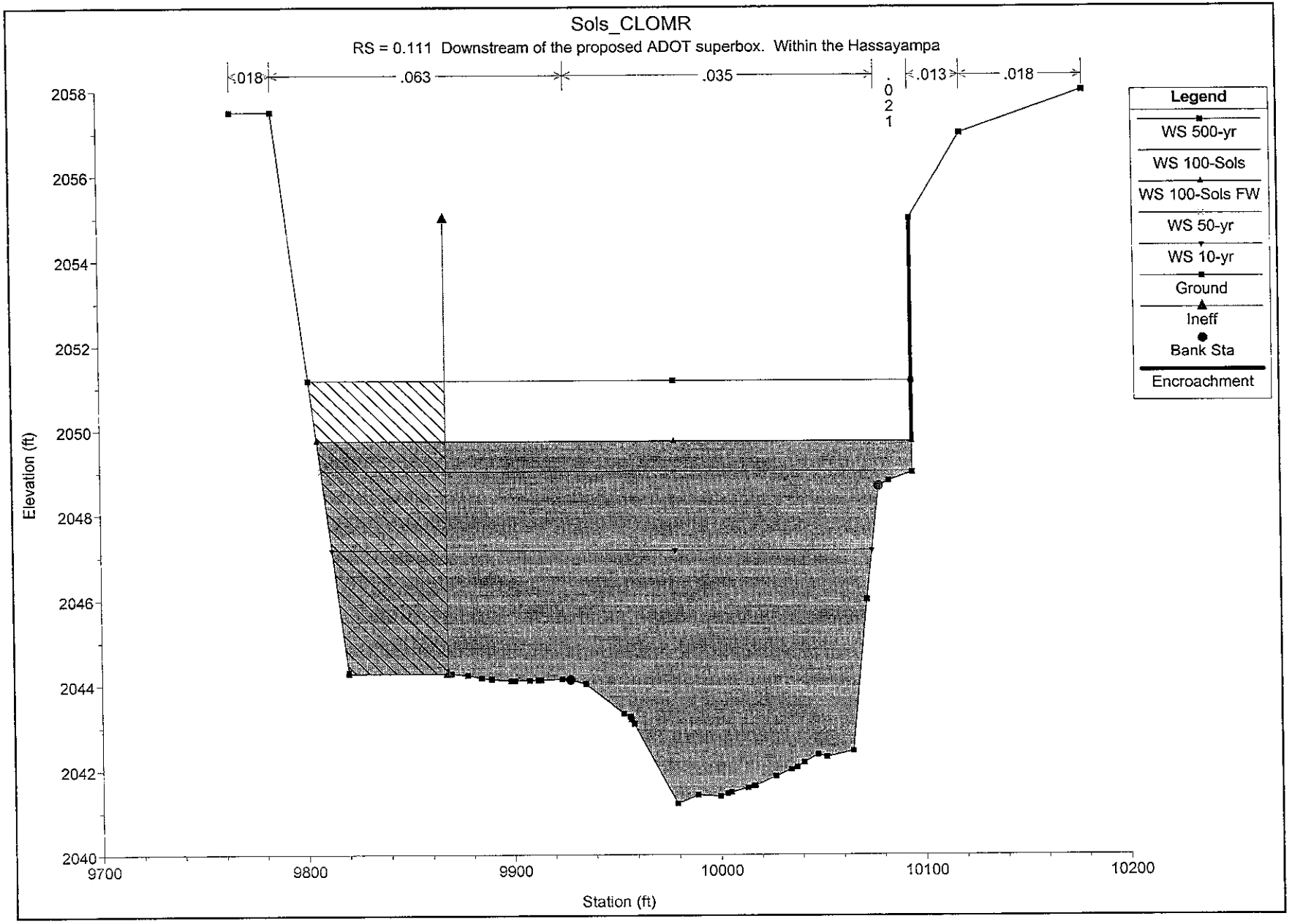

Sols_CLOMR
RS = 0.150
.03
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2060
2055
2050
2045
2040
9850
9900
9950
10000
10050
10100
Station (ft)

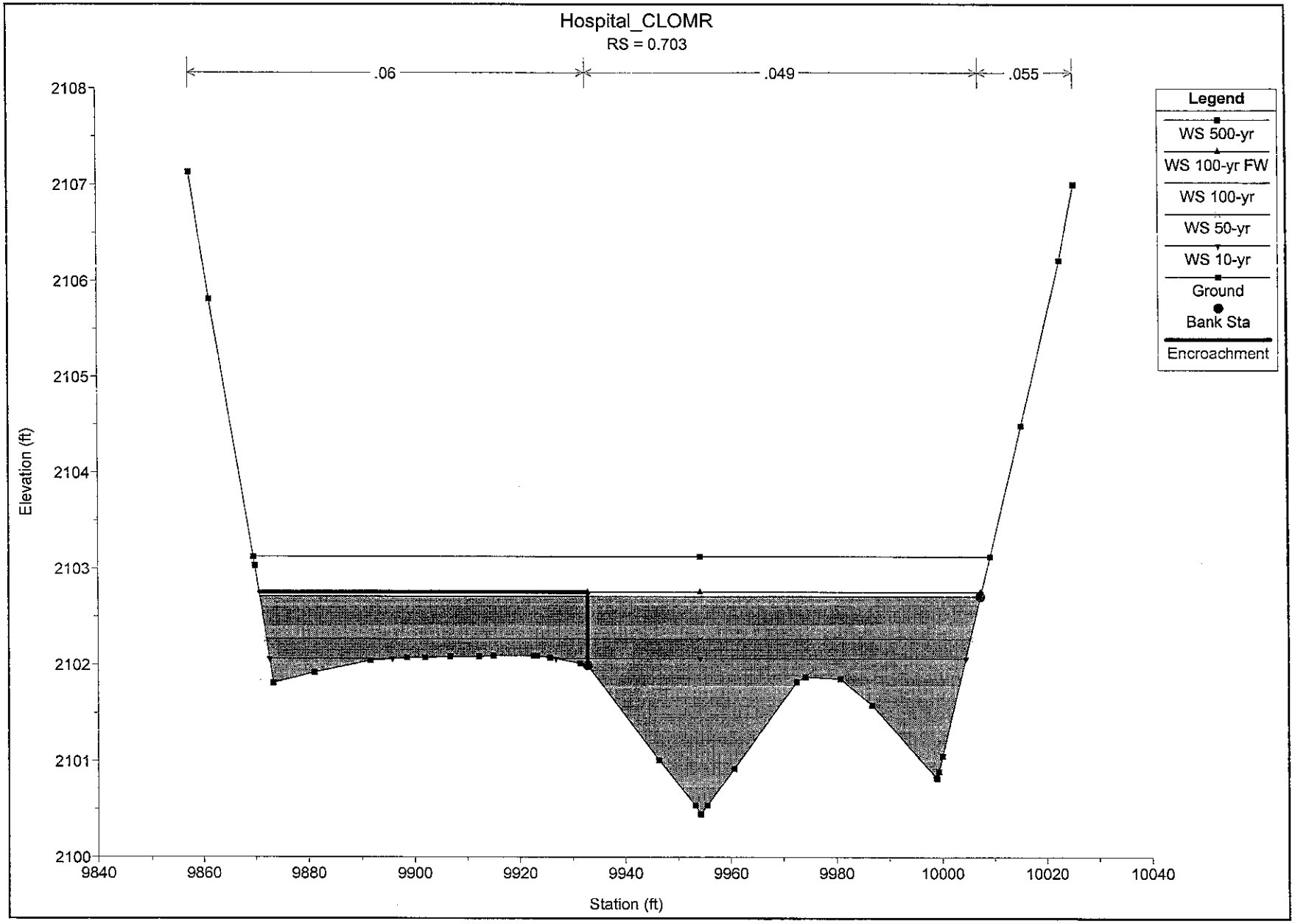

Sols_CLOMR
RS = 0.140
.03
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2060
2055
2050
2045
2040
9850
9900
9950
10000
10050
10100
10150
Station (ft)

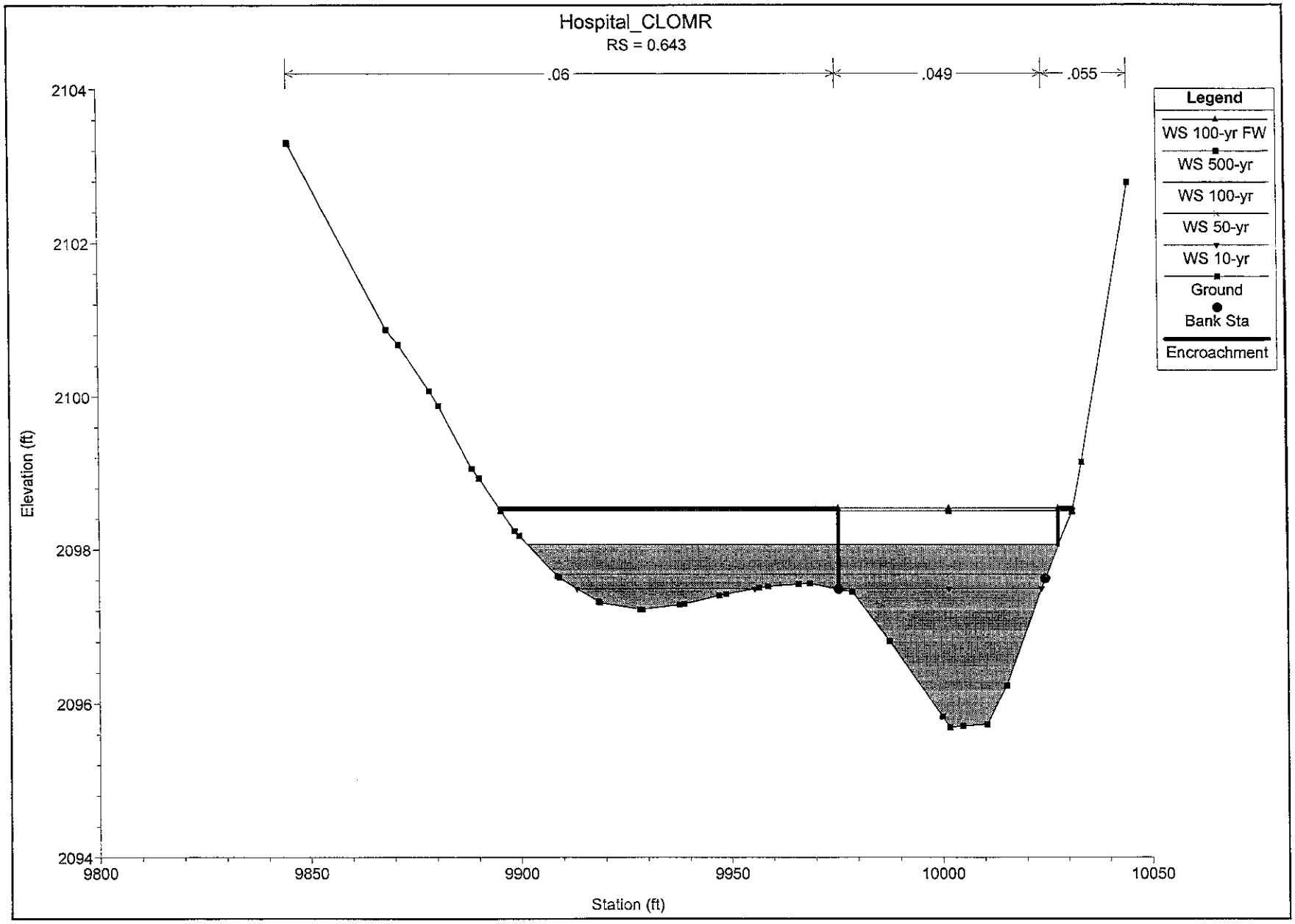

Sols_CLOMR
RS = 0.132 Just upstream of the proposed ADOT superbox. Cross section skew
.03
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2060
2058
2056
2054
2052
2050
2048
2046
2044
2042
2040
9850
9900
9950
10000
10050
10100
10150
Station (ft)

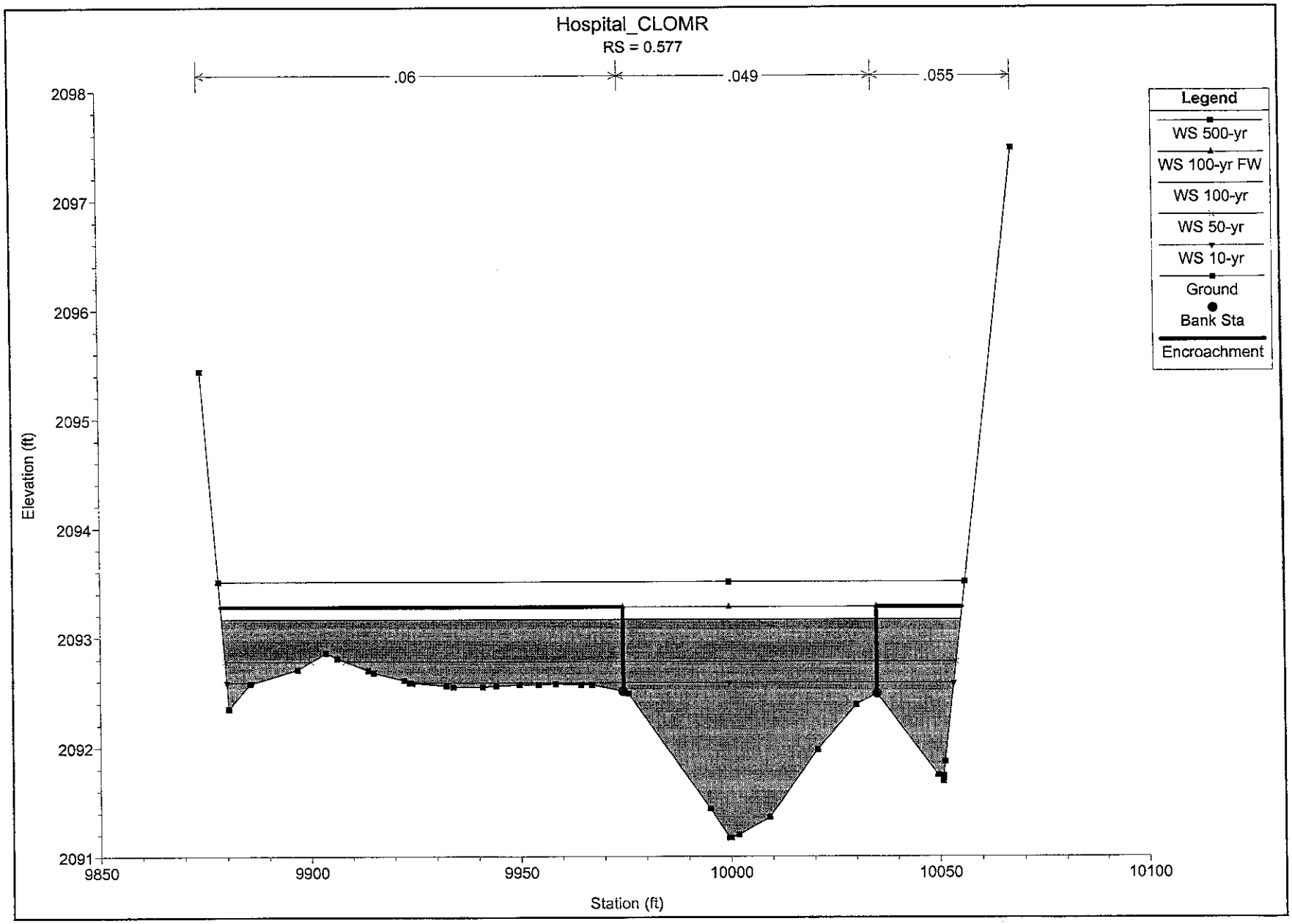

Sols_CLOMR
RS = 0.121 BR
.03
Legend
WS 500-yr
WS 100-Sols FW
WS 100-Sols
WS 50-yr
WS 10-yr
Ground
Bank Sta
Pier Debris
Encroachment
Elevation (ft)
2060
2058
2056
2054
2052
2050
2048
2046
2044
2042
2040
9850
9900
9950
10000
10050
10100
10150
Station (ft)

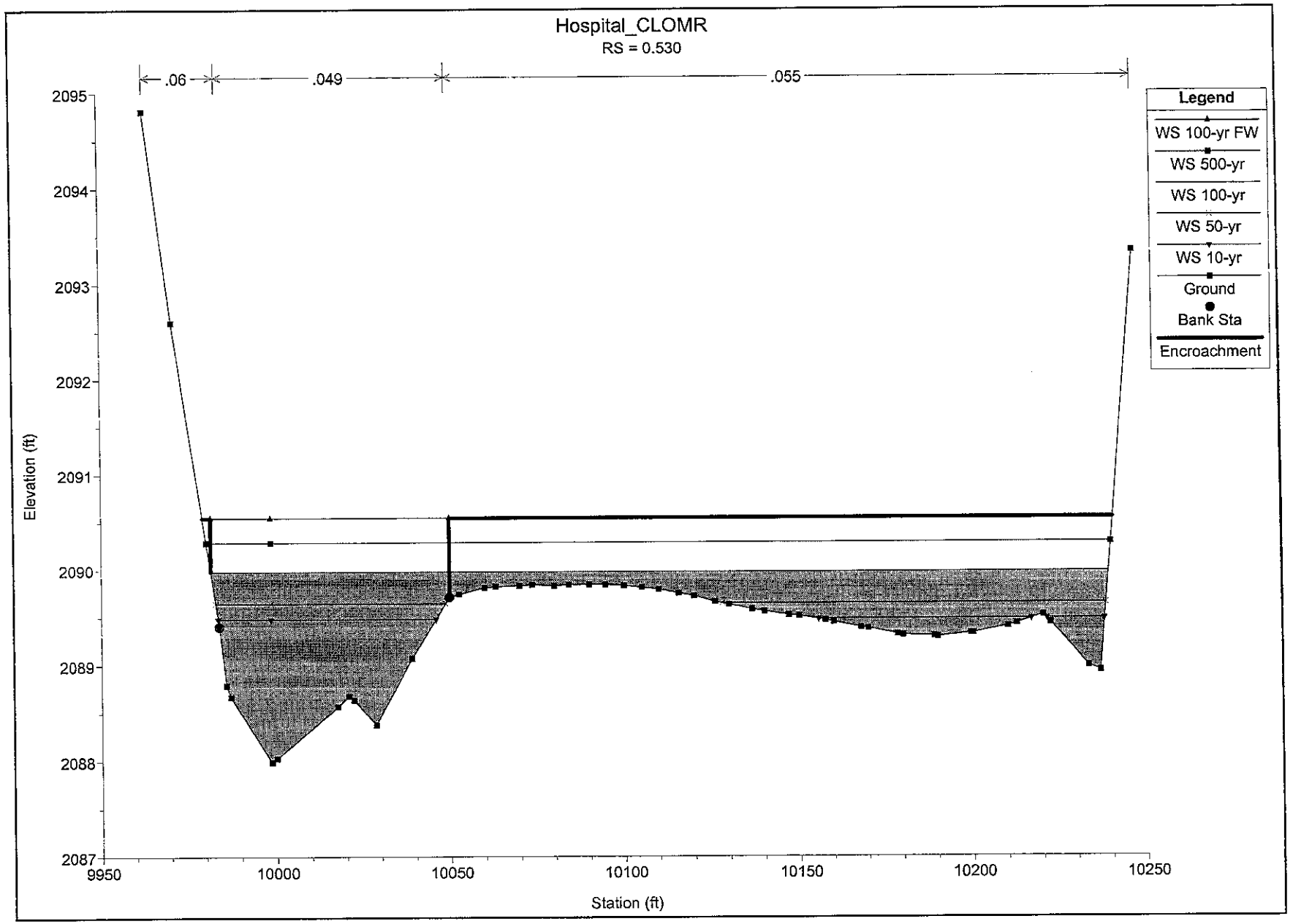

Sols_CLOMR
RS = 0.121 BR
.018
.063
.035
.021
.013
.018
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
2060
2058
2056
2054
2052
2050
2048
2046
2044
2042
2040
9700
9800
9900
10000
10100
10200
Station (ft)

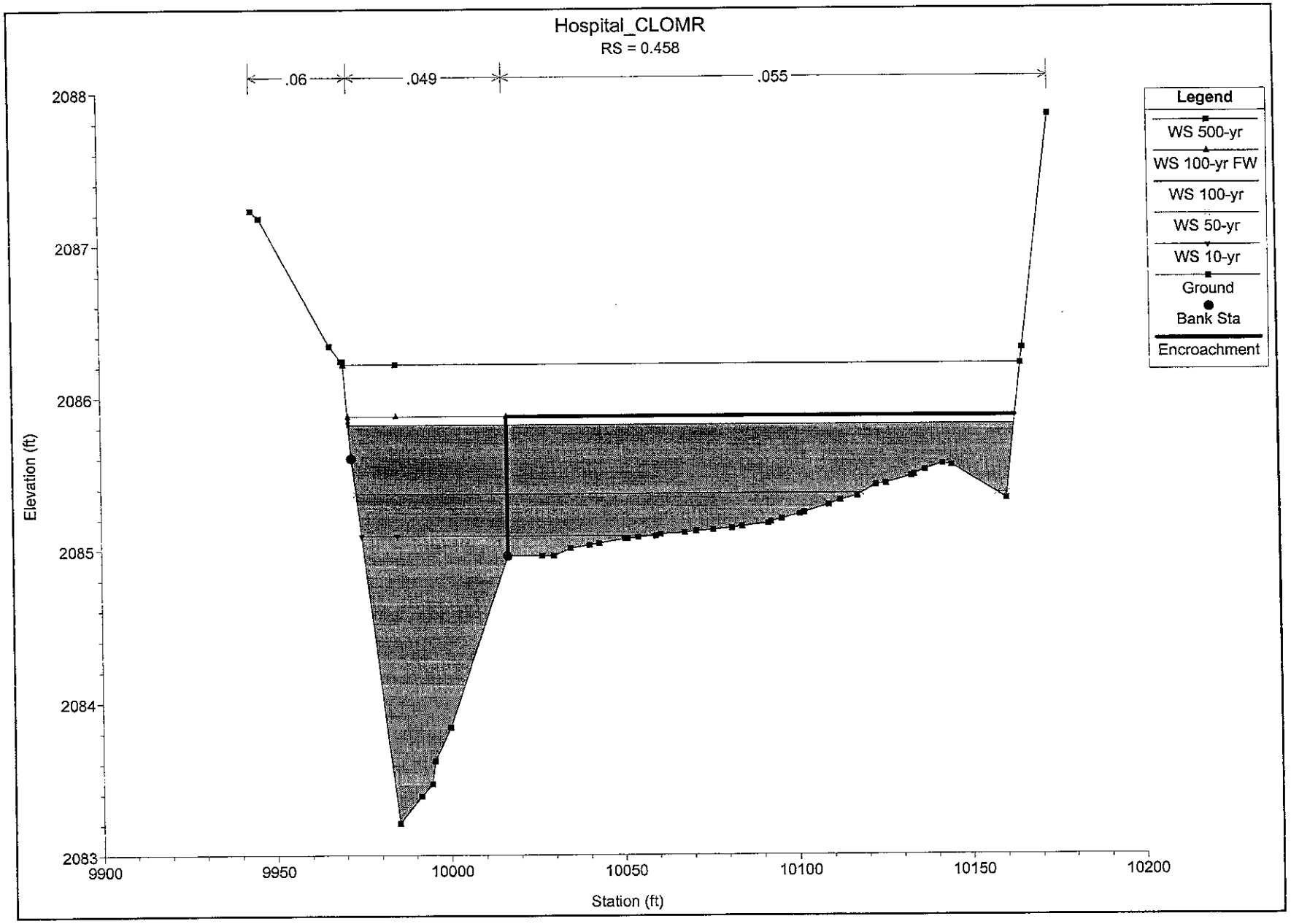

Sols_CLOMR
RS = 0.111 Downstream of the proposed ADOT superbox. Within the Hassayampa
.018
.063
.035
.021
.013
.018
Legend
WS 500-yr
WS 100-Sols
WS 100-Sols FW
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
2058
2056
2054
2052
2050
2048
2046
2044
2042
2040
9700
9800
9900
10000
10100
10200
Station (ft)

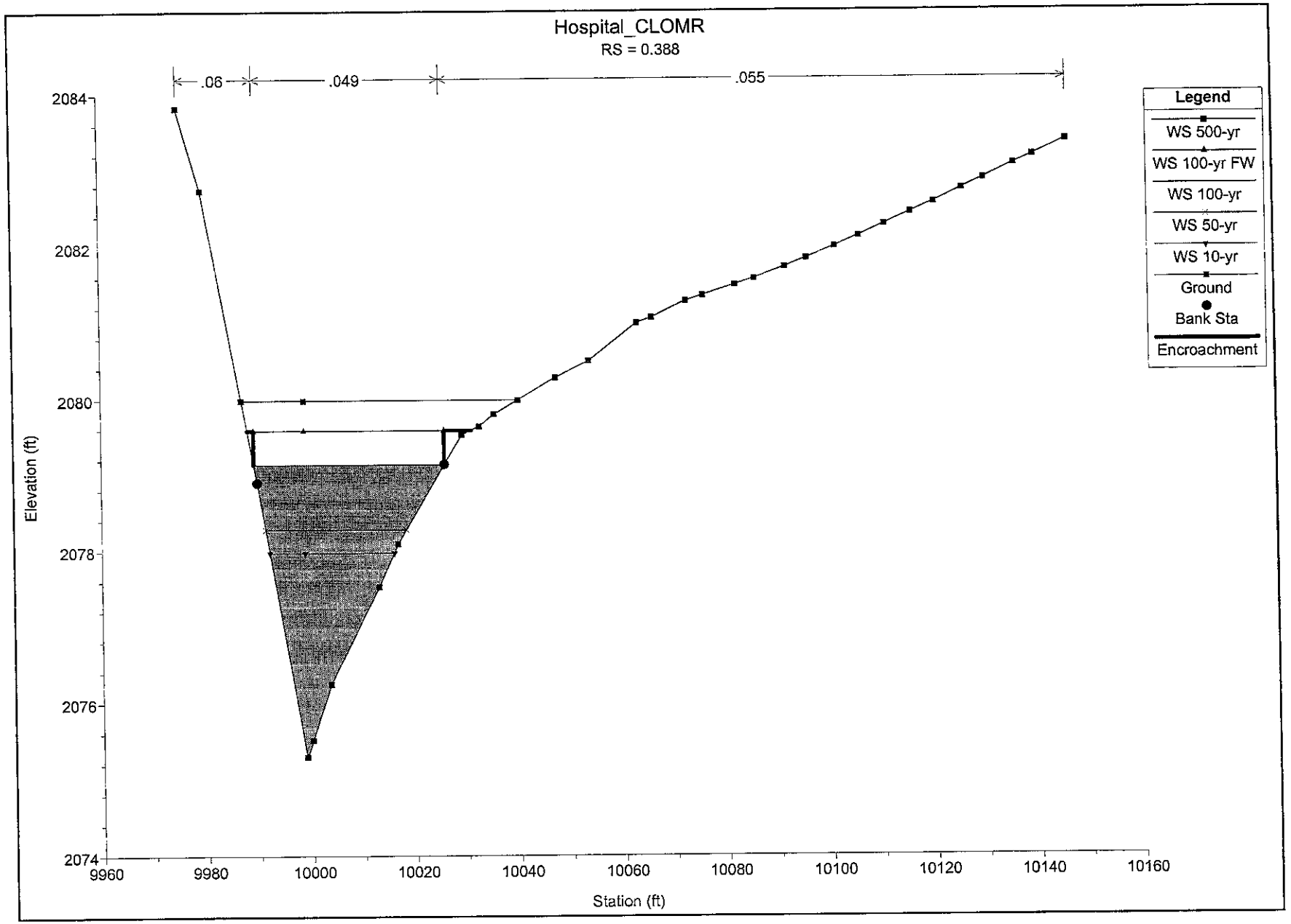

Hospital_CLOMR
RS = 0.703
.06
.049
.055
Legend
WS 500-yr
WS 100-yr FW
WS 100-yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2108
2107
2106
2105
2104
2103
2102
2101
2100
9840
9860
9880
9900
9920
9940
9960
9980
10000
10020
10040
Station (ft)

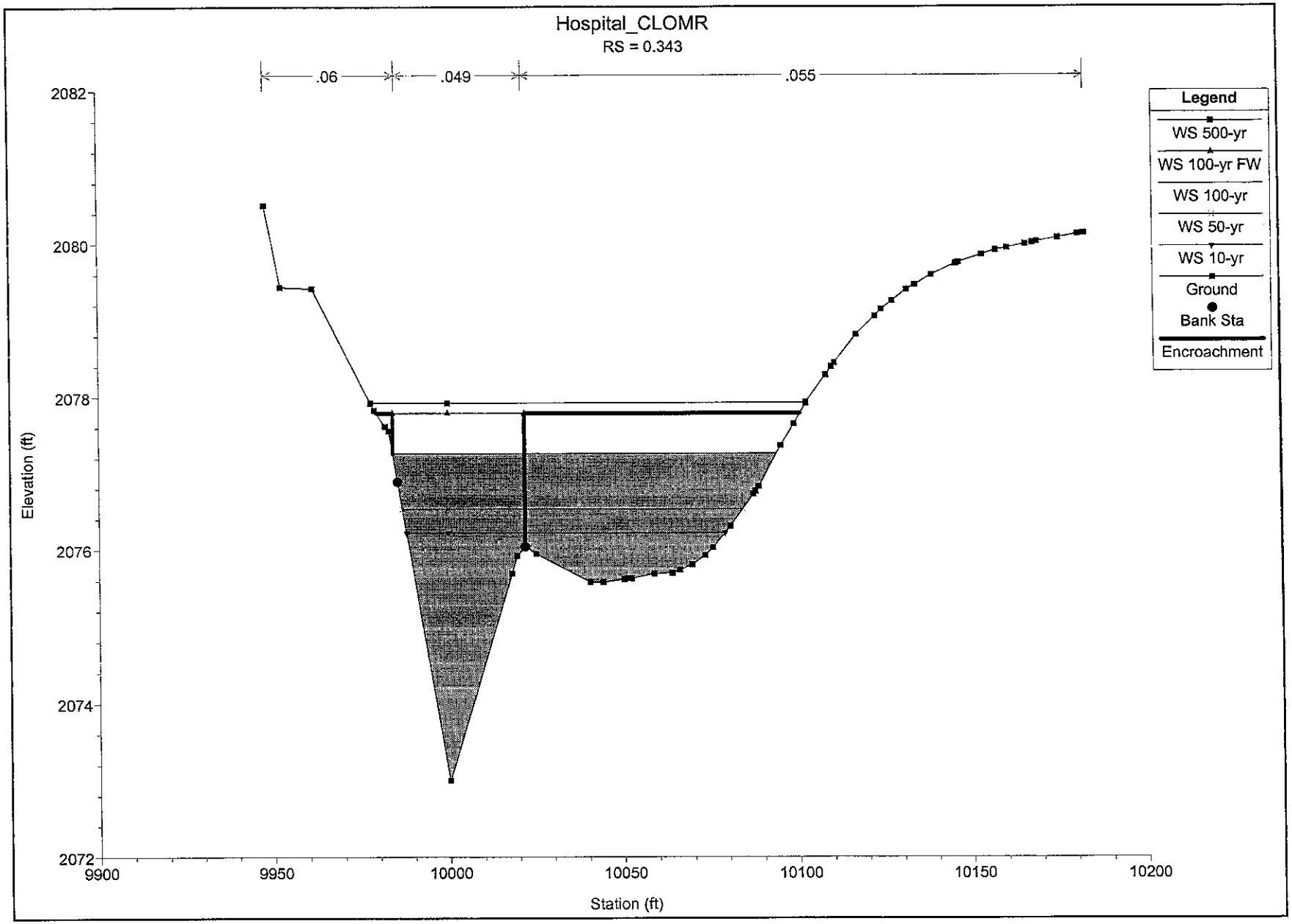

Hospital_CLOMR
RS = 0.643
.06
.049
.055
Legend
WS 100-yr FW
WS 500-yr
WS 100-yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2104
2102
2100
2098
2096
2094
9800
9850
9900
9950
10000
10050
Station (ft)

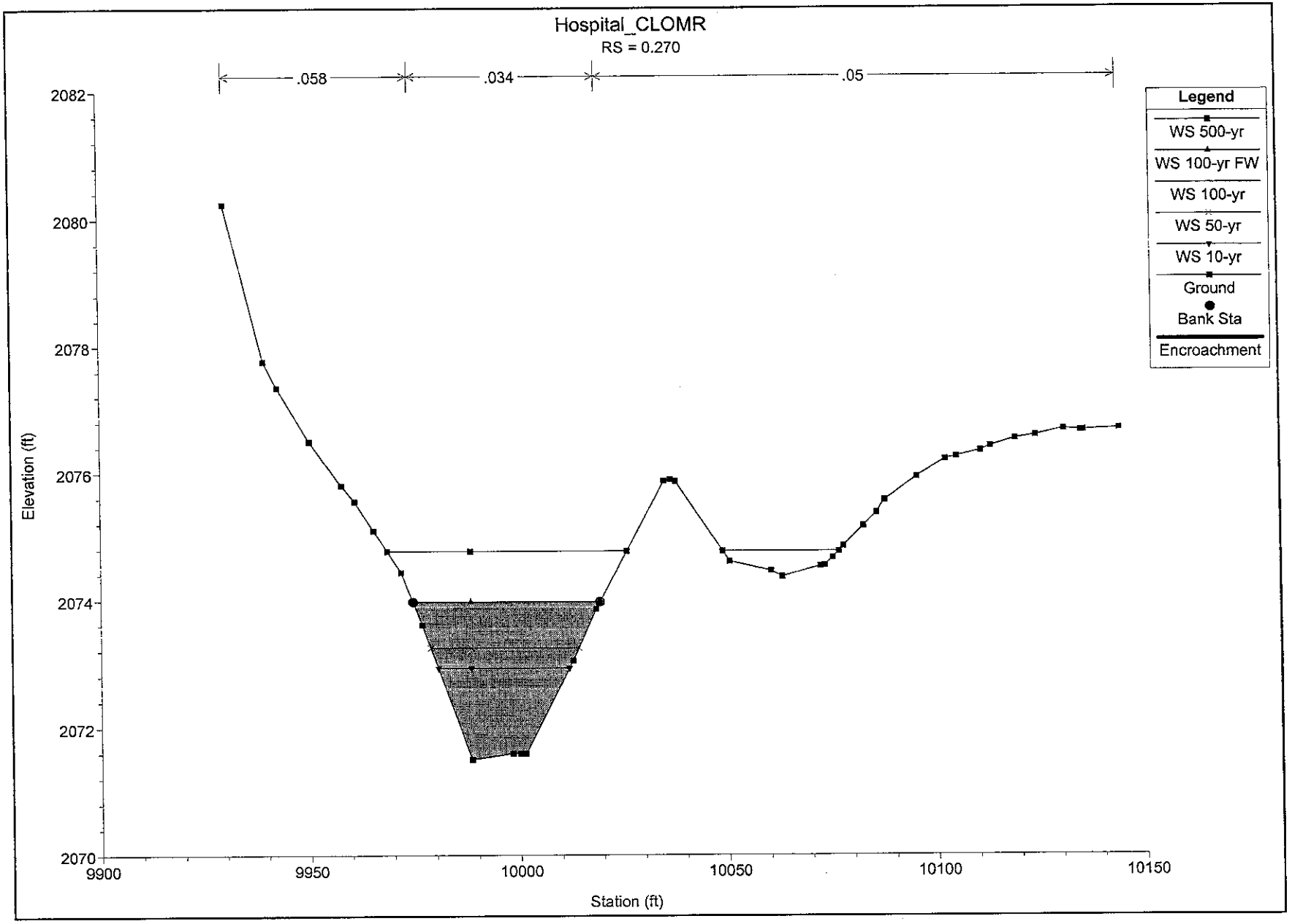

Hospital_CLOMR
RS = 0.577
.06
.049
.055
Legend
WS 500-yr
WS 100-yr FW
WS 100-yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2098
2097
2096
2095
2094
2093
2092
2091
9850
9900
9950
10000
10050
10100
Station (ft)

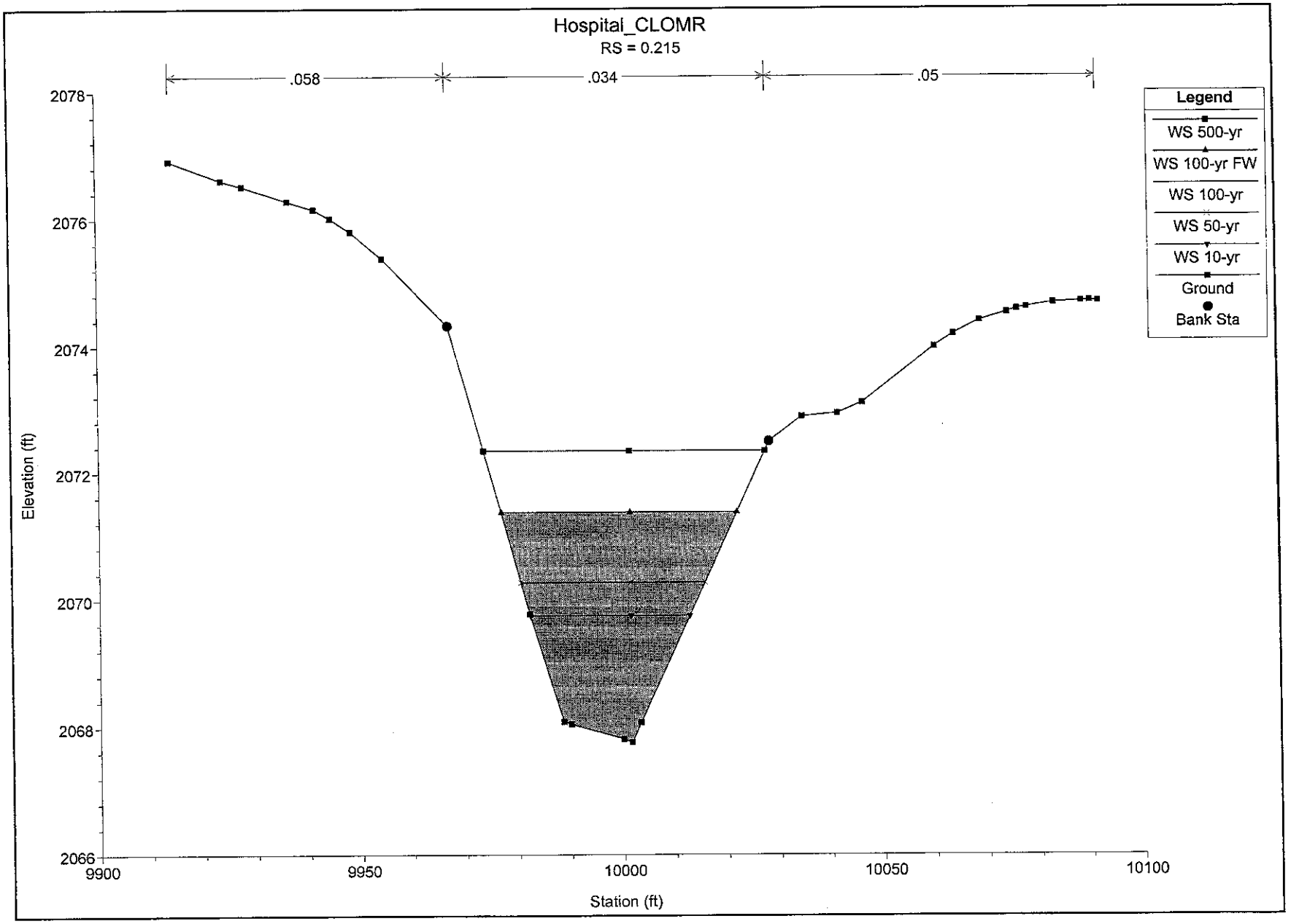

Hospital_CLOMR
RS = 0.530
.06
.049
.055
Legend
WS 100-yr FW
WS 500-yr
WS 100-yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2095
2094
2093
2092
2091
2090
2089
2088
2087
9950
10000
10050
10100
10150
10200
10250
Station (ft)

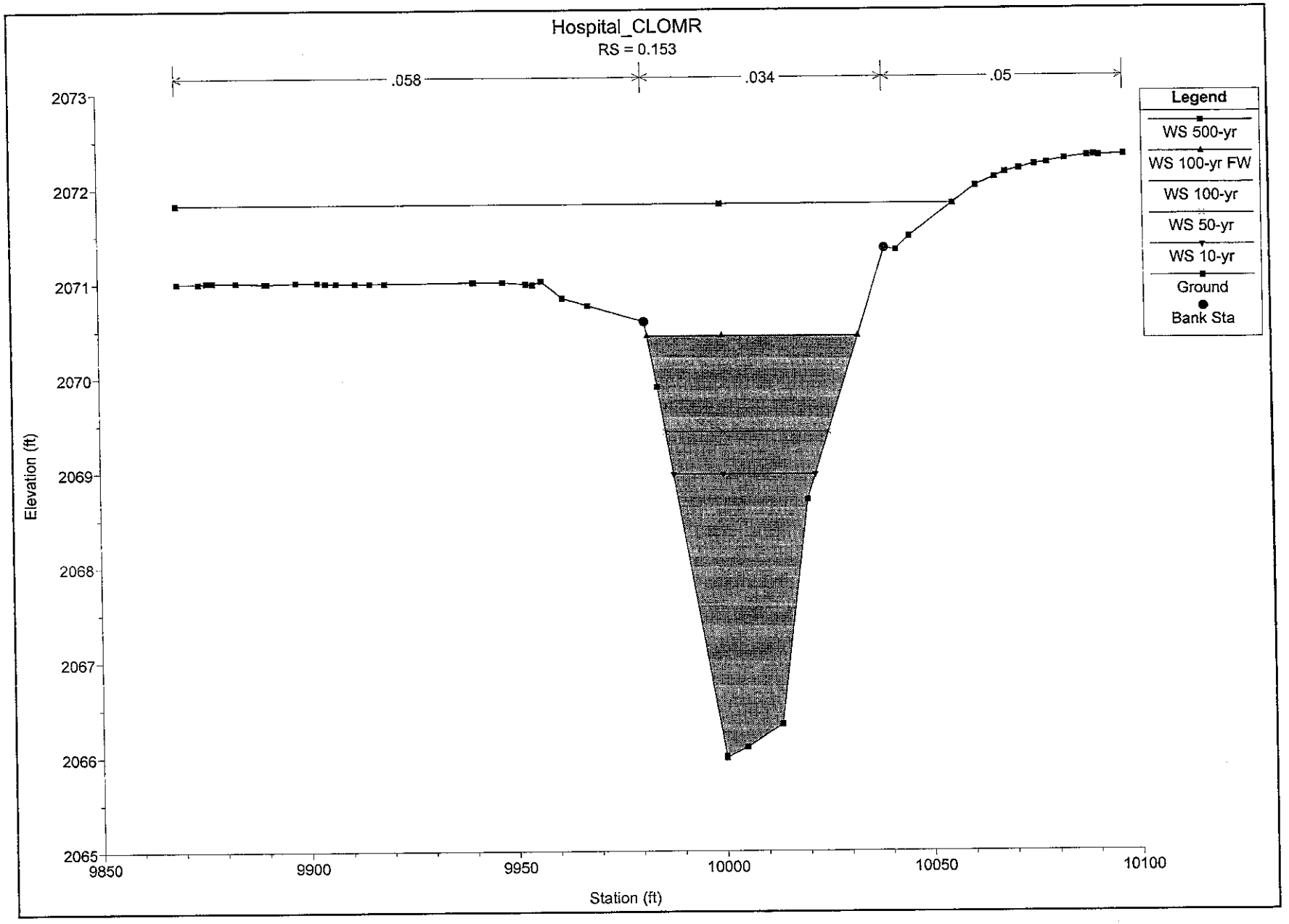

Hospital_CLOMR
RS = 0.458
.06
.049
.055
Legend
WS 500-yr
WS 100-yr FW
WS 100-yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2088
2087
2086
2085
2084
2083
9900
9950
10000
10050
10100
10150
10200
Station (ft)

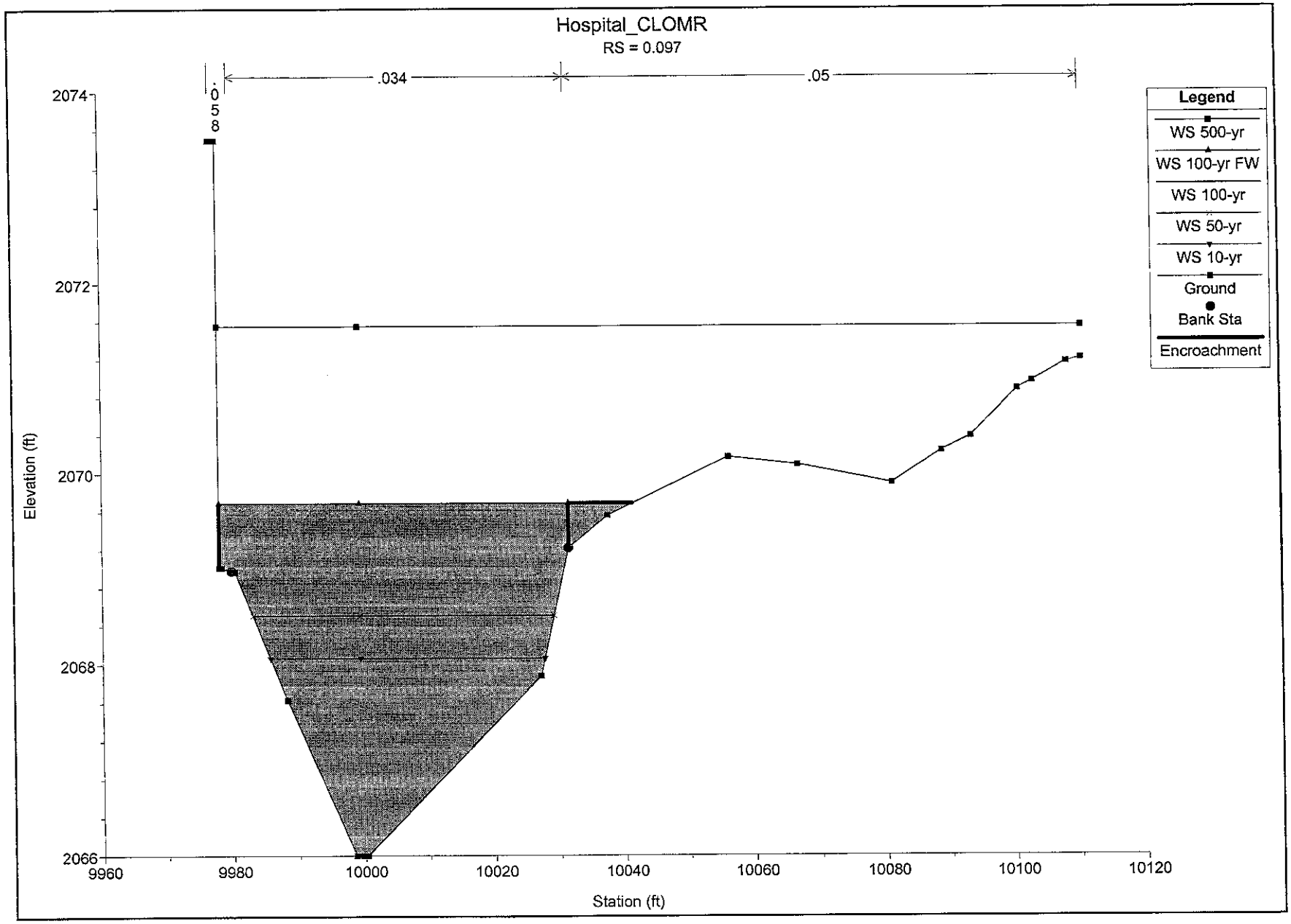

Hospital_CLOMR
RS = 0.388
.06
.049
.055
Legend
WS 500-yr
WS 100-yr FW
WS 100-yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2084
2082
2080
2078
2076
2074
9960
9980
10000
10020
10040
10060
10080
10100
10120
10140
10160
Station (ft)

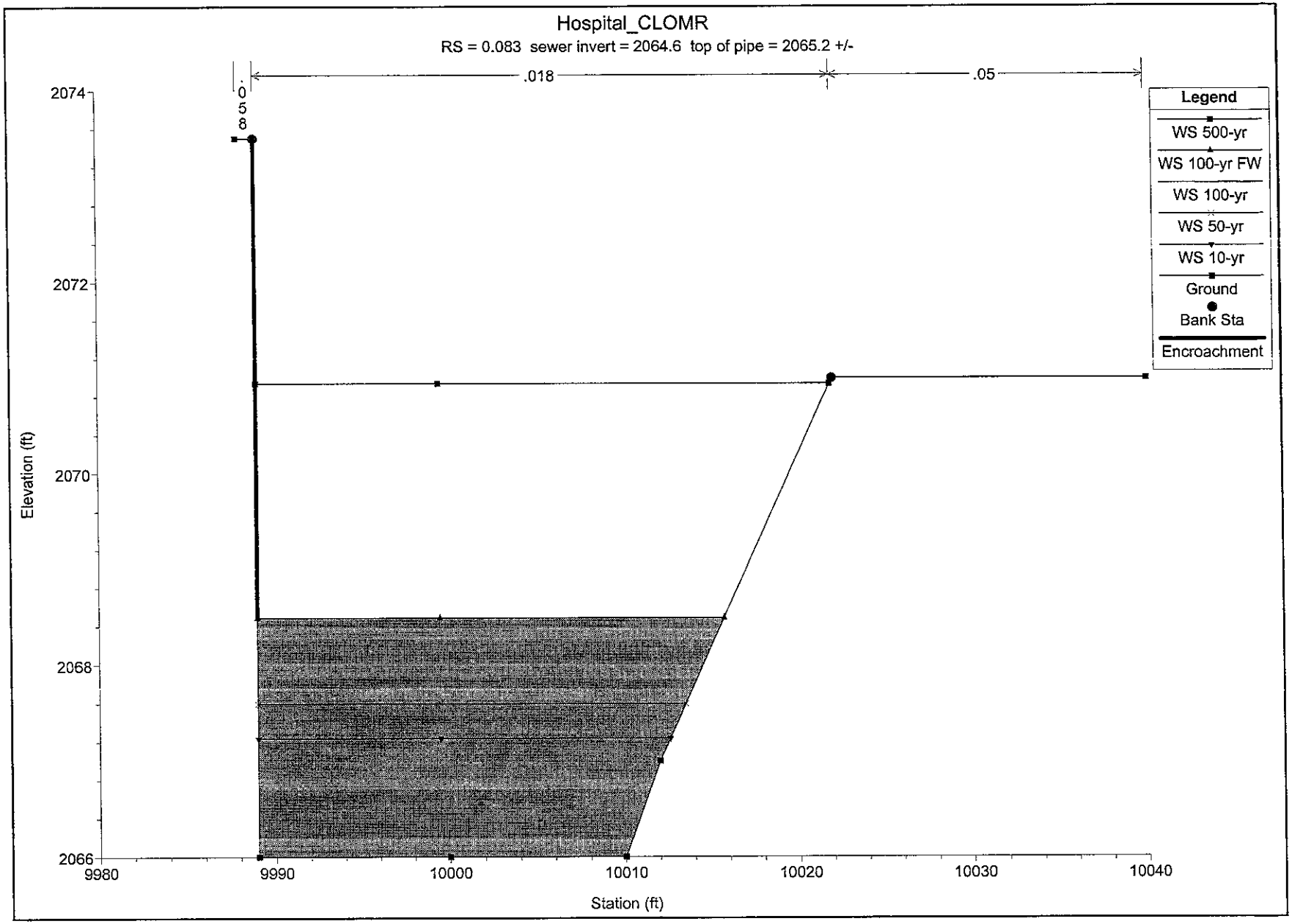

Hospital_CLOMR
RS = 0.343
.06
.049
.055
Legend
WS 500-yr
WS 100-yr FW
WS 100-yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2082
2080
2078
2076
2074
2072
9900
9950
10000
10050
10100
10150
10200
Station (ft)

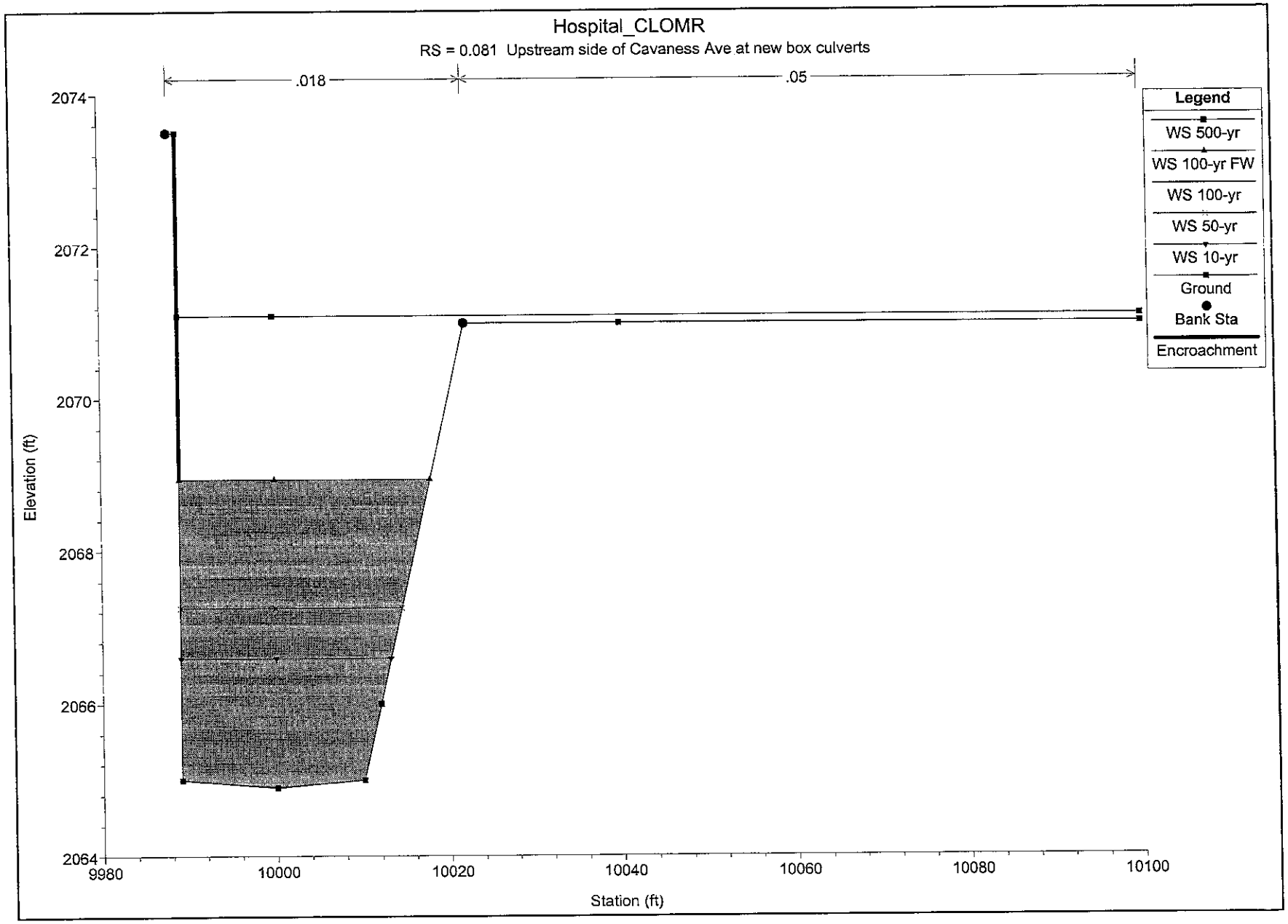

Hospital_CLOMR
RS = 0.270
.058
.034
.05
Legend
WS 500-yr
WS 100-yr FW
WS 100-yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2082
2080
2078
2076
2074
2072
2070
9900
9950
10000
10050
10100
10150
Station (ft)

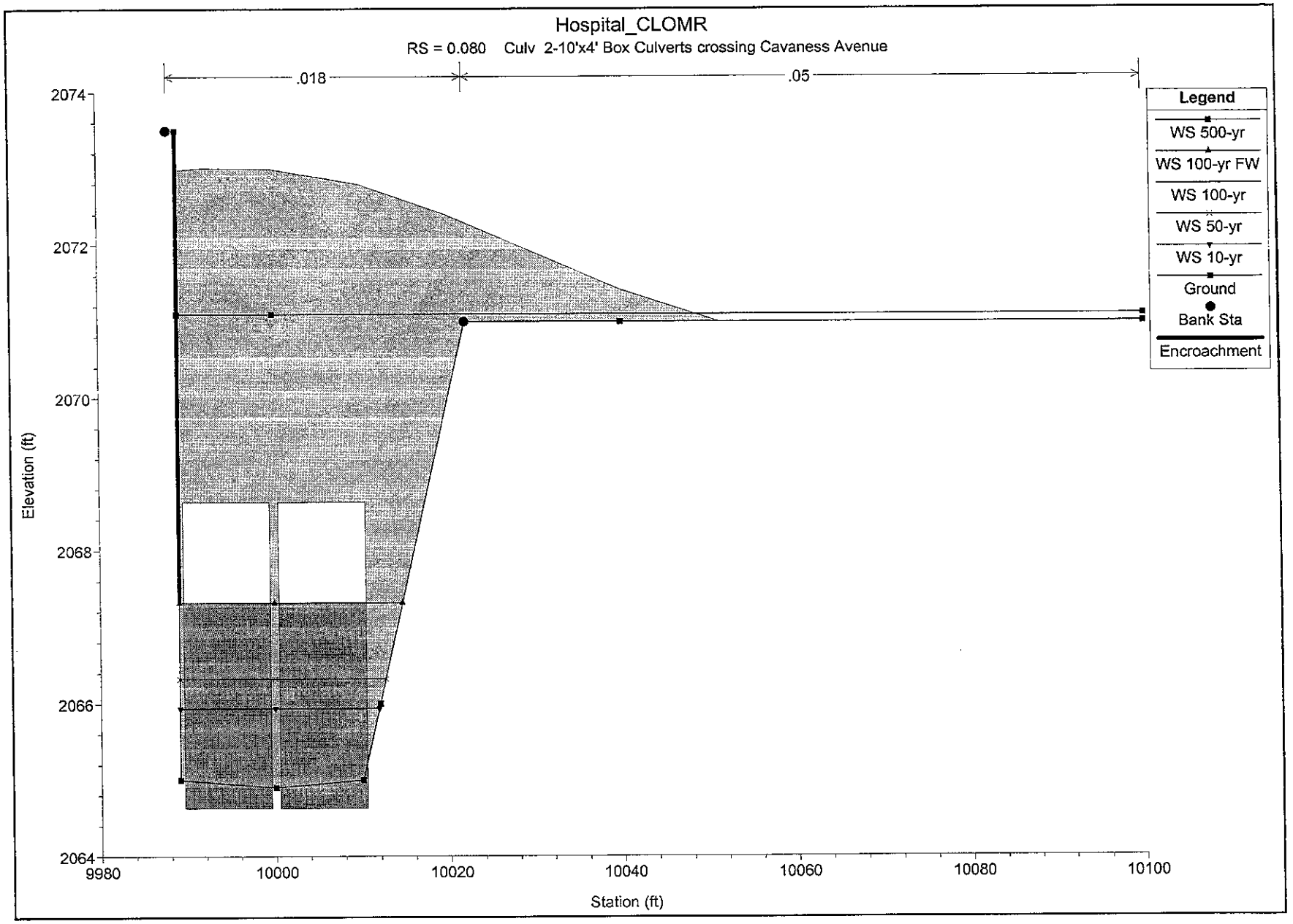

Hospital_CLOMR
RS = 0.215
.058
.034
.05
Legend
WS 500-yr
WS 100-yr FW
WS 100-yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
2078
2076
2074
2072
2070
2068
2066
9900
9950
10000
10050
10100
Station (ft)

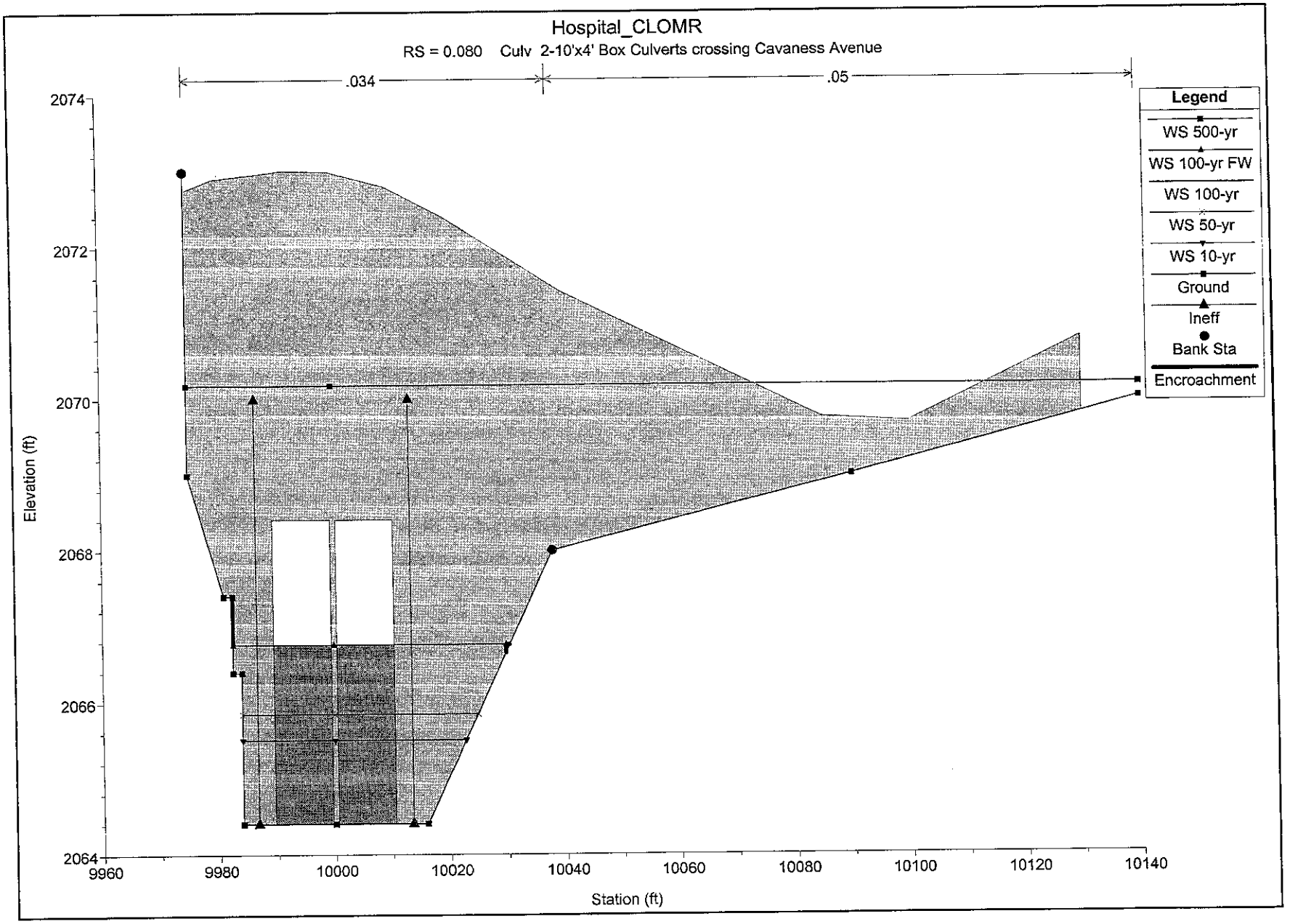

Hospital_CLOMR
RS = 0.153
.058
.034
.05
Legend
WS 500-yr
WS 100-yr FW
WS 100-yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
2073
2072
2071
2070
2069
2068
2067
2066
2065
9850
9900
9950
10000
10050
10100
Station (ft)

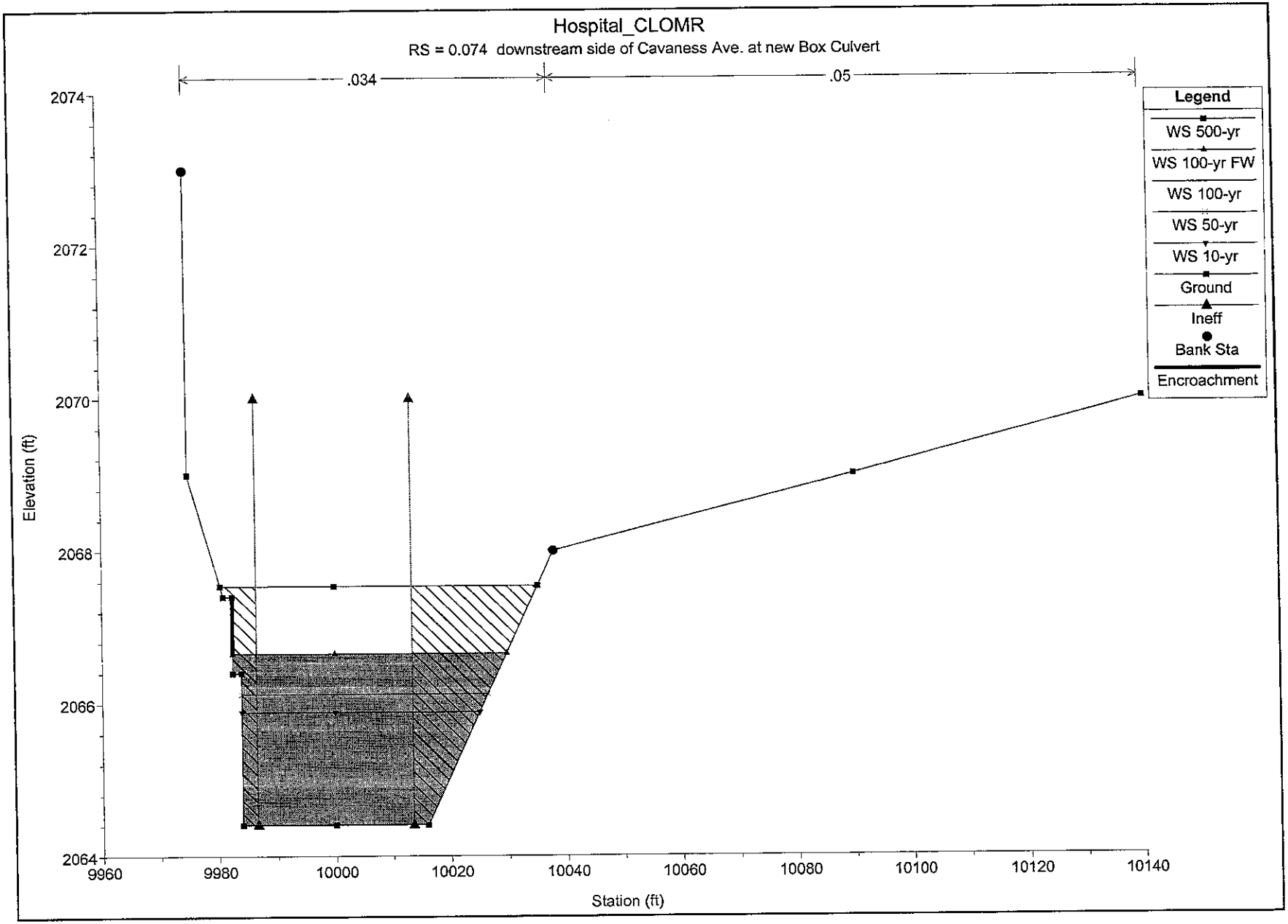

Hospital_CLOMR
RS = 0.097
.058
.034
.05
Legend
WS 500-yr
WS 100-yr FW
WS 100-yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2074
2072
2070
2068
2066
9960
9980
10000
10020
10040
10060
10080
10100
10120
Station (ft)

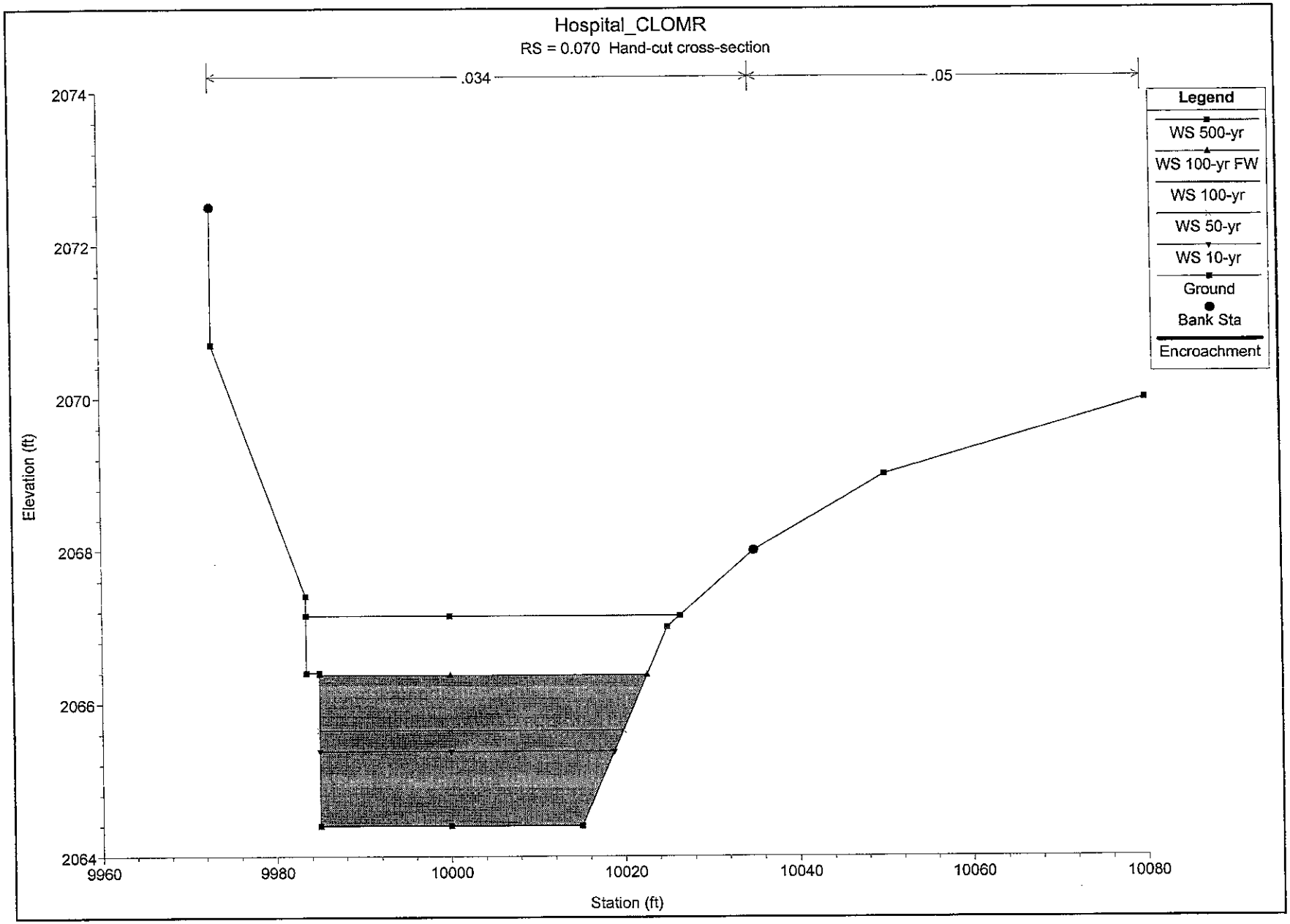

Hospital_CLOMR
RS = 0.083 sewer invert = 2064.6 top of pipe = 2065.2 +/-
.058
.018
.05
Legend
WS 500-yr
WS 100-yr FW
WS 100-yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2074
2072
2070
2068
2066
9980
9990
10000
10010
10020
10030
10040
Station (ft)


Hospital_CLOMR
RS = 0.081 Upstream side of Cavaness Ave at new box culverts
.018
.05
Legend
WS 500-yr
WS 100-yr FW
WS 100-yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2074
2072
2070
2068
2066
2064
9980
10000
10020
10040
10060
10080
10100
Station (ft)


Hospital_CLOMR
RS = 0.080 Culv 2-10'x4' Box Culverts crossing Cavaness Avenue
.018
.05
Legend
WS 500-yr
WS 100-yr FW
WS 100-yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2074
2072
2070
2068
2066
2064
9980
10000
10020
10040
10060
10080
10100
Station (ft)


Hospital_CLOMR
RS = 0.080 Culv 2-10'x4' Box Culverts crossing Cavaness Avenue
.034
.05
Legend
WS 500-yr
WS 100-yr FW
WS 100-yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
2074
2072
2070
2068
2066
2064
9960
9980
10000
10020
10040
10060
10080
10100
10120
10140
Station (ft)


Hospital_CLOMR
RS = 0.074 downstream side of Cavaness Ave. at new Box Culvert
.034
.05
Legend
WS 500-yr
WS 100-yr FW
WS 100-yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
2074
2072
2070
2068
2066
2064
9960
9980
10000
10020
10040
10060
10080
10100
10120
10140
Station (ft)


Hospital_CLOMR
RS = 0.070 Hand-cut cross-section
.034
.05
Legend
WS 500-yr
WS 100-yr FW
WS 100-yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Encroachment
Elevation (ft)
2074
2072
2070
2068
2066
2064
9960
9980
10000
10020
10040
10060
10080
Station (ft)

Appendix E.3

HOSPITAL WASH AND SOLS WASH EFFECTIVE MODEL PRINTOUTS

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*****************************************
HEC2 VERSION UPDATED JAN 1976
ERROR CORRECTIONS 01,02,03,04,05,06,07,08,09
MODIFICATIONS 52,53,54,55,56,57,58
*****************************************


T1    WITKENBURG  FTS   1975
T2    HOSPITAL  CASH   500 YEAR FLOOD
T3    DETERMINE   USE S-CS CASH TIME

J1   IDWRT    IPG      NINT      IMIN      STRT      METRIC    RVINS     Q         WSEL
     0.       0.       0.        0.        0.000000  0.00      0.0       0.        2089.500  0.000

J2   XPRCP    TPCPT    PRFVS     XSECV     XSECH     FN        ALLOC     ISK       CHNIM     ITRACE
     0.000    0.000    0.000     0.000     0.000     0.000     1.000     0.000     0.000     15.000

NC       .050      .150      .000      .100      .300      0.000     0.000     0.000     0.000     0.000
NT      4.000  2000.000   900.000   600.000   150.000     0.000     0.000     0.000     0.000     0.000

X1      1.000     5.000    50.000   340.000     0.000     0.000     0.000     0.000     0.000     0.000
GR   2100.000     0.000  2090.000    50.000  2088.000   165.000  2090.000   320.000  2100.000   360.000

X1      2.000     6.000    40.000   255.000   300.000   250.000   270.000     0.000     0.000     0.000
GR   2100.000     0.000  2095.000    40.000  2093.000   160.000  2095.000   255.000  2100.000   275.000

X1      3.000     5.000    10.000   230.000   310.000   340.000   320.000     0.000     0.000     0.000
GR   2105.000     0.000  2100.000    10.000  2098.000   130.000  2100.000   230.000  2105.000   235.000
NJ      0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000
```

```
*****************************************
HEC2 VERSION UPDATED JAN 1976
ERROR CORRECTIONS 01,02,03,04,05,06,07,08,09
MODIFICATIONS 52,53,54,55,56,57,58
*****************************************


T1  FLOOD INSURANCE  STUDY  PICKENBURG  ARIZONA
T2     100 YEAR  FLOOD
T3  HOSPITAL WASH

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ
      =0.      5.      =0.      =0.  =0.000000   =0.00    =0.0     =0.  2089.500   =0.00

J2  NPROF    IPLOT    PRFVS    XSECV    XSECH     FN      ALLDC    IBW      CHNIM    ITRACE
      2.000   =0.000   =0.000   =0.000   =0.000   =0.000   =1.000   =0.000   =0.000   15.000
```

```
*****************************************
HEC2 VERSION UPDATED JAN 1976
ERROR CORRECTIONS 01,02,03,04,05,06,07,08,09
MODIFICATIONS 52,53,54,55,56,57,58
*****************************************


T1  FLOOD INSURANCE   STUDY  KICKENBURG  ARIZONA
T2   50 YEAR  FLOOD
T3  HOSPITAL WASH

J1  ICHECK    INQ        NV      IDIM      SKIP      METRIC    HVINQ     Q         NSEC      TW
     =0.       0.       =0.     =0.  =0.000000    =0.00     =0.0      =0.  4064.500   =0.000

J2  NPROF     IPLOT    PRFVS    XSECV     XSECH     ATM       ALTD      JUMP      CHNIM     ITRACE
     5.000   =0.000   =0.000   =0.000   =1.000   =0.000    =0.000    =0.000    =0.000    =0.000
```

```
*****************************************
HEC2 VERSION UPDATED JAN 1976
ERROR CORRECTIONS 01,02,03,04,05,06,07,08,09
MODIFICATIONS 52,53,54,55,56,57,58
*****************************************


T1  FLOOD INSURANCE   STUDY  WICKENBURG  ARIZONA
T2     10   YEAR FLOOD
T3  HOSPITAL WASH

J1  ICHECK    INQ      NINV     IDIM     STRT     METRIC   HVINS    Q        WSEL     FQ
     *0.       5.      *0.      *0.  *0.000000   *0.00    *0.0     *0.  2056.500  *0.000

J2  NPROF    IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE
    15.000   *0.000   *0.000   *0.000   *0.000   *0.000   *0.000   *0.000   *0.000   *0.000
```

SUMMARY PRINTOUT FOR MULTIPLE PROFILES

TYAL WASH

SECTION NUMBER	CHANNEL LENGTH	MID EL OF ROADWAY	MAX EL OF LOW CHORD	MIN EL GROUND	DISCHARGE (CFS)	CWSEL	CRIWS	EQ	TOPWID	LOKWS	TIME	VOL
1.00	-0.00	0.00	0.00	2088.00	2000.00	2090.14	2090.14	2090.71	290.97	225.18	0.00	0.00
1.00	-0.00	0.00	0.00	2088.00	900.00	2089.56	2089.56	2089.96	226.95	201.10	0.00	0.00
1.00	-0.00	0.00	0.00	2088.00	600.00	2089.50	0.00	2089.71	217.50	143.88	0.00	0.00
1.00	-0.00	0.00	0.00	2088.00	150.00	2088.76	2088.76	2088.90	110.01	311.19	0.00	0.00
2.00	270.00	0.00	0.00	2093.00	2000.00	2095.45	2095.39	2096.04	220.32	177.32	.01	4.00
2.00	270.00	0.00	0.00	2093.00	900.00	2094.93	2094.77	2095.28	208.00	191.52	.02	3.17
2.00	270.00	0.00	0.00	2093.00	600.00	2094.50	2094.50	2094.88	181.36	200.84	.02	.66
2.00	270.00	0.00	0.00	2093.00	150.00	2094.03	0.00	2094.13	110.22	124.50	.03	.31
3.00	320.00	0.00	0.00	2098.00	2000.00	2100.56	2100.35	2101.09	281.45	138.83	.03	2.63
3.00	320.00	0.00	0.00	2098.00	900.00	2099.70	2099.74	2100.22	208.98	187.58	.04	[illegible]
3.00	320.00	0.00	0.00	2098.00	600.00	2099.76	0.00	2099.93	193.85	108.87	.04	1.98
3.00	320.00	0.00	0.00	2098.00	150.00	2098.98	0.00	2099.09	102.94	198.78	.05	[illegible]

SECTION NUMBER	DISCHARGE CFS	CWSEL	CWSEL DIFF EACH Q	CWSEL DIFF EACH SECTION	CWSEL-RSELK	TOPWID	T.W. DIST	LENGTH
1.000	2000.000	2090.139	0.000	0.000	0.000	290.975	0.000	-0.000
1.000	900.000	2089.562	-.578	0.000	0.000	226.947	64.528	-65.000
1.000	600.000	2089.500	-.062	0.000	0.000	217.500	93.478	-0.000
1.000	150.000	2088.763	-.737	0.000	0.000	110.012	180.343	-0.000
2.000	2000.000	2095.451	0.000	5.312	0.000	220.319	0.000	270.000
2.000	900.000	2094.938	-.513	5.373	0.000	208.000	12.320	270.000
2.000	600.000	2094.495	-.439	4.995	0.000	181.383	39.136	270.000
2.000	150.000	2094.025	-.470	5.263	0.000	110.210	110.301	270.000
3.000	2000.000	2100.558	0.000	5.107	0.000	221.651	0.000	320.000
3.000	900.000	2099.903	-.655	4.968	0.000	208.953	12.648	320.000
3.000	600.000	2099.758	-.104	5.263	0.000	193.846	27.802	320.000
3.000	150.000	2098.939	-.820	4.913	0.000	102.416	119.035	320.000

DATA FOR ... CROSS SECTION

REPORT	TYPE FOR	TARGET	TOP WIDTH AREA-ACRES	TOP WIDTH AREA-DIFF
1	[illegible]	0.000	3.210	0.000
2	[illegible]	[illegible]	2.878	-.332
[illegible]	[illegible]	0.000	2.479	-.731
[illegible]	[illegible]	0.000	1.488	-1.722

```
*****************************************
HEC2 VERSION UPDATED JAN 1976
ERROR CORRECTIONS 01,02,03,04,05,06,07,08,09
MODIFICATIONS 52,53,54,55,56,57,58
*****************************************


T1  FLOOD INSURANCE  STUDY  WICKENBURG  ARIZONA   1975
T2    HOSPITAL  WASH   100 YEAR FLOOD
T3    GRISWALD  USE BOLS WASH TOWN

J1  ICHECK   INTT    NINV    IDIM    IRPT    METRIC   HVINS    Q      *SEL     PS
        .0       2       *0.     *0.  *0.000000   *0.00    *0.0    *0.  2069.000   *0.000

J2  *NCHK    INQT    PRFVS   XSECV   XSECH    FN     ALLOC    IBW     CHNIM   ITRACE
        1.000   *0.000  *0.000  *0.000  *0.000  *0.000   *1.000  *0.000  *0.000  *10.000

J3      1.000    *.000   35.000    *.000   27.000   28.000   35.000   *0.000   *0.000   *0.000
NC       .050     .050     .040     .100     .300   *0.000   *0.000   *0.000   *0.000   *0.000
GT     2.000  *00.000  *00.000  *0.000   *0.000   *0.000   *0.000   *0.000   *0.000   *0.000
ET     *0.000   *0.000   10.000   *0.000   *0.000   *0.000   *0.000   *0.000   *0.000   *0.000

X1      1.000    5.000   50.000  340.000   *0.000   *0.000   *0.000   *0.000   *0.000   *0.000
SX   2100.000   *.000 2060.000   50.000 2060.000  165.000 2070.000  380.000 2100.000  360.000

X1      2.000    5.000   40.000  255.000  300.000  250.000  270.000   *0.000   *0.000   *0.000
SX   2100.000    .000 2065.000   40.000 2093.000  160.000 2095.000  285.000 2130.000  275.000

X1      1.000    5.000   10.000  230.000  310.000  340.000  320.000   *0.000   *0.000   *0.000
SX   2100.000    .000 2100.000   10.000 2095.000  150.000 2100.000  280.000 2105.000  235.000
        *.000   *.000   *0.000   *0.000   *0.000   *0.000   *0.000   *0.000   *0.000   *0.000
```

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*****************************************
HEC2 VERSION UPDATED JAN 1976
ERROR CORRECTIONS 01,02,03,04,05,06,07,08,09
MODIFICATIONS 52,53,54,55,56,57,58
*****************************************


T1  FLOOD INSURANCE   STUDY  WICKENBURG  ARIZONA
T2  HOSPITAL WASH  FLOODWAY
T3

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    Q        WSEL     FQ
      *0.      3.      *0.      *0.  *0.000000   *0.00    *0.0     *0.  2090.500   *0.000

J2  NPROF    IPLOT    PRFVS    XSECV    XSECH    FN       ALLOC    IDM      CHNIM    ITRACE
     14.000   *0.000   *0.000   *0.000   *0.000   *0.000   *1.000   *0.000   *0.000   19.000
```

SUMMARY PRINTOUT FOR MULTIPLE PROFILES

SECTION NUMBER	CHANNEL LENGTH	MIN EL OF ROADWAY	MAX EL OF LOW CHORD	MIN EL GROUND	DISCHARGE (CFS)	CWSEL	WSELK	TYPE C	TOPWID	SLENCL	SLENCR	TW
1.00	-0.00	0.00	0.00	2088.00	900.00	2089.56	2089.56	0.00	226.45	0.00	0.00	55.70
1.00	-0.00	0.00	0.00	2088.00	900.00	2090.56	2089.56	0.00	290.00	50.00	300.00	228.17
2.00	270.00	0.00	0.00	2093.00	900.00	2094.93	0.00	0.00	208.00	0.00	0.00	13.18
2.00	270.00	0.00	0.00	2093.00	900.00	2095.93	2094.93	4.00	215.00	40.00	255.00	239.20
3.00	320.00	0.00	0.00	2098.00	900.00	2099.90	0.00	0.00	208.98	0.00	0.00	71.26
3.00	320.00	0.00	0.00	2098.00	900.00	2100.90	2099.90	4.00	220.00	10.00	230.00	238.17

SECTION NUMBER	DISCHARGE CFS	CWSEL	CWSEL DIFF EACH Q	CWSEL DIFF EACH SECTION	CWSEL-WSELK	TOPWID	T.W. DIFF	LENGTH
1.000	900.000	2089.562	0.000	0.000	0.000	226.447	0.000	-0.000
1.000	900.000	2090.562	1.000	0.000	0.000	290.001	-63.554	-0.000
2.000	900.000	2094.935	0.000	5.373	0.000	208.000	0.000	270.000
2.000	900.000	2095.935	1.000	5.373	1.000	215.001	-7.001	270.000
3.000	900.000	2099.903	0.000	4.968	0.000	208.983	0.000	320.000
3.000	900.000	2100.903	1.000	4.968	1.000	220.001	-11.018	320.000

DATA FOR LAST CROSS SECTION

PROFILE	TYPE ENC	TARGET	TOP WIDTH AREA-ACRES	TOP WIDTH AREA-DIKE
1	0.000	0.000	2.878	0.000
2	4.000	.001	3.163	.285

THU, OCT 30 1986 14:49:56

THIS RUN EXECUTED THU, OCT 30 1986 14:49:

```
*****************************************
HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
ERROR CORR - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
*****************************************
```

Sols

wash

NOV 18 1986 12:53:29

THIS RUN EXECUTED TUE NOV 18 1986 12:53:29

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**********************************************
HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
ERROR C' : - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
**********************************************

C
T1 SOLS WASH FLOODPLAIN DELINEATION, MARICOPA COUNTY, ARIZONA
T2 BY CELLA BARR ASSOCIATES FOR THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
T3     SOLS WASH  REACH 1        FLOOD INSURANCE RATE ANALYSIS  500 YR

J1  ICHECK    INQ      NINV     IDIR     STRT    METRIC   NVINS     Q      WSEL      FQ

      0.       2.       0.       0.  0.004000    0.00     0.0      0.  2041.000   0.000

J2  NPROF    IPLOT    PRFVS    XSECV    XSECH     FN     ALLDC    IBW    CHNIM   ITRACE

    1.000    0.000   -1.000    0.000    0.000   0.000    0.000  0.000   0.000   15.000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    38.000   1.000    8.000    3.000   26.000  42.000   39.000  4.000  53.000  54.000

    13.000  14.000   15.000  201.000    0.000   0.000    0.000  0.000   0.000   0.000

NC     0.000    0.000    0.000    0.100    0.300    0.000    0.000    0.000    0.000    0.000
NH     4.000    1.000 9476.000    0.065 10104.000    0.025 10340.000    0.065 10722.000    0.000
QT     4.000 20836.000   15.000 12453.000 7019.000    0.000    0.000    0.000    0.000    0.000
          RIVER MILE 0.0 - PROFILE BASE LINE FOR HASSAYAMPA
X1     0.030   21.000 10104.000 10340.000    0.000    0.000    0.000    0.000    0.000    0.000
GR  2044.300 8655.000 2044.400 8730.000 2043.700 8842.000 2043.300 8943.000 2042.600 9054.000
GR  2041.800 9188.000 2041.300 9308.000 2040.700 9395.000 2040.000 9476.000 2039.500 9661.000
GR  2038.700 9840.000 2038.200 10060.000 2038.100 10104.000 2037.100 10183.000 2037.100 10258.000
GR  2036.200 10340.000 2036.200 10440.000 2034.800 10571.000 2033.500 10593.000 2032.300 10682.000
GR  2047.500 10722.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000

NH     4.000    1.000 9438.000    0.065 9963.000    0.025 10044.000    0.065 10935.000    0.000
X1     0.130   42.000 9963.000 10044.000  300.000  560.000  505.000    0.000    0.000    0.000
GR  2048.000 8515.000 2046.200 8945.000 2045.200 9041.000 2044.300 9141.000 2043.700 9248.000
GR  2044.500 9284.000 2044.800 9293.000 2046.300 9299.000 2046.600 9312.000 2043.800 9326.000
GR  2042.700 9402.000 2044.300 9419.000 2042.800 9438.000 2045.000 9459.000 2044.400 9519.000
GR  2044.300 9587.000 2043.500 9635.000 2044.000 9692.000 2043.700 9724.000 2042.700 9748.000
GR  2043.100 9813.000 2043.400 9869.000 2042.900 9928.000 2040.000 9963.000 2040.000 10000.000
GR  2040.000 10026.000 2046.400 10044.000 2047.600 10064.000 2047.600 10126.000 2047.400 10200.000
GR  2049.200 10225.000 2049.800 10307.000 2049.400 10380.000 2047.500 10442.000 2047.500 10486.000
GR  2051.300 10519.000 2052.400 10579.000 2052.900 10643.000 2052.000 10712.000 2050.700 10770.000
GR  2049.600 10831.000 2048.300 10935.000    0.000    0.000    0.000    0.000    0.000    0.000
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NH	3.000	0.065	9963.000	0.025	10037.000	0.065	10788.000	0.000	0.000	0.000
X1	0.220	27.000	9899.000	10019.000	465.000	515.000	500.000	0.000	0.000	0.000
GR	2050.500	9433.000	2049.600	9473.000	2049.700	9508.000	2050.400	9516.000	2050.400	9590.000
GR	2050.400	9669.000	2051.500	9726.000	2051.300	9799.000	2051.000	9899.000	2044.600	9938.000
GR	2043.000	9963.000	2043.000	10000.000	2043.000	10019.000	2058.400	10037.000	2059.300	10170.000
GR	2060.600	10292.000	2061.600	10331.000	2061.400	10381.000	2057.800	10430.000	2056.900	10485.000
GR	2056.400	10541.000	2058.500	10573.000	2060.400	10625.000	2063.400	10628.000	2063.400	10671.000
GR	2062.000	10732.000	2061.700	10788.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.000	0.000	0.000	0.300	0.500	0.000	0.000	0.000	0.000	0.000
NH	4.000	1.000	9538.000	0.065	9905.000	0.025	10101.000	0.065	10414.000	0.000
X1	0.360	23.000	9969.000	10046.000	615.000	785.000	770.000	0.000	0.000	0.000
GR	2055.200	9433.000	2055.800	9497.000	2055.700	9533.000	2056.300	9538.000	2056.400	9594.000
GR	2056.100	9667.000	2056.800	9752.000	2056.800	9866.000	2057.500	9905.000	2053.300	9942.000
GR	2049.200	9969.000	2048.400	9996.000	2048.400	10000.000	2049.100	10046.000	2054.000	10061.000
GR	2060.900	10101.000	2066.000	10136.000	2065.800	10149.000	2066.800	10235.000	2066.600	10290.000
GR	2066.300	10356.000	2066.200	10387.000	2072.800	10414.000	0.000	0.000	0.000	0.000
NC	0.065	0.065	0.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	U.S. HIGHWAY 89 BRIDGE CROSSING									
X1	0.400	17.000	9910.000	10110.000	250.000	105.000	170.000	0.707	0.000	0.000
GR	2062.800	9546.000	2063.900	9577.000	2064.100	9661.000	2063.200	9675.000	2062.100	9718.000
GR	2064.700	9749.000	2064.700	9838.000	2064.700	9872.000	2051.600	9910.000	2051.700	9948.000
GR	2051.600	10000.000	2050.600	10110.000	2058.200	10131.000	2065.200	10162.000	2065.200	10216.000
GR	2065.800	10291.000	2066.400	10342.000	0.000	0.000	0.000	0.000	0.000	0.000
SB	0.900	1.560	2.630	0.000	157.000	10.000	1720.000	0.000	0.000	0.000
X1	0.420	17.000	9933.000	10161.000	135.000	135.000	135.000	0.707	0.000	0.000
X2	0.000	0.000	1.000	2061.700	2065.000	0.000	0.000	1.330	0.707	0.000
GR	2063.500	9428.000	2064.200	9453.000	2064.200	9541.000	2064.200	9645.000	2064.700	9736.000
GR	2064.000	9886.000	2052.300	9933.000	2052.500	10000.000	2052.500	10060.000	2053.300	10090.000
GR	2052.300	10130.000	2051.400	10161.000	2062.200	10208.000	2063.600	10289.000	2064.900	10366.000
GR	2066.400	10432.000	2066.500	10525.000	0.000	0.000	0.000	0.000	0.000	0.000
BT	2.000	9910.000	2065.000	2061.700	10130.000	2065.000	2061.700	0.000	0.000	0.000
X1	0.470	22.000	9921.000	10038.000	190.000	260.000	230.000	0.000	0.000	0.000
GR	2063.500	9738.000	2064.000	9790.000	2063.300	9856.000	2062.300	9921.000	2054.900	9941.000
GR	2053.400	9961.000	2053.600	10000.000	2053.600	10024.000	2059.900	10038.000	2060.200	10145.000
GR	2059.700	10268.000	2054.300	10325.000	2054.700	10334.000	2057.900	10363.000	2058.600	10470.000
GR	2058.900	10536.000	2058.900	10574.000	2059.800	10597.000	2060.100	10664.000	2060.100	10711.000
GR	2064.000	10724.000	2078.400	10770.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.065	0.065	0.025	0.100	0.300	0.000	0.000	0.000	0.000	0.000
X1	0.500	32.000	9919.000	10041.000	200.000	220.000	200.000	0.000	0.000	0.000
GR	2064.000	9600.000	2063.200	9622.000	2062.600	9628.000	2062.400	9665.000	2062.900	9694.000
GR	2062.200	9740.000	2061.900	9800.000	2062.500	9843.000	2062.200	9919.000	2055.500	9958.000
GR	2055.500	10000.000	2055.500	10041.000	2059.100	10058.000	2059.200	10079.000	2062.800	10114.000
GR	2062.800	10129.000	2062.000	10146.000	2062.900	10204.000	2062.600	10253.000	2061.300	10316.000
GR	2060.400	10373.000	2059.800	10426.000	2058.100	10441.000	2058.300	10457.000	2060.700	10470.000
GR	2061.300	10505.000	2060.600	10530.000	2060.900	10569.000	2061.800	10634.000	2062.200	10663.000
GR	2067.500	10671.000	2073.600	10705.000	0.000	0.000	0.000	0.000	0.000	0.000

QT	4.000	20005.000	14459.000	11964.000	6748.000	0.000	0.000	0.000	0.000	0.000
NH	4.000	41.000	9448.000	0.065	9928.000	0.025	10075.000	0.065	10075.000	0.000

CONFLUENCE OF BRAIDED CHANNELS

X1	0.600	48.000	9928.000	10075.000	515.000	505.000	505.000	0.000	0.000	0.000
GR	2070.300	8792.000	2069.000	8819.000	2070.000	8838.000	2065.600	8862.000	2063.800	8891.000
GR	2064.800	8917.000	2065.400	8930.000	2064.900	9013.000	2064.300	9025.000	2065.000	9104.000
GR	2065.200	9168.000	2065.400	9230.000	2064.800	9320.000	2064.200	9403.000	2065.000	9446.000
GR	2065.100	9486.000	2064.300	9503.000	2065.300	9548.000	2066.100	9615.000	2066.800	9671.000
GR	2066.900	9736.000	2066.200	9798.000	2066.100	9809.000	2066.100	9812.000	2066.400	9859.000
GR	2065.800	9928.000	2059.700	9954.000	2059.900	10000.000	2059.900	10052.000	2066.400	10075.000
GR	2067.100	10097.000	2066.800	10124.000	2067.900	10141.000	2067.000	10154.000	2065.500	10178.000
GR	2066.800	10195.000	2067.000	10225.000	2066.400	10257.000	2067.100	10324.000	2066.400	10403.000
GR	2063.900	10431.000	2064.800	10476.000	2063.100	10494.000	2062.700	10520.000	2063.100	10532.000
GR	2069.700	10552.000	2070.400	10561.000	2069.700	10575.000	0.000	0.000	0.000	0.000
NH	6.000	1.000	9332.000	0.065	9720.000	0.025	9760.000	0.065	9973.000	0.025
NH	10050.000	0.065	10300.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
QT	4.000	19986.000	14413.000	11927.000	6725.000	0.000	0.000	0.000	0.000	0.000
X1	0.690	46.000	9973.000	10050.000	495.000	490.000	510.000	0.000	0.000	0.000
GR	2074.700	8940.000	2072.300	8966.000	2069.300	9004.000	2069.300	9025.000	2068.700	9034.000
GR	2069.000	9080.000	2069.400	9145.000	2069.700	9209.000	2069.800	9269.000	2069.600	9332.000
GR	2069.400	9369.000	2069.900	9423.000	2069.900	9472.000	2064.800	9494.000	2064.900	9509.000
GR	2070.200	9543.000	2070.300	9609.000	2070.500	9663.000	2070.500	9702.000	2065.200	9720.000
GR	2064.600	9745.000	2064.700	9758.000	2070.500	9775.000	2071.000	9808.000	2070.200	9868.000
GR	2069.800	9918.000	2067.600	9950.000	2064.500	9973.000	2064.200	10000.000	2064.200	10034.000
GR	2065.800	10050.000	2064.400	10063.000	2065.100	10071.000	2067.300	10088.000	2067.600	10100.000
GR	2065.400	10118.000	2066.900	10124.000	2065.300	10135.000	2070.300	10152.000	2070.200	10194.000
GR	2068.600	10222.000	2068.600	10241.000	2068.200	10264.000	2072.100	10288.000	2072.800	10297.000
GR	2072.800	10300.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NH	4.000	0.065	9550.000	0.025	9590.000	0.065	9959.000	0.025	10075.000	0.000
X1	0.790	35.000	9959.000	10040.000	485.000	495.000	500.000	0.000	0.000	0.000
GR	2080.600	8960.000	2078.300	8976.000	2077.700	9002.000	2074.700	9041.000	2068.400	9080.000
GR	2068.500	9088.000	2073.400	9126.000	2073.200	9135.000	2073.200	9149.000	2074.300	9211.000
GR	2074.000	9245.000	2074.500	9274.000	2074.100	9343.000	2074.400	9404.000	2074.600	9472.000
GR	2074.300	9518.000	2068.200	9557.000	2067.700	9585.000	2074.400	9598.000	2073.600	9644.000
GR	2068.600	9666.000	2073.700	9685.000	2073.900	9699.000	2072.600	9712.000	2074.200	9741.000
GR	2074.600	9794.000	2075.200	9883.000	2073.900	9911.000	2070.300	9940.000	2068.900	9959.000
GR	2068.900	10000.000	2068.900	10040.000	2077.100	10059.000	2078.000	10067.000	2078.200	10075.000
NH	6.000	1.000	8769.000	0.065	9475.000	0.025	9520.000	0.065	9958.000	0.025
NH	10045.000	0.065	10080.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
X1	0.900	43.000	9958.000	10060.000	540.000	575.000	565.000	0.000	0.000	0.000
GR	2090.800	8508.000	2083.300	8563.000	2084.600	8596.000	2084.200	8614.000	2083.600	8638.000
GR	2079.100	8672.000	2079.100	8719.000	2077.500	8769.000	2075.400	8800.000	2072.800	8815.000
GR	2072.800	8824.000	2077.000	8849.000	2077.200	8898.000	2077.400	8966.000	2077.500	9029.000
GR	2077.800	9093.000	2078.300	9156.000	2078.600	9229.000	2078.700	9290.000	2078.400	9365.000
GR	2078.300	9435.000	2075.200	9457.000	2074.300	9474.000	2071.100	9500.000	2071.100	9520.000
GR	2075.700	9540.000	2077.800	9562.000	2078.600	9595.000	2077.900	9615.000	2078.400	9640.000
GR	2077.700	9668.000	2078.500	9688.000	2078.000	9793.000	2077.200	9808.000	2074.500	9828.000
GR	2077.000	9843.000	2078.600	9917.000	2077.700	9958.000	2073.500	9976.000	2073.100	10000.000
GR	2073.100	10050.000	2078.000	10060.000	2083.000	10080.000	0.000	0.000	0.000	0.000

NH	6.000	0.060	8603.000	0.065	9274.000	0.025	9310.000	0.065	9944.000	0.025
NH	10050.000	0.065	10075.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
X1	1.000	49.000	9944.000	10050.000	570.000	565.000	560.000	0.000	0.000	0.000
GR	2097.200	8262.000	2089.400	8292.000	2086.600	8319.000	2084.000	8354.000	2083.000	8410.000
GR	2082.800	8469.000	2083.300	8481.000	2082.600	8514.000	2081.700	8539.000	2082.300	8544.000
GR	2081.700	8574.000	2082.500	8603.000	2082.700	8648.000	2082.100	8671.000	2082.800	8710.000
GR	2083.100	8757.000	2083.300	8837.000	2083.900	8898.000	2084.100	8967.000	2083.600	9018.000
GR	2083.400	9059.000	2082.800	9113.000	2082.200	9135.000	2082.200	9154.000	2082.900	9174.000
GR	2082.500	9214.000	2083.200	9234.000	2077.800	9257.000	2074.600	9274.000	2076.600	9302.000
GR	2078.600	9314.000	2079.000	9340.000	2082.700	9371.000	2083.000	9387.000	2083.400	9429.000
GR	2083.100	9586.000	2083.100	9682.000	2083.400	9776.000	2082.700	9814.000	2083.600	9831.000
GR	2083.200	9884.000	2081.600	9916.000	2078.900	9944.000	2078.300	9957.000	2078.100	10000.000
GR	2078.100	10033.000	2082.100	10050.000	2082.600	10039.000	2087.100	10075.000	0.000	0.000

NH	5.000	0.060	9331.000	0.025	9392.000	0.060	9949.000	0.025	10062.000	0.060
NH	10205.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
X1	1.120	24.000	9949.000	10062.000	615.000	630.000	620.000	0.000	0.000	0.000
GR	2092.500	9227.000	2092.600	9301.000	2083.300	9331.000	2082.200	9392.000	2087.500	9437.000
GR	2088.000	9549.000	2087.700	9693.000	2087.200	9798.000	2086.600	9872.000	2086.400	9897.000
GR	2087.300	9926.000	2083.400	9949.000	2082.300	9970.000	2082.500	10000.000	2083.400	10035.000
GR	2084.900	10062.000	2086.400	10084.000	2086.100	10118.000	2086.600	10129.000	2086.600	10157.000
GR	2086.200	10161.000	2085.100	10180.000	2085.100	10185.000	2091.900	10205.000	0.000	0.000

NH	6.000	0.060	9272.000	0.025	9303.000	0.045	9550.000	0.065	9923.000	0.025
NH	10079.000	0.050	10530.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
X1	1.300	40.000	9923.000	10079.000	935.000	885.000	935.000	0.000	0.000	0.000
GR	2112.500	9183.000	2098.600	9217.000	2094.100	9260.000	2091.300	9272.000	2091.300	9303.000
GR	2094.200	9322.000	2095.400	9341.000	2097.800	9398.000	2096.700	9458.000	2095.700	9543.000
GR	2097.100	9565.000	2096.400	9593.000	2097.400	9614.000	2096.800	9653.000	2096.800	9723.000
GR	2097.100	9777.000	2096.500	9816.000	2096.700	9882.000	2096.900	9923.000	2092.200	9930.000
GR	2092.200	9967.000	2092.900	10000.000	2093.400	10055.000	2095.300	10079.000	2095.800	10098.000
GR	2094.600	10116.000	2094.200	10161.000	2095.000	10175.000	2094.000	10228.000	2092.600	10268.000
GR	2092.300	10311.000	2093.000	10324.000	2093.200	10338.000	2094.200	10355.000	2096.800	10382.000
GR	2098.300	10424.000	2098.100	10493.000	2101.100	10511.000	2101.300	10521.000	2101.300	10530.000

NH	8.000	0.060	9145.000	0.025	9168.000	0.060	9200.000	0.025	9280.000	0.045
NH	9500.000	0.055	9902.000	0.025	10091.000	0.050	10470.000	0.000	0.000	0.000
X1	1.400	46.000	9902.000	10091.000	300.000	435.000	500.000	0.000	0.000	0.000
GR	2120.000	9030.000	2110.600	9060.000	2106.400	9096.000	2097.200	9139.000	2095.300	9151.000
GR	2095.500	9168.000	2100.000	9181.000	2097.200	9260.000	2098.800	9219.000	2098.700	9228.000
GR	2098.000	9277.000	2101.300	9298.000	2101.500	9343.000	2100.100	9415.000	2101.000	9433.000
GR	2100.700	9477.000	2100.100	9520.000	2100.900	9563.000	2100.500	9611.000	2100.700	9669.000
GR	2100.800	9760.000	2100.300	9812.000	2099.100	9866.000	2100.500	9902.000	2096.900	9935.000
GR	2096.900	9965.000	2098.000	9992.000	2098.000	10000.000	2097.800	10065.000	2098.000	10091.000
GR	2099.700	10116.000	2096.700	10147.000	2098.900	10162.000	2099.400	10190.000	2099.300	10217.000
GR	2099.800	10248.000	2098.700	10271.000	2099.300	10288.000	2097.800	10301.000	2097.400	10340.000
GR	2099.900	10352.000	2101.000	10384.000	2101.100	10406.000	2101.700	10442.000	2105.100	10460.000
GR	2106.100	10470.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

TUE, NOV 18

NH	8.000	0.060	9028.000	0.025	9100.000	0.050	9301.000	0.035	9746.000	0.025	
NH	9762.000	0.050	9930.000	0.025	10059.000	0.050	10301.000	0.000	0.000	0.000	
X1	1.490	49.000	9930.000	10059.000	300.000	490.000	300.000	0.000	0.000	0.000	
GR	2120.500	8960.000	2112.000	8998.000	2102.100	9028.000	2102.200	9097.000	2101.600	9111.000	
GR	2106.100	9156.000	2105.300	9202.000	2106.000	9264.000	2106.100	9350.000	2104.600	9416.000	
GR	2105.700	9448.000	2105.900	9505.000	2104.900	9538.000	2104.400	9564.000	2105.000	9585.000	
GR	2104.500	9621.000	2103.800	9658.000	2105.500	9688.000	2104.100	9716.000	2103.300	9738.000	
GR	2101.500	9746.000	2101.600	9762.000	2104.000	9774.000	2104.500	9790.000	2103.300	9812.000	
GR	2104.400	9820.000	2103.700	9857.000	2104.200	9891.000	2103.400	9930.000	2102.200	9941.000	
GR	2101.800	9975.000	2102.300	10000.000	2102.800	10043.000	2103.700	10059.000	2104.300	10110.000	
GR	2103.400	10159.000	2104.100	10205.000	2104.700	10247.000	2105.700	10265.000	2103.700	10292.000	
GR	2104.300	10359.000	2104.500	10396.000	2104.300	10411.000	2104.500	10421.000	2102.100	10444.000	
GR	2104.900	10486.000	2111.000	10508.000	2112.000	10519.000	2112.000	10530.000	0.000	0.000	
NH	7.000	0.060	9158.000	0.025	9270.000	0.050	9740.000	0.040	9850.000	0.065	
NH	9943.000	0.025	10033.000	0.050	10370.000	0.000	0.000	0.000	0.000	0.000	
X1	1.590	44.000	9943.000	10033.000	490.000	540.000	490.000	0.000	0.000	0.000	
GR	2130.500	8975.000	2109.600	9042.000	2107.200	9061.000	2107.200	9065.000	2109.700	9083.000	
GR	2109.900	9109.000	2109.100	9125.000	2109.800	9142.000	2107.300	9158.000	2107.300	9220.000	
GR	2109.500	9240.000	2110.500	9262.000	2110.500	9326.000	2110.000	9381.000	2109.700	9425.000	
GR	2109.600	9482.000	2109.300	9561.000	2108.500	9625.000	2108.300	9665.000	2109.100	9697.000	
GR	2108.600	9705.000	2109.100	9714.000	2107.900	9723.000	2108.600	9733.000	2107.800	9756.000	
GR	2107.700	9788.000	2108.500	9811.000	2108.500	9836.000	2107.900	9849.000	2109.200	9888.000	
GR	2109.600	9929.000	2107.200	9943.000	2107.200	10000.000	2107.200	10033.000	2109.900	10051.000	
GR	2110.000	10110.000	2109.400	10158.000	2110.700	10178.000	2111.400	10218.000	2113.000	10249.000	
GR	2114.500	10275.000	2118.000	10300.000	2120.000	10343.000	2122.800	10370.000	0.000	0.000	
NH	8.000	0.065	9314.000	0.025	9380.000	0.050	9828.000	0.025	9850.000	0.065	
NH	9936.000	0.025	10064.000	0.050	10340.000	0.000	10523.000	0.000	0.000	0.000	
X1	1.680	42.000	9936.000	10064.000	495.000	490.000	490.000	0.000	0.000	0.000	
GR	2123.900	9020.000	2121.700	9071.000	2119.900	9123.000	2117.400	9191.000	2115.800	9255.000	
GR	2113.400	9307.000	2112.000	9314.000	2112.400	9361.000	2112.800	9377.000	2114.300	9400.000	
GR	2114.400	9475.000	2114.700	9538.000	2114.300	9559.000	2114.700	9578.000	2114.000	9617.000	
GR	2114.100	9688.000	2114.100	9753.000	2114.400	9819.000	2112.200	9828.000	2113.000	9861.000	
GR	2114.300	9879.000	2114.100	9898.000	2114.200	9906.000	2114.800	9925.000	2114.100	9936.000	
GR	2113.100	9945.000	2112.900	10000.000	2113.000	10064.000	2115.100	10083.000	2115.000	10111.000	
GR	2114.800	10165.000	2114.500	10226.000	2114.100	10248.000	2111.800	10259.000	2112.100	10267.000	
GR	2114.100	10280.000	2112.900	10302.000	2112.800	10328.000	2114.400	10340.000	2116.000	10460.000	
GR	2120.000	10478.000	2130.000	10523.000	0.000	0.000	0.000	0.000	0.000	0.000	
NH	8.000	0.065	9475.000	0.045	9580.000	0.050	9645.000	0.025	9740.000	0.035	
NH	9920.000	0.025	10080.000	0.035	10265.000	0.035	10325.000	0.000	0.000	0.000	
X1	1.820	25.000	9920.000	10080.000	715.000	650.000	695.000	0.000	0.000	0.000	
GR	2150.000	9280.000	2140.000	9320.000	2130.000	9360.000	2124.000	9380.000	2122.000	9410.000	
GR	2121.000	9475.000	2120.000	9570.000	2119.000	9580.000	2120.000	9590.000	2121.000	9645.000	
GR	2120.000	9655.000	2120.000	9670.000	2120.500	9700.000	2120.000	9720.000	2120.000	9740.000	
GR	2120.700	9815.000	2120.000	9920.000	2119.000	10000.000	2120.000	10080.000	2120.000	10215.000	
GR	2122.000	10265.000	2124.000	10280.000	2126.000	10295.000	2128.000	10310.000	2130.000	10325.000	

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MC	0.050	0.055	0.025	0.100	0.300	0.000	0.000	0.000	0.000	0.000
X1	1.870	33.000	9809.000	10071.000	330.000	305.000	0.000	0.000	0.000	0.000
GR	2145.100	9420.000	2136.300	9448.000	2124.200	9479.000	2122.900	9496.000	2123.500	9505.000
GR	2123.600	9520.000	2124.400	9531.000	2123.800	9549.000	2124.200	9534.000	2123.600	9565.000
GR	2123.300	9570.000	2124.300	9579.000	2124.200	9594.000	2123.100	9626.000	2123.800	9636.000
GR	2123.800	9683.000	2124.400	9739.000	2125.400	9775.000	2124.200	9809.000	2123.400	9831.000
GR	2123.400	9903.000	2124.500	9931.000	2122.400	9988.000	2122.000	10000.000	2122.000	10071.000
GR	2125.400	10090.000	2124.600	10151.000	2123.100	10229.000	2124.700	10261.000	2125.900	10305.000
GR	2128.000	10349.000	2129.500	10393.000	2136.200	10413.000	0.000	0.000	0.000	0.000
X1	1.970	43.000	9879.000	10126.000	480.000	500.000	0.000	0.000	0.000	0.000
GR	2144.800	9360.000	2136.500	9380.000	2128.400	9407.000	2127.200	9416.000	2127.800	9435.000
GR	2128.000	9469.000	2127.600	9473.000	2127.600	9487.000	2128.100	9493.000	2127.700	9499.000
GR	2128.100	9512.000	2128.100	9533.000	2127.200	9541.000	2127.800	9549.000	2127.600	9562.000
GR	2128.100	9571.000	2127.400	9609.000	2128.200	9631.000	2128.200	9648.000	2127.900	9661.000
GR	2128.300	9687.000	2128.000	9707.000	2128.700	9761.000	2129.100	9795.000	2128.600	9810.000
GR	2128.800	9822.000	2128.500	9841.000	2128.400	9861.000	2126.800	9879.000	2126.600	9928.000
GR	2128.000	9938.000	2128.000	9949.000	2127.500	9958.000	2126.900	9972.000	2126.600	10000.000
GR	2127.100	10126.000	2140.900	10155.000	2141.800	10172.000	2140.500	10203.000	2138.600	10232.000
GR	2139.800	10256.000	2142.500	10271.000	2144.800	10285.000	0.000	0.000	0.000	0.000
QT	4.000	18691.000	12945.000	10433.000	5784.000	0.000	0.000	0.000	0.000	0.000
NH	3.000	0.050	9905.000	0.025	10083.000	0.033	0.008	0.000	0.000	0.000
X1	2.060	38.000	9905.000	10083.000	470.000	515.000	500.000	0.000	0.000	0.000
GR	2146.500	9340.000	2143.700	9365.000	2134.200	9413.000	2135.000	9426.000	2135.000	9430.000
GR	2134.500	9460.000	2133.700	9491.000	2133.000	9538.000	2133.400	9560.000	2132.500	9617.000
GR	2132.800	9628.000	2132.500	9643.000	2132.700	9656.000	2131.400	9679.000	2132.600	9687.000
GR	2133.100	9732.000	2133.500	9780.000	2134.200	9833.000	2134.300	9871.000	2133.700	9905.000
GR	2131.200	9919.000	2131.600	9952.000	2131.800	9960.000	2131.300	9990.000	2131.500	10002.000
GR	2131.700	10006.000	2131.200	10083.000	2132.900	10093.000	2132.400	10108.000	2131.800	10112.000
GR	2132.300	10117.000	2132.300	10137.000	2131.700	10304.000	2133.900	10319.000	2134.200	10339.000
GR	2133.700	10364.000	2134.000	10380.000	2141.700	10408.000	0.000	0.000	0.000	0.000
EJ	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

TUE, NOV 18 1986 12:53:29

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**********************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
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T1 SOLS WASH FLOODPLAIN DELINEATION, MARICOPA COUNTY, ARIZONA
T2 BY CELLA BARR ASSOCIATES FOR THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
T3   100 YEAR PROFILE - R1

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    TW       WSEL     FQ
     -10.      3.       0.       0.  0.004000    0.00     0.0      0.   2040.140   0.000

J2  NPROF    IPLOT    PRFVS    XSECV    XSECH     FN      ALLDC    IBT      CHNK     ITRACE
     2.000    0.000   -1.000    0.000    0.000   0.000    0.000    0.000    0.000    15.000
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THIS RUN EXECUTED TUE, NOV 18 1986 12:54

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**********************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
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T1 SOLS WASH
T2 REACH 1
T3 50 YEAR PROFILE

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	-10.	1.	0.	0.	0.004000	0.00	0.0	0.	2039.000	0.000

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALDC	IBW	CHNIM	ITRACE
	3.000	0.000	-1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

TUE, NOV 18 1986 12:53:29

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**********************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**********************************************
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T1 SOLS WASH
T2 REACH 1
T3 10-YEAR PROFILE

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	QUINS	Q	[illegible]	FQ
	-10.	5.	0.	0.	0.004000	0.00	0.0	0.	[illegible]	0.000

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	[illegible]	[illegible]	CHAIN	ITRACE
	15.000	0.000	-1.000	0.000	0.000	0.000	0.000	0.000	[illegible]	0.000

THIS RUN EXECUTED TUE, NOV 18 1986 12:55:37

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HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
ERROR CORR - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
****

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

10 -
717
505

OLS WASH REACH 1

SUMMARY PRINTOUT

		SECNO	CWSEL	DEPTH	EG	VCH	ELMIN	XLCH	TOPWID	SSTA	ENDST	QLOB	QCH	QROB
		0.030	2040.89	8.59	2041.54	8.93	2032.30	0.00	1337.37	9367.24	10704.61	2841.18	7762.22	10232.6[illegible]
		0.030	2040.14	7.84	2040.65	7.75	2032.30	0.00	1242.82	9459.81	10702.63	1349.19	5361.70	8314.11
	A	0.030	2039.77	7.47	2040.21	7.04	2032.30	0.00	1141.91	9559.72	10701.67	845.59	4262.39	7343.02
		0.030	2038.76	6.46	2039.02	5.04	2032.30	0.00	873.07	9825.94	10699.01	997.74	1847.10	5072.14
*		0.130	2048.05	8.05	2049.90	15.93	2040.00	505.00	1760.83	8515.00	10490.79	11208.87	9486.04	1411.00
*		0.130	2047.07	7.07	2048.77	14.62	2040.00	505.00	1316.94	8738.13	10055.10	7514.33	7527.73	2.93
*	B	0.130	2046.64	6.64	2048.18	13.58	2040.00	505.00	1208.90	8839.15	10048.05	5928.03	6524.77	0.19
*		0.130	2046.44	6.44	2047.00	8.11	2040.00	505.00	1150.37	8886.79	10044.73	3252.78	3766.22	0.00
*		0.220	2053.86	10.86	2056.09	13.77	2043.00	500.00	598.67	9433.00	10031.69	5025.84	15088.38	721.78
*	C	0.220	2052.81	9.81	2054.77	12.38	2043.00	500.00	597.46	9433.00	10030.46	2510.35	12007.94	526.71
*		0.220	2052.23	9.23	2054.07	11.69	2043.00	500.00	596.79	9433.00	10029.79	1486.97	10527.45	438.58
*		0.220	2049.15	6.15	2051.58	12.61	2043.00	500.00	115.88	9910.30	10026.18	0.00	6820.67	190.33
*		0.360	2059.40	11.00	2061.73	15.23	2048.40	770.00	659.31	9433.00	10092.31	6556.71	12382.71	1896.58
*	D	0.360	2058.22	9.82	2060.31	13.78	2048.40	770.00	652.48	9433.00	10085.48	3799.27	9957.66	1208.06
*		0.360	2057.53	9.13	2059.55	13.16	2048.40	770.00	648.46	9433.00	10081.46	2625.76	8808.50	1018.74
*		0.360	2054.71	6.31	2057.00	12.81	2048.40	770.00	135.59	9929.55	10065.13	863.15	5792.89	362.95
*		0.400	2059.95	9.35	2064.10	16.60	2050.60	170.00	180.31	9786.36	9966.68	251.08	20135.68	429.24
*		0.400	2058.32	7.72	2061.69	14.92	2050.60	170.00	172.27	9789.78	9962.04	142.88	14657.42	244.71
	E	0.400	2057.77	7.17	2060.50	13.42	2050.60	170.00	169.85	9790.91	9960.76	107.61	12155.94	189.45
		0.400	2056.52	5.92	2057.88	9.43	2050.60	170.00	164.46	9793.51	9957.97	46.77	6879.83	92.40
*		0.420	2061.49	10.09	2064.29	13.71	2051.40	135.00	218.35	9758.93	9977.28	388.78	19903.98	543.24
*		0.420	2059.37	7.97	2061.93	13.07	2051.40	135.00	205.77	9764.97	9970.74	219.94	14495.26	329.80
*	F	0.420	2058.33	6.93	2060.79	12.80	2051.40	135.00	199.63	9767.91	9967.54	157.18	12047.70	248.12
		0.420	2056.93	5.53	2058.30	9.54	2051.40	135.00	191.35	9771.89	9963.24	69.54	6027.83	121.63
		0.470	2064.55	11.15	2065.33	9.54	2053.40	230.00	907.77	9738.00	10723.77	211.46	10780.15	9844.38
*		0.470	2061.63	8.23	2063.32	12.65	2053.40	230.00	793.27	9922.82	10716.09	0.00	9973.71	5071.29
*	G	0.470	2061.17	7.77	2062.72	11.83	2053.40	230.00	790.51	9921.05	10714.56	0.00	8707.08	3745.92
*		0.470	2059.36	5.96	2060.99	11.10	2053.40	230.00	421.96	9928.95	10585.72	0.00	5934.93	1084.06

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		SECNO	CWSEL	DEPTH	EG	WSEL	[illegible]	[illegible]	TOPWID	STA	EXMST	DLW	[illegible]	[illegible]
*		0.500	2064.60	9.10	2066.25	[illegible]	[illegible]	[illegible]	1066.63	[illegible]	10666.43	[illegible]	[illegible]	[illegible]
*		0.500	2063.62	8.12	2065.20	[illegible]	[illegible]	[illegible]	1054.68	[illegible]	10665.14	542.80	[illegible]	127.78
*	H	0.500	2063.14	7.64	2064.64	[illegible]	[illegible]	[illegible]	1041.82	9622.60	10664.42	257.70	9136.66	58.64
*		0.500	2061.27	5.77	2062.88	[illegible]	[illegible]	[illegible]	449.40	9924.42	10595.63	[illegible]	4215.[illegible]	[illegible]
*		0.600	2068.47	8.77	2070.17	[illegible]	[illegible]	505.00	1701.87	[illegible]	10548.26	3217.57	[illegible]	[illegible]
*		0.600	2067.68	7.98	2069.17	[illegible]	[illegible]	505.00	1688.82	[illegible]	10545.89	1763.70	[illegible]	[illegible]
*	I	0.600	2067.17	7.47	2068.62	[illegible]	[illegible]	[illegible]	1649.20	9833.42	10544.34	1087.47	[illegible]	[illegible]
*		0.600	2066.55	6.85	2067.24	[illegible]	[illegible]	[illegible]	1314.14	[illegible]	10542.44	361.80	[illegible]	[illegible]
*		0.690	2071.57	7.37	2073.25	15.39	2064.20	510.00	1309.46	9973.25	10284.73	8151.13	[illegible]	[illegible]
*	J	0.690	2070.74	6.54	2072.24	13.81	2064.20	510.00	1257.71	8985.72	10279.63	5415.23	6727.23	2270.52
*		0.690	2070.13	5.93	2071.67	13.47	2064.20	510.00	984.39	8993.50	10275.87	4261.96	5922.82	1742.22
*		0.690	2068.44	4.24	2069.93	12.09	2064.20	510.00	336.87	9478.28	10265.50	2260.70	3747.73	716.55
*		0.790	2075.71	8.01	2077.34	14.73	2067.70	500.00	1027.90	9527.87	10053.78	11377.62	8136.[illegible]	471.57
*	K	0.790	2074.89	7.19	2076.36	13.35	2067.70	500.00	961.78	9038.59	10053.87	7613.33	6470.[illegible]	[illegible]
*		0.790	2074.16	6.46	2075.81	13.40	2067.70	500.00	565.49	9044.33	10052.19	5959.33	5711.[illegible]	255.82
*		0.790	2072.35	4.65	2073.89	12.18	2067.70	500.00	280.79	[illegible]	10047.99	3222.06	3403.[illegible]	[illegible]
		0.900	2079.72	8.62	2080.34	8.94	2071.10	565.00	1399.38	8667.31	10066.88	14602.34	5374.[illegible]	[illegible]
	L	0.900	2078.82	7.72	2079.52	8.58	2071.10	565.00	1335.16	8728.08	10063.24	10052.97	4358.[illegible]	[illegible]
		0.900	2078.49	7.39	2079.17	7.83	2071.10	565.00	1144.24	8738.[illegible]	10061.96	8200.86	3725.[illegible]	[illegible]
		0.900	2077.33	6.23	2078.21	3.94	2071.10	565.00	436.03	8771.56	10058.62	5315.97	1409.[illegible]	[illegible]
*		1.000	2084.81	8.21	2086.06	13.10	2076.60	560.00	1723.69	8343.15	10066.84	11190.98	8722.[illegible]	72.97
*		1.000	2083.96	7.36	2085.23	12.36	2076.60	560.00	1644.25	8356.32	10063.83	7254.28	7124.29	34.44
*	M	1.000	2083.47	6.87	2084.76	11.92	2076.60	560.00	1415.20	8303.87	10062.07	5655.33	6253.26	18.40
*		1.000	2082.22	5.62	2083.16	9.16	2076.60	560.00	372.77	8525.61	10052.23	3129.97	3095.69	0.03
*		1.120	2089.12	6.92	2090.81	13.91	2082.20	620.00	881.37	9312.23	10196.84	9063.30	9502.15	1420.54
*		1.120	2088.38	6.18	2089.82	12.31	2082.20	620.00	880.02	9314.87	10194.64	6171.72	7381.47	859.00
*	N	1.120	2088.00	5.80	2089.31	11.38	2082.20	620.00	877.71	9315.83	10193.34	4966.88	6339.19	620.93
*		1.120	2086.32	4.12	2087.78	10.57	2082.20	620.00	313.20	9321.26	10180.59	2787.53	3878.84	58.63
*		1.300	2097.54	6.24	2098.96	12.80	2091.30	935.00	1135.37	9227.12	10402.73	5504.16	8979.29	5502.55
*	O	1.300	2097.04	5.74	2098.14	10.80	2091.30	935.00	1049.55	9231.88	10388.79	3797.00	6733.47	3882.52
*		1.300	2096.48	5.18	2097.70	10.71	2091.30	935.00	667.06	9237.29	10378.64	3164.33	5733.72	3028.95
*		1.300	2095.42	4.12	2096.43	8.85	2091.30	935.00	516.42	9247.39	10367.67	2050.14	3293.63	1301.22
*		1.400	2101.62	6.32	[illegible]	11.61	2095.30	500.00	1318.93	9118.33	10437.28	7730.52	8340.47	3915.00
*		1.400	2101.07	5.77	2102.09	10.35	2095.30	500.00	1210.40	9120.90	10399.78	5341.29	6357.73	2713.99
*	P	1.400	2100.80	5.50	2101.74	9.56	2095.30	500.00	1118.90	9122.18	10378.13	4366.22	5381.56	2179.21
*		1.400	2099.89	4.59	2100.72	8.09	2095.30	500.00	661.62	9126.43	10351.95	2571.56	3176.17	977.27
*		1.490	2106.38	4.88	2107.47	12.48	2101.50	500.00	1476.32	9015.02	10491.34	9315.61	6384.67	4285.72
*		1.490	2105.92	4.42	2106.83	11.00	2101.50	500.00	1357.82	9016.41	10489.69	6589.95	4976.44	2846.61
*	Q	1.490	2105.61	4.11	2106.50	10.54	2101.50	500.00	1213.91	9017.36	10488.57	5428.24	4346.90	2151.87
*		1.490	2104.92	3.42	2105.63	8.62	2101.50	500.00	1000.63	9019.45	10486.08	3105.75	2787.24	832.03

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	SECNO	CWSEL	DEPTH	EG	VCH	ELMIN	LCH	TOPWI	SSTA	ENDLT	OLOT	DCH	[illegible]
*	1.590	2111.52	4.32	2112.72	13.88	2107.20	490.00	1184.57	9035.83	10220.40	13498.25	5402.08	1007.17
*	1.590	2111.02	3.82	2112.02	12.41	2107.20	490.00	1158.67	9037.46	10196.09	9534.23	4264.23	761.7[illegible]
*	1.590	2110.75	3.55	2111.67	11.64	2107.20	490.00	1142.[illegible]	9038.30	10181.10	7773.80	3724.89	428.41
*	1.590	2110.04	2.84	2110.76	9.73	2107.20	490.00	1002.72	9040.59	10167.85	4128.93	2486.30	109.27
*	1.680	2116.36	4.56	2117.55	13.30	2111.80	490.00	1239.10	9222.54	10461.64	10521.96	5698.25	3765.7[illegible]
*	1.680	2115.89	4.09	2116.87	11.86	2111.80	490.00	1214.54	9237.07	10451.61	7540.32	4358.12	2514.54
*	1.680	2115.64	3.84	2116.52	11.13	2111.80	490.00	1188.20	9244.66	10432.94	6202.02	3735.00	1989.1[illegible]
*	1.680	2115.02	3.22	2115.67	9.05	2111.80	490.00	1102.[illegible]	9262.56	10386.76	3411.76	2327.17	1[illegible]
*	1.820	2123.02	4.02	2124.37	12.34	2119.00	695.00	878.03	9394.63	10272.68	9155.68	6958.24	3872.37
*	1.820	2122.50	3.50	2123.59	11.09	2119.00	695.00	866.72	9402.52	10268.74	6351.51	5320.83	2740.[illegible]
*	1.820	2122.25	3.25	2123.21	10.39	2119.00	695.00	860.51	9406.31	10264.85	5122.27	4564.00	2240.72
*	1.820	2121.60	2.60	2122.29	8.65	2119.00	695.00	819.36	9435.74	10255.10	2592.19	2911.87	1220.1[illegible]
*	1.870	2126.99	4.99	2128.53	12.00	2122.00	305.00	833.50	9471.96	10327.86	4730.54	12717.27	2530.1[illegible]
*	1.870	2126.36	4.36	2127.63	10.72	2122.00	305.00	841.1[illegible]	9473.54	10314.73	3189.18	9603.80	1820.[illegible]
*	1.870	2126.06	4.06	2127.19	10.03	2122.00	303.00	833.[illegible]	9474.32	10308.27	2514.53	8173.15	1219.[illegible]
*	1.870	2125.26	3.26	2126.10	8.35	2122.00	305.00	784.2[illegible]	9476.33	10781.43	1143.72	5056.50	524.7[illegible]
*	1.970	2131.12	4.52	2132.77	12.32	2126.60	495.00	736.51	9397.92	10134.46	7172.25	12759.19	541.36
*	1.970	2130.46	3.86	2131.81	11.01	2126.60	495.00	732.93	9400.13	10133.06	4781.20	9597.88	33.83
*	1.970	2130.14	3.54	2131.34	10.28	2126.60	495.00	731.20	9401.19	10132.37	3750.39	8150.82	25.78
*	1.970	2129.36	2.76	2130.20	8.37	2126.60	495.00	726.93	9403.81	10130.74	1695.8[illegible]	5016.71	11.42
*	2.060	2135.68	4.48	2137.05	12.51	2131.20	500.00	980.58	9405.53	10384.11	1812.99	9202.28	4675.73
*	2.060	2135.05	3.85	2136.16	10.98	2131.20	500.00	1[illegible]	9408.69	10383.83	2858.84	6852.68	3233.40
*	2.060	2134.72	3.52	2135.71	10.24	2131.20	500.00	916.[illegible]	9410.37	10382.62	2035.21	5782.54	2595.25
*	2.060	2133.91	2.71	2134.70	8.68	2131.20	500.00	775.98	9412.92	10375.13	741.44	3646.16	1396.40

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THIS RUN EXECUTED THU, OCT 30 [illegible]

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**********************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
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C
T1 SOLS WASH FLOODPLAIN DELINEATION, MARICOPA COUNTY, ARIZONA
T2 BY CELLA BARR ASSOCIATES FOR THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
T3      100 YEAR DISCHARGE - RI      FLOODWAY ANALYSIS

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   INVNS    Q        WSEL     FQ
       0.       2.       0.       0.  0.004000     0.00     0.0      0.  2040.140   0.000

J2  NPROF    IPLOT    PRFVS    XSECV    XSECH      FN     XLDC     IBW     CHVIN   ITRACE
     1.000    0.000   -1.000    0.000    0.000    0.000    0.000    0.000    0.000   15.000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    38.000    1.000    8.000    3.000   26.000   42.000    5.000    4.000   53.000   54.000

    13.000   14.000   15.000  200.000    0.000    0.000    0.000    0.000    0.000    0.000

NC      0.000      0.000      0.000      0.100      0.300      0.000      0.000      0.000      0.000      0.000
QT      2.000  13045.000  13045.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000
NH      4.000      1.000   9476.000      0.065  10104.000      0.025  10340.000      0.065  10722.000      0.000
ET      0.000      0.000      4.100   8730.000  10682.000      0.000      0.000      0.000      0.000      0.000
          RIVER MILE 0.0 - PROFILE BASE LINE FOR HASSAYAMPA
X1      0.030     21.000  10104.000  10340.000      0.000      0.000      0.000      0.000      0.000      0.000
GR   2044.500   8655.000   2044.400   8730.000   2043.700   8842.000   2043.300   8943.000   2042.600   9054.000
GR   2041.800   9168.000   2041.300   9308.000   2040.700   9395.000   2040.000   9476.000   2039.500   9661.000
GR   2038.700   9840.000   2038.200  10000.000   2038.100  10104.000   2037.400  10183.000   2037.100  10258.000
GR   2036.200  10340.000   2036.200  10440.000   2034.800  10571.000   2033.500  10593.000   2032.300  10682.000
GR   2047.500  10722.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000

NH      4.000      1.000   9138.000      0.065   9963.000      0.025  10044.000      0.065  10935.000      0.000
ET      0.000      0.000      4.100   9500.000  10045.000      0.000      0.000      0.000      0.000      0.000
X1      0.130     42.000   9263.000  10044.000    500.000    560.000    505.000      0.000      0.000      0.000
GR   2048.000   8515.000   2046.200   8945.000   2045.200   9041.000   2044.300   9141.000   2043.700   9248.000
GR   2044.500   9284.000   2044.800   9293.000   2046.300   9299.000   2046.600   9312.000   2043.800   9326.000
GR   2042.700   9402.000   2044.300   9419.000   2042.800   9438.000   2045.000   9459.000   2044.400   9519.000
GR   2044.300   9587.000   2043.500   9635.000   2044.000   9692.000   2043.700   9724.000   2042.700   9748.000
GR   2043.100   9813.000   2043.400   9869.000   2042.900   9928.000   2040.000   9963.000   2040.000  10000.000
GR   2040.000  10036.000   2046.400  10041.000   2047.600  10054.000   2047.600  10126.000   2047.400  10200.000
GR   2049.200  10225.000   2049.800  10307.000   2049.400  10380.000   2047.500  10442.000   2047.500  10486.000
GR   2051.300  10519.000   2052.400  10579.000   2052.900  10643.000   2052.000  10712.000   2050.700  10770.000
GR   2049.600  10831.000   2048.300  10935.000      0.000      0.000      0.000      0.000      0.000      0.000
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NH	3.000	0.065	9963.000	0.025	10037.000	0.065	[illegible]	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9780.000	10170.000	0.000	[illegible]	0.000	0.000	[illegible]
X1	0.220	27.000	9899.000	10019.000	465.000	515.000	[illegible]	0.000	0.000	[illegible]
GR	2050.500	9433.000	2049.600	9473.000	2049.700	9508.000	2050.400	9516.000	2050.400	[illegible]
GR	2050.400	9669.000	2051.500	9726.000	2051.300	9799.000	2051.000	9899.000	2044.600	[illegible]
GR	2043.000	9963.000	2043.000	10000.000	2043.000	10019.000	2050.400	10037.000	2039.300	10170.000
GR	2060.600	10292.000	2061.600	10331.000	2061.400	10381.000	2057.800	10430.000	2056.900	10485.000
GR	2056.400	10541.000	2058.500	10573.000	2060.400	10625.000	2063.400	10628.000	2063.400	10671.000
GR	2062.000	10732.000	2061.700	10788.000	[illegible]	0.000	[illegible]	0.000	0.000	[illegible]
NC	0.000	0.000	0.000	0.300	0.300	0.000	[illegible]	0.000	0.000	[illegible]
NH	4.000	1.000	9533.000	0.065	9905.000	0.025	10101.000	0.065	10414.000	[illegible]
ET	0.000	0.000	4.100	9870.000	10102.000	0.000	[illegible]	0.000	0.000	[illegible]
X1	0.360	23.000	9969.000	10046.000	615.000	2785.000	[illegible]	0.000	0.000	[illegible]
GR	2055.200	9433.000	2055.800	9497.000	2055.700	9533.000	2054.300	9538.000	2056.400	[illegible]
GR	2056.100	9667.000	2056.800	9752.000	2056.800	9864.000	2057.500	9905.000	2053.300	[illegible]
GR	2049.200	9969.000	2048.400	9994.000	2048.400	10000.000	2049.400	10046.000	2054.000	[illegible]
GR	2060.900	10101.000	2066.000	10136.000	2065.800	10149.000	2064.800	10235.000	2066.600	[illegible]
GR	2066.300	10354.000	2066.200	10387.000	2072.800	10414.000	[illegible]	0.000	0.000	[illegible]
NC	0.065	0.065	0.025	0.000	0.000	0.000	[illegible]	[illegible]	0.000	[illegible]
ET	0.000	0.000	4.110	9909.000	10111.000	0.000	[illegible]	0.000	0.000	[illegible]
	U.S. HIGHWAY 69 BRIDGE CROSSING									
X1	0.400	17.000	9910.000	10110.000	250.000	105.000	170.000	0.707	0.000	[illegible]
GR	2062.300	9546.000	2063.200	9577.000	2064.100	9661.000	2063.200	9675.000	2062.100	9718.000
GR	2064.700	9749.000	2064.700	9838.000	2064.700	9872.000	2061.800	9910.000	2061.700	9948.000
GR	2061.600	10000.000	2060.600	10110.000	2058.200	10134.000	2065.200	10182.000	2063.200	10216.000
GR	2065.800	10291.000	2066.400	10342.000	0.000	0.000	0.000	0.000	0.000	0.000
SB	0.900	1.560	2.630	0.000	157.000	10.000	1720.000	0.000	0.000	0.000
ET	0.000	0.000	4.110	9932.000	10162.000	0.000	0.000	0.000	0.000	0.000
X1	0.120	17.000	9933.000	10161.000	135.000	135.000	135.000	0.707	0.000	0.000
X2	0.000	0.000	1.000	2061.700	2065.000	0.000	0.000	1.330	0.707	0.000
GR	2063.500	9428.000	2064.200	9453.000	2064.200	9511.000	2064.200	9645.000	2064.700	9736.000
GR	2064.000	9886.000	2052.300	9933.000	2052.500	10000.000	2052.500	10060.000	2053.300	10090.000
GR	2052.300	10130.000	2051.400	10161.000	2062.200	10208.000	2063.600	10289.000	2064.900	10366.000
GR	2066.400	10432.000	2066.500	10525.000	0.300	0.000	0.000	0.000	0.000	0.000
RT	2.000	9910.000	2065.000	2061.700	10130.000	2065.000	2061.700	0.000	0.000	0.000
ET	0.000	0.000	4.100	9870.000	10470.000	0.000	0.000	0.000	0.000	0.000
X1	0.470	22.000	9921.000	10038.000	190.000	260.000	230.000	0.000	0.000	0.000
GR	2063.500	9738.000	2064.000	9790.000	2063.300	9856.000	2062.300	9921.000	2054.900	9941.000
GR	2053.400	9961.000	2053.600	10000.000	2053.600	10024.000	2059.900	10038.000	2060.200	10145.000
GR	2059.700	10268.000	2054.300	10325.000	2054.700	10334.000	2057.900	10363.000	2058.600	10470.000
GR	2058.900	10536.000	2058.900	10574.000	2059.800	10597.000	2060.100	10664.000	2060.100	10711.000
GR	2064.000	10724.000	2078.400	10770.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.065	0.065	0.025	0.100	0.300	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9870.000	10665.000	0.000	0.000	0.000	0.000	0.000

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X1	0.500	32.000	9919.000	10041.000	200.000	20.000	[illegible]	0.000	0.000	0.000
GR	2064.000	9600.000	2063.200	9622.000	2062.600	[illegible]	[illegible]	9665.000	2062.900	9694.000
GR	2062.200	9740.000	2061.900	9800.000	2062.500	[illegible]	[illegible]	9919.000	2055.500	9958.000
GR	2055.500	10000.000	2055.500	10041.000	2039.100	[illegible]	2061.200	10079.000	2062.800	10114.000
GR	2062.800	10129.000	2062.000	10146.000	2062.900	[illegible]	[illegible]	10253.000	2061.300	10316.000
GR	2060.400	10373.000	2059.800	10426.000	2058.100	[illegible]	[illegible]	10457.000	2060.700	10470.000
GR	2061.300	10505.000	2060.600	10530.000	2060.900	[illegible]	2061.800	10634.000	2062.200	10663.000
GR	2067.500	10671.000	2073.600	10705.000	0.000	[illegible]	0.000	[illegible]	0.000	[illegible]
OT	2.000	14459.000	14459.000	[illegible]	0.000	[illegible]	0.000	0.000	0.000	0.000
NH	4.000	1.000	9846.000	[illegible]	0.028.000	[illegible]	10075.000	0.065	10373.000	[illegible]
ET	0.000	0.000	4.100	9830.000	0545.000	[illegible]	0.000	0.000	0.000	[illegible]

CONFLUENCE OF BRAIDED CHANNELS

X1	0.600	48.000	9928.000	10075.000	515.000	505.000	505.000	520.000	0.000	0.000
GR	2070.300	8792.000	2069.000	8819.000	2070.000	8838.000	2063.600	8862.000	2063.800	8891.000
GR	2064.800	8917.000	2065.400	8930.000	2064.900	8913.000	2064.700	9064.000	2065.000	9104.000
GR	2063.200	9148.000	2065.400	9230.000	2064.800	9320.000	2064.200	9403.000	2063.000	9446.000
GR	2065.100	9486.000	2064.300	9503.000	2065.300	9543.000	2066.100	9615.000	2066.800	9671.000
GR	2066.900	9736.000	2066.200	9798.000	2066.100	9792.000	2066.100	9842.000	2066.400	9859.000
GR	2065.800	9928.000	2059.700	9954.000	2059.900	10000.000	2059.900	10052.000	2068.400	10075.000
GR	2067.100	10097.000	2066.800	10124.000	2067.900	10141.000	2067.000	10154.000	2065.500	10178.000
GR	2066.800	10195.000	2067.000	10225.000	2066.400	10237.000	2067.100	10334.000	2066.400	10403.000
GR	2063.900	10431.000	2064.800	10476.000	2065.100	10494.000	2062.700	10520.000	2063.100	10532.000
GR	2069.700	10552.000	2070.400	10561.000	2069.700	10575.000	0.000	0.000	0.000	0.000
NH	6.000	1.000	9332.000	0.065	9720.000	0.025	9760.000	0.065	9973.000	0.025
NH	10050.000	0.065	10300.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
OT	2.000	14413.000	14413.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9640.000	10271.000	0.000	0.000	0.000	0.000	0.000
X1	0.690	46.000	9973.000	10050.000	495.000	490.000	510.000	510.000	0.000	0.000
GR	2074.700	8940.000	2072.300	8966.000	2069.300	9004.000	2069.300	9025.000	2068.700	9034.000
GR	2069.000	9080.000	2069.400	9143.000	2069.700	9207.000	2069.800	9269.000	2067.600	9332.000
GR	2069.400	9369.000	2069.900	9423.000	2069.900	9472.000	2064.800	9494.000	2064.900	9509.000
GR	2070.200	9543.000	2070.300	9609.000	2070.300	9643.000	2070.500	9702.000	2065.200	9720.000
GR	2064.600	9745.000	2064.700	9758.000	2070.500	9775.000	2071.000	9808.000	2070.200	9848.000
GR	2069.800	9918.000	2067.600	9930.000	2064.300	9973.000	2064.200	10000.000	2064.200	10034.000
GR	2065.800	10050.000	2064.400	10063.000	2065.100	10071.000	2067.300	10088.000	2067.600	10100.000
GR	2065.400	10118.000	2064.900	10124.000	2045.300	10133.000	2070.300	10152.000	2070.200	10184.000
GR	2068.600	10222.000	2069.600	10241.000	2068.200	10264.000	2072.100	10288.000	2072.800	10297.000
GR	2072.800	10300.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NH	4.000	0.065	9550.000	0.025	9590.000	0.065	9959.000	0.025	10075.000	0.000
ET	0.000	0.000	4.100	9520.000	10040.000	0.000	0.000	0.000	0.000	0.000
X1	0.790	35.000	9959.000	10040.000	485.000	495.000	500.000	0.000	0.000	0.000
GR	2080.600	8960.000	2078.300	8976.000	2077.700	9002.000	2074.700	9041.000	2068.400	9080.000
GR	2068.500	9088.000	2073.400	9126.000	2073.200	9135.000	2073.200	9149.000	2074.300	9214.000
GR	2074.000	9245.000	2074.500	9274.000	2074.100	9343.000	2074.400	9404.000	2074.600	9472.000
GR	2074.300	9518.000	2068.200	9557.000	2067.700	9585.000	2074.400	9598.000	2073.600	9644.000
GR	2068.600	9666.000	2073.700	9685.000	2073.900	9699.000	2072.600	9712.000	2074.200	9741.000
GR	2074.600	9794.000	2075.200	9883.000	2073.900	9911.000	2070.300	9940.000	2068.900	9959.000
GR	2068.900	10000.000	2068.900	10040.000	2077.100	10059.000	2078.000	10067.000	2078.200	10075.000

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NH	6.000	1.000	8769.000	0.065	9475.000	0.025	9520.000	0.043	9958.000	[illegible]
NH	10045.000	0.065	10080.000	0.000	0.000	0.000	0.000	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9380.000	10061.000	0.000	0.000	0.000	0.000	[illegible]
X1	0.900	43.000	9958.000	10060.000	540.000	575.000	565.000	0.000	0.000	0.000
GR	2090.800	8508.000	2083.300	8563.000	2084.600	8590.000	2081.200	8614.000	2083.600	8638.000
GR	2079.100	8672.000	2079.100	8719.000	2077.500	8769.000	2078.400	8800.000	2072.800	8813.000
GR	2072.800	8824.000	2077.000	8847.000	2077.200	8881.000	2077.400	8966.000	2077.500	9029.000
GR	2077.800	9093.000	2078.300	9156.000	2078.600	9229.000	2078.700	9290.000	2078.400	9365.000
GR	2078.300	9435.000	2075.200	9437.000	2074.300	9474.000	2071.100	9500.000	2071.100	9520.000
GR	2075.700	9540.000	2077.800	9562.000	2078.100	9595.000	2077.900	9615.000	2078.400	9640.000
GR	2077.700	9668.000	2078.500	9688.000	2078.500	9793.000	2077.200	9808.000	2074.300	9828.000
GR	2077.000	9843.000	2078.600	9917.000	2077.700	9958.000	2073.500	9976.000	2073.100	10000.000
GR	2073.100	10030.000	2078.000	10060.000	2083.000	10080.000	0.000	0.000	0.000	0.000
NH	6.000	1.000	8603.000	0.065	9274.000	0.025	9310.000	0.065	9944.000	0.025
NH	10050.000	0.065	10075.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9214.000	10075.000	0.000	0.000	0.000	0.000	0.000
X1	1.000	49.000	9944.000	10050.000	570.000	565.000	560.000	0.000	0.000	0.000
GR	2097.200	8262.000	2089.400	8292.000	2086.600	8319.000	2084.000	8354.000	2083.000	8410.000
GR	2082.800	8469.000	2083.300	8481.000	2082.600	8516.000	2081.700	8539.000	2082.300	8544.000
GR	2081.700	8574.000	2082.500	8603.000	2082.700	8648.000	2082.100	8671.000	2082.800	8710.000
GR	2083.100	8757.000	2083.500	8837.000	2083.900	8898.000	2084.100	8967.000	2083.600	9018.000
GR	2083.400	9059.000	2082.800	9113.000	2082.200	9135.000	2082.200	9154.000	2082.900	9171.000
GR	2082.500	9214.000	2083.200	9234.000	2077.800	9257.000	2076.600	9274.000	2076.600	9302.000
GR	2078.600	9314.000	2079.000	9340.000	2082.700	9371.000	2083.000	9387.000	2083.400	9429.000
GR	2083.100	9586.000	2083.100	9682.000	2083.400	9776.000	2082.700	9814.000	2083.600	9831.000
GR	2083.200	9884.000	2081.600	9916.000	2078.900	9944.000	2078.300	9957.000	2078.100	10000.000
GR	2078.100	10033.000	2082.100	10050.000	2082.600	10059.000	2087.100	10075.000	0.000	0.000
NH	5.000	0.060	9331.000	0.025	9392.000	0.060	9949.000	0.025	10062.000	0.060
NH	10205.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9315.000	10195.000	0.000	0.000	0.000	0.000	0.000
X1	1.120	24.000	9949.000	10062.000	615.000	630.000	620.000	0.000	0.000	0.000
GR	2092.500	9227.000	2092.600	9301.000	2083.300	9331.000	2082.200	9392.000	2087.500	9437.000
GR	2088.000	9549.000	2087.700	9693.000	2087.200	9798.000	2086.600	9872.000	2086.400	9897.000
GR	2087.300	9926.000	2083.400	9949.000	2082.300	9970.000	2082.500	10000.000	2083.400	10035.000
GR	2084.900	10062.000	2086.400	10084.000	2086.100	10118.000	2086.600	10129.000	2086.600	10157.000
GR	2086.200	10164.000	2085.100	10180.000	2085.100	10185.000	2091.900	10205.000	0.000	0.000
NH	6.500	0.060	9272.000	0.025	9303.000	0.015	9550.000	0.065	9923.000	0.025
NH	10079.000	0.050	10530.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9250.000	10370.000	0.000	0.000	0.000	0.000	0.000
X1	1.300	40.000	9923.000	10079.000	935.000	885.000	935.000	0.000	0.000	0.000
GR	2112.500	9183.000	2098.600	9217.000	2091.100	9260.000	2091.300	9272.000	2091.300	9303.000
GR	2094.200	9322.000	2095.400	9341.000	2097.800	9398.000	2096.700	9458.000	2095.700	9543.000
GR	2097.100	9565.000	2096.400	9593.000	2097.400	9614.000	2096.800	9653.000	2096.800	9723.000
GR	2097.100	9777.000	2096.500	9816.000	2096.700	9882.000	2096.900	9923.000	2092.200	9930.000
GR	2092.200	9967.000	2092.900	10000.000	2093.100	10055.000	2095.300	10079.000	2095.800	10098.000
GR	2094.600	10116.000	2094.200	10161.000	2095.000	10175.000	2094.000	10228.000	2092.600	10268.000
GR	2092.300	10311.000	2095.000	10324.000	2095.200	10338.000	2094.200	10355.000	2096.800	10382.000
GR	2098.300	10424.000	2098.100	10493.000	2101.100	10511.000	2101.300	10521.000	2101.300	10530.000

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NH	8.000	0.060	9145.000	0.025	9168.000	0.060	9200.000	0.025	9280.000	0.045
NH	9500.000	0.055	9902.000	0.025	10091.000	0.030	10470.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9140.000	10390.000	0.000	0.000	0.000	0.000	0.000
X1	1.400	46.000	9902.000	10091.000	500.000	490.000	500.000	0.000	0.000	0.000
GR	2120.000	9030.000	2110.600	9060.000	2106.100	[illegible]	2097.200	9139.000	2095.200	9151.000
GR	2095.500	9168.000	2100.000	9181.000	2097.200	[illegible]	2098.000	9219.000	2098.700	9228.000
GR	2098.000	9277.000	2101.300	9298.000	2101.500	[illegible]	2100.100	9415.000	2101.000	9433.000
GR	2100.700	9477.000	2100.100	9520.000	2100.900	[illegible]	2100.500	9611.000	2100.700	9669.000
GR	2100.800	9760.000	2100.300	9812.000	2099.100	[illegible]	2100.500	9902.000	2096.900	9935.000
GR	2096.900	9963.000	2098.000	9992.000	2098.000	10000.000	2097.800	10065.000	2098.000	10091.000
GR	2099.700	10116.000	2096.700	10147.000	2098.700	10162.000	2099.100	10190.000	2099.300	10217.000
GR	2099.800	10248.000	2098.700	10271.000	2099.300	10288.000	2097.800	10301.000	2097.400	10340.000
GR	2099.900	10352.000	2101.000	10384.000	2101.100	10406.000	2101.700	10442.000	2105.100	10460.000
GR	2106.100	10470.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

NH	8.000	0.060	9028.000	0.025	9100.000	0.050	9350.000	0.055	9746.000	0.025
NH	9762.000	0.050	9930.000	0.025	10039.000	0.030	10530.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9040.000	10124.000	0.000	0.000	0.000	0.000	0.000
X1	1.490	49.000	9930.000	10039.000	500.000	490.000	500.000	0.000	0.000	0.000
GR	2120.500	8960.000	2112.000	8998.000	2102.100	9028.000	2102.200	9097.000	2104.600	9114.000
GR	2106.100	9156.000	2105.300	9202.000	2106.000	9244.000	2106.100	9350.000	2104.600	9416.000
GR	2105.700	9448.000	2105.900	9505.000	2104.900	9538.000	2104.400	9564.000	2105.300	9586.000
GR	2104.500	9621.000	2103.800	9658.000	2105.500	9688.000	2104.500	9714.000	2103.300	9736.000
GR	2101.500	9746.000	2101.600	9762.000	2104.000	9774.000	2104.500	9790.000	2103.500	9812.000
GR	2104.400	9820.000	2103.700	9857.000	2104.200	9891.000	2103.400	9930.000	2102.200	9941.000
GR	2101.800	9975.000	2102.300	10000.000	2102.800	10043.000	2103.700	10059.000	2104.300	10110.000
GR	2103.400	10139.000	2104.100	10205.000	2104.700	10247.000	2105.700	10265.000	2103.700	10292.000
GR	2104.300	10359.000	2104.500	10396.000	2104.300	10411.000	2104.900	10421.000	2102.400	10464.000
GR	2104.900	10486.000	2111.000	10508.000	2112.000	10519.000	2112.000	10530.000	0.000	0.000

NH	7.000	0.060	9158.000	0.025	9220.000	[illegible]	9240.000	0.040	9850.000	0.065
NH	9943.000	0.025	10033.000	0.030	10370.000	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9050.000	10053.000	0.000	0.000	0.000	0.000	0.000
X1	1.590	44.000	9943.000	10033.000	490.000	540.000	490.000	0.000	0.000	0.000
GR	2130.500	8975.000	2109.600	9042.000	2107.200	9061.000	2107.200	9065.000	2109.700	9085.000
GR	2109.900	9109.000	2109.100	9123.000	2109.800	9142.000	2107.300	9158.000	2107.300	9220.000
GR	2109.500	9240.000	2110.500	9262.000	2110.500	9326.000	2110.000	9381.000	2109.700	9423.000
GR	2109.600	9482.000	2109.300	9541.000	2108.500	9625.000	2108.400	9665.000	2109.100	9697.000
GR	2108.600	9705.000	2109.100	9714.000	2107.900	9725.000	2108.600	9733.000	2107.800	9756.000
GR	2107.700	9788.000	2108.500	9811.000	2108.500	9836.000	2107.900	9849.000	2109.200	9888.000
GR	2109.600	9929.000	2107.200	9943.000	2107.200	10000.000	2107.200	10033.000	2109.900	10051.000
GR	2110.000	10110.000	2109.400	10138.000	2110.700	10178.000	2111.400	10218.000	2113.000	10249.000
GR	2114.500	10275.000	2118.000	10300.000	2120.000	10345.000	2122.800	10370.000	0.000	0.000

NH	8.000	0.065	9314.000	0.025	9380.000	0.030	9828.000	0.025	9850.000	0.065
NH	9936.000	0.025	10064.000	0.050	10340.000	0.065	10523.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9270.000	10360.000	0.000	0.000	0.000	0.000	0.000
X1	1.880	42.000	9936.000	10064.000	495.000	490.000	490.000	0.000	0.000	0.000
GR	2123.900	9020.000	2121.700	9071.000	2119.900	9123.000	2117.400	9191.000	2115.300	9255.000
GR	2113.400	9307.000	2112.000	9314.000	2112.400	9361.000	2112.800	9377.000	2114.300	9400.000
GR	2114.100	9473.000	2114.700	9538.000	2114.300	9539.000	2114.700	9578.000	2114.000	9619.000
GR	2114.100	9688.000	2114.100	9753.000	2114.400	9819.000	2112.200	9828.000	2113.000	9861.000
GR	2114.300	9879.000	2114.100	9898.000	2114.200	9906.000	2114.800	9925.000	2114.100	9936.000

GR	2113.100	9945.000	2112.900	10000.000	2113.000	10064.000	[illegible]	10083.000	2113.000	10111.000
GR	2114.600	10165.000	2114.500	10225.000	2114.100	10248.000	[illegible]	10259.000	2112.100	10267.000
GR	2114.100	10280.000	2112.900	10302.000	2112.800	10328.000	[illegible]	10340.000	2116.000	10460.000
GR	2120.000	10478.000	2130.000	10523.000	0.000	0.000	0.000	0.000	0.000	0.000
NH	8.000	0.065	9475.000	0.045	9380.000	0.030	[illegible]	0.025	9740.000	0.035
NH	9920.000	0.025	10080.000	0.035	10265.000	0.055	[illegible]	0.000	0.000	0.000
ET	0.000	0.000	4.100	9510.000	10230.000	0.000	0.000	0.000	0.000	0.000
X1	1.820	25.000	9920.000	10080.000	715.000	650.000	[illegible]	0.000	0.000	0.000
GR	2150.000	9280.000	2140.000	9320.000	2134.000	9360.000	2121.000	9380.000	2122.000	9410.000
GR	2121.000	9475.000	2120.000	9570.000	2119.000	9580.000	2120.000	9590.000	2121.000	9645.000
GR	2120.000	9655.000	2120.000	9670.000	2120.500	9700.000	2120.000	9720.000	2120.000	9740.000
GR	2120.700	9815.000	2120.000	9920.000	2119.000	10000.000	2120.000	10080.000	2120.000	10215.000
GR	2122.000	10265.000	2124.000	10280.000	2126.000	10293.000	2128.000	10310.000	2130.000	10325.000
NC	0.050	0.055	0.025	0.100	0.300	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9530.000	10220.000	0.000	0.000	0.000	0.000	0.000
X1	1.870	33.000	9809.000	10071.000	330.000	305.000	305.000	0.000	0.000	0.000
GR	2145.100	9420.000	2136.500	9448.000	2124.200	9479.000	2122.900	9496.000	2123.500	9505.000
GR	2123.600	9520.000	2124.400	9531.000	2123.800	9549.000	2124.200	9554.000	2123.600	9565.000
GR	2123.300	9570.000	2124.300	9579.000	2124.200	9594.000	2123.100	9626.000	2123.800	9636.000
GR	2123.800	9683.000	2124.400	9739.000	2125.400	9775.000	2124.200	9809.000	2123.400	9871.000
GR	2123.400	9903.000	2123.300	9931.000	2122.400	9988.000	2122.000	10000.000	2122.000	10071.000
GR	2125.400	10090.000	2124.600	10151.000	2123.100	10229.000	2124.700	10261.000	2125.900	10305.000
GR	2128.000	10349.000	2129.300	10393.000	2136.200	10443.000	[illegible]	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9530.000	10127.000	0.000	0.000	0.000	0.000	0.000
X1	1.970	13.000	9879.000	10126.000	480.000	500.000	495.000	0.000	0.000	0.000
GR	2144.800	9360.000	2136.500	9380.000	2128.400	9407.000	2127.200	9446.000	2127.800	9455.000
GR	2128.000	9469.000	2127.600	9473.000	2127.600	9487.000	2128.100	9493.000	2127.700	9499.000
GR	2128.100	9512.000	2128.100	9533.000	2127.200	9541.000	2127.800	9549.000	2127.600	[illegible]
GR	2128.100	9571.000	2127.400	9609.000	2128.200	9631.000	2128.200	9648.000	2127.900	9664.000
GR	2128.300	9687.000	2128.000	9707.000	2128.700	9761.000	2129.100	9795.000	2128.600	9810.000
GR	2128.800	9822.000	2128.500	9841.000	2128.400	9861.000	2128.800	9879.000	2126.600	9928.000
GR	2128.000	9938.000	2128.000	9949.000	2127.500	9958.000	2126.900	9972.000	2126.600	10000.000
GR	2127.100	10126.000	2140.900	10155.000	2141.800	10172.000	2140.500	10203.000	2138.600	10232.000
GR	2139.800	10256.000	2142.500	10271.000	2144.800	10285.000	0.000	0.000	0.000	0.000
DT	2.000	12945.000	12945.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NH	3.000	0.050	9905.000	0.025	10063.000	0.055	10408.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9600.000	10330.000	0.000	0.000	0.000	0.000	0.000
X1	2.060	38.000	9905.000	10083.000	470.000	515.000	500.000	0.000	0.000	0.000
GR	2146.500	9340.000	2143.700	9365.000	2134.200	9413.000	2135.000	9426.000	2135.000	9430.000
GR	2134.500	9460.000	2133.700	9491.000	2133.000	9538.000	2133.400	9560.000	2132.500	9617.000
GR	2132.800	9628.000	2132.500	9643.000	2132.700	9656.000	2131.400	9679.000	2132.600	9687.000
GR	2133.100	9732.000	2133.500	9780.000	2134.200	9833.000	2134.300	9871.000	2133.700	9905.000
GR	2131.200	9919.000	2131.600	9952.000	2131.800	9960.000	2131.300	9990.000	2131.500	10002.000
GR	2131.700	10006.000	2131.200	10083.000	2132.900	10093.000	2132.400	10108.000	2131.800	10112.000
GR	2132.300	10117.000	2132.300	10137.000	2131.700	10304.000	2133.900	10319.000	2134.200	10339.000
GR	2133.700	10364.000	2134.000	10380.000	2141.700	10408.000	0.000	0.000	0.000	0.000
EJ	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

THU, OCT 30 1986 14:47:49

THIS RUN EXECUTED THU, OCT 30 [illegible]

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HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
ERROR CORR - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
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T1 SOLS WASH FLOODPLAIN DELINEATION, MARICOPA COUNTY, ARIZONA
T2 BY CELLA BARR ASSOCIATES FOR THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
T3 100 YEAR DISCHARGE - R1 FLOODWAY PROFILE

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	[illegible]	[illegible]	[illegible]	FQ
	-10.	3.	0.	0.	0.000000	0.00	[illegible]	[illegible]	2010.700	0.000
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	[illegible]	[illegible]	[illegible]	ITRACE
	15.000	0.000	-1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

THU, OCT 30 1986 14:47:49

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HEC2 RELEASE DATED NOV 76 UPDATED MAY 1980

FORTRAN CORE - 01,02,03,04,05,06

MODIFICATION - 50,51,52,53,54,55,56

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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES [illegible]

100 YEAR DISCHARGE - 01

SUMMARY PRINTOUT

	SECNO	CWSEL	DEPTH	EG		ELMIN		TOPWID		EXPWT			
	0.030	2040.14	[illegible]	2040.65	[illegible]	2032.30	[illegible]	1242.82	9459.81	16702.63	1367.19	[illegible]	[illegible]
	0.030	2040.70	8.40	2041.10	[illegible]	2032.30	[illegible]	1287.00	9395.00	10487.00	1945.[illegible]	[illegible]	[illegible]
*	0.130	2047.[illegible]	[illegible]	2048.77	14.[illegible]	2040.60	[illegible]	1316.96	9738.13	10055.10	751[illegible]	[illegible]	[illegible]
*	0.130	2047.21	[illegible]	2049.14	[illegible]	2040.60	53.02	540.00	9500.00	10005.00	710[illegible]	[illegible]	[illegible]
*	0.220	2052.81	9.81	2054.77	[illegible]	2043.00	42.98	397.66	9433.00	[illegible]	[illegible]	1206.[illegible]	[illegible]
*	0.220	2052.82	9.82	2055.08	[illegible]	2043.00	57.91	250.48	9700.00	10030.[illegible]	449.66	137[illegible]	[illegible]
*	0.360	2058.[illegible]	9.82	2060.31	[illegible]	[illegible]	27.08	652.49	9143.00	[illegible]	2014.59	9943.92	1286.[illegible]
*	0.360	2058.06	9.66	2061.30	[illegible]	[illegible]	[illegible]	214.54	9970.00	[illegible]	2941.23	10748.38	1355.39
*	0.400	2058.[illegible]	[illegible]	2061.69	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9742.84	142.88	14437.42	244.71
	0.400	2058.48	[illegible]	2061.94	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5.32	15033.24	6.40
*	0.420	2059.37	9.[illegible]	2061.93	13.47	2051.40	37.06	205.77	9744.72	9970.74	219.94	14475.26	329.80
*	0.420	2059.37	[illegible]	[illegible]	13.56	2051.40	39.00	162.61	9784.33	9946.94	5.30	15033.69	6.91
*	0.470	[illegible]	[illegible]	[illegible]	13.45	2053.40	35.89	793.27	9922.82	10716.09	0.00	9973.71	5071.29
*	0.470	2061.78	8.38	2063.82	13.38	2053.40	39.16	542.60	9972.40	10470.00	0.00	10789.86	4255.14
*	0.560	2063.62	8.12	[illegible]	12.64	2055.50	30.22	1054.68	9610.46	10665.14	542.80	10354.42	4127.78
*	0.560	2063.63	8.11	[illegible]	12.61	2055.50	32.40	795.00	9870.00	10665.00	100.74	10478.83	4265.43
*	0.600	[illegible]	[illegible]	2069.[illegible]	13.11	2059.70	27.51	1680.82	8854.63	10545.89	1743.76	11114.37	1580.93
*	0.600	2067.80	8.10	2069.[illegible]	13.09	2059.70	31.61	712.11	9830.00	10545.00	294.22	12301.62	1861.16
*	[illegible]	[illegible]	[illegible]	[illegible]	13.81	2064.20	44.23	1237.71	8985.72	10279.43	5415.21	6727.25	2279.52
*	[illegible]	[illegible]	[illegible]	[illegible]	14.14	2064.20	45.20	639.00	9640.00	10279.00	4521.75	7258.67	2632.57
*	[illegible]	[illegible]	[illegible]	[illegible]	13.73	2067.70	44.38	941.78	9038.59	10053.87	7613.33	6470.09	329.58
*	[illegible]	[illegible]	[illegible]	[illegible]	14.14	2067.70	48.38	532.16	9520.00	10054.56	6877.24	7200.53	385.23

THU, OCT 30 1986 14:47:49

	SECNO	CWSEL	DEPTH	EG	VCH	ELMIN	[illegible]	[illegible]	[illegible]	EMOST	DLOR	[illegible]	[illegible]
	0.900	2078.82	7.72	2079.32	8.58	2071.[illegible]	[illegible]	[illegible]	8728.08	10063.24	10052.97	[illegible]	[illegible]
	0.900	2079.33	3.23	2080.32	9.06	2071.[illegible]	[illegible]	[illegible]	9380.00	10061.00	9324.74	[illegible]	[illegible]
*	1.000	2083.96	7.36	2083.23	12.36	2076.[illegible]	[illegible]	[illegible]	[illegible]	10063.83	7254.28	[illegible]	[illegible]
*	1.000	2083.93	7.33	2085.58	13.24	2076.[illegible]	[illegible]	[illegible]	9214.00	10063.74	6785.34	[illegible]	[illegible]
*	1.120	2088.38	6.18	2089.82	12.31	2082.[illegible]	[illegible]	[illegible]	9314.62	10194.64	6171.72	[illegible]	[illegible]
*	1.120	2088.38	6.18	2089.82	12.30	2082.[illegible]	[illegible]	[illegible]	9315.00	10194.65	6173.91	[illegible]	[illegible]
*	1.300	2097.04	5.74	2098.14	10.80	2091.[illegible]	[illegible]	[illegible]	9231.88	10388.79	3797.00	[illegible]	[illegible]
*	1.300	2097.04	5.74	2098.15	10.83	2091.[illegible]	[illegible]	[illegible]	9250.00	10370.00	3781.30	[illegible]	[illegible]
*	1.400	2101.07	5.77	2102.09	10.33	2095.30	[illegible]	121.[illegible]	9120.90	10399.78	5341.29	[illegible]	[illegible]
*	1.400	2101.11	5.81	2102.13	10.38	2095.30	[illegible]	[illegible]	9140.00	10390.00	5173.53	[illegible]	[illegible]
*	1.490	2105.92	4.42	2106.83	11.00	2101.50	[illegible]	[illegible]	9016.41	10489.89	6589.95	[illegible]	[illegible]
*	1.490	2106.40	4.90	2107.49	11.58	2101.50	[illegible]	[illegible]	9040.00	10124.00	7851.88	[illegible]	[illegible]
*	1.590	2111.02	3.82	2112.02	12.41	2107.20	73.14	[illegible]	9037.46	10196.09	9534.23	[illegible]	[illegible]
*	1.590	2111.03	3.83	2112.12	12.75	2107.20	76.69	[illegible]	9050.00	10053.00	9799.27	[illegible]	[illegible]
*	1.680	2115.89	4.09	2116.87	11.86	2111.80	[illegible]	1214.34	9237.07	10451.61	7540.32	[illegible]	[illegible]
*	1.680	2115.87	4.07	2116.90	12.05	2111.80	[illegible]	1090.00	9270.00	10360.00	7567.69	[illegible]	[illegible]
*	1.820	2122.50	3.30	2123.59	11.09	2119.00	[illegible]	866.22	9402.52	10288.74	6331.51	[illegible]	[illegible]
*	1.820	2122.53	3.53	2123.72	11.26	2119.00	[illegible]	740.00	9310.00	10250.00	6156.67	[illegible]	[illegible]
*	1.870	2126.36	4.36	2127.63	10.72	2122.00	63.14	841.18	9473.54	10314.73	3189.10	[illegible]	1620.02
*	1.870	2126.60	4.60	2128.03	10.97	2122.00	60.45	670.00	9530.00	10220.00	2670.16	[illegible]	1233.57
*	1.970	2130.46	3.86	2131.81	11.01	2126.[illegible]	[illegible]	732.93	9400.13	10133.06	4781.28	9597.88	33.83
*	1.970	2130.74	4.14	2132.25	11.22	2126.[illegible]	[illegible]	537.00	9530.00	10127.00	3049.71	10557.19	6.10
*	2.060	2135.05	3.85	2136.16	10.98	2131.20	64.17	973.14	9408.69	10383.83	2858.84	6852.68	3233.48
*	2.060	2135.13	3.93	2136.43	11.53	2131.20	68.83	730.00	9600.00	10330.00	2251.12	7345.81	3348.07

THU, OCT 30 1986 14:47:49

FLOODWAY DATA, 100 YEAR DISCHARGE - R1
PROFILE NO. 2

STATION	FLOODWAY WIDTH	FLOODWAY SECTION AREA	FLOODWAY MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WATER SURFACE ELEVATION WITHOUT FLOODWAY	DIFFERENCE
0.030	1287.	3909.	3.8	2040.1	2040.1	0.0
0.130	545.	2274.	6.6	2047.2	2047.1	0.1
0.270	256.	1223.	12.3	2052.8	2052.8	0.0
0.360	215.	1166.	12.9	2058.1	2058.2	-0.1
0.400	143.	1016.	14.8	2058.3	2058.3	0.0
0.420	163.	1119.	13.4	2059.4	2059.4	0.0
0.470	348.	2092.	7.2	2061.6	2061.6	0.0
0.500	795.	2490.	6.0	2063.6	2063.6	0.0
0.600	715.	1997.	7.2	2067.8	2067.7	0.1
0.690	639.	1895.	7.6	2071.0	2070.7	0.3
0.790	535.	1561.	9.2	2075.2	2074.9	0.3
0.900	681.	1840.	7.8	2079.3	2078.8	0.5
1.000	850.	1843.	7.8	2084.0	2084.0	0.0
1.120	880.	1954.	7.4	2088.4	2088.4	0.0
1.300	1120.	2049.	7.0	2097.0	2097.0	0.0
1.400	1250.	2103.	6.9	2101.1	2101.1	0.0
1.490	1084.	2184.	6.6	2106.4	2105.9	0.5
1.590	1003.	2192.	6.6	2111.0	2111.0	0.0
1.680	1090.	2166.	6.7	2115.9	2115.9	0.0
1.820	740.	1811.	8.0	2122.5	2122.5	0.0
1.870	670.	1925.	7.5	2126.6	2126.4	0.2
1.970	597.	1832.	7.9	2130.8	2130.5	0.3
2.060	730.	1924.	6.7	2135.2	2135.1	0.1

THE RUN EXECUTED THU, OCT 30 1986 15:02:18

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 HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
 ERROR CORR - 01,02,03,04,05,06
 MODIFICATION - 50,51,52,53,54,55,56
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C
T1 SOLS WASH FLOODPLAIN DELINEATION, MARICOPA COUNTY, ARIZONA
T2 BY CELLA BARR ASSOCIATES FOR THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
T3      100 YEAR DISCHARGE - R2      FLOODWAY ANALYSIS
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J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	[illegible]	[illegible]	FQ
	0.	2.	0.	0.	0.000000	0.00	[illegible]	[illegible]	[illegible]	0.000
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	[illegible]	[illegible]	[illegible]	ITRACE
	1.000	0.000	-1.000	0.000	0.000	0.000	[illegible]	[illegible]	[illegible]	15.000
J3	VARIABLE CODES FOR SUMMARY PRINTOUT									
	38.000	1.000	8.000	3.000	26.000	42.000	39.000	4.000	[illegible]	54.000
	13.000	14.000	15.000	200.000	0.000	0.000	0.000	0.000	0.000	0.000

NC	0.000	0.000	0.000	0.100	[illegible]	[illegible]	[illegible]	0.000	0.000	[illegible]
NH	3.000	0.050	9905.000	0.025	10083.000	[illegible]	[illegible]	0.000	0.000	[illegible]
QT	2.000	12945.000	12945.000	0.000	0.000	[illegible]	[illegible]	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9600.000	10330.000	0.000	[illegible]	[illegible]	[illegible]	[illegible]
X1	2.060	38.000	9905.000	10083.000	0.000	0.000	[illegible]	0.000	0.000	0.000
GR	2146.500	9340.000	2143.700	9365.000	2134.200	9413.000	2135.000	9426.000	2135.000	9430.000
GR	2134.500	9460.000	2133.700	9491.000	2133.000	9538.000	2133.400	9560.000	2132.500	9617.000
GR	2132.800	9628.000	2132.300	9643.000	2132.700	9656.000	2131.400	9679.000	2132.600	9687.000
GR	2133.100	9732.000	2133.500	9780.000	2134.200	9833.000	2134.300	9871.000	2133.700	9905.000
GR	2131.200	9919.000	2131.600	9952.000	2131.800	9960.000	2131.300	9990.000	2131.500	10002.000
GR	2131.700	10006.000	2131.200	10083.000	2132.900	10093.000	2132.400	10108.000	2131.800	10112.000
GR	2132.300	10117.000	2132.300	10137.000	2131.700	10304.000	2133.900	10319.000	2134.200	10339.000
GR	2133.700	10364.000	2134.000	10380.000	2141.000	10408.000	0.000	0.000	0.000	0.000
NH	6.000	1.000	9660.000	0.050	9882.000	0.063	9936.000	0.025	10065.000	0.065
NH	10119.000	0.050	10246.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	1.100	9700.000	10234.000	0.000	0.000	0.000	0.000	0.000
X1	2.170	22.000	9936.000	10065.000	520.000	610.000	575.000	0.000	0.000	0.000
GR	2147.400	9490.000	2144.300	9513.000	2137.200	9546.000	2136.400	9603.000	2136.600	9615.000
GR	2137.300	9646.000	2136.300	9705.000	2136.500	9715.000	2137.000	9727.000	2137.500	9767.000
GR	2138.100	9832.000	2138.700	9882.000	2139.000	9914.000	2138.700	9936.000	2136.400	10000.000
GR	2135.800	10065.000	2137.400	10076.000	2138.300	10119.000	2138.900	10161.000	2139.500	10199.000
GR	2139.300	10234.000	2142.600	10246.000	0.000	0.000	0.000	0.000	0.000	0.000

NH	6.000	1.000	9834.000	0.050	9881.000	0.065	9911.000	0.025	10065.000	[illegible]
NH	10132.000	0.050	10213.000	0.000	0.000	0.000	0.000	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9881.000	10170.000	0.000	0.000	0.000	0.000	[illegible]
X1	2.250	19.000	9941.000	10065.000	430.000	440.000	430.000	0.000	0.000	[illegible]
GR	2150.000	9684.000	2144.000	9709.000	2140.000	9751.000	2139.200	9769.000	2140.000	[illegible]
GR	2146.100	9854.000	2143.800	9881.000	2140.800	9935.000	2139.000	9941.000	2139.500	[illegible]
GR	2139.500	10065.000	2141.400	10080.000	2142.000	10102.000	2142.100	10132.000	2143.300	[illegible]
GR	2141.800	10175.000	2143.600	10205.000	2145.700	10213.000	2145.000	10214.000	0.000	[illegible]
NH	5.000	1.000	9935.000	0.065	9943.000	[illegible]	0.050	0.050	10226.000	[illegible]
NH	10285.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9940.000	10245.000	0.000	0.000	0.000	0.000	[illegible]
X1	2.370	20.000	9945.000	10060.000	615.000	610.000	615.000	0.000	0.000	[illegible]
GR	2161.300	9810.000	2158.800	9839.000	2156.300	9853.000	2150.400	9877.000	2147.400	[illegible]
GR	2147.400	9971.000	2144.000	9945.000	2144.000	10000.000	2144.700	10012.000	2144.900	[illegible]
GR	2146.500	10074.000	2147.400	10113.000	2147.600	10148.000	2147.400	10183.000	2146.500	[illegible]
GR	2145.400	10226.000	2145.200	10261.000	2146.000	10266.000	2150.400	10275.000	2151.200	[illegible]
NH	8.000	0.050	9753.000	0.035	9805.000	0.050	9832.000	0.025	10034.000	0.045
NH	10081.000	0.025	10121.000	0.050	10219.000	0.000	10260.000	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9828.000	10230.000	0.000	0.000	0.000	0.000	[illegible]
X1	2.460	36.000	9952.000	10121.000	455.000	445.000	470.000	0.000	0.000	[illegible]
GR	2177.400	9615.000	2181.400	9645.000	2188.900	9653.000	2150.400	9670.000	2188.000	[illegible]
GR	2185.600	9706.000	2164.800	9729.000	2149.000	9753.000	2149.300	9761.000	2150.400	[illegible]
GR	2150.100	9780.000	2150.000	9788.000	2150.300	9795.000	2151.000	9805.000	2150.800	[illegible]
GR	2150.100	9825.000	2150.800	9835.000	2151.100	9883.000	2150.600	9916.000	2149.000	[illegible]
GR	2148.700	9952.000	2148.200	10016.000	2150.300	10034.000	2151.100	10049.000	2148.500	[illegible]
GR	2148.500	10107.000	2149.000	10121.000	2149.700	10140.000	2150.600	10151.000	2151.400	[illegible]
GR	2150.000	10192.000	2148.200	10219.000	2147.800	10233.000	2147.800	10240.000	2153.200	[illegible]
GR	2154.800	10260.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	[illegible]
NH	9.000	1.000	9425.000	0.030	9606.000	0.030	9620.000	0.030	9680.000	0.030
NH	9710.000	0.045	9901.000	0.065	9952.000	0.025	10054.000	0.065	10178.000	0.000
ET	0.000	0.000	4.100	9390.000	10098.000	0.000	0.000	0.000	0.000	0.000
X1	2.580	48.000	9952.000	10054.000	625.000	670.000	655.000	0.000	0.000	0.000
GR	2169.700	9280.000	2166.200	9313.000	2163.100	9349.000	2163.500	9356.000	2162.200	9369.000
GR	2161.100	9394.000	2161.100	9425.000	2156.100	9449.000	2156.600	9455.000	2157.700	9501.000
GR	2157.900	9542.000	2156.400	9579.000	2156.600	9594.000	2154.500	9606.000	2154.700	9620.000
GR	2156.600	9631.000	2156.300	9651.000	2154.300	9662.000	2154.400	9671.000	2155.300	9681.000
GR	2154.500	9693.000	2154.800	9697.000	2155.400	9702.000	2155.200	9707.000	2156.600	9719.000
GR	2157.000	9768.000	2156.600	9782.000	2155.500	9793.000	2155.500	9798.000	2156.600	9814.000
GR	2156.800	9833.000	2156.200	9872.000	2155.800	9901.000	2156.300	9931.000	2154.100	9952.000
GR	2153.700	9967.000	2152.000	9972.000	2152.400	10000.000	2152.400	10021.000	2153.200	10029.000
GR	2153.400	10037.000	2153.800	10054.000	2155.700	10071.000	2155.300	10087.000	2155.400	10098.000
GR	2156.400	10115.000	2157.800	10153.000	2160.900	10170.000	0.000	0.000	0.000	0.000
NH	6.000	1.000	9390.000	0.050	9678.000	0.025	9730.000	0.045	9940.000	0.025
NH	10055.000	0.050	10318.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9630.000	10120.000	0.000	0.000	0.000	0.000	0.000

X1	2.690	44.000	9940.000	10055.000	495.000	575.000	550.000	0.000	0.000	[illegible]
GR	2170.000	9300.000	2162.400	9338.000	2163.400	9351.000	2163.300	9390.000	2161.200	9397.000
GR	2160.500	9448.000	2161.100	9464.000	2161.500	9521.000	2161.300	9553.000	2161.700	9582.000
GR	2161.300	9652.000	2160.700	9678.000	2158.900	9690.000	2158.700	9730.000	2160.100	9739.000
GR	2159.500	9746.000	2159.800	9753.000	2160.800	9756.000	2161.000	9781.000	2161.400	9808.000
GR	2160.900	9824.000	2160.900	9842.000	2160.500	9857.000	2161.100	9873.000	2161.900	9917.000
GR	2158.200	9940.000	2157.600	9970.000	2158.700	9979.000	2157.400	10000.000	2157.700	10020.000
GR	2159.100	10032.000	2158.500	10055.000	2159.500	10069.000	2159.700	10082.000	2159.900	10097.000
GR	2159.200	10099.000	2159.800	10102.000	2159.800	10127.000	2162.100	10161.000	2162.000	10187.000
GR	2161.800	10239.000	2162.300	10264.000	2162.800	10293.000	2160.100	10318.000	0.000	0.000
NH	3.000	0.045	9877.000	0.025	10134.000	0.050	10421.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9750.000	10200.000	0.000	0.000	0.000	0.000	0.000
	VULTURE MINE ROAD									
X1	2.730	14.000	9877.000	10134.000	340.000	460.000	240.000	0.000	0.000	0.000
GR	2172.800	9525.000	2169.600	9571.000	2164.800	9668.000	2163.900	9735.000	2163.000	9787.000
GR	2162.900	9919.000	2162.400	10000.000	2162.100	10069.000	2162.300	10134.000	2161.200	10180.000
GR	2165.900	10258.000	2167.300	10312.000	2168.900	10397.000	2169.000	10421.000	0.000	0.000
NH	3.000	0.045	9937.000	0.025	10048.000	0.050	10547.000	0.000	0.000	0.000
QT	2.000	12817.000	12817.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9710.000	10345.000	0.000	0.000	0.000	0.000	0.000
X1	2.780	37.000	9937.000	10048.000	150.000	310.000	260.000	0.000	0.000	0.000
GR	2176.000	9585.000	2176.500	9597.000	2173.100	9640.000	2166.800	9692.000	2165.800	9729.000
GR	2164.900	9740.000	2165.100	9749.000	2166.800	9765.000	2166.400	9818.000	2166.100	9826.000
GR	2163.000	9840.000	2165.500	9917.000	2164.100	9937.000	2163.800	9961.000	2163.700	9965.000
GR	2163.700	10000.000	2163.700	10048.000	2166.100	10069.000	2165.900	10098.000	2165.900	10123.000
GR	2164.300	10202.000	2164.300	10219.000	2165.000	10238.000	2162.000	10303.000	2163.900	10318.000
GR	2164.900	10332.000	2164.800	10345.000	2164.100	10353.000	2165.200	10366.000	2165.200	10413.000
GR	2165.100	10460.000	2164.000	10471.000	2163.900	10476.000	2163.000	10492.000	2163.400	10510.000
GR	2163.700	10522.000	2170.000	10547.000	0.000	0.000	0.000	0.000	0.000	0.000
NH	3.000	0.050	9944.000	0.025	10064.000	0.050	10743.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9930.000	10330.000	0.000	0.000	0.000	0.000	0.000
X1	2.880	29.000	9944.000	10064.000	500.000	460.000	495.000	0.000	0.000	0.000
GR	2180.000	9810.000	2176.000	9878.000	2172.500	9912.000	2167.000	9941.000	2167.000	10000.000
GR	2167.000	10064.000	2167.600	10074.000	2169.300	10098.000	2169.600	10128.000	2169.300	10205.000
GR	2168.500	10238.000	2169.000	10254.000	2168.100	10289.000	2168.500	10304.000	2168.300	10328.000
GR	2168.100	10350.000	2168.500	10374.000	2169.400	10439.000	2170.800	10509.000	2170.300	10524.000
GR	2170.700	10538.000	2170.500	10591.000	2171.700	10669.000	2171.200	10681.000	2168.100	10705.000
GR	2170.200	10726.000	2178.800	10750.000	2180.000	10763.000	2180.000	10768.000	0.000	0.000
NH	4.000	0.050	9928.000	0.025	10086.000	0.065	10290.000	0.050	10831.000	0.000
ET	0.000	0.000	4.100	9928.000	10330.000	0.000	0.000	0.000	0.000	0.000
X1	2.970	33.000	9928.000	10086.000	510.000	400.000	500.000	0.000	0.000	0.000
GR	2202.800	9910.000	2171.100	9928.000	2171.700	9975.000	2171.800	10000.000	2171.100	10014.000
GR	2171.100	10086.000	2173.400	10100.000	2172.500	10147.000	2174.100	10179.000	2172.800	10203.000
GR	2171.800	10211.000	2172.000	10226.000	2172.600	10238.000	2172.900	10278.000	2173.600	10367.000
GR	2174.100	10410.000	2174.000	10458.000	2174.000	10506.000	2174.400	10544.000	2174.300	10554.000
GR	2174.600	10565.000	2174.800	10630.000	2176.100	10672.000	2175.400	10700.000	2175.000	10707.000
GR	2174.800	10724.000	2175.900	10742.000	2174.800	10752.000	2174.400	10761.000	2173.200	10773.000
GR	2173.200	10778.000	2175.800	10807.000	2183.500	10831.000	0.000	0.000	0.000	0.000

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NH	3.000	0.050	9956.000	0.025	10160.000	0.050	10226.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9956.000	10335.000	0.000	0.000	0.000	0.000	0.000
X1	3.070	39.000	9956.000	10160.000	515.000	560.000	560.000	0.000	0.000	0.000
GR	2210.000	9910.000	2194.300	9938.000	2176.200	9956.000	2176.200	9994.000	2177.100	9998.000
GR	2177.100	10000.000	2177.000	10008.000	2176.400	10013.000	2176.300	10019.000	2175.400	10027.000
GR	2174.900	10116.000	2175.200	10132.000	2175.900	10141.000	2176.300	10160.000	2176.800	10173.000
GR	2177.900	10212.000	2179.800	10217.000	2177.800	10229.000	2178.700	10267.000	2179.100	10289.000
GR	2178.800	10312.000	2179.800	10346.000	2179.800	10380.000	2179.100	10400.000	2179.400	10438.000
GR	2179.500	10461.000	2178.100	10497.000	2179.000	10513.000	2178.100	10545.000	2178.700	10555.000
GR	2179.000	10633.000	2179.700	10669.000	2180.300	10712.000	2180.500	10734.000	2179.800	10741.000
GR	2179.700	10754.000	2178.300	10771.000	2179.000	10797.000	2183.100	10826.000	0.000	0.000
NH	8.000	1.000	9540.000	0.050	9731.000	0.065	9769.000	0.025	9873.000	0.055
NH	9952.000	0.025	10041.000	0.050	10115.000	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9675.000	10135.000	0.000	0.000	0.000	0.000	0.000
X1	3.180	40.000	9900.000	10056.000	555.000	610.000	620.000	0.000	0.000	0.000
GR	2194.200	9433.000	2188.400	9471.000	2185.000	9498.000	2183.500	9527.000	2180.400	9546.000
GR	2180.100	9564.000	2179.500	9569.000	2179.600	9577.000	2180.000	9583.000	2180.000	9616.000
GR	2179.800	9625.000	2180.300	9636.000	2180.300	9651.000	2180.700	9722.000	2181.600	9805.000
GR	2180.900	9815.000	2181.300	9827.000	2181.300	9843.000	2180.700	9900.000	2180.100	9926.000
GR	2179.700	10000.000	2179.700	10056.000	2182.800	10075.000	2184.100	10097.000	2184.800	10111.000
GR	2182.900	10124.000	2183.600	10161.000	2184.400	10197.000	2185.100	10264.000	2184.800	10328.000
GR	2185.900	10347.000	2185.400	10366.000	2185.700	10430.000	2190.100	10453.000	2194.200	10469.000
GR	2194.000	10482.000	2191.900	10495.000	2190.600	10510.000	2190.500	10521.000	2192.000	10530.000
QT	2.000	12464.000	12464.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NH	7.000	1.000	9150.000	0.050	9731.000	0.065	9769.000	0.025	9873.000	0.055
NH	9952.000	0.025	10041.000	0.050	10115.000	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9440.000	10042.000	0.000	0.000	0.000	0.000	0.000
X1	3.270	37.000	9952.000	10041.000	485.000	535.000	560.000	0.000	0.000	0.000
GR	2193.900	8950.000	2191.700	9000.000	2188.800	9090.000	2186.900	9155.000	2186.500	9162.000
GR	2185.800	9186.000	2185.400	9194.000	2185.000	9219.000	2184.600	9223.000	2184.300	9246.000
GR	2183.900	9249.000	2183.300	9287.000	2184.900	9383.000	2184.600	9350.000	2184.200	9369.000
GR	2184.500	9383.000	2183.300	9437.000	2183.900	9483.000	2184.300	9517.000	2184.700	9540.000
GR	2184.500	9590.000	2185.300	9637.000	2186.300	9731.000	2184.300	9769.000	2184.000	9817.000
GR	2182.800	9853.000	2182.300	9873.000	2184.900	9888.000	2183.800	9910.000	2184.900	9928.000
GR	2184.900	9943.000	2183.900	9952.000	2183.700	10000.000	2184.200	10041.000	2191.700	10071.000
GR	2198.800	10093.000	2200.100	10115.000	0.000	0.000	0.000	0.000	0.000	0.000
EJ	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

THU, OCT 30 1986 15:02:18

THIS RUN EXECUTED THU, OCT 30 1986 15:02:18

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 HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
 ERROR CORR - 01,02,03,04,05,06
 MODIFICATION - 50,51,52,53,54,55,56
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T1 SOLS WASH FLOODPLAIN DELINEATION, MARICOPA COUNTY, ARIZONA
T2 BY CELLA BARR ASSOCIATES FOR THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
T3 100 YEAR DISCHARGE - R2 FLOODWAY PROFILE - 0.8 FOOT

J1	ICHECK	INQ	NINV	IDIR	STAT	METRIC	HVINS		USEL	FQ
	-10.	3.	0.	0.	0.000000	0.00	0.0	0.	2135.130	0.000

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALDC	IBW	CHVIM	ITRACE
	15.000	0.000	-1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

THIS RUN EXECUTED THU, OCT 30 1986 15:05:01

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  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

100 YEAR DISCHARGE - R2

SUMMARY PRINTOUT

	SECNO	CWSEL	DEPTH	EG	VCH	ELKIN	XLCH	TOPWID	SSTA	ENDST	QLOB	QCH	QROB
*	2.060	2135.06	3.86	2136.16	10.70	2131.20	0.00	[illegible]	9408.63	10384.23	2861.75	6849.47	3233.77
*	2.060	2135.14	3.94	2136.43	11.49	2131.20	0.00	[illegible]	9600.00	10330.00	2256.10	7340.61	3348.29
*	2.170	2140.68	4.88	[illegible]	12.70	2133.80	575.00	707.18	9529.83	10239.01	4511.83	7135.51	1297.66
*	2.170	2141.07	5.27	2142.67	12.63	2135.80	575.00	534.00	9700.00	10234.00	3622.40	7733.36	1589.23
*	2.250	2145.53	6.53	[illegible]	13.39	2139.00	430.00	376.47	9702.63	10212.33	932.68	10142.90	1869.51
*	2.250	2145.60	6.60	2148.06	13.78	2139.00	430.00	289.00	9881.00	10170.00	836.52	10628.48	1510.01
*	2.370	2149.93	5.93	2151.96	13.41	2144.00	615.00	514.10	9679.95	10274.03	270.23	9381.65	4973.10
*	2.370	2150.35	6.35	2152.57	13.65	2144.00	615.00	405.00	9840.00	10245.00	90.70	9385.99	3488.29
	2.460	2153.30	5.50	2154.28	9.48	2147.80	470.00	503.06	9746.47	10251.53	3303.98	6316.91	2794.13
	2.460	2153.66	5.78	2154.93	10.44	2147.89	470.00	402.00	9828.00	10230.00	2442.28	8172.96	2129.78
*	2.580	2158.72	6.72	2160.11	12.26	2152.00	655.00	724.00	9436.42	10160.42	5141.83	7084.54	718.39
*	2.580	2158.79	6.79	2160.44	12.91	2152.00	655.00	508.00	9590.00	10098.00	4938.00	7545.98	461.03
*	2.690	2163.01	6.31	2164.09	11.01	2156.70	550.00	914.06	9334.94	10294.00	4818.99	6604.67	1521.33
*	2.690	2163.02	6.32	2164.66	12.58	2156.70	550.00	490.00	9630.00	10120.00	4254.34	7562.26	1128.40
*	2.730	2166.21	4.11	2167.61	10.68	2162.10	240.00	554.57	9625.84	10180.41	2243.37	8970.68	1730.94
*	2.730	2166.26	4.16	2167.95	11.19	2162.10	240.00	396.00	9723.00	10119.00	1721.67	9526.31	1696.52
	2.780	2168.22	5.22	2168.84	9.27	2163.00	260.00	859.69	9690.26	10539.95	1906.13	4595.78	6315.09
	2.780	2168.35	4.65	2169.48	11.59	2163.70	260.00	635.00	9710.00	10345.00	2403.91	5896.12	4516.97
*	2.880	2171.74	4.74	2173.01	11.87	2167.00	495.00	813.89	9916.41	10730.30	242.12	6751.88	5823.00
*	2.880	2172.08	5.08	2173.89	13.13	2167.00	495.00	420.00	9930.00	10350.00	262.80	8005.88	4548.32
*	2.970	2175.91	4.81	2177.15	11.09	2171.10	500.00	868.68	9925.27	10807.36	14.71	7979.12	4823.17
*	2.970	2176.06	4.96	2177.91	12.49	2171.10	500.00	402.00	9928.00	10330.00	0.00	9349.46	3467.54

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	SECND	CWSEL	DEPTH	EB	VCH	ELH	[illegible]	[illegible]	STA	EXDST	BLOB	DCH	[illegible]
*	3.070	2180.47	5.37	2181.81	[illegible]	[illegible]	[illegible]	[illegible]	931.80	10803.01	21.14	10192.28	[illegible]
*	3.070	2180.36	5.46	2182.27	[illegible]	[illegible]	[illegible]	[illegible]	936.00	10335.00	0.00	11319.82	[illegible]
	3.180	2183.83	4.33	2184.66	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10171.29	7399.53	[illegible]	[illegible]
	3.190	2184.47	4.77	2185.56	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10155.00	6106.20	[illegible]	[illegible]
	3.270	2186.92	4.12	2187.55	[illegible]	2182.80	[illegible]	[illegible]	[illegible]	10051.89	9810.50	2812.66	[illegible]
	3.270	2187.42	4.62	2188.33	[illegible]	2182.80	[illegible]	[illegible]	[illegible]	10042.00	9087.53	2370.19	[illegible]

THU, OCT 30 1986 15:02:18

FLOODWAY DATA, 100 YEAR DISCHARGE R2
PROFILE NO. 2

STATION	FLOODWAY WIDTH	FLOODWAY SECTION AREA	FLOODWAY MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WATER SURFACE ELEVATION WITHOUT FLOODWAY	WATER SURFACE ELEVATION DIFFERENCE
2.060	730.	1930.	6.7	2135.2	2135.1	.1
2.170	534.	1795.	7.2	2141.1	2140.7	.4
2.250	289.	1367.	9.5	2145.6	2145.5	.1
2.370	305.	1371.	9.4	2150.3	2149.9	.4
2.460	402.	1604.	8.1	2153.7	2153.3	.4
2.580	508.	1747.	7.4	2158.8	2158.7	.1
2.690	490.	1582.	8.2	2163.0	2163.0	.0
2.730	396.	1341.	9.7	2166.3	2166.2	.1
2.780	635.	2037.	6.3	2168.3	2168.2	.1
2.880	420.	1594.	8.0	2177.0	2171.7	.3
2.970	402.	1523.	8.4	2176.0	2175.9	.1
3.070	379.	1354.	9.5	2180.5	2180.5	.0
3.180	480.	1608.	8.0	2184.4	2183.8	.6
3.270	602.	1783.	7.0	2187.4	2186.9	.5

THU, OCT 30 1986 15:16:09

EXECUTED THU

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 HEC2 RELEASE DATED NOV 76 UPDATED MAY, 1984
 ERROR CORR - 01,02,03,04,05,06
 MODIFICATION - 50,51,52,53,54,55,56
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T1 SOLS WASH FLOODPLAIN DELINEATION, MARICOPA COUNTY, ARIZO
T2 KI SELLA BARR ASSOCIATES FOR THE FLOOD CONTROL DISTRICT
T3      100 YEAR DISCHARGE - R3   FLOODWAY ANALYSIS

J1  ICHECK    INQ      NINQ     IDIR     STRT     METRIC   HVINQ    ...    SELEV    FLEV
                                          %                                          %
       0.       2.       0.       0.  0.000000     0.00   0.000    ...   184.920    0.000

J2  NPROF    IPLOT    PRFVS    XSEC1    XSECH      FN    ...    ...    ...    ITRACE
                                                                                   0
     1.000    0.000   -1.000    0.000    0.000    0.00   ...    ...    ...    15.000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    38.000    1.000    8.000    3.000   26.000   42.000   39.000   ...   53.000   54.000   ...

    13.000   14.000   15.000  200.000    0.000    0.000    0.000   ...    0.000    0.000   ...

NC      0.000    0.000    0.000    0.100    0.300    0.000   ...    ...    0.000   ...
NT      2.000 12464.000 12464.000    0.000    0.000    0.000   ...    ...    0.000   ...
NH      7.000    1.000 9150.000    0.050 9731.000    0.065   ...    ...    0.025   ...
NH   9952.000    0.025 10041.000    0.050 10115.000    0.000   ...    ...    0.000   ...
ET      0.000    0.000    4.100 9440.000 10042.000    0.000   ...    ...    0.000   ...
X1      3.270   37.000 9932.000 10041.000    0.000    0.000   ...    ...    0.000   ...
GR   2193.900 8950.000 2191.700 9000.000 2188.800 9090.000 2186.900 9155.000 2186.500 9162.000
GR   2185.800 [illegible] 2184.400 9215.000 2185.000 9219.000 2184.600 9223.000 2184.300 9246.000
GR   2183.900 9249.000 2183.300 9287.000 2184.900 9303.000 2184.500 9350.000 2184.200 9369.000
GR   2184.500 9383.000 2183.300 9437.000 2183.900 9483.000 2184.300 9517.000 2184.700 9560.000
GR   2184.500 9590.000 2185.300 9637.000 2186.300 9731.000 2184.300 9769.000 2184.000 9817.000
GR   2182.800 9853.000 2182.800 9873.000 2184.900 9888.000 2183.800 9910.000 2184.900 9928.000
GR   2184.900 9943.000 2183.900 9952.000 2183.700 10000.000 2184.900 10041.000 2191.700 10071.000
GR   2198.800 10093.000 2200.400 10115.000    0.000    0.000    0.000    0.000    0.000    0.000

NH      7.000    1.000 9050.000    0.050 9622.000    0.045 9672.000    0.025 9736.000    0.055
NH   9937.000    0.025 10020.000    0.050 10039.000    0.000    0.000    0.000    0.000    0.000
ET      0.000    0.000    4.100 9104.000 10032.000    0.000    0.000    0.000    0.000    0.000
X1      3.150   40.000 9937.000 10070.000  370.000  425.000  430.000    0.000    0.000    0.000
GR   2193.500 8950.000 2191.500 8996.000 2189.400 9060.000 2188.700 9097.000 2188.200 9104.000
GR   2187.900 9127.000 2187.400 9130.000 2187.000 9154.000 2187.800 9168.000 2187.000 9200.000
GR   2187.400 9320.000 2187.900 9400.000 2188.100 9441.000 2187.400 9457.000 2187.700 9491.000
GR   2187.900 9514.000 2187.400 9535.000 2188.600 9576.000 2188.900 9602.000 2188.900 9622.000
GR   2189.900 9635.000 2189.500 9659.000 2186.200 9672.000 2186.200 9702.000 2186.500 9736.000
GR   2187.500 9763.000 2189.100 9807.000 2189.200 9824.000 2189.400 9837.000 2189.800 9848.000
GR   2188.800 9881.000 2188.600 9906.000 2187.700 9923.000 2188.100 9937.000 2187.800 9972.000
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GR	2187.000	9982.000	2187.000	10000.000	2187.000	[illegible]	[illegible]	10032.000	2194.400	10063.000
NH	6.000	0.065	9722.000	[illegible]	[illegible]	[illegible]	[illegible]	0.065	9912.000	0.025
NH	10043.000	0.050	10053.000	[illegible]	[illegible]	[illegible]	[illegible]	0.000	0.000	0.000
ET	0.000	0.000	4.100	9670.000	[illegible]	[illegible]	[illegible]	0.000	0.000	0.000
X1	3.460	35.000	9912.000	10043.000	[illegible]	[illegible]	[illegible]	0.000	0.000	0.000
GR	2209.600	9225.000	2204.800	9253.000	2200.900	[illegible]	[illegible]	9277.000	2198.000	9295.000
GR	2197.600	9311.000	2197.700	9332.000	2195.900	[illegible]	[illegible]	9219.000	2192.300	9469.000
GR	2191.400	9510.000	2190.500	9541.000	2191.000	[illegible]	[illegible]	9611.000	2192.600	9682.000
GR	2192.500	9704.000	2191.800	9722.000	2192.600	[illegible]	[illegible]	9734.000	2190.400	9792.000
GR	2190.200	9835.000	2191.500	9843.000	2191.600	[illegible]	[illegible]	9873.000	2191.900	9885.000
GR	2191.900	9903.000	2190.900	9912.000	2190.900	[illegible]	[illegible]	9954.000	2192.100	9982.000
GR	2191.900	10000.000	2191.900	10013.000	2191.200	[illegible]	[illegible]	10033.000	2196.600	10053.000
NH	5.000	0.050	9721.000	0.035	9794.000	0.035	[illegible]	0.025	10053.000	0.050
NH	10064.000	0.000	0.000	0.000	0.000	0.000	[illegible]	0.000	0.000	0.000
ET	0.500	0.000	4.100	9650.000	10054.000	0.000	[illegible]	0.000	0.000	0.000
X1	3.760	26.000	9942.000	10053.000	525.000	190.000	[illegible]	0.000	0.000	0.000
GR	2206.100	9285.000	2197.600	9328.000	2196.900	9336.000	2196.400	9440.000	2195.500	[illegible]
GR	2195.800	9564.000	2196.400	9638.000	2195.600	9699.000	2194.600	9721.000	2193.400	9734.000
GR	2194.400	9756.000	2194.400	9794.000	2196.700	9811.000	2196.700	9821.000	2196.000	[illegible]
GR	2196.700	9846.000	2196.700	9871.000	2196.200	9883.000	2195.600	9900.000	2196.400	[illegible]
GR	2196.400	9942.000	2194.100	9972.000	2194.100	10000.000	2194.100	10043.000	2199.400	[illegible]
GR	2200.400	10064.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NH	6.000	0.065	9527.000	0.025	9535.000	0.050	9873.000	0.065	[illegible]	0.025
NH	10043.000	0.050	10064.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9490.000	10054.000	0.000	0.000	0.000	0.000	0.000
X1	3.660	37.000	9932.000	10043.000	575.000	573.000	570.000	0.000	0.000	0.000
GR	2219.100	8997.000	2213.000	9022.000	2212.400	9050.000	2213.[illegible]	9065.000	2211.700	[illegible]
GR	2211.500	9170.000	2209.100	9230.000	2209.900	9262.000	2208.600	9307.000	2206.700	[illegible]
GR	2205.900	9396.000	2205.100	9438.000	2204.100	9469.000	2202.500	9500.000	2201.200	[illegible]
GR	2201.500	9529.000	2202.100	9545.000	2202.400	9576.000	2201.400	9625.000	2202.100	[illegible]
GR	2202.100	9698.000	2202.100	9738.000	2200.500	9745.000	2200.500	9751.000	2202.400	[illegible]
GR	2201.300	9800.000	2201.200	9811.000	2201.500	9827.000	2201.000	9830.000	2201.300	9873.000
GR	2201.100	9901.000	2200.500	9932.000	2199.200	9945.000	2199.000	10000.000	2199.000	10043.000
GR	2206.500	10059.000	2207.500	10066.000	0.000	0.000	0.000	0.000	0.000	0.000
NH	6.000	0.050	9558.000	0.025	9679.000	0.045	9831.000	0.030	9872.000	0.045
NH	9920.000	0.025	10101.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9640.000	10095.000	0.000	0.000	0.000	0.000	0.000
X1	3.790	33.000	9920.000	10075.000	675.000	645.000	675.000	0.000	0.000	0.000
GR	2219.100	9405.000	2210.500	9452.000	2209.100	9464.000	2210.000	9472.000	2208.800	9487.000
GR	2208.800	9553.000	2208.900	9558.000	2207.800	9592.000	2208.600	9600.000	2207.300	9640.000
GR	2206.900	9648.000	2206.900	9668.000	2208.600	9679.000	2208.600	9730.000	2208.100	9805.000
GR	2206.500	9851.000	2208.500	9872.000	2206.900	9882.000	2204.200	9920.000	2204.000	10075.000
GR	2213.400	10095.000	2214.000	10096.000	2213.800	10101.000	0.000	0.000	0.000	0.000
NH	4.000	0.065	9933.000	0.025	10047.000	0.065	10131.000	0.050	10458.000	0.000
ET	0.000	0.000	4.100	9919.000	10250.000	0.000	0.000	0.000	0.000	0.000

X1	3.930	19.000	9933.000	10047.000	[illegible]	[illegible]	[illegible]	0.000	[illegible]	[illegible]
GR	2230.600	9875.000	2227.100	9897.000	2209.300	[illegible]	[illegible]	10000.000	2209.800	[illegible]
GR	2212.200	10078.000	2213.200	10131.000	2213.500	[illegible]	[illegible]	10227.000	2214.000	[illegible]
GR	2213.800	10318.000	2213.900	10345.000	2214.100	[illegible]	[illegible]	10376.000	2210.800	[illegible]
GR	2210.900	10417.000	2213.600	10431.000	2222.900	[illegible]	[illegible]	[illegible]	0.000	[illegible]
NH	4.000	0.045	9943.000	0.025	10057.000	[illegible]	[illegible]	0.050	10363.000	[illegible]
ET	0.000	0.000	4.100	9932.000	10310.000	[illegible]	[illegible]	0.000	0.000	[illegible]
X1	4.070	23.000	9943.000	10057.000	770.000	[illegible]	[illegible]	0.000	0.000	[illegible]
GR	2232.300	9915.000	2215.000	9943.000	2215.500	[illegible]	[illegible]	10057.000	2217.300	[illegible]
GR	2220.200	10131.000	2221.000	10172.000	2221.500	[illegible]	[illegible]	10233.000	2220.600	[illegible]
GR	2220.500	10346.000	2219.600	10356.000	2220.400	[illegible]	[illegible]	10375.000	2219.700	10382.000
GR	2220.400	10390.000	2219.900	10397.000	2221.300	[illegible]	[illegible]	10442.000	2221.100	[illegible]
GR	2220.600	10479.000	2227.900	10517.000	[illegible]	[illegible]	[illegible]	[illegible]	0.000	[illegible]
MC	0.500	0.000	0.000	0.600	[illegible]	[illegible]	[illegible]	0.000	0.000	[illegible]
NH	3.000	0.045	9793.000	0.035	[illegible]	[illegible]	[illegible]	0.045	9955.000	[illegible]
NH	10057.000	0.045	10110.000	0.065	10690.000	[illegible]	[illegible]	0.000	0.000	0.000
ET	0.000	0.000	4.100	9780.000	10224.000	0.000	[illegible]	0.000	0.000	[illegible]
X1	4.160	38.000	9948.000	10063.000	440.000	310.000	[illegible]	0.000	0.000	[illegible]
GR	2237.300	9750.000	2218.600	9793.000	2220.100	9799.000	[illegible]	9833.000	2218.600	[illegible]
GR	2218.500	9885.000	2221.700	9898.000	2221.900	9912.000	[illegible]	9922.000	2222.200	[illegible]
GR	2221.700	9948.000	2220.300	9955.000	2220.300	10030.000	[illegible]	10063.000	2224.600	[illegible]
GR	2225.300	10123.000	2224.600	10178.000	2225.600	10198.000	[illegible]	10217.000	2223.800	[illegible]
GR	2225.300	10288.000	2224.800	10339.000	2224.400	[illegible]	[illegible]	10426.000	2224.800	[illegible]
GR	2223.700	10472.000	2224.400	10480.000	2224.500	[illegible]	[illegible]	10561.000	2224.100	[illegible]
GR	2224.100	10583.000	2230.500	10608.000	2235.800	[illegible]	[illegible]	10690.000	0.000	[illegible]
NH	8.000	0.030	9880.000	0.025	9731.000	[illegible]	[illegible]	0.040	9888.000	[illegible]
NH	10077.000	0.065	10101.000	0.030	10128.000	[illegible]	[illegible]	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9802.000	10152.000	[illegible]	[illegible]	0.000	0.000	[illegible]
X1	4.200	31.000	9888.000	10023.000	330.000	[illegible]	[illegible]	0.000	0.000	[illegible]
GR	2243.500	9410.000	2233.700	9454.000	2232.000	[illegible]	[illegible]	9558.000	2228.900	[illegible]
GR	2223.300	9661.000	2223.400	9693.000	2223.300	9734.000	[illegible]	9771.000	2225.800	[illegible]
GR	2225.300	9830.000	2223.500	9898.000	2223.400	9954.000	[illegible]	9996.000	2221.100	[illegible]
GR	2224.400	10011.000	2223.300	10023.000	2223.700	10044.000	2225.400	10077.000	2225.400	10101.000
GR	2223.000	10111.000	2224.000	10128.000	2227.600	10133.000	2228.100	10173.000	2228.100	10197.000
GR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10369.000
GR	2230.900	10193.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
DT	0.000	12244.000	12244.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MC	0.250	0.000	0.000	0.400	0.300	0.000	0.000	0.000	0.000	0.000
NH	3.000	0.100	9863.000	0.025	10063.000	0.050	10110.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9391.000	10075.000	0.000	0.000	0.000	0.000	0.000
X1	4.310	25.000	9863.000	10063.000	715.000	410.000	560.000	0.000	0.000	0.000
GR	2236.000	9075.000	2234.0[illegible]	9085.000	2233.500	9175.000	2232.400	9251.000	2231.900	9311.000
GR	2231.800	9355.000	2233.000	9391.000	2232.700	9467.000	2232.300	9511.000	2232.500	9577.000
GR	2232.000	9646.000	2237.200	9710.000	2232.200	9749.000	2232.400	9788.000	2232.400	9838.000
GR	2231.700	9848.000	2228.600	9863.000	2229.200	9919.000	2228.300	9933.000	2228.000	9981.000
GR	2226.000	10000.000	2226.900	10008.000	2227.400	10043.000	2234.700	10074.000	2234.900	10110.000

MC	0.050	0.050	0.025	0.000	0.000	[illegible]	[illegible]	[illegible]	0.000	[illegible]
ET	0.000	0.000	4.110	9858.000	10139.000	[illegible]	[illegible]	[illegible]	0.000	[illegible]
X1	4.338	15.000	9885.000	10135.000	145.000	[illegible]	[illegible]	[illegible]	0.000	[illegible]
X3	10.000	0.000	0.000	0.000	0.000	[illegible]	[illegible]	9734.000	2228.600	[illegible]
GR	2241.300	9245.000	2239.500	9345.000	2239.100	[illegible]	[illegible]	9345.000	2236.900	[illegible]
GR	2237.400	9745.000	2235.700	9845.000	2230.000	[illegible]	[illegible]	9945.000	2230.000	[illegible]
GR	2230.000	10015.000	2228.600	10115.000	2228.600	[illegible]	[illegible]	10115.000	2236.500	[illegible]
SB	1.050	1.560	2.650	0.000	252.000	[illegible]	[illegible]	21.000	0.000	[illegible]
ET	0.000	0.000	4.110	9843.000	10133.000	[illegible]	[illegible]	0.000	0.000	[illegible]
X1	4.344	12.000	9835.000	10135.000	40.000	[illegible]	[illegible]	0.000	0.000	[illegible]
X2	0.000	0.000	1.000	2237.550	2240.700	[illegible]	[illegible]	[illegible]	0.000	[illegible]
X3	10.000	0.000	0.000	0.000	0.000	[illegible]	[illegible]	2237.900	2236.300	[illegible]
RT	5.000	9538.000	2240.800	2240.900	9730.000	[illegible]	[illegible]	10000.000	2240.700	[illegible]
RT	10112.000	2240.500	2240.500	10135.000	2239.700	[illegible]	[illegible]	0.000	0.000	[illegible]
GR	2242.000	9235.000	2240.000	9335.000	2240.000	[illegible]	[illegible]	9535.000	2239.000	[illegible]
GR	2239.000	9735.000	2237.300	9835.000	2230.500	[illegible]	[illegible]	10000.000	2228.900	[illegible]
GR	2228.900	10125.000	2236.700	10135.000	0.000	[illegible]	[illegible]	0.000	0.000	[illegible]
MH	4.000	0.100	9754.000	0.045	9940.000	[illegible]	[illegible]	0.065	10225.000	[illegible]
ET	0.000	0.000	4.100	9700.000	10043.000	[illegible]	[illegible]	0.000	0.000	[illegible]
X1	4.410	39.000	9940.000	10036.000	350.000	375.000	[illegible]	0.000	0.000	[illegible]
GR	2250.000	9110.000	2241.800	9166.000	2236.500	9221.000	[illegible]	9257.000	2236.900	[illegible]
GR	2235.800	9371.000	2237.000	9382.000	2236.300	9399.000	[illegible]	9425.000	2236.500	[illegible]
GR	2237.100	[illegible]	2237.100	9545.000	2236.500	9552.000	[illegible]	9613.000	2234.600	[illegible]
GR	2237.200	9754.000	2237.500	9791.000	2235.900	9832.000	[illegible]	9876.000	2237.300	[illegible]
GR	2232.200	9940.000	2232.400	10000.000	2232.400	10036.000	[illegible]	10253.000	2234.800	[illegible]
GR	2253.500	10103.000	2254.100	10151.000	2258.500	10210.000	[illegible]	10225.000	0.000	[illegible]
MC	0.000	0.500	0.000	0.000	0.300	0.000	[illegible]	0.000	0.000	[illegible]
MH	4.000	0.050	9819.000	0.025	10176.000	[illegible]	[illegible]	0.065	10705.000	[illegible]
ET	0.000	0.000	4.100	9805.000	10440.000	0.000	[illegible]	0.000	0.000	[illegible]
X1	4.530	19.000	9819.000	10176.000	560.000	590.000	610.000	0.000	0.000	[illegible]
GR	2250.000	9670.000	2247.100	9698.000	2242.700	9731.000	[illegible]	9768.000	2241.200	9793.000
GR	2238.400	9819.000	2238.000	9858.000	2238.300	9917.000	2238.500	9957.000	2237.800	10000.000
GR	2238.300	10045.000	2236.900	10176.000	2241.700	10228.000	2242.000	10318.000	2240.900	10454.000
GR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10681.000	[illegible]	10705.000	0.000	0.000
MH	4.000	0.045	9781.000	0.025	10194.000	0.045	10194.000	1.000	10500.000	0.000
ET	0.000	0.000	4.100	9770.000	10195.000	0.000	0.000	0.000	0.000	0.000
X1	4.600	21.000	9781.000	10191.000	315.000	525.000	390.000	0.000	0.000	0.000
GR	2255.900	9701.000	2255.700	9719.000	2254.000	9757.000	2252.000	9759.000	2242.500	9770.000
GR	2241.700	9777.000	2240.800	9781.000	2241.300	9841.000	2241.800	9907.000	2241.800	9985.000
GR	2242.300	10000.000	2242.000	10050.000	2241.300	10125.000	2240.900	10186.000	2245.200	10194.000
GR	2246.000	10219.000	2246.100	10274.000	2246.300	10360.000	2247.100	10415.000	2249.400	10466.000
GR	2250.000	10500.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MC	0.045	0.050	[illegible]	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9862.000	10171.000	0.000	0.000	0.000	0.000	0.000

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X1	4.700	22.000	9868.000	10170.000	500.[illegible]	[illegible]	[illegible]	0.000	0.[illegible]	[illegible]
GR	2253.100	9855.000	2245.400	9868.000	2245.[illegible]	[illegible]	[illegible]	10060.000	2245.[illegible]	[illegible]
GR	2245.000	10112.000	2244.200	10170.000	2245.[illegible]	[illegible]	[illegible]	10226.000	2248.[illegible]	[illegible]
GR	2247.900	10284.000	2247.800	10292.000	2248.[illegible]	[illegible]	[illegible]	10307.000	2251.[illegible]	[illegible]
GR	2248.200	10326.000	2250.400	10338.000	[illegible]	[illegible]	[illegible]	10444.000	2255.[illegible]	[illegible]
GR	2259.300	10517.000	2260.000	10535.[illegible]	[illegible]	[illegible]	[illegible]	0.000	0.[illegible]	[illegible]
ET	0.000	0.000	4.100	9865.000	10117.000	[illegible]	[illegible]	0.000	0.[illegible]	[illegible]
X1	4.790	22.000	9913.000	10103.000	[illegible]	[illegible]	[illegible]	0.000	0.[illegible]	[illegible]
GR	2260.000	9885.000	2249.900	9915.[illegible]	[illegible]	[illegible]	[illegible]	9979.000	2248.7[illegible]	[illegible]
GR	2247.500	10052.000	2247.500	10103.[illegible]	[illegible]	[illegible]	[illegible]	10153.000	2231.3[illegible]	[illegible]
GR	2251.500	10259.000	2250.200	10270.000	[illegible]	[illegible]	[illegible]	10319.000	2252.6[illegible]	[illegible]
GR	2252.000	10421.000	2252.800	10475.000	[illegible]	[illegible]	[illegible]	10588.000	2257.0[illegible]	[illegible]
GR	2259.300	10694.000	2259.800	10710.000	[illegible]	[illegible]	[illegible]	0.000	0.0[illegible]	[illegible]
ET	0.000	0.000	[illegible]	9914.000	10220.000	0.000	[illegible]	0.000	0.0[illegible]	[illegible]
X1	4.870	24.000	9927.000	10108.000	410.[illegible]	450.000	[illegible]	0.000	0.0[illegible]	[illegible]
GR	2267.000	9850.000	2265.800	9908.000	2251.[illegible]	9927.000	[illegible]	10000.000	2251.0[illegible]	[illegible]
GR	2251.800	10070.000	2252.400	10108.000	2253.[illegible]	10150.000	[illegible]	10185.000	2252.9[illegible]	[illegible]
GR	2252.100	10188.000	[illegible]	10195.000	2252.[illegible]	[illegible]	[illegible]	10263.000	2253.8[illegible]	[illegible]
GR	2254.300	10259.000	2255.600	10348.000	2255.[illegible]	[illegible]	[illegible]	10472.000	2256.6[illegible]	[illegible]
GR	2257.000	10547.000	2258.300	10601.000	2259.700	[illegible]	[illegible]	10735.000	0.0[illegible]	[illegible]
QT	2.000	12118.000	12118.000	0.000	0.000	0.[illegible]	[illegible]	0.000	0.[illegible]	[illegible]
NH	6.000	0.065	9941.000	0.025	10040.000	[illegible]	[illegible]	0.025	10199.[illegible]	[illegible]
NH	10332.000	0.045	10820.000	0.000	0.000	[illegible]	[illegible]	0.000	0.0[illegible]	[illegible]
ET	0.000	0.000	4.100	9916.000	10220.000	0.000	[illegible]	0.000	0.000	[illegible]
X1	4.980	35.000	9941.000	10190.000	585.000	[illegible]	[illegible]	0.000	0.000	[illegible]
GR	2265.600	9806.000	2261.400	9841.000	2259.200	[illegible]	[illegible]	9941.000	2253.400	[illegible]
GR	2255.500	10000.000	2256.200	10040.000	2255.900	[illegible]	[illegible]	10092.000	2256.0[illegible]	[illegible]
GR	2255.700	10190.000	2259.100	10220.000	2258.400	[illegible]	[illegible]	10265.000	2257.9[illegible]	[illegible]
GR	2257.900	10317.000	2258.700	10332.000	2258.400	[illegible]	[illegible]	10362.000	2254.7[illegible]	[illegible]
GR	2258.500	10389.000	2259.000	10432.000	2259.700	[illegible]	[illegible]	10537.000	2262.1[illegible]	[illegible]
GR	2261.500	10604.000	2262.600	10614.000	2262.600	[illegible]	[illegible]	[illegible]	2262.7[illegible]	[illegible]
GR	2263.100	10701.000	2267.600	10746.000	2262.600	10761.500	2263.100	10772.000	2268.700	10820.000
NH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10109.000	0.045	10160.000	0.045	10930.000	0.000
ET	0.000	0.000	4.100	9795.000	10117.000	0.000	0.000	0.000	0.000	0.000
X1	5.080	25.000	9891.000	10109.000	515.000	460.000	505.000	0.000	0.000	0.000
GR	2256.400	9795.000	2258.300	9836.000	2259.000	9847.000	2258.400	9891.000	2258.900	9931.000
GR	2260.000	9965.000	2260.000	10000.000	2259.300	10057.000	2258.300	10109.000	2261.900	10127.000
GR	2262.100	10141.000	2263.300	10207.000	2261.900	10268.000	2261.800	10331.000	2259.900	10457.000
GR	2261.300	10472.000	2261.500	10507.000	2262.200	10539.000	2263.200	10595.000	2264.500	10643.000
GR	2263.800	10704.000	2267.300	10768.000	2267.800	10824.000	2268.400	10888.000	2269.200	10930.000
NC	0.000	0.000	0.000	0.300	0.500	0.000	0.000	0.000	0.000	0.000
NH	6.000	0.065	9765.000	0.025	9819.000	0.060	9888.000	0.025	10093.000	0.045
NH	10155.000	0.045	10675.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9746.000	10094.000	0.000	0.000	0.000	0.000	0.000
X1	5.170	39.000	9765.000	10093.000	510.000	480.000	495.000	0.000	0.000	0.000
GR	2279.700	9630.000	2278.700	9634.000	2265.100	9684.000	2269.500	9712.000	2259.600	9746.000
GR	2267.300	9765.000	2263.300	9817.000	2262.900	9849.000	2264.500	9861.000	2265.100	9881.000
GR	2264.300	9888.000	2264.300	9949.000	2264.600	10000.000	2261.100	10064.000	2264.400	10079.000
GR	2265.300	10093.000	2265.100	10121.000	2264.700	10131.000	2264.700	10155.000	2265.400	10166.000

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GR	2265.400	10179.000	2265.100	10193.000	2263.[illegible]	[illegible]	[illegible]	10242.000	2264.[illegible]	[illegible]
GR	2265.900	10299.000	2266.400	10305.000	2267.400	[illegible]	[illegible]	10398.000	2268.[illegible]	[illegible]
GR	2264.700	10459.000	2266.300	10465.000	2265.500	[illegible]	[illegible]	10501.000	2265.[illegible]	[illegible]
GR	2268.000	10568.000	2268.900	10593.000	2269.300	[illegible]	[illegible]	10675.000	0.000	[illegible]
MH	5.000	0.050	9842.000	0.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10132.000	[illegible]
MH	10193.000	0.000	0.000	0.000	[illegible]	[illegible]	[illegible]	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9649.000	[illegible]	[illegible]	[illegible]	0.000	0.000	[illegible]
XI	5.270	17.000	9940.000	10071.000	615.000	[illegible]	[illegible]	0.000	0.000	[illegible]
GR	2276.000	9080.000	2273.[illegible]00	9380.000	2272.100	[illegible]13.000	[illegible]	9649.000	2269.800	[illegible]
GR	2268.600	9818.000	2272.900	9842.[illegible]	2272.900	[illegible]869.000	[illegible]	9907.000	2268.900	[illegible]
GR	2266.800	10000.000	2266.800	10024.000	2268.000	[illegible]035.000	[illegible]	10071.000	2276.600	[illegible]
GR	2277.000	10132.000	2277.300	10193.[illegible]	0.000	0.000	[illegible]	0.000	0.000	[illegible]
QT	2.000	10370.000	10370.000	0.000	0.000	0.000	[illegible]	0.000	0.000	[illegible]
MH	5.000	0.100	9824.000	0.023	9841.000	[illegible]	[illegible]	0.023	10032.000	[illegible]
MH	10365.000	0.000	0.000	0.000	0.000	0.000	[illegible]	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9460.000	10062.000	0.000	[illegible]	0.000	0.000	[illegible]
XI	5.350	32.000	9995.000	10052.000	390.000	[illegible]	[illegible]	0.000	0.000	[illegible]
GR	2284.000	9285.000	2278.600	9356.000	2273.300	[illegible]	[illegible]	9423.000	2275.100	[illegible]
GR	2274.400	9470.000	2273.200	9488.000	2272.600	[illegible]	[illegible]	9565.000	2272.700	[illegible]
GR	2272.800	9647.000	2273.200	9673.000	2272.700	[illegible]	[illegible]	[illegible]	2274.200	[illegible]
GR	2274.300	9788.000	2273.300	9804.000	2270.400	[illegible]	[illegible]	[illegible]	2271.900	[illegible]
GR	2272.700	9894.000	2271.700	9934.000	2272.300	[illegible]	[illegible]	[illegible]	2269.700	[illegible]
GR	2269.700	10000.000	2269.700	10052.000	2273.200	[illegible]	[illegible]	10163.000	2276.000	[illegible]
GR	2276.000	10165.000	2278.000	10365.000	0.000	0.000	[illegible]	0.000	0.000	[illegible]
EJ	0.000	0.000	0.000	0.000	0.000	0.000	[illegible]	0.000	0.000	[illegible]

THU, OCT 30 1986 15:16:09

THIS RUN EXECUTED

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**********************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY, 1984
 ERROR CORR - 01,02,03,04,05,06
 MODIFICATION - 50,51,52,53,54,55,56
**********************************************

T1 SOLS WASH FLOODPLAIN DELINEATION, MARICOPA COUNTY, ARIZONA
T2 BY CELLA BARR ASSOCIATES FOR THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
T3  100 YEAR DISCHARGE - R3   FLOODWAY PROFILE - 0.8 FOOT

J1  ICHECK    INQ     NINP     IDIS     STRT     METRIC    HVINS     WSEL     FQ
   -10.       3.       0.       0.  0.000000    0.0       0.0     2187.420   0.000

J2  NPROF    IPLOT    PROFVS   XSECV    XSECH    FN      ALLOC     ITRACE
   15.000    0.000   -1.000    0.000    0.000   0.0
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THU, OCT 30 1986 13:16:09

THIS RUN EXECUTED THU, OCT 3[illegible] 15:1[illegible]

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HEC2 RELEASE DATED NOV 76 UPDATED MAY 198[illegible]
ERROR CORR - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION [illegible] INDICATES [illegible] ERRORS LIST

100 YEAR DISCHARGE - R3

SUMMARY PRINTOUT

	SECNO	CWSEL	DEPTH	EG	[illegible]	ELMIN	XLCH	[illegible]	SSTA	ENDST	BLOB	OCH	[illegible]
	3.270	2186.92	4.12	2187.55	[illegible]	2182.[illegible]	[illegible]	[illegible]	9134.31	10051.88	9816.16	2613.13	[illegible]
	3.270	2187.42	4.42	2188.33	[illegible]	2182.[illegible]	0.00	[illegible]	9440.00	10042.00	9089.67	3369.37	[illegible]
	3.350	2189.80	3.60	2190.63	[illegible]	2186.[illegible]	430.00	[illegible]	9048.39	10025.09	10281.97	2156.51	[illegible]
	3.350	2190.16	3.98	2190.79	[illegible]	2186.[illegible]	430.00	[illegible]	9104.00	10025.79	10260.39	2175.42	[illegible]
	3.460	2194.48	4.28	2195.53	[illegible]	2190.[illegible]	545.00	[illegible]	9408.66	10049.07	8070.72	4358.21	35.07
*	3.460	2194.95	4.75	2196.73	[illegible]	2190.[illegible]	545.00	[illegible]	9670.00	10049.94	6659.58	5753.27	51.64
*	3.560	2199.47	6.07	2199.98	[illegible]	2193.[illegible]	[illegible]	[illegible]	9318.55	10053.75	8044.32	4419.68	0.00
*	3.560	2199.44	6.04	2200.67	[illegible]	2193.[illegible]	[illegible]	[illegible]	9650.00	10053.43	6438.57	6025.43	0.00
*	3.660	2204.55	5.55	2206.06	[illegible]	2199.00	670.00	[illegible]	9454.29	10054.83	4923.61	7418.39	122.00
*	3.660	2204.53	5.53	2206.07	[illegible]	2199.00	670.00	[illegible]	9496.00	10054.00	4894.20	7445.[illegible]	124.44
*	3.790	2209.63	5.63	2211.05	10.83	2204.00	675.00	619.73	9459.42	10086.99	2953.50	9290.36	218.14
*	3.790	2209.57	5.57	2211.30	11.63	2204.00	675.00	446.86	9640.00	10086.86	2371.33	9863.52	229.15
*	3.930	2215.[illegible]	[illegible]	2217.50	12.37	2209.30	720.00	515.84	9919.87	10433.71	123.24	8651.76	2685.99
*	3.930	2216.10	6.80	2218.36	13.41	2209.30	720.00	330.76	9919.24	10250.00	146.52	9861.75	2455.74
*	4.070	2222.41	7.41	2223.16	12.09	2215.00	770.00	557.39	9931.01	10488.40	177.93	9412.01	2874.05
*	4.070	2222.35	7.35	2224.45	12.88	2215.00	770.00	398.00	9932.00	10330.00	189.90	9956.82	2317.28
	4.160	2224.54	6.04	2226.12	8.23	2218.50	430.00	500.92	9779.34	10584.72	8115.93	3973.81	374.26
	4.160	2225.27	6.77	2226.44	7.27	2218.50	430.00	423.92	9780.00	10223.79	8056.99	4120.02	286.98
	4.200	2227.31	5.31	2228.18	7.77	2223.00	250.00	383.37	9841.65	10377.73	5635.55	3936.23	2892.21
*	4.200	2227.56	4.56	2229.29	11.43	2223.00	250.00	350.00	9802.00	10152.00	1911.79	6176.91	4375.29
*	4.310	2233.33	6.43	2235.08	10.96	2226.90	560.00	884.85	9187.08	10071.93	672.08	11384.16	87.76
*	4.310	2233.24	6.34	2235.16	11.37	2226.90	560.00	680.79	9391.00	10071.79	439.04	11716.50	88.45

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	SECNO	CWSEL	DEPTH	EG	VCH	ELMIN	ID CH	TOP	STA	EXMAX	FL	VCH	[illegible]
	4.338	2233.99	5.39	2235.83	10.96	2228.60	170.00	281	9856.96	10139.99	[illegible]	[illegible]	[illegible]
	4.338	2234.38	5.78	2235.92	10.07	2228.60	170.00	281	9858.00	10139.00	[illegible]	[illegible]	[illegible]
	4.344	2235.07	6.17	2236.31	8.92	2228.90	40.00	[illegible]	[illegible]	10133.34	[illegible]	[illegible]	[illegible]
	4.344	2235.11	6.21	2236.33	8.85	2228.90	40.00	270	9843.00	10133.00	[illegible]	[illegible]	[illegible]
*	4.410	2239.19	6.99	2240.72	12.16	2232.20	370.00	651	9793.00	10044.00	[illegible]	[illegible]	[illegible]
*	4.410	2239.49	7.29	2241.68	13.48	2232.20	370.00	345	9700.00	[illegible]	[illegible]	[illegible]	[illegible]
	4.530	2241.73	4.83	2242.82	8.62	2236.90	610.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	4.530	2242.63	5.73	2243.30	6.82	2236.90	610.00	[illegible]	[illegible]	10440.00	[illegible]	[illegible]	[illegible]
*	4.600	2245.22	4.42	2246.22	8.07	2240.80	390.00	427	9764.85	10194.61	[illegible]	[illegible]	[illegible]
*	4.600	2245.25	4.45	2246.24	8.03	2240.80	390.00	425	9770.00	10195.00	[illegible]	[illegible]	[illegible]
*	4.700	2248.79	4.59	2250.37	10.33	2244.20	535.00	[illegible]	9862.27	10328.70	[illegible]	[illegible]	[illegible]
*	4.700	2249.00	4.80	2250.86	10.96	2244.20	535.00	[illegible]	9862.00	10471.00	[illegible]	[illegible]	[illegible]
*	4.790	2253.53	6.03	2255.08	10.89	2247.50	470.00	415	9902.93	10518.85	[illegible]	[illegible]	[illegible]
*	4.790	2253.55	6.05	2256.00	12.72	2247.50	470.00	214	9902.67	10117.00	[illegible]	[illegible]	[illegible]
*	4.870	2255.95	4.95	2257.65	11.56	2251.00	415.00	497	9913.14	10413.89	[illegible]	[illegible]	[illegible]
	4.870	2256.38	5.38	2258.01	11.06	2251.00	415.00	306	9914.00	10220.00	[illegible]	[illegible]	[illegible]
*	4.980	2259.82	4.42	2261.28	10.39	2255.40	580.00	[illegible]	9895.62	10477.61	[illegible]	[illegible]	[illegible]
*	4.980	2259.88	4.48	2261.84	11.45	2255.40	580.00	[illegible]	9916.00	10420.00	[illegible]	[illegible]	[illegible]
*	5.080	2263.10	4.80	2264.35	[illegible]	[illegible]	[illegible]	[illegible]	9826.69	10589.64	[illegible]	[illegible]	[illegible]
*	5.080	2263.31	5.01	2265.28	[illegible]	[illegible]	[illegible]	[illegible]	9826.21	10147.00	[illegible]	[illegible]	[illegible]
*	5.170	2267.38	4.48	2268.57	[illegible]	2262.90	[illegible]	[illegible]	[illegible]	[illegible]	125.01	[illegible]	[illegible]
*	5.170	2267.54	4.64	[illegible]	[illegible]	2262.90	495.00	[illegible]	[illegible]	[illegible]	97.83	[illegible]	[illegible]
*	5.270	2273.03	6.23	2274.67	11.78	2266.80	505.00	624.80	9469.15	10095.93	2992.62	8970.29	153.18
*	5.270	2272.90	6.10	2274.79	12.46	2266.80	505.00	419.11	9649.00	10095.26	2690.03	9272.98	154.99
*	5.350	2275.30	5.60	2276.71	13.82	2269.70	435.00	656.19	9404.42	10060.61	5856.22	4410.14	103.64
	5.350	2275.67	5.97	2276.78	12.41	2269.70	435.00	601.18	9460.00	10061.18	6041.68	4227.53	105.79

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FLOODWAY DATA, 100 YEAR DISCHARGE - R3
PROFILE NO. 2

STATION	FLOODWAY WIDTH	FLOODWAY SECTION AREA	FLOODWAY MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE
3.270	602.	1788.	5.0	2187.4	2186.9	0.5
3.350	922.	2143.	5.8	2190.2	2189.8	0.4
3.460	386.	1249.	10.0	2195.0	2194.5	0.5
3.560	403.	1646.	7.6	2199.5	2199.5	0.0
3.660	564.	1869.	6.7	2204.5	2204.5	0.0
3.790	447.	1467.	8.5	2209.6	2209.6	0.0
3.930	331.	1455.	8.7	2216.1	2215.8	0.3
4.070	398.	1465.	8.5	2222.4	2222.4	0.0
4.160	434.	1545.	8.1	2225.2	2224.5	0.7
4.200	350.	1209.	10.3	2227.6	2227.3	0.3
4.310	681.	1490.	8.2	2233.3	2233.3	0.0
4.330	281.	1272.	9.6	2234.4	2234.0	0.4
4.394	290.	1384.	8.8	2235.1	2235.1	0.0
4.410	345.	1443.	8.5	2239.5	2239.2	0.3
4.530	640.	2095.	5.8	2242.6	2241.7	0.9
4.600	425.	1545.	7.9	2245.2	2245.2	0.0
4.700	309.	1128.	10.9	2249.0	2248.8	0.2
4.790	214.	1012.	12.1	2253.5	2253.5	0.0
4.870	306.	1385.	8.8	2256.[illegible]	2255.9	0.1
4.980	304.	1151.	10.5	2259.[illegible]	2259.[illegible]	0.1
5.080	321.	1209.	10.0	2263.[illegible]	2263.1	0.2
5.170	344.	1162.	10.4	2267.[illegible]	2267.4	0.2
5.270	446.	1499.	8.1	2273.[illegible]	2273.0	0.0
5.350	601.	1958.	5.5	2275.[illegible]	2275.3	0.4

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HEC2 RELEASE DATED NOV 76 UPDATED MAY 19
ERROR CORR - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
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T1 SCLS WASH FLOODPLAIN DELINEATION, MARICOPA COUNTY, ARIZO
T2 BY CELIA BARR ASSOCIATES FOR THE FLOOD CONTROL DISTRICT
T3      100 YEAR DISCHARGE - R4     FLOODWAY ANALYSIS

J1  ICHECK    INQ      NINV     IDIR     ITRT     METRI                    FN
     0.       2.       0.       0.  0.000000  0.0                          0.000

J2  NPROF    IPLOT    PRFVS    XSECV    XSEND    FN                    ONTIN    ITRACE
    1.000    0.000   -1.000    0.000    [illegible]  0.[illegible]          0.000   15.000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

   38.000    1.000    8.000    3.000    [illegible]  [illegible]                   54.000

   13.000   14.000   15.000  200.000    [illegible]  0.00  [illegible]  [illegible]  0.000

NC      0.000    0.000    0.000    0.100    0.300    0.000    0.000    0.000    0.000    0.000
QT      2.000 10370.000 10370.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000
NH      5.000    0.100 9824.000    0.025 [illegible]  0.000    [illegible]  [illegible]  10032.000    0.045
NH  10365.000    0.300    0.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000
ET      6.000    0.000    4.100 9480.000 10062.000    0.000    0.000    0.000    0.000    0.000
X1      5.750   32.000 9993.000 10032.000    0.000    0.000    0.000    0.000    0.000    0.000
GR   2284.600 9285.000 2278.800 9356.000 2275.500 9399.000 2274.600 9423.000 2275.100 9436.000
GR   2274.[illegible] [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]
GR   2272.800 9647.000 2273.200 9673.000 2272.700 9700.000 2273.200 9726.000 2274.200 9760.000
GR   2274.300 9788.000 2273.300 9804.000 2270.400 9824.000 2270.200 9844.000 2271.900 9864.000
GR   2272.700 9894.000 2271.700 9934.000 2272.300 9954.000 2272.700 9983.000 2269.700 [illegible]
GR   2269.700 10000.000 2269.700 10032.000 2276.200 10062.000 2274.200 10063.000 2276.000 10085.000
GR   2276.000 10165.000 2278.000 10365.000    0.000    0.000    0.000    0.000    0.000    0.000

NC      0.000    0.000    0.000    0.100    0.300    0.000    0.000    0.000    0.000    0.000
NH      4.000    0.045 9963.000    0.025 10041.000    0.045 10073.000    0.045 10213.000    0.000
ET      0.000    0.000    4.100 9460.000 10106.000    0.000    0.000    0.000    0.000    0.000
X1      5.470   34.000 9963.000 10041.000  450.000  620.000  610.000    0.000    0.000    0.000
GR   2281.900 9400.000 2275.800 9436.000 2273.900 9448.000 2276.600 9452.000 2276.600 9483.000
GR   2275.400 9494.000 2276.800 9501.000 2277.200 9553.000 2275.400 9[illegible]3.000 2276.900 9607.000
GR   2276.700 9642.000 2276.800 9668.000 2277.000 9680.000 2277.800 9699.000 2278.300 9733.000
GR   2278.000 9771.000 2277.800 9817.000 2278.100 9850.000 2278.700 9875.000 2277.900 9892.000
GR   2273.700 9929.000 2274.000 9932.000 2275.600 9939.000 2275.600 9963.000 2274.100 9972.000
GR   2273.700 10000.000 2273.700 10041.000 2279.300 10057.000 2279.300 10073.000 2278.200 10092.000
GR   2275.100 10106.000 2277.300 10118.000 2280.500 10169.000 2285.000 10213.000    0.000    0.000
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NC	0.045	0.045	0.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9553.000	10050.000	0.000	0.000	0.000	0.000	0.000
X1	5.580	20.000	9947.000	10044.000	185.000	525.000	515.000	0.000	0.000	0.000
GR	2288.300	9436.000	2281.500	9475.000	2279.800	9500.000	2280.100	9553.000	2279.500	9562.000
GR	2280.000	9570.000	2280.300	9615.000	2281.100	9670.000	2281.400	9739.000	2281.100	9789.000
GR	2281.100	9846.000	2280.200	9890.000	2279.200	9923.000	2278.600	9937.000	2278.800	9947.000
GR	2277.400	9969.000	2277.000	10000.000	2277.000	10044.000	2294.000	10065.000	2294.600	10092.000
ET	0.000	0.000	4.100	9560.000	10087.000	0.000	0.000	0.000	0.000	0.000
X1	5.650	28.000	9951.000	10068.000	300.000	340.000	335.000	0.000	0.000	0.000
GR	2288.500	9465.000	2284.900	9486.000	2282.800	9509.000	2282.200	9527.000	2282.800	9539.000
GR	2282.500	9550.000	2282.500	9568.000	2282.100	9577.000	2282.600	9585.000	2283.500	9658.000
GR	2282.200	9695.000	2283.600	9715.000	2283.900	9762.000	2282.700	9800.000	2282.900	9816.000
GR	2281.200	9828.000	2281.600	9839.000	2282.300	9860.000	2282.400	9873.000	2282.500	9891.000
GR	2282.100	9913.000	2282.300	9928.000	2280.100	9951.000	2278.900	10000.000	2278.900	10068.000
GR	2294.100	10084.000	2288.100	10112.000	2293.400	10135.000	0.000	0.000	0.000	0.000
NH	4.000	0.100	9682.000	0.045	9932.000	0.025	10045.000	0.045	10310.000	0.000
ET	0.000	0.000	4.100	9720.000	10170.000	0.000	0.000	0.000	0.000	0.000
X1	5.740	32.000	9932.000	10045.000	430.000	520.000	500.000	0.000	0.000	0.000
GR	2294.200	9210.000	2293.000	9251.000	2290.800	9328.000	2289.400	9390.000	2288.000	9437.000
GR	2287.000	9497.000	2286.500	9568.000	2285.800	9600.000	2286.400	96[illegible]	2287.100	9687.000
GR	2287.400	9744.000	2287.300	9761.000	2287.500	9780.000	2287.400	982[illegible]	2287.600	9852.000
GR	2287.900	9872.000	2287.400	9882.000	2285.100	9912.000	2282.500	9932.000	2281.400	10000.000
GR	2281.400	10043.000	2284.300	10057.000	2284.600	10087.000	2286.800	10110.000	2286.800	10123.000
GR	2285.500	10167.000	2284.800	10214.000	2284.400	10227.000	2284.800	10243.000	2290.800	10259.000
GR	2287.900	10284.000	2295.500	10310.000	0.000	0.000	0.000	0.000	0.000	0.000
NH	3.000	0.045	9920.000	0.025	10068.000	0.045	10500.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9910.000	10130.000	0.000	0.000	0.000	0.000	0.000
X1	5.850	15.000	9920.000	10068.000	575.000	580.000	570.000	0.000	0.000	0.000
GR	2297.600	9880.000	2296.500	9892.000	2286.000	9920.000	2286.200	9948.000	2285.800	10000.000
GR	2284.700	10046.000	2289.600	10068.000	2290.000	10099.000	2289.600	10168.000	2288.800	10247.000
GR	2289.800	10286.000	2289.500	10328.000	2290.600	10352.000	2294.800	10461.000	2300.400	10500.000
NC	0.050	0.045	0.030	0.600	0.800	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9940.000	10384.000	0.000	0.000	0.000	0.000	0.000
X1	5.920	25.000	9953.000	10075.000	390.000	415.000	400.000	0.000	0.000	0.000
GR	2307.900	9[illegible]3.000	2304.900	9929.000	2288.000	9953.000	2288.000	10000.000	2288.800	10041.000
GR	2292.100	10075.000	2292.500	10097.000	2294.600	10117.000	2294.100	10147.000	2293.400	10168.000
GR	2294.700	10194.000	2294.300	10229.000	2293.900	10246.000	2294.900	10263.000	2295.300	10280.000
GR	2294.400	10323.000	2295.100	10353.000	2294.700	10384.000	2295.800	10407.000	2295.100	10425.000
GR	2295.400	10443.000	2295.300	10461.000	2295.900	10505.000	2296.500	10525.000	2303.700	10580.000
NH	3.000	0.045	9879.000	0.025	10120.000	0.045	10445.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9849.000	10230.000	0.000	0.000	0.000	0.000	0.000
X1	6.010	17.000	9954.000	10093.000	560.000	210.000	480.000	0.000	0.000	0.000
GR	2304.000	9843.000	2297.900	9867.000	2292.500	9879.000	2292.300	9913.000	2292.400	9954.000
GR	2293.700	9969.000	2293.500	10000.000	2293.500	10039.000	2293.200	10093.000	2292.200	10120.000
GR	2297.500	10133.000	2297.600	10192.000	2297.900	10232.000	2298.000	10342.000	2298.300	10385.000
GR	2305.700	10416.000	2314.600	10445.000	0.000	0.000	0.000	0.000	0.000	0.000

NC	0.045	0.045	0.025	0.000	[illegible]	0.000	[illegible]	[illegible]	0.000	[illegible]
ET	0.000	0.000	4.100	9762.000	[illegible]	0.000	[illegible]	[illegible]	0.000	[illegible]
X1	6.090	19.000	9912.000	10037.000	[illegible]	290.000	[illegible]	0.000	0.000	[illegible]
GR	2309.900	9635.000	2307.900	9670.000	[illegible]	710.000	[illegible]	9728.000	2299.10[illegible]	[illegible]
GR	2298.000	9778.000	2298.700	9793.000	[illegible]	733.000	[illegible]	9850.000	2298.200	[illegible]
GR	2299.500	9875.000	2298.300	9912.000	[illegible]	751.000	[illegible]	10000.000	2295.000	[illegible]
GR	2310.500	10049.000	2313.700	10069.000	[illegible]	0082.000	[illegible]	10085.000	0.000	[illegible]
NC	0.000	0.000	0.000	0.000	[illegible]	0.000	[illegible]	0.000	0.000	[illegible]
NH	3.000	0.045	9953.000	0.025	[illegible]	0.045	[illegible]	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9752.000	[illegible]	0.000	[illegible]	0.000	0.000	[illegible]
X1	6.210	21.000	9953.000	10037.000	[illegible]	640.000	[illegible]	0.000	0.000	[illegible]
GR	2313.900	9401.000	2312.300	9407.000	2311.200	9416.000	[illegible]	9425.000	2304.600	[illegible]
GR	2303.600	9575.000	2303.100	9634.000	2302.700	9695.000	[illegible]	9731.000	2303.000	[illegible]
GR	2303.400	9787.000	2303.500	9833.000	2304.000	9886.000	[illegible]	9935.000	2300.100	[illegible]
GR	2298.300	9953.000	2298.600	10000.000	2298.000	0019.000	[illegible]	10037.000	2327.800	[illegible]
GR	2327.800	10076.000	0.000	0.000	0.000	0.000	[illegible]	0.000	0.000	[illegible]
NC	0.000	0.000	0.000	0.100	0.300	[illegible]	[illegible]	0.000	0.000	[illegible]
NH	3.000	0.045	9895.000	0.025	10041.000	[illegible]	[illegible]	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9820.000	10055.000	[illegible]	[illegible]	0.000	0.000	[illegible]
X1	6.310	25.000	9895.000	10041.000	[illegible]	[illegible]	[illegible]	0.000	0.000	[illegible]
GR	2315.800	9305.000	2314.600	9311.000	2308.300	[illegible]	[illegible]	9362.000	2308.400	[illegible]
GR	2309.300	9404.000	2307.800	9454.000	2309.100	9483.000	[illegible]	9514.000	2309.000	[illegible]
GR	2308.100	9589.000	2307.100	9615.000	2306.000	9639.000	[illegible]	9660.000	2306.900	[illegible]
GR	2307.000	9770.000	2306.900	9812.000	2304.300	9838.000	[illegible]	9888.000	2304.300	[illegible]
GR	2300.900	9979.000	2301.100	10000.000	2302.700	10041.000	[illegible]	10055.000	2324.100	[illegible]
NH	3.000	0.045	9949.000	[illegible]	10081.000	0.045	[illegible]	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9863.000	10150.000	0.000	[illegible]	0.000	0.000	[illegible]
X1	6.400	28.000	9949.000	10081.000	420.000	520.000	[illegible]	0.000	0.000	[illegible]
GR	2315.000	9439.000	2314.200	9497.000	2312.600	9597.000	[illegible]	9638.000	2308.200	[illegible]
GR	2310.000	9729.000	2309.200	9764.000	2308.600	9786.000	[illegible]	[illegible]	2308.900	[illegible]
GR	2306.100	9836.000	2307.300	9851.000	2307.600	9882.000	[illegible]	[illegible]	2306.500	[illegible]
GR	2307.000	9915.000	2306.300	9949.000	2306.100	9976.000	[illegible]	[illegible]	2304.500	10000.000
GR	2303.900	10031.000	2305.600	10052.000	2306.900	10064.000	2304.300	10081.000	2304.300	10117.000
GR	2307.300	10136.000	2310.800	10156.000	2318.800	10220.000	0.000	0.000	0.000	0.000
NH	3.000	0.045	9952.000	0.025	10058.000	0.045	10500.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9952.000	10239.000	0.000	0.000	0.000	0.000	0.000
X1	6.500	29.000	9952.000	10058.000	470.000	560.000	500.000	0.000	0.000	0.000
GR	2321.800	9488.000	2320.700	9501.000	2318.300	9519.000	2316.800	9562.000	2317.700	9587.000
GR	2319.200	9628.000	2319.800	9658.000	2318.400	9701.000	2317.300	9744.000	2315.700	9806.000
GR	2315.600	9843.000	2314.800	9891.000	2313.700	9927.000	2309.900	9952.000	2309.100	10000.000
GR	2308.600	10051.000	2311.700	10058.000	2311.900	10069.000	2311.100	10075.000	2311.100	10099.000
GR	2312.600	10122.000	2314.500	10205.000	2316.300	10271.000	2318.000	10349.000	2317.800	10391.000
GR	2316.500	10419.000	2316.500	10452.000	2320.100	10479.000	2323.300	10500.000	0.000	0.000

NH	5.000	0.050	9937.000	0.025	10034.000	0.045	[illegible]	0.030	10116.000	[illegible]
NH	10390.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9922.000	10331.000	0.000	0.000	0.000	0.000	[illegible]
XI	6.610	25.000	9937.000	10034.000	570.000	590.000	570.000	0.000	0.000	[illegible]
GR	2322.100	9807.000	2322.100	9813.000	2320.800	9822.000	2325.100	9832.000	2324.600	[illegible]
GR	2327.700	9853.000	2323.700	9876.000	2322.100	9905.000	2315.000	9937.000	2312.200	[illegible]
GR	2312.700	10000.000	2312.700	10034.000	2315.000	10077.000	2314.100	10116.000	2315.300	[illegible]
GR	2315.200	10149.000	2315.800	10158.000	2315.500	10169.000	2316.500	10202.000	2316.000	[illegible]
GR	2316.000	10225.000	2316.900	10276.000	2318.400	10341.000	2317.100	10366.000	2325.100	[illegible]
										[illegible]
NH	5.000	0.065	9945.000	0.025	10040.000	0.060	10070.000	0.025	10178.000	[illegible]
NH	10310.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9914.000	10224.000	0.000	0.000	0.000	0.000	[illegible]
XI	6.690	16.000	9945.000	10178.000	430.000	420.000	425.000	0.000	0.000	[illegible]
GR	2324.300	9893.000	2324.400	9900.000	2319.600	9917.000	2315.800	9945.000	2313.200	[illegible]
GR	2318.300	10000.000	2317.800	10064.000	2315.700	10122.000	2315.100	10131.000	2315.200	[illegible]
GR	2320.100	10189.000	2320.400	10200.000	2319.400	10217.000	2320.700	10227.000	2320.600	[illegible]
GR	2326.600	10310.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	[illegible]
										[illegible]
NH	5.000	0.065	9909.000	0.025	10000.000	0.060	10100.000	0.025	10172.000	0.050
NH	10260.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9880.000	10184.000	[illegible]	0.000	0.000	0.000	[illegible]
XI	6.760	15.000	9951.000	10124.000	360.000	365.000	370.000	0.000	0.000	[illegible]
GR	2326.100	9848.000	2319.900	9874.000	2321.200	9892.000	2318.600	9909.000	2318.900	9951.000
GR	2318.000	9960.000	2317.800	9989.000	2318.400	10000.000	2319.300	10044.000	2319.800	10081.000
GR	2317.300	10124.000	2317.300	10172.000	2322.700	10184.000	2330.600	10231.000	2335.200	10260.000
NH	4.000	0.050	9959.000	0.025	10045.000	0.050	10350.000	0.000	10835.000	0.000
ET	0.000	0.000	4.100	9780.000	10176.000	0.000	0.000	0.000	0.000	0.000
XI	6.880	43.000	9959.000	10045.000	580.000	610.000	620.000	0.000	0.000	0.000
GR	2329.200	9755.000	2328.300	9765.000	2328.600	9768.000	2325.600	9781.000	2325.700	9799.000
GR	2326.200	9804.000	2324.900	9845.000	2322.600	9868.000	2324.700	9890.000	2322.900	9916.000
GR	2323.100	9936.000	2320.500	9959.000	2320.500	10000.000	2320.500	10021.000	2325.200	10045.000
GR	2324.600	10079.000	2324.200	10117.000	2323.100	10158.000	2324.200	10168.000	2324.800	10213.000
GR	2325.000	10253.000	2325.400	10299.000	2327.100	10343.000	2327.300	10412.000	2324.900	10429.000
GR	2326.200	10442.000	2327.500	10475.000	2325.500	10494.000	2325.600	10521.000	2328.900	10532.000
GR	2327.200	10556.000	2326.100	10589.000	2324.700	10629.000	2324.900	10642.000	2327.300	10653.000
GR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10709.000	2327.500	10720.000	2328.800	10738.000
GR	2327.200	10750.000	2325.500	10780.000	2338.100	10833.000	0.000	0.000	0.000	0.000
HC	0.000	0.000	0.000	0.100	0.300	0.000	0.000	0.000	0.000	0.000
NH	3.000	0.050	9954.000	0.025	10030.000	0.050	10420.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9954.000	10259.000	0.000	0.000	0.000	0.000	0.000
XI	6.990	22.000	9954.000	10030.000	595.000	595.000	610.000	0.000	0.000	0.000
GR	2332.600	9912.000	2332.600	9919.000	2329.200	9932.000	2327.600	9954.000	2323.200	9965.000
GR	2322.800	10000.000	2322.800	10022.000	2325.400	10030.000	2325.400	10051.000	2328.300	10065.000
GR	2328.200	10102.000	2328.200	10160.000	2327.900	10191.000	2327.300	10210.000	2327.500	10216.000
GR	2327.000	10227.000	2327.600	10235.000	2327.300	10284.000	2325.700	10302.000	2326.500	10313.000
GR	2327.200	10379.000	2334.600	10420.000	0.000	0.000	0.000	0.000	0.000	0.000

WED NOV 19 1986 08140152

WC	0.000	0.000	0.000	0.300	0.500	0.000	0.000	0.000	0.000	[illegible]
NH	3.000	0.050	9967.000	0.025	10041.000	0.050	10390.000	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9954.000	0190.000	0.000	0.000	0.000	0.000	[illegible]
X1	7.130	19.000	9967.000	10041.000	725.000	720.000	725.000	0.000	0.000	[illegible]
GR	2339.000	9948.000	2327.500	9967.000	2327.300	0000.000	2327.300	10023.000	2331.900	[illegible]
GR	2332.200	10[illegible]8.000	2333.100	10073.000	332.800	0119.000	2333.600	10131.000	2332.800	[illegible]
GR	2333.300	10181.000	2332.600	10200.000	2332.900	0213.000	2331.900	10226.000	2332.600	[illegible]
GR	2332.200	10273.000	2335.400	10326.00[illegible]	[illegible]	0373.000	2341.200	10390.000	0.000	[illegible]
NH	3.000	0.050	9979.000	0.025	00[illegible]0.000	0.050	10240.000	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9959.000	0110.000	0.000	0.000	0.000	0.000	[illegible]
X1	7.210	12.000	9955.000	10066.000	420.000	410.000	420.000	0.000	0.000	[illegible]
GR	2340.900	9950.000	2340.500	9955.000	2329.800	9979.000	2329.800	10000.000	2332.100	[illegible]
GR	2332.300	10048.000	2331.000	10066.000	2331.000	0079.000	2335.000	10091.000	2335.900	[illegible]
GR	2346.000	10183.000	2354.200	10240.000	0.000	0.000	0.000	0.000	0.000	[illegible]
NH	3.000	0.050	9946.000	0.025	10028.000	0.050	10095.000	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9840.000	0030.000	0.000	0.000	0.000	0.000	[illegible]
X1	7.300	13.000	9946.000	10028.000	505.000	450.000	480.000	0.000	0.000	[illegible]
GR	2344.500	9816.000	2342.100	9825.000	2336.000	9851.000	2336.200	9864.000	2337.500	[illegible]
GR	2337.500	9893.000	2336.400	9913.000	2338.300	9[illegible]3.000	2338.400	9946.000	2333.300	[illegible]
GR	2333.600	10000.000	2334.000	10028.000	2[illegible].900	[illegible].000	0.000	0.000	0.000	[illegible]
EJ	0.000	0.000	0.000	0.000	[illegible]	[illegible]	0.000	0.000	0.000	[illegible]

WED, NOV 19 1986 08:10:52

THIS RUN EXECUTED WED, NOV 19 1986 08:10:52

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*****************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
*****************************************

T1 SOLS WASH FLOODPLAIN DELINEATION, MARICOPA COUNTY, ARIZONA
T2 BY CELLA BARR ASSOCIATES FOR THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
T3   100 YEAR DISCHARGE - R4   FLOODWAY PROFILE - 0.8 FOOT

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC   HVINS    TW       WSEL     FQ

    -10.       3.       0.       0.  0.000000     0.00     0.0                        0.000

J2  NPROF     IPLOT    PRFVS    XSECV    XSECH     FN      ALLDC    IBW      HVINS    ITRACE

    15.000    0.000   -1.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000
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WED, NOV 19 1986 08140:52

RUN EXECUTED WED, NOV 19 1986 08:14:52

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*****************************************
 HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
 ERROR CORR -  01,02,03,04,05,06
 MODIFICATION -  50,51,52,53,54,55,56
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

100 YEAR DISCHARGE - R4

SUMMARY PRINTOUT

	SECNO	CWSEL	DEPTH	EG	VCH	ELMIN	XLCH	TOPWID	SSTA	ENDST	QLOB	QCH	QRIB
*	5.350	2275.31	5.61	2276.71	13.76	2269.70	0.00	[illegible]	9304.04	10060.83	[illegible]	4101.84	103.70
	5.350	2275.67	5.97	2276.78	12.41	2269.70	0.00	[illegible]	9360.00	10061.18	6042.70	4221.50	105.[illegible]
*	5.470	2279.24	5.54	2280.42	11.94	2273.70	610.00	[illegible]	9415.72	10148.85	4876.[illegible]	4964.99	528.[illegible]
*	5.470	2279.40	5.70	2280.67	12.11	2273.70	610.00	[illegible]	9460.00	10106.00	4869.12	4991.14	209.74
*	5.580	2282.84	5.84	2284.18	11.59	2277.00	513.00	[illegible]	9467.29	10051.22	[illegible]	6213.59	[illegible]
*	5.580	2283.04	6.04	2284.52	11.89	2277.00	513.00	497.00	9553.00	10050.00	[illegible]	6603.16	[illegible]
*	5.650	2284.69	5.79	2286.05	11.05	2278.90	335.00	[illegible]	9488.33	10088.11	[illegible]	158.18	210.62
*	5.650	2284.79	5.89	2286.21	11.16	2278.90	435.00	[illegible]	9560.00	10087.00	2790.02	457.97	[illegible]
*	5.740	2287.81	6.41	2289.26	11.10	2281.40	500.00	[illegible]	9418.10	10251.03	[illegible]	2627.49	[illegible]
*	5.740	2287.98	6.58	2289.80	11.90	2281.40	500.00	[illegible]	9720.00	10170.00	[illegible]	1405.82	[illegible]
*	5.850	2291.31	6.61	2292.93	11.04	2284.70	570.00	[illegible]	9905.83	10370.49	138.81	8753.82	1477.36
*	5.850	2291.36	6.66	2293.67	12.44	2284.70	570.00	220.00	9910.00	10130.00	156.96	9931.90	271.14
*	5.920	[illegible]	[illegible]	[illegible]	11.10	2288.00	400.00	[illegible]	[illegible]	10478.97	160.20	9110.45	1099.35
*	5.920	2295.44	7.44	2297.25	11.39	2288.00	400.00	441.57	9942.43	10384.00	160.27	9211.87	997.86
	6.010	2298.15	5.95	2299.01	7.51	2292.20	180.00	496.98	9866.03	10363.01	3814.86	4934.54	1618.60
	6.010	2298.26	6.06	2299.09	7.36	2292.20	480.00	364.39	9865.61	10230.00	3801.22	4947.94	1620.84
*	6.090	2300.82	5.82	2302.66	12.21	2295.00	430.00	349.02	9692.48	10041.50	2388.96	7937.53	43.51
*	6.090	2301.37	6.37	2303.44	12.39	2295.00	430.00	278.00	9762.00	10040.00	1426.02	8901.89	42.09
*	6.210	2305.41	7.41	2306.85	11.59	2298.00	530.00	621.46	9424.99	10046.45	3343.65	6901.74	124.61
*	6.210	2305.57	7.57	2307.71	13.18	2298.00	530.00	294.65	9752.00	10046.65	2190.69	8023.60	147.71
*	6.310	2307.64	6.74	2309.39	11.29	2300.90	500.00	456.75	9438.24	10051.18	1263.67	9019.71	86.62
	6.310	2307.65	6.75	2309.57	11.64	2300.90	500.00	231.20	9820.00	10051.20	963.16	9317.09	89.75

WED, NOV 19 1986 08:40:52

	SECND	CWSEL	DEPTH	EB	VCH	ELMIN	ALCH	TOPWID	SSTA	ENDST	[illegible]	[illegible]	[illegible]
	6.400	2310.10	6.20	2311.27	10.28	2303.90	500.00	304.15	9847.84	10151.99	2021.71	507.83	1110.17
	6.400	2310.19	6.29	2311.60	10.96	2303.90	500.00	287.00	9863.00	10150.00	1347.05	723.00	1907.14
*	6.500	2315.43	6.83	2317.31	12.49	2308.60	500.00	385.45	9853.48	10238.93	538.23	3071.36	1760.41
*	6.500	2315.49	6.89	2317.58	12.69	2308.60	500.00	287.00	9952.00	10239.00	[illegible]	1421.97	1743.02
*	6.610	2318.18	5.98	2319.84	12.53	2312.20	570.00	409.10	9922.23	10331.33	2015.[illegible]	757.68	2450.31
	6.610	2318.49	6.29	2319.87	11.74	2312.20	570.00	409.00	9922.00	10331.00	[illegible]	[illegible]	[illegible]
	6.690	2320.35	5.25	2321.99	10.41	2313.10	425.00	307.03	9914.36	10224.28	2470.[illegible]	974.27	[illegible]
	6.690	2320.29	5.10	2321.97	10.86	2315.10	425.00	297.41	9914.88	10223.13	2391.[illegible]	[illegible]	[illegible]
	6.760	2322.70	5.40	2323.89	9.42	2317.[illegible]	370.00	321.73	9862.27	10183.99	1884.27	2257.86	3227.[illegible]
	6.760	2322.75	5.46	2323.96	7.59	2317.[illegible]	370.00	304.00	9880.00	10184.00	1825.83	5702.90	3241.[illegible]
*	6.880	2326.94	6.44	2328.33	12.13	2320.50	620.00	316.38	9773.21	10786.27	2164.72	4038.05	2167.41
*	6.880	2327.02	6.52	2328.77	12.96	2320.50	620.00	396.00	9780.00	10176.00	2379.[illegible]	4339.14	[illegible]
*	6.990	2330.19	7.40	2331.84	12.67	2322.80	610.00	467.40	9928.20	10395.59	106.27	5083.21	2757.39
*	6.990	2330.77	7.97	2332.84	13.40	2322.80	610.00	305.00	9954.00	10259.00	0.00	2462.13	[illegible]
*	7.130	2335.78	8.48	2337.67	12.84	2327.30	725.00	376.16	9953.32	10329.48	214.36	7428.90	2676.77
*	7.130	2336.02	8.72	2338.53	13.99	2327.30	725.00	236.00	9954.00	10190.00	250.21	8401.51	1971.22
*	7.210	2337.82	8.02	2340.47	13.84	2329.80	420.00	165.27	9961.02	10126.29	0.00	3621.70	1678.21
	7.210	2338.39	8.59	2340.61	12.63	2329.80	420.00	150.27	9959.72	10110.00	0.00	3598.02	1671.98
*	7.300	2341.13	7.83	2343.66	14.22	2333.30	480.00	212.20	9829.12	10041.31	2087.[illegible]	3102.10	199.94
*	7.300	2341.08	7.78	2343.69	14.39	2333.30	480.00	201.22	9840.00	10041.21	2030.50	3170.03	199.43

WED, NOV 19 1986 08140152

FLOODWAY DATA, 100 YEAR DISCHARGE - R4
PROFILE NO. 2

STATION	FLOODWAY WIDTH	FLOODWAY SECTION AREA	FLOODWAY MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WATER SURFACE ELEVATION WITHOUT FLOODWAY	DIFFERENCE
5.350	601.	1960.	5.3	2275.7	2275.3	0.4
5.470	646.	1710.	6.1	2279.4	2279.2	0.2
5.580	497.	1531.	6.8	2283.0	2282.8	0.2
5.650	527.	1539.	6.7	2284.8	2284.7	0.1
5.740	450.	1248.	8.3	2288.0	2287.8	0.2
5.850	220.	927.	11.2	2291.3	2291.3	0.0
5.920	442.	1202.	8.6	2295.5	2295.5	0.0
6.010	364.	1461.	7.1	2298.2	2298.1	0.1
6.090	278.	1100.	9.4	2301.3	2300.8	0.5
6.210	295.	1186.	8.7	2305.6	2305.4	0.2
6.310	231.	1050.	9.9	2307.6	2307.6	0.0
6.400	287.	1252.	8.3	2310.2	2310.1	0.1
6.500	287.	1097.	9.5	2313.5	2313.4	0.1
6.610	409.	1413.	7.3	2318.5	2318.2	0.3
6.690	308.	1027.	10.1	2320.3	2320.4	-0.1
6.760	304.	1234.	8.4	2322.8	2322.7	0.1
6.880	396.	1394.	7.4	2327.0	2326.9	0.1
6.990	305.	1275.	8.1	2330.8	2330.2	0.6
7.130	236.	1124.	9.2	2336.0	2335.8	0.2
7.210	150.	907.	11.4	2338.4	2337.8	0.6
7.300	201.	1025.	10.1	2341.1	2341.1	0.0

THIS RUN EXECUTED TUE, NOV 18, 1986 09134154

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HEC2 RELEASE DATED NOV 76 UPDATED MAY 1980
ERROR CORR - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
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T1 SOLS WASH FLOODPLAIN DELINEATION, MARICOPA COUNTY, ARIZONA
T2 BY CELLA BARR ASSOCIATES FOR THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
T3     100 YEAR DISCHARGE - 85,000 FLOODWAY VALUES

J1  ICHECK    INQ    NINP    IDIR    METRIC    HVINS    NSEC    FQ

     0.       2.      0.      0.     0.000     0.       341.130  0.000

J2  NPROF    IPLOT   PRFVS   XSECV   XSEDV     ALLDC    CHNIM   ITRACE

    1.000    0.000  -1.000   0.000   0.000     0.000    0.000   10.000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    38.000   1.000   8.000   3.000  24.000    42.000   32.000   53.000   54.000

    13.000  14.000  15.000 200.000   0.000     0.000    0.000    0.000    0.000

QT      2.000 10370.000 10370.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000
NC      0.000     0.000     0.000     0.300     0.500     0.000     0.000     0.000     0.000     0.000
NH      3.000     0.050  9946.000     0.025 10028.000     0.050 10095.000     0.000     0.000     0.000
ET      0.000     0.000     4.100  9810.000 10050.000     0.000     0.000     0.000     0.000     0.000
X1      7.300    13.000  9946.000 10028.000     0.000     0.000     0.000     0.000     0.000     0.000
GR   2341.500  9816.000  2342.100  9825.000  2336.000  9851.000  2336.200  9864.000  2337.500  9878.000
GR   2337.500  9893.000  2336.400  9913.000  2338.300  9933.000  2338.400  9946.000  2333.300  9967.000
GR   2333.600 10000.000  2334.000 10028.000  2349.900 10095.000     0.000     0.000     0.000     0.000

NH      3.000     0.065  9924.000     0.025 10068.000     0.035 10320.000     0.000     0.000     0.000
ET      0.000     0.000     4.100  9705.000 10120.000     0.000     0.000     0.000     0.000     0.000
X1      7.440    28.000  9924.000 10068.000   660.000   800.000   745.000     0.000     0.000     0.000
GR   2349.600  9648.000  2349.600  9650.000  2347.600  9658.000  2342.300  9678.000  2341.500  9697.000
GR   2345.800  9734.000  2343.100  9748.000  2344.200  9773.000  2342.500  9807.000  2343.300  9837.000
GR   2343.000  9905.000  2341.000  9924.000  2340.600  9985.000  2340.300 10000.000  2339.200 10022.000
GR   2338.600 10068.000  2343.800 10088.000  2344.200 10131.000  2343.200 10154.000  2340.800 10177.000
GR   2341.600 10184.000  2340.800 10189.000  2342.800 10201.000  2343.600 10214.000  2343.700 10231.000
GR   2344.600 10240.000  2350.900 10270.000  2354.800 10320.000     0.000     0.000     0.000     0.000

NC      0.000     0.000     0.000     0.600     0.800     0.000     0.000     0.000     0.000     0.000
NH      3.000     0.065  9938.000     0.025 10063.000     0.035 10555.000     0.000     0.000     0.000
ET      0.000     0.000     4.100  9913.000 10162.000     0.000     0.000     0.000     0.000     0.000
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TUE, NOV 18 1986 09:34:54

X1	7.530	20.000	9961.000	10044.000	463.000	610.000	[illegible]	0.000	0.[illegible]	[illegible]
GR	2352.400	9786.000	2352.200	9796.000	2351.000	9803.000	[illegible]	9830.000	2341.[illegible]	[illegible]
GR	2349.200	9913.000	2346.300	9938.000	2342.700	9961.000	[illegible]	10000.000	2342.[illegible]	[illegible]
GR	2346.500	10063.000	2347.300	10086.000	2347.600	10134.000	[illegible]	10182.000	2348.[illegible]	[illegible]
GR	2347.100	10322.000	2347.400	10378.000	2348.300	10447.000	[illegible]	10506.000	2354.[illegible]	[illegible]
NC	0.065	0.055	0.025	0.000	0.000	0.000	[illegible]	0.000	0.[illegible]	[illegible]
ET	0.000	0.000	1.110	9901.000	10160.000	0.000	[illegible]	0.000	0.[illegible]	[illegible]
X1	7.579	6.000	9902.000	10042.000	210.000	295.000	[illegible]	0.470	0.[illegible]	[illegible]
X3	10.000	0.000	0.000	0.000	0.000	0.000	[illegible]	2351.800	2351.[illegible]	[illegible]
GR	2353.600	9900.000	2343.600	9902.000	2343.600	10000.000	[illegible]	10042.000	2354.[illegible]	[illegible]
GR	2356.000	10230.000	0.000	0.000	0.000	0.000	[illegible]	0.000	0.[illegible]	[illegible]
SB	1.050	1.560	2.630	0.000	65.800	4.230	[illegible]	0.000	0.[illegible]	[illegible]
ET	0.000	0.000	4.110	9901.000	10160.000	0.000	[illegible]	0.000	0.[illegible]	[illegible]
X1	7.590	6.000	9902.000	10042.000	50.000	50.000	[illegible]	0.470	0.[illegible]	[illegible]
X2	0.000	0.000	1.000	2350.800	2353.700	0.000	[illegible]	0.000	0.[illegible]	[illegible]
X3	10.000	0.000	0.000	0.000	0.000	0.000	[illegible]	2351.800	2351.[illegible]	[illegible]
BT	3.000	9900.000	2353.630	2350.630	10044.000	2354.690	[illegible]	10230.000	2356.[illegible]	[illegible]
GR	2353.600	9900.000	2343.600	9902.000	2343.600	10000.000	[illegible]	10042.000	2354.[illegible]	[illegible]
GR	2356.000	10230.000	0.000	0.000	0.000	0.000	[illegible]	0.000	0.[illegible]	[illegible]
NH	3.000	0.065	9954.000	0.025	10048.000	0.055	[illegible]	0.000	0.[illegible]	[illegible]
ET	0.000	0.000	4.100	9737.000	10070.000	0.000	[illegible]	0.000	0.[illegible]	[illegible]
X1	7.630	10.000	9931.000	10067.000	255.000	140.000	[illegible]	0.000	0.[illegible]	[illegible]
GR	2363.600	9735.000	2354.400	9807.000	2352.300	9838.000	[illegible]	9904.000	2351.[illegible]	[illegible]
GR	2347.100	9954.000	2347.000	10000.000	2347.000	10048.000	[illegible]	10067.000	2356.[illegible]	[illegible]
NH	3.000	0.065	9958.000	0.025	10191.000	0.055	[illegible]	0.000	0.[illegible]	[illegible]
ET	0.000	0.000	4.100	9927.000	10215.000	0.000	[illegible]	0.000	0.[illegible]	[illegible]
X1	7.720	18.000	9958.000	10059.000	500.000	505.000	[illegible]	0.000	0.[illegible]	[illegible]
GR	2363.800	9925.000	2350.500	9958.000	2350.000	10000.000	[illegible]	[illegible]	[illegible]	[illegible]
GR	2351.100	10059.000	2352.400	10071.000	2352.900	10087.000	[illegible]	[illegible]	[illegible]	[illegible]
GR	2351.900	10115.000	2356.500	10129.000	2351.800	10156.000	[illegible]	[illegible]	[illegible]	[illegible]
GR	2352.400	10191.000	2360.300	10213.000	2361.500	10220.000	[illegible]	0.000	0.[illegible]	[illegible]
NH	3.000	0.065	9933.000	0.025	10082.000	0.055	10247.000	0.000	0.000	0.000
ET	0.000	0.000	4.100	9910.000	10100.000	0.000	0.000	0.000	0.000	0.000
X1	7.820	15.000	9933.000	10082.000	535.000	380.000	[illegible]	0.000	0.[illegible]	[illegible]
GR	2370.000	9903.000	2354.300	9933.000	2351.500	9947.000	2353.500	9972.000	2353.600	9980.000
GR	2353.600	10000.000	2354.300	10043.000	2355.800	10082.000	2356.400	10100.000	2356.400	10138.000
GR	2361.400	10189.000	2363.400	10222.000	2362.100	10232.000	2363.400	10240.000	2363.400	10247.000
NC	0.065	0.055	0.025	0.600	0.800	0.000	0.000	0.000	0.000	0.000
ET	0.000	0.000	4.110	9800.000	10300.000	0.000	0.000	0.000	0.000	0.000
X1	7.884	12.000	9935.000	10051.000	360.000	145.000	345.000	0.707	0.000	0.000
X3	10.000	0.000	0.000	0.000	0.000	0.000	0.000	2360.000	2362.700	0.000
GR	2366.000	9735.000	2364.000	9835.000	2360.000	9935.000	2359.600	9945.000	2355.600	9946.000
GR	2355.600	10000.000	2354.600	10043.000	2362.700	10051.000	2363.700	10136.000	2362.900	10236.000
GR	2364.500	10336.000	2365.000	10390.000	0.000	0.000	0.000	0.000	0.000	0.000

SB	1.050	1.560	2.630	0.000	67.200	6.360	[illegible]	0.000	0.000	0.000
ET	0.000	0.000	4.110	9790.000	10271.000	0.000	0.000	0.000	0.000	0.000
X1	7.891	12.000	9870.000	10270.000	730.000	30.000	[illegible]	0.707	0.000	0.000
X2	0.000	0.000	1.000	2359.100	2365.400	0.000	[illegible]	0.000	0.000	0.000
X3	10.000	0.000	0.000	0.000	0.000	0.000	[illegible]	2361.400	2360.100	0.000
BT	6.000	9835.000	2364.700	2366.700	9935.000	2366.300	[illegible]	10000.000	2365.800	2365.800
BT	10035.000	2365.800	2365.800	10135.000	2365.400	2365.400	[illegible]	2365.800	2365.800	[illegible]
GR	2369.000	9770.000	2364.000	9870.000	2361.000	9945.000	[illegible]	9950.000	2355.800	9970.000
GR	2355.800	10000.000	2355.100	10070.000	2355.100	10100.000	[illegible]	10105.000	2360.100	10170.000
GR	2364.700	10270.000	2369.800	10370.000	0.000	0.000	[illegible]	0.000	0.000	0.000
NH	3.000	0.065	9977.000	0.025	10076.000	0.055	[illegible]	0.000	0.000	0.000
ET	0.000	0.000	4.100	9918.000	10140.000	0.000	[illegible]	0.000	0.000	0.000
X1	7.920	23.000	9937.000	10124.000	150.000	220.000	[illegible]	0.000	0.000	0.000
GR	2372.000	9707.000	2370.000	9717.000	2369.000	9787.000	[illegible]	9817.000	2360.000	[illegible]
GR	2369.000	9887.000	2366.600	9891.000	2361.200	9915.000	[illegible]	9937.000	2358.200	[illegible]
GR	2356.500	9977.000	2355.700	10000.000	2355.700	10023.000	[illegible]	10030.000	2357.900	[illegible]
GR	2357.800	10076.000	2356.800	10086.000	2357.500	10096.000	[illegible]	10110.000	2357.900	[illegible]
GR	2357.000	10124.000	2370.000	10160.000	2380.000	10180.000	[illegible]	0.000	0.000	[illegible]
NH	4.000	0.050	9930.000	0.065	9967.000	0.025	[illegible]	0.050	10275.000	[illegible]
ET	0.000	0.000	4.100	9719.000	10200.000	0.000	[illegible]	0.000	0.000	[illegible]
X1	8.000	35.000	9930.000	10094.000	440.000	420.000	[illegible]	0.000	0.000	[illegible]
GR	2372.000	9515.000	2368.000	9565.000	2366.000	9605.000	[illegible]	9615.000	2366.000	[illegible]
GR	2369.200	9665.000	2367.400	9670.000	2366.300	9675.000	[illegible]	9695.000	2362.400	[illegible]
GR	2363.100	9754.000	2362.700	9770.000	2362.800	9775.000	[illegible]	9831.000	2361.000	[illegible]
GR	2360.000	9930.000	2359.000	9960.000	2356.900	9967.000	[illegible]	10000.000	2358.500	[illegible]
GR	2358.100	10038.000	2357.600	10048.000	2357.700	10061.000	[illegible]	10073.000	2339.600	[illegible]
GR	2359.600	10106.000	2359.500	10125.000	2358.300	10145.000	[illegible]	10157.000	2359.200	[illegible]
GR	2359.000	10191.000	2358.000	10200.000	2338.000	10204.000	[illegible]	10245.000	2380.000	[illegible]
NC	0.000	0.000	0.000	0.100	0.300	0.000	[illegible]	0.000	0.000	0.000
NH	5.000	0.050	9920.000	0.065	9953.000	0.025	[illegible]	[illegible]	10119.000	[illegible]
NH	10535.000	0.000	0.000	0.000	0.000	0.000	[illegible]	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9620.000	10401.000	0.000	0.000	0.000	0.000	0.000
X1	8.100	37.000	9953.000	10048.000	465.000	535.000	500.000	0.000	0.000	0.000
GR	2372.200	9584.000	2368.800	9607.000	2367.400	9613.000	2367.500	9638.000	2367.800	9652.000
GR	2367.400	9679.000	2367.300	9687.000	2366.900	9697.000	2366.000	9766.000	2364.800	9814.000
GR	2363.800	9864.000	2363.200	9903.000	2363.600	9931.000	2361.200	9953.000	2360.500	10000.000
GR	2359.900	10048.000	2362.200	10064.000	2363.400	10088.000	2363.400	10119.000	2362.600	10128.000
GR	2363.100	10135.000	2362.300	10143.000	2363.200	10154.000	2363.100	10181.000	2360.500	10201.000
GR	2360.800	10215.000	2362.400	10226.000	2362.300	10244.000	2361.300	10255.000	2362.500	10265.000
GR	2362.900	10294.000	2362.400	10325.000	2363.800	10370.000	2365.300	10404.000	2365.900	10436.000
GR	2368.100	10484.000	2374.000	10535.000	0.000	0.000	0.000	0.000	0.000	0.000
NH	4.000	0.050	9907.000	0.065	9944.000	0.023	10039.000	0.055	10515.000	0.000
ET	0.000	0.000	4.100	9700.000	10357.000	0.000	0.000	0.000	0.000	0.000
X1	8.190	30.000	9944.000	10039.000	475.000	535.000	500.000	0.000	0.000	0.000
GR	2374.600	9557.000	2372.800	9574.000	2370.900	9587.000	2370.700	9645.000	2369.200	9697.000
GR	2367.400	9781.000	2366.300	9863.000	2365.900	9907.000	2364.900	9944.000	2362.200	9965.000
GR	2362.200	10000.000	2362.200	10039.000	2364.700	10059.000	2365.100	10072.000	2364.700	10084.000
GR	2365.500	10103.000	2365.500	10146.000	2363.900	10168.000	2364.000	10184.000	2365.300	10202.000
GR	2365.100	10218.000	2364.400	10233.000	2365.500	10236.000	2365.900	10281.000	2365.700	10310.000

GR	2365.300	10335.000	2366.300	10368.000	2367.900	[illegible]	[illegible]	10445.000	2372.100	10515.000	
NH	3.000	0.030	9958.000	0.025	10022.000	0.045	[illegible]	0.000	0.000	0.000	
ET	0.000	0.000	4.100	9850.000	10326.000	0.000	[illegible]	0.000	0.000	0.000	
X1	8.290	30.000	9958.000	10022.000	510.000	510.000	[illegible]	0.000	0.000	0.000	
GR	2377.900	9567.000	2376.500	9579.000	2371.700	9605.000	[illegible]	9641.000	2371.900	9690.000	
GR	2370.400	9773.000	2369.600	9812.000	2368.900	9874.000	[illegible]	9900.000	2369.000	9906.000	
GR	2369.200	9954.000	2367.500	9958.000	2364.700	9967.000	[illegible]	10000.000	2364.000	10022.000	
GR	2366.200	10040.000	2366.800	10039.000	2365.700	10088.000	[illegible]	10077.000	2366.500	10110.000	
GR	2364.400	10130.000	2364.800	10180.000	2368.000	10204.000	[illegible]	10275.000	2368.600	[illegible]	
GR	2367.500	10275.000	2368.200	10286.000	2368.100	10339.000	[illegible]	10422.000	2376.000	[illegible]	
NH	3.000	0.050	9949.000	0.025	10028.000	0.045	[illegible]	0.000	0.000	[illegible]	
ET	0.000	0.000	4.100	9870.000	10170.000	0.000	[illegible]	0.000	0.000	[illegible]	
X1	8.400	34.000	9949.000	10028.000	595.000	570.000	[illegible]	0.000	0.000	[illegible]	
GR	2382.700	9493.000	2380.900	9504.000	2380.100	9518.000	[illegible]	9551.000	2374.200	[illegible]	
GR	2373.600	9658.000	2373.300	9714.000	2372.600	9781.000	[illegible]	9840.000	2371.500	[illegible]	
GR	2369.800	9906.000	2370.800	9917.000	2370.700	9927.000	[illegible]	9937.000	2370.400	[illegible]	
GR	2367.000	9960.000	2366.600	10000.000	2367.400	10028.000	[illegible]	10044.000	2367.400	[illegible]	
GR	2366.300	10079.000	2367.700	10088.000	2368.000	10101.000	[illegible]	10106.000	2368.900	[illegible]	
GR	2366.600	10133.000	2366.600	10145.000	2368.600	10153.000	[illegible]	10165.000	2371.500	[illegible]	
GR	2372.000	10198.000	2370.[illegible]	10216.000	2374.200	10249.000	[illegible]	10305.000	0.000	[illegible]	
DT	2.000	9862.000	9862.000	0.000	0.000	0.000	[illegible]	0.000	0.000	[illegible]	
NH	6.000	0.050	9900.000	0.065	9954.000	0.025	[illegible]	0.065	10003.000	[illegible]	
NH	10054.000	0.060	10090.000	0.000	0.000	0.000	[illegible]	0.000	0.000	[illegible]	
ET	0.000	0.000	4.100	9801.000	10060.000	0.000	[illegible]	0.000	0.000	[illegible]	
X1	8.480	20.000	9954.000	10044.000	425.000	370.000	[illegible]	0.000	0.000	[illegible]	
GR	2387.900	9575.000	2384.900	9621.000	2380.400	9657.000	[illegible]	9698.000	2374.200	[illegible]	
GR	2375.100	9756.000	2375.100	9776.000	2373.400	9801.000	[illegible]	9820.000	2373.900	[illegible]	
GR	2372.500	9879.000	2374.600	9911.000	2373.600	9942.000	[illegible]	9954.000	2368.700	[illegible]	
GR	2369.900	9998.000	2370.400	10000.000	2369.200	10012.000	[illegible]	10044.000	2381.700	[illegible]	
NH	4.000	0.030	9900.000	0.065	9947.000	0.040	[illegible]	0.060	10080.000	0.000	
ET	0.000	0.000	4.100	9580.000	10060.000	0.000	[illegible]	0.000	0.000	0.000	
X1	8.570	24.000	9947.000	10039.000	440.000	300.000	500.000	0.000	0.000	0.000	
GR	2389.300	9420.000	2377.400	9469.000	2376.800	9514.000	2378.200	9534.000	2378.100	9583.000	
GR	2377.100	9624.000	2377.100	9627.000	2377.100	9691.000	2378.800	9699.000	2375.100	9729.000	
GR	2373.300	9750.000	2376.700	9771.000	2376.200	9792.000	2375.800	9817.000	2376.700	9830.000	
GR	2377.000	9861.000	2374.400	9886.000	2374.900	9904.000	2377.300	9923.000	2377.300	9947.000	
GR	2373.300	9970.000	2372.100	10000.000	2371.700	10039.000	2386.800	10080.000	0.000	0.000	
NH	7.000	0.100	9269.000	0.030	9873.000	0.025	9929.000	0.063	9933.000	0.025	
NH	10026.000	0.050	10250.000	0.100	10385.000	0.000	0.000	0.000	0.000	0.000	
ET	0.000	0.000	4.100	9470.000	10066.000	0.000	0.000	0.000	0.000	0.000	
X1	8.670	42.000	9875.000	10026.000	410.000	555.000	500.000	0.000	0.000	0.000	
GR	2389.000	9040.000	2389.000	9043.000	2380.900	9080.000	2380.700	9095.000	2381.000	9106.000	
GR	2379.300	9126.000	2377.000	9150.000	2377.100	9178.000	2381.100	9201.000	2381.700	9218.000	
GR	2381.700	9269.000	2381.400	9335.000	2380.400	9383.000	2379.700	9401.000	2380.800	9417.000	
GR	2380.000	9470.000	2379.200	9533.000	2378.000	9554.000	2379.200	9573.000	2379.200	9610.000	
GR	2377.900	9641.000	2378.300	9664.000	2377.900	9685.000	2379.500	9714.000	2380.200	9747.000	
GR	2380.200	9805.000	2379.000	9848.000	2378.000	9875.000	2377.400	9901.000	2377.600	9929.000	
GR	2375.900	9958.000	2374.600	10000.000	2374.600	10026.000	2379.100	10040.000	2379.700	10051.000	
GR	2378.400	10074.000	2377.600	10115.000	2378.900	10161.000	2380.800	10219.000	2382.200	10271.000	

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GR	2383.300	10288.000	2385.900	10349.000	2387.800	10385.000	[illegible]	0.000	0.000	[illegible]
QT	2.000	9419.000	9419.000	0.000	0.000	0.000	[illegible]	0.000	0.000	0.000
NH	5.000	0.100	9497.000	0.050	9958.000	0.025	[illegible]	0.050	10350.000	0.100
NH	10645.000	0.000	0.000	0.000	0.000	0.000	[illegible]	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9560.000	10241.000	0.000	[illegible]	0.000	0.000	[illegible]
X1	8.760	39.000	9958.000	10053.000	450.000	515.000	[illegible]	0.000	0.000	0.000
GR	2393.100	9397.000	2391.400	9429.000	2387.600	9455.000	[illegible]	9489.000	2381.800	9522.000
GR	2381.800	9567.000	2380.300	9578.000	2380.500	9587.000	[illegible]	9596.000	2382.900	9665.000
GR	2382.500	9723.000	2381.500	9765.000	2380.300	9788.000	[illegible]	9803.000	2380.800	9823.000
GR	2381.200	9850.000	2381.100	9857.000	2381.800	9874.000	[illegible]	9913.000	2380.500	9947.000
GR	2378.700	9958.000	2378.100	9989.000	2378.400	10000.000	[illegible]	10036.000	2383.300	10053.000
GR	2382.900	10097.000	2381.600	10172.000	2377.700	10189.000	[illegible]	10200.000	2376.000	10206.000
GR	2380.300	10216.000	2380.800	10241.000	2380.800	10302.000	[illegible]	10370.000	2384.700	10454.000
GR	2386.400	10515.000	2387.500	10569.000	2388.800	[illegible]	[illegible]	10515.000	0.000	[illegible]
NC	0.000	0.000	0.000	0.300	0.500	0.000	[illegible]	0.000	0.000	[illegible]
NH	7.000	0.050	9969.000	0.025	10032.000	0.065	10091.000	0.025	10161.000	[illegible]
NH	10312.000	0.050	10445.000	0.100	10125.000	0.000	[illegible]	0.000	0.000	[illegible]
QT	2.000	8323.000	8323.000	0.000	0.000	0.000	[illegible]	0.000	0.000	[illegible]
ET	0.000	0.000	4.100	9672.000	10328.000	0.000	[illegible]	0.000	0.000	[illegible]
X1	8.860	51.000	9969.000	10161.000	70.000	70.000	[illegible]	0.000	0.000	[illegible]
GR	2393.600	9600.000	2392.500	9614.000	2389.600	9655.000	[illegible]	9672.000	2385.000	[illegible]
GR	2383.800	9784.000	2384.600	9793.000	2384.600	9801.000	[illegible]	9813.000	2381.800	[illegible]
GR	2384.400	9862.000	2385.200	9873.000	2385.500	9907.000	[illegible]	9956.000	2381.200	[illegible]
GR	2381.200	10000.000	2381.200	10013.000	2384.400	10032.000	[illegible]	10055.000	2384.000	[illegible]
GR	2383.500	10091.000	2382.100	10106.000	2382.500	10142.000	[illegible]	10153.000	2382.800	[illegible]
GR	2384.200	10177.000	2384.900	10201.000	2384.300	10216.000	[illegible]	10238.000	2383.600	[illegible]
GR	2383.600	10267.000	2384.300	10272.000	2383.500	10281.000	[illegible]	10294.000	2385.200	[illegible]
GR	2385.500	10326.000	2385.100	10333.000	2384.900	10383.000	[illegible]	10391.000	2385.000	[illegible]
GR	2386.100	10445.000	2385.400	10564.000	2385.400	10642.000	[illegible]	10693.000	2386.400	[illegible]
GR	2386.700	10843.000	2386.700	10919.000	2386.500	10997.000	[illegible]	11101.000	2390.000	[illegible]
GR	2392.000	11425.000	0.000	0.000	0.000	0.000	[illegible]	0.000	0.000	[illegible]
NC	0.050	0.040	0.025	0.000	0.000	0.000	[illegible]	0.000	0.000	[illegible]
ET	0.000	0.000	4.110	9750.000	10253.000	0.000	[illegible]	0.000	0.000	[illegible]
X1	8.947	26.000	9947.000	10129.000	450.000	535.000	[illegible]	0.840	0.000	0.000
X3	10.000	0.000	0.000	0.000	0.000	0.000	[illegible]	2390.700	2393.000	0.000
GR	2395.100	[illegible]	[illegible]	[illegible]	2391.500	9150.000	[illegible]	9350.000	2391.000	9850.000
GR	2389.100	9750.000	2390.900	9771.000	2390.900	9848.000	2390.700	9947.000	2384.900	9954.000
GR	2385.700	10000.000	2386.600	10022.000	2387.700	10074.000	2389.300	10104.000	2392.000	10117.000
GR	2393.000	10129.000	2393.300	10253.000	2394.000	10320.000	2394.000	10436.000	2394.700	10568.000
GR	2395.800	10721.000	2397.400	10921.000	2398.700	11081.000	2399.700	11231.000	2400.900	11413.000
GR	2401.500	11435.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SB	1.050	1.560	2.630	0.000	96.900	91.240	554.400	0.000	0.000	0.000
ET	0.000	0.000	4.110	9545.000	10199.000	0.000	0.000	0.000	0.000	0.000
X1	8.953	25.000	9912.000	10103.000	30.000	30.000	30.000	0.840	0.000	0.000
X2	0.000	0.000	1.000	2393.400	2395.700	0.000	0.000	0.000	0.000	0.000
X3	10.000	0.000	0.000	0.000	0.000	0.000	0.000	2391.700	2393.800	0.000
BT	7.000	9140.000	2391.600	2391.600	9320.000	2392.800	2392.800	9720.000	2394.000	2394.000
BT	10000.000	2394.000	2394.000	10450.000	2396.000	2396.000	11000.000	2399.500	2399.500	11300.000
BT	2402.500	2402.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
GR	2395.300	9270.000	2395.300	9345.000	2392.100	9415.000	2392.400	9545.000	2392.900	9645.000

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GR	2391.600	9726.000	2392.600	9757.000	2392.100	9870.000	2391.700	9912.000	2387.1[illegible]	[illegible]	
GR	2394.800	9937.000	2383.200	10000.000	2385.700	10046.000	2384.400	10085.000	2393.1[illegible]	10[illegible]	
GR	2394.200	10199.000	2395.300	10237.000	2394.900	10393.000	2395.300	10493.000	2395.70[illegible]	[illegible]	
GR	2396.600	10723.000	2397.200	10833.000	2398.400	10924.000	2398.700	11030.000	2399.2[illegible]	[illegible]	
ET	0.000	0.000	4.100	9900.000	0200.000	0.000	0.000	0.000	[illegible]	[illegible]	
X1	9.060	13.000	9885.000	10215.000	405.000	540.000	565.000	0.000	0.00[illegible]	[illegible]	
GR	2401.700	9880.000	2401.400	9885.000	2400.100	9913.000	2397.100	9950.000	2390.50[illegible]	[illegible]	
GR	2390.600	10000.000	2391.200	10051.000	2390.200	10109.000	2391.100	10118.000	2390.50[illegible]	[illegible]	
GR	2390.300	10170.000	2390.500	10215.000	2400.900	10225.000	[illegible]	0.0[illegible]	0.00[illegible]	[illegible]	
MC	0.000	0.000	0.000	[illegible]	0.300	0.000	0.000	0.002	0.00[illegible]	[illegible]	
MH	3.000	0.050	9883.000	[illegible]	0120.030	0.040	10391.000	0.000	0.00[illegible]	[illegible]	
ET	0.000	0.000	4.100	9602.000	0150.000	0.000	0.000	0.000	[illegible]	[illegible]	
X1	9.160	16.000	9911.000	10085.000	475.000	460.000	500.000	0.000	0.00[illegible]	[illegible]	
GR	2400.600	9600.000	2395.000	9656.000	2393.800	9708.000	2393.400	9729.000	2394.100	[illegible]	
GR	2393.600	9776.000	2392.200	9787.000	2393.600	9800.000	2394.500	9824.000	2394.500	[illegible]	
GR	2393.400	9911.000	2393.200	9930.000	2393.400	10000.000	2394.200	10085.000	2396.200	[illegible]	
GR	2405.200	10155.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00[illegible]	[illegible]	
MH	4.000	0.100	9380.000	0.050	9918.000	0.025	10048.000	0.010	10579.00[illegible]	[illegible]	
ET	0.000	0.000	4.100	9700.000	10070.000	0.000	0.000	1000	0.00[illegible]	[illegible]	
X1	9.250	17.000	9918.000	10048.000	505.000	510.000	500.000	0.000	0.00[illegible]	[illegible]	
GR	2410.000	9340.000	2408.200	9380.000	2405.700	9439.000	2402.600	9500.000	2400.400	[illegible]	
GR	2399.100	9633.000	2398.600	9689.000	2399.600	9717.000	2399.000	9742.000	2399.500	[illegible]	
GR	2398.700	9796.000	2399.400	9805.000	2399.700	9886.000	2397.900	9918.000	2397.300	[illegible]	
GR	2397.600	10048.000	2407.500	10084.000	0.000	0.000	0.000	0.000	0.00[illegible]	[illegible]	
EJ	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00[illegible]	[illegible]	

TUE, NOV 18 1986 09:34:54

THIS RUN EXECUTED TUE, NOV 18 1986 (1934)

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**********************************************
HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
ERROR CORR -  01,02,03,04,05,06
MODIFICATION -  50,51,52,53,54,55,56
**********************************************
```

T1 SOLS WASH FLOODPLAIN DELINEATION, MARICOPA COUNTY, ARIZONA
T2 BY CELLA BARR ASSOCIATES FOR THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
T3 100 YEAR DISCHARGE - R5 FLOODWAY PROFILE - 0.8 FOOT

J1	ICHECK	INQ	NINV	IDIR	SKT	METRIC	IVINS	0	WSEL	FQ
	-10.	3.	0.	0.	0.000000	0.00	0.0	0.	2341.100	0.000

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLOC	IBW	CHNIM	ITRACE
	15.000	0.000	-1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

TUE, NOV 18 1986 09:34:54

THIS RUN EXECUTED TUE, NOV 18 1986 09:34:54

```
**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

100 YEAR DISCHARGE - R5

SUMMARY PRINTOUT

	SECNO	CWSEL	DEPTH	EG	VCH	ELMIN	XLCH	TOPWID	SSTA	EWDST	DLOB	DCH	DROB
	7.300	2341.13	7.83	2343.66	14.23	2333.30	0.00	612.17	9829.13	10041.30	2066.64	8103.53	199.83
	7.300	2341.10	7.80	2343.69	14.34	2333.30	0.00	201.25	9840.00	10041.25	2035.61	8134.58	199.81
	7.440	2345.49	6.89	2346.64	9.85	2338.60	745.00	[illegible]	9663.97	10244.23	1315.33	7751.66	203.00
	7.440	2345.27	6.67	2347.11	11.73	2338.60	745.00	[illegible]	9705.00	10120.00	1060.56	8863.46	196.98
*	7.530	2348.72	7.12	2350.25	12.35	2341.60	500.00	[illegible]	9810.34	10467.47	[illegible]	[illegible]	[illegible]
*	7.530	2349.39	6.89	2351.65	13.50	2342.50	500.00	[illegible]	9913.00	10162.00	[illegible]	[illegible]	[illegible]
*	7.579	2352.73	9.13	2357.35	17.24	2343.60	233.00	[illegible]	9900.08	9967.51	[illegible]	10363.26	3.35
*	7.579	2352.74	9.14	2357.35	17.24	2343.60	233.00	[illegible]	9900.47	9967.51	[illegible]	10364.32	3.77
*	7.590	2353.67	10.07	2357.46	15.64	2343.60	50.00	[illegible]	9900.00	9967.39	3.72	10362.58	3.70
*	7.590	2354.20	10.60	2357.62	14.84	2343.60	50.00	[illegible]	9900.47	9967.64	2.28	10363.81	3.91
	7.630	2359.24	12.24	2359.67	5.73	2347.00	190.00	302.81	9769.16	10072.00	1667.72	8691.64	10.64
	7.630	2359.15	12.15	2359.60	5.78	2347.00	190.00	300.16	9769.84	10070.00	1655.00	8709.50	5.50
	7.720	2359.49	9.49	2359.95	6.01	2350.00	500.00	[illegible]	9933.70	10210.74	138.31	5467.35	4764.14
	7.720	2359.41	9.41	2359.88	6.07	2350.00	500.00	274.63	9935.89	10210.52	137.59	5478.86	4753.65
	7.820	2359.73	6.13	2361.75	11.94	2353.60	500.00	248.37	9923.56	10171.93	64.93	9382.52	922.33
*	7.820	2359.64	6.04	2362.18	13.00	2353.60	500.00	176.28	9923.72	10100.00	68.28	10040.62	261.11
*	7.884	2364.84	10.24	2367.13	12.78	2354.60	345.00	410.23	9775.89	10186.12	500.59	9331.41	538.00
*	7.884	2364.71	10.11	2367.14	13.10	2354.60	345.00	353.50	9780.95	10134.45	476.73	9422.90	470.37
*	7.891	2368.61	13.51	2368.84	3.89	2355.10	30.00	402.23	9775.49	10177.72	90.04	10212.71	67.25
*	7.891	2368.58	13.48	2368.82	3.93	2355.10	30.00	340.07	9784.14	10124.21	94.69	10274.51	0.79
	7.920	2368.72	13.02	2368.91	3.89	2355.70	180.00	428.10	9723.98	10156.43	1733.01	8358.76	278.23
	7.920	2368.62	12.92	2368.93	4.60	2355.70	180.00	222.00	9918.00	10140.00	299.60	9809.64	260.75

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	SECNO	CWSEL	DEPTH	EG	VCH	ELMIN	XLCH	TOPWID	SSTA	ENDST	QLOB	QCH	QROB
	8.000	2368.96	12.06	2369.06	3.21	2356.90	425.00	677.33	9533.04	10233.35	2657.04	360.05	2021.18
	8.000	2369.03	12.14	2369.16	3.45	2356.90	425.00	481.00	9719.00	10200.00	2384.56	606.12	1317.61
	8.100	2369.03	9.13	2369.20	4.93	2359.90	500.00	886.21	9605.80	10492.01	1802.86	3981.02	4586.11
	8.100	2369.13	9.23	2369.31	4.98	2359.90	500.00	781.00	9620.00	10401.00	1868.79	4068.55	4434.65
	8.190	2369.06	6.85	2369.72	8.69	2362.20	500.00	732.94	9701.73	10436.67	1084.11	5113.61	3872.28
	8.190	2369.15	6.95	2369.83	8.71	2362.20	500.00	657.00	9700.00	10357.00	1145.31	5501.70	3722.97
	8.290	2370.03	6.03	2371.16	12.01	2364.00	500.00	619.32	9805.17	10424.49	1331.71	4268.41	5571.88
	8.290	2370.08	6.08	2371.29	12.20	2364.00	500.00	476.00	9850.00	10326.00	518.75	4372.13	5409.12
	8.400	2372.44	3.84	2374.11	13.12	2366.60	615.00	438.02	9793.21	10233.22	482.59	5189.74	4397.68
	8.400	2372.51	5.91	2374.28	13.26	2366.60	615.00	300.00	9870.00	10170.00	471.86	5629.56	4298.57
*	8.480	2376.21	7.51	2377.93	11.84	2368.70	390.00	368.05	9693.57	10062.42	2020.36	7534.60	285.05
*	8.480	2376.06	7.36	2378.19	12.83	2368.70	390.00	259.00	9801.00	10060.00	1542.37	8018.19	304.43
	8.570	2379.28	7.58	2380.05	9.11	2371.70	500.00	598.35	9461.24	10059.59	4338.28	5239.29	221.41
	8.570	2379.61	7.91	2380.34	8.81	2371.70	500.00	480.00	9580.00	10060.00	4258.62	5314.37	427.01
	8.670	2380.80	6.20	2381.67	9.14	2374.60	500.00	957.59	9087.40	10219.06	2288.53	6258.93	1311.53
*	8.670	2380.92	6.32	2382.17	10.26	2374.60	500.00	596.00	9470.00	10066.00	2247.38	7217.43	397.49
*	8.760	2383.34	7.84	2384.34	10.82	2375.50	500.00	913.82	9485.81	10399.63	2128.11	1614.89	2613.58
*	8.760	2383.42	7.92	2384.71	11.73	2375.50	500.00	681.00	9560.00	10241.00	2188.41	5124.67	2105.38
*	8.860	2386.16	4.96	2387.06	8.92	2381.20	510.00	1020.41	9704.04	10724.45	962.25	3802.92	1559.83
	8.860	2386.43	5.23	2387.23	8.32	2381.20	510.00	637.51	9690.49	10628.00	1116.14	3857.33	1325.52
*	8.947	2391.92	7.02	2393.19	9.88	2384.90	480.00	573.02	9403.33	9976.36	1434.22	6896.78	0.00
*	8.947	2392.02	7.12	2393.81	11.03	2384.90	480.00	308.50	9668.40	9976.89	471.59	7853.41	0.00
*	8.953	2393.78	8.98	2394.38	6.46	2384.80	30.00	621.20	9372.86	9994.06	609.79	7714.74	0.48
*	8.953	2394.73	9.94	2395.16	5.52	2384.80	30.00	549.36	9501.00	10050.36	831.51	7442.84	50.66
	9.060	2394.37	4.17	2395.54	8.70	2390.20	565.00	262.93	9935.79	10218.72	0.00	8304.97	20.03
	9.060	2395.03	4.83	2395.99	7.88	2390.20	565.00	245.60	9954.40	10200.00	0.00	8325.00	0.00
	9.160	2396.79	4.59	2397.60	8.66	2392.20	500.00	484.18	9638.11	10122.29	3133.34	4891.89	299.77
	9.160	2396.83	4.63	2397.62	8.53	2392.20	500.00	484.80	9637.66	10122.46	3137.97	4880.79	306.24
*	9.250	2401.43	4.13	2402.64	10.63	2397.30	500.00	536.50	9525.44	10061.94	2840.34	5376.50	108.16
*	9.250	2401.75	4.45	2403.23	11.16	2397.30	500.00	363.09	9700.00	10063.08	2094.47	6097.58	132.95

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FLOODWAY DATA, 100 YEAR DISCHARGE - R5
PROFILE NO. 2

STATION	FLOODWAY WIDTH	FLOODWAY SECTION AREA	FLOODWAY MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE
7.300	201.	1028.	10.1	2341.1	2341.1	0.0
7.440	415.	1309.	7.9	2345.4	2345.5	-0.1
7.530	249.	1000.	10.4	2349.7	2348.7	0.7
7.579	67.	608.	17.1	2352.7	2352.7	0.0
7.590	67.	707.	14.7	2354.7	2353.7	0.5
7.630	300.	2455.	4.2	2359.2	2359.2	0.0
7.720	275.	1975.	5.3	2359.5	2359.5	0.0
7.820	176.	860.	12.1	2359.7	2359.7	0.0
7.884	353.	1170.	8.9	2364.8	2364.8	0.0
7.891	340.	2763.	3.8	2368.6	2368.6	0.0
7.920	222.	2452.	4.2	2368.7	2368.7	0.0
8.000	481.	4377.	2.4	2369.1	2369.0	0.1
8.100	781.	4340.	2.4	2369.1	2369.0	0.1
8.190	657	2457.	4.2	2369.2	2369.1	0.1
8.290		860.	6.6	2370.0	2370.0	0.0
8.400		1215.	8.5	2372.5	2372.4	0.1
8.480		1030.	9.4	2376.2	2376.2	0.0
8.570	460.	1922.	5.1	2379.6	2379.3	0.3
8.670	596.	1503.	6.6	2380.9	2380.8	0.1
8.760	681.	1503.	6.3	2383.4	2383.3	0.1
8.860	638.	1476.	5.6	2386.5	2386.2	0.3
8.947	308.	922.	9.0	2392.0	2391.9	0.1
8.953	549.	2121.	3.9	2394.8	2393.8	1.0
9.060	246.	1056.	7.9	2395.1	2394.4	0.7
9.160	485.	1364.	6.1	2396.8	2396.8	0.0
9.250	363.	1115.	7.5	2401.7	2401.4	0.3

Appendix E.4

DUPLICATE EFFECTIVE MODEL

```
                HEC-RAS Version 3.1.3 May 2005
                 U.S. Army Corp of Engineers
                Hydrologic Engineering Center
                      609 Second Street
                      Davis, California

X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: Duplicate Effective Model -Multi-Profile
Project File : Sol206Pa.prj
Run Date and Time: 9/7/2006 2:53:11 PM

Project in English units

Project Description:
DUPLICATE EFFECTIVE MODEL FOR SOLS WASH - Floodway
Wickenburg Downtown Flood
Hazard Mitigation Project

This model was originally prepared and used by
JEFuller as the Duplicate Effective Model for the Goldmine Villages CLOMR up to
and including cross section 1.12. The FCDMC added cross sections 1.30 through
1.59. The data for the additional sections came from the original HEC-2 model
prepared by Cella Barr (model: SOL206W.DAT). Elevations are NGVD 1929
datum.

The order of the profiles has also been reversed from the JEFuller
model. (The profiles in the JEFuller model started with the 10 YR as Profile 1
and progressed to the 500 YR as Profile 4.)

(cwr 9/7/06)
****
****

SOLS WASH FLOODPLAIN DELINEATION,
MARICOPA COUNTY, ARIZONA
BY CELLA BARR ASSOCIATES FOR THE FLOOD CONTROL
DISTRICT OF MARICOPA COUNTY
SOLS WASH REACH 1 FLOOD INSURANCE
RATE ANALYSIS

PLAN DATA

Plan Title: Douplicate Effective Model
Plan File : q:\305020.02 CLOMR\HEC-RAS\Duplicate Effective FCD\Sol206Pa.p01

Geometry Title: Duplicate Effective Model
Geometry File : q:\305020.02 CLOMR\HEC-RAS\Duplicate Effective FCD\Sol206Pa.g01

Flow Title : Duplicate Effective Model

Flow File : q:\305020.02 CLOMR\HEC-RAS\Duplicate Effective FCD\Sol206Pa.f01

Plan Summary Information:

Number of:	Cross Sections =	18	Multiple Openings =	0
	Culverts =	0	Inline Structures =	0
	Bridges =	0	Lateral Structures =	0

Computational Information

Water surface calculation tolerance = 0.003
Critical depth calculation tolerance = 0.003
Maximum number of iterations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

Computation Options

Critical depth computed only where necessary
Conveyance Calculation Method: Between every coordinate point (HEC2 Style)
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Duplicate Effective Model
Flow File : q:\305020.02 CLOMR\HEC-RAS\Duplicate Effective FCD\Sol206Pa.f01

Flow Data (cfs)

River	Reach	RS	500 YR	100 YR	50 YR	10 YR
Sols Wash	Reach 2	1.59	19986	14413	11927	6725
Sols Wash	Reach 2	1.12	19986	14413	11927	6725
Sols Wash	Reach 2	0.6	20005	14459	11964	6748
Sols Wash	Reach 2	0.5	20836	15045	12453	7019
Sols Wash	Reach 1	0.40	20836	15045	12453	7019

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Sols Wash	Reach 1	500 YR		Known WS = 2040.89
Sols Wash	Reach 1	100 YR		Known WS = 2040.14
Sols Wash	Reach 1	50 YR		Known WS = 2039.77
Sols Wash	Reach 1	10 YR		Known WS = 2038.76
Sols Wash	Reach 2	500 YR		Known WS = 2061.49
Sols Wash	Reach 2	100 YR		Known WS = 2059.37
Sols Wash	Reach 2	50 YR		Known WS = 2058.33
Sols Wash	Reach 2	10 YR		Known WS = 2056.93

GEOMETRY DATA

Geometry Title: Duplicate Effective Model
Geometry File : q:\305020.02 CLOMR\HEC-RAS\Duplicate Effective FCD\Sol206Pa.g01

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 1 RS: 0.40

INPUT

Descriptio[illegible]

Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9546	2062.89	567.917	2063.99	627.305	2064.19	637.203	2063.29	667.604	2062.1
9689.521	2064.79	752.444	2064.79	776.482	2064.79	803.348	2051.89	830.214	2051.7
9866.978	2051.69	944.748	2050.69	961.716	2058.29	981.512	2065.21	0019.69	2065.2
10072.71	2065.81	0108.77	2066.4						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9546	.065	9803.348	.025	9944.748	.065

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9803.348	9944.748	250	170	105	.3	.5

CROSS SECTION OUTPUT Profile #500 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2064.10	Element			
Vel Head (ft)	4.13	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2059.97	Reach Len. (ft)	250.00	170.00	105.00
Crit W.S. (ft)	2059.97	Flow Area (sq ft)	69.48	1216.28	98.90
E.G. Slope (ft/ft)	0.004410	Area (sq ft)	69.48	1216.28	98.90
Q Total (cfs)	20836.00	Flow (cfs)	251.49	20154.58	429.92
Top Width (ft)	180.38	Top Width (ft)	17.01	141.40	21.97
Vel Total (ft/s)	15.05	Avg. Vel. (ft/s)	3.62	16.57	4.35
Max Chl Dpth (ft)	9.37	Hydr. Depth (ft)	4.08	8.60	4.50
Conv. Total (cfs)	313742.3	Conv. (cfs)	3786.9	303481.8	6473.7
Length Wtd. (ft)	179.42	Wetted Per. (ft)	18.87	141.41	23.90
Min Ch El (ft)	2050.60	Shear (lb/sq ft)	1.01	2.37	1.14
Alpha	1.18	Stream Power (lb/ft s)	3.67	39.24	4.95
Frctn Loss (ft)	0.63	Cum Volume (acre-ft)	94.35	39.12	18.49
C & E Loss (ft)	0.89	Cum SA (acres)	31.41	5.16	5.91

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2061.69	Element			
Vel Head (ft)	3.36	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2058.33	Reach Len. (ft)	250.00	170.00	105.00
Crit W.S. (ft)	2058.33	Flow Area (sq ft)	44.36	984.23	66.66
E.G. Slope (ft/ft)	0.004724	Area (sq ft)	44.36	984.23	66.66
Q Total (cfs)	15045.00	Flow (cfs)	143.11	14656.70	245.19
Top Width (ft)	172.32	Top Width (ft)	13.59	141.40	17.33
Vel Total (ft/s)	13.74	Avg. Vel. (ft/s)	3.23	14.89	3.68
Max Chl Dpth (ft)	7.73	Hydr. Depth (ft)	3.26	6.96	3.85
Conv. Total (cfs)	218906.2	Conv. (cfs)	2082.3	213256.3	3567.6
Length Wtd. (ft)	177.18	Wetted Per. (ft)	15.08	141.41	18.97
Min Ch El (ft)	2050.60	Shear (lb/sq ft)	0.87	2.05	1.04
Alpha	1.15	Stream Power (lb/ft s)	2.80	30.57	3.81
Frctn Loss (ft)	0.62	Cum Volume (acre-ft)	64.31	33.90	14.45
C & E Loss (ft)	0.64	Cum SA (acres)	28.47	5.16	3.07

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 50 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2060.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.73	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2057.78	Reach Len. (ft)	250.00	170.00	105.00
Crit W.S. (ft)	2057.49	Flow Area (sq ft)	37.21	906.59	57.52
E.G. Slope (ft/ft)	0.004273	Area (sq ft)	37.21	906.59	57.52
Q Total (cfs)	12453.00	Flow (cfs)	107.68	12155.76	189.56
Top Width (ft)	169.88	Top Width (ft)	12.45	141.40	16.03
Vel Total (ft/s)	12.44	Avg. Vel. (ft/s)	2.89	13.41	3.30
Max Chl Dpth (ft)	7.18	Hydr. Depth (ft)	2.99	6.41	3.59
Conv. Total (cfs)	190510.3	Conv. (cfs)	1647.3	185963.0	2900.0
Length Wtd. (ft)	175.67	Wetted Per. (ft)	13.81	141.41	17.56
Min Ch El (ft)	2050.60	Shear (lb/sq ft)	0.72	1.71	0.87
Alpha	1.14	Stream Power (lb/ft s)	2.08	22.93	2.88
Frctn Loss (ft)	0.59	Cum Volume (acre-ft)	50.60	31.24	13.18
C & E Loss (ft)	0.36	Cum SA (acres)	26.81	5.16	2.93

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile # 10 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2057.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.37	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2056.49	Reach Len. (ft)	250.00	170.00	105.00
Crit W.S. (ft)		Flow Area (sq ft)	22.92	724.73	38.75
E.G. Slope (ft/ft)	0.002887	Area (sq ft)	22.92	724.73	38.75
Q Total (cfs)	7019.00	Flow (cfs)	46.39	6880.57	92.04
Top Width (ft)	164.33	Top Width (ft)	9.77	141.40	13.15
Vel Total (ft/s)	8.93	Avg. Vel. (ft/s)	2.02	9.49	2.38
Max Chl Dpth (ft)	5.89	Hydr. Depth (ft)	2.35	5.13	2.95
Conv. Total (cfs)	130623.2	Conv. (cfs)	863.4	128047.0	1712.8
Length Wtd. (ft)	173.10	Wetted Per. (ft)	10.84	141.41	14.41
Min Ch El (ft)	2050.60	Shear (lb/sq ft)	0.38	0.92	0.48
Alpha	1.11	Stream Power (lb/ft s)	0.77	8.77	1.15
Frctn Loss (ft)	0.60	Cum Volume (acre-ft)	20.21	20.90	9.61
C & E Loss (ft)	0.26	Cum SA (acres)	12.43	4.97	2.63

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 1 RS: 0.36

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9433	2055.2	9497	2055.8	9533	2055.7	9538	2056.5	9594	2056.4
9667	2056.1	9752	2056.8	9866	2056.8	9905	2057.5	9942	2053.3
9969	2049.2	9996	2048.4	10000	2048.4	10046	2049.4	10061	2054
10101	2060.9	10136	2066	10149	2065.8	10235	2066.8	10290	2066.6

10356 [illegible]66.3 10387 2066.2 10414 2072.8

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9433	1	9538	.065	9905	.025	10101	.065

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9969	10046	615	770	785	.3	.5

CROSS SECTION OUTPUT Profile #500 YR

E.G. Elev (ft)	2061.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.34	Wt. n-Val.	0.051	0.025	0.025
W.S. Elev (ft)	2059.39	Reach Len. (ft)	615.00	770.00	785.00
Crit W.S. (ft)	2059.39	Flow Area (sq ft)	1789.39	812.32	199.49
E.G. Slope (ft/ft)	0.002850	Area (sq ft)	1789.39	812.32	199.49
Q Total (cfs)	20836.00	Flow (cfs)	6544.48	12396.03	1895.50
Top Width (ft)	659.24	Top Width (ft)	536.00	77.00	46.24
Vel Total (ft/s)	7.44	Avg. Vel. (ft/s)	3.66	15.26	9.50
Max Chl Dpth (ft)	10.99	Hydr. Depth (ft)	3.34	10.55	4.31
Conv. Total (cfs)	390285.7	Conv. (cfs)	122586.7	232193.9	35505.2
Length Wtd. (ft)	727.64	Wetted Per. (ft)	540.81	77.02	47.39
Min Ch El (ft)	2048.40	Shear (lb/sq ft)	0.59	1.88	0.75
Alpha	2.73	Stream Power (lb/ft s)	2.15	28.64	7.12
Frctn Loss (ft)	2.59	Cum Volume (acre-ft)	89.02	35.16	18.13
C & E Loss (ft)	0.08	Cum SA (acres)	29.83	4.73	5.83

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100 YR

E.G. Elev (ft)	2060.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.09	Wt. n-Val.	0.046	0.025	0.025
W.S. Elev (ft)	2058.23	Reach Len. (ft)	615.00	770.00	785.00
Crit W.S. (ft)	2058.23	Flow Area (sq ft)	1167.54	722.98	149.75
E.G. Slope (ft/ft)	0.002709	Area (sq ft)	1167.54	722.98	149.75
Q Total (cfs)	15045.00	Flow (cfs)	3803.70	9952.82	1288.49
Top Width (ft)	652.51	Top Width (ft)	536.00	77.00	39.51
Vel Total (ft/s)	7.37	Avg. Vel. (ft/s)	3.26	13.77	8.60
Max Chl Dpth (ft)	9.83	Hydr. Depth (ft)	2.18	9.39	3.79
Conv. Total (cfs)	289047.8	Conv. (cfs)	73077.5	191215.7	24754.7
Length Wtd. (ft)	738.16	Wetted Per. (ft)	539.65	77.02	40.56
Min Ch El (ft)	2048.40	Shear (lb/sq ft)	0.37	1.59	0.62
Alpha	2.47	Stream Power (lb/ft s)	1.19	21.86	5.37
Frctn Loss (ft)	2.46	Cum Volume (acre-ft)	60.83	30.56	14.19
C & E Loss (ft)	0.08	Cum SA (acres)	26.89	4.73	3.00

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 50 YR

E.G. Elev (ft)	2059.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.01	Wt. n-Val.	0.040	0.025	0.025
W.S. Elev (ft)	2057.55	Reach Len. (ft)	615.00	770.00	785.00
Crit W.S. (ft)	2057.55	Flow Area (sq ft)	803.36	670.67	124.24
E.G. Slope (ft/ft)	0.002716	Area (sq ft)	803.36	670.67	124.24
Q Total (cfs)	12453.00	Flow (cfs)	2640.42	8792.34	1020.25
Top Width (ft)	648.57	Top Width (ft)	536.00	77.00	35.57
Vel Total (ft/s)	7.79	Avg. Vel. (ft/s)	3.29	13.11	8.21
Max Chl Dpth (ft)	9.15	Hydr. Depth (ft)	1.50	8.71	3.49
Conv. Total (cfs)	238959.0	Conv. (cfs)	50666.7	168715.0	19577.4
Length Wtd. (ft)	745.08	Wetted Per. (ft)	538.97	77.02	36.57
Min Ch El (ft)	2048.40	Shear (lb/sq ft)	0.25	1.48	0.58
Alpha	2.13	Stream Power (lb/ft s)	0.83	19.35	4.73
Frctn Loss (ft)	2.46	Cum Volume (acre-ft)	48.18	28.17	12.96
C & E Loss (ft)	0.09	Cum SA (acres)	25.24	4.73	2.87

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 10 YR

E.G. Elev (ft)	2057.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.25	Wt. n-Val.	0.025	0.025	0.025
W.S. Elev (ft)	2054.75	Reach Len. (ft)	615.00	770.00	785.00
Crit W.S. (ft)	2054.75	Flow Area (sq ft)	103.70	455.04	47.35
E.G. Slope (ft/ft)	0.004282	Area (sq ft)	103.70	455.04	47.35
Q Total (cfs)	7019.00	Flow (cfs)	869.11	5783.75	366.14
Top Width (ft)	136.10	Top Width (ft)	39.76	77.00	19.34
Vel Total (ft/s)	11.58	Avg. Vel. (ft/s)	8.38	12.71	7.73
Max Chl Dpth (ft)	6.35	Hydr. Depth (ft)	2.61	5.91	2.45
Conv. Total (cfs)	107266.5	Conv. (cfs)	13282.0	88389.0	5595.5
Length Wtd. (ft)	761.01	Wetted Per. (ft)	40.15	77.02	20.09
Min Ch El (ft)	2048.40	Shear (lb/sq ft)	0.69	1.58	0.63
Alpha	1.08	Stream Power (lb/ft s)	5.79	20.07	4.87
Frctn Loss (ft)	4.21	Cum Volume (acre-ft)	19.85	18.59	9.50
C & E Loss (ft)	0.06	Cum SA (acres)	12.29	4.54	2.59

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 1 RS: 0.22

INPUT
Description:
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9433	2050.5	9473	2049.6	9508	2049.7	9516	2050.4	9590	2050.4
9669	2050.4	9726	2051.5	9799	2051.3	9899	2051	9938	2044.6

9963	[illegible]2043	10000	2043	10019	2043	10037	2058.4	10170	[illegible]059.3
10292	2060.6	10331	2061.6	10381	2061.4	10430	2057.8	10485	2056.9
10541	2056.4	10573	2058.5	10625	2060.4	10628	2063.4	10671	2063.4
10732	2062	10788	2061.7						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9433	.065	9963	.025	10037	.065

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9899	10019	465	500	515	.1	.3

CROSS SECTION OUTPUT Profile #500 YR

E.G. Elev (ft)	2056.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.18	Wt. n-Val.	0.065	0.033	0.025
W.S. Elev (ft)	2053.91	Reach Len. (ft)	465.00	500.00	515.00
Crit W.S. (ft)	2053.91	Flow Area (sq ft)	1499.44	1102.02	69.56
E.G. Slope (ft/ft)	0.004574	Area (sq ft)	1499.44	1102.02	69.56
Q Total (cfs)	20836.00	Flow (cfs)	5097.63	15016.81	721.57
Top Width (ft)	598.75	Top Width (ft)	466.00	120.00	12.75
Vel Total (ft/s)	7.80	Avg. Vel. (ft/s)	3.40	13.63	10.37
Max Chl Dpth (ft)	10.91	Hydr. Depth (ft)	3.22	9.18	5.46
Conv. Total (cfs)	308087.6	Conv. (cfs)	75375.1	222043.2	10669.3
Length Wtd. (ft)	486.61	Wetted Per. (ft)	469.46	120.57	16.78
Min Ch El (ft)	2043.00	Shear (lb/sq ft)	0.91	2.61	1.18
Alpha	2.31	Stream Power (lb/ft s)	3.10	35.56	12.28
Frctn Loss (ft)	2.34	Cum Volume (acre-ft)	65.80	18.24	15.70
C & E Loss (ft)	0.11	Cum SA (acres)	22.75	2.99	5.30

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100 YR

E.G. Elev (ft)	2054.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.93	Wt. n-Val.	0.065	0.032	0.025
W.S. Elev (ft)	2052.85	Reach Len. (ft)	465.00	500.00	515.00
Crit W.S. (ft)	2052.85	Flow Area (sq ft)	1003.52	974.31	56.65
E.G. Slope (ft/ft)	0.004210	Area (sq ft)	1003.52	974.31	56.65
Q Total (cfs)	15045.00	Flow (cfs)	2553.85	11964.64	526.50
Top Width (ft)	597.51	Top Width (ft)	466.00	120.00	11.51
Vel Total (ft/s)	7.39	Avg. Vel. (ft/s)	2.54	12.28	9.29
Max Chl Dpth (ft)	9.85	Hydr. Depth (ft)	2.15	8.12	4.92
Conv. Total (cfs)	231866.8	Conv. (cfs)	39358.8	184393.7	8114.2
Length Wtd. (ft)	488.53	Wetted Per. (ft)	468.40	120.57	15.15
Min Ch El (ft)	2043.00	Shear (lb/sq ft)	0.56	2.12	0.98
Alpha	2.27	Stream Power (lb/ft s)	1.43	26.08	9.14
Frctn Loss (ft)	2.27	Cum Volume (acre-ft)	45.51	15.56	12.33
C & E Loss (ft)	0.07	Cum SA (acres)	19.82	2.99	2.54

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there

is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 50 YR

E.G. Elev (ft)	2054.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.83	Wt. n-Val.	0.065	0.032	0.025
W.S. Elev (ft)	2052.25	Reach Len. (ft)	465.00	500.00	515.00
Crit W.S. (ft)	2052.25	Flow Area (sq ft)	723.99	902.33	49.96
E.G. Slope (ft/ft)	0.004084	Area (sq ft)	723.99	902.33	49.96
Q Total (cfs)	12453.00	Flow (cfs)	1504.92	10509.55	438.53
Top Width (ft)	596.81	Top Width (ft)	466.00	120.00	10.81
Vel Total (ft/s)	7.43	Avg. Vel. (ft/s)	2.08	11.65	8.78
Max Chl Dpth (ft)	9.25	Hydr. Depth (ft)	1.55	7.52	4.62
Conv. Total (cfs)	194867.4	Conv. (cfs)	23549.3	164455.9	6862.3
Length Wtd. (ft)	489.78	Wetted Per. (ft)	467.80	120.57	14.22
Min Ch El (ft)	2043.00	Shear (lb/sq ft)	0.39	1.91	0.90
Alpha	2.13	Stream Power (lb/ft s)	0.82	22.22	7.86
Frctn Loss (ft)	2.16	Cum Volume (acre-ft)	37.40	14.26	11.39
C & E Loss (ft)	0.10	Cum SA (acres)	18.16	2.99	2.45

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 10 YR

E.G. Elev (ft)	2051.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.45	Wt. n-Val.		0.030	0.025
W.S. Elev (ft)	2049.14	Reach Len. (ft)	465.00	500.00	515.00
Crit W.S. (ft)	2049.14	Flow Area (sq ft)		539.57	22.00
E.G. Slope (ft/ft)	0.007429	Area (sq ft)		539.57	22.00
Q Total (cfs)	7019.00	Flow (cfs)		6820.93	198.07
Top Width (ft)	115.80	Top Width (ft)		108.63	7.17
Vel Total (ft/s)	12.50	Avg. Vel. (ft/s)		12.64	9.01
Max Chl Dpth (ft)	6.13	Hydr. Depth (ft)		4.97	3.07
Conv. Total (cfs)	81437.1	Conv. (cfs)		79139.0	2298.1
Length Wtd. (ft)	493.38	Wetted Per. (ft)		109.05	9.44
Min Ch El (ft)	2043.00	Shear (lb/sq ft)		2.29	1.08
Alpha	1.01	Stream Power (lb/ft s)		29.01	9.73
Frctn Loss (ft)	2.57	Cum Volume (acre-ft)	19.12	9.80	8.88
C & E Loss (ft)	0.40	Cum SA (acres)	12.01	2.90	2.35

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 1 RS: 0.13

INPUT

Descript[illegible]
Station Elevation Data num= 42

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8515	2048	8945	2046.2	9041	2045.2	9141	2044.3	9248	2043.7
9284	2044.5	9293	2044.8	9299	2046.3	9312	2046.6	9326	2043.8
9402	2042.7	9419	2044.3	9438	2042.8	9459	2045	9519	2044.4
9587	2044.3	9635	2043.5	9692	2044	9724	2043.7	9748	2042.7
9813	2043.1	9869	2043.4	9928	2042.9	9963	2040	10000	2040
10026	2040	10044	2046.4	10064	2047.6	10126	2047.6	10200	2047.4
10225	2049.2	10307	2049.8	10380	2049.4	10442	2047.5	10486	2047.5
10519	2051.3	10579	2052.4	10643	2052.9	10712	2052	10770	2050.7
10831	2049.6	10935	2048.3						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8515	1	9438	.065	9963	.025	10044	.065

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9963	10044	500	505	560	.1	.3

CROSS SECTION OUTPUT Profile #500 YR

E.G. Elev (ft)	2049.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.83	Wt. n-Val.	0.107	0.025	0.065
W.S. Elev (ft)	2048.08	Reach Len. (ft)	500.00	505.00	560.00
Crit W.S. (ft)	2048.08	Flow Area (sq ft)	4568.95	596.51	128.90
E.G. Slope (ft/ft)	0.005064	Area (sq ft)	4568.95	596.51	128.90
Q Total (cfs)	20836.00	Flow (cfs)	11221.83	9464.51	149.66
Top Width (ft)	1762.16	Top Width (ft)	1448.00	81.00	233.16
Vel Total (ft/s)	3.94	Avg. Vel. (ft/s)	2.46	15.87	1.16
Max Chl Dpth (ft)	8.08	Hydr. Depth (ft)	3.16	7.36	0.55
Conv. Total (cfs)	292791.6	Conv. (cfs)	157691.3	132997.2	2103.1
Length Wtd. (ft)	517.02	Wetted Per. (ft)	1448.99	82.10	233.26
Min Ch El (ft)	2040.00	Shear (lb/sq ft)	1.00	2.30	0.17
Alpha	7.59	Stream Power (lb/ft s)	2.45	36.45	0.20
Frctn Loss (ft)	2.31	Cum Volume (acre-ft)	33.41	8.49	14.53
C & E Loss (ft)	0.35	Cum SA (acres)	12.54	1.84	3.84

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100 YR

E.G. Elev (ft)	2048.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.68	Wt. n-Val.	0.100	0.025	0.065
W.S. Elev (ft)	2047.09	Reach Len. (ft)	500.00	505.00	560.00
Crit W.S. (ft)	2047.09	Flow Area (sq ft)	3243.00	516.83	3.99
E.G. Slope (ft/ft)	0.005140	Area (sq ft)	3243.00	516.83	3.99
Q Total (cfs)	15045.00	Flow (cfs)	7533.89	7507.89	3.22
Top Width (ft)	1323.55	Top Width (ft)	1231.02	81.00	11.53
Vel Total (ft/s)	4.00	Avg. Vel. (ft/s)	2.32	14.53	0.81
Max Chl Dpth (ft)	7.09	Hydr. Depth (ft)	2.63	6.38	0.35
Conv. Total (cfs)	209858.4	Conv. (cfs)	105088.1	104725.5	44.8
Length Wtd. (ft)	518.72	Wetted Per. (ft)	1231.92	82.10	11.55
Min Ch El (ft)	2040.00	Shear (lb/sq ft)	0.84	2.02	0.11
Alpha	6.76	Stream Power (lb/ft s)	1.96	29.34	0.09

Frctn Loss (ft)	2.36	Cum Volume (acre-ft)	22.84	7.01	11.97
C & E Loss (ft)	0.35	Cum SA (acres)	10.76	1.84	2.41

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 50 YR

E.G. Elev (ft)	2048.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.49	Wt. n-Val.	0.098	0.025	0.065
W.S. Elev (ft)	2046.69	Reach Len. (ft)	500.00	505.00	560.00
Crit W.S. (ft)	2046.69	Flow Area (sq ft)	2761.92	483.87	0.68
E.G. Slope (ft/ft)	0.004789	Area (sq ft)	2761.92	483.87	0.68
Q Total (cfs)	12453.00	Flow (cfs)	5959.26	6493.45	0.29
Top Width (ft)	1219.57	Top Width (ft)	1133.83	81.00	4.75
Vel Total (ft/s)	3.84	Avg. Vel. (ft/s)	2.16	13.42	0.43
Max Chl Dpth (ft)	6.68	Hydr. Depth (ft)	2.44	5.97	0.14
Conv. Total (cfs)	179952.6	Conv. (cfs)	86114.5	93833.9	4.2
Length Wtd. (ft)	519.87	Wetted Per. (ft)	1134.73	82.10	4.76
Min Ch El (ft)	2040.00	Shear (lb/sq ft)	0.73	1.76	0.04
Alpha	6.53	Stream Power (lb/ft s)	1.57	23.64	0.02
Frctn Loss (ft)	2.27	Cum Volume (acre-ft)	18.80	6.31	11.09
C & E Loss (ft)	0.32	Cum SA (acres)	9.62	1.84	2.36

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 10 YR

E.G. Elev (ft)	2046.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.11	Wt. n-Val.	0.091	0.025	
W.S. Elev (ft)	2045.61	Reach Len. (ft)	500.00	505.00	560.00
Crit W.S. (ft)	2045.61	Flow Area (sq ft)	1667.02	397.38	
E.G. Slope (ft/ft)	0.003852	Area (sq ft)	1667.02	397.38	
Q Total (cfs)	7019.00	Flow (cfs)	2741.70	4277.30	
Top Width (ft)	1019.01	Top Width (ft)	940.24	78.77	
Vel Total (ft/s)	3.40	Avg. Vel. (ft/s)	1.64	10.76	
Max Chl Dpth (ft)	5.61	Hydr. Depth (ft)	1.77	5.05	
Conv. Total (cfs)	113085.5	Conv. (cfs)	44172.5	68913.0	
Length Wtd. (ft)	523.87	Wetted Per. (ft)	940.96	79.73	
Min Ch El (ft)	2040.00	Shear (lb/sq ft)	0.43	1.20	
Alpha	6.20	Stream Power (lb/ft s)	0.70	12.90	
Frctn Loss (ft)	2.06	Cum Volume (acre-ft)	10.22	4.43	8.75
C & E Loss (ft)	0.26	Cum SA (acres)	6.99	1.82	2.31

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for

additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 1 RS: 0.03

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8655	2044.5	8730	2044.4	8842	2043.7	8943	2043.3	9054	2042.6
9168	2041.8	9308	2041.3	9395	2040.7	9476	2040	9661	2039.5
9840	2038.7	10000	2038.2	10104	2038.1	10183	2037.4	10258	2037.1
10340	2036.2	10440	2036.2	10571	2034.8	10593	2033.5	10682	2032.3
10722	2047.5								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8655	1	9476	.065	10104	.025	10340	.065

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
10104	10340	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #500 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2041.54	Element			
Vel Head (ft)	0.65	Wt. n-Val.	0.066	0.025	0.065
W.S. Elev (ft)	2040.89	Reach Len. (ft)			
Crit W.S. (ft)	2039.29	Flow Area (sq ft)	1253.06	868.75	2131.58
E.G. Slope (ft/ft)	0.003976	Area (sq ft)	1253.06	868.75	2131.58
Q Total (cfs)	20836.00	Flow (cfs)	2839.66	7761.87	10234.47
Top Width (ft)	1337.16	Top Width (ft)	736.55	236.00	364.61
Vel Total (ft/s)	4.90	Avg. Vel. (ft/s)	2.27	8.93	4.80
Max Chl Dpth (ft)	8.59	Hydr. Depth (ft)	1.70	3.68	5.85
Conv. Total (cfs)	330450.3	Conv. (cfs)	45035.9	123100.1	162314.4
Length Wtd. (ft)		Wetted Per. (ft)	736.56	236.01	366.24
Min Ch El (ft)	2036.20	Shear (lb/sq ft)	0.42	0.91	1.44
Alpha	1.74	Stream Power (lb/ft s)	0.96	8.16	6.94
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #100 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2040.65	Element			
Vel Head (ft)	0.51	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2040.14	Reach Len. (ft)			
Crit W.S. (ft)	2038.52	Flow Area (sq ft)	736.83	691.75	1858.86
E.G. Slope (ft/ft)	0.004054	Area (sq ft)	736.83	691.75	1858.86
Q Total (cfs)	15045.00	Flow (cfs)	1369.37	5361.84	8313.79
Top Width (ft)	1242.84	Top Width (ft)	644.20	236.00	362.63
Vel Total (ft/s)	4.58	Avg. Vel. (ft/s)	1.86	7.75	4.47
Max Chl Dpth (ft)	7.84	Hydr. Depth (ft)	1.14	2.93	5.13
Conv. Total (cfs)	236279.6	Conv. (cfs)	21505.7	84207.0	130566.9
Length Wtd. (ft)		Wetted Per. (ft)	644.21	236.01	364.13
Min Ch El (ft)	2036.20	Shear (lb/sq ft)	0.29	0.74	1.29
Alpha	1.57	Stream Power (lb/ft s)	0.54	5.75	5.78
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile # 50 YR

E.G. Elev (ft)	2040.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.43	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2039.77	Reach Len. (ft)			
Crit W.S. (ft)	2038.21	Flow Area (sq ft)	513.12	604.43	1724.87
E.G. Slope (ft/ft)	0.004014	Area (sq ft)	513.12	604.43	1724.87
Q Total (cfs)	12453.00	Flow (cfs)	842.83	4260.31	7349.87
Top Width (ft)	1140.57	Top Width (ft)	542.91	236.00	361.66
Vel Total (ft/s)	4.38	Avg. Vel. (ft/s)	1.64	7.05	4.26
Max Chl Dpth (ft)	7.47	Hydr. Depth (ft)	0.95	2.56	4.77
Conv. Total (cfs)	196566.7	Conv. (cfs)	13303.7	67247.6	116015.4
Length Wtd. (ft)		Wetted Per. (ft)	542.91	236.01	363.08
Min Ch El (ft)	2036.20	Shear (lb/sq ft)	0.24	0.64	1.19
Alpha	1.45	Stream Power (lb/ft s)	0.39	4.52	5.07
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile # 10 YR

E.G. Elev (ft)	2039.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.26	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2038.76	Reach Len. (ft)			
Crit W.S. (ft)	2037.34	Flow Area (sq ft)	113.46	366.07	1360.94
E.G. Slope (ft/ft)	0.004004	Area (sq ft)	113.46	366.07	1360.94
Q Total (cfs)	7019.00	Flow (cfs)	98.95	1844.87	5075.19
Top Width (ft)	872.44	Top Width (ft)	277.44	236.00	359.00
Vel Total (ft/s)	3.81	Avg. Vel. (ft/s)	0.87	5.04	3.73
Max Chl Dpth (ft)	6.46	Hydr. Depth (ft)	0.41	1.55	3.79
Conv. Total (cfs)	110920.4	Conv. (cfs)	1563.7	29154.2	80202.6
Length Wtd. (ft)		Wetted Per. (ft)	277.44	236.01	360.24
Min Ch El (ft)	2036.20	Shear (lb/sq ft)	0.10	0.39	0.94
Alpha	1.15	Stream Power (lb/ft s)	0.09	1.95	3.52
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 1.59

INPUT
Description:
Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8975	2130.5	9042	2109.6	9061	2107.2	9065	2107.2	9085	2109.7
9109	2109.9	9125	2109.1	9142	2109.8	9158	2107.3	9220	2107.3
9240	2109.5	9262	2110.5	9326	2110.5	9381	2110	9425	2109.7
9482	2109.6	9561	2109.3	9625	2108.5	9665	2108.4	9695	2109.1
9705	2108.6	9714	2109.1	9725	2107.9	9733	2108.6	9740	2108.345
9755	2107.8	9788	2107.7	9811	2108.5	9836	2108.5	9849	2107.9
9850	2107.936	9885	2109.2	9929	2109.6	9943	2107.2	10000	2107.2
10033	2107.2	10055	2109.9	10110	2110	10158	2109.4	10178	2110.7
10218	2111.4	10245	2113	10275	2114.5	10300	2118	10345	2120
10370	2122.8								

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8975	.06	9158	.025	9220	.05	9740	.04	9850	.06
9943	.025	10033	.05						

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9943	10033	490	490	540	.1	.3

CROSS SECTION OUTPUT Profile #500 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2112.71	Element			
Vel Head (ft)	1.18	Wt. n-Val.	0.043	0.025	0.050
W.S. Elev (ft)	2111.53	Reach Len. (ft)	490.00	490.00	540.00
Crit W.S. (ft)	2111.53	Flow Area (sq ft)	2268.71	389.79	289.44
E.G. Slope (ft/ft)	0.007616	Area (sq ft)	2268.71	389.79	289.44
Q Total (cfs)	19986.00	Flow (cfs)	13485.80	5372.06	1128.14
Top Width (ft)	1184.40	Top Width (ft)	907.19	90.00	187.21
Vel Total (ft/s)	6.78	Avg. Vel. (ft/s)	5.94	13.78	3.90
Max Chl Dpth (ft)	4.33	Hydr. Depth (ft)	2.50	4.33	1.55
Conv. Total (cfs)	229019.4	Conv. (cfs)	154533.6	61558.4	12927.4
Length Wtd. (ft)	496.67	Wetted Per. (ft)	908.58	90.00	187.43
Min Ch El (ft)	2107.20	Shear (lb/sq ft)	1.19	2.06	0.73
Alpha	1.65	Stream Power (lb/ft s)	7.06	28.38	2.86
Frctn Loss (ft)	3.59	Cum Volume (acre-ft)	266.10	100.36	108.07
C & E Loss (ft)	0.03	Cum SA (acres)	123.72	17.07	34.99

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2112.01	Element			
Vel Head (ft)	0.98	Wt. n-Val.	0.042	0.025	0.050
W.S. Elev (ft)	2111.03	Reach Len. (ft)	490.00	490.00	540.00
Crit W.S. (ft)	2111.03	Flow Area (sq ft)	1813.52	344.60	200.33
E.G. Slope (ft/ft)	0.007138	Area (sq ft)	1813.52	344.60	200.33
Q Total (cfs)	14413.00	Flow (cfs)	9527.37	4235.08	650.55
Top Width (ft)	1159.37	Top Width (ft)	905.58	90.00	163.79
Vel Total (ft/s)	6.11	Avg. Vel. (ft/s)	5.25	12.29	3.25
Max Chl Dpth (ft)	3.83	Hydr. Depth (ft)	2.00	3.83	1.22
Conv. Total (cfs)	170597.5	Conv. (cfs)	112769.4	50127.9	7700.1
Length Wtd. (ft)	495.91	Wetted Per. (ft)	906.89	90.00	164.01
Min Ch El (ft)	2107.20	Shear (lb/sq ft)	0.89	1.71	0.54
Alpha	1.69	Stream Power (lb/ft s)	4.68	20.97	1.77
Frctn Loss (ft)	3.39	Cum Volume (acre-ft)	173.09	85.94	74.99
C & E Loss (ft)	0.02	Cum SA (acres)	113.82	17.06	33.78

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 50 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2111.66	Element			
Vel Head (ft)	0.89	Wt. n-Val.	0.041	0.025	0.050
W.S. Elev (ft)	2110.76	Reach Len. (ft)	490.00	490.00	540.00
Crit W.S. (ft)	2110.76	Flow Area (sq ft)	1573.76	320.76	158.94
E.G. Slope (ft/ft)	0.006921	Area (sq ft)	1573.76	320.76	158.94
Q Total (cfs)	11927.00	Flow (cfs)	7766.51	3700.67	459.82
Top Width (ft)	1143.39	Top Width (ft)	904.73	90.00	148.66

Vel Total (ft/s)	5.81	Avg. Vel. (ft/s)	4.94	11.54	2.89
Max Chl Dpth (ft)	3.56	Hydr. Depth (ft)	1.74	3.56	1.07
Conv. Total (cfs)	143363.1	Conv. (cfs)	93353.8	44482.2	5527.1
Length Wtd. (ft)	495.37	Wetted Per. (ft)	906.00	90.00	148.87
Min Ch El (ft)	2107.20	Shear (lb/sq ft)	0.75	1.54	0.46
Alpha	1.70	Stream Power (lb/ft s)	3.70	17.77	1.33
Frctn Loss (ft)	3.31	Cum Volume (acre-ft)	127.57	78.59	61.04
C & E Loss (ft)	0.01	Cum SA (acres)	92.86	17.04	32.49

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 10 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2110.75	Element			
Vel Head (ft)	0.71	Wt. n-Val.	0.039	0.025	0.050
W.S. Elev (ft)	2110.04	Reach Len. (ft)	490.00	490.00	540.00
Crit W.S. (ft)	2110.04	Flow Area (sq ft)	961.37	255.41	56.92
E.G. Slope (ft/ft)	0.006631	Area (sq ft)	961.37	255.41	56.92
Q Total (cfs)	6725.00	Flow (cfs)	4119.57	2477.82	127.61
Top Width (ft)	1002.21	Top Width (ft)	777.40	90.00	134.81
Vel Total (ft/s)	5.28	Avg. Vel. (ft/s)	4.29	9.70	2.24
Max Chl Dpth (ft)	2.84	Hydr. Depth (ft)	1.24	2.84	0.42
Conv. Total (cfs)	82587.2	Conv. (cfs)	50590.8	30429.2	1567.2
Length Wtd. (ft)	493.50	Wetted Per. (ft)	778.54	90.00	135.00
Min Ch El (ft)	2107.20	Shear (lb/sq ft)	0.51	1.17	0.17
Alpha	1.65	Stream Power (lb/ft s)	2.19	11.40	0.39
Frctn Loss (ft)	3.07	Cum Volume (acre-ft)	48.80	53.60	23.83
C & E Loss (ft)	0.01	Cum SA (acres)	28.51	16.64	21.03

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 1.49

INPUT
Description:
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8960	2120.5	8998	2112	9028	2102.1	9097	2102.2	9100	2102.6
9115	2104.6	9156	2106.1	9202	2105.3	9264	2106	9350	2106.1
9415	2104.6	9448	2105.7	9505	2105.9	9538	2104.9	9564	2104.4
9585	2105.3	9621	2104.5	9658	2103.8	9688	2105.5	9714	2104.5
9735	2103.3	9746	2101.5	9762	2101.6	9774	2104	9790	2104.5
9815	2103.5	9820	2104.4	9857	2103.7	9891	2104.2	9930	2103.4
9945	2102.2	9975	2101.8	10000	2102.3	10043	2102.8	10059	2103.7
10115	2104.3	10159	2103.4	10205	2104.1	10247	2104.7	10265	2105.7
10295	2103.7	10359	2104.3	10396	2104.5	10411	2104.3	10421	2104.9
10465	2102.4	10486	2104.9	10508	2111	10519	2112	10530	2112

Manning's n Values num= 8

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8960	.06	9028	.025	9100	.05	9350	.055	9746	.02
9762	.05	9930	.025	10059	.05				

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9930	10059	500	500	490	.1	.3

CROSS SECTION OUTPUT Profile #500 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2107.44	Element			
Vel Head (ft)	1.06	Wt. n-Val.	0.037	0.025	0.050
W.S. Elev (ft)	2106.38	Reach Len. (ft)	500.00	500.00	490.00
Crit W.S. (ft)	2106.38	Flow Area (sq ft)	1582.96	507.79	973.76
E.G. Slope (ft/ft)	0.006865	Area (sq ft)	1582.96	507.79	973.76
Q Total (cfs)	19986.00	Flow (cfs)	9552.09	6231.80	4202.11
Top Width (ft)	1476.29	Top Width (ft)	914.96	129.00	432.33
Vel Total (ft/s)	6.52	Avg. Vel. (ft/s)	6.03	12.27	4.32
Max Chl Dpth (ft)	4.88	Hydr. Depth (ft)	1.73	3.94	2.25
Conv. Total (cfs)	241207.0	Conv. (cfs)	115282.2	75210.4	50714.4
Length Wtd. (ft)	497.95	Wetted Per. (ft)	916.55	129.08	432.89
Min Ch El (ft)	2101.80	Shear (lb/sq ft)	0.74	1.69	0.96
Alpha	1.61	Stream Power (lb/ft s)	4.47	20.69	4.16
Frctn Loss (ft)	3.30	Cum Volume (acre-ft)	244.44	95.31	100.24
C & E Loss (ft)	0.01	Cum SA (acres)	113.47	15.83	31.15

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2106.81	Element			
Vel Head (ft)	0.92	Wt. n-Val.	0.035	0.025	0.050
W.S. Elev (ft)	2105.89	Reach Len. (ft)	500.00	500.00	490.00
Crit W.S. (ft)	2105.89	Flow Area (sq ft)	1151.51	444.42	761.83
E.G. Slope (ft/ft)	0.006541	Area (sq ft)	1151.51	444.42	761.83
Q Total (cfs)	14413.00	Flow (cfs)	6782.47	4871.08	2759.45
Top Width (ft)	1345.20	Top Width (ft)	785.64	129.00	430.56
Vel Total (ft/s)	6.11	Avg. Vel. (ft/s)	5.89	10.96	3.62
Max Chl Dpth (ft)	4.39	Hydr. Depth (ft)	1.47	3.45	1.77
Conv. Total (cfs)	178208.4	Conv. (cfs)	83861.3	60228.1	34119.0
Length Wtd. (ft)	498.08	Wetted Per. (ft)	787.14	129.08	431.05
Min Ch El (ft)	2101.80	Shear (lb/sq ft)	0.60	1.41	0.72
Alpha	1.59	Stream Power (lb/ft s)	3.52	15.41	2.61
Frctn Loss (ft)	3.18	Cum Volume (acre-ft)	156.41	81.50	69.03
C & E Loss (ft)	0.01	Cum SA (acres)	104.30	15.83	30.10

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 50 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2106.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.86	Wt. n-Val.	0.033	0.025	0.050
W.S. Elev (ft)	2105.62	Reach Len. (ft)	500.00	500.00	490.00
Crit W.S. (ft)	2105.62	Flow Area (sq ft)	957.28	409.43	645.30
E.G. Slope (ft/ft)	0.006444	Area (sq ft)	957.28	409.43	645.30
Q Total (cfs)	11927.00	Flow (cfs)	5606.03	4217.02	2103.95
Top Width (ft)	1217.20	Top Width (ft)	661.42	129.00	426.78
Vel Total (ft/s)	5.93	Avg. Vel. (ft/s)	5.86	10.30	3.26
Max Chl Dpth (ft)	4.11	Hydr. Depth (ft)	1.45	3.17	1.51
Conv. Total (cfs)	148582.8	Conv. (cfs)	69838.1	52534.3	26210.3
Length Wtd. (ft)	498.18	Wetted Per. (ft)	662.86	129.08	427.23
Min Ch El (ft)	2101.80	Shear (lb/sq ft)	0.58	1.28	0.61
Alpha	1.58	Stream Power (lb/ft s)	3.40	13.14	1.98
Frctn Loss (ft)	3.07	Cum Volume (acre-ft)	113.34	74.49	56.06
C & E Loss (ft)	0.00	Cum SA (acres)	84.05	15.81	28.93

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 10 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2105.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.68	Wt. n-Val.	0.030	0.025	0.050
W.S. Elev (ft)	2104.93	Reach Len. (ft)	500.00	500.00	490.00
Crit W.S. (ft)	2104.93	Flow Area (sq ft)	572.86	321.22	362.01
E.G. Slope (ft/ft)	0.005854	Area (sq ft)	572.86	321.22	362.01
Q Total (cfs)	6725.00	Flow (cfs)	3228.43	2682.47	814.11
Top Width (ft)	1002.65	Top Width (ft)	471.90	129.00	401.74
Vel Total (ft/s)	5.35	Avg. Vel. (ft/s)	5.64	8.35	2.25
Max Chl Dpth (ft)	3.43	Hydr. Depth (ft)	1.21	2.49	0.90
Conv. Total (cfs)	87894.5	Conv. (cfs)	42194.9	35059.3	10640.2
Length Wtd. (ft)	498.64	Wetted Per. (ft)	473.15	129.08	402.06
Min Ch El (ft)	2101.80	Shear (lb/sq ft)	0.44	0.91	0.33
Alpha	1.52	Stream Power (lb/ft s)	2.49	7.59	0.74
Frctn Loss (ft)	3.20	Cum Volume (acre-ft)	40.17	50.35	21.23
C & E Loss (ft)	0.02	Cum SA (acres)	21.48	15.40	17.71

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 1.4

INPUT
Description:
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9030	2120	9060	2110.6	9096	2106.4	9139	2097.2	91452096.488	
9155	2095.3	9168	2095.5	9181	2100	9200	2097.2	9219	2098.8

9225	[illegible]8.7	9277	2098	9280	2098.471	9298	2101.3	9343	[illegible]01.5
9415	2100.1	9435	2101	9477	2100.7	9500	2100.379	9520	2100.1
9563	2100.9	9611	2100.5	9665	2100.7	9760	2100.8	9812	2100.3
9866	2099.1	9902	2100.5	9935	2096.9	9965	2096.9	9992	2098
10000	2098	10065	2097.8	10091	2098	10116	2099.7	10147	2096.7
10162	2098.9	10190	2099.4	10215	2099.3	10248	2099.8	10271	2098.7
10288	2099.3	10301	2097.8	10345	2097.4	10352	2099.9	10384	2101
10406	2101.1	10442	2101.7	10465	2105.1	10470	2106.1		

Manning's n Values num= 8

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9030	.06	9145	.025	9168	.06	9200	.025	9280	.04
9500	.055	9902	.025	10091	.05				

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9902	10091	500	500	435	.1	.3

CROSS SECTION OUTPUT Profile #500 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2102.80	Element			
Vel Head (ft)	1.17	Wt. n-Val.	0.035	0.025	0.050
W.S. Elev (ft)	2101.64	Reach Len. (ft)	500.00	500.00	435.00
Crit W.S. (ft)	2101.64	Flow Area (sq ft)	1261.24	721.33	827.57
E.G. Slope (ft/ft)	0.006404	Area (sq ft)	1261.24	721.33	827.57
Q Total (cfs)	19986.00	Flow (cfs)	7629.18	8372.81	3984.02
Top Width (ft)	1319.99	Top Width (ft)	783.74	189.00	347.25
Vel Total (ft/s)	7.11	Avg. Vel. (ft/s)	6.05	11.61	4.81
Max Chl Dpth (ft)	6.34	Hydr. Depth (ft)	1.61	3.82	2.38
Conv. Total (cfs)	249742.0	Conv. (cfs)	95333.0	104625.3	49783.7
Length Wtd. (ft)	485.26	Wetted Per. (ft)	785.71	189.22	348.20
Min Ch El (ft)	2096.90	Shear (lb/sq ft)	0.64	1.52	0.95
Alpha	1.48	Stream Power (lb/ft s)	3.88	17.69	4.57
Frctn Loss (ft)	2.46	Cum Volume (acre-ft)	228.11	88.26	90.11
C & E Loss (ft)	0.03	Cum SA (acres)	103.73	14.01	26.76

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2102.10	Element			
Vel Head (ft)	1.00	Wt. n-Val.	0.032	0.025	0.050
W.S. Elev (ft)	2101.10	Reach Len. (ft)	500.00	500.00	435.00
Crit W.S. (ft)	2101.10	Flow Area (sq ft)	855.72	619.03	648.41
E.G. Slope (ft/ft)	0.006231	Area (sq ft)	855.72	619.03	648.41
Q Total (cfs)	14413.00	Flow (cfs)	5228.46	6400.66	2783.87
Top Width (ft)	1217.29	Top Width (ft)	714.15	189.00	314.14
Vel Total (ft/s)	6.79	Avg. Vel. (ft/s)	6.11	10.34	4.29
Max Chl Dpth (ft)	5.80	Hydr. Depth (ft)	1.20	3.28	2.06
Conv. Total (cfs)	182584.9	Conv. (cfs)	66234.6	81084.1	35266.3
Length Wtd. (ft)	485.69	Wetted Per. (ft)	716.04	189.22	315.09
Min Ch El (ft)	2096.90	Shear (lb/sq ft)	0.46	1.27	0.80
Alpha	1.40	Stream Power (lb/ft s)	2.84	13.16	3.44
Frctn Loss (ft)	2.46	Cum Volume (acre-ft)	144.89	75.40	61.10
C & E Loss (ft)	0.03	Cum SA (acres)	95.70	14.00	25.91

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 50 YR

E.G. Elev (ft)	2101.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.91	Wt. n-Val.	0.031	0.025	0.050
W.S. Elev (ft)	2100.83	Reach Len. (ft)	500.00	500.00	435.00
Crit W.S. (ft)	2100.83	Flow Area (sq ft)	673.54	569.57	571.11
E.G. Slope (ft/ft)	0.005909	Area (sq ft)	673.54	569.57	571.11
Q Total (cfs)	11927.00	Flow (cfs)	4252.67	5425.18	2249.15
Top Width (ft)	1136.76	Top Width (ft)	659.58	189.00	288.19
Vel Total (ft/s)	6.57	Avg. Vel. (ft/s)	6.31	9.53	3.94
Max Chl Dpth (ft)	5.53	Hydr. Depth (ft)	1.02	3.01	1.98
Conv. Total (cfs)	155157.3	Conv. (cfs)	55322.6	70575.7	29259.0
Length Wtd. (ft)	486.14	Wetted Per. (ft)	661.41	189.22	289.13
Min Ch El (ft)	2096.90	Shear (lb/sq ft)	0.38	1.11	0.73
Alpha	1.35	Stream Power (lb/ft s)	2.37	10.58	2.87
Frctn Loss (ft)	2.45	Cum Volume (acre-ft)	103.98	68.87	49.21
C & E Loss (ft)	0.04	Cum SA (acres)	76.47	13.98	24.91

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 10 YR

E.G. Elev (ft)	2100.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.84	Wt. n-Val.	0.029	0.025	0.050
W.S. Elev (ft)	2099.88	Reach Len. (ft)	500.00	500.00	435.00
Crit W.S. (ft)	2099.88	Flow Area (sq ft)	339.45	390.47	308.62
E.G. Slope (ft/ft)	0.007080	Area (sq ft)	339.45	390.47	308.62
Q Total (cfs)	6725.00	Flow (cfs)	2474.26	3230.85	1019.89
Top Width (ft)	660.48	Top Width (ft)	216.25	183.29	260.94
Vel Total (ft/s)	6.48	Avg. Vel. (ft/s)	7.29	8.27	3.30
Max Chl Dpth (ft)	4.58	Hydr. Depth (ft)	1.57	2.13	1.18
Conv. Total (cfs)	79924.4	Conv. (cfs)	29405.7	38397.6	12121.1
Length Wtd. (ft)	488.85	Wetted Per. (ft)	217.82	183.48	261.86
Min Ch El (ft)	2096.90	Shear (lb/sq ft)	0.69	0.94	0.52
Alpha	1.29	Stream Power (lb/ft s)	5.02	7.78	1.72
Frctn Loss (ft)	2.99	Cum Volume (acre-ft)	34.93	46.27	17.46
C & E Loss (ft)	0.02	Cum SA (acres)	17.53	13.61	13.98

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash

REACH: Re[illegible]2 RS: 1.3

INPUT
Description:
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9183	2112.5	9217	2098.6	9260	2094.1	9272	2091.3	9303	2091.3
9322	2094.2	9341	2095.4	9398	2097.8	9458	2096.7	9545	2095.7
9550	2096.05	9565	2097.1	9593	2096.4	9614	2097.4	9653	2096.8
9725	2096.8	9777	2097.1	9816	2096.5	9882	2096.7	9923	2096.9
9935	2092.2	9967	2092.2	10000	2092.9	10055	2093.4	10079	2095.3
10095	2095.8	10116	2094.6	10161	2094.2	10175	2095	10228	2094
10265	2092.6	10311	2092.3	10324	2095	10338	2095.2	10355	2094.2
10385	2096.8	10424	2098.3	10493	2098.1	10511	2101.1	10521	2101.3
10530	2101.3								

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9183	.06	9272	.025	9303	.045	9550	.065	9923	.02
10079	.05								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9923	10079	935	935	885	.1	.3

CROSS SECTION OUTPUT Profile #500 YR

E.G. Elev (ft)	2099.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.51	Wt. n-Val.	0.038	0.020	0.050
W.S. Elev (ft)	2097.81	Reach Len. (ft)	935.00	935.00	885.00
Crit W.S. (ft)	2097.81	Flow Area (sq ft)	1107.51	731.54	1105.60
E.G. Slope (ft/ft)	0.004115	Area (sq ft)	1107.51	731.54	1105.60
Q Total (cfs)	19986.00	Flow (cfs)	5178.60	9727.70	5079.70
Top Width (ft)	1186.70	Top Width (ft)	698.45	156.00	332.25
Vel Total (ft/s)	6.79	Avg. Vel. (ft/s)	4.68	13.30	4.59
Max Chl Dpth (ft)	6.51	Hydr. Depth (ft)	1.59	4.69	3.33
Conv. Total (cfs)	311552.1	Conv. (cfs)	80726.7	151640.4	79185.0
Length Wtd. (ft)	926.86	Wetted Per. (ft)	699.38	156.97	332.80
Min Ch El (ft)	2092.20	Shear (lb/sq ft)	0.41	1.20	0.85
Alpha	2.11	Stream Power (lb/ft s)	1.90	15.92	3.92
Frctn Loss (ft)	4.12	Cum Volume (acre-ft)	214.52	79.92	80.46
C & E Loss (ft)	0.01	Cum SA (acres)	95.22	12.03	23.37

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100 YR

E.G. Elev (ft)	2098.40	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.33	Wt. n-Val.	0.034	0.020	0.050
W.S. Elev (ft)	2097.07	Reach Len. (ft)	935.00	935.00	885.00
Crit W.S. (ft)	2097.07	Flow Area (sq ft)	619.41	616.22	867.08
E.G. Slope (ft/ft)	0.004213	Area (sq ft)	619.41	616.22	867.08
Q Total (cfs)	14413.00	Flow (cfs)	3454.23	7395.10	3563.67
Top Width (ft)	1066.34	Top Width (ft)	597.30	156.00	313.03
Vel Total (ft/s)	6.85	Avg. Vel. (ft/s)	5.58	12.00	4.11
Max Chl Dpth (ft)	5.77	Hydr. Depth (ft)	1.04	3.95	2.77
Conv. Total (cfs)	222049.7	Conv. (cfs)	53216.5	113930.5	54902.7
Length Wtd. (ft)	927.32	Wetted Per. (ft)	598.16	156.97	313.56
Min Ch El (ft)	2092.20	Shear (lb/sq ft)	0.27	1.03	0.73
Alpha	1.82	Stream Power (lb/ft s)	1.52	12.39	2.99

Frctn Loss (ft)	4.07	Cum Volume (acre-ft)	136.43	68.31	53.53
C & E Loss (ft)	0.01	Cum SA (acres)	88.17	12.02	22.77

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 50 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2097.92	Element			
Vel Head (ft)	1.26	Wt. n-Val.	0.032	0.020	0.050
W.S. Elev (ft)	2096.65	Reach Len. (ft)	935.00	935.00	885.00
Crit W.S. (ft)	2096.65	Flow Area (sq ft)	425.20	551.21	738.58
E.G. Slope (ft/ft)	0.004334	Area (sq ft)	425.20	551.21	738.58
Q Total (cfs)	11927.00	Flow (cfs)	2841.62	6246.37	2839.02
Top Width (ft)	767.43	Top Width (ft)	307.75	155.37	304.31
Vel Total (ft/s)	6.95	Avg. Vel. (ft/s)	6.68	11.33	3.84
Max Chl Dpth (ft)	5.35	Hydr. Depth (ft)	1.38	3.55	2.43
Conv. Total (cfs)	181172.9	Conv. (cfs)	43164.6	94883.2	43125.1
Length Wtd. (ft)	927.74	Wetted Per. (ft)	308.54	156.30	304.82
Min Ch El (ft)	2092.20	Shear (lb/sq ft)	0.37	0.95	0.66
Alpha	1.68	Stream Power (lb/ft s)	2.49	10.81	2.52
Frctn Loss (ft)	4.00	Cum Volume (acre-ft)	97.67	62.43	42.68
C & E Loss (ft)	0.00	Cum SA (acres)	70.91	12.01	21.95

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 10 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2096.55	Element			
Vel Head (ft)	1.08	Wt. n-Val.	0.030	0.020	0.050
W.S. Elev (ft)	2095.46	Reach Len. (ft)	935.00	935.00	885.00
Crit W.S. (ft)	2095.46	Flow Area (sq ft)	235.38	368.24	387.65
E.G. Slope (ft/ft)	0.005348	Area (sq ft)	235.38	368.24	387.65
Q Total (cfs)	6725.00	Flow (cfs)	1844.53	3592.71	1287.76
Top Width (ft)	521.85	Top Width (ft)	95.56	152.33	273.96
Vel Total (ft/s)	6.78	Avg. Vel. (ft/s)	7.84	9.76	3.32
Max Chl Dpth (ft)	4.16	Hydr. Depth (ft)	2.46	2.42	1.42
Conv. Total (cfs)	91960.1	Conv. (cfs)	25222.7	49128.1	17609.3
Length Wtd. (ft)	929.99	Wetted Per. (ft)	96.21	153.04	274.41
Min Ch El (ft)	2092.20	Shear (lb/sq ft)	0.82	0.80	0.47
Alpha	1.52	Stream Power (lb/ft s)	6.40	7.84	1.57
Frctn Loss (ft)	5.50	Cum Volume (acre-ft)	31.63	41.92	13.98
C & E Loss (ft)	0.04	Cum SA (acres)	15.74	11.69	11.31

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical

depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 1.12

INPUT
Description:
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9227	2092.5	9301	2092.6	9331	2083.3	9392	2082.2	9437	2087.5
9549	2088	9693	2087.7	9798	2087.2	9872	2086.6	9897	2086.4
9926	2087.3	9949	2083.4	9970	2082.3	10000	2082.5	10035	2083.4
10062	2084.9	10084	2086.4	10118	2086.1	10129	2086.6	10157	2086.6
10164	2086.2	10180	2085.1	10185	2085.1	10205	2091.9		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9227	.06	9331	.025	9392	.06	9949	.025	10062	.06

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9949	10062	615	620	630	.1	.3

CROSS SECTION OUTPUT Profile #500 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2090.81	Element			
Vel Head (ft)	1.65	Wt. n-Val.	0.039	0.025	0.060
W.S. Elev (ft)	2089.16	Reach Len. (ft)	615.00	620.00	630.00
Crit W.S. (ft)	2089.16	Flow Area (sq ft)	1554.15	687.81	398.62
E.G. Slope (ft/ft)	0.004828	Area (sq ft)	1554.15	687.81	398.62
Q Total (cfs)	19986.00	Flow (cfs)	9089.88	9465.27	1430.86
Top Width (ft)	884.84	Top Width (ft)	636.90	113.00	134.94
Vel Total (ft/s)	7.57	Avg. Vel. (ft/s)	5.85	13.76	3.59
Max Chl Dpth (ft)	6.96	Hydr. Depth (ft)	2.44	6.09	2.95
Conv. Total (cfs)	287631.0	Conv. (cfs)	130818.1	136220.6	20592.3
Length Wtd. (ft)	617.84	Wetted Per. (ft)	638.46	113.08	135.72
Min Ch El (ft)	2082.30	Shear (lb/sq ft)	0.73	1.83	0.89
Alpha	1.85	Stream Power (lb/ft s)	4.29	25.23	3.18
Frctn Loss (ft)	2.93	Cum Volume (acre-ft)	185.95	64.69	65.18
C & E Loss (ft)	0.09	Cum SA (acres)	80.89	9.14	18.62

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2089.82	Element			
Vel Head (ft)	1.42	Wt. n-Val.	0.035	0.025	0.060
W.S. Elev (ft)	2088.39	Reach Len. (ft)	615.00	620.00	630.00
Crit W.S. (ft)	2088.39	Flow Area (sq ft)	1067.78	601.35	296.24
E.G. Slope (ft/ft)	0.004580	Area (sq ft)	1067.78	601.35	296.24
Q Total (cfs)	14413.00	Flow (cfs)	6179.62	7369.36	864.02
Top Width (ft)	880.12	Top Width (ft)	634.43	113.00	132.69
Vel Total (ft/s)	7.33	Avg. Vel. (ft/s)	5.79	12.25	2.92
Max Chl Dpth (ft)	6.19	Hydr. Depth (ft)	1.68	5.32	2.23
Conv. Total (cfs)	212976.6	Conv. (cfs)	91314.4	108894.9	12767.4
Length Wtd. (ft)	617.96	Wetted Per. (ft)	635.87	113.08	133.35

Min Ch El (ft)	2082.30	Shear (lb/sq ft)	0.48	1.52	0.64
Alpha	1.70	Stream Power (lb/ft s)	2.78	18.63	1.85
Frctn Loss (ft)	2.85	Cum Volume (acre-ft)	118.32	55.24	41.71
C & E Loss (ft)	0.05	Cum SA (acres)	74.95	9.13	18.25

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 50 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2089.31	Element			
Vel Head (ft)	1.29	Wt. n-Val.	0.033	0.025	0.060
W.S. Elev (ft)	2088.02	Reach Len. (ft)	615.00	620.00	630.00
Crit W.S. (ft)	2088.02	Flow Area (sq ft)	833.18	559.53	247.33
E.G. Slope (ft/ft)	0.004292	Area (sq ft)	833.18	559.53	247.33
Q Total (cfs)	11927.00	Flow (cfs)	4973.95	6326.49	626.56
Top Width (ft)	877.84	Top Width (ft)	633.24	113.00	131.60
Vel Total (ft/s)	7.27	Avg. Vel. (ft/s)	5.97	11.31	2.53
Max Chl Dpth (ft)	5.82	Hydr. Depth (ft)	1.32	4.95	1.88
Conv. Total (cfs)	182053.5	Conv. (cfs)	75922.2	96567.4	9563.9
Length Wtd. (ft)	618.01	Wetted Per. (ft)	634.62	113.08	132.19
Min Ch El (ft)	2082.30	Shear (lb/sq ft)	0.35	1.33	0.50
Alpha	1.57	Stream Power (lb/ft s)	2.10	14.99	1.27
Frctn Loss (ft)	2.82	Cum Volume (acre-ft)	84.16	50.51	32.66
C & E Loss (ft)	0.00	Cum SA (acres)	60.81	9.13	17.52

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 10 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2087.78	Element			
Vel Head (ft)	1.46	Wt. n-Val.	0.029	0.025	0.060
W.S. Elev (ft)	2086.32	Reach Len. (ft)	615.00	620.00	630.00
Crit W.S. (ft)	2086.32	Flow Area (sq ft)	329.87	367.19	37.32
E.G. Slope (ft/ft)	0.006569	Area (sq ft)	329.87	367.19	37.32
Q Total (cfs)	6725.00	Flow (cfs)	2787.47	3878.72	58.81
Top Width (ft)	313.52	Top Width (ft)	122.97	113.00	77.55
Vel Total (ft/s)	9.16	Avg. Vel. (ft/s)	8.45	10.56	1.58
Max Chl Dpth (ft)	4.12	Hydr. Depth (ft)	2.68	3.25	0.48
Conv. Total (cfs)	82973.9	Conv. (cfs)	34392.2	47856.1	725.6
Length Wtd. (ft)	617.75	Wetted Per. (ft)	123.93	113.08	77.85
Min Ch El (ft)	2082.30	Shear (lb/sq ft)	1.09	1.33	0.20
Alpha	1.12	Stream Power (lb/ft s)	9.22	14.07	0.31
Frctn Loss (ft)	4.60	Cum Volume (acre-ft)	25.57	34.02	9.66
C & E Loss (ft)	0.01	Cum SA (acres)	13.39	8.84	7.74

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical

depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 1

INPUT
Description:
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8262	2097.2	8292	2089.4	8319	2086.6	8354	2084	8410	2083
8469	2082.8	8481	2083.3	8516	2082.6	8539	2081.7	8544	2082.3
8574	2081.7	8603	2082.5	8648	2082.7	8671	2082.1	8710	2082.8
8757	2083.1	8837	2083.5	8898	2083.9	8967	2084.1	9018	2083.6
9059	2083.4	9113	2082.8	9135	2082.2	9154	2082.2	9174	2082.9
9214	2082.5	9234	2083.2	9257	2077.8	9274	2076.6	9302	2076.6
9314	2078.6	9340	2079	9371	2082.7	9387	2083	9429	2083.4
9586	2083.1	9682	2083.1	9776	2083.4	9814	2082.7	9831	2083.6
9884	2083.2	9916	2081.6	9944	2078.9	9957	2078.3	10000	2078.1
10033	2078.1	10050	2082.1	10059	2082.6	10075	2087.1		

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8262	1	8603	.065	9274	.025	9310	.065	9944	.025
10050	.065								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9944	10050	570	560	565	.1	.3

CROSS SECTION OUTPUT Profile #500 YR

E.G. Elev (ft)	2085.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.35	Wt. n-Val.	0.055	0.025	0.065
W.S. Elev (ft)	2084.62	Reach Len. (ft)	570.00	560.00	565.00
Crit W.S. (ft)	2084.62	Flow Area (sq ft)	3104.52	646.14	27.66
E.G. Slope (ft/ft)	0.004656	Area (sq ft)	3104.52	646.14	27.66
Q Total (cfs)	19986.00	Flow (cfs)	11202.01	8717.99	66.00
Top Width (ft)	1720.50	Top Width (ft)	1598.32	106.00	16.18
Vel Total (ft/s)	5.29	Avg. Vel. (ft/s)	3.61	13.49	2.39
Max Chl Dpth (ft)	8.02	Hydr. Depth (ft)	1.94	6.10	1.71
Conv. Total (cfs)	292912.8	Conv. (cfs)	164175.5	127770.0	967.3
Length Wtd. (ft)	566.19	Wetted Per. (ft)	1599.77	106.48	16.47
Min Ch El (ft)	2078.10	Shear (lb/sq ft)	0.56	1.76	0.49
Alpha	3.10	Stream Power (lb/ft s)	2.04	23.80	1.16
Frctn Loss (ft)	2.97	Cum Volume (acre-ft)	153.06	55.20	62.10
C & E Loss (ft)	0.14	Cum SA (acres)	65.11	7.58	17.53

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100 YR

E.G. Elev (ft)	2085.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.27	Wt. n-Val.	0.049	0.025	0.065
W.S. Elev (ft)	2083.86	Reach Len. (ft)	570.00	560.00	565.00
Crit W.S. (ft)	2083.86	Flow Area (sq ft)	1910.23	565.82	16.42
E.G. Slope (ft/ft)	0.004657	Area (sq ft)	1910.23	565.82	16.42

Q Total (cfs)	14413.00	Flow (cfs)	7393.29	6988.67	31.05
Top Width (ft)	1602.25	Top Width (ft)	1482.77	106.00	13.48
Vel Total (ft/s)	5.78	Avg. Vel. (ft/s)	3.87	12.35	1.89
Max Chl Dpth (ft)	7.26	Hydr. Depth (ft)	1.29	5.34	1.22
Conv. Total (cfs)	211202.2	Conv. (cfs)	108338.2	102409.1	455.0
Length Wtd. (ft)	565.75	Wetted Per. (ft)	1484.18	106.48	13.67
Min Ch El (ft)	2078.10	Shear (lb/sq ft)	0.37	1.54	0.35
Alpha	2.44	Stream Power (lb/ft s)	1.45	19.08	0.66
Frctn Loss (ft)	3.25	Cum Volume (acre-ft)	97.30	46.94	39.45
C & E Loss (ft)	0.07	Cum SA (acres)	60.00	7.58	17.19

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 50 YR

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	2084.65				
Vel Head (ft)	1.28	Wt. n-Val.	0.044	0.025	0.065
W.S. Elev (ft)	2083.37	Reach Len. (ft)	570.00	560.00	565.00
Crit W.S. (ft)	2083.37	Flow Area (sq ft)	1232.08	514.19	10.27
E.G. Slope (ft/ft)	0.004861	Area (sq ft)	1232.08	514.19	10.27
Q Total (cfs)	11927.00	Flow (cfs)	5823.89	6087.34	15.77
Top Width (ft)	1362.43	Top Width (ft)	1244.68	106.00	11.75
Vel Total (ft/s)	6.79	Avg. Vel. (ft/s)	4.73	11.84	1.53
Max Chl Dpth (ft)	6.77	Hydr. Depth (ft)	0.99	4.85	0.87
Conv. Total (cfs)	171074.6	Conv. (cfs)	83534.8	87313.7	226.2
Length Wtd. (ft)	565.59	Wetted Per. (ft)	1246.08	106.48	11.87
Min Ch El (ft)	2078.10	Shear (lb/sq ft)	0.30	1.47	0.26
Alpha	1.79	Stream Power (lb/ft s)	1.42	17.35	0.40
Frctn Loss (ft)	3.07	Cum Volume (acre-ft)	69.59	42.87	30.80
C & E Loss (ft)	0.12	Cum SA (acres)	47.56	7.57	16.48

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 10 YR

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	2082.87				
Vel Head (ft)	1.54	Wt. n-Val.	0.036	0.025	
W.S. Elev (ft)	2081.33	Reach Len. (ft)	570.00	560.00	565.00
Crit W.S. (ft)	2081.33	Flow Area (sq ft)	392.99	298.77	
E.G. Slope (ft/ft)	0.008516	Area (sq ft)	392.99	298.77	
Q Total (cfs)	6725.00	Flow (cfs)	3394.51	3330.49	
Top Width (ft)	245.47	Top Width (ft)	142.74	102.72	
Vel Total (ft/s)	9.72	Avg. Vel. (ft/s)	8.64	11.15	
Max Chl Dpth (ft)	4.73	Hydr. Depth (ft)	2.75	2.91	
Conv. Total (cfs)	72875.2	Conv. (cfs)	36784.4	36090.7	
Length Wtd. (ft)	565.60	Wetted Per. (ft)	143.62	103.11	
Min Ch El (ft)	2078.10	Shear (lb/sq ft)	1.45	1.54	
Alpha	1.05	Stream Power (lb/ft s)	12.57	17.17	
Frctn Loss (ft)	4.13	Cum Volume (acre-ft)	20.46	29.28	9.39
C & E Loss (ft)	0.17	Cum SA (acres)	11.52	7.30	7.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 0.9

INPUT
Description:
Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8508	2090.8	8563	2083.3	8590	2084.6	8614	2084.2	8638	2083.6
8672	2079.1	8719	2079.1	8769	2077.5	8800	2075.4	8815	2072.8
8824	2072.8	8849	2077	8898	2077.2	8966	2077.4	9029	2077.5
9093	2077.8	9156	2078.3	9229	2078.6	9290	2078.7	9365	2078.4
9435	2078.3	9457	2075.2	9474	2074.3	9500	2071.1	9520	2071.1
9540	2075.7	9562	2077.8	9595	2078.6	9615	2077.9	9640	2078.4
9668	2077.7	9688	2078.5	9793	2078	9808	2077.2	9828	2074.5
9843	2077	9917	2078.6	9958	2077.7	9976	2073.5	10000	2073.1
10050	2073.1	10060	2078	10080	2083				

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8508	1	8769	.065	9475	.025	9520	.065	9958	.025
10045	.065								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9958	10060	540	565	575	.1	.3

CROSS SECTION OUTPUT Profile #500 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2080.43	Element			
Vel Head (ft)	0.88	Wt. n-Val.	0.048	0.033	0.065
W.S. Elev (ft)	2079.55	Reach Len. (ft)	540.00	565.00	575.00
Crit W.S. (ft)		Flow Area (sq ft)	2686.92	583.35	4.79
E.G. Slope (ft/ft)	0.005964	Area (sq ft)	2686.92	583.35	4.79
Q Total (cfs)	19986.00	Flow (cfs)	13504.14	6474.88	6.99
Top Width (ft)	1397.57	Top Width (ft)	1289.38	102.00	6.19
Vel Total (ft/s)	6.10	Avg. Vel. (ft/s)	5.03	11.10	1.46
Max Chl Dpth (ft)	8.45	Hydr. Depth (ft)	2.08	5.72	0.77
Conv. Total (cfs)	258796.8	Conv. (cfs)	174863.8	83842.5	90.5
Length Wtd. (ft)	549.65	Wetted Per. (ft)	1291.64	103.62	6.38
Min Ch El (ft)	2073.10	Shear (lb/sq ft)	0.77	2.10	0.28
Alpha	1.53	Stream Power (lb/ft s)	3.89	23.27	0.41
Frctn Loss (ft)	2.94	Cum Volume (acre-ft)	115.17	47.29	61.89
C & E Loss (ft)	0.08	Cum SA (acres)	46.21	6.25	17.38

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #100 YR

E.G. Elev (ft)	2079.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.04	Wt. n-Val.	0.042	0.033	0.065
W.S. Elev (ft)	2078.58	Reach Len. (ft)	540.00	565.00	575.00
Crit W.S. (ft)	2078.54	Flow Area (sq ft)	1481.40	485.09	0.68
E.G. Slope (ft/ft)	0.007258	Area (sq ft)	1481.40	485.09	0.68
Q Total (cfs)	14413.00	Flow (cfs)	9160.15	5252.28	0.57
Top Width (ft)	1230.87	Top Width (ft)	1126.53	102.00	2.34
Vel Total (ft/s)	7.33	Avg. Vel. (ft/s)	6.18	10.83	0.84
Max Chl Dpth (ft)	7.48	Hydr. Depth (ft)	1.32	4.76	0.29
Conv. Total (cfs)	169181.3	Conv. (cfs)	107522.8	61651.8	6.7
Length Wtd. (ft)	550.64	Wetted Per. (ft)	1128.74	103.62	2.41
Min Ch El (ft)	2073.10	Shear (lb/sq ft)	0.59	2.12	0.13
Alpha	1.25	Stream Power (lb/ft s)	3.68	22.97	0.11
Frctn Loss (ft)	3.17	Cum Volume (acre-ft)	75.11	40.18	39.34
C & E Loss (ft)	0.05	Cum SA (acres)	42.93	6.24	17.09

Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile # 50 YR

E.G. Elev (ft)	2079.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.89	Wt. n-Val.	0.040	0.033	0.065
W.S. Elev (ft)	2078.35	Reach Len. (ft)	540.00	565.00	575.00
Crit W.S. (ft)	2078.07	Flow Area (sq ft)	1240.43	461.28	0.25
E.G. Slope (ft/ft)	0.006094	Area (sq ft)	1240.43	461.28	0.25
Q Total (cfs)	11927.00	Flow (cfs)	7501.12	4425.75	0.13
Top Width (ft)	1008.19	Top Width (ft)	904.79	102.00	1.40
Vel Total (ft/s)	7.01	Avg. Vel. (ft/s)	6.05	9.59	0.55
Max Chl Dpth (ft)	7.25	Hydr. Depth (ft)	1.37	4.52	0.18
Conv. Total (cfs)	152779.8	Conv. (cfs)	96086.1	56692.0	1.7
Length Wtd. (ft)	551.06	Wetted Per. (ft)	906.98	103.62	1.45
Min Ch El (ft)	2073.10	Shear (lb/sq ft)	0.52	1.69	0.06
Alpha	1.16	Stream Power (lb/ft s)	3.15	16.25	0.04
Frctn Loss (ft)	3.32	Cum Volume (acre-ft)	53.41	36.60	30.73
C & E Loss (ft)	0.09	Cum SA (acres)	33.49	6.23	16.40

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile # 10 YR

E.G. Elev (ft)	2077.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.96	Wt. n-Val.	0.035	0.032	
W.S. Elev (ft)	2076.92	Reach Len. (ft)	540.00	565.00	575.00
Crit W.S. (ft)	2076.51	Flow Area (sq ft)	538.72	318.20	
E.G. Slope (ft/ft)	0.006344	Area (sq ft)	538.72	318.20	
Q Total (cfs)	6725.00	Flow (cfs)	4139.09	2585.92	
Top Width (ft)	308.07	Top Width (ft)	211.59	96.48	
Vel Total (ft/s)	7.85	Avg. Vel. (ft/s)	7.68	8.13	
Max Chl Dpth (ft)	5.82	Hydr. Depth (ft)	2.55	3.30	
Conv. Total (cfs)	84435.8	Conv. (cfs)	51968.3	32467.5	
Length Wtd. (ft)	551.35	Wetted Per. (ft)	213.50	97.76	
Min Ch El (ft)	2073.10	Shear (lb/sq ft)	1.00	1.29	
Alpha	1.00	Stream Power (lb/ft s)	7.68	10.48	
Frctn Loss (ft)	3.95	Cum Volume (acre-ft)	14.37	25.32	9.39

C & E Loss (ft) 0.06 Cum SA (acres) 9.20 6.02 7.18

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 0.79

INPUT
Description:
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8960	2080.6	8976	2078.3	9002	2077.7	9041	2074.7	9080	2068.4
9088	2068.5	9126	2073.4	9135	2073.2	9149	2073.2	9214	2074.3
9245	2074	9274	2074.5	9343	2074.1	9404	2074.4	9472	2074.6
9518	2074.3	9557	2068.2	9585	2067.7	9598	2074.4	9644	2073.6
9666	2068.6	9685	2073.7	9699	2073.9	9712	2072.6	9741	2074.2
9794	2074.6	9883	2075.2	9911	2073.9	9940	2070.3	9959	2068.9
10000	2068.9	10040	2068.9	10059	2077.1	10067	2078	10075	2078.2

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8960	.065	9550	.025	9590	.065	9959	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9959	10040	485	500	495	.1	.3

CROSS SECTION OUTPUT Profile #500 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2077.42	Element			
Vel Head (ft)	1.66	Wt. n-Val.	0.048	0.025	0.025
W.S. Elev (ft)	2075.76	Reach Len. (ft)	485.00	500.00	495.00
Crit W.S. (ft)	2075.76	Flow Area (sq ft)	2290.39	555.27	54.44
E.G. Slope (ft/ft)	0.004817	Area (sq ft)	2290.39	555.27	54.44
Q Total (cfs)	19986.00	Flow (cfs)	11237.48	8266.20	482.32
Top Width (ft)	1028.60	Top Width (ft)	931.72	81.00	15.88
Vel Total (ft/s)	6.89	Avg. Vel. (ft/s)	4.91	14.89	8.86
Max Chl Dpth (ft)	8.06	Hydr. Depth (ft)	2.46	6.86	3.43
Conv. Total (cfs)	287958.3	Conv. (cfs)	161909.7	119099.4	6949.2
Length Wtd. (ft)	492.22	Wetted Per. (ft)	936.36	81.00	17.30
Min Ch El (ft)	2068.90	Shear (lb/sq ft)	0.74	2.06	0.95
Alpha	2.25	Stream Power (lb/ft s)	3.61	30.69	8.38
Frctn Loss (ft)	2.37	Cum Volume (acre-ft)	84.32	39.91	61.50
C & E Loss (ft)	0.00	Cum SA (acres)	32.45	5.06	17.24

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2076.41	Element			
Vel Head (ft)	1.50	Wt. n-Val.	0.045	0.025	0.025

W.S. Elev (ft)	2074.91	Reach Len. (ft)	485.00	500.00	495.00
Crit W.S. (ft)	2074.91	Flow Area (sq ft)	1516.38	486.97	41.87
E.G. Slope (ft/ft)	0.004678	Area (sq ft)	1516.38	486.97	41.87
Q Total (cfs)	14413.00	Flow (cfs)	7532.78	6545.30	334.92
Top Width (ft)	966.74	Top Width (ft)	871.81	81.00	13.93
Vel Total (ft/s)	7.05	Avg. Vel. (ft/s)	4.97	13.44	8.00
Max Chl Dpth (ft)	7.21	Hydr. Depth (ft)	1.74	6.01	3.01
Conv. Total (cfs)	210729.5	Conv. (cfs)	110135.2	95697.5	4896.8
Length Wtd. (ft)	492.80	Wetted Per. (ft)	876.41	81.00	15.17
Min Ch El (ft)	2068.90	Shear (lb/sq ft)	0.51	1.76	0.81
Alpha	1.94	Stream Power (lb/ft s)	2.51	23.60	6.45
Frctn Loss (ft)	2.32	Cum Volume (acre-ft)	56.52	33.88	39.06
C & E Loss (ft)	0.00	Cum SA (acres)	30.55	5.05	16.98

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 50 YR

E.G. Elev (ft)	2075.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.75	Wt. n-Val.	0.041	0.025	0.025
W.S. Elev (ft)	2074.08	Reach Len. (ft)	485.00	500.00	495.00
Crit W.S. (ft)	2074.08	Flow Area (sq ft)	934.70	419.81	31.12
E.G. Slope (ft/ft)	0.005962	Area (sq ft)	934.70	419.81	31.12
Q Total (cfs)	11927.00	Flow (cfs)	5902.28	5770.18	254.54
Top Width (ft)	515.27	Top Width (ft)	422.26	81.00	12.01
Vel Total (ft/s)	8.61	Avg. Vel. (ft/s)	6.31	13.74	8.18
Max Chl Dpth (ft)	6.38	Hydr. Depth (ft)	2.21	5.18	2.59
Conv. Total (cfs)	154465.4	Conv. (cfs)	76439.8	74729.1	3296.5
Length Wtd. (ft)	493.17	Wetted Per. (ft)	426.68	81.00	13.08
Min Ch El (ft)	2068.90	Shear (lb/sq ft)	0.82	1.93	0.89
Alpha	1.52	Stream Power (lb/ft s)	5.15	26.52	7.24
Frctn Loss (ft)	2.72	Cum Volume (acre-ft)	39.93	30.89	30.52
C & E Loss (ft)	0.06	Cum SA (acres)	25.27	5.05	16.31

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 10 YR

E.G. Elev (ft)	2073.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.55	Wt. n-Val.	0.037	0.025	0.025
W.S. Elev (ft)	2072.32	Reach Len. (ft)	485.00	500.00	495.00
Crit W.S. (ft)	2072.32	Flow Area (sq ft)	457.44	277.31	13.58
E.G. Slope (ft/ft)	0.008155	Area (sq ft)	457.44	277.31	13.58
Q Total (cfs)	6725.00	Flow (cfs)	3245.51	3380.97	98.52
Top Width (ft)	279.76	Top Width (ft)	190.83	81.00	7.93
Vel Total (ft/s)	8.99	Avg. Vel. (ft/s)	7.09	12.19	7.26
Max Chl Dpth (ft)	4.62	Hydr. Depth (ft)	2.40	3.42	1.71
Conv. Total (cfs)	74472.0	Conv. (cfs)	35940.5	37440.5	1091.0
Length Wtd. (ft)	493.52	Wetted Per. (ft)	193.92	81.00	8.64
Min Ch El (ft)	2068.90	Shear (lb/sq ft)	1.20	1.74	0.80

Alpha	1.24	Stream Power (lb/ft s)	8.52	21.25	5.81
Frctn Loss (ft)	3.52	Cum Volume (acre-ft)	8.19	21.46	9.31
C & E Loss (ft)	0.03	Cum SA (acres)	6.71	4.87	7.12

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 0.69

INPUT
Description:
Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8940	2074.7	8966	2072.3	9004	2069.3	9025	2069.3	9034	2068.7
9080	2069	9145	2069.4	9209	2069.7	9269	2069.8	9332	2069.6
9369	2069.4	9423	2069.9	9472	2069.9	9494	2064.8	9509	2064.9
9543	2070.2	9609	2070.3	9663	2070.5	9702	2070.5	9720	2065.2
9745	2064.6	9758	2064.7	9775	2070.5	9808	2071	9868	2070.2
9918	2069.8	9950	2067.6	9973	2064.5	10000	2064.2	10034	2064.2
10050	2065.8	10063	2064.4	10071	2065.1	10088	2067.3	10100	2067.6
10118	2065.4	10124	2066.9	10135	2065.3	10152	2070.3	10184	2070.2
10222	2068.6	10241	2068.6	10264	2068.2	10288	2072.1	10297	2072.8
10300	2072.8								

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8940	1	9332	.065	9720	.025	9760	.065	9973	.025
10050	.065								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9973	10050	495	510	490	.1	.3

CROSS SECTION OUTPUT Profile #500 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2073.23	Element			
Vel Head (ft)	1.65	Wt. n-Val.	0.060	0.025	0.065
W.S. Elev (ft)	2071.57	Reach Len. (ft)	495.00	510.00	490.00
Crit W.S. (ft)	2071.57	Flow Area (sq ft)	2298.36	550.74	816.72
E.G. Slope (ft/ft)	0.004809	Area (sq ft)	2298.36	550.74	816.72
Q Total (cfs)	19986.00	Flow (cfs)	8223.16	8421.10	3341.75
Top Width (ft)	1309.52	Top Width (ft)	997.77	77.00	234.75
Vel Total (ft/s)	5.45	Avg. Vel. (ft/s)	3.58	15.29	4.09
Max Chl Dpth (ft)	7.37	Hydr. Depth (ft)	2.30	7.15	3.48
Conv. Total (cfs)	288198.8	Conv. (cfs)	118578.2	121432.5	48188.1
Length Wtd. (ft)	502.58	Wetted Per. (ft)	1000.91	77.08	236.46
Min Ch El (ft)	2064.20	Shear (lb/sq ft)	0.69	2.15	1.04
Alpha	3.59	Stream Power (lb/ft s)	2.47	32.80	4.24
Frctn Loss (ft)	1.85	Cum Volume (acre-ft)	58.78	33.56	56.55
C & E Loss (ft)	0.00	Cum SA (acres)	21.71	4.15	15.81

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100 YR

E.G. Elev (ft)	2072.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.51	Wt. n-Val.	0.051	0.025	0.065
W.S. Elev (ft)	2070.70	Reach Len. (ft)	495.00	510.00	490.00
Crit W.S. (ft)	2070.70	Flow Area (sq ft)	1436.90	483.39	613.73
E.G. Slope (ft/ft)	0.004728	Area (sq ft)	1436.90	483.39	613.73
Q Total (cfs)	14413.00	Flow (cfs)	5450.30	6718.23	2244.47
Top Width (ft)	1250.26	Top Width (ft)	943.90	77.00	229.36
Vel Total (ft/s)	5.69	Avg. Vel. (ft/s)	3.79	13.90	3.66
Max Chl Dpth (ft)	6.50	Hydr. Depth (ft)	1.52	6.28	2.68
Conv. Total (cfs)	209609.4	Conv. (cfs)	79264.1	97703.7	32641.6
Length Wtd. (ft)	503.60	Wetted Per. (ft)	947.00	77.08	231.01
Min Ch El (ft)	2064.20	Shear (lb/sq ft)	0.45	1.85	0.78
Alpha	3.02	Stream Power (lb/ft s)	1.70	25.73	2.87
Frctn Loss (ft)	1.78	Cum Volume (acre-ft)	40.08	28.31	35.34
C & E Loss (ft)	0.01	Cum SA (acres)	20.44	4.15	15.60

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 50 YR

E.G. Elev (ft)	2071.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.55	Wt. n-Val.	0.044	0.025	0.065
W.S. Elev (ft)	2070.09	Reach Len. (ft)	495.00	510.00	490.00
Crit W.S. (ft)	2070.09	Flow Area (sq ft)	932.03	436.76	481.29
E.G. Slope (ft/ft)	0.005114	Area (sq ft)	932.03	436.76	481.29
Q Total (cfs)	11927.00	Flow (cfs)	4304.98	5900.61	1721.41
Top Width (ft)	977.46	Top Width (ft)	710.12	77.00	190.34
Vel Total (ft/s)	6.45	Avg. Vel. (ft/s)	4.62	13.51	3.58
Max Chl Dpth (ft)	5.89	Hydr. Depth (ft)	1.31	5.67	2.53
Conv. Total (cfs)	166776.4	Conv. (cfs)	60197.0	82508.8	24070.6
Length Wtd. (ft)	504.30	Wetted Per. (ft)	713.06	77.08	191.90
Min Ch El (ft)	2064.20	Shear (lb/sq ft)	0.42	1.81	0.80
Alpha	2.40	Stream Power (lb/ft s)	1.93	24.44	2.86
Frctn Loss (ft)	1.87	Cum Volume (acre-ft)	29.53	25.97	27.61
C & E Loss (ft)	0.03	Cum SA (acres)	18.97	4.14	15.16

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 10 YR

E.G. Elev (ft)	2069.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.45	Wt. n-Val.	0.037	0.025	0.065
W.S. Elev (ft)	2068.46	Reach Len. (ft)	495.00	510.00	490.00
Crit W.S. (ft)	2068.46	Flow Area (sq ft)	361.86	311.21	218.18

E.G. Slo (ft/ft)	0.006282	Area (sq ft)	361.86	1.21	218.18
Q Total (cfs)	6725.00	Flow (cfs)	2293.95	3717.11	713.94
Top Width (ft)	338.56	Top Width (ft)	149.24	77.00	112.32
Vel Total (ft/s)	7.55	Avg. Vel. (ft/s)	6.34	11.94	3.27
Max Chl Dpth (ft)	4.26	Hydr. Depth (ft)	2.42	4.04	1.94
Conv. Total (cfs)	84851.1	Conv. (cfs)	28943.4	46899.8	9007.9
Length Wtd. (ft)	506.14	Wetted Per. (ft)	151.28	77.08	113.49
Min Ch El (ft)	2064.20	Shear (lb/sq ft)	0.94	1.58	0.75
Alpha	1.65	Stream Power (lb/ft s)	5.95	18.91	2.47
Frctn Loss (ft)	2.74	Cum Volume (acre-ft)	3.63	18.08	7.99
C & E Loss (ft)	0.03	Cum SA (acres)	4.81	3.96	6.44

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 0.6

INPUT
Description:
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8792	2070.3	8819	2069	8838	2070	8862	2065.6	8891	2063.8
8917	2064.8	8930	2065.4	9013	2064.9	9064	2064.3	9104	2065
9168	2065.2	9230	2065.4	9320	2064.8	9403	2064.2	9446	2065
9486	2065.1	9503	2064.3	9548	2065.3	9615	2066.1	9671	2066.8
9736	2066.9	9798	2066.2	9809	2066.1	9842	2066.1	9859	2066.4
9928	2065.8	9954	2059.7	10000	2059.9	10052	2059.9	10075	2066.4
10097	2067.1	10124	2066.8	10141	2067.9	10154	2067	10178	2065.5
10195	2066.8	10225	2067	10257	2066.4	10334	2067.1	10403	2066.4
10431	2063.9	10476	2064.8	10494	2065.1	10520	2062.7	10532	2063.1
10552	2069.7	10561	2070.4	10575	2069.7				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8792	1	9446	.065	9928	.025	10075	.065

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9928	10075	515	505	505	.1	.3

CROSS SECTION OUTPUT Profile #500 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2070.17	Element			
Vel Head (ft)	1.65	Wt. n-Val.	0.181	0.025	0.065
W.S. Elev (ft)	2068.52	Reach Len. (ft)	515.00	505.00	505.00
Crit W.S. (ft)	2068.52	Flow Area (sq ft)	3369.13	1122.87	1153.39
E.G. Slope (ft/ft)	0.002903	Area (sq ft)	3369.13	1122.87	1153.39
Q Total (cfs)	20005.00	Flow (cfs)	3296.85	13845.19	2862.96
Top Width (ft)	1702.35	Top Width (ft)	1081.93	147.00	473.42
Vel Total (ft/s)	3.54	Avg. Vel. (ft/s)	0.98	12.33	2.48
Max Chl Dpth (ft)	8.82	Hydr. Depth (ft)	3.11	7.64	2.44
Conv. Total (cfs)	371320.5	Conv. (cfs)	61194.1	256985.9	53140.5
Length Wtd. (ft)	506.15	Wetted Per. (ft)	1082.35	148.61	474.72
Min Ch El (ft)	2059.70	Shear (lb/sq ft)	0.56	1.37	0.44
Alpha	8.46	Stream Power (lb/ft s)	0.55	16.88	1.09
Frctn Loss (ft)	1.53	Cum Volume (acre-ft)	26.57	23.76	45.47

C & E Loss (ft)	0.01	Cum SA (acres)	9.89	2.84	11.83

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100 YR

E.G. Elev (ft)	2069.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.48	Wt. n-Val.	0.201	0.025	0.065
W.S. Elev (ft)	2067.68	Reach Len. (ft)	515.00	505.00	505.00
Crit W.S. (ft)	2067.68	Flow Area (sq ft)	2464.78	999.73	758.61
E.G. Slope (ft/ft)	0.002757	Area (sq ft)	2464.78	999.73	758.61
Q Total (cfs)	14459.00	Flow (cfs)	1761.61	11117.94	1579.45
Top Width (ft)	1688.73	Top Width (ft)	1077.36	147.00	464.37
Vel Total (ft/s)	3.42	Avg. Vel. (ft/s)	0.71	11.12	2.08
Max Chl Dpth (ft)	7.98	Hydr. Depth (ft)	2.29	6.80	1.63
Conv. Total (cfs)	275390.8	Conv. (cfs)	33552.1	211755.9	30082.7
Length Wtd. (ft)	505.79	Wetted Per. (ft)	1077.71	148.61	465.52
Min Ch El (ft)	2059.70	Shear (lb/sq ft)	0.39	1.16	0.28
Alpha	8.16	Stream Power (lb/ft s)	0.28	12.88	0.58
Frctn Loss (ft)	1.45	Cum Volume (acre-ft)	17.92	19.63	27.62
C & E Loss (ft)	0.01	Cum SA (acres)	8.95	2.83	11.70

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 50 YR

E.G. Elev (ft)	2068.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.46	Wt. n-Val.	0.225	0.025	0.065
W.S. Elev (ft)	2067.16	Reach Len. (ft)	515.00	505.00	505.00
Crit W.S. (ft)	2067.16	Flow Area (sq ft)	1907.63	923.61	522.56
E.G. Slope (ft/ft)	0.002812	Area (sq ft)	1907.63	923.61	522.56
Q Total (cfs)	11964.00	Flow (cfs)	1080.82	9839.89	1043.29
Top Width (ft)	1668.85	Top Width (ft)	1074.53	147.00	447.32
Vel Total (ft/s)	3.57	Avg. Vel. (ft/s)	0.57	10.65	2.00
Max Chl Dpth (ft)	7.46	Hydr. Depth (ft)	1.78	6.28	1.17
Conv. Total (cfs)	225630.9	Conv. (cfs)	20383.3	185572.0	19675.6
Length Wtd. (ft)	505.56	Wetted Per. (ft)	1074.84	148.61	448.35
Min Ch El (ft)	2059.70	Shear (lb/sq ft)	0.31	1.09	0.20
Alpha	7.37	Stream Power (lb/ft s)	0.18	11.62	0.41
Frctn Loss (ft)	1.45	Cum Volume (acre-ft)	13.40	18.01	21.96
C & E Loss (ft)	0.00	Cum SA (acres)	8.83	2.83	11.57

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 10 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2066.75	Element			
Vel Head (ft)	1.79	Wt. n-Val.	0.427	0.025	0.065
W.S. Elev (ft)	2064.96	Reach Len. (ft)	515.00	505.00	505.00
Crit W.S. (ft)	2064.96	Flow Area (sq ft)	130.16	605.05	92.37
E.G. Slope (ft/ft)	0.004732	Area (sq ft)	130.16	605.05	92.37
Q Total (cfs)	6748.00	Flow (cfs)	17.83	6574.39	155.77
Top Width (ft)	586.67	Top Width (ft)	339.56	138.34	108.77
Vel Total (ft/s)	8.15	Avg. Vel. (ft/s)	0.14	10.87	1.69
Max Chl Dpth (ft)	5.26	Hydr. Depth (ft)	0.38	4.37	0.85
Conv. Total (cfs)	98099.1	Conv. (cfs)	259.3	95575.3	2264.6
Length Wtd. (ft)	505.01	Wetted Per. (ft)	339.66	139.65	109.24
Min Ch El (ft)	2059.70	Shear (lb/sq ft)	0.11	1.28	0.25
Alpha	1.73	Stream Power (lb/ft s)	0.02	13.91	0.42
Frctn Loss (ft)	2.17	Cum Volume (acre-ft)	0.84	12.71	6.24
C & E Loss (ft)	0.05	Cum SA (acres)	2.04	2.70	5.20

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 0.5

INPUT
Description:
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9600	2064	9622	2063.2	9628	2062.6	9665	2062.4	9694	2062.9
9740	2062.2	9800	2061.9	9843	2062.5	9919	2062.2	9958	2055.5
10000	2055.5	10041	2055.5	10058	2059.1	10079	2059.2	10114	2062.8
10129	2062.8	10146	2062	10204	2062.9	10253	2062.6	10316	2061.3
10373	2060.4	10426	2059.8	10444	2058.1	10457	2058.3	10470	2060.7
10505	2061.3	10530	2060.6	10569	2060.9	10634	2061.8	10663	2062.2
10671	2067.5	10705	2073.6						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9600	.065	9919	.025	10041	.065

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9919	10041	200	200	220	.1	.3

CROSS SECTION OUTPUT Profile #500 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2066.25	Element			
Vel Head (ft)	1.72	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2064.52	Reach Len. (ft)	200.00	200.00	220.00
Crit W.S. (ft)	2064.52	Flow Area (sq ft)	662.61	969.85	2123.37
E.G. Slope (ft/ft)	0.003141	Area (sq ft)	662.61	969.85	2123.37
Q Total (cfs)	20836.00	Flow (cfs)	1407.85	12828.40	6599.76
Top Width (ft)	1066.50	Top Width (ft)	319.00	122.00	625.50
Vel Total (ft/s)	5.55	Avg. Vel. (ft/s)	2.12	13.23	3.11
Max Chl Dpth (ft)	9.02	Hydr. Depth (ft)	2.08	7.95	3.39
Conv. Total (cfs)	371775.7	Conv. (cfs)	25120.2	228896.4	117759.1

Length Wtd. (ft)	207.89	Wetted Per. (ft)	319.58	122.57	627.14
Min Ch El (ft)	2055.50	Shear (lb/sq ft)	0.41	1.55	0.66
Alpha	3.61	Stream Power (lb/ft s)	0.86	20.52	2.06
Frctn Loss (ft)	0.40	Cum Volume (acre-ft)	2.74	11.63	26.47
C & E Loss (ft)	0.28	Cum SA (acres)	1.61	1.28	5.46

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100 YR

E.G. Elev (ft)	2065.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.54	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2063.66	Reach Len. (ft)	200.00	200.00	220.00
Crit W.S. (ft)	2063.66	Flow Area (sq ft)	388.68	864.47	1583.64
E.G. Slope (ft/ft)	0.002973	Area (sq ft)	388.68	864.47	1583.64
Q Total (cfs)	15045.00	Flow (cfs)	582.46	10304.17	4158.38
Top Width (ft)	1055.76	Top Width (ft)	309.56	122.00	624.20
Vel Total (ft/s)	5.30	Avg. Vel. (ft/s)	1.50	11.92	2.63
Max Chl Dpth (ft)	8.16	Hydr. Depth (ft)	1.26	7.09	2.54
Conv. Total (cfs)	275905.8	Conv. (cfs)	10681.5	188965.1	76259.3
Length Wtd. (ft)	206.15	Wetted Per. (ft)	309.61	122.57	625.58
Min Ch El (ft)	2055.50	Shear (lb/sq ft)	0.23	1.31	0.47
Alpha	3.53	Stream Power (lb/ft s)	0.35	15.61	1.23
Frctn Loss (ft)	0.67	Cum Volume (acre-ft)	1.05	8.82	14.04
C & E Loss (ft)	0.01	Cum SA (acres)	0.75	1.27	5.39

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 50 YR

E.G. Elev (ft)	2064.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.46	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2063.18	Reach Len. (ft)	200.00	200.00	220.00
Crit W.S. (ft)	2063.18	Flow Area (sq ft)	244.93	806.60	1287.71
E.G. Slope (ft/ft)	0.002912	Area (sq ft)	244.93	806.60	1287.71
Q Total (cfs)	12453.00	Flow (cfs)	275.63	9085.08	3092.29
Top Width (ft)	1042.31	Top Width (ft)	296.82	122.00	623.48
Vel Total (ft/s)	5.32	Avg. Vel. (ft/s)	1.13	11.26	2.40
Max Chl Dpth (ft)	7.68	Hydr. Depth (ft)	0.83	6.61	2.07
Conv. Total (cfs)	230766.2	Conv. (cfs)	5107.8	168355.3	57303.2
Length Wtd. (ft)	205.50	Wetted Per. (ft)	296.87	122.57	624.72
Min Ch El (ft)	2055.50	Shear (lb/sq ft)	0.15	1.20	0.37
Alpha	3.32	Stream Power (lb/ft s)	0.17	13.48	0.90
Frctn Loss (ft)	0.64	Cum Volume (acre-ft)	0.67	7.98	11.47
C & E Loss (ft)	0.01	Cum SA (acres)	0.72	1.27	5.37

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 10 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2062.88	Element			
Vel Head (ft)	1.61	Wt. n-Val.		0.025	0.065
W.S. Elev (ft)	2061.27	Reach Len. (ft)	200.00	200.00	220.00
Crit W.S. (ft)	2061.27	Flow Area (sq ft)		576.24	367.44
E.G. Slope (ft/ft)	0.003937	Area (sq ft)		576.24	367.44
Q Total (cfs)	7019.00	Flow (cfs)		6216.93	802.07
Top Width (ft)	450.61	Top Width (ft)		116.61	334.00
Vel Total (ft/s)	7.44	Avg. Vel. (ft/s)		10.79	2.18
Max Chl Dpth (ft)	5.77	Hydr. Depth (ft)		4.94	1.10
Conv. Total (cfs)	111870.9	Conv. (cfs)		99087.3	12783.6
Length Wtd. (ft)	202.71	Wetted Per. (ft)		117.10	334.82
Min Ch El (ft)	2055.50	Shear (lb/sq ft)		1.21	0.27
Alpha	1.87	Stream Power (lb/ft s)		13.05	0.59
Frctn Loss (ft)	0.82	Cum Volume (acre-ft)	0.07	5.87	3.58
C & E Loss (ft)	0.00	Cum SA (acres)	0.03	1.23	2.63

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 0.47

INPUT
Description:
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9738	2063.5	9790	2064	9856	2063.3	9921	2062.3	9941	2054.9
9961	2053.4	10000	2053.6	10024	2053.6	10038	2059.9	10145	2060.2
10268	2059.7	10325	2054.3	10334	2054.7	10363	2057.9	10470	2058.6
10536	2058.9	10574	2058.9	10597	2059.8	10664	2060.1	10711	2060.1
10724	2064	10770	2078.4						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9738	.065	9921	.025	10038	.065

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9921	10038	190	230	260	.3	.5

CROSS SECTION OUTPUT Profile #500 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2065.33	Element			
Vel Head (ft)	0.78	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2064.55	Reach Len. (ft)	190.00	230.00	260.00
Crit W.S. (ft)		Flow Area (sq ft)	214.13	1129.56	3746.58
E.G. Slope (ft/ft)	0.001295	Area (sq ft)	214.13	1129.56	3746.58
Q Total (cfs)	20836.00	Flow (cfs)	209.59	10786.13	9840.28
Top Width (ft)	987.75	Top Width (ft)	183.00	117.00	687.75

Vel Total (ft/s)	4.09	Avg. Vel. (ft/s)	0.98	9.55	2.63
Max Chl Dpth (ft)	11.15	Hydr. Depth (ft)	1.17	9.65	5.45
Conv. Total (cfs)	579035.3	Conv. (cfs)	5824.5	299748.1	273462.7
Length Wtd. (ft)	236.90	Wetted Per. (ft)	184.06	119.73	688.86
Min Ch El (ft)	2053.40	Shear (lb/sq ft)	0.09	0.76	0.44
Alpha	3.01	Stream Power (lb/ft s)	0.09	7.28	1.15
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)	0.73	6.81	11.65
C & E Loss (ft)	0.60	Cum SA (acres)	0.46	0.73	2.15

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #100 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2063.32	Element			
Vel Head (ft)	1.66	Wt. n-Val.		0.025	0.065
W.S. Elev (ft)	2061.65	Reach Len. (ft)	190.00	230.00	260.00
Crit W.S. (ft)	2061.65	Flow Area (sq ft)		791.46	1769.64
E.G. Slope (ft/ft)	0.003528	Area (sq ft)		791.46	1769.64
Q Total (cfs)	15045.00	Flow (cfs)		9944.88	5100.13
Top Width (ft)	793.42	Top Width (ft)		115.25	678.17
Vel Total (ft/s)	5.87	Avg. Vel. (ft/s)		12.57	2.88
Max Chl Dpth (ft)	8.25	Hydr. Depth (ft)		6.87	2.61
Conv. Total (cfs)	253301.8	Conv. (cfs)		167434.7	85867.1
Length Wtd. (ft)	235.12	Wetted Per. (ft)		117.87	678.86
Min Ch El (ft)	2053.40	Shear (lb/sq ft)		1.48	0.57
Alpha	3.11	Stream Power (lb/ft s)		18.58	1.65
Frctn Loss (ft)	0.85	Cum Volume (acre-ft)	0.15	5.02	5.57
C & E Loss (ft)	0.27	Cum SA (acres)	0.04	0.73	2.10

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 50 YR

			Left OB	Channel	Right OB
E.G. Elev (ft)	2062.72	Element			
Vel Head (ft)	1.54	Wt. n-Val.		0.025	0.065
W.S. Elev (ft)	2061.18	Reach Len. (ft)	190.00	230.00	260.00
Crit W.S. (ft)	2061.18	Flow Area (sq ft)		737.68	1451.78
E.G. Slope (ft/ft)	0.003356	Area (sq ft)		737.68	1451.78
Q Total (cfs)	12453.00	Flow (cfs)		8692.91	3760.09
Top Width (ft)	790.59	Top Width (ft)		113.98	676.61
Vel Total (ft/s)	5.69	Avg. Vel. (ft/s)		11.78	2.59
Max Chl Dpth (ft)	7.78	Hydr. Depth (ft)		6.47	2.15
Conv. Total (cfs)	214960.5	Conv. (cfs)		150054.8	64905.7
Length Wtd. (ft)	234.58	Wetted Per. (ft)		116.51	677.23
Min Ch El (ft)	2053.40	Shear (lb/sq ft)		1.33	0.45
Alpha	3.06	Stream Power (lb/ft s)		15.63	1.16
Frctn Loss (ft)	0.90	Cum Volume (acre-ft)	0.11	4.43	4.55
C & E Loss (ft)	0.28	Cum SA (acres)	0.04	0.73	2.08

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile # 10 YR

E.G. Elev (ft)	2060.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.60	Wt. n-Val.		0.025	0.065
W.S. Elev (ft)	2059.39	Reach Len. (ft)	190.00	230.00	260.00
Crit W.S. (ft)	2059.39	Flow Area (sq ft)		537.61	455.24
E.G. Slope (ft/ft)	0.004145	Area (sq ft)		537.61	455.24
Q Total (cfs)	7019.00	Flow (cfs)		5921.78	1097.22
Top Width (ft)	423.12	Top Width (ft)		107.99	315.13
Vel Total (ft/s)	7.07	Avg. Vel. (ft/s)		11.02	2.41
Max Chl Dpth (ft)	5.99	Hydr. Depth (ft)		4.98	1.44
Conv. Total (cfs)	109017.0	Conv. (cfs)		91975.3	17041.7
Length Wtd. (ft)	232.41	Wetted Per. (ft)		110.09	315.57
Min Ch El (ft)	2053.40	Shear (lb/sq ft)		1.26	0.37
Alpha	2.07	Stream Power (lb/ft s)		13.92	0.90
Frctn Loss (ft)	0.89	Cum Volume (acre-ft)	0.07	3.31	1.50
C & E Loss (ft)	0.11	Cum SA (acres)	0.03	0.71	0.99

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 0.42

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9428	2063.59	445.675	2064.29	507.891	2064.29	581.419	2064.29	645.756	2064.7
9751.806	2064	9785.035	2052.39	832.404	2052.59	874.824	2052.59	896.034	2053.3
9924.314	2052.39	946.231	2051.4	9979.46	2062.21	036.73	2063.61	091.17	2064.9
10137.83	2066.41	203.58	2066.5						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9428	.065	9785.035	.025	9946.231	.065

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9785.03	9946.231	135	135	135	.3	.5

CROSS SECTION OUTPUT Profile #500 YR

E.G. Elev (ft)	2064.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.80	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2061.49	Reach Len. (ft)			
Crit W.S. (ft)	2060.30	Flow Area (sq ft)	119.93	1451.17	156.62

E.G. Slope (ft/ft)	0.002845	Area (sq ft)	119.93	1451.17	156.62
Q Total (cfs)	20836.00	Flow (cfs)	388.72	19904.05	543.23
Top Width (ft)	218.34	Top Width (ft)	26.10	161.20	31.04
Vel Total (ft/s)	12.06	Avg. Vel. (ft/s)	3.24	13.72	3.47
Max Chl Dpth (ft)	10.09	Hydr. Depth (ft)	4.59	9.00	5.05
Conv. Total (cfs)	390655.0	Conv. (cfs)	7288.2	373181.8	10185.0
Length Wtd. (ft)		Wetted Per. (ft)	27.67	161.25	32.64
Min Ch El (ft)	2051.40	Shear (lb/sq ft)	0.77	1.60	0.85
Alpha	1.24	Stream Power (lb/ft s)	2.49	21.92	2.96
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #100 YR

E.G. Elev (ft)	2061.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.56	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2059.37	Reach Len. (ft)			
Crit W.S. (ft)	2058.80	Flow Area (sq ft)	70.98	1109.45	97.72
E.G. Slope (ft/ft)	0.003692	Area (sq ft)	70.98	1109.45	97.72
Q Total (cfs)	15045.00	Flow (cfs)	220.07	14494.95	329.98
Top Width (ft)	205.80	Top Width (ft)	20.08	161.20	24.52
Vel Total (ft/s)	11.77	Avg. Vel. (ft/s)	3.10	13.06	3.38
Max Chl Dpth (ft)	7.97	Hydr. Depth (ft)	3.54	6.88	3.99
Conv. Total (cfs)	247598.1	Conv. (cfs)	3621.7	238545.8	5430.6
Length Wtd. (ft)		Wetted Per. (ft)	21.29	161.25	25.78
Min Ch El (ft)	2051.40	Shear (lb/sq ft)	0.77	1.59	0.87
Alpha	1.19	Stream Power (lb/ft s)	2.38	20.72	2.95
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile # 50 YR

E.G. Elev (ft)	2060.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.46	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2058.33	Reach Len. (ft)			
Crit W.S. (ft)	2058.06	Flow Area (sq ft)	51.64	941.80	73.88
E.G. Slope (ft/ft)	0.004404	Area (sq ft)	51.64	941.80	73.88
Q Total (cfs)	12453.00	Flow (cfs)	157.23	12047.56	248.21
Top Width (ft)	199.64	Top Width (ft)	17.13	161.20	21.32
Vel Total (ft/s)	11.67	Avg. Vel. (ft/s)	3.05	12.79	3.36
Max Chl Dpth (ft)	6.93	Hydr. Depth (ft)	3.02	5.84	3.47
Conv. Total (cfs)	187656.8	Conv. (cfs)	2369.4	181547.2	3740.3
Length Wtd. (ft)		Wetted Per. (ft)	18.16	161.25	22.42
Min Ch El (ft)	2051.40	Shear (lb/sq ft)	0.78	1.61	0.91
Alpha	1.17	Stream Power (lb/ft s)	2.38	20.54	3.04
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile # 10 YR

E.G. Elev (ft)	2058.31	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.38	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2056.93	Reach Len. (ft)			
Crit W.S. (ft)	2056.30	Flow Area (sq ft)	30.44	716.10	47.04
E.G. Slope (ft/ft)	0.003525	Area (sq ft)	30.44	716.10	47.04
Q Total (cfs)	7019.00	Flow (cfs)	69.54	6827.81	121.65
Top Width (ft)	191.36	Top Width (ft)	13.15	161.20	17.01
Vel Total (ft/s)	8.84	Avg. Vel. (ft/s)	2.28	9.53	2.59
Max Chl Dpth (ft)	5.53	Hydr. Depth (ft)	2.31	4.44	2.76
Conv. Total (cfs)	118216.0	Conv. (cfs)	1171.2	114996.0	2048.8
Length Wtd. (ft)		Wetted Per. (ft)	13.94	161.25	17.89
Min Ch El (ft)	2051.40	Shear (lb/sq ft)	0.48	0.98	0.58
Alpha	1.13	Stream Power (lb/ft s)	1.10	9.32	1.50

Frctn Los[illegible] (ft)
C & E Loss (ft)

Cum Volume (acre-ft)
Cum SA (acres)

SUMMARY OF MANNING'S N VALUES

River:Sols Wash

Reach	River Sta.	n1	n2	n3	n4	n5	n6	n7	n8
Reach 1	0.40	.065	.025	.065					
Reach 1	0.36	1	.065	.025	.065				
Reach 1	0.22	.065	.025	.065					
Reach 1	0.13	1	.065	.025	.065				
Reach 1	0.03	1	.065	.025	.065				
Reach 2	1.59	.06	.025	.05	.04	.06	.025	.05	
Reach 2	1.49	.06	.025	.05	.055	.02	.05	.025	.05
Reach 2	1.4	.06	.025	.06	.025	.04	.055	.025	.05
Reach 2	1.3	.06	.025	.045	.065	.02	.05		
Reach 2	1.12	.06	.025	.06	.025	.06			
Reach 2	1	1	.065	.025	.065	.025	.065		
Reach 2	0.9	1	.065	.025	.065	.025	.065		
Reach 2	0.79	.065	.025	.065	.025				
Reach 2	0.69	1	.065	.025	.065	.025	.065		
Reach 2	0.6	1	.065	.025	.065				
Reach 2	0.5	.065	.025	.065					
Reach 2	0.47	.065	.025	.065					
Reach 2	0.42	.065	.025	.065					

SUMMARY OF REACH LENGTHS

River: Sols Wash

Reach	River Sta.	Left	Channel	Right
Reach 1	0.40	250	170	105
Reach 1	0.36	615	770	785
Reach 1	0.22	465	500	515
Reach 1	0.13	500	505	560
Reach 1	0.03	0	0	0
Reach 2	1.59	490	490	540
Reach 2	1.49	500	500	490
Reach 2	1.4	500	500	435
Reach 2	1.3	935	935	885
Reach 2	1.12	615	620	630
Reach 2	1	570	560	565
Reach 2	0.9	540	565	575
Reach 2	0.79	485	500	495
Reach 2	0.69	495	510	490
Reach 2	0.6	515	505	505
Reach 2	0.5	200	200	220
Reach 2	0.47	190	230	260
Reach 2	0.42	135	135	135

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Sols Wash

Reach	River Sta.	Contr.	Expan.
Reach 1	0.40	.3	.5
Reach 1	0.36	.3	.5
Reach 1	0.22	.1	.3
Reach 1	0.13	.1	.3
Reach 1	0.03	.1	.3
Reach 2	1.59	.1	.3
Reach 2	1.49	.1	.3
Reach 2	1.4	.1	.3
Reach 2	1.3	.1	.3
Reach 2	1.12	.1	.3
Reach 2	1	.1	.3
Reach 2	0.9	.1	.3
Reach 2	0.79	.1	.3
Reach 2	0.69	.1	.3
Reach 2	0.6	.1	.3
Reach 2	0.5	.1	.3
Reach 2	0.47	.3	.5
Reach 2	0.42	.3	.5

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	0.40	500 YR	20836.00	2050.60	2059.97	2060	2064	0	17	1385	180	1
Reach 1	0.40	100 YR	15045.00	2050.60	2058.33	2058	2062	0	15	1095	172	1
Reach 1	0.40	50 YR	12453.00	2050.60	2057.78	2057	2061	0	13	1001	170	1
Reach 1	0.40	10 YR	7019.00	2050.60	2056.49		2058	0	9	786	164	1
Reach 1	0.36	500 YR	20836.00	2048.40	2059.39	2059	2062	0	15	2801	659	1
Reach 1	0.36	100 YR	15045.00	2048.40	2058.23	2058	2060	0	14	2040	653	1
Reach 1	0.36	50 YR	12453.00	2048.40	2057.55	2058	2060	0	13	1598	649	1
Reach 1	0.36	10 YR	7019.00	2048.40	2054.75	2055	2057	0	13	606	136	1
Reach 1	0.22	500 YR	20836.00	2043.00	2053.91	2054	2056	0	14	2671	599	1
Reach 1	0.22	100 YR	15045.00	2043.00	2052.85	2053	2055	0	12	2034	598	1
Reach 1	0.22	50 YR	12453.00	2043.00	2052.25	2052	2054	0	12	1676	597	1
Reach 1	0.22	10 YR	7019.00	2043.00	2049.14	2049	2052	0	13	562	116	1
Reach 1	0.13	500 YR	20836.00	2040.00	2048.08	2048	2050	0	16	5294	1762	1
Reach 1	0.13	100 YR	15045.00	2040.00	2047.09	2047	2049	0	15	3764	1324	1
Reach 1	0.13	50 YR	12453.00	2040.00	2046.69	2047	2048	0	13	3246		

1220	1									
Reach 1	0.13	10 YR	7019.00	2040.00	2045.61	2046	2047	0	11	2064
1019	1									
Reach 1	0.03	500 YR	20836.00	2036.20	2040.89	2039	2042	0	9	4253
1337	1									
Reach 1	0.03	100 YR	15045.00	2036.20	2040.14	2039	2041	0	8	3287
1243	1									
Reach 1	0.03	50 YR	12453.00	2036.20	2039.77	2038	2040	0	7	2842
1141	1									
Reach 1	0.03	10 YR	7019.00	2036.20	2038.76	2037	2039	0	5	1840
872	1									
Reach 2	1.59	500 YR	19986.00	2107.20	2111.53	2112	2113	0	14	2948
1184	1									
Reach 2	1.59	100 YR	14413.00	2107.20	2111.03	2111	2112	0	12	2358
1159	1									
Reach 2	1.59	50 YR	11927.00	2107.20	2110.76	2111	2112	0	12	2053
1143	1									
Reach 2	1.59	10 YR	6725.00	2107.20	2110.04	2110	2111	0	10	1274
1002	1									
Reach 2	1.49	500 YR	19986.00	2101.80	2106.38	2106	2107	0	12	3065
1476	1									
Reach 2	1.49	100 YR	14413.00	2101.80	2105.89	2106	2107	0	11	2358
1345	1									
Reach 2	1.49	50 YR	11927.00	2101.80	2105.62	2106	2106	0	10	2012
1217	1									
Reach 2	1.49	10 YR	6725.00	2101.80	2104.93	2105	2106	0	8	1256
1003	1									
Reach 2	1.4	500 YR	19986.00	2096.90	2101.64	2102	2103	0	12	2810
1320	1									
Reach 2	1.4	100 YR	14413.00	2096.90	2101.10	2101	2102	0	10	2123
1217	1									
Reach 2	1.4	50 YR	11927.00	2096.90	2100.83	2101	2102	0	10	1814
1137	1									
Reach 2	1.4	10 YR	6725.00	2096.90	2099.88	2100	2101	0	8	1039
660	1									
Reach 2	1.3	500 YR	19986.00	2092.20	2097.81	2098	2099	0	13	2945
1187	1									
Reach 2	1.3	100 YR	14413.00	2092.20	2097.07	2097	2098	0	12	2103
1066	1									
Reach 2	1.3	50 YR	11927.00	2092.20	2096.65	2097	2098	0	11	1715
767	1									
Reach 2	1.3	10 YR	6725.00	2092.20	2095.46	2095	2097	0	10	991
522	1									
Reach 2	1.12	500 YR	19986.00	2082.30	2089.16	2089	2091	0	14	2641
885	1									
Reach 2	1.12	100 YR	14413.00	2082.30	2088.39	2088	2090	0	12	1965
880	1									
Reach 2	1.12	50 YR	11927.00	2082.30	2088.02	2088	2089	0	11	1640
878	1									
Reach 2	1.12	10 YR	6725.00	2082.30	2086.32	2086	2088	0	11	734
314	1									
Reach 2	1	500 YR	19986.00	2078.10	2084.62	2085	2086	0	13	3778

1721	1									
Reach 2	1	100 YR	14413.00	2078.10	2083.86	2084	2085	0	12	2492
1602	1									
Reach 2	1	50 YR	11927.00	2078.10	2083.37	2083	2085	0	12	1757
1362	1									
Reach 2	1	10 YR	6725.00	2078.10	2081.33	2081	2083	0	11	692
245	1									
Reach 2	0.9	500 YR	19986.00	2073.10	2079.55		2080	0	11	3275
1398	1									
Reach 2	0.9	100 YR	14413.00	2073.10	2078.58	2079	2080	0	11	1967
1231	1									
Reach 2	0.9	50 YR	11927.00	2073.10	2078.35	2078	2079	0	10	1702
1008	1									
Reach 2	0.9	10 YR	6725.00	2073.10	2076.92	2077	2078	0	8	857
308	1									
Reach 2	0.79	500 YR	19986.00	2068.90	2075.76	2076	2077	0	15	2900
1029	1									
Reach 2	0.79	100 YR	14413.00	2068.90	2074.91	2075	2076	0	13	2045
967	1									
Reach 2	0.79	50 YR	11927.00	2068.90	2074.08	2074	2076	0	14	1386
515	1									
Reach 2	0.79	10 YR	6725.00	2068.90	2072.32	2072	2074	0	12	748
280	1									
Reach 2	0.69	500 YR	19986.00	2064.20	2071.57	2072	2073	0	15	3666
1310	1									
Reach 2	0.69	100 YR	14413.00	2064.20	2070.70	2071	2072	0	14	2534
1250	1									
Reach 2	0.69	50 YR	11927.00	2064.20	2070.09	2070	2072	0	14	1850
977	1									
Reach 2	0.69	10 YR	6725.00	2064.20	2068.46	2068	2070	0	12	891
339	1									
Reach 2	0.6	500 YR	20005.00	2059.70	2068.52	2069	2070	0	12	5645
1702	1									
Reach 2	0.6	100 YR	14459.00	2059.70	2067.68	2068	2069	0	11	4223
1689	1									
Reach 2	0.6	50 YR	11964.00	2059.70	2067.16	2067	2069	0	11	3354
1669	1									
Reach 2	0.6	10 YR	6748.00	2059.70	2064.96	2065	2067	0	11	828
587	1									
Reach 2	0.5	500 YR	20836.00	2055.50	2064.52	2065	2066	0	13	3756
1067	1									
Reach 2	0.5	100 YR	15045.00	2055.50	2063.66	2064	2065	0	12	2837
1056	1									
Reach 2	0.5	50 YR	12453.00	2055.50	2063.18	2063	2065	0	11	2339
1042	1									
Reach 2	0.5	10 YR	7019.00	2055.50	2061.27	2061	2063	0	11	944
451	1									
Reach 2	0.47	500 YR	20836.00	2053.40	2064.55		2065	0	10	5090
988	1									
Reach 2	0.47	100 YR	15045.00	2053.40	2061.65	2062	2063	0	13	2561
793	1									
Reach 2	0.47	50 YR	12453.00	2053.40	2061.18	2061	2063	0	12	2189
791	1									
Reach 2	0.47	10 YR	7019.00	2053.40	2059.39	2059	2061	0	11	993

423	1									
Reach 2	0.42	500 YR	20836.00	2051.40	2061.49	2060	2064	0	14	1728
218	1									
Reach 2	0.42	100 YR	15045.00	2051.40	2059.37	2059	2062	0	13	1278
206	1									
Reach 2	0.42	50 YR	12453.00	2051.40	2058.33	2058	2061	0	13	1067
200	1									
Reach 2	0.42	10 YR	7019.00	2051.40	2056.93	2056	2058	0	10	794
191	1									

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Reach 1	0.40	500 YR	2064.10	2059.97	4.13	0.63	0.89	251.49	20154.58	429.92	180.38
Reach 1	0.40	100 YR	2061.69	2058.33	3.36	0.62	0.64	143.11	14656.70	245.19	172.32
Reach 1	0.40	50 YR	2060.51	2057.78	2.73	0.59	0.36	107.68	12155.76	189.56	169.88
Reach 1	0.40	10 YR	2057.87	2056.49	1.37	0.60	0.26	46.39	6880.57	92.04	164.33
Reach 1	0.36	500 YR	2061.73	2059.39	2.34	2.59	0.08	6544.48	12396.03	1895.50	659.24
Reach 1	0.36	100 YR	2060.32	2058.23	2.09	2.46	0.08	3803.70	9952.82	1288.49	652.51
Reach 1	0.36	50 YR	2059.55	2057.55	2.01	2.46	0.09	2640.42	8792.34	1020.25	648.57
Reach 1	0.36	10 YR	2057.00	2054.75	2.25	4.21	0.06	869.11	5783.75	366.14	136.10
Reach 1	0.22	500 YR	2056.09	2053.91	2.18	2.34	0.11	5097.63	15016.81	721.57	598.75
Reach 1	0.22	100 YR	2054.77	2052.85	1.93	2.27	0.07	2553.85	11964.64	526.50	597.51
Reach 1	0.22	50 YR	2054.07	2052.25	1.83	2.16	0.10	1504.92	10509.55	438.53	596.81
Reach 1	0.22	10 YR	2051.58	2049.14	2.45	2.57	0.40		6820.93	198.07	115.80
Reach 1	0.13	500 YR	2049.90	2048.08	1.83	2.31	0.35	11221.83	9464.51	149.66	1762.16
Reach 1	0.13	100 YR	2048.77	2047.09	1.68	2.36	0.35	7533.89	7507.89	3.22	1323.55
Reach 1	0.13	50 YR	2048.18	2046.69	1.49	2.27	0.32	5959.26	6493.45	0.29	1219.57
Reach 1	0.13	10 YR	2046.72	2045.61	1.11	2.06	0.26	2741.70	4277.30		1019.01
Reach 1	0.03	500 YR	2041.54	2040.89	0.65			2839.66	7761.87	10234.47	1337.16
Reach 1	0.03	100 YR	2040.65	2040.14	0.51			1369.37	5361.84	8313.79	

1242.84										
Reach 1	0.03	50 YR	2040.20	2039.77	0.43			842.83	4260.31	7349.87
1140.57										
Reach 1	0.03	10 YR	2039.02	2038.76	0.26			98.95	1844.87	5075.19
872.44										
Reach 2	1.59	500 YR	2112.71	2111.53	1.18	3.59	0.03	13485.80	5372.06	1128.14
1184.40										
Reach 2	1.59	100 YR	2112.01	2111.03	0.98	3.39	0.02	9527.37	4235.08	650.55
1159.37										
Reach 2	1.59	50 YR	2111.66	2110.76	0.89	3.31	0.01	7766.51	3700.67	459.82
1143.39										
Reach 2	1.59	10 YR	2110.75	2110.04	0.71	3.07	0.01	4119.57	2477.82	127.61
1002.21										
Reach 2	1.49	500 YR	2107.44	2106.38	1.06	3.30	0.01	9552.09	6231.80	4202.11
1476.29										
Reach 2	1.49	100 YR	2106.81	2105.89	0.92	3.18	0.01	6782.47	4871.08	2759.45
1345.20										
Reach 2	1.49	50 YR	2106.48	2105.62	0.86	3.07	0.00	5606.03	4217.02	2103.95
1217.20										
Reach 2	1.49	10 YR	2105.61	2104.93	0.68	3.20	0.02	3228.43	2682.47	814.11
1002.65										
Reach 2	1.4	500 YR	2102.80	2101.64	1.17	2.46	0.03	7629.18	8372.81	3984.02
1319.99										
Reach 2	1.4	100 YR	2102.10	2101.10	1.00	2.46	0.03	5228.46	6400.66	2783.87
1217.29										
Reach 2	1.4	50 YR	2101.74	2100.83	0.91	2.45	0.04	4252.67	5425.18	2249.15
1136.76										
Reach 2	1.4	10 YR	2100.72	2099.88	0.84	2.99	0.02	2474.26	3230.85	1019.89
660.48										
Reach 2	1.3	500 YR	2099.32	2097.81	1.51	4.12	0.01	5178.60	9727.70	5079.70
1186.70										
Reach 2	1.3	100 YR	2098.40	2097.07	1.33	4.07	0.01	3454.23	7395.10	3563.67
1066.34										
Reach 2	1.3	50 YR	2097.92	2096.65	1.26	4.00	0.00	2841.62	6246.37	2839.02
767.43										
Reach 2	1.3	10 YR	2096.55	2095.46	1.08	5.50	0.04	1844.53	3592.71	1287.76
521.85										
Reach 2	1.12	500 YR	2090.81	2089.16	1.65	2.93	0.09	9089.88	9465.27	1430.86
884.84										
Reach 2	1.12	100 YR	2089.82	2088.39	1.42	2.85	0.05	6179.62	7369.36	864.02
880.12										
Reach 2	1.12	50 YR	2089.31	2088.02	1.29	2.82	0.00	4973.95	6326.49	626.56
877.84										
Reach 2	1.12	10 YR	2087.78	2086.32	1.46	4.60	0.01	2787.47	3878.72	58.81
313.52										
Reach 2	1	500 YR	2085.97	2084.62	1.35	2.97	0.14	11202.01	8717.99	66.00
1720.50										
Reach 2	1	100 YR	2085.13	2083.86	1.27	3.25	0.07	7393.29	6988.67	31.05
1602.25										
Reach 2	1	50 YR	2084.65	2083.37	1.28	3.07	0.12	5823.89	6087.34	15.77
1362.43										
Reach 2	1	10 YR	2082.87	2081.33	1.54	4.13	0.17	3394.51	3330.49	
245.47										

Reach 2 1397.57	0.9	500 YR	2080.43	2079.55	0.88	2.94	0.08	13504.14	6474.88	6.99
Reach 2 1230.87	0.9	100 YR	2079.63	2078.58	1.04	3.17	0.05	9160.15	5252.28	0.57
Reach 2 1008.19	0.9	50 YR	2079.24	2078.35	0.89	3.32	0.09	7501.12	4425.75	0.13
Reach 2 308.07	0.9	10 YR	2077.88	2076.92	0.96	3.95	0.06	4139.09	2585.92	
Reach 2 1028.60	0.79	500 YR	2077.42	2075.76	1.66	2.37	0.00	11237.48	8266.20	482.32
Reach 2 966.74	0.79	100 YR	2076.41	2074.91	1.50	2.32	0.00	7532.78	6545.30	334.92
Reach 2 515.27	0.79	50 YR	2075.83	2074.08	1.75	2.72	0.06	5902.28	5770.18	254.54
Reach 2 279.76	0.79	10 YR	2073.87	2072.32	1.55	3.52	0.03	3245.51	3380.97	98.52
Reach 2 1309.52	0.69	500 YR	2073.23	2071.57	1.65	1.85	0.00	8223.16	8421.10	3341.75
Reach 2 1250.26	0.69	100 YR	2072.21	2070.70	1.51	1.78	0.01	5450.30	6718.23	2244.47
Reach 2 977.46	0.69	50 YR	2071.64	2070.09	1.55	1.87	0.03	4304.98	5900.61	1721.41
Reach 2 338.56	0.69	10 YR	2069.92	2068.46	1.45	2.74	0.03	2293.95	3717.11	713.94
Reach 2 1702.35	0.6	500 YR	2070.17	2068.52	1.65	1.53	0.01	3296.85	13845.19	2862.96
Reach 2 1688.73	0.6	100 YR	2069.17	2067.68	1.48	1.45	0.01	1761.61	11117.94	1579.45
Reach 2 1668.85	0.6	50 YR	2068.62	2067.16	1.46	1.45	0.00	1080.82	9839.89	1043.29
Reach 2 586.67	0.6	10 YR	2066.75	2064.96	1.79	2.17	0.05	17.83	6574.39	155.77
Reach 2 1066.50	0.5	500 YR	2066.25	2064.52	1.72	0.40	0.28	1407.85	12828.40	6599.76
Reach 2 1055.76	0.5	100 YR	2065.20	2063.66	1.54	0.67	0.01	582.46	10304.17	4158.38
Reach 2 1042.31	0.5	50 YR	2064.64	2063.18	1.46	0.64	0.01	275.63	9085.08	3092.29
Reach 2 450.61	0.5	10 YR	2062.88	2061.27	1.61	0.82	0.00		6216.93	802.07
Reach 2 987.75	0.47	500 YR	2065.33	2064.55	0.78	0.44	0.60	209.59	10786.13	9840.28
Reach 2 793.42	0.47	100 YR	2063.32	2061.65	1.66	0.85	0.27		9944.88	5100.13
Reach 2 790.59	0.47	50 YR	2062.72	2061.18	1.54	0.90	0.28		8692.91	3760.09
Reach 2 423.12	0.47	10 YR	2060.99	2059.39	1.60	0.89	0.11		5921.78	1097.22
Reach 2 218.34	0.42	500 YR	2064.29	2061.49	2.80			388.72	19904.05	543.23
Reach 2 205.80	0.42	100 YR	2061.93	2059.37	2.56			220.07	14494.95	329.98
Reach 2	0.42	50 YR	2060.79	2058.33	2.46			157.23	12047.56	248.21

199.64								
Reach 2	0.42	10 YR	2058.31	2056.93	1.38	69.54	6827.81	121.65
191.36								

```
                    HEC-RAS Version 3.1.3 May 2005
                     U.S. Army Corp of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California

          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: Duplicate Effective Floodway Model
Project File : Sol206Wa.prj
Run Date and Time: 9/7/2006 2:53:14 PM

Project in English units

Project Description:
DUPLICATE EFFECTIVE MODEL FOR SOLS WASH - Floodway
Wickenburg Downtown Flood
Hazard Mitigation Project

This model was originally prepared and used by
JEFuller as the Duplicate Effective Model for the Goldmine Villages CLOMR up to
and including cross section 1.12. The FCDMC added cross sections 1.30 through
1.59. The data for the additional sections came from the original HEC-2 model
prepared by Cella Barr (model: SOL206W.DAT). Elevations are NGVD 1929
datum.

(cwr
9/7/06)
****
****

SOLS WASH FLOODPLAIN DELINEATION,
MARICOPA COUNTY, ARIZONA
BY CELLA BARR ASSOCIATES FOR THE FLOOD CONTROL
DISTRICT OF MARICOPA COUNTY
100 YEAR DISCHARGE - R1 FLOODWAY
ANALYSIS

PLAN DATA

Plan Title: Duplicate Effective Floodway Plan
Plan File : q:\305020.02 CLOMR\HEC-RAS\Duplicate Effective FCD\Sol206Wa.p01

Geometry Title: Duplicate Effective Floodway Geometry
Geometry File : q:\305020.02 CLOMR\HEC-RAS\Duplicate Effective FCD\Sol206Wa.g02

Flow Title : Duplicate Effective Floodway Flow Data
Flow File : q:\305020.02 CLOMR\HEC-RAS\Duplicate Effective FCD\Sol206Wa.f01

Plan Summary Information:
Number of: Cross Sections = 18 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: Between every coordinate point (HEC2 Style)
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

Encroachment Data
Equal Conveyance = True
Left Offset = 0
Right Offset = 0

River = Sols Wash Reach = Reach 1

RS	Profile	Method	Value1	Value2
0.40	PF 2	1	9802.64	9945.45
0.36	PF 2	1	9870	10102
0.22	PF 2	1	9780	10170
0.13	PF 2	1	9500	10045
0.03	PF 2	1	8730	10682

River = Sols Wash Reach = Reach 2

RS	Profile	Method	Value1	Value2
1.68	PF 2	1	9270	10360
1.59	PF 2	1	9050	10053
1.49	PF 2	1	9040	10124
1.4	PF 2	1	9140	10390
1.3	PF 2	1	9250	10370
1.12	PF 2	1	9315	10195
1	PF 2	1	9214	10075
0.9	PF 2	1	9380	10061
0.79	PF 2	1	9520	10060
0.69	PF 2	1	9640	10279
0.6	PF 2	1	9830	10545
0.5	PF 2	1	9870	10665
0.47	PF 2	1	9870	10470
0.42	PF 2	1	9784.33	9946.94

FLOW DATA

Flow Title: Duplicate Effective Floodway Flow Data
Flow File : q:\305020.02 CLOMR\HEC-RAS\Duplicate Effective FCD\Sol206Wa.f01

Flow Data (cfs)

River	Reach	RS	PF 1	PF 2
Sols Wash	Reach 1	0.40	15045	15045
Sols Wash	Reach 2	1.59	14413	14413
Sols Wash	Reach 2	1.12	14413	14413
Sols Wash	Reach 2	0.69	14413	14413
Sols Wash	Reach 2	0.6	14459	14459
Sols Wash	Reach 2	0.42	15045	15045

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Sols Wash	Reach 1	PF 1		Known WS = 2040.14
Sols Wash	Reach 1	PF 2		Known WS = 2040.7
Sols Wash	Reach 2	PF 1		Known WS = 2059.37
Sols Wash	Reach 2	PF 2		Known WS = 2059.37

GEOMETRY DATA

Geometry Title: Duplicate Effective Floodway Geometry
Geometry File : q:\305020.02 CLOMR\HEC-RAS\Duplicate Effective FCD\Sol206Wa.g02

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 1 RS: 0.40

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9546	2062.89	567.917	2063.99	627.305	2064.19	637.203	2063.29	667.604	2062.1
9689.521	2064.79	752.444	2064.79	776.482	2064.79	803.348	2051.89	830.214	2051.7
9866.978	2051.69	944.748	2050.69	961.716	2058.29	981.512	2065.21	0019.69	2065.2
10072.71	2065.81	0108.77	2066.4						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9546	.065	9803.348	.025	9944.748	.065

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9803.348	9944.748	250	170	105	.3	.5

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	2061.69	Element			
Vel Head (ft)	3.36	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2058.33	Reach Len. (ft)	250.00	170.00	105.00
Crit W.S. (ft)	2058.33	Flow Area (sq ft)	44.36	984.23	66.66
E.G. Slope (ft/ft)	0.004724	Area (sq ft)	44.36	984.23	66.66
Q Total (cfs)	15045.00	Flow (cfs)	143.11	14656.70	245.19
Top Width (ft)	172.32	Top Width (ft)	13.59	141.40	17.33
Vel Total (ft/s)	13.74	Avg. Vel. (ft/s)	3.23	14.89	3.68
Max Chl Dpth (ft)	7.73	Hydr. Depth (ft)	3.26	6.96	3.85
Conv. Total (cfs)	218906.2	Conv. (cfs)	2082.3	213256.3	3567.6

Length Wtd. (ft)	177.21	Wetted Per. (ft)	15.08	141.41	18.97
Min Ch El (ft)	2050.60	Shear (lb/sq ft)	0.87	2.05	1.04
Alpha	1.15	Stream Power (lb/ft s)	2.80	30.57	3.81
Frctn Loss (ft)	0.62	Cum Volume (acre-ft)	64.28	33.90	14.46
C & E Loss (ft)	0.64	Cum SA (acres)	28.45	5.16	3.07

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	2061.95				
Vel Head (ft)	3.46	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2058.48	Reach Len. (ft)	250.00	170.00	105.00
Crit W.S. (ft)	2058.43	Flow Area (sq ft)	4.61	1006.46	5.43
E.G. Slope (ft/ft)	0.004613	Area (sq ft)	4.61	1006.46	5.43
Q Total (cfs)	15045.00	Flow (cfs)	5.36	15033.32	6.32
Top Width (ft)	142.81	Top Width (ft)	0.71	141.40	0.70
Vel Total (ft/s)	14.80	Avg. Vel. (ft/s)	1.16	14.94	1.17
Max Chl Dpth (ft)	7.88	Hydr. Depth (ft)	6.51	7.12	7.73
Conv. Total (cfs)	221517.0	Conv. (cfs)	78.9	221345.1	93.1
Length Wtd. (ft)	174.90	Wetted Per. (ft)	7.13	141.41	8.34
Min Ch El (ft)	2050.60	Shear (lb/sq ft)	0.19	2.05	0.19
Alpha	1.02	Stream Power (lb/ft s)	0.22	30.62	0.22
Frctn Loss (ft)	0.68	Cum Volume (acre-ft)	31.68	34.74	14.99
C & E Loss (ft)	0.27	Cum SA (acres)	11.66	5.16	2.78

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 1 RS: 0.36

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9433	2055.2	9497	2055.8	9533	2055.7	9538	2056.5	9594	2056.4
9667	2056.1	9752	2056.8	9866	2056.8	9905	2057.5	9942	2053.3
9969	2049.2	9996	2048.4	10000	2048.4	10046	2049.4	10061	2054
10101	2060.9	10136	2066	10149	2065.8	10235	2066.8	10290	2066.6
10356	2066.3	10387	2066.2	10414	2072.8				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val

9433	1	9538	.065	9905	.025	10101	.065

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9969	10046	615	770	785	.3	.5

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	2060.32	Element			
Vel Head (ft)	2.07	Wt. n-Val.	0.046	0.025	0.025
W.S. Elev (ft)	2058.24	Reach Len. (ft)	615.00	770.00	785.00
Crit W.S. (ft)	2058.24	Flow Area (sq ft)	1175.26	724.09	150.32
E.G. Slope (ft/ft)	0.002688	Area (sq ft)	1175.26	724.09	150.32
Q Total (cfs)	15045.00	Flow (cfs)	3816.32	9939.11	1289.57
Top Width (ft)	652.60	Top Width (ft)	536.00	77.00	39.60
Vel Total (ft/s)	7.34	Avg. Vel. (ft/s)	3.25	13.73	8.58
Max Chl Dpth (ft)	9.84	Hydr. Depth (ft)	2.19	9.40	3.80
Conv. Total (cfs)	290186.8	Conv. (cfs)	73608.8	191704.8	24873.2
Length Wtd. (ft)	738.08	Wetted Per. (ft)	539.67	77.02	40.65
Min Ch El (ft)	2048.40	Shear (lb/sq ft)	0.37	1.58	0.62
Alpha	2.48	Stream Power (lb/ft s)	1.19	21.65	5.32
Frctn Loss (ft)	2.45	Cum Volume (acre-ft)	60.78	30.57	14.20
C & E Loss (ft)	0.07	Cum SA (acres)	26.87	4.73	3.00

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	2061.00	Element			
Vel Head (ft)	2.92	Wt. n-Val.	0.026	0.025	0.025
W.S. Elev (ft)	2058.07	Reach Len. (ft)	615.00	770.00	785.00
Crit W.S. (ft)	2058.07	Flow Area (sq ft)	314.17	711.03	143.68
E.G. Slope (ft/ft)	0.003336	Area (sq ft)	314.17	711.03	143.68
Q Total (cfs)	15045.00	Flow (cfs)	2945.98	10741.59	1357.43
Top Width (ft)	214.61	Top Width (ft)	99.00	77.00	38.61
Vel Total (ft/s)	12.87	Avg. Vel. (ft/s)	9.38	15.11	9.45
Max Chl Dpth (ft)	9.67	Hydr. Depth (ft)	3.17	9.23	3.72
Conv. Total (cfs)	260481.6	Conv. (cfs)	51005.2	185974.5	23501.8
Length Wtd. (ft)	753.34	Wetted Per. (ft)	100.75	77.02	39.65
Min Ch El (ft)	2048.40	Shear (lb/sq ft)	0.65	1.92	0.75
Alpha	1.14	Stream Power (lb/ft s)	6.09	29.05	7.13
Frctn Loss (ft)	3.24	Cum Volume (acre-ft)	30.77	31.39	14.81
C & E Loss (ft)	0.03	Cum SA (acres)	11.37	4.73	2.73

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 1 RS: 0.22

INPUT
Description:
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9433	2050.5	9473	2049.6	9508	2049.7	9516	2050.4	9590	2050.4
9669	2050.4	9726	2051.5	9799	2051.3	9899	2051	9938	2044.6
9963	2043	10000	2043	10019	2043	10037	2058.4	10170	2059.3
10292	2060.6	10331	2061.6	10381	2061.4	10430	2057.8	10485	2056.9
10541	2056.4	10573	2058.5	10625	2060.4	10628	2063.4	10671	2063.4
10732	2062	10788	2061.7						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9433	.065	9963	.025	10037	.065

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9899	10019	465	500	515	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2054.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.92	Wt. n-Val.	0.065	0.032	0.025
W.S. Elev (ft)	2052.85	Reach Len. (ft)	465.00	500.00	515.00
Crit W.S. (ft)	2052.85	Flow Area (sq ft)	1004.66	974.61	56.68
E.G. Slope (ft/ft)	0.004204	Area (sq ft)	1004.66	974.61	56.68
Q Total (cfs)	15045.00	Flow (cfs)	2556.71	11961.75	526.54
Top Width (ft)	597.51	Top Width (ft)	466.00	120.00	11.51
Vel Total (ft/s)	7.39	Avg. Vel. (ft/s)	2.54	12.27	9.29
Max Chl Dpth (ft)	9.85	Hydr. Depth (ft)	2.16	8.12	4.92
Conv. Total (cfs)	232027.3	Conv. (cfs)	39430.2	184476.8	8120.3
Length Wtd. (ft)	488.53	Wetted Per. (ft)	468.40	120.57	15.15
Min Ch El (ft)	2043.00	Shear (lb/sq ft)	0.56	2.12	0.98
Alpha	2.27	Stream Power (lb/ft s)	1.43	26.04	9.12
Frctn Loss (ft)	2.27	Cum Volume (acre-ft)	45.39	15.56	12.33
C & E Loss (ft)	0.07	Cum SA (acres)	19.80	2.99	2.54

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2055.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.03	Wt. n-Val.	0.065	0.032	0.025
W.S. Elev (ft)	2052.84	Reach Len. (ft)	465.00	500.00	515.00
Crit W.S. (ft)	2052.84	Flow Area (sq ft)	197.92	973.76	56.60
E.G. Slope (ft/ft)	0.005736	Area (sq ft)	197.92	973.76	56.60
Q Total (cfs)	15045.00	Flow (cfs)	478.19	13953.03	613.78
Top Width (ft)	250.50	Top Width (ft)	119.00	120.00	11.50
Vel Total (ft/s)	12.25	Avg. Vel. (ft/s)	2.42	14.33	10.84

Max Chl Dpth (ft)	9.84	Hydr. Depth (ft)	1.66	8.11	4.92
Conv. Total (cfs)	198654.4	Conv. (cfs)	6314.0	184236.0	8104.4
Length Wtd. (ft)	491.34	Wetted Per. (ft)	120.49	120.57	15.14
Min Ch El (ft)	2043.00	Shear (lb/sq ft)	0.59	2.89	1.34
Alpha	1.30	Stream Power (lb/ft s)	1.42	41.44	14.52
Frctn Loss (ft)	2.65	Cum Volume (acre-ft)	27.15	16.50	13.00
C & E Loss (ft)	0.35	Cum SA (acres)	9.83	2.99	2.28

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 1 RS: 0.13

INPUT
Description:
Station Elevation Data num= 42

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8515	2048	8945	2046.2	9041	2045.2	9141	2044.3	9248	2043.7
9284	2044.5	9293	2044.8	9299	2046.3	9312	2046.6	9326	2043.8
9402	2042.7	9419	2044.3	9438	2042.8	9459	2045	9519	2044.4
9587	2044.3	9635	2043.5	9692	2044	9724	2043.7	9748	2042.7
9813	2043.1	9869	2043.4	9928	2042.9	9963	2040	10000	2040
10026	2040	10044	2046.4	10064	2047.6	10126	2047.6	10200	2047.4
10225	2049.2	10307	2049.8	10380	2049.4	10442	2047.5	10486	2047.5
10519	2051.3	10579	2052.4	10643	2052.9	10712	2052	10770	2050.7
10831	2049.6	10935	2048.3						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8515	1	9438	.065	9963	.025	10044	.065

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9963	10044	500	505	560	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2048.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.69	Wt. n-Val.	0.100	0.025	0.065
W.S. Elev (ft)	2047.08	Reach Len. (ft)	500.00	505.00	560.00
Crit W.S. (ft)	2047.08	Flow Area (sq ft)	3231.74	516.08	3.88
E.G. Slope (ft/ft)	0.005174	Area (sq ft)	3231.74	516.08	3.88
Q Total (cfs)	15045.00	Flow (cfs)	7526.98	7514.91	3.11
Top Width (ft)	1321.21	Top Width (ft)	1228.83	81.00	11.38
Vel Total (ft/s)	4.01	Avg. Vel. (ft/s)	2.33	14.56	0.80
Max Chl Dpth (ft)	7.08	Hydr. Depth (ft)	2.63	6.37	0.34
Conv. Total (cfs)	209161.4	Conv. (cfs)	104643.0	104475.1	43.3
Length Wtd. (ft)	518.72	Wetted Per. (ft)	1229.74	82.10	11.40
Min Ch El (ft)	2040.00	Shear (lb/sq ft)	0.85	2.03	0.11
Alpha	6.75	Stream Power (lb/ft s)	1.98	29.56	0.09

Frctn Loss (ft)	2.37	Cum Volume (acre-ft)	22.78	7.00	11.97
C & E Loss (ft)	0.35	Cum SA (acres)	10.75	1.84	2.40

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2049.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.87	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2047.27	Reach Len. (ft)	500.00	505.00	560.00
Crit W.S. (ft)	2047.27	Flow Area (sq ft)	1777.95	531.48	0.84
E.G. Slope (ft/ft)	0.005071	Area (sq ft)	1777.95	531.48	0.84
Q Total (cfs)	15045.00	Flow (cfs)	7230.67	7813.51	0.82
Top Width (ft)	545.00	Top Width (ft)	463.00	81.00	1.00
Vel Total (ft/s)	6.51	Avg. Vel. (ft/s)	4.07	14.70	0.98
Max Chl Dpth (ft)	7.27	Hydr. Depth (ft)	3.84	6.56	0.84
Conv. Total (cfs)	211268.9	Conv. (cfs)	101536.5	109720.9	11.6
Length Wtd. (ft)	516.95	Wetted Per. (ft)	465.84	82.10	1.81
Min Ch El (ft)	2040.00	Shear (lb/sq ft)	1.21	2.05	0.15
Alpha	2.83	Stream Power (lb/ft s)	4.91	30.13	0.14
Frctn Loss (ft)	1.82	Cum Volume (acre-ft)	16.61	7.86	12.67
C & E Loss (ft)	0.44	Cum SA (acres)	6.73	1.84	2.20

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 1 RS: 0.03

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8655	2044.5	8730	2044.4	8842	2043.7	8943	2043.3	9054	2042.6
9168	2041.8	9308	2041.3	9395	2040.7	9476	2040	9661	2039.5
9840	2038.7	10000	2038.2	10104	2038.1	10183	2037.4	10258	2037.1
10340	2036.2	10440	2036.2	10571	2034.8	10593	2033.5	10682	2032.3
10722	2047.5								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8655	1	9476	.065	10104	.025	10340	.065

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
10104	10340	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	2040.65	Element			
Vel Head (ft)	0.51	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2040.14	Reach Len. (ft)			
Crit W.S. (ft)	2038.54	Flow Area (sq ft)	736.83	691.75	1858.86
E.G. Slope (ft/ft)	0.004054	Area (sq ft)	736.83	691.75	1858.86
Q Total (cfs)	15045.00	Flow (cfs)	1369.37	5361.84	8313.79
Top Width (ft)	1242.84	Top Width (ft)	644.20	236.00	362.63
Vel Total (ft/s)	4.58	Avg. Vel. (ft/s)	1.86	7.75	4.47
Max Chl Dpth (ft)	7.84	Hydr. Depth (ft)	1.14	2.93	5.13
Conv. Total (cfs)	236279.6	Conv. (cfs)	21505.7	84207.0	130566.9
Length Wtd. (ft)		Wetted Per. (ft)	644.21	236.01	364.13
Min Ch El (ft)	2036.20	Shear (lb/sq ft)	0.29	0.74	1.29
Alpha	1.57	Stream Power (lb/ft s)	0.54	5.75	5.78
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	2041.10	Element			
Vel Head (ft)	0.40	Wt. n-Val.	0.066	0.025	0.065
W.S. Elev (ft)	2040.70	Reach Len. (ft)			
Crit W.S. (ft)	2038.59	Flow Area (sq ft)	1115.68	823.89	1969.49
E.G. Slope (ft/ft)	0.002582	Area (sq ft)	1115.68	823.89	1969.49
Q Total (cfs)	15045.00	Flow (cfs)	1946.60	5726.60	7371.81
Top Width (ft)	1287.00	Top Width (ft)	709.00	236.00	342.00
Vel Total (ft/s)	3.85	Avg. Vel. (ft/s)	1.74	6.95	3.74
Max Chl Dpth (ft)	8.40	Hydr. Depth (ft)	1.57	3.49	5.76
Conv. Total (cfs)	296061.6	Conv. (cfs)	38305.9	112690.3	145065.4
Length Wtd. (ft)		Wetted Per. (ft)	709.01	236.01	350.45
Min Ch El (ft)	2036.20	Shear (lb/sq ft)	0.25	0.56	0.91
Alpha	1.73	Stream Power (lb/ft s)	0.44	3.91	3.39
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 1.59

INPUT
Description:
Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8975	2130.5	9042	2109.6	9061	2107.2	9065	2107.2	9085	2109.7
9109	2109.9	9125	2109.1	9142	2109.8	9158	2107.3	9220	2107.3
9240	2109.5	9262	2110.5	9326	2110.5	9381	2110	9425	2109.7
9482	2109.6	9561	2109.3	9625	2108.5	9665	2108.4	9695	2109.1
9705	2108.6	9714	2109.1	9725	2107.9	9733	2108.6	9740	2108.345
9755	2107.8	9788	2107.7	9811	2108.5	9836	2108.5	9849	2107.9

98502	2107.936	9885	2109.2	9929	2109.6	9943	2107.2	10000	2107.2
10033	2107.2	10055	2109.9	10110	2110	10158	2109.4	10178	2110.7
10218	2111.4	10245	2113	10275	2114.5	10300	2118	10345	2120
10370	2122.8								

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8975	.06	9158	.025	9220	.05	9740	.04	9850	.06
9943	.025	10033	.05						

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9943	10033	490	490	540	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	2112.01	Element			
Vel Head (ft)	0.98	Wt. n-Val.	0.042	0.025	0.050
W.S. Elev (ft)	2111.03	Reach Len. (ft)	490.00	490.00	540.00
Crit W.S. (ft)	2111.03	Flow Area (sq ft)	1815.29	344.77	200.65
E.G. Slope (ft/ft)	0.007120	Area (sq ft)	1815.29	344.77	200.65
Q Total (cfs)	14413.00	Flow (cfs)	9528.32	4233.46	651.22
Top Width (ft)	1159.49	Top Width (ft)	905.59	90.00	163.90
Vel Total (ft/s)	6.11	Avg. Vel. (ft/s)	5.25	12.28	3.25
Max Chl Dpth (ft)	3.83	Hydr. Depth (ft)	2.00	3.83	1.22
Conv. Total (cfs)	170807.7	Conv. (cfs)	112919.5	50170.5	7717.6
Length Wtd. (ft)	495.92	Wetted Per. (ft)	906.89	90.00	164.12
Min Ch El (ft)	2107.20	Shear (lb/sq ft)	0.89	1.70	0.54
Alpha	1.69	Stream Power (lb/ft s)	4.67	20.91	1.76
Frctn Loss (ft)	3.38	Cum Volume (acre-ft)	173.07	85.80	74.12
C & E Loss (ft)	0.02	Cum SA (acres)	113.87	17.06	33.76

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	2112.11	Element			
Vel Head (ft)	1.06	Wt. n-Val.	0.042	0.025	0.050
W.S. Elev (ft)	2111.05	Reach Len. (ft)	490.00	490.00	540.00
Crit W.S. (ft)	2111.05	Flow Area (sq ft)	1812.88	346.42	52.44
E.G. Slope (ft/ft)	0.007458	Area (sq ft)	1812.88	346.42	52.44
Q Total (cfs)	14413.00	Flow (cfs)	9802.12	4367.37	243.51
Top Width (ft)	1003.00	Top Width (ft)	893.00	90.00	20.00
Vel Total (ft/s)	6.52	Avg. Vel. (ft/s)	5.41	12.61	4.64
Max Chl Dpth (ft)	3.85	Hydr. Depth (ft)	2.03	3.85	2.62
Conv. Total (cfs)	166891.6	Conv. (cfs)	113501.2	50570.9	2819.6
Length Wtd. (ft)	491.47	Wetted Per. (ft)	896.49	90.00	21.54
Min Ch El (ft)	2107.20	Shear (lb/sq ft)	0.94	1.79	1.13
Alpha	1.61	Stream Power (lb/ft s)	5.09	22.59	5.26
Frctn Loss (ft)	3.32	Cum Volume (acre-ft)	118.67	88.12	64.44
C & E Loss (ft)	0.00	Cum SA (acres)	71.75	17.06	26.66

Warning: The energy equation could not be balanced within the specified number of iterations. The

program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 1.49

INPUT
Description:
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8960	2120.5	8998	2112	9028	2102.1	9097	2102.2	9100	2102.6
9115	2104.6	9156	2106.1	9202	2105.3	9264	2106	9350	2106.1
9415	2104.6	9448	2105.7	9505	2105.9	9538	2104.9	9564	2104.4
9585	2105.3	9621	2104.5	9658	2103.8	9688	2105.5	9714	2104.5
9735	2103.3	9746	2101.5	9762	2101.6	9774	2104	9790	2104.5
9815	2103.5	9820	2104.4	9857	2103.7	9891	2104.2	9930	2103.4
9945	2102.2	9975	2101.8	10000	2102.3	10043	2102.8	10059	2103.7
10115	2104.3	10159	2103.4	10205	2104.1	10247	2104.7	10265	2105.7
10295	2103.7	10359	2104.3	10396	2104.5	10411	2104.3	10421	2104.9
10465	2102.4	10486	2104.9	10508	2111	10519	2112	10530	2112

Manning's n Values num= 8

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8960	.06	9028	.025	9100	.05	9350	.055	9746	.02
9762	.05	9930	.025	10059	.05				

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9930	10059	500	500	490	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2106.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.92	Wt. n-Val.	0.035	0.025	0.050
W.S. Elev (ft)	2105.89	Reach Len. (ft)	500.00	500.00	490.00
Crit W.S. (ft)	2105.89	Flow Area (sq ft)	1151.51	444.42	761.83
E.G. Slope (ft/ft)	0.006541	Area (sq ft)	1151.51	444.42	761.83
Q Total (cfs)	14413.00	Flow (cfs)	6782.47	4871.08	2759.45
Top Width (ft)	1345.20	Top Width (ft)	785.64	129.00	430.56
Vel Total (ft/s)	6.11	Avg. Vel. (ft/s)	5.89	10.96	3.62
Max Chl Dpth (ft)	4.39	Hydr. Depth (ft)	1.47	3.45	1.77
Conv. Total (cfs)	178208.4	Conv. (cfs)	83861.3	60228.1	34119.0
Length Wtd. (ft)	498.08	Wetted Per. (ft)	787.14	129.08	431.05
Min Ch El (ft)	2101.80	Shear (lb/sq ft)	0.60	1.41	0.72
Alpha	1.59	Stream Power (lb/ft s)	3.52	15.41	2.61
Frctn Loss (ft)	3.20	Cum Volume (acre-ft)	156.38	81.36	68.15
C & E Loss (ft)	0.01	Cum SA (acres)	104.36	15.82	30.07

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2107.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.10	Wt. n-Val.	0.037	0.025	0.050
W.S. Elev (ft)	2106.34	Reach Len. (ft)	500.00	500.00	490.00
Crit W.S. (ft)	2106.34	Flow Area (sq ft)	1472.73	503.25	150.38
E.G. Slope (ft/ft)	0.006145	Area (sq ft)	1472.73	503.25	150.38
Q Total (cfs)	14413.00	Flow (cfs)	8001.69	5808.37	602.94
Top Width (ft)	1084.00	Top Width (ft)	890.00	129.00	65.00
Vel Total (ft/s)	6.78	Avg. Vel. (ft/s)	5.43	11.54	4.01
Max Chl Dpth (ft)	4.84	Hydr. Depth (ft)	1.65	3.90	2.31
Conv. Total (cfs)	183858.7	Conv. (cfs)	102073.1	74094.2	7691.4
Length Wtd. (ft)	498.81	Wetted Per. (ft)	895.13	129.08	67.23
Min Ch El (ft)	2101.80	Shear (lb/sq ft)	0.63	1.50	0.86
Alpha	1.54	Stream Power (lb/ft s)	3.43	17.26	3.44
Frctn Loss (ft)	3.10	Cum Volume (acre-ft)	100.19	83.35	63.19
C & E Loss (ft)	0.02	Cum SA (acres)	61.72	15.83	26.13

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 1.4

INPUT
Description:
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9030	2120	9060	2110.6	9096	2106.4	9139	2097.2	9145	2096.488
9155	2095.3	9168	2095.5	9181	2100	9200	2097.2	9219	2098.8
9225	2098.7	9277	2098	9280	2098.471	9298	2101.3	9343	2101.5
9415	2100.1	9435	2101	9477	2100.7	9500	2100.379	9520	2100.1
9563	2100.9	9611	2100.5	9665	2100.7	9760	2100.8	9812	2100.3
9866	2099.1	9902	2100.5	9935	2096.9	9965	2096.9	9992	2098
10000	2098	10065	2097.8	10091	2098	10116	2099.7	10147	2096.7
10162	2098.9	10190	2099.4	10215	2099.3	10248	2099.8	10271	2098.7
10288	2099.3	10301	2097.8	10345	2097.4	10352	2099.9	10384	2101
10406	2101.1	10442	2101.7	10465	2105.1	10470	2106.1		

Manning's n Values num= 8

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9030	.06	9145	.025	9168	.06	9200	.025	9280	.04
9500	.055	9902	.025	10091	.05				

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9902	10091	500	500	435	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2102.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.01	Wt. n-Val.	0.032	0.025	0.050
W.S. Elev (ft)	2101.09	Reach Len. (ft)	500.00	500.00	435.00
Crit W.S. (ft)	2101.09	Flow Area (sq ft)	847.87	616.96	644.97
E.G. Slope (ft/ft)	0.006315	Area (sq ft)	847.87	616.96	644.97
Q Total (cfs)	14413.00	Flow (cfs)	5223.74	6407.75	2781.51
Top Width (ft)	1214.19	Top Width (ft)	713.46	189.00	311.73
Vel Total (ft/s)	6.83	Avg. Vel. (ft/s)	6.16	10.39	4.31
Max Chl Dpth (ft)	5.79	Hydr. Depth (ft)	1.19	3.26	2.07
Conv. Total (cfs)	181364.5	Conv. (cfs)	65732.4	80631.3	35000.8
Length Wtd. (ft)	485.69	Wetted Per. (ft)	715.35	189.22	312.68
Min Ch El (ft)	2096.90	Shear (lb/sq ft)	0.47	1.29	0.81
Alpha	1.40	Stream Power (lb/ft s)	2.88	13.35	3.51
Frctn Loss (ft)	2.47	Cum Volume (acre-ft)	144.91	75.27	60.24
C & E Loss (ft)	0.03	Cum SA (acres)	95.76	14.00	25.90

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2102.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.03	Wt. n-Val.	0.032	0.025	0.050
W.S. Elev (ft)	2101.11	Reach Len. (ft)	500.00	500.00	435.00
Crit W.S. (ft)	2101.11	Flow Area (sq ft)	824.09	621.16	651.24
E.G. Slope (ft/ft)	0.006287	Area (sq ft)	824.09	621.16	651.24
Q Total (cfs)	14413.00	Flow (cfs)	5129.22	6466.03	2817.76
Top Width (ft)	1183.58	Top Width (ft)	695.58	189.00	299.00
Vel Total (ft/s)	6.87	Avg. Vel. (ft/s)	6.22	10.41	4.33
Max Chl Dpth (ft)	5.81	Hydr. Depth (ft)	1.18	3.29	2.18
Conv. Total (cfs)	181773.3	Conv. (cfs)	64688.4	81548.0	35536.9
Length Wtd. (ft)	485.63	Wetted Per. (ft)	701.08	189.22	300.03
Min Ch El (ft)	2096.90	Shear (lb/sq ft)	0.46	1.29	0.85
Alpha	1.40	Stream Power (lb/ft s)	2.87	13.41	3.69
Frctn Loss (ft)	2.47	Cum Volume (acre-ft)	87.01	76.89	58.68
C & E Loss (ft)	0.03	Cum SA (acres)	52.62	14.00	24.09

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 1.3

INPUT
Description:
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9183	2112.5	9217	2098.6	9260	2094.1	9272	2091.3	9303	2091.3
9322	2094.2	9341	2095.4	9398	2097.8	9458	2096.7	9545	2095.7
9550	2096.05	9565	2097.1	9593	2096.4	9614	2097.4	9653	2096.8
9725	2096.8	9777	2097.1	9816	2096.5	9882	2096.7	9923	2096.9
9935	2092.2	9967	2092.2	10000	2092.9	10055	2093.4	10079	2095.3
10095	2095.8	10116	2094.6	10161	2094.2	10175	2095	10228	2094
10265	2092.6	10311	2092.3	10324	2095	10338	2095.2	10355	2094.2
10385	2096.8	10424	2098.3	10493	2098.1	10511	2101.1	10521	2101.3
10530	2101.3								

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9183	.06	9272	.025	9303	.045	9550	.065	9923	.02
10079	.05								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9923	10079	935	935	885	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	2098.40	Element			
Vel Head (ft)	1.32	Wt. n-Val.	0.034	0.020	0.050
W.S. Elev (ft)	2097.08	Reach Len. (ft)	935.00	935.00	885.00
Crit W.S. (ft)	2097.08	Flow Area (sq ft)	626.00	617.93	870.52
E.G. Slope (ft/ft)	0.004169	Area (sq ft)	626.00	617.93	870.52
Q Total (cfs)	14413.00	Flow (cfs)	3456.48	7390.32	3566.21
Top Width (ft)	1071.74	Top Width (ft)	602.43	156.00	313.32
Vel Total (ft/s)	6.82	Avg. Vel. (ft/s)	5.52	11.96	4.10
Max Chl Dpth (ft)	5.78	Hydr. Depth (ft)	1.04	3.96	2.78
Conv. Total (cfs)	223224.4	Conv. (cfs)	53533.0	114459.1	55232.4
Length Wtd. (ft)	927.32	Wetted Per. (ft)	603.29	156.97	313.85
Min Ch El (ft)	2092.20	Shear (lb/sq ft)	0.27	1.02	0.72
Alpha	1.83	Stream Power (lb/ft s)	1.49	12.25	2.96
Frctn Loss (ft)	4.06	Cum Volume (acre-ft)	136.45	68.18	52.67
C & E Loss (ft)	0.01	Cum SA (acres)	88.20	12.02	22.78

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	2098.42	Element			
Vel Head (ft)	1.34	Wt. n-Val.	0.034	0.020	0.050
W.S. Elev (ft)	2097.08	Reach Len. (ft)	935.00	935.00	885.00
Crit W.S. (ft)	2097.08	Flow Area (sq ft)	606.97	617.63	854.95
E.G. Slope (ft/ft)	0.004204	Area (sq ft)	606.97	617.63	854.95
Q Total (cfs)	14413.00	Flow (cfs)	3442.29	7414.91	3555.80
Top Width (ft)	1030.05	Top Width (ft)	583.04	156.00	291.00
Vel Total (ft/s)	6.93	Avg. Vel. (ft/s)	5.67	12.01	4.16
Max Chl Dpth (ft)	5.78	Hydr. Depth (ft)	1.04	3.96	2.94

Conv. Total (cfs)	222301.1	Conv. (cfs)	53092.6	114365.0	54843.4
Length Wtd. (ft)	927.33	Wetted Per. (ft)	585.74	156.97	293.05
Min Ch El (ft)	2092.20	Shear (lb/sq ft)	0.27	1.03	0.77
Alpha	1.79	Stream Power (lb/ft s)	1.54	12.40	3.18
Frctn Loss (ft)	4.07	Cum Volume (acre-ft)	78.79	69.78	51.16
C & E Loss (ft)	0.01	Cum SA (acres)	45.28	12.02	21.14

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 1.12

INPUT
Description:
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9227	2092.5	9301	2092.6	9331	2083.3	9392	2082.2	9437	2087.5
9549	2088	9693	2087.7	9798	2087.2	9872	2086.6	9897	2086.4
9926	2087.3	9949	2083.4	9970	2082.3	10000	2082.5	10035	2083.4
10062	2084.9	10084	2086.4	10118	2086.1	10129	2086.6	10157	2086.6
10164	2086.2	10180	2085.1	10185	2085.1	10205	2091.9		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9227	.06	9331	.025	9392	.06	9949	.025	10062	.06

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9949	10062	615	620	630	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2089.82	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.43	Wt. n-Val.	0.035	0.025	0.060
W.S. Elev (ft)	2088.39	Reach Len. (ft)	615.00	620.00	630.00
Crit W.S. (ft)	2088.39	Flow Area (sq ft)	1064.99	600.86	295.66
E.G. Slope (ft/ft)	0.004597	Area (sq ft)	1064.99	600.86	295.66
Q Total (cfs)	14413.00	Flow (cfs)	6177.47	7372.67	862.87
Top Width (ft)	880.09	Top Width (ft)	634.42	113.00	132.67
Vel Total (ft/s)	7.35	Avg. Vel. (ft/s)	5.80	12.27	2.92
Max Chl Dpth (ft)	6.19	Hydr. Depth (ft)	1.68	5.32	2.23
Conv. Total (cfs)	212588.2	Conv. (cfs)	91116.1	108745.0	12727.1
Length Wtd. (ft)	617.95	Wetted Per. (ft)	635.86	113.08	133.33
Min Ch El (ft)	2082.30	Shear (lb/sq ft)	0.48	1.52	0.64
Alpha	1.70	Stream Power (lb/ft s)	2.79	18.71	1.86
Frctn Loss (ft)	2.84	Cum Volume (acre-ft)	118.30	55.10	40.83
C & E Loss (ft)	0.05	Cum SA (acres)	74.93	9.13	18.24

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2089.82	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.42	Wt. n-Val.	0.035	0.025	0.060
W.S. Elev (ft)	2088.39	Reach Len. (ft)	615.00	620.00	630.00
Crit W.S. (ft)	2088.39	Flow Area (sq ft)	1067.13	601.24	296.11
E.G. Slope (ft/ft)	0.004583	Area (sq ft)	1067.13	601.24	296.11
Q Total (cfs)	14413.00	Flow (cfs)	6179.96	7369.37	863.68
Top Width (ft)	879.68	Top Width (ft)	634.00	113.00	132.68
Vel Total (ft/s)	7.34	Avg. Vel. (ft/s)	5.79	12.26	2.92
Max Chl Dpth (ft)	6.19	Hydr. Depth (ft)	1.68	5.32	2.23
Conv. Total (cfs)	212911.4	Conv. (cfs)	91291.4	108861.6	12758.4
Length Wtd. (ft)	618.02	Wetted Per. (ft)	635.55	113.08	133.34
Min Ch El (ft)	2082.30	Shear (lb/sq ft)	0.48	1.52	0.64
Alpha	1.70	Stream Power (lb/ft s)	2.78	18.64	1.85
Frctn Loss (ft)	2.99	Cum Volume (acre-ft)	60.83	56.70	39.46
C & E Loss (ft)	0.02	Cum SA (acres)	32.22	9.13	16.84

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 1

INPUT
Description:
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8262	2097.2	8292	2089.4	8319	2086.6	8354	2084	8410	2083
8469	2082.8	8481	2083.3	8516	2082.6	8539	2081.7	8544	2082.3
8574	2081.7	8603	2082.5	8648	2082.7	8671	2082.1	8710	2082.8
8757	2083.1	8837	2083.5	8898	2083.9	8967	2084.1	9018	2083.6
9059	2083.4	9113	2082.8	9135	2082.2	9154	2082.2	9174	2082.9
9214	2082.5	9234	2083.2	9257	2077.8	9274	2076.6	9302	2076.6
9314	2078.6	9340	2079	9371	2082.7	9387	2083	9429	2083.4
9586	2083.1	9682	2083.1	9776	2083.4	9814	2082.7	9831	2083.6
9884	2083.2	9916	2081.6	9944	2078.9	9957	2078.3	10000	2078.1
10033	2078.1	10050	2082.1	10059	2082.6	10075	2087.1		

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8262	1	8603	.065	9274	.025	9310	.065	9944	.025
10050	.065								

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

9944 10050 570 560 565 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2085.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.25	Wt. n-Val.	0.049	0.025	0.065
W.S. Elev (ft)	2083.87	Reach Len. (ft)	570.00	560.00	565.00
Crit W.S. (ft)	2083.87	Flow Area (sq ft)	1930.17	567.24	16.60
E.G. Slope (ft/ft)	0.004603	Area (sq ft)	1930.17	567.24	16.60
Q Total (cfs)	14413.00	Flow (cfs)	7404.83	6976.80	31.37
Top Width (ft)	1606.47	Top Width (ft)	1486.94	106.00	13.53
Vel Total (ft/s)	5.73	Avg. Vel. (ft/s)	3.84	12.30	1.89
Max Chl Dpth (ft)	7.27	Hydr. Depth (ft)	1.30	5.35	1.23
Conv. Total (cfs)	212449.0	Conv. (cfs)	109147.9	102838.8	462.4
Length Wtd. (ft)	565.75	Wetted Per. (ft)	1488.36	106.48	13.72
Min Ch El (ft)	2078.10	Shear (lb/sq ft)	0.37	1.53	0.35
Alpha	2.46	Stream Power (lb/ft s)	1.43	18.83	0.66
Frctn Loss (ft)	3.24	Cum Volume (acre-ft)	97.16	46.79	38.57
C & E Loss (ft)	0.06	Cum SA (acres)	59.95	7.57	17.19

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2085.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.59	Wt. n-Val.	0.042	0.025	0.065
W.S. Elev (ft)	2083.88	Reach Len. (ft)	570.00	560.00	565.00
Crit W.S. (ft)	2083.88	Flow Area (sq ft)	1210.78	567.47	16.63
E.G. Slope (ft/ft)	0.005123	Area (sq ft)	1210.78	567.47	16.63
Q Total (cfs)	14413.00	Flow (cfs)	7014.42	7365.40	33.18
Top Width (ft)	849.54	Top Width (ft)	730.00	106.00	13.54
Vel Total (ft/s)	8.03	Avg. Vel. (ft/s)	5.79	12.98	2.00
Max Chl Dpth (ft)	7.28	Hydr. Depth (ft)	1.66	5.35	1.23
Conv. Total (cfs)	201378.1	Conv. (cfs)	98005.3	102909.2	463.6
Length Wtd. (ft)	565.37	Wetted Per. (ft)	732.65	106.48	13.73
Min Ch El (ft)	2078.10	Shear (lb/sq ft)	0.53	1.70	0.39
Alpha	1.59	Stream Power (lb/ft s)	3.06	22.12	0.77
Frctn Loss (ft)	3.26	Cum Volume (acre-ft)	44.75	48.38	37.20
C & E Loss (ft)	0.10	Cum SA (acres)	22.59	7.58	15.78

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 0.9

INPUT
Description:
Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8508	2090.8	8563	2083.3	8590	2084.6	8614	2084.2	8638	2083.6
8672	2079.1	8719	2079.1	8769	2077.5	8800	2075.4	8815	2072.8
8824	2072.8	8849	2077	8898	2077.2	8966	2077.4	9029	2077.5
9093	2077.8	9156	2078.3	9229	2078.6	9290	2078.7	9365	2078.4
9435	2078.3	9457	2075.2	9474	2074.3	9500	2071.1	9520	2071.1
9540	2075.7	9562	2077.8	9595	2078.6	9615	2077.9	9640	2078.4
9668	2077.7	9688	2078.5	9793	2078	9808	2077.2	9828	2074.5
9843	2077	9917	2078.6	9958	2077.7	9976	2073.5	10000	2073.1
10050	2073.1	10060	2078	10080	2083				

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8508	1	8769	.065	9475	.025	9520	.065	9958	.025
10045	.065								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9958	10060	540	565	575	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2079.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.05	Wt. n-Val.	0.042	0.033	0.065
W.S. Elev (ft)	2078.58	Reach Len. (ft)	540.00	565.00	575.00
Crit W.S. (ft)	2078.55	Flow Area (sq ft)	1472.90	484.31	0.67
E.G. Slope (ft/ft)	0.007306	Area (sq ft)	1472.90	484.31	0.67
Q Total (cfs)	14413.00	Flow (cfs)	9156.54	5255.91	0.56
Top Width (ft)	1225.64	Top Width (ft)	1121.34	102.00	2.31
Vel Total (ft/s)	7.36	Avg. Vel. (ft/s)	6.22	10.85	0.84
Max Chl Dpth (ft)	7.48	Hydr. Depth (ft)	1.31	4.75	0.29
Conv. Total (cfs)	168616.4	Conv. (cfs)	107121.5	61488.4	6.5
Length Wtd. (ft)	550.64	Wetted Per. (ft)	1123.55	103.62	2.38
Min Ch El (ft)	2073.10	Shear (lb/sq ft)	0.60	2.13	0.13
Alpha	1.25	Stream Power (lb/ft s)	3.72	23.14	0.11
Frctn Loss (ft)	3.17	Cum Volume (acre-ft)	74.89	40.03	38.46
C & E Loss (ft)	0.04	Cum SA (acres)	42.89	6.24	17.09

Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2080.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.27	Wt. n-Val.	0.038	0.033	0.065
W.S. Elev (ft)	2079.13	Reach Len. (ft)	540.00	565.00	575.00
Crit W.S. (ft)	2078.98	Flow Area (sq ft)	1155.75	540.19	1.00
E.G. Slope (ft/ft)	0.006530	Area (sq ft)	1155.75	540.19	1.00
Q Total (cfs)	14413.00	Flow (cfs)	8451.35	5960.45	1.20
Top Width (ft)	681.00	Top Width (ft)	578.00	102.00	1.00
Vel Total (ft/s)	8.49	Avg. Vel. (ft/s)	7.31	11.03	1.20
Max Chl Dpth (ft)	8.02	Hydr. Depth (ft)	2.00	5.30	1.00
Conv. Total (cfs)	178364.2	Conv. (cfs)	104587.4	73761.9	14.9

Length Wtd. (ft)	552.01	Wetted Per. (ft)	580.30	103.62	1.91
Min Ch El (ft)	2073.10	Shear (lb/sq ft)	0.81	2.13	0.21
Alpha	1.13	Stream Power (lb/ft s)	5.94	23.45	0.26
Frctn Loss (ft)	3.14	Cum Volume (acre-ft)	29.26	41.26	37.09
C & E Loss (ft)	0.07	Cum SA (acres)	14.03	6.24	15.69

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 0.79

INPUT
Description:
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8960	2080.6	8976	2078.3	9002	2077.7	9041	2074.7	9080	2068.4
9088	2068.5	9126	2073.4	9135	2073.2	9149	2073.2	9214	2074.3
9245	2074	9274	2074.5	9343	2074.1	9404	2074.4	9472	2074.6
9518	2074.3	9557	2068.2	9585	2067.7	9598	2074.4	9644	2073.6
9666	2068.6	9685	2073.7	9699	2073.9	9712	2072.6	9741	2074.2
9794	2074.6	9883	2075.2	9911	2073.9	9940	2070.3	9959	2068.9
10000	2068.9	10040	2068.9	10059	2077.1	10067	2078	10075	2078.2

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8960	.065	9550	.025	9590	.065	9959	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9959	10040	485	500	495	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2076.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.49	Wt. n-Val.	0.045	0.025	0.025
W.S. Elev (ft)	2074.92	Reach Len. (ft)	485.00	500.00	495.00
Crit W.S. (ft)	2074.92	Flow Area (sq ft)	1521.28	487.42	41.95
E.G. Slope (ft/ft)	0.004658	Area (sq ft)	1521.28	487.42	41.95
Q Total (cfs)	14413.00	Flow (cfs)	7536.46	6541.48	335.05
Top Width (ft)	967.78	Top Width (ft)	872.83	81.00	13.94
Vel Total (ft/s)	7.03	Avg. Vel. (ft/s)	4.95	13.42	7.99
Max Chl Dpth (ft)	7.22	Hydr. Depth (ft)	1.74	6.02	3.01
Conv. Total (cfs)	211180.9	Conv. (cfs)	110425.1	95846.5	4909.2
Length Wtd. (ft)	492.80	Wetted Per. (ft)	877.44	81.00	15.19
Min Ch El (ft)	2068.90	Shear (lb/sq ft)	0.50	1.75	0.80
Alpha	1.94	Stream Power (lb/ft s)	2.50	23.48	6.42
Frctn Loss (ft)	2.31	Cum Volume (acre-ft)	56.33	33.73	38.17
C & E Loss (ft)	0.00	Cum SA (acres)	30.53	5.05	16.98

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2077.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.97	Wt. n-Val.	0.039	0.025	0.025
W.S. Elev (ft)	2075.20	Reach Len. (ft)	485.00	500.00	495.00
Crit W.S. (ft)	2075.20	Flow Area (sq ft)	1013.68	510.62	46.04
E.G. Slope (ft/ft)	0.005013	Area (sq ft)	1013.68	510.62	46.04
Q Total (cfs)	14413.00	Flow (cfs)	6686.40	7333.14	393.46
Top Width (ft)	534.61	Top Width (ft)	439.00	81.00	14.61
Vel Total (ft/s)	9.18	Avg. Vel. (ft/s)	6.60	14.36	8.55
Max Chl Dpth (ft)	7.50	Hydr. Depth (ft)	2.31	6.30	3.15
Conv. Total (cfs)	203560.4	Conv. (cfs)	94434.6	103568.7	5557.0
Length Wtd. (ft)	493.60	Wetted Per. (ft)	443.95	81.00	15.91
Min Ch El (ft)	2068.90	Shear (lb/sq ft)	0.71	1.97	0.91
Alpha	1.51	Stream Power (lb/ft s)	4.71	28.33	7.74
Frctn Loss (ft)	2.30	Cum Volume (acre-ft)	15.82	34.45	36.78
C & E Loss (ft)	0.06	Cum SA (acres)	7.73	5.05	15.58

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 0.69

INPUT
Description:
Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8940	2074.7	8966	2072.3	9004	2069.3	9025	2069.3	9034	2068.7
9080	2069	9145	2069.4	9209	2069.7	9269	2069.8	9332	2069.6
9369	2069.4	9423	2069.9	9472	2069.9	9494	2064.8	9509	2064.9
9543	2070.2	9609	2070.3	9663	2070.5	9702	2070.5	9720	2065.2
9745	2064.6	9758	2064.7	9775	2070.5	9808	2071	9868	2070.2
9918	2069.8	9950	2067.6	9973	2064.5	10000	2064.2	10034	2064.2
10050	2065.8	10063	2064.4	10071	2065.1	10088	2067.3	10100	2067.6
10118	2065.4	10124	2066.9	10135	2065.3	10152	2070.3	10184	2070.2
10222	2068.6	10241	2068.6	10264	2068.2	10288	2072.1	10297	2072.8
10300	2072.8								

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8940	1	9332	.065	9720	.025	9760	.065	9973	.025
10050	.065								

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

9973 10050 495 510 490 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	2072.21	Element			
Vel Head (ft)	1.52	Wt. n-Val.	0.051	0.025	0.065
W.S. Elev (ft)	2070.70	Reach Len. (ft)	495.00	510.00	490.00
Crit W.S. (ft)	2070.70	Flow Area (sq ft)	1435.05	483.24	613.28
E.G. Slope (ft/ft)	0.004735	Area (sq ft)	1435.05	483.24	613.28
Q Total (cfs)	14413.00	Flow (cfs)	5449.31	6719.69	2244.00
Top Width (ft)	1249.95	Top Width (ft)	943.60	77.00	229.35
Vel Total (ft/s)	5.69	Avg. Vel. (ft/s)	3.80	13.91	3.66
Max Chl Dpth (ft)	6.49	Hydr. Depth (ft)	1.52	6.28	2.67
Conv. Total (cfs)	209455.0	Conv. (cfs)	79191.3	97653.0	32610.7
Length Wtd. (ft)	503.60	Wetted Per. (ft)	946.70	77.08	230.99
Min Ch El (ft)	2064.20	Shear (lb/sq ft)	0.45	1.85	0.78
Alpha	3.01	Stream Power (lb/ft s)	1.70	25.77	2.87
Frctn Loss (ft)	1.78	Cum Volume (acre-ft)	39.88	28.16	34.45
C & E Loss (ft)	0.01	Cum SA (acres)	20.42	4.14	15.60

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	2072.88	Element			
Vel Head (ft)	1.76	Wt. n-Val.	0.036	0.025	0.065
W.S. Elev (ft)	2071.12	Reach Len. (ft)	495.00	510.00	490.00
Crit W.S. (ft)	2071.12	Flow Area (sq ft)	690.74	515.89	710.39
E.G. Slope (ft/ft)	0.004356	Area (sq ft)	690.74	515.89	710.39
Q Total (cfs)	14413.00	Flow (cfs)	4600.64	7187.58	2624.78
Top Width (ft)	639.00	Top Width (ft)	333.00	77.00	229.00
Vel Total (ft/s)	7.52	Avg. Vel. (ft/s)	6.66	13.93	3.69
Max Chl Dpth (ft)	6.92	Hydr. Depth (ft)	2.07	6.70	3.10
Conv. Total (cfs)	218366.9	Conv. (cfs)	69702.9	108896.8	39767.2
Length Wtd. (ft)	504.35	Wetted Per. (ft)	335.73	77.08	231.12
Min Ch El (ft)	2064.20	Shear (lb/sq ft)	0.56	1.82	0.84
Alpha	2.01	Stream Power (lb/ft s)	3.73	25.36	3.09
Frctn Loss (ft)	1.86	Cum Volume (acre-ft)	6.33	28.56	32.48
C & E Loss (ft)	0.02	Cum SA (acres)	3.43	4.15	14.20

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 0.6

INPUT
Description:
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8792	2070.3	8819	2069	8838	2070	8862	2065.6	8891	2063.8
8917	2064.8	8930	2065.4	9013	2064.9	9064	2064.3	9104	2065
9168	2065.2	9230	2065.4	9320	2064.8	9403	2064.2	9446	2065
9486	2065.1	9503	2064.3	9548	2065.3	9615	2066.1	9671	2066.8
9736	2066.9	9798	2066.2	9809	2066.1	9842	2066.1	9859	2066.4
9928	2065.8	9954	2059.7	10000	2059.9	10052	2059.9	10075	2066.4
10097	2067.1	10124	2066.8	10141	2067.9	10154	2067	10178	2065.5
10195	2066.8	10225	2067	10257	2066.4	10334	2067.1	10403	2066.4
10431	2063.9	10476	2064.8	10494	2065.1	10520	2062.7	10532	2063.1
10552	2069.7	10561	2070.4	10575	2069.7				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8792	1	9446	.065	9928	.025	10075	.065

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9928	10075	515	505	505	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2069.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.48	Wt. n-Val.	0.201	0.025	0.065
W.S. Elev (ft)	2067.69	Reach Len. (ft)	515.00	505.00	505.00
Crit W.S. (ft)	2067.69	Flow Area (sq ft)	2467.41	1000.09	759.74
E.G. Slope (ft/ft)	0.002752	Area (sq ft)	2467.41	1000.09	759.74
Q Total (cfs)	14459.00	Flow (cfs)	1763.64	11114.40	1580.96
Top Width (ft)	1688.82	Top Width (ft)	1077.37	147.00	464.45
Vel Total (ft/s)	3.42	Avg. Vel. (ft/s)	0.71	11.11	2.08
Max Chl Dpth (ft)	7.98	Hydr. Depth (ft)	2.29	6.80	1.64
Conv. Total (cfs)	275643.4	Conv. (cfs)	33621.8	211882.6	30139.0
Length Wtd. (ft)	505.79	Wetted Per. (ft)	1077.72	148.61	465.61
Min Ch El (ft)	2059.70	Shear (lb/sq ft)	0.39	1.16	0.28
Alpha	8.16	Stream Power (lb/ft s)	0.28	12.85	0.58
Frctn Loss (ft)	1.44	Cum Volume (acre-ft)	17.70	19.47	26.73
C & E Loss (ft)	0.00	Cum SA (acres)	8.93	2.83	11.69

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2069.75	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.94	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2067.81	Reach Len. (ft)	515.00	505.00	505.00
Crit W.S. (ft)	2067.81	Flow Area (sq ft)	164.68	1018.00	816.30
E.G. Slope (ft/ft)	0.003176	Area (sq ft)	164.68	1018.00	816.30

Q Total (cfs)	14459.00	Flow (cfs)	296.83	12298.50	1863.67
Top Width (ft)	712.20	Top Width (ft)	98.00	147.00	467.20
Vel Total (ft/s)	7.23	Avg. Vel. (ft/s)	1.80	12.08	2.28
Max Chl Dpth (ft)	8.11	Hydr. Depth (ft)	1.68	6.93	1.75
Conv. Total (cfs)	256583.2	Conv. (cfs)	5267.5	218243.9	33071.9
Length Wtd. (ft)	505.13	Wetted Per. (ft)	99.71	148.61	468.73
Min Ch El (ft)	2059.70	Shear (lb/sq ft)	0.33	1.36	0.35
Alpha	2.39	Stream Power (lb/ft s)	0.59	16.41	0.79
Frctn Loss (ft)	1.63	Cum Volume (acre-ft)	1.47	19.58	23.89
C & E Loss (ft)	0.07	Cum SA (acres)	0.98	2.83	10.28

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 0.5

INPUT
Description:
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9600	2064	9622	2063.2	9628	2062.6	9665	2062.4	9694	2062.9
9740	2062.2	9800	2061.9	9843	2062.5	9919	2062.2	9958	2055.5
10000	2055.5	10041	2055.5	10058	2059.1	10079	2059.2	10114	2062.8
10129	2062.8	10146	2062	10204	2062.9	10253	2062.6	10316	2061.3
10373	2060.4	10426	2059.8	10444	2058.1	10457	2058.3	10470	2060.7
10505	2061.3	10530	2060.6	10569	2060.9	10634	2061.8	10663	2062.2
10671	2067.5	10705	2073.6						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9600	.065	9919	.025	10041	.065

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9919	10041	200	200	220	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2065.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.51	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2063.57	Reach Len. (ft)	200.00	200.00	220.00
Crit W.S. (ft)	2063.57	Flow Area (sq ft)	361.06	853.54	1527.72
E.G. Slope (ft/ft)	0.002934	Area (sq ft)	361.06	853.54	1527.72
Q Total (cfs)	14459.00	Flow (cfs)	514.31	10020.12	3924.57
Top Width (ft)	1053.16	Top Width (ft)	307.10	122.00	624.06
Vel Total (ft/s)	5.27	Avg. Vel. (ft/s)	1.42	11.74	2.57
Max Chl Dpth (ft)	8.07	Hydr. Depth (ft)	1.18	7.00	2.45
Conv. Total (cfs)	266953.6	Conv. (cfs)	9495.5	184999.5	72458.6
Length Wtd. (ft)	206.02	Wetted Per. (ft)	307.15	122.57	625.41
Min Ch El (ft)	2055.50	Shear (lb/sq ft)	0.22	1.28	0.45
Alpha	3.50	Stream Power (lb/ft s)	0.31	14.97	1.15

Frctn Loss (ft)	0.66	Cum Volume (acre-ft)	0.98	8.73	13.47
C & E Loss (ft)	0.01	Cum SA (acres)	0.75	1.27	5.38

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2065.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.72	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2063.50	Reach Len. (ft)	200.00	200.00	220.00
Crit W.S. (ft)	2063.50	Flow Area (sq ft)	58.91	845.20	1485.06
E.G. Slope (ft/ft)	0.003263	Area (sq ft)	58.91	845.20	1485.06
Q Total (cfs)	14459.00	Flow (cfs)	85.68	10396.10	3977.22
Top Width (ft)	794.96	Top Width (ft)	49.00	122.00	623.96
Vel Total (ft/s)	6.05	Avg. Vel. (ft/s)	1.45	12.30	2.68
Max Chl Dpth (ft)	8.00	Hydr. Depth (ft)	1.20	6.93	2.38
Conv. Total (cfs)	253122.9	Conv. (cfs)	1500.0	181996.7	69626.3
Length Wtd. (ft)	205.51	Wetted Per. (ft)	50.11	122.57	625.29
Min Ch El (ft)	2055.50	Shear (lb/sq ft)	0.24	1.40	0.48
Alpha	3.02	Stream Power (lb/ft s)	0.35	17.28	1.30
Frctn Loss (ft)	0.73	Cum Volume (acre-ft)	0.15	8.78	10.55
C & E Loss (ft)	0.03	Cum SA (acres)	0.11	1.27	3.96

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 0.47

INPUT
Description:
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9738	2063.5	9790	2064	9856	2063.3	9921	2062.3	9941	2054.9
9961	2053.4	10000	2053.6	10024	2053.6	10038	2059.9	10145	2060.2
10268	2059.7	10325	2054.3	10334	2054.7	10363	2057.9	10470	2058.6
10536	2058.9	10574	2058.9	10597	2059.8	10664	2060.1	10711	2060.1
10724	2064	10770	2078.4						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9738	.065	9921	.025	10038	.065

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff Contr.	Expan.
	9921	10038		190	230	260	.3	.5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2063.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.65	Wt. n-Val.		0.025	0.065
W.S. Elev (ft)	2061.54	Reach Len. (ft)	190.00	230.00	260.00
Crit W.S. (ft)	2061.54	Flow Area (sq ft)		778.23	1691.68
E.G. Slope (ft/ft)	0.003524	Area (sq ft)		778.23	1691.68
Q Total (cfs)	14459.00	Flow (cfs)		9682.64	4776.36
Top Width (ft)	792.73	Top Width (ft)		114.94	677.79
Vel Total (ft/s)	5.85	Avg. Vel. (ft/s)		12.44	2.82
Max Chl Dpth (ft)	8.14	Hydr. Depth (ft)		6.77	2.50
Conv. Total (cfs)	243556.3	Conv. (cfs)		163100.4	80455.9
Length Wtd. (ft)	234.89	Wetted Per. (ft)		117.54	678.46
Min Ch El (ft)	2053.40	Shear (lb/sq ft)		1.46	0.55
Alpha	3.10	Stream Power (lb/ft s)		18.13	1.55
Frctn Loss (ft)	0.85	Cum Volume (acre-ft)	0.15	4.98	5.34
C & E Loss (ft)	0.27	Cum SA (acres)	0.04	0.73	2.10

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2063.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.01	Wt. n-Val.		0.025	0.065
W.S. Elev (ft)	2061.66	Reach Len. (ft)	190.00	230.00	260.00
Crit W.S. (ft)	2061.66	Flow Area (sq ft)		792.02	1231.68
E.G. Slope (ft/ft)	0.003899	Area (sq ft)		792.02	1231.68
Q Total (cfs)	14459.00	Flow (cfs)		10466.78	3992.22
Top Width (ft)	547.26	Top Width (ft)		115.26	432.00
Vel Total (ft/s)	7.14	Avg. Vel. (ft/s)		13.22	3.24
Max Chl Dpth (ft)	8.26	Hydr. Depth (ft)		6.87	2.85
Conv. Total (cfs)	231552.9	Conv. (cfs)		167619.7	63933.2
Length Wtd. (ft)	234.06	Wetted Per. (ft)		117.88	435.50
Min Ch El (ft)	2053.40	Shear (lb/sq ft)		1.64	0.69
Alpha	2.53	Stream Power (lb/ft s)		21.61	2.23
Frctn Loss (ft)	0.92	Cum Volume (acre-ft)	0.01	5.02	3.69
C & E Loss (ft)	0.25	Cum SA (acres)	0.00	0.73	1.29

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Sols Wash
REACH: Reach 2 RS: 0.42

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9428	2063.59	445.675	2064.29	507.891	2064.29	581.419	2064.29	645.756	2064.7
9751.806	2064	9785.035	2052.39	832.404	2052.59	874.824	2052.59	896.034	2053.3
9924.314	2052.39	946.231	2051.4	9979.46	2062.21	0036.73	2063.61	0091.17	2064.9
10137.83	2066.41	0203.58	2066.5						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9428	.065	9785.035	.025	9946.231	.065

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9785.035	9946.231	135	135	135	.3	.5

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	2061.93	Element			
Vel Head (ft)	2.56	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2059.37	Reach Len. (ft)			
Crit W.S. (ft)	2058.81	Flow Area (sq ft)	70.98	1109.45	97.72
E.G. Slope (ft/ft)	0.003692	Area (sq ft)	70.98	1109.45	97.72
Q Total (cfs)	15045.00	Flow (cfs)	220.07	14494.95	329.98
Top Width (ft)	205.80	Top Width (ft)	20.08	161.20	24.52
Vel Total (ft/s)	11.77	Avg. Vel. (ft/s)	3.10	13.06	3.38
Max Chl Dpth (ft)	7.97	Hydr. Depth (ft)	3.54	6.88	3.99
Conv. Total (cfs)	247598.1	Conv. (cfs)	3621.7	238545.8	5430.6
Length Wtd. (ft)		Wetted Per. (ft)	21.29	161.25	25.78
Min Ch El (ft)	2051.40	Shear (lb/sq ft)	0.77	1.59	0.87
Alpha	1.19	Stream Power (lb/ft s)	2.38	20.72	2.95
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	2062.22	Element			
Vel Head (ft)	2.85	Wt. n-Val.	0.065	0.025	0.065
W.S. Elev (ft)	2059.37	Reach Len. (ft)			
Crit W.S. (ft)	2058.96	Flow Area (sq ft)	4.90	1109.45	5.57
E.G. Slope (ft/ft)	0.003972	Area (sq ft)	4.90	1109.45	5.57
Q Total (cfs)	15045.00	Flow (cfs)	5.28	15033.66	6.06
Top Width (ft)	162.61	Top Width (ft)	0.71	161.20	0.71
Vel Total (ft/s)	13.43	Avg. Vel. (ft/s)	1.08	13.55	1.09
Max Chl Dpth (ft)	7.97	Hydr. Depth (ft)	6.95	6.88	7.85
Conv. Total (cfs)	238725.7	Conv. (cfs)	83.8	238545.8	96.1
Length Wtd. (ft)		Wetted Per. (ft)	7.57	161.25	8.49
Min Ch El (ft)	2051.40	Shear (lb/sq ft)	0.16	1.71	0.16
Alpha	1.02	Stream Power (lb/ft s)	0.17	23.12	0.18
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: The cross section had to be extended vertically during the critical depth calculations.

Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

SUMMARY OF MANNING'S N VALUES

River:Sols Wash

Reach	River Sta.	n1	n2	n3	n4	n5	n6	n7	n8
Reach 1	0.40	.065	.025	.065					
Reach 1	0.36	1	.065	.025	.065				
Reach 1	0.22	.065	.025	.065					
Reach 1	0.13	1	.065	.025	.065				
Reach 1	0.03	1	.065	.025	.065				
Reach 2	1.59	.06	.025	.05	.04	.06	.025	.05	
Reach 2	1.49	.06	.025	.05	.055	.02	.05	.025	.05
Reach 2	1.4	.06	.025	.06	.025	.04	.055	.025	.05
Reach 2	1.3	.06	.025	.045	.065	.02	.05		
Reach 2	1.12	.06	.025	.06	.025	.06			
Reach 2	1	1	.065	.025	.065	.025	.065		
Reach 2	0.9	1	.065	.025	.065	.025	.065		
Reach 2	0.79	.065	.025	.065	.025				
Reach 2	0.69	1	.065	.025	.065	.025	.065		
Reach 2	0.6	1	.065	.025	.065				
Reach 2	0.5	.065	.025	.065					
Reach 2	0.47	.065	.025	.065					
Reach 2	0.42	.065	.025	.065					

SUMMARY OF REACH LENGTHS

River: Sols Wash

Reach	River Sta.	Left	Channel	Right
Reach 1	0.40	250	170	105
Reach 1	0.36	615	770	785
Reach 1	0.22	465	500	515
Reach 1	0.13	500	505	560
Reach 1	0.03	0	0	0
Reach 2	1.59	490	490	540
Reach 2	1.49	500	500	490
Reach 2	1.4	500	500	435
Reach 2	1.3	935	935	885
Reach 2	1.12	615	620	630
Reach 2	1	570	560	565
Reach 2	0.9	540	565	575
Reach 2	0.79	485	500	495
Reach 2	0.69	495	510	490
Reach 2	0.6	515	505	505
Reach 2	0.5	200	200	220
Reach 2	0.47	190	230	260
Reach 2	0.42	135	135	135

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Sols Wash

Reach	River Sta.	Contr.	Expan.
Reach 1	0.40	.3	.5
Reach 1	0.36	.3	.5
Reach 1	0.22	.1	.3
Reach 1	0.13	.1	.3
Reach 1	0.03	.1	.3
Reach 2	1.59	.1	.3
Reach 2	1.49	.1	.3
Reach 2	1.4	.1	.3
Reach 2	1.3	.1	.3
Reach 2	1.12	.1	.3
Reach 2	1	.1	.3
Reach 2	0.9	.1	.3
Reach 2	0.79	.1	.3
Reach 2	0.69	.1	.3
Reach 2	0.6	.1	.3
Reach 2	0.5	.1	.3
Reach 2	0.47	.3	.5
Reach 2	0.42	.3	.5

Profile Output Table - Standard Table 1

Reach Froude # Chl	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)
Reach 2 1	1.59	PF 1	14413.00	2107.20	2111.03	2111	2112	0	12	2361	1159
Reach 2 1	1.59	PF 2	14413.00	2107.20	2111.05	2111	2112	0	13	2212	1003
Reach 2 1	1.49	PF 1	14413.00	2101.80	2105.89	2106	2107	0	11	2358	1345
Reach 2 1	1.49	PF 2	14413.00	2101.80	2106.34	2106	2107	0	12	2126	1084
Reach 2 1	1.4	PF 1	14413.00	2096.90	2101.09	2101	2102	0	10	2110	1214
Reach 2 1	1.4	PF 2	14413.00	2096.90	2101.11	2101	2102	0	10	2096	1184
Reach 2 1	1.3	PF 1	14413.00	2092.20	2097.08	2097	2098	0	12	2114	1072
Reach 2 1	1.3	PF 2	14413.00	2092.20	2097.08	2097	2098	0	12	2080	1030
Reach 2 1	1.12	PF 1	14413.00	2082.30	2088.39	2088	2090	0	12	1962	880

Reach 2 1	1.12	PF 2	14413.00	2082.30	2088.39	2088	2090	0	12	1964	880
Reach 2 1	1	PF 1	14413.00	2078.10	2083.87	2084	2085	0	12	2514	1606
Reach 2 1	1	PF 2	14413.00	2078.10	2083.88	2084	2085	0	13	1795	850
Reach 2 1	0.9	PF 1	14413.00	2073.10	2078.58	2079	2080	0	11	1958	1226
Reach 2 1	0.9	PF 2	14413.00	2073.10	2079.13	2079	2080	0	11	1697	681
Reach 2 1	0.79	PF 1	14413.00	2068.90	2074.92	2075	2076	0	13	2051	968
Reach 2 1	0.79	PF 2	14413.00	2068.90	2075.20	2075	2077	0	14	1570	535
Reach 2 1	0.69	PF 1	14413.00	2064.20	2070.70	2071	2072	0	14	2532	1250
Reach 2 1	0.69	PF 2	14413.00	2064.20	2071.12	2071	2073	0	14	1917	639
Reach 2 1	0.6	PF 1	14459.00	2059.70	2067.69	2068	2069	0	11	4227	1689
Reach 2 1	0.6	PF 2	14459.00	2059.70	2067.81	2068	2070	0	12	1999	712
Reach 2 1	0.5	PF 1	14459.00	2055.50	2063.57	2064	2065	0	12	2742	1053
Reach 2 1	0.5	PF 2	14459.00	2055.50	2063.50	2063	2065	0	12	2389	795
Reach 2 1	0.47	PF 1	14459.00	2053.40	2061.54	2062	2063	0	12	2470	793
Reach 2 1	0.47	PF 2	14459.00	2053.40	2061.66	2062	2064	0	13	2024	547
Reach 2 1	0.42	PF 1	15045.00	2051.40	2059.37	2059	2062	0	13	1278	206
Reach 2 1	0.42	PF 2	15045.00	2051.40	2059.37	2059	2062	0	14	1120	163
Reach 1 1	0.40	PF 1	15045.00	2050.60	2058.33	2058	2062	0	15	1095	172
Reach 1 1	0.40	PF 2	15045.00	2050.60	2058.48	2058	2062	0	15	1017	143
Reach 1 1	0.36	PF 1	15045.00	2048.40	2058.24	2058	2060	0	14	2050	653
Reach 1	0.36	PF 2	15045.00	2048.40	2058.07	2058	2061	0	15	1169	215

1											
Reach 1 1	0.22	PF 1	15045.00	2043.00	2052.85	2053	2055	0	12	2036	598
Reach 1 1	0.22	PF 2	15045.00	2043.00	2052.84	2053	2056	0	14	1228	251
Reach 1 1	0.13	PF 1	15045.00	2040.00	2047.08	2047	2049	0	15	3752	1321
Reach 1 1	0.13	PF 2	15045.00	2040.00	2047.27	2047	2049	0	15	2310	545
Reach 1 1	0.03	PF 1	15045.00	2036.20	2040.14	2039	2041	0	8	3287	1243
Reach 1 1	0.03	PF 2	15045.00	2036.20	2040.70	2039	2041	0	7	3909	1287

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Reach 2	1.59	PF 1	2112.01	2111.03	0.98	3.38	0.02	9528.32	4233.46	651.22	1159.49
Reach 2	1.59	PF 2	2112.11	2111.05	1.06	3.32	0.00	9802.12	4367.37	243.51	1003.00
Reach 2	1.49	PF 1	2106.81	2105.89	0.92	3.20	0.01	6782.47	4871.08	2759.45	1345.20
Reach 2	1.49	PF 2	2107.44	2106.34	1.10	3.10	0.02	8001.69	5808.37	602.94	1084.00
Reach 2	1.4	PF 1	2102.10	2101.09	1.01	2.47	0.03	5223.74	6407.75	2781.51	1214.19
Reach 2	1.4	PF 2	2102.13	2101.11	1.03	2.47	0.03	5129.22	6466.03	2817.76	1183.58
Reach 2	1.3	PF 1	2098.40	2097.08	1.32	4.06	0.01	3456.48	7390.32	3566.21	1071.74
Reach 2	1.3	PF 2	2098.42	2097.08	1.34	4.07	0.01	3442.29	7414.91	3555.80	1030.05
Reach 2	1.12	PF 1	2089.82	2088.39	1.43	2.84	0.05	6177.47	7372.67	862.87	880.09
Reach 2	1.12	PF 2	2089.82	2088.39	1.42	2.99	0.02	6179.96	7369.37	863.68	879.68
Reach 2	1	PF 1	2085.13	2083.87	1.25	3.24	0.06	7404.83	6976.80	31.37	1606.47
Reach 2	1	PF 2	2085.47	2083.88	1.59	3.26	0.10	7014.42	7365.40	33.18	849.54
Reach 2	0.9	PF 1	2079.63	2078.58	1.05	3.17	0.04	9156.54	5255.91	0.56	1225.64
Reach 2	0.9	PF 2	2080.39	2079.13	1.27	3.14	0.07	8451.35	5960.45	1.20	681.00
Reach 2	0.79	PF 1	2076.41	2074.92	1.49	2.31	0.00	7536.46	6541.48	335.05	967.78
Reach 2	0.79	PF 2	2077.18	2075.20	1.97	2.30	0.06	6686.40	7333.14	393.46	534.61
Reach 2	0.69	PF 1	2072.21	2070.70	1.52	1.78	0.01	5449.31	6719.69	2244.00	1249.95
Reach 2	0.69	PF 2	2072.88	2071.12	1.76	1.86	0.02	4600.64	7187.58	2624.78	639.00
Reach 2	0.6	PF 1	2069.17	2067.69	1.48	1.44	0.00	1763.64	11114.40	1580.96	1688.82
Reach 2	0.6	PF 2	2069.75	2067.81	1.94	1.63	0.07	296.83	12298.50	1863.67	712.20
Reach 2	0.5	PF 1	2065.08	2063.57	1.51	0.66	0.01	514.31	10020.12	3924.57	1053.16
Reach 2	0.5	PF 2	2065.22	2063.50	1.72	0.73	0.03	85.68	10396.10	3977.22	794.96
Reach 2	0.47	PF 1	2063.19	2061.54	1.65	0.85	0.27		9682.64	4776.36	792.73

Reach 2	0.47	PF 2	2063.67	2061.66	2.01	0.92	0.25		10466.78	3992.22	547.26
Reach 2	0.42	PF 1	2061.93	2059.37	2.56			220.07	14494.95	329.98	205.80
Reach 2	0.42	PF 2	2062.22	2059.37	2.85			5.28	15033.66	6.06	162.61
Reach 1	0.40	PF 1	2061.69	2058.33	3.36	0.62	0.64	143.11	14656.70	245.19	172.32
Reach 1	0.40	PF 2	2061.95	2058.48	3.46	0.68	0.27	5.36	15033.32	6.32	142.81
Reach 1	0.36	PF 1	2060.32	2058.24	2.07	2.45	0.07	3816.32	9939.11	1289.57	652.60
Reach 1	0.36	PF 2	2061.00	2058.07	2.92	3.24	0.03	2945.98	10741.59	1357.43	214.61
Reach 1	0.22	PF 1	2054.77	2052.85	1.92	2.27	0.07	2556.71	11961.75	526.54	597.51
Reach 1	0.22	PF 2	2055.88	2052.84	3.03	2.65	0.35	478.19	13953.03	613.78	250.50
Reach 1	0.13	PF 1	2048.77	2047.08	1.69	2.37	0.35	7526.98	7514.91	3.11	1321.21
Reach 1	0.13	PF 2	2049.14	2047.27	1.87	1.82	0.44	7230.67	7813.51	0.82	545.00
Reach 1	0.03	PF 1	2040.65	2040.14	0.51			1369.37	5361.84	8313.79	1242.84
Reach 1	0.03	PF 2	2041.10	2040.70	0.40			1946.60	5726.60	7371.81	1287.00

Appendix E.5

PROPOSED CONDTIONS FLOODWAY/FLOODPLAIN MODEL

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX XXXX     XXXXXX    XXXX
X     X  X        X            X  X    X    X        X
X     X  X        X    X       X   X   X    X        X
X     X  XXXXXX    XXXX        X    X  X    X   XXXXX
```

****

PROJECT DATA
Project Title: Sols_CLOMR
Project File : Sols_CLOMR.prj
Run Date and Time: 11/27/2006 10:57:36 AM

Project in English units

Project Description:
Sols Wash CLOMR
Future Conditions with 4.5' Weir (modeled with cross
sections)
Prepared by:
Engineering and Environmental Consultants, Inc.
3003
N. Central Avenue, Suite 600
Phoenix, Arizona 85012
Phone: 602-248-7702
FAX: 602-248-7851

For: Flood Control District of Maricopa County
Wickenburg
Downtown Flooding Hazard Mitigation Project Final Design
Contract #
FCD2005C006

Discharge information obtained from FEMA
Starting water surface
from West Consultants Model
US 93 Bypass Project - Hassayampa
River

Profile 1: Sols Wash (100-year)
Profile 2: Sols Wash (100-year)
with Floodway
Profile 3: Sols Wash (10-year)
Profile 4: Sols Wash
(50-year)
Profile 5: Sols Wash (500-year)

Compared with starting water
surface from FEMA Firm Panel 04013C2055 G.
Elev = 2051.3 (NGVD 29),
converted to Elev=2053.5 (NAVD 88) by adding 2.2 ft. +/-

The Tegner Street
Bridge was adjusted by using the datum difference at the bridge which was
detetmined by comparing common monuments and the bridge plans/as-builts with
a
resulting difference of 1.51 ft.

Future Conditions Model, with modified
bank stations & bank protection.
Island trimmed/removed to contain 100-yr Q to
Sols Wash by trimming North Wash.
Goldmine Village also trimmed to reduce WSEL
at the breakout point adjacent to the mobile home park.

Study Limits: Sols
Wash
Final Model Run Date: October 2006

Model: Sols_CLOMR

****

PLAN DATA

Plan Title: Sols_CLOMR
Plan File : q:\305020.02 CLOMR\HEC-RAS\CLOMR Models\Sols Wash\Sols_CLOMR.p01

Geometry Title: Sols_CLOMR
Geometry File : q:\305020.02 CLOMR\HEC-RAS\CLOMR Models\Sols Wash\Sols_CLOMR.g01

Flow Title : Sols_CLOMR
Flow File : q:\305020.02 CLOMR\HEC-RAS\CLOMR Models\Sols Wash\Sols_CLOMR.f01

Plan Summary Information:
Number of: Cross Sections = 46 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 2 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

Encroachment Data
Equal Conveyance = True
Left Offset = 0
Right Offset = 0

River = Sols Wash Reach = Sols Wash Main

RS	Profile	Method	Value1	Value2
1.319	100-Sols FW	1	9250	10370
1.224	100-Sols FW	1	9054.32	10304.49
1.141	100-Sols FW	1	9247.97	10129.14
1.081	100-Sols FW	1	9183.67	10080.56
1.021	100-Sols FW	1	9269.21	10065.72
0.955	100-Sols FW	1	9365.88	10047.62
0.886	100-Sols FW	1	9496.48	10057.44
0.822	100-Sols FW	1	9533.23	10067.99
0.785	100-Sols FW	1	9589.66	10068.51
0.746	100-Sols FW	1	9643.27	10068.47
0.708	100-Sols FW	1	9681.63	10077.03
0.668	100-Sols FW	1	9718	10101.67
0.642	100-Sols FW	1	9799.51	10113.55
0.614	100-Sols FW	1	9889.25	10119.42
0.592	100-Sols FW	1	9909	10122.49
0.557	100-Sols FW	1	9902	10122.47
0.529	100-Sols FW	1	9884.19	10117.46
0.505	100-Sols FW	1	9899.41	10110
0.485	100-Sols FW	1	9910.88	10081.3
0.467	100-Sols FW	1	9923	10084
0.447	100-Sols FW	1	9930.5	10091.2
0.442	100-Sols FW	1	9944.5	10100
0.412	100-Sols FW	1	9929	10084
0.389	100-Sols FW	1	9923.5	10081.77
0.359	100-Sols FW	1	9926	10088
0.306	100-Sols FW	1	9954	10089.5
0.288	100-Sols FW	1	9940.5	10077
0.227	100-Sols FW	1	9927.5	10061.95
0.220	100-Sols FW	1	9929.5	10049.5
0.212	100-Sols FW	1	9932.5	10050.5
0.204	100-Sols FW	1	9929	10052
0.201	100-Sols FW	1	9944.5	10052
0.198	100-Sols FW	1	9943	10051.4
0.195	100-Sols FW	1	9941	10053
0.192	100-Sols FW	1	9939	10053
0.189	100-Sols FW	1	9939	10056.5
0.187	100-Sols FW	1	9932	10057.5
0.184	100-Sols FW	1	9929.5	10057.5

```
0.182   100-Sols FW          1  9926.5 10060.5
0.180   100-Sols FW          1    9924 10062.5
0.169   100-Sols FW          1 9891.7510075.63
0.159   100-Sols FW          1 9878.6610083.15
0.150   100-Sols FW          1    986110088.97
0.140   100-Sols FW          1    985710103.84
0.132   100-Sols FW          1  9866.5 10110.5
0.111   100-Sols FW          1 9805.57   10095

*****************************************************************************

FLOW DATA

Flow Title: Sols_CLOMR
Flow File : q:\305020.02 CLOMR\HEC-RAS\CLOMR Models\Sols Wash\Sols_CLOMR.f01

Flow Data (cfs)
*****************************************************************************************************************
********************
* River          Reach          RS      *        100-Sols     100-Sols FW          10-yr
50-yr          500-yr *
* Sols Wash      Sols Wash Main  1.319   *          14413          14413           6725
11927          19986 *
* Sols Wash      Sols Wash Main  1.141   *          14459          14459           6758
11964          20005 *
* Sols Wash      Sols Wash Main  0.955   *          14459          14459           6758
11964          20005 *
* Sols Wash      Sols Wash Main  0.746   *          14459          14459           6758
11964          20005 *
* Sols Wash      Sols Wash Main  0.485   *          15045          15045           7019
12453          20836 *
*****************************************************************************************************************
********************

Boundary Conditions
*****************************************************************************************************************
* River          Reach          Profile         *          Upstream                Downstream    *
*****************************************************************************************************************
* Sols Wash      Sols Wash Main  100-Sols        *                                 Normal S = 0.006 *
* Sols Wash      Sols Wash Main  100-Sols FW     *                                 Normal S = 0.006 *
*****************************************************************************************************************

*****************************************************************************

GEOMETRY DATA

Geometry Title: Sols_CLOMR
Geometry File : q:\305020.02 CLOMR\HEC-RAS\CLOMR Models\Sols Wash\Sols_CLOMR.g01

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 1.319

INPUT
Description: Note:  Cross Section taken from FIS Study, X-sect M
Station Elevation Data    num=      45
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
    9183  2114.5    9217  2100.6  9236.12098.601    92502097.146    9260  2096.1
    9272  2093.3    9303  2093.3    9322  2096.2    9341  2097.4    9398  2099.8
    9458  2098.7    9543  2097.7    9550 2098.15    9565  2099.1    9593  2098.4
    9614  2099.4    9653  2098.8    9723  2098.8    9777  2099.1    9816  2098.5
    9882  2098.7    9923  2098.9    9930  2094.2    9967  2094.2   10000  2094.9
   10055  2095.4   10079  2097.3   10098  2097.8   10116  2096.6   10161  2096.2
   10175    2097   10228    2096   10268  2094.6   10311  2094.3   10324    2097
   10338  2097.2   10355  2096.2   103702097.64510379.942098.602   10382  2098.8
   10424  2100.3   10493  2100.1   10511  2103.1   10521  2103.3   10530  2103.3

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
    9183     .06    9272    .025    9303    .045    9550    .065    9923    .025
   10079     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9250   10370              504     504     504              .1       .3
```

CROSS SECTION

RIVER: Sols Wash
REACH: Sols Wash Main RS: 1.224

INPUT
Description:
Station Elevation Data num= 292

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9042.63	2096.83	9046.97	2095.27	9049.88	2094.07	9052.32	2093.41	9057.01	2092.18
9065.4	2089.68	9067.83	2089.34	9072.16	2089.38	9074.69	2089.4	9078.83	2089.45
9081.21	2089.49	9088.35	2089.61	9097.31	2089.75	9101.27	2089.9	9105.02	2089.87
9108.66	2089.84	9113.17	2089.6	9125.7	2088.98	9131	2089.99	9135.3	2090.81
9139.61	2090.74	9155.96	2089.85	9158.44	2089.92	9164.58	2089.93	9173.72	2090.02
9178.67	2090.09	9189.76	2089.71	9198.01	2089.62	9204.76	2089.43	9210.26	2089.24
9232.67	2090	9235.4	2090.09	9241.63	2090.26	9246.74	2090.37	9249.01	2090.42
9253.26	2090.48	9256.4	2090.52	9258.09	2090.54	9263.79	2090.5	9266.01	2090.43
9273.98	2090.17	9290.1	2090.33	9300.73	2090.75	9303.46	2090.79	9308.11	2090.85
9314.81	2090.91	9315.5	2090.92	9316.79	2090.93	9322.89	2090.99	9326.15	2091.02
9330.27	2091.08	9337.5	2091.17	9337.66	2091.17	9337.97	2091.18	9345.05	2091.32
9348.84	2091.39	9352.43	2091.47	9359.14	2091.6	9359.82	2091.61	9360.19	2091.62
9367.21	2091.74	9371.53	2091.8	9374.6	2091.84	9380.32	2091.89	9381.98	2091.9
9382.88	2091.91	9389.37	2091.95	9394.22	2091.98	9396.76	2091.99	9401.5	2092
9404.15	2092.01	9405.56	2092.02	9411.53	2092.03	9416.91	2092.05	9418.92	2092.05
9422.67	2092.07	9426.31	2092.08	9428.25	2092.09	9433.69	2092.12	9439.6	2092.16
9441.08	2092.17	9443.85	2092.2	9448.47	2092.25	9450.94	2092.27	9455.86	2092.32
9462.29	2092.39	9463.24	2092.4	9465.02	2092.42	9470.63	2092.48	9473.63	2092.51
9478.02	2092.55	9484.98	2092.62	9485.4	2092.62	9486.2	2092.63	9492.79	2092.68
9496.32	2092.71	9500.18	2092.73	9507.38	2092.78	9507.56	2092.78	9507.67	2092.78
9514.95	2092.81	9519.01	2092.84	9522.34	2092.84	9528.55	2092.87	9529.73	2092.87
9530.35	2092.88	9537.11	2092.89	9541.7	2092.92	9544.5	2092.93	9549.73	2092.96
9551.89	2092.97	9553.04	2092.98	9559.28	2093.03	9564.39	2093.07	9566.66	2093.09
9570.91	2093.12	9574.05	2093.14	9575.73	2093.15	9581.44	2093.18	9587.08	2093.21
9588.82	2093.22	9592.08	2093.23	9596.21	2093.25	9598.42	2093.26	9603.6	2093.27
9609.77	2093.29	9610.99	2093.29	9613.26	2093.29	9618.37	2093.29	9621.11	2093.28
9625.76	2093.27	9632.46	2093.24	9633.15	2093.24	9634.44	2093.23	9640.53	2093.2
9643.8	2093.18	9647.92	2093.16	9655.14	2093.13	9655.31	2093.13	9655.61	2093.12
9662.7	2093.11	9666.49	2093.11	9670.08	2093.12	9676.79	2093.12	9677.47	2093.13
9677.83	2093.13	9684.86	2093.14	9689.18	2093.14	9692.24	2093.13	9697.97	2093.12
9699.63	2093.11	9700.52	2093.11	9707.02	2093.1	9711.87	2093.09	9714.41	2093.09
9719.14	2093.09	9721.79	2093.1	9723.21	2093.1	9729.18	2093.14	9734.56	2093.17
9736.57	2093.19	9740.32	2093.22	9743.95	2093.25	9745.9	2093.26	9751.34	2093.31
9757.25	2093.34	9758.73	2093.34	9761.5	2093.35	9766.12	2093.36	9768.59	2093.35
9773.5	2093.32	9779.93	2093.21	9780.89	2093.2	9782.67	2093.13	9788.28	2092.92
9793.99	2092.78	9807.15	2092.55	9815.23	2088.36	9815.83	2088.01	9817.17	2088.1
9819.64	2088.15	9839.99	2088.91	9846.2	2088.8	9847.37	2088.78	9848	2088.78
9854.76	2088.76	9859.35	2088.79	9862.15	2088.8	9867.38	2088.85	9869.54	2088.87
9870.69	2088.89	9876.92	2088.97	9882.04	2089.05	9884.31	2089.09	9888.56	2089.16
9891.7	2089.21	9893.38	2089.24	9899.08	2089.34	9904.73	2089.45	9906.47	2089.48
9909.73	2089.55	9913.86	2089.63	9916.07	2089.67	9921.25	2089.77	9927.41	2089.87
9928.63	2089.89	9930.91	2089.93	9936.02	2089.99	9938.76	2090.02	9943.41	2090.07
9950.1	2090.12	9950.79	2090.12	9952.08	2090.13	9958.18	2090.16	9961.45	2090.17
9965.57	2090.18	9972.79	2090.19	9972.96	2090.19	9973.26	2090.19	9980.34	2090.19
9984.14	2090.18	9987.73	2090.17	9994.44	2090.14	9995.12	2090.14	9995.48	2090.14
10000	2090.11	10002.51	2090.09	10006.8	2090.06	10009.92	2090.04	10015.86	2089.98
10017.32	2089.97	10018.09	2089.96	10024.73	2089.89	10029.39	2089.83	10032.13	2089.8
10037.37	2089.72	10039.54	2089.69	10040.68	2089.67	10046.95	2089.58	10051.98	2089.51
10054.35	2089.48	10058.88	2089.43	10061.76	2089.41	10063.27	2089.38	10069.16	2089.35
10074.56	2089.35	10076.57	2089.36	10080.39	2089.41	10083.98	2089.44	10087.37	2089.48
10091.82	2089.56	10100.76	2089.72	10106.09	2089.83	10109.27	2089.69	10110.89	2089.61
10117.28	2089.85	10122.37	2090.11	10143.98	2092.55	10150.32	2092.42	10158.04	2092.24
10164.92	2092.28	10165.44	2092.28	10193.07	2091.97	10200.1	2091.69	10202.47	2091.77
10209.45	2091.84	10209.88	2091.85	10210.1	2091.85	10217.28	2091.88	10221.4	2091.89
10224.69	2091.91	10230.96	2091.89	10232.1	2091.89	10232.69	2091.89	10239.5	2091.84
10243.99	2091.79	10246.91	2091.76	10252.47	2091.71	10254.31	2091.69	10255.28	2091.68
10261.72	2091.61	10266.58	2091.58	10269.13	2091.57	10273.98	2091.57	10276.53	2091.58
10277.87	2091.58	10283.94	2091.63	10297.76	2091.75	10300.86	2091.79	10301.96	2091.79
10312.25	2096.25	10313.54	2096.47						

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9042.63	.067	9135.3	.031	9300.73	.067	9689.18	.067	9807.15	.03
10143.98	.05								

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

```
      9042.6310313.54                438     438     438                .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main      RS: 1.141

INPUT
Description:
Station Elevation Data     num=      220
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9206.22 2093.39 9213.82 2093.34 9216.59 2093.34 9226.16 2093.22 9236.48 2092.95
 9246.51 2089.61 9259.61    2085 9273.89 2085.36 9283.96 2085.62  9288.3 2084.47
 9294.83 2083.04 9308.48 2083.13 9311.46 2083.14 9317.09 2083.13  9319.6 2083.13
 9319.79 2083.13 9320.29 2083.13 9327.61 2083.06 9330.75 2083.06 9339.38 2082.74
 9353.98 2082.21 9365.13 2085.55 9368.68 2086.51 9382.67 2088.04 9383.68 2088.14
 9385.84 2088.27 9391.69 2088.61 9404.34 2088.88 9406.97 2088.92 9407.02 2088.92
  9408.1 2088.94 9408.51 2088.92 9419.87 2088.58 9426.37 2088.62 9439.75 2088.71
  9440.2  2088.7 9446.66 2088.67 9446.99 2088.67 9447.46 2088.66 9454.18 2088.64
 9458.81 2088.63 9461.37 2088.62 9465.06 2088.62 9468.55 2088.62 9470.97 2088.62
 9475.74 2088.62 9482.66 2088.64 9482.93 2088.64 9483.12 2088.64 9490.12 2088.64
 9495.27 2088.66 9497.31 2088.66 9500.25 2088.67  9504.5 2088.67 9507.43 2088.68
 9511.68 2088.68 9517.85 2088.69 9518.87 2088.69 9519.58 2088.69 9526.06 2088.69
 9531.73 2088.69 9533.25 2088.69 9535.45 2088.69 9536.36 2088.69 9540.44 2088.68
 9543.88 2088.68 9547.63 2088.68 9553.05 2088.69 9554.82 2088.69 9556.04 2088.69
    9562  2088.7 9568.19 2088.71 9569.19 2088.72 9570.65 2088.72 9576.38 2088.73
 9580.34 2088.73 9583.57 2088.73 9588.24 2088.73 9590.76 2088.73  9592.5 2088.73
 9597.95 2088.73 9604.65 2088.72 9605.14 2088.72 9605.84 2088.72 9612.32  2088.7
  9616.8  2088.7 9619.51 2088.69 9623.44 2088.69  9626.7 2088.69 9628.95 2088.69
 9633.89 2088.68 9641.04 2088.69 9641.08 2088.69 9641.11 2088.69 9648.27 2088.68
 9653.26 2088.69 9655.46 2088.69 9658.63 2088.69 9662.64 2088.69 9665.41 2088.69
 9669.83 2088.69 9676.23 2088.69 9677.02 2088.69 9677.57 2088.69 9684.21 2088.68
 9689.72 2088.67  9691.4 2088.67 9693.83 2088.66 9698.59 2088.64 9701.87 2088.62
 9705.77  2088.6 9711.43 2088.57 9712.96 2088.56 9714.02 2088.55 9720.15 2088.52
 9726.18  2088.5 9727.34 2088.49 9729.02 2088.49 9734.53 2088.47 9738.33 2088.46
 9741.72 2088.45 9746.62 2088.43 9748.91 2088.43 9750.48 2088.42 9756.09 2088.39
 9762.64 2088.35 9763.28 2088.35 9764.22 2088.34 9770.47  2088.3 9774.79 2088.27
 9777.66 2088.25 9781.82 2088.22 9784.85  2088.2 9786.94 2088.18 9792.04 2088.15
 9799.09 2088.11 9799.23 2088.11 9799.42 2088.11 9806.41 2088.07 9811.25 2088.04
  9813.6 2088.03 9817.01 2088.02 9820.79    2088  9823.4 2087.98 9827.98 2087.97
 9834.61 2087.98 9835.17 2087.98 9835.55 2087.98 9842.36 2087.99 9846.64 2087.99
 9847.71 2087.99 9849.55 2087.98 9852.21 2087.96 9856.73 2087.92 9859.86 2087.85
 9863.92 2087.77 9869.81 2087.58 9871.11 2087.54 9871.88 2087.54 9886.17 2087.48
 9891.02 2086.81  9904.9  2084.5 9920.44 2085.09 9921.43 2085.14  9922.6 2085.12
 9928.62 2085.01 9932.78 2084.96 9935.81 2084.92  9940.2 2084.89    9943 2084.87
 9944.93 2084.86 9950.18 2084.82 9957.08 2084.78 9957.37 2084.78 9957.79 2084.78
 9964.56 2084.74 9969.23 2084.71 9971.75  2084.7 9975.39 2084.68 9978.94 2084.67
 9981.39 2084.67 9986.13 2084.68 9992.99 2084.74 9993.32 2084.74 9993.54 2084.75
   10000 2084.87 10000.5 2084.8810005.68 2085.02 10007.7 2085.0810010.66 2085.18
10014.89 2085.3210017.79 2085.4210022.09 2085.5710028.37 2085.7610029.28 2085.79
10029.91  2085.810036.48 2085.9710042.02 2086.0710043.67  2086.110046.08 2086.13
10050.87  2086.210054.14 2086.2310058.06 2086.2710063.79 2086.3210065.25 2086.33
10066.26 2086.3410072.45  2086.410078.37 2086.4710079.64 2086.48 10081.5  2086.5
10086.84 2086.58 10090.6  2086.610097.72 2086.6610108.76 2086.7610110.19  2086.8
10122.48 2087.3610135.77 2090.8210136.84 2091.1810137.46 2091.2210139.55 2091.41

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
 9206.22     .067 9319.79     .031  9440.2     .05 9886.17     .03110110.19     .05

Bank Sta: Left   Right     Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9236.4810139.55                316     316     316              .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main      RS: 1.081

INPUT
Description:
Station Elevation Data     num=      196
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9158.15 2086.71 9165.61 2086.74 9165.65 2086.74 9165.73 2086.74 9173.16  2086.7
 9176.69 2086.66 9180.66 2086.58 9192.94 2086.15 9201.35 2085.94 9209.79 2083.25
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 9219.48    2080 9299.78    2080 9353.91 2082.88 9361.84  2083.6 9377.23 2085.24
 9383.25 2085.92 9387.12 2086.14 9390.75 2086.25  9398.2 2086.41 9398.26 2086.41
 9398.38 2086.42 9405.76 2086.49 9409.27 2086.52 9413.26 2086.53 9420.35 2086.56
 9420.77 2086.56 9421.64 2086.56 9428.27 2086.57 9431.42 2086.57 9435.77 2086.57
  9442.5 2086.56 9443.28 2086.55 9444.91 2086.55 9450.78 2086.52 9453.57 2086.51
 9458.28 2086.48 9464.65 2086.45 9465.79 2086.45 9468.17 2086.43 9473.29  2086.4
 9475.72 2086.39 9480.79 2086.36  9486.8 2086.33  9488.3 2086.32 9491.44 2086.31
  9495.8 2086.29 9497.88 2086.28  9503.3 2086.26 9508.95 2086.25 9510.81 2086.25
  9514.7 2086.25 9518.31 2086.24 9520.03 2086.24 9525.81 2086.24  9531.1 2086.25
 9533.32 2086.25 9537.97 2086.25 9540.82 2086.25 9542.18 2086.26 9548.32 2086.27
 9549.21 2086.27 9553.27 2086.28  9555.8 2086.28 9560.98 2086.29 9563.28  2086.3
  9564.4  2086.3 9570.75 2086.32 9575.53 2086.34 9578.23 2086.34 9583.75 2086.36
 9585.71 2086.37 9586.66 2086.37 9593.18 2086.39  9597.8 2086.41 9600.66 2086.42
 9606.52 2086.43 9608.14 2086.44 9608.93 2086.44 9615.61 2086.46 9620.06 2086.47
 9623.09 2086.48 9629.29  2086.5 9630.56  2086.5 9631.19  2086.5 9638.04 2086.52
 9642.32 2086.52 9645.52 2086.53 9652.05 2086.53 9653.45 2086.53 9654.78 2086.54
 9664.58 2086.54 9674.82 2086.54 9675.61 2086.52 9680.84 2086.39 9685.46 2086.27
 9686.15 2086.25  9693.1 2086.24  9696.5 2086.22 9700.58 2086.22 9707.63 2086.19
 9708.05 2086.19 9708.92 2086.19 9715.53 2086.17 9718.76 2086.16 9723.01 2086.15
 9729.89 2086.13 9730.48 2086.13 9731.69 2086.13 9737.96 2086.12 9741.02 2086.12
 9745.43 2086.12 9752.15 2086.13 9752.91 2086.13 9754.46 2086.14 9760.39 2086.15
 9763.28 2086.16 9767.86 2086.18 9774.41 2086.21 9775.34 2086.21 9777.23 2086.22
 9782.81 2086.25 9785.54 2086.26 9790.29 2086.27 9796.68  2086.3 9797.77  2086.3
    9800  2086.3 9805.24 2086.32 9807.81 2086.32 9812.72 2086.34 9818.94 2086.34
  9820.2 2086.34 9822.77 2086.34 9827.67 2086.34 9830.07 2086.33 9835.15 2086.33
  9841.2  2086.3 9842.62  2086.3 9845.54 2086.28  9850.1 2086.25 9852.33 2086.23
 9857.58 2086.17 9857.97 2086.16 9863.46 2086.09 9865.05 2086.06 9868.31    2086
 9872.53 2085.93 9874.59 2085.88 9880.01 2085.75 9885.72 2085.59 9887.48 2085.53
 9891.08 2085.39 9894.96 2085.24 9896.85 2085.16 9902.43  2085.2 9916.79 2086.01
 9921.58 2086.29 9935.52 2082.66 9936.28 2082.44 9937.26 2082.48 9952.51 2082.96
 9954.77 2082.98 9959.39 2083.03 9962.24 2083.09 9963.64 2083.08 9969.72 2083.01
 9974.77 2082.94  9977.2 2082.91 9982.16 2082.84 9984.67  2082.8  9985.9 2082.78
 9992.15 2082.67 9997.03 2082.58 9999.62 2082.52   10000 2082.5110004.85  2082.4
10007.08 2082.34 10008.2 2082.3110014.54 2082.1210019.37 2081.9610021.99 2081.86
10027.24 2081.6910029.45 2081.6110030.55 2081.57 10036.9 2081.4110041.73 2081.47
10044.36 2081.4810049.63 2081.4710051.81  2081.410055.05 2081.4210070.43 2081.09
10081.87 2087.1710084.75  2088.8 10088.9 2089.0610094.32  2089.2   10104 2089.65
 10110.3 2089.48

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
 9158.15    .031 9377.23     .05 9921.58    .031

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9180.66   10104               315     315     315              .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 1.021

INPUT
Description:
Station Elevation Data    num=     167
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
    9190    2084    9277    2083    9297    2077    9345  2077.1    9402    2077
    9420    2083 9429.65  2083.8 9435.84 2083.85 9436.88 2083.86 9438.47 2083.87
  9444.1 2083.89 9447.78  2083.9 9451.33  2083.9 9456.77  2083.9 9458.56  2083.9
 9459.72  2083.9 9465.78 2083.91 9471.66 2083.91 9473.01 2083.91 9475.08 2083.91
 9480.23 2083.91  9483.6 2083.91 9487.46  2083.9 9493.38 2083.89 9494.69 2083.89
 9495.54 2083.88 9501.91 2083.86 9507.48 2083.84 9509.14 2083.83 9511.68 2083.83
 9516.36 2083.81 9519.42 2083.81 9523.59 2083.81 9529.99 2083.82 9530.82 2083.82
 9531.36 2083.82 9538.04 2083.85 9543.29 2083.87 9545.27 2083.88 9548.29  2083.9
 9552.49 2083.92 9555.23 2083.93 9559.72 2083.95  9566.6 2083.98 9566.95 2083.98
 9567.17 2083.99 9574.17 2084.01 9579.11 2084.03  9581.4 2084.04  9584.9 2084.06
 9588.62 2084.07 9591.05 2084.08 9591.95 2084.08 9596.01 2084.09 9602.15 2084.11
 9603.54 2084.11 9606.52 2084.12 9611.07 2084.13 9613.18 2084.13 9618.59 2084.14
 9624.21 2084.14 9626.12 2084.13 9630.22 2084.12 9633.65 2084.12 9635.24 2084.11
 9641.17 2084.09 9646.27 2084.07  9648.7 2084.05 9653.92 2084.01 9656.23    2084
  9657.3    2084 9663.75 2083.96 9668.33 2083.93 9671.28 2083.91 9677.62 2083.88
 9678.81 2083.88 9679.36 2083.87 9686.33 2083.86 9690.39 2083.85 9693.86 2083.85
 9701.32 2083.86 9701.39 2083.86 9701.42 2083.86 9708.92 2083.88 9712.45 2083.89
 9716.44 2083.91 9723.48 2083.94 9723.97 2083.95 9725.02 2083.95  9731.5 2083.98
 9734.51    2084 9739.02 2084.01 9745.54 2084.03 9746.55 2084.03 9748.72 2084.04
 9754.08 2084.05 9756.57 2084.05  9761.6 2084.05  9767.6 2084.06 9769.13 2084.05
 9772.42 2084.05 9776.66 2084.05 9778.63 2084.05 9784.18 2084.04 9789.66 2084.04
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9791.71	2084.03	9796.12	2084.04	9799.24	2084.04	9800.69	2084.05	9806.77	2084.07
9811.72	2084.11	9814.29	2084.14	9819.82	2084.21	9821.82	2084.23	9822.75	2084.24
9829.35	2084.33	9833.78	2084.4	9836.87	2084.44	9843.52	2084.5	9844.4	2084.51
9844.81	2084.51	9851.93	2084.54	9855.84	2084.53	9859.68	2084.51	9866.87	2084.45
9866.99	2084.45	9867.22	2084.44	9874.51	2084.33	9877.9	2084.28	9882.04	2084.21
9888.93	2084.09	9890.69	2084.03	9904.03	2083.61	9914.62	2083.27	9919.67	2083.09
9922.03	2082.99	9931.23	2082.79	9940.97	2082.36	9948.26	2080.74	9954.69	2078.77
9964.15	2079.2	9972.36	2079.51	9977.17	2079.62	9979.89	2079.65	9985.72	2079.64
9987.42	2079.64	9988.2	2079.63	9994.94	2079.49	9999.23	2079.36	10000	2079.33
10002.49	2079.23	10009.78	2078.91	0010.06	2078.88	10010.18	2078.88	10017.64	2078.54
10021.13	2078.41	0025.21	2078.31	0032.07	2078.21	0032.79	2078.21	10034.4	2078.13
10040.36	2077.95	10044.59	2077.76	10058.39	2077.05	10066.67	2083.87	10070.44	2087.42
10082.15	2088.32	10088.7	2088.59						

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9190	.069	9297	.03	9402	.05	9859.68	.067	9940.97	.031
10070.44	.05								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9277	10066.67	351	351	351	.1	.3

CROSS SECTION

RIVER: Sols Wash
REACH: Sols Wash Main RS: 0.955

INPUT
Description: Flow was split out to the north branch as it overtopped the island.
Station Elevation Data num= 136

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9179.26	2079.99	9182.53	2080.02	9185.9	2080.04	9189.61	2080.07	9193.21	2080.11
9196.68	2080.14	9200.24	2080.16	9203.75	2080.2	9207.17	2080.23	9210.82	2080.26
9214.58	2080.28	9217.89	2080.31	9221.12	2080.33	9224.96	2080.35	9228.91	2080.37
9232.04	2080.39	9235.08	2080.39	9239.11	2080.41	9243.25	2080.42	9246.18	2080.43
9249.03	2080.43	9253.25	2080.43	9257.59	2080.44	9260.32	2080.43	9262.99	2080.43
9267.4	2080.43	9271.73	2080.43	9271.93	2080.43	9274.47	2080.43	9276.94	2080.43
9281.54	2080.42	9286.26	2080.42	9288.61	2080.42	9290.9	2080.42	9295.68	2080.4
9300.6	2080.37	9302.75	2080.36	9304.85	2080.34	9309.83	2080.28	9314.94	2080.21
9316.9	2080.17	9318.81	2080.13	9323.97	2080.01	9329.27	2079.87	9331.04	2079.81
9336.98	2079.79	9340	2080.1	9365	2080	9400	2074	9482	2073.5
9519	2074	9530	2079	9592.69	2080.89	9597.9	2080.91	9599.76	2080.92
9601.68	2080.92	9606.84	2080.92	9611.86	2080.93	9613.91	2080.93	9616.02	2080.94
9620.98	2080.94	9625.81	2080.96	9628.05	2080.97	9630.35	2080.99	9635.12	2081.01
9639.77	2081.05	9642.2	2081.07	9644.69	2081.09	9649.27	2081.13	9653.72	2081.17
9656.34	2081.19	9659.03	2081.21	9663.41	2081.24	9667.68	2081.27	9670.48	2081.28
9673.37	2081.3	9677.55	2081.31	9681.63	2081.32	9684.63	2081.33	9687.7	2081.33
9689.11	2081.33	9692.16	2081.31	9698.37	2081.26	9700.5	2081.24	9708.63	2081.18
9708.83	2081.18	9709.7	2081.18	9717.17	2081.14	9718.9	2081.13	9725.51	2081.11
9729.16	2081.11	9733.84	2081.1	9739.42	2081.09	9742.18	2081.09	9749.69	2081.08
9750.51	2081.08	9754.09	2081.08	9758.85	2081.09	9759.95	2081.09	9767.19	2081.12
9770.21	2081.13	9775.52	2081.16	9780.48	2081.19	9783.86	2081.21	9790.74	2081.24
9792.2	2081.24	9798.48	2081.22	9800.53	2081.21	9801.01	2081.21	9813.82	2080.53
9838.26	2078.89	9856.78	2080.17	9862.59	2080.62	9867.22	2080.79	9872.85	2081.01
9875.56	2081.07	9883.12	2081.27	9883.9	2081.28	9887.27	2081.31	9892.23	2081.36
9893.38	2081.37	9900.57	2081.35	9903.64	2081.34	9905.03	2081.33	9908.9	2081.31
9913.91	2081.27	9917.24	2081.21	9924.17	2081.04	9935	2081	9946	2080
9957	2077	9965	2076	10000	2075.5	10039	2075	10055	2084
10070	2084								

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9179.26	.069	9340	.069	9400	.03	9519	.05	9935	.067
9946	.031	10055	.05						

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9365	10055	366	366	366	.1	.3

CROSS SECTION

RIVER: Sols Wash
REACH: Sols Wash Main RS: 0.886

INPUT

Description:
Station Elevation Data num= 141

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9115.27	2077.53	9117.55	2077.56	9120.81	2077.57	9127.39	2077.59	9128.27	2077.59
9128.71	2077.59	9135.73	2077.56	9139.87	2077.52	9143.2	2077.45	9148.11	2077.28
9151.5	2076.63	9161.17	2076.6	9177.75	2077.46	9184.24	2077.63	9187.48	2077.72
9201.91	2077.72	9203.38	2077.72	9208.84	2077.66	9235.55	2077.55	9255.13	2077.65
9263.89	2077.69	9272.71	2077.63	9286.68	2077.86	9290.1	2077.95	9295.77	2078.09
9307.02	2078.37	9307.4	2078.38	9307.67	2078.39	9314.85	2078.44	9318.41	2078.46
9322.32	2078.49	9329.57	2078.51	9329.78	2078.51	9330.21	2078.51	9337.24	2078.48
9340.72	2078.47	9344.71	2078.46	9351.88	2078.45	9352.17	2078.45	9352.75	2078.45
9359.63	2078.44	9363.04	2078.44	9367.1	2078.45	9374.2	2078.48	9374.56	2078.48
9375.28	2078.48	9382.02	2078.48	9382.95	2078.48	9385.36	2078.48	9389.48	2078.47
9396.52	2078.46	9396.95	2078.46	9397.82	2078.46	9405.03	2078.38	9411.68	2078.22
9419.45	2078.08	9423.95	2077.99	9438.38	2077.95	9442.76	2077.97	9447.62	2077.9
9449.39	2077.86	9450.83	2077.83	9451.95	2077.81	9468.36	2077.59	9468.76	2077.58
9469.05	2077.57	9469.25	2077.56	9470.07	2077.56	9470.27	2077.54	9471.17	2077.42
9494.25	2077.65	9494.85	2077.58	9495.03	2077.65	9501.82	2073.49	9501.92	2073.44
9502.81	2073.42	9523.35	2073.12	9529.5	2071.52	9529.72	2071.46	9530.12	2071.45
9545.02	2071.14	9549.44	2071.14	9557.85	2071.1	9569.11	2071.11	9690	2071.4
9710	2078	9713.32	2078.96	9717.87	2078.97	9720.12	2078.98	9725.33	2079
9731.28	2079.01	9732.79	2079.02	9735.85	2079.03	9740.26	2079.04	9742.44	2079.04
9747.72	2079.01	9753.6	2078.98	9755.18	2078.96	9759.02	2078.9	9770.71	2078.64
9789.79	2076.89	9790.93	2076.76	9801.34	2074.89	9816.77	2077.32	9817.77	2077.48
9818.87	2077.59	9825.19	2078.24	9827.51	2078.48	9827.92	2078.51	9836.16	2078.9
9838.07	2078.98	9844.81	2079.1	9848.22	2079.14	9853.45	2079.13	9858.37	2079.12
9862.1	2079.09	9868.52	2079.05	9870.74	2079.04	9878.67	2079.05	9879.39	2079.06
9883.52	2079.09	9888.03	2079.13	9888.82	2079.14	9896.68	2079.2	9898.97	2079.21
9905.33	2079.22	9909.12	2079.22	9913.97	2079.18	9919.27	2079.15	9922.62	2079.08
9929.42	2078.94	9931.26	2078.87	9938	2077.5	9950	2072.5	9981.53	2072.5
10047.69	2072.51	10054.72	2075.34	10065.4	2080.94	10079.12	2080.92	10085.79	2081.04
10088.81	2081.04								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9115.27	.067	9382.95	.067	9501.82	.031	9690	.05	9950	.031

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9494.25	10088.81	336	336	336	.1	.3

CROSS SECTION

RIVER: Sols Wash
REACH: Sols Wash Main RS: 0.822

INPUT
Description:
Station Elevation Data num= 121

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9171.05	2075.61	9174.35	2075.66	9175.56	2075.66	9179.6	2075.68	9183.59	2075.68
9184.79	2075.68	9191.62	2075.66	9195.23	2075.63	9199.64	2075.57	9211.91	2074.96
9217.11	2074.74	9220.2	2074.61	9224.98	2074.75	9243.75	2075.38	9255.85	2075.75
9263.86	2075.99	9268.34	2076.06	9271.88	2076.08	9278.78	2076.13	9279.91	2076.14
9283.66	2076.16	9287.94	2076.18	9289.22	2076.19	9295.96	2076.23	9299.67	2076.26
9303.99	2076.29	9310.11	2076.34	9312.02	2076.35	9318.35	2076.39	9320.04	2076.4
9320.55	2076.4	9328.07	2076.42	9331	2076.42	9336.1	2076.41	9341.44	2076.4
9344.12	2076.39	9351.88	2076.33	9352.15	2076.33	9353.03	2076.32	9360.18	2076.25
9362.33	2076.22	9368.2	2076.14	9372.77	2076.05	9376.23	2075.99	9383.21	2075.84
9384.26	2075.82	9387.72	2075.72	9392.28	2075.6	9393.66	2075.55	9402.71	2074.95
9412.18	2074.36	9434.71	2074.75	9440.96	2074.89	9456.27	2075.82	9456.5	2075.83
9457.1	2075.85	9464.53	2076.14	9466.76	2076.2	9472.55	2076.28	9477.21	2076.31
9480.09	2076.32	9480.58	2076.32	9487.65	2076.29	9488.61	2076.27	9491.78	2076.2
9497	2076.1	9512	2076	9532	2075	9538	2074	9554	2070
9648	2069.4	9722	2069.4	9730	2074	9750	2075	9768.71	2076.04
9772.15	2076.12	9778.84	2076.27	9780.86	2076.3	9788.97	2076.44	9789.58	2076.44
9793.32	2076.48	9798.3	2076.54	9799.1	2076.54	9807.01	2076.59	9808.8	2076.6
9809.23	2076.61	9815.73	2076.63	9819.37	2076.64	9824.44	2076.66	9829.5	2076.67
9833.16	2076.67	9839.63	2076.68	9841.88	2076.69	9849.76	2076.71	9850.59	2076.71
9855.73	2076.73	9859.31	2076.75	9859.89	2076.75	9864.88	2076.78	9868.02	2076.79
9870.02	2076.8	9876.74	2076.84	9880.15	2076.85	9885.46	2076.86	9890.28	2076.87
9894.17	2076.85	9900.41	2076.81	9902.89	2076.77	9910.54	2076.64	9911.6	2076.61
9918.15	2076.42	9920.32	2076.36	9920.67	2076.35	9925	2075.2	9940	2075
9945	2074	9955	2070	10000	2069.8	10060	2070	10075	2079
10090	2079								

Manning's n Values num= 7

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9171.05	.069	9497	.069	9554	.03	9722	.05	9925	.067
9955	.031	10075	.05						

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9512	10075	200	200	200	.1	.3

CROSS SECTION

RIVER: Sols Wash
REACH: Sols Wash Main RS: 0.785

INPUT
Description:
Station Elevation Data num= 107

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9252	2073.49	9254.89	2073.51	9262.17	2073.55	9262.94	2073.56	9265.57	2073.58
9270.99	2073.63	9272.59	2073.64	9279.04	2073.66	9283.02	2073.65	9287.09	2073.62
9296.51	2073.32	9309.83	2072.83	9321.51	2072.66	9336.47	2072.66	9339.17	2072.8
9344.38	2073.07	9355.96	2073.64	9359.54	2073.82	9366.43	2073.96	9367.6	2073.98
9371.53	2074.03	9375.65	2074.07	9376.86	2074.08	9383.7	2074.14	9387.29	2074.16
9391.75	2074.21	9397.71	2074.24	9399.8	2074.26	9406.85	2074.29	9407.85	2074.3
9408.14	2074.3	9415.9	2074.26	9418.57	2074.23	9423.95	2074.13	9430.79	2073.91
9445.88	2073.04	9451.43	2073.04	9460.91	2073.14	9471	2073.21	9475.51	2073.3
9490.7	2074.02	9496.4	2074.26	9501.98	2074.42	9504.45	2074.47	9512.41	2074.58
9512.5	2074.58	9512.8	2074.58	9517.27	2074.6	9520.55	2074.62	9522.83	2074.61
9528.6	2074.57	9533.26	2074.46	9535	2074.5	9559	2074.33	9577	2074
9588	2073	9600	2072	9613	2068	9632	2068	9687	2068.2
9759	2069	9770	2074	9770.1	2074.74	9773.07	2074.77	9778.15	2074.8
9780.57	2074.82	9783.5	2074.85	9786.2	2074.88	9793.92	2074.97	9794.26	2074.98
9795.38	2074.99	9802.31	2075.09	9803.53	2075.11	9804.32	2075.12	9811.08	2075.21
9814.41	2075.24	9819.97	2075.29	9824.5	2075.32	9828.87	2075.32	9834.59	2075.34
9837.77	2075.33	9842.57	2075.33	9844.68	2075.33	9846.67	2075.33	9854.77	2075.32
9855.57	2075.32	9861.58	2075.32	9864.47	2075.32	9864.86	2075.32	9873.37	2075.3
9874.94	2075.3	9882.27	2075.27	9885.03	2075.26	9891.17	2075.19	9895.12	2075.16
9900.07	2075.05	9905.21	2074.93	9908.96	2074.76	9910	2074.2	9925	2074
9935	2073	9945	2069	10000	2068.4	10060	2068	10074	2076
10080	2077	10095	2077						

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9252	.069	9535	.069	9613	.03	9759	.067	9945	.031
10074	.05								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9577	10080	200	200	200	.1	.3

CROSS SECTION

RIVER: Sols Wash
REACH: Sols Wash Main RS: 0.746

INPUT
Description: Filled right overbank approximately 2'.
Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9395.96	2072.08	9398.46	2072.12	9400.21	2072.14	9400.67	2072.14	9408.38	2072.18
9411.01	2072.19	9416.56	2072.21	9421.36	2072.2	9424.74	2072.2	9431.7	2072.15
9432.92	2072.15	9437.51	2072	9441.1	2071.89	9442.14	2071.84	9458.55	2070.5
9460.74	2070.65	9467.81	2071.32	9488.27	2071.88	9492.1	2072.06	9494.84	2072.03
9511.95	2071.89	9521.27	2071.92	9530.66	2072.01	9540.44	2072	9550.71	2072.03
9562.52	2072.44	9566.18	2072.59	9566.98	2072.61	9571.96	2072.74	9576.53	2072.87
9580.13	2072.91	9586.87	2072.99	9588.31	2072.99	9593.74	2072.95	9596.49	2072.93
9597.22	2072.93	9600.39	2072.79	9623	2072.6	9638	2072	9653	2068
9665	2067	9695	2066.83	9830	2066.77	10000	2066.63	10058	2066.7
10075	2073								

Manning's n Values num= 2

Sta	n Val	Sta	n Val
9395.96	.069	9665	.03

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9623   10075              200     200     200             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.708

INPUT
Description: Filled right overbank approximately 2'.
Station Elevation Data    num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9662    2071    9675    2070    9706    2066    9715 2065.32    9840  2065.2
   10000  2065.1   10067    2065   10085  2072.4

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
*******************************
    9662    .069    9715     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9662   10085              240     215     215             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.668

INPUT
Description: Filled right overbank approximately 2'.
Station Elevation Data    num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9718  2072.5    9718 2066.32  9719.5 2066.32  9719.5 2063.32   10000  2063.3
 10087.3  2063.3   10108  2071.4

Manning's n Values        num=       1
     Sta   n Val
****************
    9718     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9718   10108              160     135     135             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.642

INPUT
Description: Filled right overbank approximately 2'.
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9792  2072.5    9792  2070.4    9802  2067.9    9802  2064.9  9803.5  2064.9
  9803.5  2062.1   10000  2062.1   10097  2062.1 10119.5  2070.8

Manning's n Values        num=       1
     Sta   n Val
****************
    9792     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9792 10119.5               135     150     150             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.614

INPUT
Description: Filled right overbank approximately 2'.
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
*****************************************************************************
    9880  2071.5    9880  2069.4  9890.5  2066.9  9890.5  2063.9    9892  2063.9
    9892  2060.9   10000  2060.8 10103.5  2060.9   10127  2070.2

Manning's n Values        num=       1
     Sta   n Val
****************
    9880     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9880   10127              120     120     120             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.592

INPUT
Description: Filled right overbank approximately 2'.
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
    9901  2071.5    9901  2070.7    9909  2068.7    9909  2065.7  9910.5  2065.7
  9910.5  2062.7    9912  2062.7    9912  2059.8   10000  2059.7   10105  2059.8
   10130  2069.8   10130    2071

Manning's n Values        num=       1
     Sta   n Val
****************
    9901     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9901   10130              180     180     180             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.557

INPUT
Description: Filled right overbank approximately 2'.
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  9893.5  2070.5  9893.5  2069.3    9902  2067.3    9902  2064.3  9903.5  2064.3
  9903.5  2061.3    9905  2061.3    9905  2058.5   10000  2058.3   10102  2058.5
   10127  2068.5   10127    2071

Manning's n Values        num=       1
     Sta   n Val
****************
  9893.5     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9893.5   10127              150     150     150             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.529

INPUT
Description: Filled right overbank approximately 2'.
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
    9879  2070.5    9879    2068  9887.5    2066  9887.5    2063    9889    2063
    9889    2060  9890.5    2060  9890.5  2057.3   10000  2057.2   10094  2057.3
   10119  2067.3   10119    2071

Manning's n Values        num=       1
     Sta   n Val
****************
    9879     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
```

```
          9879   10119              130     130     130             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.505

INPUT
Description: Filled right overbank approximately 2'.
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9897  2070.5    9897    2067    9905    2065    9905    2062  9906.5    2062
  9906.5    2059    9908    2059    9908  2056.4   10000  2056.4 10084.5  2056.4
   10110  2066.4   10110  2070.5

Manning's n Values        num=       1
     Sta   n Val
****************
    9897     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9897   10110              100     100     100             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.485

INPUT
Description: Filled right overbank approximately 2'.
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9910  2070.5    9910  2066.2    9918  2064.2    9918  2061.2  9919.5  2061.2
  9919.5  2058.2    9921  2058.2    9921  2055.5   10000  2055.5 10081.3  2055.5
 10081.3  2070.5

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
*******************************
    9910     .03 10081.3    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9910 10081.3              100     100     100             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.467

INPUT
Description: Filled right overbank approximately 2'.
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9923  2070.5    9923  2065.4    9931  2063.4    9931  2060.4  9932.5  2060.4
  9932.5  2057.4    9934  2057.4    9934  2054.7   10000  2054.7   10084  2054.7
   10084  2070.5

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
*******************************
    9923     .03   10084    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9923   10084              95      95      95              .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.447

INPUT
Description: This cross section was skewed by hand an angle of 42.5 degrees
```

```
Station Elevation Data     num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  9930.5  2070.5  9930.5  2062.9  9935.8 2060.23  9935.8 2057.23  9937.3 2057.23
  9937.3 2054.23   10000 2053.68 10091.2 2052.88 10091.2  2070.5

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
  9930.5    .013  9935.8     .03 10091.2    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9930.5 10091.2                25      25      25              .3       .5

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.442

INPUT
Description: This cross section was skewed to match the bridge skew of 45
             degrees
Station Elevation Data     num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  9944.5  2070.5  9944.5 2054.16   10000 2053.57   10100 2052.78   10100  2070.5

Manning's n Values         num=       2
     Sta   n Val     Sta   n Val
*******************************
  9944.5     .03   10100    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9944.5   10100                170     170     170              .3       .5
Blocked Obstructions      num=       5
   Sta L   Sta R    Elev   Sta L   Sta R    Elev   Sta L   Sta R    Elev
*****************************************************************************
  9968.6 9969.85 2063.36    9995 9996.25 2063.36 10021.410022.65 2063.36
 10047.810049.05 2063.36 10074.210075.45 2063.36

BRIDGE


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.423

INPUT
Description: U/S Modeled with 2.75 ft parapet extension
Distance from Upstream XS =       5
Deck/Roadway Width        =     145
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=      28
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*********************************************************************
    9903  2066.5         9943.69  2066.5          9943.7 2070.29 2062.75
    9948 2070.29 2063.08 9964.32 2070.29 2063.08 9968.62 2070.29 2062.75
 9969.87 2070.29 2062.75 9974.17 2070.29 2063.08 9990.82 2070.29 2063.08
 9995.13 2070.29 2062.75 9996.38 2070.29 2062.7510000.68 2070.29 2063.08
10016.95 2070.29 2063.0810021.25 2070.29 2062.75 10022.5 2070.29 2062.75
 10026.8 2070.29 2063.0810043.77 2070.29 2063.0810048.07 2070.29 2062.75
10049.32 2070.29 2062.7510053.62 2070.29 2063.0810070.21 2070.29 2063.08
 10074.5 2070.29 2062.7510075.76 2070.29 2062.7510080.06 2070.29 2063.08
10096.38 2070.29 2063.0810100.67 2070.29 2062.7510100.68  2066.5
   10141  2066.5

Upstream Bridge Cross Section Data
Station Elevation Data     num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  9944.5  2070.5  9944.5 2054.16   10000 2053.57   10100 2052.78   10100  2070.5

Manning's n Values         num=       2
     Sta   n Val     Sta   n Val
*******************************
  9944.5     .03   10100    .013

Bank Sta: Left   Right    Coeff Contr.   Expan.
```

```
        9944.5   10100              .3        .5
Blocked Obstructions      num=       5
   Sta L   Sta R    Elev   Sta L   Sta R    Elev   Sta L   Sta R    Elev
*****************************************************************************
  9968.6 9969.85 2063.36    9995 9996.25 2063.36 10021.410022.65 2063.36
 10047.810049.05 2063.36 10074.210075.45 2063.36

Downstream  Deck/Roadway Coordinates
    num=       28
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*****************************************************************************
    9877  2066.5         9917.27  2066.5         9917.28 2067.54 2062.75
 9921.58 2067.54 2063.08  9939.5 2067.54 2063.08  9943.8 2067.54 2062.75
 9945.05 2067.54 2062.75 9949.35 2067.54 2063.08 9968.24 2067.54 2063.08
 9972.54 2067.54 2062.75 9973.79 2067.54 2062.75 9978.09 2067.54 2063.08
 9994.53 2067.54 2063.08 9998.83 2067.54 2062.7510000.08 2067.54 2062.75
10004.38 2067.54 2063.0810020.96 2067.54 2063.0810025.26 2067.54 2062.75
10026.51 2067.54 2062.7510030.81 2067.54 2063.0810047.32 2067.54 2063.08
10051.62 2067.54 2062.7510052.87 2067.54 2062.7510057.17 2067.54 2063.08
10074.12 2067.54 2063.0810078.41 2067.54 2062.7510078.42  2066.5
   10119  2066.5

Downstream Bridge Cross Section Data
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9929  2065.5    9929 2052.24   10000 2052.15   10084 2051.44   10084  2065.5

Manning's n Values        num=       1
     Sta   n Val
****************
    9929     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
          9929   10084              .3        .5

Upstream Embankment side slope              =      .1 horiz. to 1.0 vertical
Downstream Embankment side slope            =      .1 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         = 2070.29
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  5

Pier Data
Pier Station     Upstream=9969.245    Downstream=9944.431
Upstream     num=       2
    Width   Elev    Width   Elev
*******************************
    1.25  1949.5    1.25 2063.97
Downstream     num=       2
    Width   Elev    Width   Elev
*******************************
    1.25  1949.5    1.25 2063.97
Debris Width  =      2.5
Debris Height =     2064

Pier Data
Pier Station     Upstream=9995.747    Downstream=9973.167
Upstream     num=       2
    Width   Elev    Width   Elev
*******************************
    1.25  1949.5    1.25 2063.97
Downstream     num=       2
    Width   Elev    Width   Elev
*******************************
    1.25  1949.5    1.25 2063.97
Debris Width  =      2.5
Debris Height =     2064

Pier Data
Pier Station     Upstream=10021.87    Downstream=9999.458
Upstream     num=       2
    Width   Elev    Width   Elev
*******************************
    1.25  1949.5    1.25 2063.97
Downstream     num=       2
```

```
    Width   Elev    Width   Elev
*******************************
    1.25  1949.5    1.25 2063.97
Debris Width  =      2.5
Debris Height =     2064

Pier Data
Pier Station     Upstream=10048.69    Downstream=10025.88
Upstream     num=       2
    Width   Elev    Width   Elev
*******************************
    1.25  1949.5    1.25 2063.97
Downstream     num=       2
    Width   Elev    Width   Elev
*******************************
    1.25  1949.5    1.25 2063.97
Debris Width  =      2.5
Debris Height =     2064

Pier Data
Pier Station     Upstream=10075.13    Downstream=10052.24
Upstream     num=       2
    Width   Elev    Width   Elev
*******************************
    1.25  1949.5    1.25 2063.97
Downstream     num=       2
    Width   Elev    Width   Elev
*******************************
    1.25  1949.5    1.25 2063.97
Debris Width  =      2.5
Debris Height =     2064

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum                Cd   =    1.33
       Yarnell                 KVal =      .9
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =      .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.412

INPUT
Description: Station adjusted to account for 45 degree skew.
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
    9929  2065.5    9929 2052.24   10000 2052.15   10084 2051.44   10084  2065.5

Manning's n Values        num=       1
     Sta   n Val
***************
    9929     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9929   10084              120     120     120              .3       .5

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.389
```

```
INPUT
Description: roadway in left over bank at Elev=2057.4 +/-
parking lot in right
             over bank at Elev=2063+/-
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  9923.5  2065.5  9923.5  2051.3   10000  2051.3 10076.5  2051.3 10076.5 2054.16
   10078 2054.16   10078 2057.16 10079.5 2057.16 10079.5 2060.16 10086.5    2062
 10086.5  2065.5

Manning's n Values        num=       1
     Sta   n Val
****************
  9923.5     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9923.5 10086.5              155     155     155              .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.359

INPUT
Description:
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9926  2064.3    9926  2056.5  9933.5    2056  9936.5    2056  9936.5    2053
    9938    2053    9938  2050.1   10000  2050.1   10067  2050.1   10067  2052.7
 10068.5  2052.7 10068.5  2055.7   10070  2055.7   10070  2058.7   10073  2058.7
   10088  2059.2   10088  2065.5

Manning's n Values        num=       1
     Sta   n Val
****************
    9926     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9926   10088              275     279     275              .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.306

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9954  2064.3    9954  2056.3    9964 2053.87    9964 2050.87  9965.5 2050.87
  9965.5 2047.87   10000  2047.2 10075.5  2047.2 10075.5  2050.1   10077  2050.1
   10077  2053.1 10078.5  2053.1 10078.5  2056.1 10089.5  2059.1 10089.5  2065.5

Manning's n Values        num=       1
     Sta   n Val
****************
    9954     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9954 10089.5                96     100     106              .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.288

INPUT
Description:
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  9940.5    2063  9940.5 2055.47    9951  2052.8    9951  2049.8  9952.5  2049.8
```

```
  9952.5  2046.8   10000  2046.8   10063  2046.8   10063  2049.8 10064.5  2049.8
 10064.5  2052.8   10066  2052.8   10066  2055.8   10077  2058.8   10077  2063.3

Manning's n Values        num=       1
     Sta   n Val
****************
  9940.5     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9940.5   10077              318     318     318             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.227

INPUT
Description:
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  9927.5  2062.3  9927.5 2055.17    9938  2052.5    9938  2049.5  9939.5  2049.5
  9939.5  2046.5   10000  2046.5   10046  2046.5   10046  2049.5 10047.5  2049.5
 10047.5  2052.5   10049  2052.5   10049  2055.5 10050.5  2055.5 10050.5  2057.4
 10053.5  2057.4 10062.5    2058 10062.5  2062.5

Manning's n Values        num=       1
     Sta   n Val
****************
  9927.5     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9927.5 10062.5              40      40      40             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.220

INPUT
Description:
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  9929.5  2062.3  9929.5 2055.07    9940  2052.4    9940  2049.4  9941.5  2049.4
  9941.5  2046.4   10000  2046.4   10045  2046.4   10045  2049.4 10046.5  2049.4
 10046.5  2052.4   10048  2052.4   10048  2055.4 10049.5  2055.4 10049.5  2058.4
   10062  2061.4   10062  2063.5

Manning's n Values        num=       1
     Sta   n Val
****************
  9929.5     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9929.5   10062              40      40      40             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.212

INPUT
Description:
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  9931.5  2061.3  9932.5  2061.3  9932.5  2052.5  9939.5    2052  9942.5    2052
  9942.5    2049    9944    2049    9944  2046.4   10000  2046.4   10046  2046.4
   10046  2049.4 10047.5  2049.4 10047.5  2052.4   10049  2052.4   10049  2055.4
 10050.5  2055.4 10050.5  2058.4   10052  2058.4   10052  2061.4   10055  2061.4
 10060.5  2062.3   10066  2062.3

Manning's n Values        num=       1
     Sta   n Val
****************
```

```
  9931.5     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9932.5   10052               40      40      40             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.204

INPUT
Description: Upstream of drop, beginning of toe-in/cuf off wall
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9928  2060.7    9929  2060.7    9929  2055.3  9941.5  2053.3  9944.5  2053.3
  9944.5  2052.3    9946  2052.3    9946  2049.3  9947.5  2049.3  9947.5  2046.3
   10000  2046.3 10047.5  2046.3 10047.5  2049.3   10049  2049.3   10049  2052.3
 10050.5  2052.3 10050.5  2055.3   10052  2055.3   10052  2058.3 10053.5  2058.3
 10053.5  2061.3   10055  2061.3   10055  2062.3   10067  2062.3

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************************
    9928    .014    9929    .033  9947.5     .03 10047.5    .033

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9929   10055               20      20      20             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.201

INPUT
Description: Top of drop structure.  Cross sections were used to modeled the
             drop structure as opposed to an inline-weir.
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9926  2060.7    9927  2060.7    9927  2057.4  9941.5  2056.3  9944.5  2056.3
  9944.5  2053.3    9946  2053.3    9946  2050.3  9947.5  2050.3  9947.5  2046.3
   10000  2046.3   10049  2046.3   10049  2049.3 10050.5  2049.3 10050.5  2052.3
   10052  2052.3   10052  2055.3 10053.5  2055.3 10053.5  2058.3   10055  2058.3
   10055  2061.3 10056.5  2061.3 10056.5  2062.3   10062  2062.3

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************************
    9926    .014    9927    .033  9947.5    .014   10049    .033

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9944.5 10056.5               15      15      15             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.198

INPUT
Description: Halfway down drop structure.
Station Elevation Data    num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9924  2060.3    9924  2057.3  9938.5 2056.66  9941.5 2056.66  9941.5 2054.66
    9943 2054.66    9943 2051.66  9944.5 2051.66  9944.5 2048.66    9946 2048.66
    9946 2045.66    9947 2045.66    9956 2042.55   10000 2042.55   10038 2042.55
   10047 2045.66   10048 2045.66   10048 2048.66 10049.7 2048.66 10049.7 2051.66
 10051.4 2051.66 10051.4 2054.66 10053.1 2054.66 10053.1 2057.66 10054.8 2057.66
 10054.8 2060.66 10056.5 2060.66 10056.8 2061.66   10067 2061.66

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
    9924    .033    9946    .014   10048    .033
```

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9941.5	10056.5	19	19	19	.1	.3

CROSS SECTION

RIVER: Sols Wash
REACH: Sols Wash Main RS: 0.195

INPUT
Description: Toe of drop structure.
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9921	2059.8	9921	2058.48	9936.5	2056.93	9939.5	2056.93	9939.5	2053.93
9941	2053.93	9941	2050.93	9942.5	2050.93	9942.5	2047.93	9944	2047.93
9944	2044.93	9945	2044.93	9966	2037.8	10000	2037.8	10027	2037.8
10049	2044.7	10050	2044.7	10050	2047.7	10051.5	2047.7	10051.5	2050.7
10053	2050.7	10053	2053.7	10054.5	2053.7	10054.5	2056.7	10056	2056.7
10056	2059.7	10057.5	2059.7	10057.5	2060.7	10060.5	2060.7		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9921	.033	9944	.014	10050	.033

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9939.5	10057.5	11	11	11	.1	.3

CROSS SECTION

RIVER: Sols Wash
REACH: Sols Wash Main RS: 0.192

INPUT
Description:
Station Elevation Data num= 31

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9919	2059.8	9919	2058.38	9933	2058.38	9936	2058.38	9936	2056.38
9937.5	2056.38	9937.5	2053.38	9939	2053.38	9939	2050.38	9940.5	2050.38
9940.5	2047.38	9942	2047.38	9942	2044.38	9943	2044.38	9963	2037.74
10000	2037.74	10030	2037.74	10049	2044.11	10050	2044.11	10050	2047.11
10051.5	2047.11	10051.5	2050.11	10053	2050.11	10053	2053.11	10054.5	2053.11
10054.5	2056.11	10056	2056.11	10056	2059.11	10057.5	2059.11	10057.5	2060.11
10060.5	2060.11								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9919	.016	9933	.033	9942	.014	10050	.033

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9936	10057.5	14	14	14	.1	.3

CROSS SECTION

RIVER: Sols Wash
REACH: Sols Wash Main RS: 0.189

INPUT
Description:
Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9934.5	2059.6	9934.5	2058.74	9936	2058.74	9936	2055.74	9937.5	2055.74
9937.5	2052.74	9939	2052.74	9939	2049.74	9940.5	2049.74	9940.5	2046.74
9942	2046.74	9942	2043.74	9943	2043.74	9959	2037.67	10000	2037.67
10033	2037.67	10051	2043.56	10052	2043.56	10052	2046.56	10053.5	2046.56
10053.5	2049.56	10055	2049.56	10055	2052.59	10056.5	2052.56	10056.5	2055.56
10058	2055.56	10058	2058.56	10059.5	2058.56	10059.5	2060.56	10062.5	2060.56

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9934.5	.033	9942	.014	10052	.033

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9936 10059.5               14      14      14             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.187

INPUT
Description:
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9926 2060.08    9929 2060.08    9929 2058.08  9930.5 2058.08  9930.5 2055.08
    9932 2055.08    9932 2052.08  9933.5 2052.08  9933.5 2049.08    9935 2049.08
    9935 2046.08  9936.5 2046.08  9936.5 2043.08  9937.5 2043.08  9954.5  2037.6
   10000  2037.6 10035.5  2037.6   10052 2043.08   10053 2043.08   10053 2046.08
 10054.5 2046.08 10054.5 2049.08   10056 2049.08   10056 2052.08 10057.5 2052.08
 10057.5 2055.08   10059 2055.08   10059 2058.08 10060.5 2058.08 10060.5 2060.08
 10063.5 2060.08

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    9926    .033  9936.5    .014   10053    .033

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9929 10060.5               10      10      10             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.184

INPUT
Description:
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  9923.5 2059.58  9926.5 2059.58  9926.5 2057.58    9928 2057.58    9928 2054.58
  9929.5 2054.58  9929.5 2051.58    9931 2051.58    9931 2048.58  9932.5 2048.58
  9932.5 2045.58    9934 2045.58    9934 2042.58    9935 2042.58    9951 2037.56
   10000 2037.56   10037 2037.56   10052 2042.58   10053 2042.58   10053 2045.58
 10054.5 2045.58 10054.5 2048.58   10056 2048.58   10056 2051.58 10057.5 2051.58
 10057.5 2054.58   10059 2054.58   10059 2057.58 10060.5 2057.58 10060.5 2060.58
 10063.5 2060.58

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  9923.5    .033    9934    .014   10053    .033

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9926.5 10060.5               17      17      17             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.182

INPUT
Description:
Station Elevation Data    num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9908  2059.8    9911  2059.8    9911  2058.8  9923.5  2058.8  9923.5  2056.8
    9925  2056.8    9925  2053.8  9926.5  2053.8  9926.5  2050.8    9928  2050.8
    9928  2047.8  9929.5  2047.8  9929.5  2044.8    9931  2044.8    9931  2041.8
   10000  2041.8   10056  2041.8   10056  2044.8 10057.5  2044.8 10057.5  2047.8
   10059  2047.8   10059  2050.8 10060.5  2050.8 10060.5  2053.8   10062  2053.8
   10062  2056.8 10063.5  2056.8 10063.5  2059.8   10075  2059.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    9908    .033    9931    .014   10056    .033
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9923.5 10063.5                 10      10      10             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.180

INPUT
Description:
Station Elevation Data    num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
    9902  2059.8    9905  2059.8    9905  2057.8    9921  2057.8    9921  2056.8
  9922.5  2056.8  9922.5  2053.8    9924  2053.8    9924  2050.8  9925.5  2050.8
  9925.5  2047.8    9927  2047.8    9927  2044.8  9928.5  2044.8  9928.5  2041.8
   10000  2041.8   10058  2041.8   10058  2044.8 10059.5  2044.8 10059.5  2047.8
   10061  2047.8   10061  2050.8 10062.5  2050.8 10062.5  2053.8   10064  2053.8
   10064  2056.8 10065.5  2056.8 10065.5  2059.8   10075  2059.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    9902    .033  9928.5     .03   10058    .033

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9921 10065.5                 58      58      58             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.169

INPUT
Description:
Station Elevation Data    num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
 9888.63 2059.52 9888.64 2056.52 9890.19 2056.52  9890.2 2053.52 9891.75 2053.52
 9891.76 2049.75 9907.33 2049.75 9907.34 2051.52 9910.46 2051.52 9910.47 2050.52
 9912.05 2050.52 9912.06 2047.52 9913.58 2047.52 9913.59 2044.52 9915.14 2044.52
 9915.15  2041.8   10000  2041.810071.07  2041.810071.08 2044.6410072.59 2044.64
 10072.6 2047.6410074.11 2047.6410074.12 2050.6410075.62 2050.6410075.63 2053.64
10077.14 2053.6410077.15 2056.6410078.66 2056.6410078.67 2059.64

Manning's n Values        num=       1
     Sta   n Val
****************
 9888.63     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9888.6310078.67                 50      50      50             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.159

INPUT
Description:
Station Elevation Data    num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
 9875.54 2059.31 9875.55 2056.31  9877.1 2056.31 9877.11 2053.31 9878.66 2053.31
 9878.67 2050.31 9880.22 2050.31 9880.23 2047.31 9881.76 2047.31 9881.77 2044.64
 9897.35 2044.64 9897.36 2046.31 9900.46 2046.31 9900.47 2044.31 9902.02 2044.31
 9902.03  2041.8   10000  2041.810078.59  2041.8 10078.6 2044.5110080.11 2044.51
10080.12 2047.5110081.62 2047.5110081.63 2050.5110083.14 2050.5110083.15 2053.51
10084.66 2053.5110084.67 2056.5110086.17 2056.5110086.18 2059.51

Manning's n Values        num=       1
     Sta   n Val
****************
 9875.54     .03
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9875.5410086.18               50      50      50             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.150

INPUT
Description:
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9858 2059.09    9858 2056.09  9859.5 2056.09  9859.5 2053.09    9861 2053.09
    9861 2050.09  9862.5 2050.09  9862.5 2047.09    9864 2047.09    9864 2044.09
  9865.5 2044.09  9865.5  2041.7   10000  2041.710084.41  2041.710084.42 2044.39
10085.93 2044.3910085.94 2047.3910087.44 2047.3910087.45 2050.3910088.96 2050.39
10088.97 2053.3910090.48 2053.3910090.49 2056.3910091.99 2056.39   10092 2059.39

Manning's n Values        num=       1
     Sta   n Val
****************
    9858     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9858   10092            12.19      50   78.09             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.140

INPUT
Description:
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9854 2059.04    9854 2056.04  9855.5 2056.04  9855.5 2053.04    9857 2053.04
    9857 2050.04  9858.5 2050.04  9858.5 2047.04    9860 2047.04    9860 2044.04
  9861.5 2044.04  9861.5  2041.6   10000  2041.610099.09  2041.6 10099.1 2044.19
10100.67 2044.1910100.68 2047.1910102.25 2047.1910102.26 2050.1910103.83 2050.19
10103.84 2053.1910105.41 2053.1910105.42 2056.1910106.99 2056.19   10107 2059.19

Manning's n Values        num=       1
     Sta   n Val
****************
    9854     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9854   10107            12.66      40   67.35             .1       .3

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.132

INPUT
Description: Just upstream of the proposed ADOT superbox.  Cross section skewed
             by hand to an angle of 24.5 degrees.
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
  9863.5 2058.98  9863.5 2055.98    9865 2055.98    9865 2052.98  9866.5 2052.98
  9866.5 2049.98    9868 2049.98    9868 2046.98  9869.5 2046.98  9869.5 2043.98
    9871 2043.98    9871  2041.5  9874.6  2041.5   10000  2041.5 10100.4  2041.5
   10106  2041.5   10106 2043.98 10107.5 2043.98 10107.5 2046.98   10109 2046.98
   10109 2049.98 10110.5 2049.98 10110.5 2052.98   10112 2052.98   10112 2055.98
 10113.5 2055.98 10113.5 2058.98

Manning's n Values        num=       1
     Sta   n Val
****************
  9863.5     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9863.5 10113.5              140     127     135             .3       .5
```

```
Skew Angle = 25

BRIDGE


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.121

INPUT
Description:
Distance from Upstream XS =      21
Deck/Roadway Width        =      78
Weir Coefficient          =     2.6
Bridge Deck/Roadway Skew  =      25
Upstream  Deck/Roadway Coordinates
    num=       4
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*****************************************************************************
9708.216 2056.48        9883.132 2057.66 2055.8310109.71 2058.32 2056.49
10232.63 2058.75

Upstream Bridge Cross Section Data
Station Elevation Data    num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  9863.5 2058.98  9863.5 2055.98    9865 2055.98    9865 2052.98  9866.5 2052.98
  9866.5 2049.98    9868 2049.98    9868 2046.98  9869.5 2046.98  9869.5 2043.98
    9871 2043.98    9871  2041.5  9874.6  2041.5   10000  2041.5 10100.4  2041.5
   10106  2041.5   10106 2043.98 10107.5 2043.98 10107.5 2046.98   10109 2046.98
   10109 2049.98 10110.5 2049.98 10110.5 2052.98   10112 2052.98   10112 2055.98
 10113.5 2055.98 10113.5 2058.98

Manning's n Values        num=       1
     Sta   n Val
****************
  9863.5     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
        9863.5 10113.5            .3       .5
Skew Angle = 25

Downstream  Deck/Roadway Coordinates
    num=       4
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*****************************************************************************
9708.216 2056.48        9883.132 2057.66 2055.8310109.71 2058.32 2056.49
10232.63 2058.75

Downstream Bridge Cross Section Data
Station Elevation Data    num=      44
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
    9765  2057.5    9785  2057.5    9820  2044.3    9820 2044.27 9869.81 2044.27
 9877.58 2044.23 9884.37 2044.17 9889.17 2044.14 9898.92  2044.1 9900.75  2044.1
 9907.89 2044.11 9912.33 2044.12 9913.48 2044.12 9923.92 2044.14 9928.02 2044.12
  9935.5 2044.02 9953.65 2043.33 9956.77 2043.26 9957.17 2043.19  9957.3 2043.19
 9958.54 2043.09 9979.01 2041.21 9988.89 2041.41 9999.66 2041.3810003.14 2041.45
   10005 2041.4710013.07 2041.5810015.93 2041.6210016.23 2041.6310016.63 2041.63
10026.66 2041.8510034.27 2042.0110037.09 2042.0710040.79 2042.1810047.51 2042.37
10051.74 2042.3110064.72 2042.4510072.08 2046.0110078.45 2048.6710083.54  2048.8
   10095     2049   10095     2055   10120     2057   10180     2058

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
    9765    .018    9785    .063 9928.02    .03510078.45    .021   10095    .013
   10120    .018

Bank Sta: Left   Right    Coeff Contr.   Expan.
        9928.0210078.45            .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
    9765 9868.07    2055        F
Skew Angle = 25

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
```

```
Energy head used in spillway design          =
Spillway height used in design               =
Weir crest shape                             = Broad Crested

Number of Piers =  6

Pier Data
Pier Station     Upstream=9909.323    Downstream=9909.323
Upstream     num=       2
    Width   Elev    Width   Elev
*********************************
    1.25    2036    1.25    2056
Downstream     num=       2
    Width   Elev    Width   Elev
*********************************
    1.25    2036    1.25    2056
Debris Width  =      2.5
Debris Height =     2057

Pier Data
Pier Station     Upstream=9941.517    Downstream=9941.517
Upstream     num=       2
    Width   Elev    Width   Elev
*********************************
    1.25    2036    1.25  2056.3
Downstream     num=       2
    Width   Elev    Width   Elev
*********************************
    1.25    2036    1.25  2056.3
Debris Width  =      2.5
Debris Height =     2057

Pier Data
Pier Station     Upstream=9973.708    Downstream=9973.708
Upstream     num=       2
    Width   Elev    Width   Elev
*********************************
    1.25    2036    1.25  2056.3
Downstream     num=       2
    Width   Elev    Width   Elev
*********************************
    1.25    2036    1.25  2056.3
Debris Width  =      2.5
Debris Height =     2057

Pier Data
Pier Station     Upstream= 10005.9    Downstream= 10005.9
Upstream     num=       2
    Width   Elev    Width   Elev
*********************************
    1.25    2036    1.25  2056.3
Downstream     num=       2
    Width   Elev    Width   Elev
*********************************
    1.25    2036    1.25  2056.3
Debris Width  =      2.5
Debris Height =     2057

Pier Data
Pier Station     Upstream=10038.09    Downstream=10038.09
Upstream     num=       2
    Width   Elev    Width   Elev
*********************************
    1.25    2036    1.25  2056.3
Downstream     num=       2
    Width   Elev    Width   Elev
*********************************
    1.25    2036    1.25  2056.3
Debris Width  =      2.5
Debris Height =     2057

Pier Data
Pier Station     Upstream=10070.28    Downstream=10070.28
Upstream     num=       2
    Width   Elev    Width   Elev
*********************************
    1.25    2036    1.25  2056.5
Downstream     num=       2
    Width   Elev    Width   Elev
```

```
*******************************
    1.25    2036    1.25  2056.5
Debris Width  =      2.5
Debris Height =     2057

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Sols Wash
REACH: Sols Wash Main     RS: 0.111

INPUT
Description: Downstream of the proposed ADOT superbox.  Within the Hassayampa
             floodplain.
Station Elevation Data    num=      44
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
    9765  2057.5    9785  2057.5    9820  2044.3    9820 2044.27 9869.81 2044.27
 9877.58 2044.23 9884.37 2044.17 9889.17 2044.14 9898.92  2044.1 9900.75  2044.1
 9907.89 2044.11 9912.33 2044.12 9913.48 2044.12 9923.92 2044.14 9928.02 2044.12
  9935.5 2044.02 9953.65 2043.33 9956.77 2043.26 9957.17 2043.19  9957.3 2043.19
 9958.54 2043.09 9979.01 2041.21 9988.89 2041.41 9999.66 2041.3810003.14 2041.45
   10005 2041.4710013.07 2041.5810015.93 2041.6210016.23 2041.6310016.63 2041.63
10026.66 2041.8510034.27 2042.0110037.09 2042.0710040.79 2042.1810047.51 2042.37
10051.74 2042.3110064.72 2042.4510072.08 2046.0110078.45 2048.6710083.54  2048.8
   10095    2049   10095    2055   10120    2057   10180    2058

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
*****************************************************************************
    9765    .018    9785    .063 9928.02    .03510078.45    .021   10095    .013
   10120    .018

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9928.0210078.45                 0       0       0             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
    9765 9868.07    2055       F
Skew Angle = 25

*****************************************************************************

SUMMARY OF MANNING'S N VALUES

River:Sols Wash
*****************************************************************************************************************
*     Reach       *   River Sta.   *   n1    *   n2    *   n3    *   n4    *   n5    *   n6    *   n7    *
*****************************************************************************************************************
*Sols Wash Main   *    1.319       *     .06*    .025*    .045*    .065*    .025*     .05*        *
*Sols Wash Main   *    1.224       *    .067*    .031*    .067*    .067*     .03*     .05*        *
*Sols Wash Main   *    1.141       *    .067*    .031*     .05*    .031*     .05*        *        *
*Sols Wash Main   *    1.081       *    .031*     .05*    .031*        *        *        *        *
*Sols Wash Main   *    1.021       *    .069*     .03*     .05*    .067*    .031*     .05*        *
*Sols Wash Main   *    0.955       *    .069*    .069*     .03*     .05*    .067*    .031*     .05*
*Sols Wash Main   *    0.886       *    .067*    .067*    .031*     .05*    .031*        *        *
*Sols Wash Main   *    0.822       *    .069*    .069*     .03*     .05*    .067*    .031*     .05*
*Sols Wash Main   *    0.785       *    .069*    .069*     .03*    .067*    .031*     .05*        *
*Sols Wash Main   *    0.746       *    .069*     .03*        *        *        *        *        *
*Sols Wash Main   *    0.708       *    .069*     .03*        *        *        *        *        *
*Sols Wash Main   *    0.668       *     .03*        *        *        *        *        *        *
*Sols Wash Main   *    0.642       *     .03*        *        *        *        *        *        *
*Sols Wash Main   *    0.614       *     .03*        *        *        *        *        *        *
*Sols Wash Main   *    0.592       *     .03*        *        *        *        *        *        *
```

Sols Wash Main	0.557	.03							
Sols Wash Main	0.529	.03							
Sols Wash Main	0.505	.03							
Sols Wash Main	0.485	.03	.013						
Sols Wash Main	0.467	.03	.013						
Sols Wash Main	0.447	.013	.03	.013					
Sols Wash Main	0.442	.03	.013						
Sols Wash Main	0.423	Bridge							
Sols Wash Main	0.412	.03							
Sols Wash Main	0.389	.03							
Sols Wash Main	0.359	.03							
Sols Wash Main	0.306	.03							
Sols Wash Main	0.288	.03							
Sols Wash Main	0.227	.03							
Sols Wash Main	0.220	.03							
Sols Wash Main	0.212	.03							
Sols Wash Main	0.204	.014	.033	.03	.033				
Sols Wash Main	0.201	.014	.033	.014	.033				
Sols Wash Main	0.198	.033	.014	.033					
Sols Wash Main	0.195	.033	.014	.033					
Sols Wash Main	0.192	.016	.033	.014	.033				
Sols Wash Main	0.189	.033	.014	.033					
Sols Wash Main	0.187	.033	.014	.033					
Sols Wash Main	0.184	.033	.014	.033					
Sols Wash Main	0.182	.033	.014	.033					
Sols Wash Main	0.180	.033	.03	.033					
Sols Wash Main	0.169	.03							
Sols Wash Main	0.159	.03							
Sols Wash Main	0.150	.03							
Sols Wash Main	0.140	.03							
Sols Wash Main	0.132	.03							
Sols Wash Main	0.121	Bridge							
Sols Wash Main	0.111	.018	.063	.035	.021	.013	.018		

SUMMARY OF REACH LENGTHS

River: Sols Wash

Reach	River Sta.	Left	Channel	Right
Sols Wash Main	1.319	504	504	504
Sols Wash Main	1.224	438	438	438
Sols Wash Main	1.141	316	316	316
Sols Wash Main	1.081	315	315	315
Sols Wash Main	1.021	351	351	351
Sols Wash Main	0.955	366	366	366
Sols Wash Main	0.886	336	336	336
Sols Wash Main	0.822	200	200	200
Sols Wash Main	0.785	200	200	200
Sols Wash Main	0.746	200	200	200
Sols Wash Main	0.708	240	215	215
Sols Wash Main	0.668	160	135	135
Sols Wash Main	0.642	135	150	150
Sols Wash Main	0.614	120	120	120
Sols Wash Main	0.592	180	180	180
Sols Wash Main	0.557	150	150	150
Sols Wash Main	0.529	130	130	130
Sols Wash Main	0.505	100	100	100
Sols Wash Main	0.485	100	100	100
Sols Wash Main	0.467	95	95	95
Sols Wash Main	0.447	25	25	25
Sols Wash Main	0.442	170	170	170
Sols Wash Main	0.423	Bridge		
Sols Wash Main	0.412	120	120	120
Sols Wash Main	0.389	155	155	155
Sols Wash Main	0.359	275	279	275
Sols Wash Main	0.306	96	100	106
Sols Wash Main	0.288	318	318	318
Sols Wash Main	0.227	40	40	40
Sols Wash Main	0.220	40	40	40
Sols Wash Main	0.212	40	40	40
Sols Wash Main	0.204	20	20	20
Sols Wash Main	0.201	15	15	15
Sols Wash Main	0.198	19	19	19
Sols Wash Main	0.195	11	11	11
Sols Wash Main	0.192	14	14	14

Sols Wash Main	0.189		14	14	14
Sols Wash Main	0.187		10	10	10
Sols Wash Main	0.184		17	17	17
Sols Wash Main	0.182		10	10	10
Sols Wash Main	0.180		58	58	58
Sols Wash Main	0.169		50	50	50
Sols Wash Main	0.159		50	50	50
Sols Wash Main	0.150		12.19	50	78.09
Sols Wash Main	0.140		12.66	40	67.35
Sols Wash Main	0.132		140	127	135
Sols Wash Main	0.121	Bridge			
Sols Wash Main	0.111		0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Sols Wash

Reach	River Sta.		Contr.	Expan.
Sols Wash Main	1.319		.1	.3
Sols Wash Main	1.224		.1	.3
Sols Wash Main	1.141		.1	.3
Sols Wash Main	1.081		.1	.3
Sols Wash Main	1.021		.1	.3
Sols Wash Main	0.955		.1	.3
Sols Wash Main	0.886		.1	.3
Sols Wash Main	0.822		.1	.3
Sols Wash Main	0.785		.1	.3
Sols Wash Main	0.746		.1	.3
Sols Wash Main	0.708		.1	.3
Sols Wash Main	0.668		.1	.3
Sols Wash Main	0.642		.1	.3
Sols Wash Main	0.614		.1	.3
Sols Wash Main	0.592		.1	.3
Sols Wash Main	0.557		.1	.3
Sols Wash Main	0.529		.1	.3
Sols Wash Main	0.505		.1	.3
Sols Wash Main	0.485		.1	.3
Sols Wash Main	0.467		.1	.3
Sols Wash Main	0.447		.3	.5
Sols Wash Main	0.442		.3	.5
Sols Wash Main	0.423	Bridge		
Sols Wash Main	0.412		.3	.5
Sols Wash Main	0.389		.1	.3
Sols Wash Main	0.359		.1	.3
Sols Wash Main	0.306		.1	.3
Sols Wash Main	0.288		.1	.3
Sols Wash Main	0.227		.1	.3
Sols Wash Main	0.220		.1	.3
Sols Wash Main	0.212		.1	.3
Sols Wash Main	0.204		.1	.3
Sols Wash Main	0.201		.1	.3
Sols Wash Main	0.198		.1	.3
Sols Wash Main	0.195		.1	.3
Sols Wash Main	0.192		.1	.3
Sols Wash Main	0.189		.1	.3
Sols Wash Main	0.187		.1	.3
Sols Wash Main	0.184		.1	.3
Sols Wash Main	0.182		.1	.3
Sols Wash Main	0.180		.1	.3
Sols Wash Main	0.169		.1	.3
Sols Wash Main	0.159		.1	.3
Sols Wash Main	0.150		.1	.3
Sols Wash Main	0.140		.1	.3
Sols Wash Main	0.132		.3	.5
Sols Wash Main	0.121	Bridge		
Sols Wash Main	0.111		.3	.5

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	

```
*****************************************************************************************************************
*****************************************************************
* Sols Wash Main * 1.319      * 100-Sols     * 14413.00 *   2093.30 *   2098.62 *   2098.62 *   2099.76 *
  0.008626 *     8.58 *   1691.75 *    742.24 *          0.99 *
* Sols Wash Main * 1.319      * 100-Sols FW * 14413.00 *   2093.30 *   2098.60 *   2098.60 *   2099.76 *
  0.008838 *     8.66 *   1664.33 *    708.15 *          1.00 *
* Sols Wash Main * 1.319      * 10-yr        *  6725.00 *   2093.30 *   2097.25 *   2097.25 *   2098.14 *
  0.009667 *     7.59 *    886.64 *    501.97 *          1.00 *
* Sols Wash Main * 1.319      * 50-yr        * 11927.00 *   2093.30 *   2098.15 *   2098.15 *   2099.31 *
  0.009787 *     8.64 *   1385.05 *    614.85 *          1.00 *
* Sols Wash Main * 1.319      * 500-yr       * 19986.00 *   2093.30 *   2099.34 *   2099.34 *   2100.44 *
  0.008098 *     8.43 *   2400.66 *   1126.73 *          1.00 *
*              *          *          *          *          *          *          *          *          *
* Sols Wash Main * 1.224      * 100-Sols     * 14413.00 *   2088.01 *   2092.89 *   2092.50 *   2093.58 *
  0.006346 *     6.67 *   2160.34 *    995.33 *          0.80 *
* Sols Wash Main * 1.224      * 100-Sols FW * 14413.00 *   2088.01 *   2092.89 *   2092.50 *   2093.58 *
  0.006341 *     6.67 *   2161.07 *    995.85 *          0.80 *
* Sols Wash Main * 1.224      * 10-yr        *  6725.00 *   2088.01 *   2091.75 *   2091.39 *   2092.26 *
  0.006631 *     5.70 *   1180.34 *    691.10 *          0.77 *
* Sols Wash Main * 1.224      * 50-yr        * 11927.00 *   2088.01 *   2092.52 *   2092.22 *   2093.19 *
  0.006854 *     6.59 *   1811.05 *    913.42 *          0.82 *
* Sols Wash Main * 1.224      * 500-yr       * 19986.00 *   2088.01 *   2093.58 *   2093.07 *   2094.29 *
  0.005734 *     6.74 *   2963.59 *   1254.42 *          0.77 *
*              *          *          *          *          *          *          *          *          *
* Sols Wash Main * 1.141      * 100-Sols     * 14459.00 *   2082.21 *   2089.09 *   2089.09 *   2090.14 *
  0.009714 *     8.20 *   1762.48 *    881.17 *          1.02 *
* Sols Wash Main * 1.141      * 100-Sols FW * 14459.00 *   2082.21 *   2089.09 *   2089.09 *   2090.14 *
  0.009719 *     8.21 *   1762.04 *    881.16 *          1.02 *
* Sols Wash Main * 1.141      * 10-yr        *  6758.00 *   2082.21 *   2087.41 *   2087.31 *   2088.44 *
  0.011560 *     8.14 *    830.30 *    360.17 *          0.94 *
* Sols Wash Main * 1.141      * 50-yr        * 11964.00 *   2082.21 *   2088.84 *   2088.84 *   2089.78 *
  0.008777 *     7.77 *   1539.39 *    870.81 *          1.03 *
* Sols Wash Main * 1.141      * 500-yr       * 20005.00 *   2082.21 *   2089.59 *   2089.59 *   2090.87 *
  0.010827 *     9.09 *   2200.01 *    884.48 *          1.02 *
*              *          *          *          *          *          *          *          *          *
* Sols Wash Main * 1.081      * 100-Sols     * 14459.00 *   2080.00 *   2086.48 *   2085.82 *   2087.64 *
  0.005233 *     8.66 *   1670.14 *    785.64 *          1.05 *
* Sols Wash Main * 1.081      * 100-Sols FW * 14459.00 *   2080.00 *   2086.47 *   2085.82 *   2087.64 *
  0.005235 *     8.66 *   1669.75 *    785.30 *          1.05 *
* Sols Wash Main * 1.081      * 10-yr        *  6758.00 *   2080.00 *   2084.14 *   2084.05 *   2085.30 *
  0.008593 *     8.61 *    784.75 *    306.32 *          0.95 *
* Sols Wash Main * 1.081      * 50-yr        * 11964.00 *   2080.00 *   2085.58 *   2085.26 *   2087.00 *
  0.006758 *     9.58 *   1248.29 *    355.35 *          0.90 *
* Sols Wash Main * 1.081      * 500-yr       * 20005.00 *   2080.00 *   2087.66 *           *   2088.49 *
  0.003838 *     7.29 *   2756.49 *    924.59 *          0.74 *
*              *          *          *          *          *          *          *          *          *
* Sols Wash Main * 1.021      * 100-Sols     * 14459.00 *   2077.00 *   2083.09 *   2082.94 *   2085.12 *
  0.012502 *    11.44 *   1264.56 *    297.92 *          0.97 *
* Sols Wash Main * 1.021      * 100-Sols FW * 14459.00 *   2077.00 *   2083.09 *   2082.95 *   2085.12 *
  0.012498 *    11.44 *   1264.78 *    297.94 *          0.97 *
* Sols Wash Main * 1.021      * 10-yr        *  6758.00 *   2077.00 *   2081.17 *   2080.94 *   2082.40 *
  0.009755 *     8.91 *    758.81 *    248.46 *          0.90 *
* Sols Wash Main * 1.021      * 50-yr        * 11964.00 *   2077.00 *   2082.51 *   2082.30 *   2084.34 *
  0.010542 *    10.86 *   1101.80 *    267.18 *          0.94 *
* Sols Wash Main * 1.021      * 500-yr       * 20005.00 *   2077.00 *   2084.81 *   2084.76 *   2086.05 *
  0.021669 *     9.03 *   2281.09 *    877.66 *          0.96 *
*              *          *          *          *          *          *          *          *          *
* Sols Wash Main * 0.955      * 100-Sols     * 14459.00 *   2073.50 *   2079.85 *   2079.85 *   2081.85 *
  0.007175 *    11.35 *   1273.71 *    329.22 *          1.01 *
* Sols Wash Main * 0.955      * 100-Sols FW * 14459.00 *   2073.50 *   2079.85 *   2079.85 *   2081.85 *
  0.007178 *    11.36 *   1273.22 *    321.51 *          1.01 *
* Sols Wash Main * 0.955      * 10-yr        *  6758.00 *   2073.50 *   2077.65 *   2077.65 *   2079.12 *
  0.008838 *     9.75 *    692.92 *    237.36 *          1.01 *
* Sols Wash Main * 0.955      * 50-yr        * 11964.00 *   2073.50 *   2079.12 *   2079.12 *   2081.10 *
  0.008035 *    11.31 *   1057.61 *    267.46 *          1.00 *
* Sols Wash Main * 0.955      * 500-yr       * 20005.00 *   2073.50 *   2081.59 *   2081.59 *   2082.96 *
  0.004709 *     9.51 *   2306.30 *    871.45 *          0.97 *
*              *          *          *          *          *          *          *          *          *
* Sols Wash Main * 0.886      * 100-Sols     * 14459.00 *   2071.10 *   2076.77 *           *   2078.17 *
  0.007047 *     9.49 *   1525.89 *    363.51 *          0.80 *
* Sols Wash Main * 0.886      * 100-Sols FW * 14459.00 *   2071.10 *   2076.77 *           *   2078.16 *
  0.007060 *     9.49 *   1523.07 *    349.81 *          0.80 *
* Sols Wash Main * 0.886      * 10-yr        *  6758.00 *   2071.10 *   2074.82 *           *   2075.73 *
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  0.007010 *      7.65 *    882.85 *     309.73 *          0.80 *
* Sols Wash Main * 0.886        * 50-yr        * 11964.00 *   2071.10 *   2076.20 *           *   2077.46 *
  0.007031 *      9.01 *   1327.47 *     337.92 *          0.80 *
* Sols Wash Main * 0.886        * 500-yr       * 20005.00 *   2071.10 *   2077.95 *   2077.13 *   2079.55 *
  0.007169 *     10.18 *   2048.77 *     608.31 *          0.79 *
*                *                *              *              *           *           *           *
*                *                *              *              *           *           *           *
* Sols Wash Main * 0.822        * 100-Sols     * 14459.00 *   2069.40 *   2074.79 *           *   2076.20 *
  0.004920 *      9.52 *   1526.18 *     381.55 *          0.79 *
* Sols Wash Main * 0.822        * 100-Sols FW * 14459.00 *   2069.40 *   2074.80 *   2074.02 *   2076.21 *
  0.004889 *      9.50 *   1521.74 *     339.87 *          0.79 *
* Sols Wash Main * 0.822        * 10-yr        *  6758.00 *   2069.40 *   2072.97 *           *   2073.77 *
  0.004781 *      7.19 *    939.60 *     303.42 *          0.72 *
* Sols Wash Main * 0.822        * 50-yr        * 11964.00 *   2069.40 *   2074.26 *           *   2075.50 *
  0.004891 *      8.92 *   1341.66 *     322.18 *          0.77 *
* Sols Wash Main * 0.822        * 500-yr       * 20005.00 *   2069.40 *   2075.76 *   2075.25 *   2077.50 *
  0.005176 *     10.62 *   1965.79 *     547.41 *          0.86 *
*                *                *              *              *           *           *           *
*                *                *              *              *           *           *           *
* Sols Wash Main * 0.785        * 100-Sols     * 14459.00 *   2068.00 *   2072.86 *   2072.86 *   2074.88 *
  0.008316 *     11.41 *   1271.84 *     342.38 *          1.00 *
* Sols Wash Main * 0.785        * 100-Sols FW * 14459.00 *   2068.00 *   2072.85 *   2072.85 *   2074.88 *
  0.008412 *     11.45 *   1262.50 *     310.73 *          1.00 *
* Sols Wash Main * 0.785        * 10-yr        *  6758.00 *   2068.00 *   2071.08 *   2071.08 *   2072.38 *
  0.010028 *      9.17 *    737.20 *     286.13 *          1.01 *
* Sols Wash Main * 0.785        * 50-yr        * 11964.00 *   2068.00 *   2072.32 *   2072.32 *   2074.15 *
  0.008781 *     10.86 *   1101.58 *     301.02 *          1.00 *
* Sols Wash Main * 0.785        * 500-yr       * 20005.00 *   2068.00 *   2074.06 *   2074.06 *   2076.26 *
  0.006994 *     11.95 *   1793.01 *     535.53 *          0.96 *
*                *                *              *              *           *           *           *
*                *                *              *              *           *           *           *
* Sols Wash Main * 0.746        * 100-Sols     * 14459.00 *   2066.63 *   2070.59 *           *   2071.89 *
  0.006016 *      9.14 *   1582.43 *     427.73 *          0.83 *
* Sols Wash Main * 0.746        * 100-Sols FW * 14459.00 *   2066.63 *   2070.59 *           *   2071.89 *
  0.006014 *      9.14 *   1582.42 *     425.20 *          0.83 *
* Sols Wash Main * 0.746        * 10-yr        *  6758.00 *   2066.63 *   2069.29 *           *   2069.95 *
  0.005283 *      6.55 *   1032.00 *     416.80 *          0.73 *
* Sols Wash Main * 0.746        * 50-yr        * 11964.00 *   2066.63 *   2070.34 *           *   2071.36 *
  0.005188 *      8.12 *   1473.73 *     423.58 *          0.77 *
* Sols Wash Main * 0.746        * 500-yr       * 20005.00 *   2066.63 *   2071.69 *           *   2073.16 *
  0.004951 *      9.73 *   2071.82 *     469.73 *          0.79 *
*                *                *              *              *           *           *           *
*                *                *              *              *           *           *           *
* Sols Wash Main * 0.708        * 100-Sols     * 14459.00 *   2065.00 *   2069.15 *   2068.82 *   2070.61 *
  0.006657 *      9.70 *   1490.36 *     395.47 *          0.88 *
* Sols Wash Main * 0.708        * 100-Sols FW * 14459.00 *   2065.00 *   2069.15 *   2068.82 *   2070.61 *
  0.006662 *      9.70 *   1489.97 *     395.40 *          0.88 *
* Sols Wash Main * 0.708        * 10-yr        *  6758.00 *   2065.00 *   2067.38 *   2067.38 *   2068.47 *
  0.010441 *      8.37 *    807.88 *     377.49 *          1.01 *
* Sols Wash Main * 0.708        * 50-yr        * 11964.00 *   2065.00 *   2068.39 *   2068.39 *   2069.95 *
  0.009275 *     10.02 *   1193.68 *     387.76 *          1.01 *
* Sols Wash Main * 0.708        * 500-yr       * 20005.00 *   2065.00 *   2071.07 *           *   2072.27 *
  0.003377 *      8.80 *   2272.07 *     419.76 *          0.67 *
*                *                *              *              *           *           *           *
*                *                *              *              *           *           *           *
* Sols Wash Main * 0.668        * 100-Sols     * 14459.00 *   2063.30 *   2068.95 *           *   2069.67 *
  0.001993 *      6.83 *   2117.99 *     383.73 *          0.51 *
* Sols Wash Main * 0.668        * 100-Sols FW * 14459.00 *   2063.30 *   2068.94 *           *   2069.67 *
  0.001994 *      6.83 *   2117.52 *     383.67 *          0.51 *
* Sols Wash Main * 0.668        * 10-yr        *  6758.00 *   2063.30 *   2066.16 *           *   2066.79 *
  0.004206 *      6.38 *   1059.32 *     375.11 *          0.67 *
* Sols Wash Main * 0.668        * 50-yr        * 11964.00 *   2063.30 *   2068.02 *           *   2068.73 *
  0.002484 *      6.79 *   1763.28 *     381.36 *          0.56 *
* Sols Wash Main * 0.668        * 500-yr       * 20005.00 *   2063.30 *   2070.95 *           *   2071.69 *
  0.001386 *      6.92 *   2891.51 *     388.84 *          0.45 *
*                *                *              *              *           *           *           *
*                *                *              *              *           *           *           *
* Sols Wash Main * 0.642        * 100-Sols     * 14459.00 *   2062.10 *   2068.53 *           *   2069.38 *
  0.002040 *      7.43 *   1945.28 *     314.12 *          0.53 *
* Sols Wash Main * 0.642        * 100-Sols FW * 14459.00 *   2062.10 *   2068.52 *           *   2069.38 *
  0.002041 *      7.43 *   1944.82 *     314.04 *          0.53 *
* Sols Wash Main * 0.642        * 10-yr        *  6758.00 *   2062.10 *   2065.68 *           *   2066.30 *
  0.003105 *      6.32 *   1069.24 *     304.27 *          0.59 *
* Sols Wash Main * 0.642        * 50-yr        * 11964.00 *   2062.10 *   2067.58 *           *   2068.40 *
  0.002355 *      7.24 *   1651.53 *     309.17 *          0.55 *
* Sols Wash Main * 0.642        * 500-yr       * 20005.00 *   2062.10 *   2070.55 *           *   2071.47 *
  0.001580 *      7.71 *   2594.23 *     326.85 *          0.48 *
*                *                *              *              *           *           *           *
*                *                *              *              *           *           *           *
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* Sols Wash Main * 0.614      * 100-Sols     * 14459.00 *   2060.80 *   2067.27 *           *   2068.89 *
  0.003961 *    10.23 *   1413.77 *    230.63 *          0.73 *
* Sols Wash Main * 0.614      * 100-Sols FW * 14459.00 *   2060.80 *   2067.27 *           *   2068.89 *
  0.003958 *    10.23 *   1413.20 *    230.17 *          0.73 *
* Sols Wash Main * 0.614      * 10-yr        *  6758.00 *   2060.80 *   2064.40 *           *   2065.61 *
  0.006208 *     8.81 *    766.87 *    221.84 *          0.84 *
* Sols Wash Main * 0.614      * 50-yr        * 11964.00 *   2060.80 *   2066.19 *           *   2067.82 *
  0.004974 *    10.24 *   1168.14 *    226.37 *          0.79 *
* Sols Wash Main * 0.614      * 500-yr       * 20005.00 *   2060.80 *   2069.39 *           *   2071.08 *
  0.002973 *    10.43 *   1918.34 *    244.91 *          0.66 *
*              *          *            *            *           *           *           *           *
*              *          *            *            *           *
* Sols Wash Main * 0.592      * 100-Sols     * 14459.00 *   2059.70 *   2066.89 *           *   2068.43 *
  0.003339 *     9.99 *   1447.96 *    213.71 *          0.68 *
* Sols Wash Main * 0.592      * 100-Sols FW * 14459.00 *   2059.70 *   2066.88 *           *   2068.43 *
  0.003340 *     9.99 *   1447.38 *    213.49 *          0.68 *
* Sols Wash Main * 0.592      * 10-yr        *  6758.00 *   2059.70 *   2063.22 *   2063.09 *   2064.73 *
  0.008021 *     9.85 *    685.80 *    203.06 *          0.94 *
* Sols Wash Main * 0.592      * 50-yr        * 11964.00 *   2059.70 *   2065.70 *           *   2067.25 *
  0.004177 *    10.01 *   1195.43 *    209.24 *          0.74 *
* Sols Wash Main * 0.592      * 500-yr       * 20005.00 *   2059.70 *   2069.05 *           *   2070.74 *
  0.002649 *    10.44 *   1916.23 *    220.51 *          0.62 *
*              *          *            *            *           *           *           *           *
*              *          *            *            *           *
* Sols Wash Main * 0.557      * 100-Sols     * 14459.00 *   2058.30 *   2066.79 *           *   2067.85 *
  0.001865 *     8.26 *   1750.12 *    220.72 *          0.52 *
* Sols Wash Main * 0.557      * 100-Sols FW * 14459.00 *   2058.30 *   2066.79 *           *   2067.85 *
  0.001866 *     8.26 *   1749.56 *    220.47 *          0.52 *
* Sols Wash Main * 0.557      * 10-yr        *  6758.00 *   2058.30 *   2061.97 *   2061.70 *   2063.34 *
  0.007021 *     9.39 *    719.49 *    207.18 *          0.89 *
* Sols Wash Main * 0.557      * 50-yr        * 11964.00 *   2058.30 *   2065.54 *           *   2066.56 *
  0.002191 *     8.10 *   1476.54 *    217.60 *          0.55 *
* Sols Wash Main * 0.557      * 500-yr       * 20005.00 *   2058.30 *   2069.00 *           *   2070.23 *
  0.001661 *     8.89 *   2250.78 *    232.23 *          0.50 *
*              *          *            *            *           *           *           *           *
*              *          *            *            *           *
* Sols Wash Main * 0.529      * 100-Sols     * 14459.00 *   2057.20 *   2066.78 *           *   2067.54 *
  0.001152 *     6.99 *   2068.83 *    233.52 *          0.41 *
* Sols Wash Main * 0.529      * 100-Sols FW * 14459.00 *   2057.20 *   2066.78 *           *   2067.54 *
  0.001152 *     6.99 *   2068.71 *    233.27 *          0.41 *
* Sols Wash Main * 0.529      * 10-yr        *  6758.00 *   2057.20 *   2061.66 *           *   2062.49 *
  0.003256 *     7.33 *    922.51 *    215.89 *          0.62 *
* Sols Wash Main * 0.529      * 50-yr        * 11964.00 *   2057.20 *   2065.52 *           *   2066.22 *
  0.001254 *     6.73 *   1778.80 *    227.04 *          0.42 *
* Sols Wash Main * 0.529      * 500-yr       * 20005.00 *   2057.20 *   2069.02 *           *   2069.94 *
  0.001080 *     7.69 *   2602.81 *    240.00 *          0.41 *
*              *          *            *            *           *           *           *           *
*              *          *            *            *           *
* Sols Wash Main * 0.505      * 100-Sols     * 14459.00 *   2056.40 *   2066.50 *           *   2067.37 *
  0.001265 *     7.47 *   1936.15 *    211.02 *          0.43 *
* Sols Wash Main * 0.505      * 100-Sols FW * 14459.00 *   2056.40 *   2066.50 *           *   2067.37 *
  0.001262 *     7.47 *   1936.07 *    210.59 *          0.43 *
* Sols Wash Main * 0.505      * 10-yr        *  6758.00 *   2056.40 *   2061.05 *           *   2062.03 *
  0.003615 *     7.94 *    850.93 *    189.85 *          0.66 *
* Sols Wash Main * 0.505      * 50-yr        * 11964.00 *   2056.40 *   2065.25 *           *   2066.04 *
  0.001329 *     7.14 *   1676.63 *    203.08 *          0.44 *
* Sols Wash Main * 0.505      * 500-yr       * 20005.00 *   2056.40 *   2068.69 *           *   2069.77 *
  0.001222 *     8.33 *   2402.11 *    213.00 *          0.44 *
*              *          *            *            *           *           *           *           *
*              *          *            *            *           *
* Sols Wash Main * 0.485      * 100-Sols     * 15045.00 *   2055.50 *   2065.98 *           *   2067.19 *
  0.001699 *     8.82 *   1705.28 *    170.42 *          0.49 *
* Sols Wash Main * 0.485      * 100-Sols FW * 15045.00 *   2055.50 *   2065.98 *           *   2067.19 *
  0.001699 *     8.82 *   1705.28 *    170.42 *          0.49 *
* Sols Wash Main * 0.485      * 10-yr        *  7019.00 *   2055.50 *   2060.34 *           *   2061.60 *
  0.004404 *     9.01 *    778.68 *    161.80 *          0.72 *
* Sols Wash Main * 0.485      * 50-yr        * 12453.00 *   2055.50 *   2064.81 *           *   2065.87 *
  0.001680 *     8.26 *   1507.95 *    165.73 *          0.48 *
* Sols Wash Main * 0.485      * 500-yr       * 20836.00 *   2055.50 *   2067.95 *           *   2069.57 *
  0.001842 *    10.20 *   2043.06 *    171.30 *          0.52 *
*              *          *            *            *           *           *           *           *
*              *          *            *            *           *
* Sols Wash Main * 0.467      * 100-Sols     * 15045.00 *   2054.70 *   2065.80 *           *   2067.02 *
  0.001626 *     8.87 *   1696.96 *    161.00 *          0.48 *
* Sols Wash Main * 0.467      * 100-Sols FW * 15045.00 *   2054.70 *   2065.80 *           *   2067.02 *
  0.001626 *     8.87 *   1696.96 *    161.00 *          0.48 *
* Sols Wash Main * 0.467      * 10-yr        *  7019.00 *   2054.70 *   2059.96 *           *   2061.18 *
  0.003848 *     8.86 *    792.66 *    151.50 *          0.68 *
* Sols Wash Main * 0.467      * 50-yr        * 12453.00 *   2054.70 *   2064.65 *           *   2065.70 *
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  0.001579 *     8.23 *   1512.60 *    157.99 *          0.47 *
* Sols Wash Main * 0.467       * 500-yr       * 20836.00 *   2054.70 *   2067.69 *           *   2069.38 *
  0.001848 *    10.41 *   2001.78 *    161.00 *          0.52 *
*              *          *            *            *            *           *           *           *
* Sols Wash Main * 0.447       * 100-Sols     * 15045.00 *   2052.88 *   2065.87 *           *   2066.82 *
  0.001021 *     7.79 *   1931.68 *    160.70 *          0.40 *
* Sols Wash Main * 0.447       * 100-Sols FW  * 15045.00 *   2052.88 *   2065.87 *           *   2066.82 *
  0.001021 *     7.79 *   1931.68 *    160.70 *          0.40 *
* Sols Wash Main * 0.447       * 10-yr        *  7019.00 *   2052.88 *   2060.03 *           *   2060.79 *
  0.001863 *     7.01 *   1000.65 *    155.40 *          0.49 *
* Sols Wash Main * 0.447       * 50-yr        * 12453.00 *   2052.88 *   2064.72 *           *   2065.51 *
  0.000970 *     7.13 *   1745.44 *    160.70 *          0.38 *
* Sols Wash Main * 0.447       * 500-yr       * 20836.00 *   2052.88 *   2067.79 *           *   2069.13 *
  0.001219 *     9.30 *   2239.43 *    160.70 *          0.44 *
*              *          *            *            *            *           *           *           *
* Sols Wash Main * 0.442       * 100-Sols     * 15045.00 *   2052.78 *   2065.73 *   2060.21 *   2066.76 *
  0.002162 *     8.12 *   1851.84 *    155.50 *          0.41 *
* Sols Wash Main * 0.442       * 100-Sols FW  * 15045.00 *   2052.78 *   2065.73 *   2060.21 *   2066.76 *
  0.002162 *     8.12 *   1851.84 *    155.50 *          0.41 *
* Sols Wash Main * 0.442       * 10-yr        *  7019.00 *   2052.78 *   2059.90 *   2057.50 *   2060.72 *
  0.003111 *     7.26 *    966.85 *    149.25 *          0.50 *
* Sols Wash Main * 0.442       * 50-yr        * 12453.00 *   2052.78 *   2064.59 *   2059.40 *   2065.45 *
  0.002047 *     7.43 *   1674.97 *    155.50 *          0.40 *
* Sols Wash Main * 0.442       * 500-yr       * 20836.00 *   2052.78 *   2067.58 *   2061.86 *   2069.06 *
  0.002609 *     9.74 *   2139.27 *    155.50 *          0.46 *
*              *          *            *            *            *           *           *           *
* Sols Wash Main * 0.423       *              *   Bridge   *            *           *           *           *
*              *          *            *            *            *           *           *           *
* Sols Wash Main * 0.412       * 100-Sols     * 15045.00 *   2051.44 *   2061.01 *           *   2062.80 *
  0.002905 *    10.75 *   1399.94 *    155.00 *          0.63 *
* Sols Wash Main * 0.412       * 100-Sols FW  * 15045.00 *   2051.44 *   2061.01 *           *   2062.80 *
  0.002905 *    10.75 *   1399.94 *    155.00 *          0.63 *
* Sols Wash Main * 0.412       * 10-yr        *  7019.00 *   2051.44 *   2056.97 *           *   2058.25 *
  0.004271 *     9.06 *    774.41 *    155.00 *          0.71 *
* Sols Wash Main * 0.412       * 50-yr        * 12453.00 *   2051.44 *   2059.76 *           *   2061.42 *
  0.003203 *    10.32 *   1206.72 *    155.00 *          0.65 *
* Sols Wash Main * 0.412       * 500-yr       * 20836.00 *   2051.44 *   2063.49 *           *   2065.60 *
  0.002581 *    11.68 *   1783.50 *    155.00 *          0.61 *
*              *          *            *            *            *           *           *           *
* Sols Wash Main * 0.389       * 100-Sols     * 15045.00 *   2051.30 *   2060.76 *           *   2062.40 *
  0.002573 *    10.28 *   1463.01 *    158.27 *          0.60 *
* Sols Wash Main * 0.389       * 100-Sols FW  * 15045.00 *   2051.30 *   2060.76 *           *   2062.40 *
  0.002573 *    10.28 *   1463.01 *    158.27 *          0.60 *
* Sols Wash Main * 0.389       * 10-yr        *  7019.00 *   2051.30 *   2056.55 *           *   2057.72 *
  0.003728 *     8.71 *    806.12 *    154.50 *          0.67 *
* Sols Wash Main * 0.389       * 50-yr        * 12453.00 *   2051.30 *   2059.48 *           *   2060.99 *
  0.002788 *     9.86 *   1262.50 *    156.00 *          0.61 *
* Sols Wash Main * 0.389       * 500-yr       * 20836.00 *   2051.30 *   2063.29 *           *   2065.21 *
  0.002310 *    11.12 *   1872.91 *    163.00 *          0.58 *
*              *          *            *            *            *           *           *           *
* Sols Wash Main * 0.359       * 100-Sols     * 15045.00 *   2050.10 *   2060.08 *           *   2061.93 *
  0.003249 *    10.92 *   1377.30 *    162.00 *          0.66 *
* Sols Wash Main * 0.359       * 100-Sols FW  * 15045.00 *   2050.10 *   2060.08 *           *   2061.93 *
  0.003250 *    10.92 *   1377.26 *    162.00 *          0.66 *
* Sols Wash Main * 0.359       * 10-yr        *  7019.00 *   2050.10 *   2055.45 *           *   2057.02 *
  0.004979 *    10.07 *    697.35 *    132.00 *          0.77 *
* Sols Wash Main * 0.359       * 50-yr        * 12453.00 *   2050.10 *   2058.67 *           *   2060.48 *
  0.003433 *    10.80 *   1153.20 *    144.00 *          0.67 *
* Sols Wash Main * 0.359       * 500-yr       * 20836.00 *   2050.10 *   2062.77 *           *   2064.82 *
  0.002592 *    11.49 *   1812.99 *    162.00 *          0.61 *
*              *          *            *            *            *           *           *           *
* Sols Wash Main * 0.306       * 100-Sols     * 15045.00 *   2047.20 *   2059.42 *           *   2061.13 *
  0.002314 *    10.51 *   1431.63 *    135.50 *          0.57 *
* Sols Wash Main * 0.306       * 100-Sols FW  * 15045.00 *   2047.20 *   2059.42 *           *   2061.13 *
  0.002314 *    10.51 *   1431.59 *    135.50 *          0.57 *
* Sols Wash Main * 0.306       * 10-yr        *  7019.00 *   2047.20 *   2054.90 *           *   2055.95 *
  0.002299 *     8.22 *    853.88 *    118.75 *          0.54 *
* Sols Wash Main * 0.306       * 50-yr        * 12453.00 *   2047.20 *   2058.07 *           *   2059.61 *
  0.002365 *     9.95 *   1251.10 *    131.72 *          0.57 *
* Sols Wash Main * 0.306       * 500-yr       * 20836.00 *   2047.20 *   2062.03 *           *   2064.14 *
  0.002221 *    11.67 *   1785.66 *    135.50 *          0.57 *
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*                *                *                *                *                *                *                *
*                *                *                *                *                *                *                *
* Sols Wash Main * 0.288          * 100-Sols      * 15045.00 *   2046.80 *   2059.30 *           *   2060.87 *
  0.002035 *     10.06 *   1495.50 *     136.50 *          0.54 *
* Sols Wash Main * 0.288          * 100-Sols FW   * 15045.00 *   2046.80 *   2059.30 *           *   2060.87 *
  0.002036 *     10.06 *   1495.47 *     136.50 *          0.54 *
* Sols Wash Main * 0.288          * 10-yr         *  7019.00 *   2046.80 *   2054.77 *           *   2055.70 *
  0.001967 *      7.74 *    906.54 *     122.76 *          0.50 *
* Sols Wash Main * 0.288          * 50-yr         * 12453.00 *   2046.80 *   2057.95 *           *   2059.34 *
  0.002063 *      9.49 *   1312.15 *     133.37 *          0.53 *
* Sols Wash Main * 0.288          * 500-yr        * 20836.00 *   2046.80 *   2061.93 *           *   2063.89 *
  0.001993 *     11.24 *   1853.98 *     136.50 *          0.54 *
*                *                *                *                *                *                *                *
*                *                *                *                *                *                *                *
* Sols Wash Main * 0.227          * 100-Sols      * 15045.00 *   2046.50 *   2057.96 *           *   2060.03 *
  0.003145 *     11.52 *   1305.52 *     134.45 *          0.65 *
* Sols Wash Main * 0.227          * 100-Sols FW   * 15045.00 *   2046.50 *   2057.96 *           *   2060.03 *
  0.003145 *     11.52 *   1305.48 *     134.44 *          0.65 *
* Sols Wash Main * 0.227          * 10-yr         *  7019.00 *   2046.50 *   2053.63 *           *   2054.90 *
  0.003037 *      9.04 *    776.18 *     115.45 *          0.61 *
* Sols Wash Main * 0.227          * 50-yr         * 12453.00 *   2046.50 *   2056.68 *           *   2058.52 *
  0.002971 *     10.89 *   1143.04 *     123.00 *          0.63 *
* Sols Wash Main * 0.227          * 500-yr        * 20836.00 *   2046.50 *   2060.69 *           *   2063.10 *
  0.002770 *     12.45 *   1674.19 *     135.00 *          0.62 *
*                *                *                *                *                *                *                *
*                *                *                *                *                *                *                *
* Sols Wash Main * 0.220          * 100-Sols      * 15045.00 *   2046.40 *   2057.53 *           *   2059.87 *
  0.003384 *     12.26 *   1227.61 *     120.00 *          0.68 *
* Sols Wash Main * 0.220          * 100-Sols FW   * 15045.00 *   2046.40 *   2057.53 *           *   2059.87 *
  0.003384 *     12.26 *   1227.58 *     120.00 *          0.68 *
* Sols Wash Main * 0.220          * 10-yr         *  7019.00 *   2046.40 *   2053.33 *           *   2054.76 *
  0.003545 *      9.59 *    731.63 *     111.64 *          0.66 *
* Sols Wash Main * 0.220          * 50-yr         * 12453.00 *   2046.40 *   2056.30 *           *   2058.37 *
  0.003475 *     11.54 *   1079.52 *     120.00 *          0.68 *
* Sols Wash Main * 0.220          * 500-yr        * 20836.00 *   2046.40 *   2060.09 *           *   2062.93 *
  0.003361 *     13.53 *   1540.00 *     127.03 *          0.68 *
*                *                *                *                *                *                *                *
*                *                *                *                *                *                *                *
* Sols Wash Main * 0.212          * 100-Sols      * 15045.00 *   2046.40 *   2057.22 *           *   2059.71 *
  0.003750 *     12.67 *   1187.64 *     118.00 *          0.70 *
* Sols Wash Main * 0.212          * 100-Sols FW   * 15045.00 *   2046.40 *   2057.22 *           *   2059.71 *
  0.003751 *     12.67 *   1187.53 *     118.00 *          0.70 *
* Sols Wash Main * 0.212          * 10-yr         *  7019.00 *   2046.40 *   2052.98 *           *   2054.58 *
  0.004500 *     10.16 *    690.79 *     116.50 *          0.74 *
* Sols Wash Main * 0.212          * 50-yr         * 12453.00 *   2046.40 *   2055.99 *           *   2058.21 *
  0.003865 *     11.94 *   1043.28 *     118.00 *          0.71 *
* Sols Wash Main * 0.212          * 500-yr        * 20836.00 *   2046.40 *   2059.70 *           *   2062.77 *
  0.003646 *     14.05 *   1482.87 *     119.50 *          0.70 *
*                *                *                *                *                *                *                *
*                *                *                *                *                *                *                *
* Sols Wash Main * 0.204          * 100-Sols      * 15045.00 *   2046.30 *   2056.67 *   2055.33 *   2059.50 *
  0.005017 *     13.51 *   1113.78 *     123.00 *          0.79 *
* Sols Wash Main * 0.204          * 100-Sols FW   * 15045.00 *   2046.30 *   2056.67 *   2055.33 *   2059.50 *
  0.005020 *     13.51 *   1113.51 *     123.00 *          0.79 *
* Sols Wash Main * 0.204          * 10-yr         *  7019.00 *   2046.30 *   2052.00 *   2051.62 *   2054.29 *
  0.007021 *     12.13 *    578.42 *     103.00 *          0.90 *
* Sols Wash Main * 0.204          * 50-yr         * 12453.00 *   2046.30 *   2055.20 *   2054.24 *   2057.96 *
  0.005880 *     13.35 *    933.10 *     120.86 *          0.85 *
* Sols Wash Main * 0.204          * 500-yr        * 20836.00 *   2046.30 *   2059.39 *   2057.20 *   2062.59 *
  0.004287 *     14.37 *   1449.85 *     124.50 *          0.74 *
*                *                *                *                *                *                *                *
*                *                *                *                *                *                *                *
* Sols Wash Main * 0.201          * 100-Sols      * 15045.00 *   2046.30 *   2055.03 *   2055.03 *   2059.29 *
  0.002567 *     16.56 *    908.45 *     107.50 *          1.00 *
* Sols Wash Main * 0.201          * 100-Sols FW   * 15045.00 *   2046.30 *   2055.04 *   2055.04 *   2059.29 *
  0.002561 *     16.55 *    909.13 *     107.50 *          1.00 *
* Sols Wash Main * 0.201          * 10-yr         *  7019.00 *   2046.30 *   2051.59 *   2051.59 *   2054.19 *
  0.002265 *     12.94 *    542.49 *     104.50 *          1.00 *
* Sols Wash Main * 0.201          * 50-yr         * 12453.00 *   2046.30 *   2054.03 *   2054.03 *   2057.78 *
  0.002525 *     15.55 *    800.71 *     107.50 *          1.00 *
* Sols Wash Main * 0.201          * 500-yr        * 20836.00 *   2046.30 *   2057.19 *   2057.19 *   2062.34 *
  0.002615 *     18.22 *   1150.91 *     123.68 *          0.99 *
*                *                *                *                *                *                *                *
*                *                *                *                *                *                *                *
* Sols Wash Main * 0.198          * 100-Sols      * 15045.00 *   2042.55 *   2051.71 *   2051.71 *   2055.95 *
  0.002275 *     16.53 *    910.21 *     108.40 *          1.01 *
* Sols Wash Main * 0.198          * 100-Sols FW   * 15045.00 *   2042.55 *   2051.71 *   2051.71 *   2055.95 *
  0.002274 *     16.52 *    910.47 *     108.40 *          1.00 *
* Sols Wash Main * 0.198          * 10-yr         *  7019.00 *   2042.55 *   2048.16 *   2048.16 *   2050.80 *
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  0.001779 *    13.05 *    537.77 *    102.00 *          1.00 *
* Sols Wash Main * 0.198      * 50-yr       * 12453.00 *   2042.55 *   2050.63 *   2050.63 *   2054.43 *
  0.002035 *    15.64 *    796.29 *    105.20 *          1.00 *
* Sols Wash Main * 0.198      * 500-yr      * 20836.00 *   2042.55 *   2053.76 *   2053.76 *   2059.02 *
  0.002385 *    18.41 *   1131.88 *    108.40 *          1.00 *
*           *           *           *           *           *           *           *           *           *
* Sols Wash Main * 0.195      * 100-Sols    * 15045.00 *   2037.80 *   2052.37 *           *   2054.17 *
  0.000614 *    10.76 *   1397.86 *    112.00 *          0.54 *
* Sols Wash Main * 0.195      * 100-Sols FW * 15045.00 *   2037.80 *   2052.37 *           *   2054.17 *
  0.000614 *    10.76 *   1397.86 *    112.00 *          0.54 *
* Sols Wash Main * 0.195      * 10-yr       *  7019.00 *   2037.80 *   2049.04 *           *   2049.76 *
  0.000271 *     6.81 *   1030.59 *    109.00 *          0.39 *
* Sols Wash Main * 0.195      * 50-yr       * 12453.00 *   2037.80 *   2051.45 *           *   2052.89 *
  0.000515 *     9.62 *   1295.07 *    112.00 *          0.50 *
* Sols Wash Main * 0.195      * 500-yr      * 20836.00 *   2037.80 *   2054.17 *           *   2056.80 *
  0.000895 *    13.02 *   1600.41 *    115.00 *          0.62 *
*           *           *           *           *           *           *           *           *           *
* Sols Wash Main * 0.192      * 100-Sols    * 15045.00 *   2037.74 *   2052.49 *           *   2054.11 *
  0.000541 *    10.19 *   1475.80 *    114.00 *          0.50 *
* Sols Wash Main * 0.192      * 100-Sols FW * 15045.00 *   2037.74 *   2052.49 *           *   2054.11 *
  0.000541 *    10.19 *   1475.80 *    114.00 *          0.50 *
* Sols Wash Main * 0.192      * 10-yr       *  7019.00 *   2037.74 *   2049.10 *           *   2049.74 *
  0.000238 *     6.43 *   1091.94 *    111.00 *          0.36 *
* Sols Wash Main * 0.192      * 50-yr       * 12453.00 *   2037.74 *   2051.55 *           *   2052.84 *
  0.000452 *     9.10 *   1368.50 *    114.00 *          0.46 *
* Sols Wash Main * 0.192      * 500-yr      * 20836.00 *   2037.74 *   2054.35 *           *   2056.71 *
  0.000783 *    12.32 *   1691.00 *    117.00 *          0.57 *
*           *           *           *           *           *           *           *           *           *
* Sols Wash Main * 0.189      * 100-Sols    * 15045.00 *   2037.67 *   2052.60 *           *   2054.05 *
  0.000498 *     9.67 *   1555.17 *    117.50 *          0.47 *
* Sols Wash Main * 0.189      * 100-Sols FW * 15045.00 *   2037.67 *   2052.60 *           *   2054.05 *
  0.000498 *     9.67 *   1555.17 *    117.50 *          0.47 *
* Sols Wash Main * 0.189      * 10-yr       *  7019.00 *   2037.67 *   2049.14 *           *   2049.71 *
  0.000209 *     6.07 *   1155.60 *    113.00 *          0.33 *
* Sols Wash Main * 0.189      * 50-yr       * 12453.00 *   2037.67 *   2051.64 *           *   2052.79 *
  0.000399 *     8.63 *   1443.70 *    116.00 *          0.43 *
* Sols Wash Main * 0.189      * 500-yr      * 20836.00 *   2037.67 *   2054.50 *           *   2056.63 *
  0.000691 *    11.69 *   1781.92 *    119.00 *          0.53 *
*           *           *           *           *           *           *           *           *           *
* Sols Wash Main * 0.187      * 100-Sols    * 15045.00 *   2037.60 *   2052.75 *           *   2053.98 *
  0.000418 *     8.87 *   1695.53 *    125.50 *          0.43 *
* Sols Wash Main * 0.187      * 100-Sols FW * 15045.00 *   2037.60 *   2052.75 *           *   2053.98 *
  0.000418 *     8.87 *   1695.53 *    125.50 *          0.43 *
* Sols Wash Main * 0.187      * 10-yr       *  7019.00 *   2037.60 *   2049.20 *           *   2049.68 *
  0.000189 *     5.58 *   1258.34 *    122.50 *          0.31 *
* Sols Wash Main * 0.187      * 50-yr       * 12453.00 *   2037.60 *   2051.76 *           *   2052.73 *
  0.000326 *     7.92 *   1571.71 *    122.50 *          0.39 *
* Sols Wash Main * 0.187      * 500-yr      * 20836.00 *   2037.60 *   2054.73 *           *   2056.52 *
  0.000556 *    10.72 *   1944.14 *    125.50 *          0.48 *
*           *           *           *           *           *           *           *           *           *
* Sols Wash Main * 0.184      * 100-Sols    * 15045.00 *   2037.56 *   2052.82 *           *   2053.94 *
  0.000381 *     8.52 *   1765.57 *    128.00 *          0.40 *
* Sols Wash Main * 0.184      * 100-Sols FW * 15045.00 *   2037.56 *   2052.82 *           *   2053.94 *
  0.000381 *     8.52 *   1765.57 *    128.00 *          0.40 *
* Sols Wash Main * 0.184      * 10-yr       *  7019.00 *   2037.56 *   2049.23 *           *   2049.67 *
  0.000172 *     5.34 *   1313.22 *    125.00 *          0.29 *
* Sols Wash Main * 0.184      * 50-yr       * 12453.00 *   2037.56 *   2051.81 *           *   2052.71 *
  0.000320 *     7.61 *   1636.66 *    128.00 *          0.37 *
* Sols Wash Main * 0.184      * 500-yr      * 20836.00 *   2037.56 *   2054.82 *           *   2056.47 *
  0.000539 *    10.30 *   2023.42 *    131.00 *          0.46 *
*           *           *           *           *           *           *           *           *           *
* Sols Wash Main * 0.182      * 100-Sols    * 15045.00 *   2041.80 *   2051.61 *           *   2053.82 *
  0.001179 *    11.93 *   1260.91 *    134.00 *          0.69 *
* Sols Wash Main * 0.182      * 100-Sols FW * 15045.00 *   2041.80 *   2051.61 *           *   2053.82 *
  0.001179 *    11.93 *   1260.91 *    134.00 *          0.69 *
* Sols Wash Main * 0.182      * 10-yr       *  7019.00 *   2041.80 *   2048.57 *           *   2049.60 *
  0.000735 *     8.16 *    859.84 *    131.00 *          0.56 *
* Sols Wash Main * 0.182      * 50-yr       * 12453.00 *   2041.80 *   2050.78 *           *   2052.60 *
  0.000984 *    10.83 *   1149.73 *    131.00 *          0.64 *
* Sols Wash Main * 0.182      * 500-yr      * 20836.00 *   2041.80 *   2053.22 *           *   2056.31 *
  0.001437 *    14.12 *   1475.65 *    134.00 *          0.75 *
*           *           *           *           *           *           *           *           *           *
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* Sols Wash Main * 0.180        * 100-Sols     * 15045.00 *   2041.80 *   2051.73 *           *   2053.75 *
  0.003212 *     11.38 *   1321.80 *     138.50 *          0.65 *
* Sols Wash Main * 0.180        * 100-Sols FW * 15045.00 *   2041.80 *   2051.73 *           *   2053.75 *
  0.003212 *     11.38 *   1321.80 *     138.50 *          0.65 *
* Sols Wash Main * 0.180        * 10-yr        *  7019.00 *   2041.80 *   2048.62 *           *   2049.57 *
  0.002328 *      7.83 *    896.56 *     135.50 *          0.54 *
* Sols Wash Main * 0.180        * 50-yr        * 12453.00 *   2041.80 *   2050.88 *           *   2052.54 *
  0.002961 *     10.35 *   1203.22 *     138.50 *          0.62 *
* Sols Wash Main * 0.180        * 500-yr       * 20836.00 *   2041.80 *   2053.40 *           *   2056.20 *
  0.003713 *     13.42 *   1553.12 *     138.50 *          0.71 *
*              *          *             *             *             *           *           *           *
*              *          *             *             *             *
* Sols Wash Main * 0.169        * 100-Sols     * 15045.00 *   2041.80 *   2052.14 *           *   2053.37 *
  0.001963 *      8.88 *   1693.36 *     183.87 *          0.52 *
* Sols Wash Main * 0.169        * 100-Sols FW * 15045.00 *   2041.80 *   2052.14 *           *   2053.37 *
  0.001965 *      8.88 *   1693.36 *     183.87 *          0.52 *
* Sols Wash Main * 0.169        * 10-yr        *  7019.00 *   2041.80 *   2048.73 *           *   2049.37 *
  0.001454 *      6.40 *   1097.19 *     162.06 *          0.43 *
* Sols Wash Main * 0.169        * 50-yr        * 12453.00 *   2041.80 *   2051.17 *           *   2052.22 *
  0.001872 *      8.21 *   1516.95 *     180.74 *          0.50 *
* Sols Wash Main * 0.169        * 500-yr       * 20836.00 *   2041.80 *   2054.08 *           *   2055.68 *
  0.002078 *     10.16 *   2051.51 *     186.94 *          0.54 *
*              *          *             *             *             *           *           *           *
*              *          *             *             *             *
* Sols Wash Main * 0.159        * 100-Sols     * 15045.00 *   2041.80 *   2052.33 *           *   2053.17 *
  0.001192 *      7.36 *   2043.77 *     204.48 *          0.41 *
* Sols Wash Main * 0.159        * 100-Sols FW * 15045.00 *   2041.80 *   2052.33 *           *   2053.17 *
  0.001192 *      7.36 *   2043.77 *     204.48 *          0.41 *
* Sols Wash Main * 0.159        * 10-yr        *  7019.00 *   2041.80 *   2048.81 *           *   2049.25 *
  0.001025 *      5.28 *   1328.96 *     201.40 *          0.36 *
* Sols Wash Main * 0.159        * 50-yr        * 12453.00 *   2041.80 *   2051.34 *           *   2052.05 *
  0.001144 *      6.77 *   1840.04 *     204.48 *          0.40 *
* Sols Wash Main * 0.159        * 500-yr       * 20836.00 *   2041.80 *   2054.34 *           *   2055.45 *
  0.001290 *      8.48 *   2456.43 *     207.56 *          0.43 *
*              *          *             *             *             *           *           *           *
*              *          *             *             *             *
* Sols Wash Main * 0.150        * 100-Sols     * 15045.00 *   2041.70 *   2052.45 *           *   2053.06 *
  0.000783 *      6.27 *   2399.75 *     227.97 *          0.34 *
* Sols Wash Main * 0.150        * 100-Sols FW * 15045.00 *   2041.70 *   2052.45 *           *   2053.06 *
  0.000783 *      6.27 *   2399.75 *     227.97 *          0.34 *
* Sols Wash Main * 0.150        * 10-yr        *  7019.00 *   2041.70 *   2048.86 *           *   2049.17 *
  0.000640 *      4.42 *   1587.06 *     224.95 *          0.29 *
* Sols Wash Main * 0.150        * 50-yr        * 12453.00 *   2041.70 *   2051.43 *           *   2051.94 *
  0.000744 *      5.74 *   2167.95 *     227.96 *          0.33 *
* Sols Wash Main * 0.150        * 500-yr       * 20836.00 *   2041.70 *   2054.49 *           *   2055.31 *
  0.000859 *      7.26 *   2870.27 *     230.98 *          0.36 *
*              *          *             *             *             *           *           *           *
*              *          *             *             *             *
* Sols Wash Main * 0.140        * 100-Sols     * 15045.00 *   2041.60 *   2052.49 *           *   2052.99 *
  0.000632 *      5.71 *   2635.79 *     246.84 *          0.31 *
* Sols Wash Main * 0.140        * 100-Sols FW * 15045.00 *   2041.60 *   2052.49 *           *   2052.99 *
  0.000632 *      5.71 *   2635.79 *     246.84 *          0.31 *
* Sols Wash Main * 0.140        * 10-yr        *  7019.00 *   2041.60 *   2048.87 *           *   2049.12 *
  0.000514 *      4.02 *   1747.92 *     243.76 *          0.26 *
* Sols Wash Main * 0.140        * 50-yr        * 12453.00 *   2041.60 *   2051.46 *           *   2051.88 *
  0.000600 *      5.23 *   2382.39 *     246.83 *          0.30 *
* Sols Wash Main * 0.140        * 500-yr       * 20836.00 *   2041.60 *   2054.55 *           *   2055.23 *
  0.000693 *      6.61 *   3150.70 *     249.92 *          0.33 *
*              *          *             *             *             *           *           *           *
*              *          *             *             *             *
* Sols Wash Main * 0.132        * 100-Sols     * 15045.00 *   2041.50 *   2052.45 *   2046.50 *   2052.97 *
  0.000633 *      5.73 *   2623.54 *     244.00 *          0.31 *
* Sols Wash Main * 0.132        * 100-Sols FW * 15045.00 *   2041.50 *   2052.45 *   2046.52 *   2052.97 *
  0.000633 *      5.73 *   2623.54 *     244.00 *          0.31 *
* Sols Wash Main * 0.132        * 10-yr        *  7019.00 *   2041.50 *   2048.85 *   2044.52 *   2049.10 *
  0.000507 *      4.02 *   1747.91 *     241.00 *          0.26 *
* Sols Wash Main * 0.132        * 50-yr        * 12453.00 *   2041.50 *   2051.43 *   2045.92 *   2051.86 *
  0.000600 *      5.25 *   2373.82 *     244.00 *          0.30 *
* Sols Wash Main * 0.132        * 500-yr       * 20836.00 *   2041.50 *   2054.52 *   2047.73 *   2055.20 *
  0.000698 *      6.65 *   3131.16 *     247.00 *          0.33 *
*              *          *             *             *             *           *           *           *
*              *          *             *             *             *
* Sols Wash Main * 0.121        *             *   Bridge *           *           *           *           *
*              *          *             *             *             *
*              *          *             *             *             *           *           *           *
*              *          *             *             *             *
* Sols Wash Main * 0.111        * 100-Sols     * 15045.00 *   2041.21 *   2049.75 *   2048.80 *   2051.79 *
  0.006001 *     12.13 *   1425.55 *     289.44 *          0.80 *
* Sols Wash Main * 0.111        * 100-Sols FW * 15045.00 *   2041.21 *   2049.74 *   2048.80 *   2051.79 *
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  0.006004 *    12.13 *   1425.33 *    289.43 *          0.80 *
* Sols Wash Main * 0.111        * 10-yr        *  7019.00 *   2041.21 *   2047.16 *   2046.45 *   2048.36 *
  0.006009 *     9.18 *    869.97 *    262.42 *          0.75 *
* Sols Wash Main * 0.111        * 50-yr        * 12453.00 *   2041.21 *   2049.02 *   2048.13 *   2050.81 *
  0.006004 *    11.30 *   1261.12 *    287.51 *          0.79 *
* Sols Wash Main * 0.111        * 500-yr       * 20836.00 *   2041.21 *   2051.17 *   2050.28 *   2053.76 *
  0.006004 *    13.70 *   1749.83 *    293.23 *          0.82 *
*****************************************************************************************************************
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Profile Output Table - Standard Table 2
*****************************************************************************************************************
*********************************************
* Reach          * River Sta    * Profile      * E.G. Elev * W.S. Elev * Vel Head * Frctn Loss * C & E Loss
*  Q Left * Q Channel * Q Right * Top Width *
*                 *              *              *     (ft) *     (ft) *     (ft) *     (ft) *     (ft)
*   (cfs) *     (cfs) *   (cfs) *      (ft) *
*****************************************************************************************************************
*********************************************
* Sols Wash Main * 1.319        * 100-Sols     *  2099.76 *   2098.62 *      1.14 *      3.71 *      0.13
*   19.29 *  14385.37 *    8.34 *    742.24 *
* Sols Wash Main * 1.319        * 100-Sols FW  *  2099.76 *   2098.60 *      1.16 *      3.75 *      0.14
*         *  14413.00 *         *    708.15 *
* Sols Wash Main * 1.319        * 10-yr        *  2098.14 *   2097.25 *      0.89 *      4.00 *      0.12
*    0.02 *   6724.98 *         *    501.97 *
* Sols Wash Main * 1.319        * 50-yr        *  2099.31 *   2098.15 *      1.16 *      4.10 *      0.15
*    7.43 *  11918.01 *    1.55 *    614.85 *
* Sols Wash Main * 1.319        * 500-yr       *  2100.44 *   2099.34 *      1.10 *      3.41 *      0.12
*   54.25 *  19896.95 *   34.80 *   1126.73 *
*         *          *         *            *          *           *          *           *
*         *          *         *            *
* Sols Wash Main * 1.224        * 100-Sols     *  2093.58 *   2092.89 *      0.69 *      3.40 *      0.04
*         *  14413.00 *         *    995.33 *
* Sols Wash Main * 1.224        * 100-Sols FW  *  2093.58 *   2092.89 *      0.69 *      3.40 *      0.04
*         *  14413.00 *         *    995.85 *
* Sols Wash Main * 1.224        * 10-yr        *  2092.26 *   2091.75 *      0.50 *      3.76 *      0.05
*         *   6725.00 *         *    691.10 *
* Sols Wash Main * 1.224        * 50-yr        *  2093.19 *   2092.52 *      0.67 *      3.38 *      0.03
*         *  11927.00 *         *    913.42 *
* Sols Wash Main * 1.224        * 500-yr       *  2094.29 *   2093.58 *      0.71 *      3.37 *      0.06
*         *  19986.00 *         *   1254.42 *
*         *          *         *            *          *           *          *           *
*         *          *         *            *
* Sols Wash Main * 1.141        * 100-Sols     *  2090.14 *   2089.09 *      1.05 *      2.20 *      0.01
*         *  14459.00 *         *    881.17 *
* Sols Wash Main * 1.141        * 100-Sols FW  *  2090.14 *   2089.09 *      1.05 *      2.20 *      0.01
*         *  14459.00 *         *    881.16 *
* Sols Wash Main * 1.141        * 10-yr        *  2088.44 *   2087.41 *      1.03 *      3.13 *      0.01
*         *   6758.00 *         *    360.17 *
* Sols Wash Main * 1.141        * 50-yr        *  2089.78 *   2088.84 *      0.94 *      2.42 *      0.05
*         *  11964.00 *         *    870.81 *
* Sols Wash Main * 1.141        * 500-yr       *  2090.87 *   2089.59 *      1.28 *      1.91 *      0.14
*         *  20005.00 *         *    884.48 *
*         *          *         *            *          *           *          *           *
*         *          *         *            *
* Sols Wash Main * 1.081        * 100-Sols     *  2087.64 *   2086.48 *      1.16 *      2.43 *      0.09
*         *  14459.00 *         *    785.64 *
* Sols Wash Main * 1.081        * 100-Sols FW  *  2087.64 *   2086.47 *      1.16 *      2.43 *      0.09
*         *  14459.00 *         *    785.30 *
* Sols Wash Main * 1.081        * 10-yr        *  2085.30 *   2084.14 *      1.15 *      2.88 *      0.01
*         *   6758.00 *         *    306.32 *
* Sols Wash Main * 1.081        * 50-yr        *  2087.00 *   2085.58 *      1.43 *      2.63 *      0.04
*         *  11964.00 *         *    355.35 *
* Sols Wash Main * 1.081        * 500-yr       *  2088.49 *   2087.66 *      0.82 *      2.40 *      0.04
*   61.32 *  19943.68 *         *    924.59 *
*         *          *         *            *          *           *          *           *
*         *          *         *            *
* Sols Wash Main * 1.021        * 100-Sols     *  2085.12 *   2083.09 *      2.03 *      3.26 *      0.01
*    0.11 *  14458.89 *         *    297.92 *
* Sols Wash Main * 1.021        * 100-Sols FW  *  2085.12 *   2083.09 *      2.03 *      3.26 *      0.01
*    0.11 *  14458.89 *         *    297.94 *
* Sols Wash Main * 1.021        * 10-yr        *  2082.40 *   2081.17 *      1.23 *      3.26 *      0.02
*         *   6758.00 *         *    248.46 *
* Sols Wash Main * 1.021        * 50-yr        *  2084.34 *   2082.51 *      1.83 *      3.22 *      0.02
*         *  11964.00 *         *    267.18 *
* Sols Wash Main * 1.021        * 500-yr       *  2086.05 *   2084.81 *      1.24 *      3.08 *      0.01
*  427.25 *  19576.15 *    1.60 *    877.66 *
*         *          *         *            *          *           *          *           *
*         *          *         *            *
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* Sols Wash Main * 0.955          * 100-Sols     *   2081.85 *   2079.85 *      2.00 *       2.60 *       0.18
*    0.07 *  14458.92 *            *    329.22 *
* Sols Wash Main * 0.955          * 100-Sols FW *   2081.85 *   2079.85 *      2.00 *       2.61 *       0.18
*         *  14459.00 *            *    321.51 *
* Sols Wash Main * 0.955          * 10-yr        *   2079.12 *   2077.65 *      1.48 *       2.87 *       0.17
*         *   6758.00 *            *    237.36 *
* Sols Wash Main * 0.955          * 50-yr        *   2081.10 *   2079.12 *      1.99 *       2.75 *       0.22
*         *  11964.00 *            *    267.46 *
* Sols Wash Main * 0.955          * 500-yr       *   2082.96 *   2081.59 *      1.37 *       2.10 *       0.02
*  450.49 *  19554.51 *            *    871.45 *
*            *                    *            *           *           *           *           *
*         *          *            *            *
* Sols Wash Main * 0.886          * 100-Sols     *   2078.17 *   2076.77 *      1.40 *       1.96 *       0.00
*    0.87 *  14458.13 *            *    363.51 *
* Sols Wash Main * 0.886          * 100-Sols FW *   2078.16 *   2076.77 *      1.40 *       1.96 *       0.00
*         *  14459.00 *            *    349.81 *
* Sols Wash Main * 0.886          * 10-yr        *   2075.73 *   2074.82 *      0.91 *       1.93 *       0.03
*         *   6758.00 *            *    309.73 *
* Sols Wash Main * 0.886          * 50-yr        *   2077.46 *   2076.20 *      1.26 *       1.95 *       0.01
*         *  11964.00 *            *    337.92 *
* Sols Wash Main * 0.886          * 500-yr       *   2079.55 *   2077.95 *      1.60 *       2.03 *       0.01
*   97.83 *  19907.17 *            *    608.31 *
*            *                    *            *           *           *           *           *
*         *          *            *            *
* Sols Wash Main * 0.822          * 100-Sols     *   2076.20 *   2074.79 *      1.41 *       1.26 *       0.06
*    4.13 *  14454.87 *            *    381.55 *
* Sols Wash Main * 0.822          * 100-Sols FW *   2076.21 *   2074.80 *      1.40 *       1.26 *       0.06
*         *  14459.00 *            *    339.87 *
* Sols Wash Main * 0.822          * 10-yr        *   2073.77 *   2072.97 *      0.80 *       1.34 *       0.05
*         *   6758.00 *            *    303.42 *
* Sols Wash Main * 0.822          * 50-yr        *   2075.50 *   2074.26 *      1.23 *       1.28 *       0.06
*         *  11964.00 *            *    322.18 *
* Sols Wash Main * 0.822          * 500-yr       *   2077.50 *   2075.76 *      1.74 *       1.20 *       0.05
*  106.95 *  19898.05 *            *    547.41 *
*            *                    *            *           *           *           *           *
*         *          *            *            *
* Sols Wash Main * 0.785          * 100-Sols     *   2074.88 *   2072.86 *      2.02 *       1.41 *       0.22
*    2.68 *  14456.32 *            *    342.38 *
* Sols Wash Main * 0.785          * 100-Sols FW *   2074.88 *   2072.85 *      2.04 *       1.41 *       0.22
*         *  14459.00 *            *    310.73 *
* Sols Wash Main * 0.785          * 10-yr        *   2072.38 *   2071.08 *      1.30 *       1.42 *       0.19
*         *   6758.00 *            *    286.13 *
* Sols Wash Main * 0.785          * 50-yr        *   2074.15 *   2072.32 *      1.83 *       1.33 *       0.24
*         *  11964.00 *            *    301.02 *
* Sols Wash Main * 0.785          * 500-yr       *   2076.26 *   2074.06 *      2.20 *       1.17 *       0.22
*  194.34 *  19810.66 *            *    535.53 *
*            *                    *            *           *           *           *           *
*         *          *            *            *
* Sols Wash Main * 0.746          * 100-Sols     *   2071.89 *   2070.59 *      1.30 *       1.26 *       0.02
*    0.03 *  14458.97 *            *    427.73 *
* Sols Wash Main * 0.746          * 100-Sols FW *   2071.89 *   2070.59 *      1.30 *       1.27 *       0.02
*         *  14459.00 *            *    425.20 *
* Sols Wash Main * 0.746          * 10-yr        *   2069.95 *   2069.29 *      0.67 *       1.44 *       0.04
*         *   6758.00 *            *    416.80 *
* Sols Wash Main * 0.746          * 50-yr        *   2071.36 *   2070.34 *      1.02 *       1.36 *       0.05
*         *  11964.00 *            *    423.58 *
* Sols Wash Main * 0.746          * 500-yr       *   2073.16 *   2071.69 *      1.47 *       0.81 *       0.08
*   17.74 *  19987.27 *            *    469.73 *
*            *                    *            *           *           *           *           *
*         *          *            *            *
* Sols Wash Main * 0.708          * 100-Sols     *   2070.61 *   2069.15 *      1.46 *       0.72 *       0.22
*         *  14459.00 *            *    395.47 *
* Sols Wash Main * 0.708          * 100-Sols FW *   2070.61 *   2069.15 *      1.46 *       0.72 *       0.22
*         *  14459.00 *            *    395.40 *
* Sols Wash Main * 0.708          * 10-yr        *   2068.47 *   2067.38 *      1.09 *       1.35 *       0.14
*         *   6758.00 *            *    377.49 *
* Sols Wash Main * 0.708          * 50-yr        *   2069.95 *   2068.39 *      1.56 *       0.93 *       0.25
*         *  11964.00 *            *    387.76 *
* Sols Wash Main * 0.708          * 500-yr       *   2072.27 *   2071.07 *      1.20 *       0.44 *       0.14
*         *  20005.00 *            *    419.76 *
*            *                    *            *           *           *           *           *
*         *          *            *            *
* Sols Wash Main * 0.668          * 100-Sols     *   2069.67 *   2068.95 *      0.72 *       0.27 *       0.01
*         *  14459.00 *            *    383.73 *
* Sols Wash Main * 0.668          * 100-Sols FW *   2069.67 *   2068.94 *      0.72 *       0.27 *       0.01
*         *  14459.00 *            *    383.67 *
* Sols Wash Main * 0.668          * 10-yr        *   2066.79 *   2066.16 *      0.63 *       0.49 *       0.00
*         *   6758.00 *            *    375.11 *
* Sols Wash Main * 0.668          * 50-yr        *   2068.73 *   2068.02 *      0.71 *       0.33 *       0.01
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*	* 11964.00 *	* 381.36 *							
* Sols Wash Main	* 0.668	* 500-yr	*	2071.69 *	2070.95 *	0.74 *	0.20 *	0.02
*	* 20005.00 *	* 388.84 *						
*	*	*	*	*	*	*	*	
*	*	*	*					
* Sols Wash Main	* 0.642	* 100-Sols	*	2069.38 *	2068.53 *	0.86 *	0.41 *	0.08
*	* 14459.00 *	* 314.12 *						
* Sols Wash Main	* 0.642	* 100-Sols FW	*	2069.38 *	2068.52 *	0.86 *	0.41 *	0.08
*	* 14459.00 *	* 314.04 *						
* Sols Wash Main	* 0.642	* 10-yr	*	2066.30 *	2065.68 *	0.62 *	0.64 *	0.06
*	* 6758.00 *	* 304.27 *						
* Sols Wash Main	* 0.642	* 50-yr	*	2068.40 *	2067.58 *	0.81 *	0.50 *	0.08
*	* 11964.00 *	* 309.17 *						
* Sols Wash Main	* 0.642	* 500-yr	*	2071.47 *	2070.55 *	0.92 *	0.32 *	0.08
*	* 20005.00 *	* 326.85 *						
*	*	*	*	*	*	*	*	
*	*	*	*					
* Sols Wash Main	* 0.614	* 100-Sols	*	2068.89 *	2067.27 *	1.62 *	0.44 *	0.02
*	* 14459.00 *	* 230.63 *						
* Sols Wash Main	* 0.614	* 100-Sols FW	*	2068.89 *	2067.27 *	1.63 *	0.44 *	0.02
*	* 14459.00 *	* 230.17 *						
* Sols Wash Main	* 0.614	* 10-yr	*	2065.61 *	2064.40 *	1.21 *	0.84 *	0.03
*	* 6758.00 *	* 221.84 *						
* Sols Wash Main	* 0.614	* 50-yr	*	2067.82 *	2066.19 *	1.63 *	0.55 *	0.02
*	* 11964.00 *	* 226.37 *						
* Sols Wash Main	* 0.614	* 500-yr	*	2071.08 *	2069.39 *	1.69 *	0.34 *	0.00
*	* 20005.00 *	* 244.91 *						
*	*	*	*	*	*	*	*	
*	*	*	*					
* Sols Wash Main	* 0.592	* 100-Sols	*	2068.43 *	2066.89 *	1.55 *	0.44 *	0.15
*	* 14459.00 *	* 213.71 *						
* Sols Wash Main	* 0.592	* 100-Sols FW	*	2068.43 *	2066.88 *	1.55 *	0.44 *	0.15
*	* 14459.00 *	* 213.49 *						
* Sols Wash Main	* 0.592	* 10-yr	*	2064.73 *	2063.22 *	1.51 *	1.35 *	0.04
*	* 6758.00 *	* 203.06 *						
* Sols Wash Main	* 0.592	* 50-yr	*	2067.25 *	2065.70 *	1.56 *	0.53 *	0.16
*	* 11964.00 *	* 209.24 *						
* Sols Wash Main	* 0.592	* 500-yr	*	2070.74 *	2069.05 *	1.69 *	0.37 *	0.14
*	* 20005.00 *	* 220.51 *						
*	*	*	*	*	*	*	*	
*	*	*	*					
* Sols Wash Main	* 0.557	* 100-Sols	*	2067.85 *	2066.79 *	1.06 *	0.22 *	0.09
*	* 14459.00 *	* 220.72 *						
* Sols Wash Main	* 0.557	* 100-Sols FW	*	2067.85 *	2066.79 *	1.06 *	0.22 *	0.09
*	* 14459.00 *	* 220.47 *						
* Sols Wash Main	* 0.557	* 10-yr	*	2063.34 *	2061.97 *	1.37 *	0.69 *	0.16
*	* 6758.00 *	* 207.18 *						
* Sols Wash Main	* 0.557	* 50-yr	*	2066.56 *	2065.54 *	1.02 *	0.24 *	0.10
*	* 11964.00 *	* 217.60 *						
* Sols Wash Main	* 0.557	* 500-yr	*	2070.23 *	2069.00 *	1.23 *	0.20 *	0.09
*	* 20005.00 *	* 232.23 *						
*	*	*	*	*	*	*	*	
*	*	*	*					
* Sols Wash Main	* 0.529	* 100-Sols	*	2067.54 *	2066.78 *	0.76 *	0.16 *	0.01
*	* 14459.00 *	* 233.52 *						
* Sols Wash Main	* 0.529	* 100-Sols FW	*	2067.54 *	2066.78 *	0.76 *	0.16 *	0.01
*	* 14459.00 *	* 233.27 *						
* Sols Wash Main	* 0.529	* 10-yr	*	2062.49 *	2061.66 *	0.83 *	0.45 *	0.01
*	* 6758.00 *	* 215.89 *						
* Sols Wash Main	* 0.529	* 50-yr	*	2066.22 *	2065.52 *	0.70 *	0.17 *	0.01
*	* 11964.00 *	* 227.04 *						
* Sols Wash Main	* 0.529	* 500-yr	*	2069.94 *	2069.02 *	0.92 *	0.15 *	0.02
*	* 20005.00 *	* 240.00 *						
*	*	*	*	*	*	*	*	
*	*	*	*					
* Sols Wash Main	* 0.505	* 100-Sols	*	2067.37 *	2066.50 *	0.87 *	0.15 *	0.03
*	* 14459.00 *	* 211.02 *						
* Sols Wash Main	* 0.505	* 100-Sols FW	*	2067.37 *	2066.50 *	0.87 *	0.15 *	0.03
*	* 14459.00 *	* 210.59 *						
* Sols Wash Main	* 0.505	* 10-yr	*	2062.03 *	2061.05 *	0.98 *	0.40 *	0.03
*	* 6758.00 *	* 189.85 *						
* Sols Wash Main	* 0.505	* 50-yr	*	2066.04 *	2065.25 *	0.79 *	0.15 *	0.03
*	* 11964.00 *	* 203.08 *						
* Sols Wash Main	* 0.505	* 500-yr	*	2069.77 *	2068.69 *	1.08 *	0.15 *	0.05
*	* 20005.00 *	* 213.00 *						
*	*	*	*	*	*	*	*	
*	*	*	*					
* Sols Wash Main	* 0.485	* 100-Sols	*	2067.19 *	2065.98 *	1.21 *	0.17 *	0.00
*	* 15045.00 *	* 170.42 *						

* Sols Wash Main * 0.485	* 100-Sols FW *	2067.19 *	2065.98 *	1.21 *	0.17 *	0.00
* 15045.00 *	* 170.42 *					
* Sols Wash Main * 0.485	* 10-yr *	2061.60 *	2060.34 *	1.26 *	0.41 *	0.01
* 7019.00 *	* 161.80 *					
* Sols Wash Main * 0.485	* 50-yr *	2065.87 *	2064.81 *	1.06 *	0.16 *	0.00
* 12453.00 *	* 165.73 *					
* Sols Wash Main * 0.485	* 500-yr *	2069.57 *	2067.95 *	1.62 *	0.18 *	0.01
* 20836.00 *	* 171.30 *					
* *	* *	*	*	*	*	
* *	* *					
* Sols Wash Main * 0.467	* 100-Sols *	2067.02 *	2065.80 *	1.22 *	0.12 *	0.08
* 15045.00 *	* 161.00 *					
* Sols Wash Main * 0.467	* 100-Sols FW *	2067.02 *	2065.80 *	1.22 *	0.12 *	0.08
* 15045.00 *	* 161.00 *					
* Sols Wash Main * 0.467	* 10-yr *	2061.18 *	2059.96 *	1.22 *	0.25 *	0.14
* 7019.00 *	* 151.50 *					
* Sols Wash Main * 0.467	* 50-yr *	2065.70 *	2064.65 *	1.05 *	0.12 *	0.08
* 12453.00 *	* 157.99 *					
* Sols Wash Main * 0.467	* 500-yr *	2069.38 *	2067.69 *	1.68 *	0.14 *	0.10
* 20836.00 *	* 161.00 *					
* *	* *	*	*	*	*	
* *	* *					
* Sols Wash Main * 0.447	* 100-Sols *	2066.82 *	2065.87 *	0.94 *	0.04 *	0.02
* 15045.00 *	* 160.70 *					
* Sols Wash Main * 0.447	* 100-Sols FW *	2066.82 *	2065.87 *	0.94 *	0.04 *	0.02
* 15045.00 *	* 160.70 *					
* Sols Wash Main * 0.447	* 10-yr *	2060.79 *	2060.03 *	0.76 *	0.06 *	0.02
* 7019.00 *	* 155.40 *					
* Sols Wash Main * 0.447	* 50-yr *	2065.51 *	2064.72 *	0.79 *	0.03 *	0.02
* 12453.00 *	* 160.70 *					
* Sols Wash Main * 0.447	* 500-yr *	2069.13 *	2067.79 *	1.34 *	0.04 *	0.04
* 20836.00 *	* 160.70 *					
* *	* *	*	*	*	*	
* *	* *					
* Sols Wash Main * 0.442	* 100-Sols *	2066.76 *	2065.73 *	1.02 *	*	
* 15045.00 *	* 155.50 *					
* Sols Wash Main * 0.442	* 100-Sols FW *	2066.76 *	2065.73 *	1.02 *	*	
* 15045.00 *	* 155.50 *					
* Sols Wash Main * 0.442	* 10-yr *	2060.72 *	2059.90 *	0.82 *	*	
* 7019.00 *	* 149.25 *					
* Sols Wash Main * 0.442	* 50-yr *	2065.45 *	2064.59 *	0.86 *	*	
* 12453.00 *	* 155.50 *					
* Sols Wash Main * 0.442	* 500-yr *	2069.06 *	2067.58 *	1.47 *	*	
* 20836.00 *	* 155.50 *					
* *	* *	*	*	*	*	
* *	* *					
* Sols Wash Main * 0.423	* *	Bridge *	*	*	*	
* *	* *					
* *	* *	*	*	*	*	
* *	* *					
* Sols Wash Main * 0.412	* 100-Sols *	2062.80 *	2061.01 *	1.79 *	0.33 *	0.08
* 15045.00 *	* 155.00 *					
* Sols Wash Main * 0.412	* 100-Sols FW *	2062.80 *	2061.01 *	1.79 *	0.33 *	0.08
* 15045.00 *	* 155.00 *					
* Sols Wash Main * 0.412	* 10-yr *	2058.25 *	2056.97 *	1.28 *	0.48 *	0.05
* 7019.00 *	* 155.00 *					
* Sols Wash Main * 0.412	* 50-yr *	2061.42 *	2059.76 *	1.65 *	0.36 *	0.07
* 12453.00 *	* 155.00 *					
* Sols Wash Main * 0.412	* 500-yr *	2065.60 *	2063.49 *	2.12 *	0.29 *	0.10
* 20836.00 *	* 155.00 *					
* *	* *	*	*	*	*	
* *	* *					
* Sols Wash Main * 0.389	* 100-Sols *	2062.40 *	2060.76 *	1.64 *	0.45 *	0.02
* 15045.00 *	* 158.27 *					
* Sols Wash Main * 0.389	* 100-Sols FW *	2062.40 *	2060.76 *	1.64 *	0.45 *	0.02
* 15045.00 *	* 158.27 *					
* Sols Wash Main * 0.389	* 10-yr *	2057.72 *	2056.55 *	1.18 *	0.66 *	0.04
* 7019.00 *	* 154.50 *					
* Sols Wash Main * 0.389	* 50-yr *	2060.99 *	2059.48 *	1.51 *	0.48 *	0.03
* 12453.00 *	* 156.00 *					
* Sols Wash Main * 0.389	* 500-yr *	2065.21 *	2063.29 *	1.92 *	0.38 *	0.01
* 20836.00 *	* 163.00 *					
* *	* *	*	*	*	*	
* *	* *					
* Sols Wash Main * 0.359	* 100-Sols *	2061.93 *	2060.08 *	1.85 *	0.76 *	0.04
* 15045.00 *	* 162.00 *					
* Sols Wash Main * 0.359	* 100-Sols FW *	2061.93 *	2060.08 *	1.85 *	0.76 *	0.04
* 15045.00 *	* 162.00 *					
* Sols Wash Main * 0.359	* 10-yr *	2057.02 *	2055.45 *	1.57 *	0.91 *	0.16

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*          *   7019.00 *          *    132.00 *
* Sols Wash Main * 0.359          * 50-yr       *   2060.48 *   2058.67 *     1.81 *       0.79 *       0.08
*          *  12453.00 *          *    144.00 *
* Sols Wash Main * 0.359          * 500-yr      *   2064.82 *   2062.77 *     2.05 *       0.67 *       0.01
*          *  20836.00 *          *    162.00 *
*          *          *          *            *           *           *           *           *
*          *          *          *            *
* Sols Wash Main * 0.306          * 100-Sols    *   2061.13 *   2059.42 *     1.71 *       0.22 *       0.04
*          *  15045.00 *          *    135.50 *
* Sols Wash Main * 0.306          * 100-Sols FW *   2061.13 *   2059.42 *     1.71 *       0.22 *       0.04
*          *  15045.00 *          *    135.50 *
* Sols Wash Main * 0.306          * 10-yr       *   2055.95 *   2054.90 *     1.05 *       0.21 *       0.04
*          *   7019.00 *          *    118.75 *
* Sols Wash Main * 0.306          * 50-yr       *   2059.61 *   2058.07 *     1.54 *       0.22 *       0.04
*          *  12453.00 *          *    131.72 *
* Sols Wash Main * 0.306          * 500-yr      *   2064.14 *   2062.03 *     2.11 *       0.21 *       0.05
*          *  20836.00 *          *    135.50 *
*          *          *          *            *           *           *           *           *
*          *          *          *            *
* Sols Wash Main * 0.288          * 100-Sols    *   2060.87 *   2059.30 *     1.57 *       0.80 *       0.05
*          *  15045.00 *          *    136.50 *
* Sols Wash Main * 0.288          * 100-Sols FW *   2060.87 *   2059.30 *     1.57 *       0.80 *       0.05
*          *  15045.00 *          *    136.50 *
* Sols Wash Main * 0.288          * 10-yr       *   2055.70 *   2054.77 *     0.93 *       0.77 *       0.03
*          *   7019.00 *          *    122.76 *
* Sols Wash Main * 0.288          * 50-yr       *   2059.34 *   2057.95 *     1.40 *       0.78 *       0.04
*          *  12453.00 *          *    133.37 *
* Sols Wash Main * 0.288          * 500-yr      *   2063.89 *   2061.93 *     1.96 *       0.74 *       0.04
*          *  20836.00 *          *    136.50 *
*          *          *          *            *           *           *           *           *
*          *          *          *            *
* Sols Wash Main * 0.227          * 100-Sols    *   2060.03 *   2057.96 *     2.06 *       0.13 *       0.03
*          *  15045.00 *          *    134.45 *
* Sols Wash Main * 0.227          * 100-Sols FW *   2060.03 *   2057.96 *     2.06 *       0.13 *       0.03
*          *  15045.00 *          *    134.44 *
* Sols Wash Main * 0.227          * 10-yr       *   2054.90 *   2053.63 *     1.27 *       0.13 *       0.02
*          *   7019.00 *          *    115.45 *
* Sols Wash Main * 0.227          * 50-yr       *   2058.52 *   2056.68 *     1.84 *       0.13 *       0.02
*          *  12453.00 *          *    123.00 *
* Sols Wash Main * 0.227          * 500-yr      *   2063.10 *   2060.69 *     2.41 *       0.12 *       0.04
*          *  20836.00 *          *    135.00 *
*          *          *          *            *           *           *           *           *
*          *          *          *            *
* Sols Wash Main * 0.220          * 100-Sols    *   2059.87 *   2057.53 *     2.33 *       0.14 *       0.02
*          *  15045.00 *          *    120.00 *
* Sols Wash Main * 0.220          * 100-Sols FW *   2059.87 *   2057.53 *     2.33 *       0.14 *       0.02
*          *  15045.00 *          *    120.00 *
* Sols Wash Main * 0.220          * 10-yr       *   2054.76 *   2053.33 *     1.43 *       0.16 *       0.02
*          *   7019.00 *          *    111.64 *
* Sols Wash Main * 0.220          * 50-yr       *   2058.37 *   2056.30 *     2.07 *       0.15 *       0.01
*          *  12453.00 *          *    120.00 *
* Sols Wash Main * 0.220          * 500-yr      *   2062.93 *   2060.09 *     2.84 *       0.14 *       0.02
*          *  20836.00 *          *    127.03 *
*          *          *          *            *           *           *           *           *
*          *          *          *            *
* Sols Wash Main * 0.212          * 100-Sols    *   2059.71 *   2057.22 *     2.49 *       0.17 *       0.03
*          *  15045.00 *          *    118.00 *
* Sols Wash Main * 0.212          * 100-Sols FW *   2059.71 *   2057.22 *     2.49 *       0.17 *       0.03
*          *  15045.00 *          *    118.00 *
* Sols Wash Main * 0.212          * 10-yr       *   2054.58 *   2052.98 *     1.60 *       0.22 *       0.07
*          *   7019.00 *          *    116.50 *
* Sols Wash Main * 0.212          * 50-yr       *   2058.21 *   2055.99 *     2.21 *       0.19 *       0.06
*          *  12453.00 *          *    118.00 *
* Sols Wash Main * 0.212          * 500-yr      *   2062.77 *   2059.70 *     3.07 *       0.16 *       0.01
*          *  20836.00 *          *    119.50 *
*          *          *          *            *           *           *           *           *
*          *          *          *            *
* Sols Wash Main * 0.204          * 100-Sols    *   2059.50 *   2056.67 *     2.83 *       0.07 *       0.14
*          *  15045.00 *          *    123.00 *
* Sols Wash Main * 0.204          * 100-Sols FW *   2059.50 *   2056.67 *     2.83 *       0.07 *       0.14
*          *  15045.00 *          *    123.00 *
* Sols Wash Main * 0.204          * 10-yr       *   2054.29 *   2052.00 *     2.29 *       0.07 *       0.03
*          *   7019.00 *          *    103.00 *
* Sols Wash Main * 0.204          * 50-yr       *   2057.96 *   2055.20 *     2.77 *       0.07 *       0.10
*          *  12453.00 *          *    120.86 *
* Sols Wash Main * 0.204          * 500-yr      *   2062.59 *   2059.39 *     3.21 *       0.07 *       0.19
*          *  20836.00 *          *    124.50 *
*          *          *          *            *           *           *           *           *
*          *          *          *            *
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* Sols Wash Main * 0.201          * 100-Sols     *   2059.29 *   2055.03 *    4.26 *    0.04 *    0.00
*          *  15045.00 *           *    107.50 *
* Sols Wash Main * 0.201          * 100-Sols FW *    2059.29 *   2055.04 *    4.25 *    0.04 *    0.00
*          *  15045.00 *           *    107.50 *
* Sols Wash Main * 0.201          * 10-yr        *   2054.19 *   2051.59 *    2.60 *    0.03 *    0.00
*          *   7019.00 *           *    104.50 *
* Sols Wash Main * 0.201          * 50-yr        *   2057.78 *   2054.03 *    3.76 *    0.03 *    0.00
*          *  12453.00 *           *    107.50 *
* Sols Wash Main * 0.201          * 500-yr       *   2062.34 *   2057.19 *    5.15 *    0.04 *    0.01
*   11.85 *  20824.15 *            *    123.68 *
*          *          *            *           *          *          *          *          *
*          *          *            *           *
* Sols Wash Main * 0.198          * 100-Sols     *   2055.95 *   2051.71 *    4.24 *    0.02 *    0.73
*          *  15045.00 *           *    108.40 *
* Sols Wash Main * 0.198          * 100-Sols FW *    2055.95 *   2051.71 *    4.24 *    0.02 *    0.73
*          *  15045.00 *           *    108.40 *
* Sols Wash Main * 0.198          * 10-yr        *   2050.80 *   2048.16 *    2.65 *    0.01 *    0.58
*          *   7019.00 *           *    102.00 *
* Sols Wash Main * 0.198          * 50-yr        *   2054.43 *   2050.63 *    3.80 *    0.02 *    0.71
*          *  12453.00 *           *    105.20 *
* Sols Wash Main * 0.198          * 500-yr       *   2059.02 *   2053.76 *    5.26 *    0.03 *    0.79
*          *  20836.00 *           *    108.40 *
*          *          *            *           *          *          *          *          *
*          *          *            *           *
* Sols Wash Main * 0.195          * 100-Sols     *   2054.17 *   2052.37 *    1.80 *    0.01 *    0.06
*          *  15045.00 *           *    112.00 *
* Sols Wash Main * 0.195          * 100-Sols FW *    2054.17 *   2052.37 *    1.80 *    0.01 *    0.06
*          *  15045.00 *           *    112.00 *
* Sols Wash Main * 0.195          * 10-yr        *   2049.76 *   2049.04 *    0.72 *    0.00 *    0.02
*          *   7019.00 *           *    109.00 *
* Sols Wash Main * 0.195          * 50-yr        *   2052.89 *   2051.45 *    1.44 *    0.01 *    0.04
*          *  12453.00 *           *    112.00 *
* Sols Wash Main * 0.195          * 500-yr       *   2056.80 *   2054.17 *    2.63 *    0.01 *    0.08
*          *  20836.00 *           *    115.00 *
*          *          *            *           *          *          *          *          *
*          *          *            *           *
* Sols Wash Main * 0.192          * 100-Sols     *   2054.11 *   2052.49 *    1.61 *    0.01 *    0.05
*          *  15045.00 *           *    114.00 *
* Sols Wash Main * 0.192          * 100-Sols FW *    2054.11 *   2052.49 *    1.61 *    0.01 *    0.05
*          *  15045.00 *           *    114.00 *
* Sols Wash Main * 0.192          * 10-yr        *   2049.74 *   2049.10 *    0.64 *    0.00 *    0.02
*          *   7019.00 *           *    111.00 *
* Sols Wash Main * 0.192          * 50-yr        *   2052.84 *   2051.55 *    1.29 *    0.01 *    0.04
*          *  12453.00 *           *    114.00 *
* Sols Wash Main * 0.192          * 500-yr       *   2056.71 *   2054.35 *    2.36 *    0.01 *    0.07
*          *  20836.00 *           *    117.00 *
*          *          *            *           *          *          *          *          *
*          *          *            *           *
* Sols Wash Main * 0.189          * 100-Sols     *   2054.05 *   2052.60 *    1.45 *    0.01 *    0.07
*          *  15045.00 *           *    117.50 *
* Sols Wash Main * 0.189          * 100-Sols FW *    2054.05 *   2052.60 *    1.45 *    0.01 *    0.07
*          *  15045.00 *           *    117.50 *
* Sols Wash Main * 0.189          * 10-yr        *   2049.71 *   2049.14 *    0.57 *    0.00 *    0.03
*          *   7019.00 *           *    113.00 *
* Sols Wash Main * 0.189          * 50-yr        *   2052.79 *   2051.64 *    1.16 *    0.01 *    0.05
*          *  12453.00 *           *    116.00 *
* Sols Wash Main * 0.189          * 500-yr       *   2056.63 *   2054.50 *    2.12 *    0.01 *    0.10
*          *  20836.00 *           *    119.00 *
*          *          *            *           *          *          *          *          *
*          *          *            *           *
* Sols Wash Main * 0.187          * 100-Sols     *   2053.98 *   2052.75 *    1.22 *    0.00 *    0.03
*          *  15045.00 *           *    125.50 *
* Sols Wash Main * 0.187          * 100-Sols FW *    2053.98 *   2052.75 *    1.22 *    0.00 *    0.03
*          *  15045.00 *           *    125.50 *
* Sols Wash Main * 0.187          * 10-yr        *   2049.68 *   2049.20 *    0.48 *    0.00 *    0.01
*          *   7019.00 *           *    122.50 *
* Sols Wash Main * 0.187          * 50-yr        *   2052.73 *   2051.76 *    0.97 *    0.00 *    0.02
*          *  12453.00 *           *    122.50 *
* Sols Wash Main * 0.187          * 500-yr       *   2056.52 *   2054.73 *    1.78 *    0.01 *    0.04
*          *  20836.00 *           *    125.50 *
*          *          *            *           *          *          *          *          *
*          *          *            *           *
* Sols Wash Main * 0.184          * 100-Sols     *   2053.94 *   2052.82 *    1.13 *    0.01 *    0.11
*          *  15045.00 *           *    128.00 *
* Sols Wash Main * 0.184          * 100-Sols FW *    2053.94 *   2052.82 *    1.13 *    0.01 *    0.11
*          *  15045.00 *           *    128.00 *
* Sols Wash Main * 0.184          * 10-yr        *   2049.67 *   2049.23 *    0.44 *    0.01 *    0.06
*          *   7019.00 *           *    125.00 *
* Sols Wash Main * 0.184          * 50-yr        *   2052.71 *   2051.81 *    0.90 *    0.01 *    0.09
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*          *  12453.00 *          *    128.00 *
* Sols Wash Main * 0.184         * 500-yr      *   2056.47 *   2054.82 *     1.65 *       0.01 *       0.14
*          *  20836.00 *          *    131.00 *
*          *          *          *           *           *           *           *           *
*          *          *          *           *
* Sols Wash Main * 0.182         * 100-Sols    *   2053.82 *   2051.61 *     2.21 *       0.02 *       0.06
*          *  15045.00 *          *    134.00 *
* Sols Wash Main * 0.182         * 100-Sols FW *   2053.82 *   2051.61 *     2.21 *       0.02 *       0.06
*          *  15045.00 *          *    134.00 *
* Sols Wash Main * 0.182         * 10-yr       *   2049.60 *   2048.57 *     1.03 *       0.01 *       0.02
*          *   7019.00 *          *    131.00 *
* Sols Wash Main * 0.182         * 50-yr       *   2052.60 *   2050.78 *     1.82 *       0.02 *       0.05
*          *  12453.00 *          *    131.00 *
* Sols Wash Main * 0.182         * 500-yr      *   2056.31 *   2053.22 *     3.10 *       0.02 *       0.09
*          *  20836.00 *          *    134.00 *
*          *          *          *           *           *           *           *           *           *
*          *          *          *           *
* Sols Wash Main * 0.180         * 100-Sols    *   2053.75 *   2051.73 *     2.01 *       0.14 *       0.24
*          *  15045.00 *          *    138.50 *
* Sols Wash Main * 0.180         * 100-Sols FW *   2053.75 *   2051.73 *     2.01 *       0.14 *       0.24
*          *  15045.00 *          *    138.50 *
* Sols Wash Main * 0.180         * 10-yr       *   2049.57 *   2048.62 *     0.95 *       0.11 *       0.09
*          *   7019.00 *          *    135.50 *
* Sols Wash Main * 0.180         * 50-yr       *   2052.54 *   2050.88 *     1.66 *       0.13 *       0.19
*          *  12453.00 *          *    138.50 *
* Sols Wash Main * 0.180         * 500-yr      *   2056.20 *   2053.40 *     2.79 *       0.16 *       0.36
*          *  20836.00 *          *    138.50 *
*          *          *          *           *           *           *           *           *           *
*          *          *          *           *
* Sols Wash Main * 0.169         * 100-Sols    *   2053.37 *   2052.14 *     1.23 *       0.08 *       0.12
*          *  15045.00 *          *    183.87 *
* Sols Wash Main * 0.169         * 100-Sols FW *   2053.37 *   2052.14 *     1.23 *       0.08 *       0.12
*          *  15045.00 *          *    183.87 *
* Sols Wash Main * 0.169         * 10-yr       *   2049.37 *   2048.73 *     0.64 *       0.06 *       0.06
*          *   7019.00 *          *    162.06 *
* Sols Wash Main * 0.169         * 50-yr       *   2052.22 *   2051.17 *     1.05 *       0.07 *       0.10
*          *  12453.00 *          *    180.74 *
* Sols Wash Main * 0.169         * 500-yr      *   2055.68 *   2054.08 *     1.60 *       0.08 *       0.15
*          *  20836.00 *          *    186.94 *
*          *          *          *           *           *           *           *           *           *
*          *          *          *           *
* Sols Wash Main * 0.159         * 100-Sols    *   2053.17 *   2052.33 *     0.84 *       0.05 *       0.07
*          *  15045.00 *          *    204.48 *
* Sols Wash Main * 0.159         * 100-Sols FW *   2053.17 *   2052.33 *     0.84 *       0.05 *       0.07
*          *  15045.00 *          *    204.48 *
* Sols Wash Main * 0.159         * 10-yr       *   2049.25 *   2048.81 *     0.43 *       0.04 *       0.04
*          *   7019.00 *          *    201.40 *
* Sols Wash Main * 0.159         * 50-yr       *   2052.05 *   2051.34 *     0.71 *       0.05 *       0.06
*          *  12453.00 *          *    204.48 *
* Sols Wash Main * 0.159         * 500-yr      *   2055.45 *   2054.34 *     1.12 *       0.05 *       0.09
*          *  20836.00 *          *    207.56 *
*          *          *          *           *           *           *           *           *           *
*          *          *          *           *
* Sols Wash Main * 0.150         * 100-Sols    *   2053.06 *   2052.45 *     0.61 *       0.04 *       0.03
*          *  15045.00 *          *    227.97 *
* Sols Wash Main * 0.150         * 100-Sols FW *   2053.06 *   2052.45 *     0.61 *       0.04 *       0.03
*          *  15045.00 *          *    227.97 *
* Sols Wash Main * 0.150         * 10-yr       *   2049.17 *   2048.86 *     0.30 *       0.03 *       0.02
*          *   7019.00 *          *    224.95 *
* Sols Wash Main * 0.150         * 50-yr       *   2051.94 *   2051.43 *     0.51 *       0.03 *       0.03
*          *  12453.00 *          *    227.96 *
* Sols Wash Main * 0.150         * 500-yr      *   2055.31 *   2054.49 *     0.82 *       0.04 *       0.04
*          *  20836.00 *          *    230.98 *
*          *          *          *           *           *           *           *           *           *
*          *          *          *           *
* Sols Wash Main * 0.140         * 100-Sols    *   2052.99 *   2052.49 *     0.51 *       0.03 *       0.00
*          *  15045.00 *          *    246.84 *
* Sols Wash Main * 0.140         * 100-Sols FW *   2052.99 *   2052.49 *     0.51 *       0.03 *       0.00
*          *  15045.00 *          *    246.84 *
* Sols Wash Main * 0.140         * 10-yr       *   2049.12 *   2048.87 *     0.25 *       0.02 *       0.00
*          *   7019.00 *          *    243.76 *
* Sols Wash Main * 0.140         * 50-yr       *   2051.88 *   2051.46 *     0.42 *       0.02 *       0.00
*          *  12453.00 *          *    246.83 *
* Sols Wash Main * 0.140         * 500-yr      *   2055.23 *   2054.55 *     0.68 *       0.03 *       0.00
*          *  20836.00 *          *    249.92 *
*          *          *          *           *           *           *           *           *           *
*          *          *          *           *
* Sols Wash Main * 0.132         * 100-Sols    *   2052.97 *   2052.45 *     0.51 *       0.02 *       0.05
*          *  15045.00 *          *    244.00 *
```

```
* Sols Wash Main * 0.132       * 100-Sols FW *   2052.97 *   2052.45 *     0.51 *       0.02 *       0.05
*          *  15045.00 *        *    244.00 *
* Sols Wash Main * 0.132       * 10-yr       *   2049.10 *   2048.85 *     0.25 *       0.01 *       0.02
*          *   7019.00 *        *    241.00 *
* Sols Wash Main * 0.132       * 50-yr       *   2051.86 *   2051.43 *     0.43 *       0.02 *       0.04
*          *  12453.00 *        *    244.00 *
* Sols Wash Main * 0.132       * 500-yr      *   2055.20 *   2054.52 *     0.69 *       0.02 *       0.08
*          *  20836.00 *        *    247.00 *
*                *              *             *           *           *           *           *
*          *          *         *            *
* Sols Wash Main * 0.121       *             *    Bridge *           *           *           *
*          *          *         *            *
*                *              *             *           *           *           *           *
*          *          *         *            *
* Sols Wash Main * 0.111       * 100-Sols    *   2051.79 *   2049.75 *     2.05 *           *
* 1929.66 *  13042.07 *   73.26 *    289.44 *
* Sols Wash Main * 0.111       * 100-Sols FW *   2051.79 *   2049.74 *     2.05 *           *
* 1929.57 *  13042.28 *   73.15 *    289.43 *
* Sols Wash Main * 0.111       * 10-yr       *   2048.36 *   2047.16 *     1.20 *           *
*  687.23 *   6331.77 *        *    262.42 *
* Sols Wash Main * 0.111       * 50-yr       *   2050.81 *   2049.02 *     1.79 *           *
* 1531.52 *  10916.71 *    4.76 *    287.51 *
* Sols Wash Main * 0.111       * 500-yr      *   2053.76 *   2051.17 *     2.59 *           *
* 2820.44 *  17674.75 *  340.81 *    293.23 *
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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Sols

River: Sols Wash  Reach: Sols Wash Main     RS: 1.319     Profile: 100-Sols
     Warning:The energy equation could not be balanced within the specified number of iterations.  The
program used critical depth
             for the water surface and continued on with the calculations.
     Warning:Divided flow computed for this cross-section.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
section.  This may indicate
             the need for additional cross sections.
     Warning:During the standard step iterations, when the assumed water surface was set equal to
critical depth, the calculated
             water surface came back below critical depth.  This indicates that there is not a valid
subcritical answer.  The
             program defaulted to critical depth.
River: Sols Wash  Reach: Sols Wash Main     RS: 1.319     Profile: 100-Sols FW
     Warning:The energy equation could not be balanced within the specified number of iterations.  The
program used critical depth
             for the water surface and continued on with the calculations.
     Warning:Divided flow computed for this cross-section.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
section.  This may indicate
             the need for additional cross sections.
     Warning:During the standard step iterations, when the assumed water surface was set equal to
critical depth, the calculated
             water surface came back below critical depth.  This indicates that there is not a valid
subcritical answer.  The
             program defaulted to critical depth.
River: Sols Wash  Reach: Sols Wash Main     RS: 1.319     Profile: 10-yr
     Warning:The energy equation could not be balanced within the specified number of iterations.  The
program used critical depth
             for the water surface and continued on with the calculations.
     Warning:Divided flow computed for this cross-section.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
section.  This may indicate
             the need for additional cross sections.
     Warning:During the standard step iterations, when the assumed water surface was set equal to
critical depth, the calculated
             water surface came back below critical depth.  This indicates that there is not a valid
subcritical answer.  The
             program defaulted to critical depth.
River: Sols Wash  Reach: Sols Wash Main     RS: 1.319     Profile: 50-yr
     Warning:The energy equation could not be balanced within the specified number of iterations.  The
program used critical depth
             for the water surface and continued on with the calculations.
     Warning:Divided flow computed for this cross-section.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
section.  This may indicate
             the need for additional cross sections.
```

Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Sols Wash Reach: Sols Wash Main RS: 1.319 Profile: 500-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Sols Wash Reach: Sols Wash Main RS: 1.224 Profile: 100-Sols
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 1.224 Profile: 100-Sols FW
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 1.224 Profile: 10-yr
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 1.224 Profile: 50-yr
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 1.224 Profile: 500-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 1.141 Profile: 100-Sols
Warning:The energy equation could not be balanced within the specified number of iterations. The program selected the water
surface that had the least amount of error between computed and assumed values.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Sols Wash Reach: Sols Wash Main RS: 1.141 Profile: 100-Sols FW
Warning:The energy equation could not be balanced within the specified number of iterations. The program selected the water
surface that had the least amount of error between computed and assumed values.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Sols Wash Reach: Sols Wash Main RS: 1.141 Profile: 10-yr
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 1.141 Profile: 50-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program selected the water
surface that had the least amount of error between computed and assumed values.

Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Sols Wash Reach: Sols Wash Main RS: 1.141 Profile: 500-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program selected the water
surface that had the least amount of error between computed and assumed values.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Sols Wash Reach: Sols Wash Main RS: 1.081 Profile: 100-Sols
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 1.081 Profile: 100-Sols FW
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 1.081 Profile: 10-yr
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 1.081 Profile: 50-yr
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 1.081 Profile: 500-yr
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 1.021 Profile: 100-Sols
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 1.021 Profile: 100-Sols FW
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 1.021 Profile: 10-yr
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 1.021 Profile: 50-yr
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 1.021 Profile: 500-yr
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.955 Profile: 100-Sols
Warning:The energy equation could not be balanced within the specified number of iterations. The program selected the water
surface that had the least amount of error between computed and assumed values.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Sols Wash Reach: Sols Wash Main RS: 0.955 Profile: 100-Sols FW
Warning:The energy equation could not be balanced within the specified number of iterations. The program selected the water
surface that had the least amount of error between computed and assumed values.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Sols Wash Reach: Sols Wash Main RS: 0.955 Profile: 10-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Sols Wash Reach: Sols Wash Main RS: 0.955 Profile: 50-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program selected the water
surface that had the least amount of error between computed and assumed values.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Sols Wash Reach: Sols Wash Main RS: 0.955 Profile: 500-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program selected the water

surface that had the least amount of error between computed and assumed values.
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Sols Wash Reach: Sols Wash Main RS: 0.886 Profile: 100-Sols
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.886 Profile: 100-Sols FW
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.886 Profile: 10-yr
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.886 Profile: 50-yr
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.886 Profile: 500-yr
Warning:Divided flow computed for this cross-section.
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.822 Profile: 100-Sols
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.822 Profile: 100-Sols FW
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.822 Profile: 10-yr
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.822 Profile: 50-yr
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.822 Profile: 500-yr
Warning:Divided flow computed for this cross-section.
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.785 Profile: 100-Sols

Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Sols Wash Reach: Sols Wash Main RS: 0.785 Profile: 100-Sols FW
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Sols Wash Reach: Sols Wash Main RS: 0.785 Profile: 10-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Sols Wash Reach: Sols Wash Main RS: 0.785 Profile: 50-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Sols Wash Reach: Sols Wash Main RS: 0.785 Profile: 500-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Sols Wash Reach: Sols Wash Main RS: 0.746 Profile: 100-Sols
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.746 Profile: 100-Sols FW
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.746 Profile: 10-yr
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.746 Profile: 50-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.746 Profile: 500-yr
Warning:Divided flow computed for this cross-section.
River: Sols Wash Reach: Sols Wash Main RS: 0.708 Profile: 100-Sols
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.708 Profile: 100-Sols FW
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.708 Profile: 10-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program selected the water
surface that had the least amount of error between computed and assumed values.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Sols Wash Reach: Sols Wash Main RS: 0.708 Profile: 50-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program selected the water
surface that had the least amount of error between computed and assumed values.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Sols Wash Reach: Sols Wash Main RS: 0.708 Profile: 500-yr
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.642 Profile: 100-Sols
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.642 Profile: 100-Sols FW
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.642 Profile: 10-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7

or greater than 1.4.
This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.642 Profile: 50-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.642 Profile: 500-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.592 Profile: 10-yr
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.592 Profile: 50-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.557 Profile: 10-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.505 Profile: 500-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.467 Profile: 10-yr
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.447 Profile: 100-Sols
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.447 Profile: 100-Sols FW
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.447 Profile: 10-yr
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.447 Profile: 50-yr
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.447 Profile: 500-yr
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.423 Profile: 100-Sols
Note: Yarnell answer is not valid if the water surface is above the low chord or if there is weir flow. The Yarnell answer
has been disregarded.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum
answer has been disregarded.
Note: The downstream water surface is below the minimum elevation for pressure flow. The sluice gate equations were used
for pressure flow.
River: Sols Wash Reach: Sols Wash Main RS: 0.423 Profile: 100-Sols FW
Note: Yarnell answer is not valid if the water surface is above the low chord or if there is weir flow. The Yarnell answer
has been disregarded.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum
answer has been disregarded.
Note: The downstream water surface is below the minimum elevation for pressure flow. The sluice gate equations were used
for pressure flow.
River: Sols Wash Reach: Sols Wash Main RS: 0.423 Profile: 10-yr
Warning:The water surface upstream of the bridge computed by the Yarnell method was below critical depth. The Yarnell
solution has been disregarded.
Note: Yarnell answer is not valid if the water surface is above the low chord or if there is weir flow. The Yarnell answer

has been disregarded.
River: Sols Wash Reach: Sols Wash Main RS: 0.423 Profile: 50-yr
Note: The downstream water surface is below the minimum elevation for pressure flow. The sluice gate equations were used
for pressure flow.
River: Sols Wash Reach: Sols Wash Main RS: 0.423 Profile: 500-yr
Note: Yarnell answer is not valid if the water surface is above the low chord or if there is weir flow. The Yarnell answer
has been disregarded.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum
answer has been disregarded.
Note: The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation was
used for pressure flow.
River: Sols Wash Reach: Sols Wash Main RS: 0.359 Profile: 10-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.212 Profile: 10-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.212 Profile: 50-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.204 Profile: 100-Sols
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.204 Profile: 100-Sols FW
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.204 Profile: 10-yr
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.204 Profile: 50-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.204 Profile: 500-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.201 Profile: 100-Sols
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.201 Profile: 100-Sols FW
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.

Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.201 Profile: 10-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.201 Profile: 50-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.201 Profile: 500-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.198 Profile: 100-Sols
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.198 Profile: 100-Sols FW
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.198 Profile: 10-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.198 Profile: 50-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.198 Profile: 500-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.195 Profile: 100-Sols
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.195 Profile: 100-Sols FW
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.195 Profile: 10-yr
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.195 Profile: 50-yr
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.195 Profile: 500-yr
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.192 Profile: 100-Sols
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.192 Profile: 100-Sols FW
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.192 Profile: 10-yr
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.192 Profile: 50-yr
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.192 Profile: 500-yr
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.189 Profile: 100-Sols
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.189 Profile: 100-Sols FW
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.189 Profile: 10-yr
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.189 Profile: 50-yr
Note: Manning's n values were composited to a single value in the main channel.

River: Sols Wash Reach: Sols Wash Main RS: 0.189 Profile: 500-yr
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.187 Profile: 100-Sols
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.187 Profile: 100-Sols FW
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.187 Profile: 10-yr
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.187 Profile: 50-yr
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.187 Profile: 500-yr
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.184 Profile: 100-Sols
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.184 Profile: 100-Sols FW
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.184 Profile: 10-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.184 Profile: 50-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.184 Profile: 500-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.182 Profile: 100-Sols
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.182 Profile: 100-Sols FW
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.182 Profile: 10-yr
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.182 Profile: 50-yr
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.182 Profile: 500-yr
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.180 Profile: 100-Sols
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.180 Profile: 100-Sols FW
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.180 Profile: 10-yr
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.180 Profile: 50-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.180 Profile: 500-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
River: Sols Wash Reach: Sols Wash Main RS: 0.169 Profile: 50-yr
Warning:Divided flow computed for this cross-section.
River: Sols Wash Reach: Sols Wash Main RS: 0.132 Profile: 100-Sols
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.132 Profile: 100-Sols FW
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.132 Profile: 10-yr
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.132 Profile: 50-yr
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.132 Profile: 500-yr
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.121 Profile: 100-Sols
Warning:Pier drag coefficient of 2.0 assumed for Class B flow.
Warning:For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy. This
is not physically possible, the momentum answer has been disregarded.
River: Sols Wash Reach: Sols Wash Main RS: 0.121 Profile: 100-Sols Upstream
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.121 Profile: 100-Sols Downstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Sols Wash Reach: Sols Wash Main RS: 0.121 Profile: 100-Sols FW
Warning:Pier drag coefficient of 2.0 assumed for Class B flow.
Warning:For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy. This
is not physically possible, the momentum answer has been disregarded.
River: Sols Wash Reach: Sols Wash Main RS: 0.121 Profile: 100-Sols FW Upstream
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.121 Profile: 100-Sols FW Downstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Sols Wash Reach: Sols Wash Main RS: 0.121 Profile: 10-yr
Warning:Pier drag coefficient of 2.0 assumed for Class B flow.
Warning:For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy. This
is not physically possible, the momentum answer has been disregarded.
River: Sols Wash Reach: Sols Wash Main RS: 0.121 Profile: 10-yr Upstream
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.121 Profile: 10-yr Downstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Sols Wash Reach: Sols Wash Main RS: 0.121 Profile: 50-yr
Warning:Pier drag coefficient of 2.0 assumed for Class B flow.
Warning:For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy. This

is not physically possible, the momentum answer has been disregarded.
River: Sols Wash Reach: Sols Wash Main RS: 0.121 Profile: 50-yr Upstream
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.121 Profile: 50-yr Downstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Sols Wash Reach: Sols Wash Main RS: 0.121 Profile: 500-yr
Warning:Pier drag coefficient of 2.0 assumed for Class B flow.
Warning:For the final momentum answer at the bridge, the upstream energy was computed lower than the downstream energy. This
is not physically possible, the momentum answer has been disregarded.
River: Sols Wash Reach: Sols Wash Main RS: 0.121 Profile: 500-yr Upstream
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Sols Wash Reach: Sols Wash Main RS: 0.121 Profile: 500-yr Downstream
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Sols Wash Reach: Sols Wash Main RS: 0.111 Profile: 100-Sols
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Sols Wash Reach: Sols Wash Main RS: 0.111 Profile: 100-Sols FW
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Sols Wash Reach: Sols Wash Main RS: 0.111 Profile: 10-yr
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Sols Wash Reach: Sols Wash Main RS: 0.111 Profile: 50-yr
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Sols Wash Reach: Sols Wash Main RS: 0.111 Profile: 500-yr
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX   XXXX       XXXX      XX      XXXX
X     X  X       X    X     X   X    X  X    X
X     X  X       X          X   X    X    X   X
XXXXXXX  XXXX    X      XXX XXXX     XXXXXX   XXXX
X     X  X       X          X  X     X    X       X
X     X  X       X    X     X   X    X    X       X
X     X  XXXXXX   XXXX      X    X   X    X   XXXXX
```

****

PROJECT DATA
Project Title: Hospital_CLOMR
Project File : Hospital_CLOMR.prj
Run Date and Time: 12/14/2006 6:07:27 PM

Project in English units

Project Description:
Hospital Wash CLOMR

Prepared by:
Engineering and Environmental Consultants,
Inc.
3003 N. Central Avenue, Suite 600
Phoenix, Arizona 85012
Phone:
602-248-7702 FAX: 602-248-7851

For: Flood Control District of Maricopa
County
Sols Wash CAR - Contract # 2005C006
Topographic Mapping Source:

5'
Contour Interval
Datum: NAVD88
Discharge information obtained from EEC HEC-1
Model
Study Limits: Hospital Wash
Final Model Run Date: October
2006

Model: Hospital Wash Future Conditions with Future Conditions on Sols
Wash
Profile 1 - 100-yr
Profile 2 - 100-yr FW
Profile 3 - 10-yr
Profile
4 - 50-yr
Profile 5 - 50-yr

Hospital Wash remains in its current existing
condition with the exception of the culvert at
Cavaness Ave, which in this
model has been improved to 2-10'x4' CBC's.

****

PLAN DATA

Plan Title: Hospital_CLOMR
Plan File : q:\305020.02 CLOMR\HEC-RAS\Hospital Wash\Hospital_CLOMR.p01

Geometry Title: Hospital_CLOMR
Geometry File : q:\305020.02 CLOMR\HEC-RAS\Hospital Wash\Hospital_CLOMR.g01

Flow Title : Hospital_CLOMR
Flow File : q:\305020.02 CLOMR\HEC-RAS\Hospital Wash\Hospital_CLOMR.f01

Plan Summary Information:
Number of: Cross Sections = 15 Multiple Openings = 0
Culverts = 1 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

Encroachment Data
Equal Conveyance = True
Left Offset = 0
Right Offset = 0

River = Hospital Wash Reach = Hospital Wash

RS	Profile	Method	Value1	Value2
0.703	100-yr FW	1	9932.9	210007.36
0.643	100-yr FW	1	9975.6	110027.89
0.577	100-yr FW	1	9974.6	310035.07
0.530	100-yr FW	1	9981.5	610049.95
0.458	100-yr FW	1	9971.3	910016.82
0.388	100-yr FW	1	9989.2	510025.98
0.343	100-yr FW	1	9984.1	510022.02
0.270	100-yr FW	1	9974.7	310019.47
0.215	100-yr FW	1	9974.6	510025.58
0.153	100-yr FW	1	9981.5	110036.72
0.097	100-yr FW	1	997	810031.45
0.083	100-yr FW	1	998	910017.42
0.081	100-yr FW	1	998	910017.88
0.074	100-yr FW	1	9982.5	10029.77
0.070	100-yr FW	1	998	510022.59

****

FLOW DATA

Flow Title: Hospital_CLOMR
Flow File : q:\305020.02 CLOMR\HEC-RAS\Hospital Wash\Hospital_CLOMR.f01

Flow Data (cfs)

River	Reach	RS	100-yr	100-yr FW	10-yr	50-yr	500-yr
Hospital Wash	Hospital Wash	0.703	500	500	170	250	845
Hospital Wash	Hospital Wash	0.388	500	500	170	250	845

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Hospital Wash	Hospital Wash	100-yr	Normal S = 0.02	Normal S = 0.02
Hospital Wash	Hospital Wash	100-yr FW	Normal S = 0.02	Normal S = 0.02
Hospital Wash	Hospital Wash	10-yr	Normal S = 0.02	Normal S = 0.02
Hospital Wash	Hospital Wash	50-yr	Normal S = 0.02	Normal S = 0.02
Hospital Wash	Hospital Wash	500-yr	Normal S = 0.02	Normal S = 0.02

****

GEOMETRY DATA

Geometry Title: Hospital_CLOMR
Geometry File : q:\305020.02 CLOMR\HEC-RAS\Hospital Wash\Hospital_CLOMR.g01

CROSS SECTION

RIVER: Hospital Wash
REACH: Hospital Wash RS: 0.703

INPUT
Description:
Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9857.48	2107.13	9861.24	2105.81	9869.84	2103.03	9873.36	2101.81	9881.06	2101.92
9891.64	2102.04	9898.58	2102.07	9901.96	2102.07	9906.8	2102.08	9912.28	2102.08
9915.02	2102.09	9922.6	2102.09	9923.24	2102.09	9925.74	2102.07	9931.46	2102.01
9932.92	2101.99	9946.35	2101.01	9953.2	2100.54	9954.21	2100.45	9955.45	2100.54
9960.64	2100.92	9972.56	2101.82	9974.21	2101.87	9980.78	2101.85	9986.76	2101.58
9998.79	2100.83	9998.97	2100.82	9999.3	2100.89	10000	2101.05	10007.36	2102.706
10015.29	2104.49	10022.71	2106.21	10025.48	2107				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9857.48	.06	9932.92	.049	10007.36	.055

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9932.92	10007.36	320	320	320	.1	.3

CROSS SECTION

RIVER: Hospital Wash
REACH: Hospital Wash RS: 0.643

INPUT
Description:
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9845.25	2103.31	9845.32	2103.29	9845.37	2103.29	9868.46	2100.87	9871.39	2100.68
9878.72	2100.07	9880.86	2099.88	9888.73	2099.05	9890.34	2098.93	9898.75	2098.24
9899.81	2098.18	9908.76	2097.65	9909.29	2097.63	9918.46	2097.32	9918.76	2097.31
9918.78	2097.31	9928.24	2097.22	9928.8	2097.22	9937.71	2097.28	9938.81	2097.29
9947.19	2097.4	9948.83	2097.42	9956.66	2097.5	9958.85	2097.52	9966.14	2097.55
9968.86	2097.56	9975.61	2097.48	9978.88	2097.45	9987.57	2096.81	10000	2095.83
10001.77	2095.69	10004.84	2095.71	10010.54	2095.73	10015.26	2096.23	10024.71	2097.62
10031.12	2098.49	10033.59	2099.14	10045	2102.78				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9845.25	.06	9975.61	.049	10024.71	.055

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9975.61	10024.71	345	345	345	.1	.3

CROSS SECTION

RIVER: Hospital Wash
REACH: Hospital Wash RS: 0.577

INPUT
Description:
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9874.02	2095.44	9880.41	2092.35	9885.46	2092.58	9896.86	2092.71	9903.66	2092.86
9906.34	2092.81	9913.8	2092.7	9915.03	2092.68	9922.39	2092.61	9923.72	2092.59
9923.94	2092.59	9932.4	2092.56	9934.08	2092.55	9941.09	2092.55	9944.22	2092.56
9949.78	2092.57	9954.35	2092.57	9958.46	2092.58	9964.49	2092.57	9967.15	2092.57
9974.63	2092.51	9975.84	2092.49	9995.05	2091.44	9999.58	2091.17	10000	2091.17
10001.79	2091.21	10009.17	2091.36	10020.72	2091.98	10030.05	2092.39	10035.07	2092.49
10049.49	2091.75	10050.76	2091.69	10050.85	2091.74	10051.16	2091.87	10068.22	2097.48

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9874.02	.06	9974.63	.049	10035.07	.055

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9974.6310035.07               251     251     251             .1       .3

CROSS SECTION


RIVER: Hospital Wash
REACH: Hospital Wash      RS: 0.530

INPUT
Description:
Station Elevation Data    num=      51
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9963.19 2094.81 9970.87  2092.6 9983.92  2089.4 9985.89 2088.79 9987.08 2088.67
 9998.63 2087.99   10000 2088.0310017.59 2088.5710020.79 2088.6810022.23 2088.64
10028.52 2088.3810038.99 2089.0710049.95 2089.71 10052.7 2089.7410059.96 2089.81
10063.19 2089.8210069.97 2089.8310073.67 2089.8410079.98 2089.8310084.16 2089.84
10089.99 2089.8410094.65 2089.84   10100 2089.8310105.13 2089.8110110.01 2089.79
10115.62 2089.7510120.02 2089.7210126.11 2089.6610130.03 2089.6310136.59 2089.58
10140.04 2089.5610147.08 2089.5210150.05 2089.5110157.57 2089.4710160.06 2089.45
10168.05 2089.3910170.07 2089.3810178.54 2089.3210180.08 2089.3110189.03  2089.3
 10190.1 2089.2910199.51 2089.3310200.11 2089.33   10210  2089.410210.12  2089.4
10212.56 2089.4310220.13 2089.5210222.18 2089.4410233.11 2088.9910236.56 2088.94
10246.82 2093.34

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9963.19     .06 9983.92    .04910049.95    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9983.9210049.95               377     377     377             .1       .3

CROSS SECTION


RIVER: Hospital Wash
REACH: Hospital Wash      RS: 0.458

INPUT
Description:
Station Elevation Data    num=      45
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9944.08 2087.23 9946.45 2087.18  9966.2 2086.34 9969.42 2086.24 9969.95 2086.24
 9972.14  2085.6 9985.16 2083.21 9991.42 2083.39 9994.49 2083.47 9995.41 2083.62
   10000 2083.8410016.82 2084.9610026.67 2084.9610030.04 2084.9610034.92 2085.01
10040.35 2085.0310043.16 2085.0410050.66 2085.0710051.41 2085.0710054.44 2085.08
10059.66 2085.0910060.96  2085.110067.91 2085.1110071.27 2085.1210076.16 2085.13
10081.58 2085.14 10084.4 2085.1510091.88 2085.1710092.65 2085.1810095.73  2085.2
 10100.9 2085.2310102.19 2085.2410109.15 2085.29 10112.5 2085.3210117.39 2085.35
 10122.8 2085.4210125.64 2085.4310133.11 2085.4810133.89 2085.4910137.01 2085.52
10142.14 2085.56 10144.8 2085.5510160.45 2085.3310165.32 2086.3210173.72 2087.85

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9944.08     .06 9972.14    .04910016.82    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9972.1410016.82               369     369     369             .1       .3

CROSS SECTION


RIVER: Hospital Wash
REACH: Hospital Wash      RS: 0.388

INPUT
Description:
Station Elevation Data    num=      32
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9975.34 2083.83 9979.72 2082.75 9989.88  2078.9 9998.91  2075.3   10000 2075.52
10003.58 2076.25 10013.1 2077.5310016.84 2078.0910025.99 2079.1410029.39 2079.53
10032.75 2079.6410035.66  2079.8 10047.4 2080.28 10053.8  2080.510063.09    2081
10065.98 2081.0710072.66 2081.2910075.99 2081.3610082.24  2081.5   10086 2081.58
10091.82 2081.7310096.01 2081.84 10101.4 2081.9910106.02 2082.1310110.98 2082.28
```

```
10116.03 2082.4410120.56 2082.5710126.04 2082.7510130.14 2082.8810136.05 2083.07
10139.72 2083.1810146.06 2083.38

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9975.34     .06 9989.88    .04910025.99    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9989.8810025.99              185     238     300              .1       .3

CROSS SECTION


RIVER: Hospital Wash
REACH: Hospital Wash      RS: 0.343

INPUT
Description:
Station Elevation Data    num=      54
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9948.07 2080.51 9952.51 2079.44 9961.57 2079.42 9978.88 2077.83 9982.04 2077.62
 9983.06 2077.56  9985.5 2076.89 9999.99    2073   10000    2073 10018.1 2075.69
10019.68 2075.9210022.02 2076.04 10025.1 2075.9510040.58 2075.5810044.27 2075.58
10050.34 2075.6210051.55 2075.6310052.28 2075.6310058.82 2075.6910063.97  2075.7
 10066.1 2075.7410069.62 2075.8110073.38 2075.9310075.67 2076.0310080.66 2076.31
10087.37 2076.7310087.94 2076.77 10088.9 2076.8310095.22 2077.3710099.06 2077.65
 10102.5 2077.9310108.18 2078.2910109.78  2078.410110.76 2078.4510117.06 2078.82
10122.45 2079.0610124.34 2079.1510127.46 2079.2610131.62 2079.4110134.15 2079.47
 10138.9  2079.610145.85 2079.7410146.18 2079.7510146.74 2079.7610153.46 2079.86
10157.54 2079.9210160.74 2079.9510166.02    20801016 8.02 2080.0210169.24 2080.03
 10175.3 2080.0810180.94 2080.1310182.58 2080.1410182.96 2080.14

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9948.07     .06  9985.5    .04910022.02    .055

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9985.510022.02              385     388     350              .1       .3

CROSS SECTION


RIVER: Hospital Wash
REACH: Hospital Wash      RS: 0.270

INPUT
Description:
Station Elevation Data    num=      43
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9930.04 2080.24 9939.44 2077.77 9942.69 2077.35 9950.29 2076.51 9950.33 2076.51
 9950.41  2076.5 9957.96 2075.81 9961.14 2075.56 9965.59  2075.1    9972 2074.44
 9974.752073.974  9976.9 2073.61 9988.48 2071.51  9998.2  2071.6   10000  2071.6
10001.32  2071.610012.85 2073.0510018.51 2073.8610019.442073.97410034.98 2075.88
10036.51  2075.910037.75 2075.8710050.48 2074.6110060.38 2074.4610063.02 2074.37
10072.26 2074.5410073.19 2074.5510075.11 2074.6710077.68 2074.8510082.52 2075.17
10085.68 2075.3810087.71 2075.5810095.38 2075.9410102.22 2076.22 10104.9 2076.26
10110.65 2076.3510113.07 2076.4210119.02 2076.5410123.94 2076.5910130.65 2076.69
 10134.7 2076.6710135.47 2076.6710144.06  2076.7

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9930.04    .058 9974.75    .03410019.44     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9974.7510019.44              235     289     325              .1       .3

CROSS SECTION


RIVER: Hospital Wash
REACH: Hospital Wash      RS: 0.215

INPUT
Description:
```

```
Station Elevation Data    num=      29
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9914.09 2076.92 9923.95 2076.61 9927.95 2076.52  9936.6 2076.29 9941.62 2076.16
 9944.75 2076.02 9948.69 2075.81 9954.71 2075.39 9967.11 2074.33 9982.26 2069.78
 9988.59 2068.09 9990.01 2068.0510000.01 2067.8210001.57 2067.7710003.31 2068.08
10028.33  2072.510034.68 2072.8910041.53 2072.9410046.34 2073.1110060.27    2074
10063.89  2074.210068.91 2074.41 10074.1 2074.5410075.99 2074.5910077.81 2074.62
10083.06 2074.6910088.47 2074.7110090.13 2074.7210091.73 2074.71

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9914.09    .058 9967.11    .03410028.33     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9967.1110028.33               330     324     320              .1       .3

CROSS SECTION


RIVER: Hospital Wash
REACH: Hospital Wash      RS: 0.153

INPUT
Description:
Station Elevation Data    num=      45
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9869.16    2071 9874.37    2071  9876.3 2071.01 9877.76 2071.01 9883.43 2071.01
 9890.34    2071 9890.57    2071 9890.87    2071  9897.7 2071.01 9902.91 2071.01
 9904.84    2071 9907.36    2071 9911.97    2071 9915.49    2071 9919.11    2071
 9940.34 2071.01 9940.51 2071.01 9940.64 2071.01 9947.65 2071.01 9953.22 2070.99
 9954.78 2070.98 9956.84 2071.02 9961.92 2070.84    9968 2070.76 9981.51 2070.59
 9984.52  2069.9   10000    206610000.06 2065.9910005.01  2066.110013.44 2066.34
10020.19 2068.7110039.54 2071.3610042.36 2071.34 10045.6 2071.4810061.81 2072.01
10066.39  2072.110068.94 2072.1510072.29 2072.1910076.08 2072.2310078.97 2072.25
10083.21 2072.2910088.78 2072.3210090.35 2072.3310091.54 2072.3210097.48 2072.33

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9869.16    .058 9981.51    .03410039.54     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9981.5110039.54               300     299     285              .1       .3

CROSS SECTION


RIVER: Hospital Wash
REACH: Hospital Wash      RS: 0.097

INPUT
Description:
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9977  2073.5 9977.99  2073.5    9978 2069.01 9978.35 2069.01 9979.86 2068.98
    9988    2067    9997    2066   10000    2066   10002    2066 10027.1 2067.38
10031.45 2069.07 10047.2  2069.510056.17 2070.1710066.69 2070.09   10081  2069.9
10088.76 2070.2410093.33 2070.3910100.54 2070.8910102.81 2070.9710108.04 2071.17
10110.31 2071.21

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    9977    .058 9979.86    .03410031.45     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9979.8610031.45                74      74      74              .1       .3

CROSS SECTION


RIVER: Hospital Wash
REACH: Hospital Wash      RS: 0.083

INPUT
```

```
Description: sewer invert = 2064.6  top of pipe = 2065.2 +/-
top of apron =
             2066+/-
6" thick concrete apron over pipe with u/s cutoff wall to
             protect sewer line from scour.
Station Elevation Data    num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
    9988  2073.5    9989  2073.5    9989    2066   10000    2066   10010    2066
   10022    2071   10040    2071

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
    9988    .058    9989    .018   10022     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9989   10022               10      10      10              .1       .3

CROSS SECTION


RIVER: Hospital Wash
REACH: Hospital Wash      RS: 0.081

INPUT
Description: Upstream side of Cavaness Ave at new box culverts
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
    9988  2073.5    9989  2073.5    9989    2065   10000  2064.9   10010    2065
   10012    2066   10022    2071   10040    2071   10100    2071

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
    9988    .058    9988    .018   10022     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9988   10022               39      39      39              .6       .8

CULVERT


RIVER: Hospital Wash
REACH: Hospital Wash      RS: 0.080

INPUT
Description: 2-10'x4' Box Culverts crossing Cavaness Avenue
Distance from Upstream XS =      10
Deck/Roadway Width        =      24
Weir Coefficient          =     2.6
Bridge Pier Skew          =      21
Upstream  Deck/Roadway Coordinates
    num=      11
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
**********************************************************************
    9955    2072            9960 2072.31            9980  2072.9
    9992 2073.01           10000    2073           10010  2072.8
   10020  2072.4           10040 2071.42           10085 2069.75
   10100 2069.69           10130  2070.8

Upstream Bridge Cross Section Data
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
    9988  2073.5    9989  2073.5    9989    2065   10000  2064.9   10010    2065
   10012    2066   10022    2071   10040    2071   10100    2071

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
    9988    .058    9988    .018   10022     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
          9988   10022              .6       .8

Downstream  Deck/Roadway Coordinates
    num=      11
```

```
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*****************************************************************************
    9955    2072            9960 2072.31            9980  2072.9
    9992 2073.01           10000    2073           10010  2072.8
   10020  2072.4           10040 2071.42           10085 2069.75
   10100 2069.69           10130  2070.8

Downstream Bridge Cross Section Data
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9975    2073    9975    2069    9981  2067.4  9982.5  2067.4  9982.5  2066.4
    9984  2066.4    9984 2064.419999.996 2064.41   10016 2064.41   10038    2068
   10090    2069   10140    2070

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    9975    .058    9975    .034   10038     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
          9975   10038            .6       .8
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    9975  9986.6    2070       F
 10013.5   10140    2070       F

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =       2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1          Box       4      10
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                  1      35     .013     .013        0                  .5                  1
Number of Barrels =  2
Upstream   Elevation =  2064.63
Centerline Stations
    Sta.    Sta.
  9994.5 10005.5
Downstream Elevation =  2064.41
Centerline Stations
    Sta.    Sta.
  9994.5 10005.5

CROSS SECTION


RIVER: Hospital Wash
REACH: Hospital Wash      RS: 0.074

INPUT
Description: downstream side of Cavaness Ave. at new Box Culvert
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9975    2073    9975    2069    9981  2067.4  9982.5  2067.4  9982.5  2066.4
    9984  2066.4    9984 2064.419999.996 2064.41   10016 2064.41   10038    2068
   10090    2069   10140    2070

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    9975    .058    9975    .034   10038     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9975   10038             24      24      24              .6       .8
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    9975  9986.6    2070       F
```

10013.5 10140 2070 F

CROSS SECTION

RIVER: Hospital Wash
REACH: Hospital Wash RS: 0.070

INPUT
Description: Hand-cut cross-section
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9973	2072.5	9973	2070.7	9983.5	2067.4	9983.5	2066.4	9985	2066.4
9985	2064.4	10000	2064.4	10015	2064.4	10025	2067	10035	2068
10050	2069	10080	2070						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9973	.058	9973	.034	10035	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9973	10035	367	367	367	.1	.3

SUMMARY OF MANNING'S N VALUES

River:Hospital Wash

Reach	River Sta.	n1	n2	n3
Hospital Wash	0.703	.06	.049	.055
Hospital Wash	0.643	.06	.049	.055
Hospital Wash	0.577	.06	.049	.055
Hospital Wash	0.530	.06	.049	.055
Hospital Wash	0.458	.06	.049	.055
Hospital Wash	0.388	.06	.049	.055
Hospital Wash	0.343	.06	.049	.055
Hospital Wash	0.270	.058	.034	.05
Hospital Wash	0.215	.058	.034	.05
Hospital Wash	0.153	.058	.034	.05
Hospital Wash	0.097	.058	.034	.05
Hospital Wash	0.083	.058	.018	.05
Hospital Wash	0.081	.058	.018	.05
Hospital Wash	0.080	Culvert		
Hospital Wash	0.074	.058	.034	.05
Hospital Wash	0.070	.058	.034	.05

SUMMARY OF REACH LENGTHS

River: Hospital Wash

Reach	River Sta.	Left	Channel	Right
Hospital Wash	0.703	320	320	320
Hospital Wash	0.643	345	345	345
Hospital Wash	0.577	251	251	251
Hospital Wash	0.530	377	377	377
Hospital Wash	0.458	369	369	369
Hospital Wash	0.388	185	238	300
Hospital Wash	0.343	385	388	350
Hospital Wash	0.270	235	289	325
Hospital Wash	0.215	330	324	320
Hospital Wash	0.153	300	299	285
Hospital Wash	0.097	74	74	74
Hospital Wash	0.083	10	10	10
Hospital Wash	0.081	39	39	39
Hospital Wash	0.080	Culvert		
Hospital Wash	0.074	24	24	24
Hospital Wash	0.070	367	367	367

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Hospital Wash

Reach	River Sta.	Contr.	Expan.
Hospital Wash	0.703	.1	.3
Hospital Wash	0.643	.1	.3
Hospital Wash	0.577	.1	.3
Hospital Wash	0.530	.1	.3
Hospital Wash	0.458	.1	.3
Hospital Wash	0.388	.1	.3
Hospital Wash	0.343	.1	.3
Hospital Wash	0.270	.1	.3
Hospital Wash	0.215	.1	.3
Hospital Wash	0.153	.1	.3
Hospital Wash	0.097	.1	.3
Hospital Wash	0.083	.1	.3
Hospital Wash	0.081	.6	.8
Hospital Wash	0.080	Culvert	
Hospital Wash	0.074	.6	.8
Hospital Wash	0.070	.1	.3

****

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Hospital

River: Hospital Wash Reach: Hospital Wash RS: 0.703 Profile: 100-yr
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Hospital Wash Reach: Hospital Wash RS: 0.643 Profile: 100-yr
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Hospital Wash Reach: Hospital Wash RS: 0.577 Profile: 100-yr
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Hospital Wash Reach: Hospital Wash RS: 0.530 Profile: 100-yr
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Hospital Wash Reach: Hospital Wash RS: 0.458 Profile: 100-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Hospital Wash Reach: Hospital Wash RS: 0.388 Profile: 100-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program selected the water
surface that had the least amount of error between computed and assumed values.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Hospital Wash Reach: Hospital Wash RS: 0.343 Profile: 100-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.
River: Hospital Wash Reach: Hospital Wash RS: 0.270 Profile: 100-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program selected the water
surface that had the least amount of error between computed and assumed values.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Hospital Wash Reach: Hospital Wash RS: 0.215 Profile: 100-yr
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: Hospital Wash Reach: Hospital Wash RS: 0.097 Profile: 100-yr
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Hospital Wash Reach: Hospital Wash RS: 0.083 Profile: 100-yr
Warning:The energy equation could not be balanced within the specified number of iterations. The program selected the water
surface that had the least amount of error between computed and assumed values.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Hospital Wash Reach: Hospital Wash RS: 0.080 Profile: 100-yr Culv: Culvert #1
Note: The flow in the culvert is entirely supercritical.
River: Hospital Wash Reach: Hospital Wash RS: 0.074 Profile: 100-yr
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Hospital Wash Reach: Hospital Wash RS: 0.070 Profile: 100-yr
Warning:Slope too steep for slope area to converge during supercritical flow calculations (normal depth is below critical
depth). Water surface set to critical depth.

Appendix E.6

DROP STRUCTURE HYDRAULIC CALCULATIONS

Project Title Sols Wash - Final Design Project No. 3050200.01 Date 8/2/06

Subject Backwater computation Prepared By FB Checked By LAV Page 1

U/S of US 93 Bypass Bridge

1) Hydraulic conditions - 100-yr storm in Sols Wash;

$Q_{100} = 15,045$ cfs

- 10-yr storm in Hassayampa River.

No. of sections - 6

Anticipated flow regime - Subcritical

Control section - Sta 11+60, u/s of US 93 Bridge

WSEL = 2052.45 ft.

Bottom EL = 2041.50 ft.

Sta 11+60 - Section 1

$Y_1 = 2052.45 - 2041.50 = 10.95$ ft

From Flow Master, Sta. 11+60 we have:

$A_1 = 2,570.5$ sq ft, $P_1 = 261.97$ ft

$V_1 = 5.85$ ft/s, $n_1 = 0.026$

$$K_1 = \frac{1.486}{n_1} A_1 R_1^{2/3} = \frac{1.486}{0.026}(2,570.5)\left[\frac{2570.5}{261.97}\right]^{2/3}$$

$= 673249$ cfs

Apply standard step method, as follows:

Project Title _____ Project No. _____ Date _____

Subject _____ Prepared By _____ Checked By _____ Page 2

$$Y_{i+1} = Y_i + \frac{Q^2}{2g}\left(\frac{1+S}{A_i^2} - \frac{1}{A_{i+1}^2}\right) + \frac{Q^2}{\bar{K}^2} L_i$$

where:

- $\bar{K} = \frac{1}{2}(K_i + K_{i+1})$ – average conveyance (cuft/s)
- Y_i, A_i, K_i – water stage, flow area and conveyance for the "i" cross section, situated downstream in this case ($Fr < 1$)
- $Y_{i+1}, A_{i+1}, K_{i+1}$ – same as before but for the "i+1" cross section
- Q – flow rate (cuft/s)
- L_i – distance between sections "i" and "i+1" (ft)
- S – coefficient that considers the changes in shape and size of cross sections
  - $= 0 - 0.1$ – contraction
  - $= 0.2$ – expansion
  - $= 0.5$ – abrupt expansion

Project Title _____ Project No. _____ Date _____

Subject _____ Prepared By _____ Checked By _____ Page 3

Please see the following tables that document:

Case 1) – 100-yr storm in Sols Wash.

$Q_{100} = 15,045$ cfs.

– 10-yr or no storm in Hassayampa River

Case 2) – 50-yr storm in Sols Wash

$Q_{50} = 12,453$ cfs

– 10-yr or no storm in Hassayampa River

Case 3) – 10-yr storm in Sols Wash

$Q_{10} = 7,019$ cfs

– 10-yr or no storm in Hassayampa River

for two roughness conditions:

– low roughness : $n = 0.026$

– high roughness : $n = 0.030$

Wickenburg Downtown Flooding Hazard Mitigation Project - Final Design
Standard Step Method for Calculating Water Surface Elevations
100-YR flow in Sols Wash - 10-YR flow or no flow in Hassayampa River
Low Roughness Coefficient (n=0.026)

Sta	L (ft)	y_p (ft)	Bottom Elev. (ft)	Y_p (ft)	A (sq.ft.)	P (ft)	R (ft)	n	ζ	K (cu.ft/s)	Kavg (cu.ft/s)	Q (cu.ft/s)	Y_c (ft)	y_c (ft)
11+60	0.00		2041.50	2052.45	2570.50	261.97	9.81	0.026	0.20	673249		15045	2052.45	10.95
12+00	40.00	10.00	2041.60	2051.60	2295.00	255.01	9.00	0.026	0.20	567531	620390	15045	2052.44	10.84
	40.00	10.84	2041.60	2052.44	2530.10	257.00	9.84	0.026	0.20	664018	668634	15045	2052.56	10.96
	40.00	10.96	2041.60	2052.56	2520.70	256.93	9.81	0.026	0.20	660206	666728	15045	2052.56	10.96
12+50	50.00	10.96	2041.70	2052.66	2368.70	246.53	9.61	0.026	0.20	611934	636070	15045	2052.63	10.93
	50.00	10.93	2041.70	2052.63	2407.00	246.87	9.75	0.026	0.20	627853	644030	15045	2052.64	10.94
	50.00	10.94	2041.70	2052.64	2411.50	246.91	9.77	0.026	0.20	629887	645047	15045	2052.65	10.95
	50.00	10.95	2041.70	2052.65	2413.70	246.93	9.77	0.026	0.20	630461	645334	15045	2052.65	10.95
13+00	50.00	10.95	2041.80	2052.75	2118.10	228.63	9.26	0.026	0.20	533825	582143	15045	2052.62	10.82
	50.00	10.82	2041.80	2052.62	2091.70	228.37	9.16	0.026	0.20	523370	576916	15045	2052.60	10.80
	50.00	10.80	2041.80	2052.60	2087.60	228.33	9.14	0.026	0.20	521583	576022	15045	2052.60	10.80
13+50	50.00	10.80	2041.80	2052.60	1756.60	206.92	8.49	0.026	0.20	417821	469702	15045	2052.48	10.68
	50.00	10.68	2041.80	2052.48	1734.80	206.68	8.39	0.026	0.20	409389	465486	15045	2052.45	10.65
	50.00	10.65	2041.80	2052.45	1729.30	206.62	8.37	0.026	0.20	407442	464513	15045	2052.44	10.64
	50.00	10.64	2041.80	2052.44	1727.50	206.60	8.36	0.026	0.20	406694	464139	15045	2052.44	10.64
14+08	58.00	10.64	2041.80	2052.44	1414.30	159.33	8.88	0.026	0.20	346627	377035	15045	2052.19	10.39
	58.00	10.39	2041.80	2052.19	1379.70	158.83	8.69	0.026	0.20	333306	370374	15045	2052.10	10.30
	58.00	10.30	2041.80	2052.10	1367.30	158.65	8.62	0.026	0.20	328534	367988	15045	2052.07	10.27
	58.00	10.27	2041.80	2052.07	1363.20	158.59	8.60	0.026	0.20	327042	367242	15045	2052.06	10.26
	58.00	10.26	2041.80	2052.06	1361.80	158.57	8.59	0.026	0.20	326453	366948	15045	2052.05	10.25
	58.00	10.25	2041.80	2052.05	1360.40	158.55	8.58	0.026	0.20	325864	366653	15045	2052.05	10.25

Legend

Input from Flow Master

Final parameters for a given cross section

Wickenburg Downtown Flooding Hazard Mitigation Project - Final Design
Standard Step Method for Calculating Water Surface Elevations
100-YR flow in Sols Wash - 10-YR flow or no flow in Hassayampa River
High Roughness Coefficient (n=0.030)

Sta	L (ft)	y_p (ft)	Bottom Elev. (ft)	Y_p (ft)	A (sq.ft.)	P (ft)	R (ft)	n	ζ	K (cu.ft/s)	Kavg (cu.ft/s)	Q (cu.ft/s)	Y_c (ft)	y_c (ft)
11+60	0.00		2041.50	2052.45	2570.50	261.97	9.81	0.030	0.20	583482		15045	2052.45	10.95
12+00	40.00	10.00	2041.60	2051.60	2295.00	255.01	9.00	0.030	0.20	491860	537671	15045	2052.45	10.85
	40.00	10.85	2041.60	2052.45	2530.10	257.00	9.84	0.030	0.20	575482	579482	15045	2052.57	10.97
	40.00	10.97	2041.60	2052.57	2520.70	256.93	9.81	0.030	0.20	572178	577830	15045	2052.56	10.96
12+50	50.00	10.96	2041.70	2052.66	2368.70	246.53	9.61	0.030	0.20	530343	551261	15045	2052.63	10.93
	50.00	10.93	2041.70	2052.63	2407.00	246.87	9.75	0.030	0.20	544139	558159	15045	2052.65	10.95
	50.00	10.95	2041.70	2052.65	2411.50	246.91	9.77	0.030	0.20	545902	559040	15045	2052.66	10.96
	50.00	10.96	2041.70	2052.66	2413.70	246.93	9.77	0.030	0.20	546400	559289	15045	2052.66	10.96
13+00	50.00	10.96	2041.80	2052.76	2118.10	228.63	9.26	0.030	0.20	462649	504525	15045	2052.64	10.84
	50.00	10.84	2041.80	2052.64	2091.70	228.37	9.16	0.030	0.20	453587	499994	15045	2052.63	10.83
	50.00	10.83	2041.80	2052.63	2087.60	228.33	9.14	0.030	0.20	452039	499220	15045	2052.62	10.82
13+50	50.00	10.82	2041.80	2052.62	1756.60	206.92	8.49	0.030	0.20	362111	407075	15045	2052.52	10.72
	50.00	10.72	2041.80	2052.52	1734.80	206.68	8.39	0.030	0.20	354804	403422	15045	2052.49	10.69
	50.00	10.69	2041.80	2052.49	1729.30	206.62	8.37	0.030	0.20	353117	402578	15045	2052.48	10.68
	50.00	10.68	2041.80	2052.48	1727.50	206.60	8.36	0.030	0.20	352468	402254	15045	2052.48	10.68
14+08	58.00	10.68	2041.80	2052.48	1419.80	159.41	8.91	0.030	0.20	302257	327687	15045	2052.27	10.47
	58.00	10.47	2041.80	2052.27	1390.80	158.99	8.75	0.030	0.20	292528	322823	15045	2052.20	10.40
	58.00	10.40	2041.80	2052.20	1381.10	158.85	8.69	0.030	0.20	289158	321138	15045	2052.18	10.38
	58.00	10.38	2041.80	2052.18	1378.40	158.81	8.68	0.030	0.20	288372	320745	15045	2052.17	10.37
	58.00	10.37	2041.80	2052.17	1377.00	158.79	8.67	0.030	0.20	287858	320488	15045	2052.16	10.36
	58.00	10.36	2041.80	2052.16	1375.60	158.77	8.66	0.030	0.20	287344	320231	15045	2052.16	10.36

Legend

input from Flow Master

Final parameters for a given cross section

Wickenburg Downtown Flooding Hazard Mitigation Project - Final Design
Standard Step Method for Calculating Water Surface Elevations
50-YR flow in Sols Wash - 10-YR flow or no flow in Hassayampa River
Low Roughness Coefficient (n=0.026)

Sta	L (ft)	y_p (ft)	Bottom Elev. (ft)	Y_p (ft)	A (sq.ft.)	P (ft)	R (ft)	n	ζ	K (cu.ft/s)	Kavg (cu.ft/s)	Q (cu.ft/s)	Y_c (ft)	y_c (ft)
11+60	0.00		2041.50	2051.46	2332.80	259.99	8.97	0.026	0.20	575596		12453	2051.46	9.96
12+00	40.00	10.00	2041.60	2051.60	2295.00	255.01	9.00	0.026	0.20	567531	571564	12453	2051.55	9.95
	40.00	9.95	2041.60	2051.55	2283.30	254.91	8.96	0.026	0.20	562964	569280	12453	2051.55	9.95
	40.00	9.95	2041.60	2051.55	2283.30	254.91	8.96	0.026	0.20	562964	569280	12453	2051.55	9.95
12+50	50.00	9.95	2041.70	2051.65	2188.60	244.93	8.94	0.026	0.20	538812	550888	12453	2051.63	9.93
	50.00	9.93	2041.70	2051.63	2184.10	244.89	8.92	0.026	0.20	536901	549933	12453	2051.63	9.93
	50.00	9.93	2041.70	2051.63	2184.10	244.89	8.92	0.026	0.20	536901	549933	12453	2051.63	9.93
	50.00	9.93	2041.70	2051.63	2184.10	244.89	8.92	0.026	0.20	536901	549933	12453	2051.63	9.93
13+00	50.00	9.93	2041.80	2051.73	1910.60	226.59	8.43	0.026	0.20	452307	494604	12453	2051.61	9.81
	50.00	9.81	2041.80	2051.61	1886.20	226.35	8.33	0.026	0.20	442993	489947	12453	2051.59	9.79
	50.00	9.79	2041.80	2051.59	1882.10	226.31	8.32	0.026	0.20	441676	489289	12453	2051.59	9.79
13+50	50.00	9.79	2041.80	2051.59	1572.90	204.90	7.68	0.026	0.20	349935	395806	12453	2051.48	9.68
	50.00	9.68	2041.80	2051.48	1553.00	201.48	7.71	0.026	0.20	346407	394042	12453	2051.46	9.66
	50.00	9.66	2041.80	2051.46	1549.40	201.40	7.69	0.026	0.20	345006	393341	12453	2051.45	9.65
	50.00	9.65	2041.80	2051.45	1547.70	201.36	7.69	0.026	0.20	344627	393152	12453	2051.45	9.65
14+08	58.00	9.65	2041.80	2051.45	1277.50	157.35	8.12	0.026	0.20	294969	319988	12453	2051.27	9.47
	58.00	9.47	2041.80	2051.27	1252.70	156.99	7.98	0.026	0.20	285909	315458	12453	2051.21	9.41
	58.00	9.41	2041.80	2051.21	1244.40	156.87	7.93	0.026	0.20	282827	313917	12453	2051.19	9.39
	58.00	9.39	2041.80	2051.19	1241.60	156.83	7.92	0.026	0.20	281953	313480	12453	2051.18	9.38
	58.00	9.38	2041.80	2051.18	1240.20	156.81	7.91	0.026	0.20	281398	313202	12453	2051.18	9.38

Legend

Input from Flow Master

Final parameters for a given cross section

Wickenburg Downtown Flooding Hazard Mitigation Project - Final Design
Standard Step Method for Calculating Water Surface Elevations
50-YR flow in Sols Wash - 10-YR flow or no flow in Hassayampa River
High Roughness Coefficient (n=0.030)

Sta	L (ft)	y_p (ft)	Bottom Elev. (ft)	Y_p (ft)	A (sq.ft.)	P (ft)	R (ft)	n	ζ	K (cu.ft/s)	Kavg (cu.ft/s)	Q (cu.ft/s)	Y_c (ft)	y_c (ft)
11+60	0.00		2041.50	2051.46	2332.80	259.99	8.97	0.030	0.20	498850		12453	2051.46	9.96
12+00	40.00	10.00	2041.60	2051.60	2295.00	255.01	9.00	0.030	0.20	491860	495355	12453	2051.56	9.96
	40.00	9.96	2041.60	2051.56	2283.30	254.91	8.96	0.030	0.20	487902	493376	12453	2051.55	9.95
	40.00	9.95	2041.60	2051.55	2283.30	254.91	8.96	0.030	0.20	487902	493376	12453	2051.55	9.95
12+50	50.00	9.95	2041.70	2051.65	2188.60	244.93	8.94	0.030	0.20	466970	477436	12453	2051.64	9.94
	50.00	9.94	2041.70	2051.64	2184.10	244.89	8.92	0.030	0.20	465315	476609	12453	2051.63	9.93
	50.00	9.93	2041.70	2051.63	2184.10	244.89	8.92	0.030	0.20	465315	476609	12453	2051.63	9.93
	50.00	9.93	2041.70	2051.63	2184.10	244.89	8.92	0.030	0.20	465315	476609	12453	2051.63	9.93
13+00	50.00	9.93	2041.80	2051.73	1910.60	226.59	8.43	0.030	0.20	392000	428658	12453	2051.62	9.82
	50.00	9.82	2041.80	2051.62	1886.20	226.35	8.33	0.030	0.20	383927	424621	12453	2051.60	9.80
	50.00	9.80	2041.80	2051.60	1882.10	226.31	8.32	0.030	0.20	382786	424051	12453	2051.60	9.80
13+50	50.00	9.80	2041.80	2051.60	1572.90	204.90	7.68	0.030	0.20	303277	343032	12453	2051.51	9.71
	50.00	9.71	2041.80	2051.51	1553.00	201.48	7.71	0.030	0.20	300219	341503	12453	2051.48	9.68
	50.00	9.68	2041.80	2051.48	1549.40	201.40	7.69	0.030	0.20	299005	340896	12453	2051.48	9.68
	50.00	9.68	2041.80	2051.48	1547.70	201.36	7.69	0.030	0.20	298677	340732	12453	2051.48	9.68
14+08	58.00	9.68	2041.80	2051.48	1281.70	157.41	8.14	0.030	0.20	256902	277954	12453	2051.33	9.53
	58.00	9.53	2041.80	2051.33	1261.00	157.11	8.03	0.030	0.20	250470	274738	12453	2051.29	9.49
	58.00	9.49	2041.80	2051.29	1255.40	157.03	7.99	0.030	0.20	248529	273767	12453	2051.28	9.48
	58.00	9.48	2041.80	2051.28	1254.10	157.01	7.99	0.030	0.20	248272	273639	12453	2051.27	9.47
	58.00	9.47	2041.80	2051.27	1252.70	156.99	7.98	0.030	0.20	247788	273397	12453	2051.27	9.47

Legend

Input from Flow Master

Final parameters for a given cross section

Wickenburg Downtown Flooding Hazard Mitigation Project - Final Design
Standard Step Method for Calculating Water Surface Elevations
10-YR flow in Sols Wash - 10-YR flow or no flow in Hassayampa River
Low Roughness Coefficient (n=0.026)

Sta	L (ft)	y_p (ft)	Bottom Elev. (ft)	Y_p (ft)	A (sq.ft.)	P (ft)	R (ft)	n	ζ	K (cu.ft/s)	Kavg (cu.ft/s)	Q (cu.ft/s)	Y_c (ft)	y_c (ft)
11+60	0.00		2041.50	2048.76	1688.80	251.02	6.73	0.026	0.20	344060		7019	2048.76	7.26
12+00	40.00	7.26	2041.60	2048.86	1655.10	246.19	6.72	0.026	0.20	336860	340460	7019	2048.82	7.22
	40.00	7.22	2041.60	2048.82	1645.90	246.11	6.69	0.026	0.20	333990	339025	7019	2048.82	7.22
	40.00	7.22	2041.60	2048.82	1645.90	246.11	6.69	0.026	0.20	333990	339025	7019	2048.82	7.22
12+50	50.00	7.22	2041.70	2048.92	1578.20	236.41	6.68	0.026	0.20	319933	326962	7019	2048.87	7.17
	50.00	7.17	2041.70	2048.87	1567.10	236.31	6.63	0.026	0.20	316095	325043	7019	2048.87	7.17
	50.00	7.17	2041.70	2048.87	1567.10	236.31	6.63	0.026	0.20	316095	325043	7019	2048.87	7.17
13+00	50.00	7.17	2041.80	2048.97	1353.40	218.01	6.21	0.026	0.20	261336	297663	7019	2048.77	6.97
	50.00	6.97	2041.80	2048.77	1313.30	217.61	6.04	0.026	0.20	248943	291467	7019	2048.74	6.94
	50.00	6.94	2041.80	2048.74	1307.30	217.55	6.01	0.026	0.20	246985	290488	7019	2048.74	6.94
13+50	50.00	6.94	2041.80	2048.74	1084.70	173.92	6.24	0.026	0.20	210125	272058	7019	2048.54	6.74
	50.00	6.74	2041.80	2048.54	1052.60	173.52	6.07	0.026	0.20	200186	267088	7019	2048.50	6.70
	50.00	6.70	2041.80	2048.50	1046.20	173.44	6.03	0.026	0.20	198094	266042	7019	2048.49	6.69
	50.00	6.69	2041.80	2048.49	1044.60	173.42	6.02	0.026	0.20	197572	265781	7019	2048.49	6.69
14+08	58.00	6.69	2041.80	2048.49	875.80	148.38	5.90	0.026	0.20	163438	248714	7019	2048.21	6.41
	58.00	6.41	2041.80	2048.21	838.20	147.82	5.67	0.026	0.20	152329	243160	7019	2048.12	6.32
	58.00	6.32	2041.80	2048.12	825.80	147.64	5.59	0.026	0.20	148660	241325	7019	2048.09	6.29
	58.00	6.29	2041.80	2048.09	821.80	147.58	5.57	0.026	0.20	147587	240789	7019	2048.08	6.28
	58.00	6.28	2041.80	2048.08	820.40	147.56	5.56	0.026	0.20	147159	240575	7019	2048.07	6.27
	58.00	6.27	2041.80	2048.07	819.10	147.54	5.55	0.026	0.20	146750	240370	7019	2048.07	6.27

Legend

Input from Flow Master

Final parameters for a given cross section

Wickenburg Downtown Flooding Hazard Mitigation Project - Final Design
Standard Step Method for Calculating Water Surface Elevations
10-YR flow in Sols Wash - 10-YR flow or no flow in Hassayampa River
High Roughness Coefficient (n=0.030)

Sta	L (ft)	y_p (ft)	Bottom Elev. (ft)	Y_p (ft)	A (sq.ft.)	P (ft)	R (ft)	n	ζ	K (cu.ft/s)	Kavg (cu.ft/s)	Q (cu.ft/s)	Y_c (ft)	y_c (ft)
11+60	0.00		2041.50	2048.76	1688.80	251.02	6.73	0.030	0.20	298185		7019	2048.76	7.26
12+00	40.00	7.26	2041.60	2048.86	1655.10	246.19	6.72	0.030	0.20	291945	295065	7019	2048.83	7.23
	40.00	7.23	2041.60	2048.83	1645.90	246.11	6.69	0.030	0.20	289458	293822	7019	2048.82	7.22
	40.00	7.22	2041.60	2048.82	1645.90	246.11	6.69	0.030	0.20	289458	293822	7019	2048.82	7.22
12+50	50.00	7.22	2041.70	2048.92	1578.20	236.41	6.68	0.030	0.20	277275	283367	7019	2048.88	7.18
	50.00	7.18	2041.70	2048.88	1567.10	236.31	6.63	0.030	0.20	273949	281704	7019	2048.88	7.18
	50.00	7.18	2041.70	2048.88	1567.10	236.31	6.63	0.030	0.20	273949	281704	7019	2048.88	7.18
13+00	50.00	7.18	2041.80	2048.98	1353.40	218.01	6.21	0.030	0.20	226491	257975	7019	2048.78	6.98
	50.00	6.98	2041.80	2048.78	1313.30	217.61	6.04	0.030	0.20	215751	252605	7019	2048.75	6.95
	50.00	6.95	2041.80	2048.75	1307.30	217.55	6.01	0.030	0.20	214054	251756	7019	2048.75	6.95
13+50	50.00	6.95	2041.80	2048.75	1084.70	173.92	6.24	0.030	0.20	182109	235784	7019	2048.55	6.75
	50.00	6.75	2041.80	2048.55	1052.60	173.52	6.07	0.030	0.20	173495	231477	7019	2048.51	6.71
	50.00	6.71	2041.80	2048.51	1046.20	173.44	6.03	0.030	0.20	171682	230570	7019	2048.51	6.71
	50.00	6.71	2041.80	2048.51	1044.60	173.42	6.02	0.030	0.20	171229	230344	7019	2048.50	6.70
14+08	58.00	6.70	2041.80	2048.50	877.10	148.40	5.91	0.030	0.20	142016	215737	7019	2048.23	6.43
	58.00	6.43	2041.80	2048.23	840.70	147.86	5.69	0.030	0.20	132723	211091	7019	2048.14	6.34
	58.00	6.34	2041.80	2048.14	828.50	147.68	5.61	0.030	0.20	129568	209513	7019	2048.11	6.31
	58.00	6.31	2041.80	2048.11	824.50	147.62	5.59	0.030	0.20	128636	209047	7019	2048.10	6.30
	58.00	6.30	2041.80	2048.10	823.10	147.60	5.58	0.030	0.20	128264	208861	7019	2048.10	6.30

Legend

Input from Flow Master

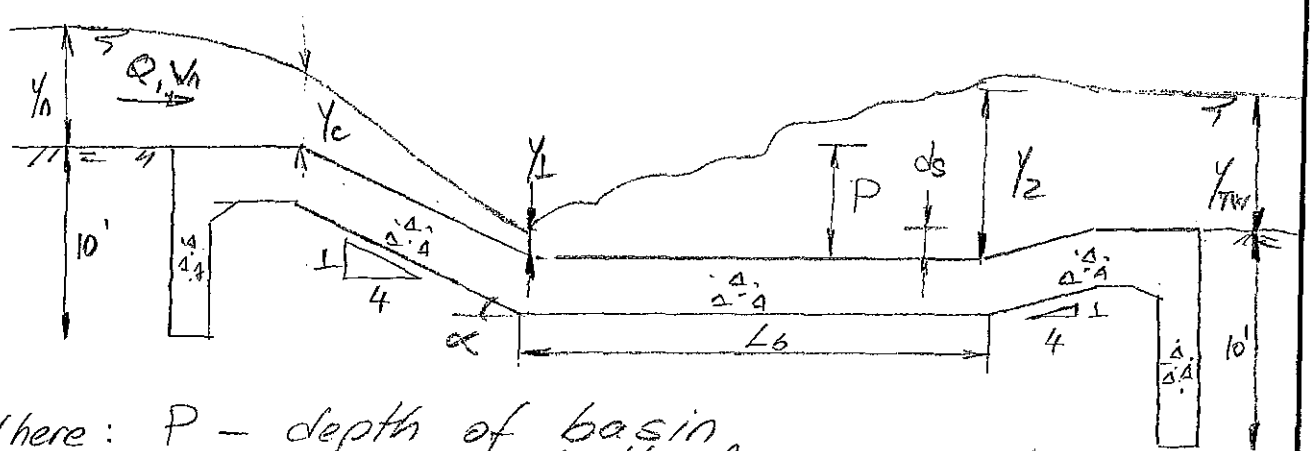
Final parameters for a given cross section

Project Title Sols Wash – Final Design Project No. 3050200/ Date 4/24/2006

Subject Drop Structure (Rev. 1) Prepared By FB Checked By LAV Page 1

1. General Aspects

The Sols Wash drop structure has to be accessible to equestrian and four-wheel (ATV) traffic beside serving as a hydraulic control structure. Hence, a vertical drop structure was ruled out and a sloping drop structure is being considered.



Where: P – depth of basin

Y_n – approach depth (normal depth assumed)

Y_c – critical depth at crest of drop structure

Y_1, Y_2 – conjugate depths

Y_{TW} – tailwater depth (normal depth assumed)

L_6 – length of basin

Q – flow rate

V_n – mean flow velocity corresponding to Y_n

Project Title _____ Project No. _____ Date _____

Subject _____ Prepared By _____ Checked By _____ Page 2

2. Hydraulic Design of Drop Structure

Define: $q = \frac{Q}{B_{avg}}$ - specific flow rate (cfs/ft)

where: $B_{avg} = \frac{B+b}{2}$

B - topwidth of channel (ft)

Also, define b - bottom width of channel (ft).

The channelized cross section of Sols Wash upstream of the drop structure is approximately 10' at the bottom.

The banks are protected by gabion baskets, 3'x3' in cross section and staked up in two layers on the north bank and five layers on the south bank. Another layer of gabion baskets forms the foundation of the bank protection but it is buried under the wash bottom and is not considered in hydraulic calculations.

Assuming that the approach to the drop structure is graded to the equilibrium slope calculated in the toe down analysis ($S_o = 0.00635$ ft/ft) and knowing that a gabion basket layer is offset by 1.5 feet to the banks compared to the layer that supports it, a depth-area

Project Title _____ Project No. _____ Date _____

Subject _____ Prepared By _____ Checked By _____ Page 3

table may be developed; hence, a cross section capacity table/chart may be calculated. (See attached Flow Master calculation sheets)

Calculations will be performed for two flow conditions:

a.- 100-year peak flow in Sols Wash, with tailwater elevation controlled by the 10-year peak flow in Hassayampa River

b.- 10-year peak flow in Sols Wash, with tailwater elevation controlled by the 100-year peak flow in Hassayampa River

Condition a. will define the size of the drop structure, while condition b. provides a check for the hydraulic jump location for flows smaller than the design flow, Q_{100}.

Condition a. - $Q_{100} = 15{,}045$ cfs. $= 426.03\ m^3/s$

From Flow Master Rating Table,

$b = 101$ ft. $= 30.78$ m

$B = 107.23$ ft. $= 32.68$ m

$B_{avg} = \frac{101 + 107.23}{2} = 104.12$ ft. $= 31.74$ m

Project Title _____ Project No. _____ Date _____

Subject _____ Prepared By _____ Checked By _____ Page 4

$$q_{100} = \frac{Q_{100}}{B_{avg}} = \frac{15{,}045}{104.12} = 144.5\ cfs/ft = 13.42\ m^3/s \cdot m$$

Using $n = 0.013$ (rough concrete surface), the energy loss along the glacis may be calculated as follows:

$$\Delta h_o = \frac{Q^2}{A_c^2\ R_c^{4/3}}\ n\ l \quad \text{where:}$$

A_c - Flow area at top of glacis where critical depth occurs.

R_c - hydraulic radius at top of glacis

l - length of glacis, defined as $P_{drop}\sqrt{m^2+1}$ where m is the slope of glacis, horizontal to vertical.

$$\Rightarrow l = P_{drop}\sqrt{m^2+1} = 4\sqrt{4^2+1} = 16.49\ ft.$$
$$= 5.03\ m.$$

where a total drop of 4 ft was assumed.

<u>NOTE:</u> Some calculations will be done using SI units and then converted to Standard units.

Project Title _____ Project No. _____ Date _____

Subject _____ Prepared By _____ Checked By _____ Page 5

Calculate Y_c:

For any cross section $\Rightarrow \dfrac{Q^2}{g} = \dfrac{A_c^3}{B_c}$

$\dfrac{Q^2}{g} = 7029566\ ft^5$

Y_c (ft)	B_c (ft)	A_c (ft^2)	A_c^3/B_c (ft^5)
3	101	303	275,427
6	104	615	2,236,619
8	113	829.4	5,049,096
9	118	944.9	7,149,498
8.95	117.74	939.0	7,031,901

$\Rightarrow$ $Y_c = 8.95\ ft = 2.73\ m$

$A_c = 939\ ft^2 = 87.24\ m^2$

$P_c = 133.43\ ft$ (from Flow Master)

$= 40.67\ m$

$R_c = A_c/P_c = 939/133.43 = 7.04\ ft = 2.14\ m$

Project Title _____ Project No. _____ Date _____

Subject _____ Prepared By _____ Checked By _____ Page 6

$$\Delta h_o = \frac{Q^2}{A_c^2 R_c^{4/3}} n l = \frac{426.03^2}{(87.24)^2 (2.14)^{4/3}} (0.013)(5.03)$$

(SI)

$$= 0.57\,m = 1.87\,ft.$$

$$p = \frac{2g(P_{drop} + y_c - \Delta h_o) + V_c^2}{3}$$

(SI)

$$V_c = \frac{Q}{A_c} = \frac{426.03}{87.24} = 4.88\,m/s = 16.02\,ft/s$$

$$p = \frac{(2 \times 9.81)(1.22 + 2.73 - 0.57) + (4.88)^2}{3}$$

$$= 30.04\,m^2/s^2 = 323.35\,ft^2/s^2$$

$$\varphi = \frac{1}{3} \arccos \frac{g Q_{100}}{\sqrt{p^3}} = \frac{1}{3} \arccos \frac{(9.81)(13.42)}{\sqrt{(30.04)^3}}$$

(SI)

$$= 12.30^\circ$$

Velocity at the toe of glacis is given by

$$V_1 = 2\sqrt{p} \cos(60^\circ - \varphi) = 2\sqrt{30.04} \cos(47.7)$$

(SI)

$$= 7.38\,m/s$$

Project Title _____ Project No. _____ Date _____

Subject _____ Prepared By _____ Checked By _____ Page 7

$$\Rightarrow y_1 = \frac{Q_{100}}{V_1} = \frac{13.42}{7.38} = 1.82\ m = 5.97\ ft.$$

$$y_2 = \frac{y_1}{2}\left[\sqrt{1 + 8F_{r_1}^2} - 1\right] =$$

(SI)

$$= \frac{1.82}{2}\left[\sqrt{1 + 8\left(\frac{7.38}{\sqrt{9.81 \times 1.82}}\right)^2} - 1\right]$$

$$= 3.68\ m = 12.06\ ft.$$

$$y_{TW_{10}} = 2051.86 - 2042.30 = 9.56\ ft = 2.91\ m$$

$\Rightarrow y_2 > y_{TW10} \Rightarrow$ need to excavate a basin.

$$d_s = y_2 - y_{TW10} = 12.06 - 9.56 = 2.5\ ft = 0.76\ m$$

$\Rightarrow$ Recalculate drop

$$P_{drop} = 1.22 + 0.76 = 1.98\ m = 6.5\ ft.$$

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$$\Rightarrow \ell = P_{drop}\sqrt{m^2+1} = (1.98)\sqrt{17} = 8.16\ m = 26.78\ ft.$$

$$\underset{(SI)}{\Delta h_o} = \frac{Q^2}{A_c^2 R_c^{4/3}} n \ell = \frac{426.03^2}{(87.24)^2(2.14)^{4/3}}(0.013)(8.16)$$

$$= 0.92\ m = 3\ ft.$$

$$\underset{(SI)}{p} = \frac{2g(P_{drop} + y_c - \Delta h_o) + V_c^2}{3} = \frac{(2\times 9.81)(1.98+2.73-0.92)}{3} + \frac{(4.88)^2}{3} = 32.72\ m^2/s^2 = 352.25\ ft^2/s^2$$

$$\underset{(SI)}{\varphi} = \frac{1}{3}\arccos\frac{g Q_{100}}{\sqrt{p^3}} = \frac{1}{3}\arccos\frac{(9.81)(13.42)}{\sqrt{32.72^3}} = 15.1^\circ$$

$$\underset{(SI)}{V_1} = 2\sqrt{p}\cos(60^\circ - \varphi) = 2\sqrt{32.72}\cos(44.9^\circ)$$

$$= 8.10\ m/s = 26.59\ ft/s$$

$$\underset{(SI)}{y_1} = \frac{Q_{100}}{V_1} = \frac{13.42}{8.10} = 1.66\ m = 5.44\ ft$$

$$\underset{(SI)}{y_2} = \frac{y_1}{2}\left[\sqrt{1+8Fr_1^2} - 1\right] = \frac{1.66}{2}\left[\sqrt{1+8\frac{(8.1)^2}{(9.81)(1.66)}} - 1\right] \Rightarrow$$

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$y_2 = 3.95\ m = 12.97\ ft.$

$y_2 > y_{TW\,10} \Rightarrow d_s = y_2 - y_{TW\,10} = 12.97 - 9.56$

$\Rightarrow d_s = 3.41\ ft = 1.04\ m$

$\Rightarrow$ Recalculate drop

$P_{drop} = 1.22 + 1.04 = 2.26\ m = 7.41\ ft.$

$l = P_{drop}\sqrt{m^2+1} = 2.26\sqrt{17} = 9.32\ m = 30.55\ ft$

$$\underset{(SI)}{\Delta h_o} = \frac{Q^2}{A_c^2 R_c^{4/3}} n l = \frac{426.03^2}{(87.24)^2(2.14)^{4/3}}(0.013)(9.32)$$

$= 1.05\ m = 3.44\ ft.$

$$\underset{(SI)}{p} = \frac{2g(P_{drop} + y_c - \Delta h_o) + V_c^2}{3} = \frac{(2\times 9.81)(2.26+2.73-1.05)}{3} +$$

$$+ \frac{(4.88)^2}{3} = 33.71\ m^2/s^2 = 362.81\ ft^2/s^2$$

$$\underset{(SI)}{\varphi} = \frac{1}{3}\arccos\frac{g\,Q_{100}}{\sqrt{p^3}} = \frac{1}{3}\arccos\frac{(9.81)(13.42)}{\sqrt{33.71^3}} = 15.91^\circ$$

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$$V_1 = 2\sqrt{\phi}\cos(60^\circ - \varphi) = 2\sqrt{33.71}\cos(44.09^\circ) = 8.34\ m/s$$
(SI)
$$= 27.36\ ft/s$$

$$y_1 = \frac{Q_{100}}{V_1} = \frac{13.42}{8.34} = 1.61\ m = 5.28\ ft.$$
(SI)

$$y_2 = \frac{y_1}{2}\left[\sqrt{1+8F_{r1}^2} - 1\right] = \frac{1.61}{2}\left[\sqrt{1+8\left(\frac{8.34^2}{9.81\times 1.61}\right)} - 1\right] =$$
(SI)

$$= 4.04\ m = 13.26\ ft.$$

$$y_2 > y_{TW/10} \Rightarrow d_s = y_2 - y_{TW/10} = 13.26 - 9.56 \Rightarrow$$

$$\Rightarrow d_s = 3.7\ ft = 1.13\ m$$

$\Rightarrow$ Recalculate drop

$$P_{drop} = 1.22 + 1.13 = 2.35\ m = 7.71\ ft.$$
(SI)

$$l = P_{drop}\sqrt{m^2+1} = 2.35\sqrt{17} = 9.69\ m = 31.79\ ft$$
(SI)

$$\Delta h_o = \frac{Q^2}{A_c^2 R_c^{4/3}} n l = \frac{(426.03)^2}{(87.24)^2(2.14)^{4/3}}(0.013)(9.69) =$$
(SI)

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$$\Rightarrow \Delta h_o = 1.09\,m = 3.57\,ft$$

$$\underset{(SI)}{p} = \frac{2g\,(P_{drop} + y_c - \Delta h_o) + V_c^2}{3} =$$

$$= \frac{(2\times 9.81)(2.26 + 2.73 - 1.09) + (4.88)^2}{3}$$

$$p = 33.44\,m^2/s^2 \cong 360\,ft^2/s^2$$

$$\underset{(SI)}{\varphi} = \frac{1}{3}\arccos\frac{g\,Q_{100}}{\sqrt{p^3}} = \frac{1}{3}\arccos\frac{(9.81)(13.42)}{\sqrt{33.44^3}} = 15.70^\circ$$

$$\underset{(SI)}{V_1} = 2\sqrt{p}\cos(60^\circ - \varphi) = 2\sqrt{33.44}\cos(44.3) =$$

$$= 8.28\,m/s = 27.17\,ft/s$$

$$\underset{(SI)}{y_1} = \frac{Q_{100}}{V_1} = \frac{13.42}{8.28} = 1.62\,m = 5.31\,ft$$

$$\underset{(SI)}{y_2} = \frac{y_1}{2}\left[\sqrt{1 + 8\,Fr_1^2} - 1\right] = \frac{1.62}{2}\left[\sqrt{1 + 8\frac{(8.28)^2}{(9.81)(1.62)}} - 1\right]$$

$$= 4.02\,m = 13.18\,ft$$

$$\Rightarrow d_s = y_2 - y_{TW/10} = 13.18 - 9.56 = 3.62\,ft = \underline{1.1\,m}$$

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=> Recalculate drop

$$P_{drop} = 1.22 + 1.1 = 2.32\ m = 7.61\ ft.$$
(SI)

$$l = P_{drop}\sqrt{m^2+1} = 2.32\sqrt{17} = 9.57\ m = 31.4\ ft$$
(SI)

$$\Delta h_o = \frac{Q^2}{A_c^2 R_c^{4/3}} n l = \frac{(426.03)^2}{(87.24)^2(2.14)^{4/3}}(0.013)(9.57) =$$
(SI)

$$= 1.08\ m = 3.53\ ft.$$

$$p = \frac{2g(P_{drop} + y_c - \Delta h_o) + V_c^2}{3} =$$
(SI)

$$= \frac{(2\times 9.81)(2.32 + 2.73 - 1.08) + (4.88)^2}{3}$$

$$= 33.9\ m^2/s^2 = 364.9\ ft^2/s^2$$

$$\varphi = \frac{1}{3}\arccos\frac{g I_{100}}{\sqrt{p^3}} = \frac{1}{3}\arccos\frac{(9.81)\times(13.42)}{\sqrt{33.9^3}} =$$
(SI)

$$= 16.05^\circ$$

$$V_1 = 2\sqrt{p}\cos(60^\circ - \varphi) = 2\sqrt{33.9}\cos(43.95) =$$
(SI)

$$= 8.38\ m/s = 27.51\ ft/s$$

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$$Y_1 = \frac{Q_{100}}{V_1} = \frac{13.42}{8.38} = 1.60\ m = 5.25\ ft.$$

(SI)

$$Y_2 = \frac{Y_1}{2}\left[\sqrt{1 + 8Fr_1^2} - 1\right] = \frac{1.60}{2}\left[\sqrt{1 + 8\frac{(8.38)^2}{(9.81)(1.6)}} - 1\right]$$

(SI)

$$= 4.05\ m = 13.30\ ft.$$

$$d_s = Y_2 - Y_{TW_{10}} = 13.30 - 9.56 = 3.74\ ft = 1.14\ m$$

Average d_s over last two iterations

$$\Rightarrow d_s = \frac{3.62 + 3.74}{2} = 3.68\ ft.$$

$$\Rightarrow \text{Say } \boxed{d_s = 3.66\ ft = 3'8'' = 1.12\ m}$$

$$\Rightarrow \boxed{P_{drop} = 7.66\ ft = 7'8'' = 2.33\ m}$$

$$\Rightarrow L_6 = 0.45(V_1)\cos\alpha\sqrt{d_s} + 0.5Y_1 + 3Y_2$$

(SI)

$$= 0.45(8.38)[\cos(14.04^\circ)]\sqrt{1.12} + 0.5(1.6) + 3(4.05)$$

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$\Rightarrow L_6 = 16.82\ m \cong 55.2\ ft$

Considering that the basin will end with a sloping up section, we choose.

$$\boxed{L_6 = 56\ ft.}$$

Summary:

$P_{drop} = 7.66\ ft.$

$d_s = 3.66\ ft.$

$L_6 = 56\ ft.$

$m = 4$

Check L_6

$$Fr_1 = \frac{V_1}{\sqrt{gy_1}} = \frac{27.51}{\sqrt{32.2 \times 5.25}} = 2.12$$

From Fig 21.50, "Standard Handbook for Civil Engineers", Merritt, Loftin, Ricketts, forth edition, the jump qualifies as weak.

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$$\Rightarrow \frac{L}{d_2} = \frac{L_6'}{y_2} \cong 4.4 \Rightarrow L_6' = 4.4\, y_2$$

$$\Rightarrow L_6' = 4.4(d_s + y_{TW/10})$$

$$= 4.4(3.66 + 9.56)$$

$$\Rightarrow L_6' = 58.16\ ft = 17.73\ m$$

$$\Rightarrow \underline{\underline{L_6 \simeq L_6'}}$$

Check for Q_{100}^{Sols} — $Q_{100}^{Hassayampa}$.

Downstream boundary condition for Sols Wash is the WSEL corresponding to $Q_{100}^{Hassayampa}$.

From HEC-RAS model,

$y_{TW/100} = 12.5\ ft = 3.81\ m.$

$d_s = 3.66\ ft = 1.12\ m$

$P_{drop} = 7.66\ ft = 2.33\ m$

$y_1 = 5.25\ ft = 1.6\ m$

$y_2 = 13.30\ ft = 4.05\ m$

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$$Y_{TW100} + d_s = 12.5 + 3.66 = 16.16 \text{ ft.}$$

$$Y_{TW100} + d_s > Y_2 \Rightarrow \underline{\text{Submerged Jump}}$$

Assuming $Y_2' = Y_{TW100} + d_s = 16.16 \text{ ft.} = 4.93 \text{ m}$

$$\Rightarrow F_{r_2} = \frac{q_{100}/Y_2}{\sqrt{g Y_2}} = \frac{(13.42/4.93)}{\sqrt{(9.81)(4.93)}} = 0.39$$

(SI)

$$\Rightarrow Y_1' = \frac{Y_2'}{2}\left[\sqrt{1 + 8F_{r_2}^2} - 1\right] = \frac{4.93}{2}\left[\sqrt{1 + 8(0.39)^2} - 1\right] =$$

$$\cong 1.21 \text{ m} = 3.95 \text{ ft.} < Y_1$$

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Check for $Q_{100}^{Sols} - Q_{o}^{Hassayampa}$

Downstream boundary condition for Sols Wash is normal depth downstream of US-93 bypass bridge.

The US-93 bypass bridge controls the flow upstream. The condition is similar to the $Q_{100}^{Sols} - Q_{10}^{Hass.}$ condition and yields the same WSEL profile.

Check for $Q_{50}^{Sols} - Q_{o}^{Hassayampa}$

$Y_{TW_{50}} = 2051.37 - 2042.80 = 8.57\,ft = 2.61\,m.$

$Q_{50}^{Sols} = 12{,}453\,cfs = 352.63\,m^3/s$

$Y_{c_{50}} \Leftarrow \frac{Q_{50}^2}{g} = \frac{A_c^3}{B_c} \Rightarrow \frac{Q_{50}^2}{g} = 4{,}816{,}062.4\,ft^5$

Y_c (ft)	B_c (ft)	A_c (ft^2)	A_c^3/B_c (ft^5)
7	108	718.9	3,440,184
8	113	829.4	5,049,096
7.87	112.35	814.7	4,813,047

$\Rightarrow Y_c = 7.87\,ft = 2.40\,m$

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$A_c = 814.7\ sq\ ft = 75.69\ m^2$

$P_c = 126.85\ ft = 38.66\ m$

$R_c = A_c / P_c = 6.42\ ft = 1.96\ m$

$P_{drop} = 7.66\ ft = 2.33\ m$

$l = P_{drop}\sqrt{m^2+1} = 2.33\sqrt{17} = 9.61\ m = 31.52\ ft.$

(SI)

$$\Delta h_o = \frac{Q^2}{A_c^2\ R_c^{4/3}}\, n l = \frac{(352.63)^2 (0.013)(9.61)}{(75.69)^2 (1.96)^{4/3}}$$

(SI)

$= 1.11\ m = 3.63\ ft.$

$$p = \frac{2g(P_{drop} + Y_c - \Delta h_o) + V_c^2}{3}$$

(SI)

$$= \frac{(2 \cdot 9.81)(2.33 + 2.40 - 1.11) + \left(\frac{352.63}{75.69}\right)^2}{3} =$$

$= 30.91\ m^2/s^2 = 332.71\ ft^2/s^2$

$$\varphi = \frac{1}{3}\arccos\frac{g Q_{50}}{\sqrt{p^3}} = \frac{1}{3}\arccos\frac{(9.81)\left(\frac{352.63}{30.78}\right)}{\sqrt{30.91^3}} = 16.39^\circ$$

(SI)

$V_1 = 2\sqrt{p}\cos(60^\circ - \varphi) = 8.05\ m/s = 26.41\ ft/s$

(SI)

$$\Rightarrow Y_1 = \frac{Q_{50}}{V_1} = \frac{352.63}{(30.78)(8.05)} = 1.42\ m = 4.67\ ft$$

(SI)

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$$Fr_1 = \frac{V_1}{\sqrt{g y_1}} = \frac{8.05}{\sqrt{9.81 \cdot 1.42}} = 2.16 \text{ (weak jump)}$$

(SI)

$$y_2 = \frac{y_1}{2}\left[\sqrt{1 + 8 Fr_1^2} - 1\right] = \frac{1.42}{2}\left[\sqrt{1 + 8 \times 2.16^2} - 1\right] =$$

(SI)

$$= 3.69 \text{ m} = 12.09 \text{ ft.}$$

$$d_s + y_{TW50} = 3.66 + 8.57 = 12.23 \text{ ft.}$$

$\Rightarrow y_2 < d_s + y_{TW50} \Rightarrow$ the hydraulic jump occurs within the basin but may be submerged.

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Check for $Q_{10}^{Sols} - Q_o^{Hassayampa}$

$Y_{TW10} = 2048.80 - 2042.80 = 6\ ft = 1.83\ m.$

$Q_{10}^{Sols} = 7{,}019\ cfs = 198.76\ m^3/s.$

$Y_{c10} \Leftarrow \frac{Q_{10}^2}{g} = \frac{A_c^3}{B_c} \Rightarrow \frac{Q_{10}^2}{g} = 1{,}530{,}011.\ ft.$

Y_c (ft)	B_c (ft)	A_c (ft^2)	A_c^3/B_c (ft^5)
5	104	509.5	1,271,742
5.5	104	561.5	1,702,221
5.32	104	542.6	1,536,052

$\Rightarrow Y_c = 5.32\ ft = 1.62\ m$

$A_c = 542.6\ ft^2 = 50.41\ m^2$

$P_c = 114.64\ ft = 34.94\ m$

$R_c = 4.73\ ft = 1.44\ m$

$P_{drop} = 7.66\ ft = 2.33\ m$

$\ell_{(SI)} = P_{drop}\sqrt{m^2+1} = 2.33\sqrt{17} = 9.61\ m = 31.52\ ft$

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$$\underset{(SI)}{\Delta h_o} = \frac{Q^2}{A_c^2 R_c^{4/3}} n l = \frac{(198.76)^2 (0.013)(9.61)}{(50.41)^2 (1.44)^{4/3}} =$$

$$= 1.19\ m = 3.92\ ft.$$

$$\underset{(SI)}{p} = \frac{2g(P_{drop} + Y_c - \Delta h_o) + V_c^2}{3}$$

$$= \frac{(2 \cdot 9.81)(2.33 + 1.62 - 1.19) + \left(\frac{198.76}{50.41}\right)^2}{3} =$$

$$= 23.23\ m^2/s^2 = 250.07\ ft^2/s^2$$

$$\underset{(SI)}{\varphi} = \frac{1}{3} \arccos \frac{g Q_{50}}{\sqrt{p^3}} = \frac{1}{3} \arccos \frac{(9.81)\left(\frac{198.76}{30.78}\right)}{\sqrt{23.23^3}}$$

$$= 18.51^\circ$$

$$\underset{(SI)}{V_1} = 2\sqrt{p} \cos(60^\circ - \varphi) = 2\sqrt{23.23} \cos(41.49) =$$

$$= 7.22\ m/s = 23.69\ ft/s.$$

$$\Rightarrow \underset{(SI)}{Y_1} = \frac{Q_{10}}{V_1} = \frac{198.76}{(30.78)(7.22)} = 0.89\ m = 2.93\ ft.$$

$$\Rightarrow \underset{(SI)}{Fr_1} = \frac{V_1}{\sqrt{g Y_1}} = \frac{7.22}{\sqrt{32.2 \times 0.89}} = 1.35 \text{ (undular jump)}$$

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$$y_2 = \frac{y_1}{2}\left[\sqrt{1+8F_{r1}^2} - 1\right] = \frac{0.89}{2}\left[\sqrt{1+8\times1.35^2} - 1\right] =$$

$$= 1.31\,m = 4.3\,ft.$$

$$d_s + y_{TW/10} = 3.66 + 6 = 9.66\,ft.$$

$$y_2 < d_s + y_{TW/10} \Rightarrow \text{submerged jump}$$

Drop Structure Approach Section
Worksheet for Irregular Channel

Project Description	
Worksheet	MI 0.256
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Slope	0.001300	ft/ft
Water Surface Elevation	2,051.30	ft

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.019	
Elevation Range	2,043.30 to 2,058.80	
Discharge	8,201.80	cfs
Flow Area	829.4	ft²
Wetted Perimeter	127.64	ft
Top Width	112.99	ft
Actual Depth	8.00	ft
Critical Elevation	2,049.18	ft
Critical Slope	0.003333	ft/ft
Velocity	9.89	ft/s
Velocity Head	1.52	ft
Specific Energy	2,052.82	ft
Froude Number	0.64	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
99+16.50	99+34.00	0.033
99+34.00	100+35.00	0.015
100+35.00	100+44.00	0.033

Natural Channel Points

Station (ft)	Elevation (ft)
99+16.50	2,057.00
99+17.50	2,057.00
99+17.51	2,052.80
99+32.50	2,049.80
99+32.50	2,046.80
99+34.00	2,046.80
99+34.00	2,043.30
100+00.00	2,043.30
100+35.00	2,043.30
100+35.00	2,046.80
100+36.50	2,046.80

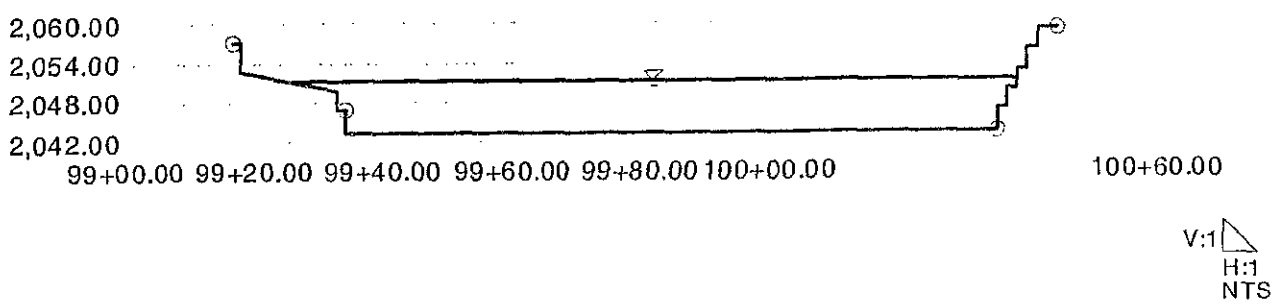
Drop Structure Approach Section
Worksheet for Irregular Channel

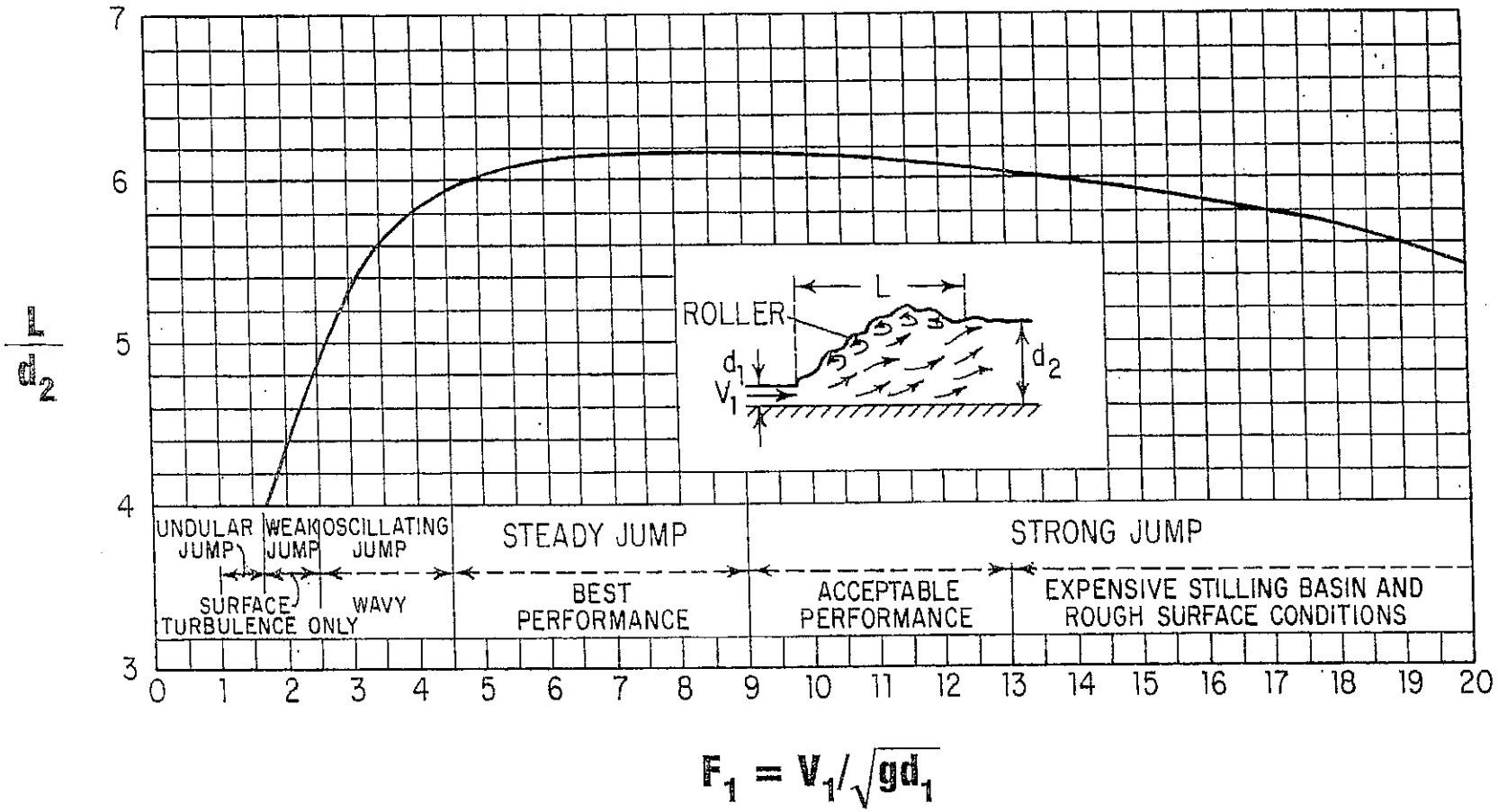
Natural Channel Points	
Station (ft)	*Elevation* (ft)
100+36.50	2,049.80
100+38.00	2,049.80
100+38.00	2,052.80
100+39.50	2,052.80
100+39.50	2,055.80
100+41.00	2,055.80
100+41.00	2,058.80
100+44.00	2,058.80

Drop Structure Approach Section
Cross Section for Irregular Channel

Project Description	
Worksheet	Mi 0.256
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Mannings Coefficient	0.019
Slope	0.001300 ft/ft
Water Surface Elevation	2,051.16 ft
Elevation Range	2,043.30 to 2,058.80
Discharge	8,026.51 cfs

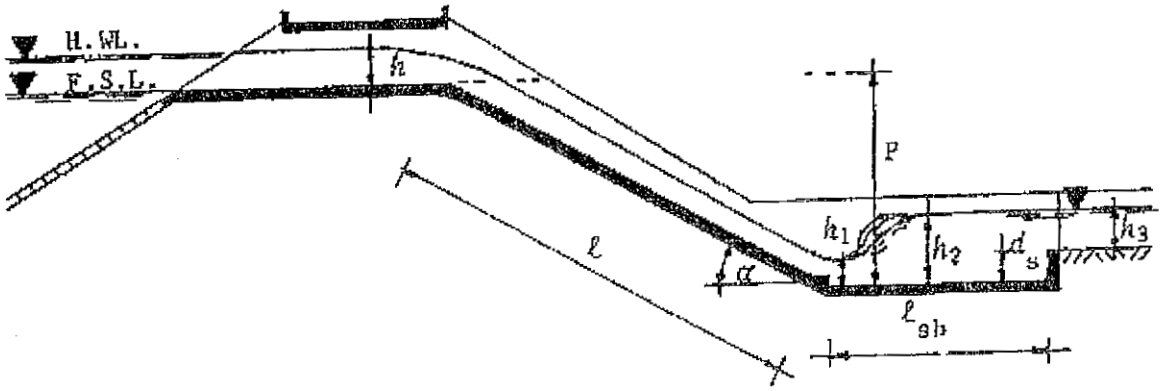




ig. 21.50 Length of hydraulic jump in a horizontal channel depends on sequent depth d_2 and roude number of the approaching flow.

3.6.3.3 Overfall spillway

Figure 13. Overfall spillway



A) Discharge over the crest

$Q = 1.7 \times L \times h^{3/2}$, m^3/sec (3.23)

where

L = overflow crest length, m
h = water depth above the crest, m
Q = designed discharge, m

B) Design formulas for the glacis and the stilling basin

Critical depth is from Equation (3.5)

$$h_c = \sqrt[3]{\frac{q^2}{g}}$$

where

$$q = \frac{Q}{L} = \text{discharge per unit width}, \ m^3/sec$$

The velocity of the flow at the toe of the spillway may be computed by

$$v_1 = 2\sqrt{p}\cos(60 - \varphi) \quad (3.24)$$

where

$$p = \frac{2g(P + h_c - h_0) + v_c^2}{3}$$

$e = g \times q$

P = the crest height above the stilling basin

and

$$h_1 = \frac{q}{v_1}$$

The head loss along the glacis can be determined by the formula

$$h_0 = \frac{Q^2}{A^2 \times R^{4/3}} n \times 1\,m \quad (3.25)$$

where

n = roughness coefficient, sec/m$^{1/3}$
1 = length of the glacis, m

The subcritical conjugate depth is defined by the formula

$$h_2 = \frac{h_1}{2}\left[\sqrt{1+8\left(\frac{h_c}{h_1}\right)^3} - 1\right], m \quad (3.26)$$

The depth of the stilling basin is:

$d_s = h_2 - h_3$, m

The length of the stilling basin can be calculated by the formula:

$$l_{sb} = 0.45 v_1 \cos\alpha \sqrt{d_s} + 0.5 h_1 + 3 h_2, m \quad (3.27)$$

Example 3.6

Design an overfall spillway with the following data

Q = 30 m^3/sec
h = 1.0 m
P = 5.0 m
gradient of the glacis = 2:1
n = 0.012
h_3 = 1.20 m

<u>Solution</u>

From Equation (3.23) the length of the crest is:

$$L = \frac{Q}{1.7 \times h^{3/2}} = \frac{30}{1.7 \times 1.0^{3/2}} = 17.65m \text{ say } 18.0m$$

Discharge per unit width is

$$q = \frac{Q}{L} = \frac{30}{18} = 1.67 m^3/sec$$

The critical depth is then

$$h_c = \sqrt[3]{\frac{q^2}{g}} = \sqrt[3]{\frac{1.67^2}{9.81}} = 0.66 m$$

The length of the glacis is defined as

$$l = \sqrt{10^2 + 5^2} = 11.18 m$$

The head loss along the glacis is obtained from Equation (3.25)

$$h_0 = \frac{Q^2}{A^2 \times R^{4/3}} \times n \times l$$

where

$Q = 30\ m^3/sec$
$n = 0.012$
$l = 11.18\ m$

$A = h_c \times L = 0.66 \times 18.0 = 11.88\ m^2$

$P_w = L + 2\,h_c = 18.0 + 2 \times 0.66 = 19.32\ m$

$$R = \frac{A}{P_w} = \frac{11.88}{19.32} = 0.615 m$$

then

$$h_0 = \frac{30^2}{11.88^2 \times 0.615^{4/3}} \times 0.012 \times 11.18 = 1.63 m$$

The velocity of the flow at the toe of the spillway is defined from Equation (3.24)

$$v_1 = 2\sqrt{p}\cos(60° - \varphi)$$

where

$$p = \frac{2g(P + h_c - h_0) + v_c^2}{3}$$

$P = 5.0\ m$

$h_c = 0.66\ m$

$h_0 = 1.63\ m$

$$v_c = \frac{Q}{A} = \frac{30}{11.88} = 2.58\,\text{m/sec}$$

then

$$p = \frac{2 \times 9.81(5.0 + 0.66 - 1.63) + 2.58^3}{3} = 28.58$$

$$\cos 3\varphi = \frac{e}{\sqrt{p^3}}$$

$e = g \times q = 9.81 \times 1.67 = 16.38$

now

$$\cos 3\varphi = \frac{16.38}{\sqrt{28.58^3}} = 0.173$$

$$3\varphi = 83^\circ 52'$$

$$\varphi = 27^\circ 37'$$

$$\cos(60^\circ - \varphi) = \cos(60^\circ - 27^\circ 37') = 32^\circ 23'$$

then

$$v_1 = 2\sqrt{24.41}\cos 32^\circ 23' = 9.02\,\text{m/sec}$$

The water depth at the toe of the spillway is

$$h_1 = \frac{q}{v_1} = \frac{1.67}{9.02} = 0.19\,\text{m}$$

The subcritical conjugate depth in the *stilling basin* is defined from Equation (3.26)

$$h_2 = \frac{h_1}{2}\left[\sqrt{1+8\left(\frac{h_c}{h_1}\right)^3} - 1\right] = \frac{0.19}{2}\left[\sqrt{1+8\left(\frac{0.66}{0.19}\right)^3} - 1\right] = 1.65\text{m}$$

The depth of the stilling basin is

$d_s = h_2 - h_3 = 1.65 - 1.20 = 0.45$ m

The length of the stilling basin is obtained from Equation (3.27)

$$l_{sb} = 0.45 \times v_1 \times \cos\alpha \sqrt{d_s} + 0.5h_1 + 3h_2$$

where

$$\cos\alpha = \frac{10}{11.18} = 0.8945$$

then

$$l_{sb} = 0.45 \times 9.02 \times 0.8945\sqrt{0.45} + 0.5 \times 0.19 + 3 \times 1.60 = 7.34\text{m say } 7.40\text{m}$$

Project Title: Sols Wash – Final Design Project No. 2050200.01 Date 7/2006

Subject: Drop Structure Check Prepared By: FB Checked By: CAV Page 1

100 Yr Sols Wash – 10 Yr Hassayampa River

Consider $Y_{TW10} = Y_6 = 2052.02$ ft

where Y_6 corresponds to Sta 14+08.

(see backwater calculations)

$\Rightarrow Y_{TW10} = 2052.02 - 2041.8 = 10.22$ ft $= 3.12$ m

$\Rightarrow Y_2 > Y_{TW10} \Rightarrow$ need to excavate basin

$d_s = Y_2 - Y_{TW10} = 12.06 - 10.22 = 1.84$ ft $= 0.56$ m

Recalculate drop

P_{drop} (SI) $= 1.22 + 0.56 = 1.78$ m $= 5.83$ ft

ℓ (SI) $= P_{drop}\sqrt{m^2+1} = 1.78\sqrt{17} = 7.34$ m $= 24.08$ ft

Δh_o (SI) $= \dfrac{Q^2}{A_c^2 R_c^{4/3}} n \ell = \left(\dfrac{426.03^2}{(87.24)^2(2.14)^{4/3}}(0.013)\right)(7.34)$ = const

$= 0.1124\,\ell = 0.1124(7.34) =$

$= 0.825$ m $= 2.71$ ft

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$$\underset{(SI)}{P} = \frac{2g(P_{drop} + Y_c - \Delta h_o) + V_c^2}{3} = \frac{(2\times 9.81)(1.78 + 2.73 - 0.825)}{3}$$

$$+ \frac{(4.88)^2}{3} = 32.04\ m^2/s^2 = 344.85\ ft^2/s^2$$

$$\underset{(SI)}{\varphi} = \frac{1}{3}\arccos\frac{g Q_{100}}{\sqrt{P^3}} = \frac{1}{3}\arccos\frac{(9.81)(13.42)}{\sqrt{32.04^3}} = 14.49°$$

$$\underset{(SI)}{V_1} = 2\sqrt{P}\cos(60° - \varphi) = 2\sqrt{32.04}\cos(45.51) =$$

$$= 7.93\ m/s = 26.03\ ft/s$$

$$\underset{(SI)}{Y_1} = \frac{Q_{100}}{V_1} = \frac{13.42}{7.93} = 1.69\ m = 5.55\ ft$$

$$\underset{(SI)}{Y_2} = \frac{Y_1}{2}\left[\sqrt{1 + 8F_{r_1}^2} - 1\right] = \frac{1.69}{2}\left[\sqrt{1 + 8\frac{(7.93)^2}{(9.81)(1.69)}} - 1\right] =$$

$$= 3.88\ m = 12.73\ ft$$

$$d_s = Y_2 - Y_{TW/10} = 12.73 - 10.22 = 2.51\ ft = 0.77\ m$$

Propose: $d_s = 4\ ft$ → next page, please

$= 1.22\ m$

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Recalculate drop

$$P_{drop} = 2046.3 - 2041.8 + 4 = 8.5\ ft. = 2.59\ m$$

$$\ell_{(SI)} = P_{drop}\sqrt{m^2+1} = 2.59\sqrt{17} = 10.68\ m = 35.05\ ft$$

$$\Delta h_{o\,(SI)} = 0.1124\,\ell = 0.1124 \times 10.68 = 1.20\ m = 3.94\ ft.$$

$$p_{(SI)} = \frac{2g(P_{drop} + Y_c - \Delta h_o) + V_c^2}{3} = \frac{(2\times 9.81)(2.59 + 2.73 - 1.2)}{3} +$$

$$+ 7.94 = 34.88\ m^2/s^2 = 375.5\ ft^2/s^2$$

$$\varphi_{(SI)} = \frac{1}{3}\arccos\frac{g\,Q_{100}}{\sqrt{p^3}} = \frac{1}{3}\arccos\frac{(9.81)(13.42)}{\sqrt{34.88^3}} = 16.76^\circ$$

$$V_{1\,(SI)} = 2\sqrt{p}\cos(60^\circ - \varphi) = 2\sqrt{34.88}\cos(43.24) =$$

$$= 8.6\ m/s = 28.23\ ft/s$$

$$Y_{1\,(SI)} = \frac{Q_{100}}{V_1} = \frac{13.42}{8.6} = 1.56\ m = 5.12\ ft.$$

$$Y_{2\,(SI)} = \frac{1.56}{2}\left[\sqrt{1 + 8\frac{(8.6)^2}{(9.81)\times(1.56}} - 1\right] =$$

$$= 4.13\ m = 13.58\ ft.$$

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$Y_2 - d_s = 13.58 - 4 = 9.58 < Y_{TW/10}$

=> hydraulic jump is submerged.

=> From "Hydraulic Design of Stilling Basins and Energy Dissipators" by A.J. Peterka, 1984 use Figure 33, page 65, to define the length of the jump, L_V and the location at which the jump begins on the upstream apron, l_a (l in documentation) from Fig 36.

Apron Slope = 0.25 (4H : 1V)

$$\Delta_2 = Y_2 + \frac{V_2^2}{2g} - d_s \quad V_2 = \frac{Q_{100}}{A_2} = \frac{15045}{13.58 \times 129} = 8.59 \text{ ft/s}$$

bottom width at Sta 14+08

$$TW = Y_{2/10} = 13.58 \text{ ft.}$$

$$\Rightarrow \frac{TW}{\Delta_2} = \frac{13.58}{\underbrace{13.58 + \frac{8.59^2}{64.4} - 4}_{=10.73}} = 1.27$$

From Fig 36 => $\frac{l}{\Delta_2} = 2.23$

Note that Δ_2 is measured to EGL

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$\Rightarrow l_a = 2.23 \times d_2 = 2.23 \times (10.73) = 23.93$ ft.

From previous calculations for the length of the upstream apron, $l = 35.05$ ft.

$\Rightarrow \cos\left[\arctan\left(\frac{1}{4}\right)\right] \times l = 0.97 \times 35.05 = 34$ ft.

$\Rightarrow 34 > 23.93 \Rightarrow$ hydraulic jump may begin on the upstream apron, given the basin has the appropriate length.

To find L_b (or L_v),

$$Fr_1 = \frac{V_1}{\sqrt{g y_1}} = \frac{28.23}{\sqrt{32.2 \times 5.12}} = 2.19, \text{ say } \underline{\underline{2.2}}$$

From Figure 33, page 65 $\Rightarrow \frac{L_v}{d_2} \simeq 5.4$

$\Rightarrow L_v = 5.4 \times d_2 = 5.4 \times 10.73 = 57.95$ ft.

say $\underline{\underline{58 \text{ ft}}}$

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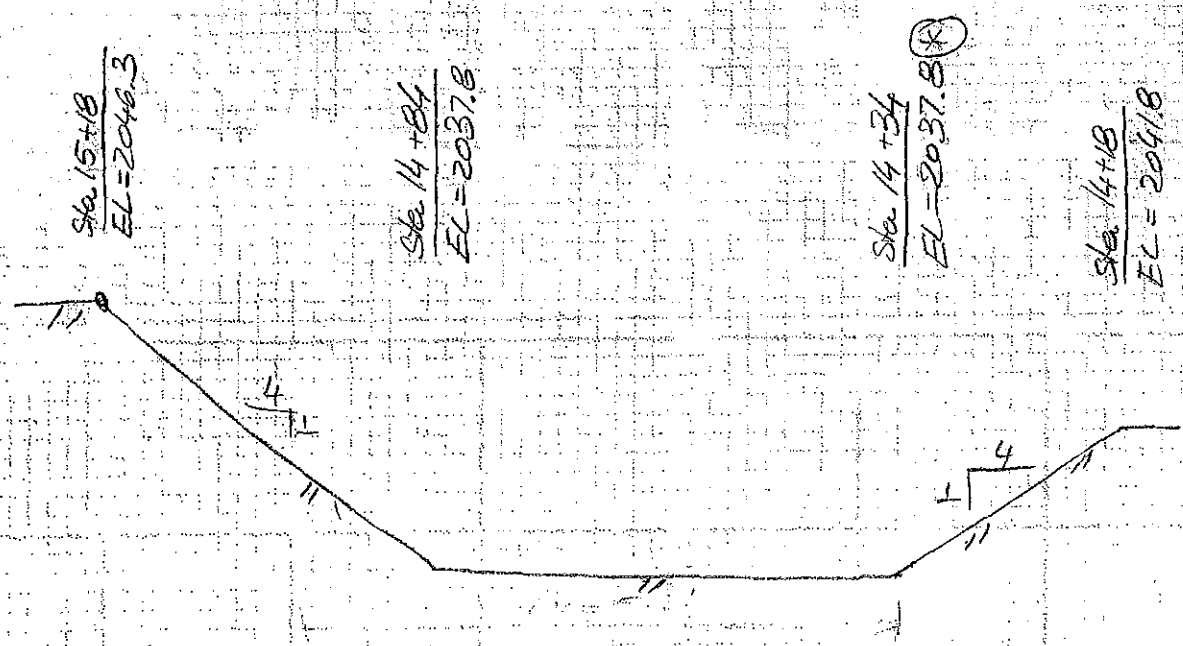

Note

(*) Elevation @ Sta 14+34 may be lowered to allow for a drainage sump to elevation 2037.56 ft.

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Check for 10 yr Sols Wash – 10 yr Hassayampa R.

$Y_6 = 2048.60$ ft at Sta 14+08

$Y_6 = 6.80$ ft $= Y_{T\,v1.10}^{10}$

At Sta 15+18, $Q_{10}^{sols} = 7019$ cfs $= 198.76$ m³/s

$Y_c = 5.32$ ft $= 1.62$ m, $q_{10}^{sols} = \frac{198.76}{30.78} = 6.46$ m³/sm

$P_{drop} = 8.5$ ft $= 2.59$ m.

$\ell_{(SI)} = P_{drop}\sqrt{m^2+1} = 2.59\sqrt{17} = 10.68$ m $= 35.05$ ft

$$\Delta h_{o\,(SI)} = \underbrace{\frac{Q_{10}^2}{A_c^2 R_c^{4/3}}}_{cf.} n\,\ell = \frac{(198.76)^2(0.013)(10.68)}{(50.41)^2(1.44)^{4/3}}$$

$= 0.1243 \times 10.68 = 1.33$ m $= 4.35$ ft

$$P_{(SI)} = \frac{2g(P_{drop} + Y_c - \Delta h_o) + V_c^2}{3} =$$

$$= \frac{(2\cdot 9.81)(2.59 + 1.62 - 1.33) + (3.94)^2}{3} =$$

$= 24.02$ m²/s² $= 258.52$ ft²/s²

$$\varphi_{(SI)} = \frac{1}{3}\arccos\frac{g\,q_{10}}{\sqrt{P^3}} = \frac{1}{3}\arccos\frac{(9.81)\left(\frac{198.76}{30.78}\right)}{\sqrt{24.02^3}} = 19.15^\circ$$

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$$V_{1(SI)} = 2\sqrt{p}\cos(60^\circ - \varphi) = 2\sqrt{24.02}\cos(60 - 19.15) =$$

$$= 7.41\ m/s = 24.33\ ft/s.$$

$$y_{1(SI)} = \frac{q_{10}}{V_1} = \frac{6.46}{7.41} = 0.87\,m = 2.86\ ft.$$

$$Fr_1 = \frac{V_1}{\sqrt{g y_1}} = \frac{24.33}{\sqrt{32.2 \times 2.86}} = 2.53$$

$$y_{2(SI)} = \frac{y_1}{2}\left[\sqrt{1 + 8Fr_1^2} - 1\right] = \frac{0.87}{2}\left[\sqrt{1 + 8(2.53)^2} - 1\right] =$$

$$= 2.71\,m = 8.88\ ft.$$

$$d_s + y^{10}_{TW/10} = 4 + 6.8 = 10.8\ ft.$$

$$\Rightarrow y_2 < d_s + y^{10}_{TW/10} \Rightarrow \text{submerged jump}$$

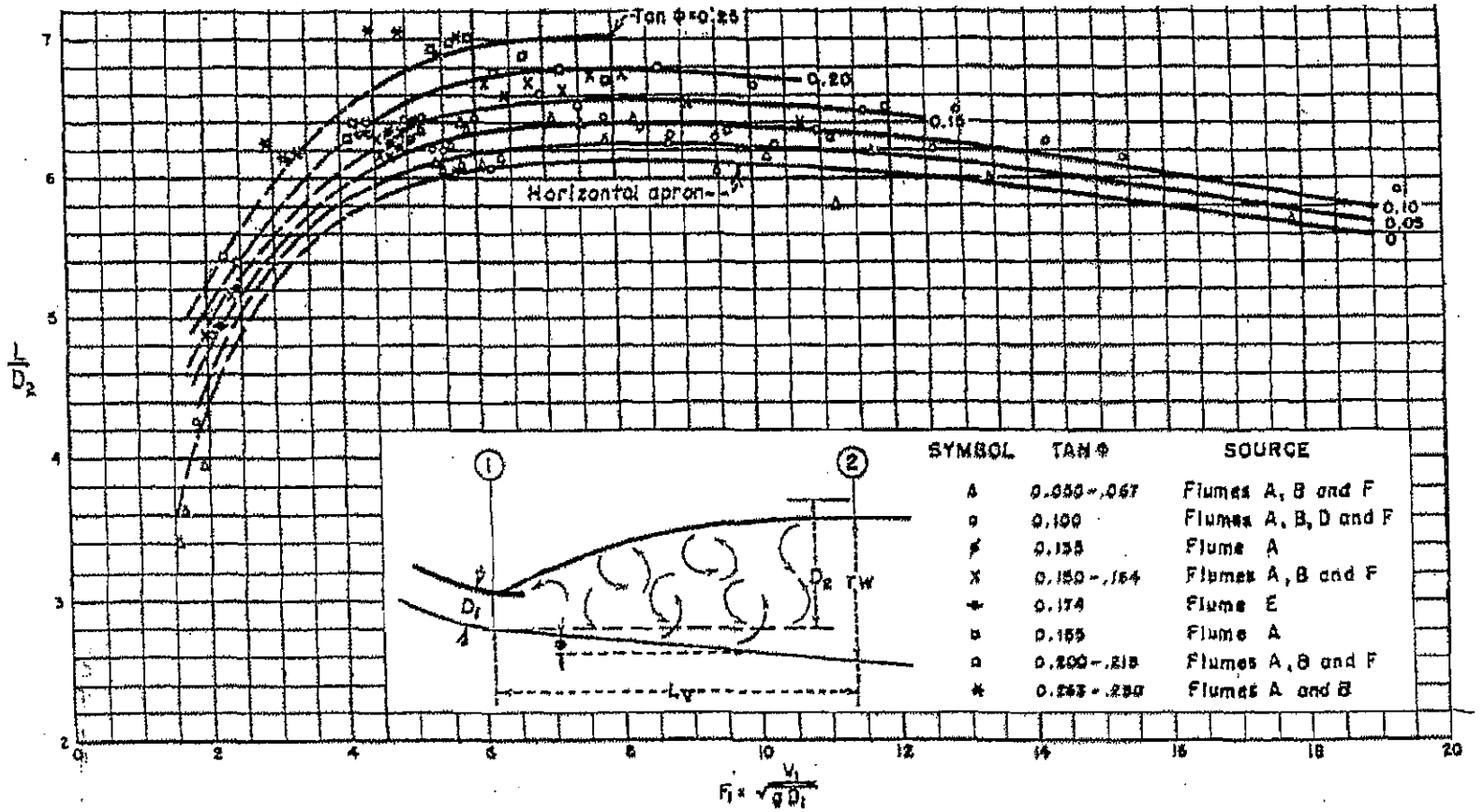


FIGURE 33.—*Length of jump in terms of conjugate depth, D_2 (Basin V, Case D).*

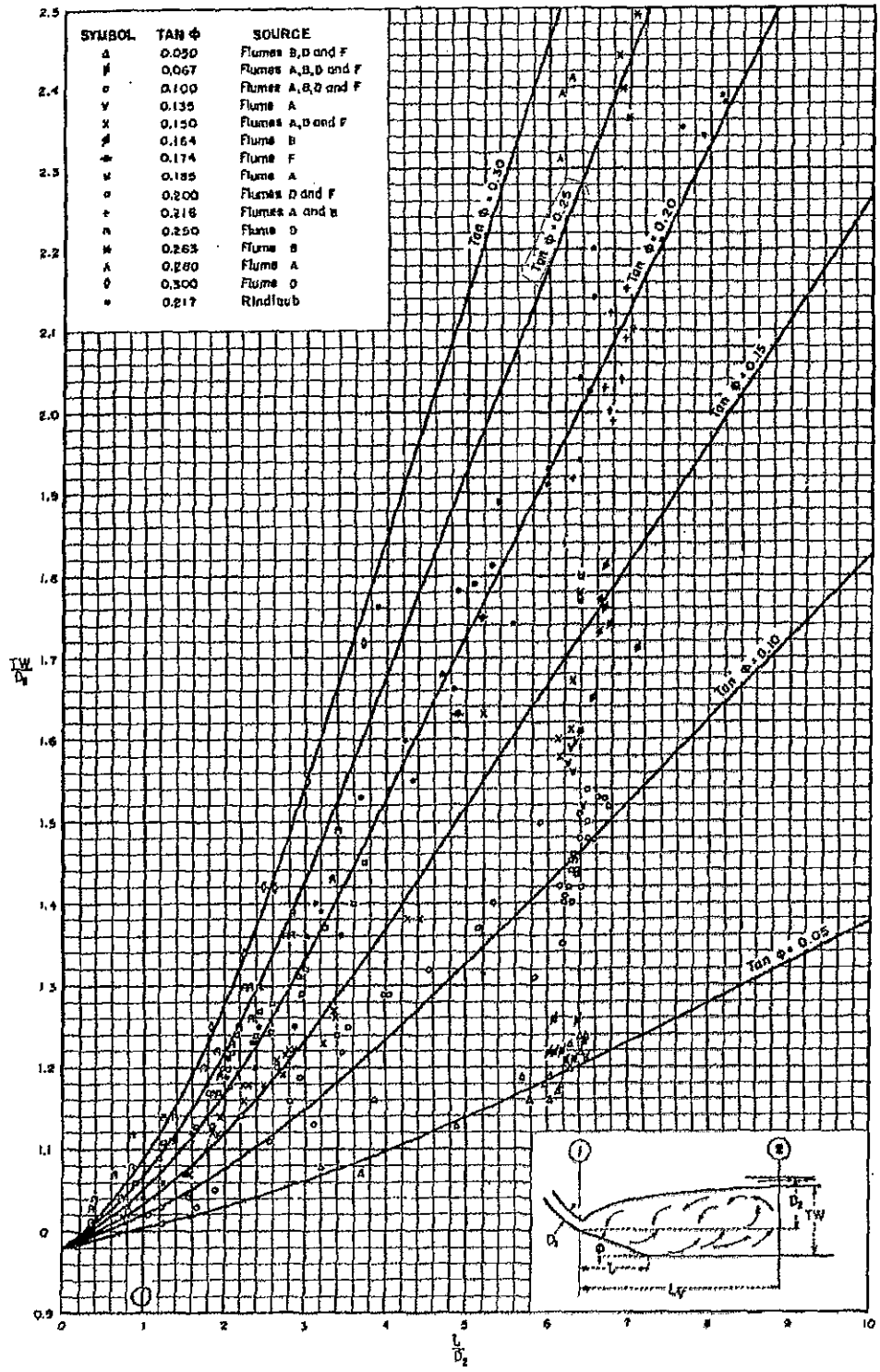


FIGURE 36.—*Tail water requirement for sloping aprons (Basin V, Case B).*

Appendix F

EROSION AND SEDIMENT TRANSPORT ANALYSIS

Appendix F.1

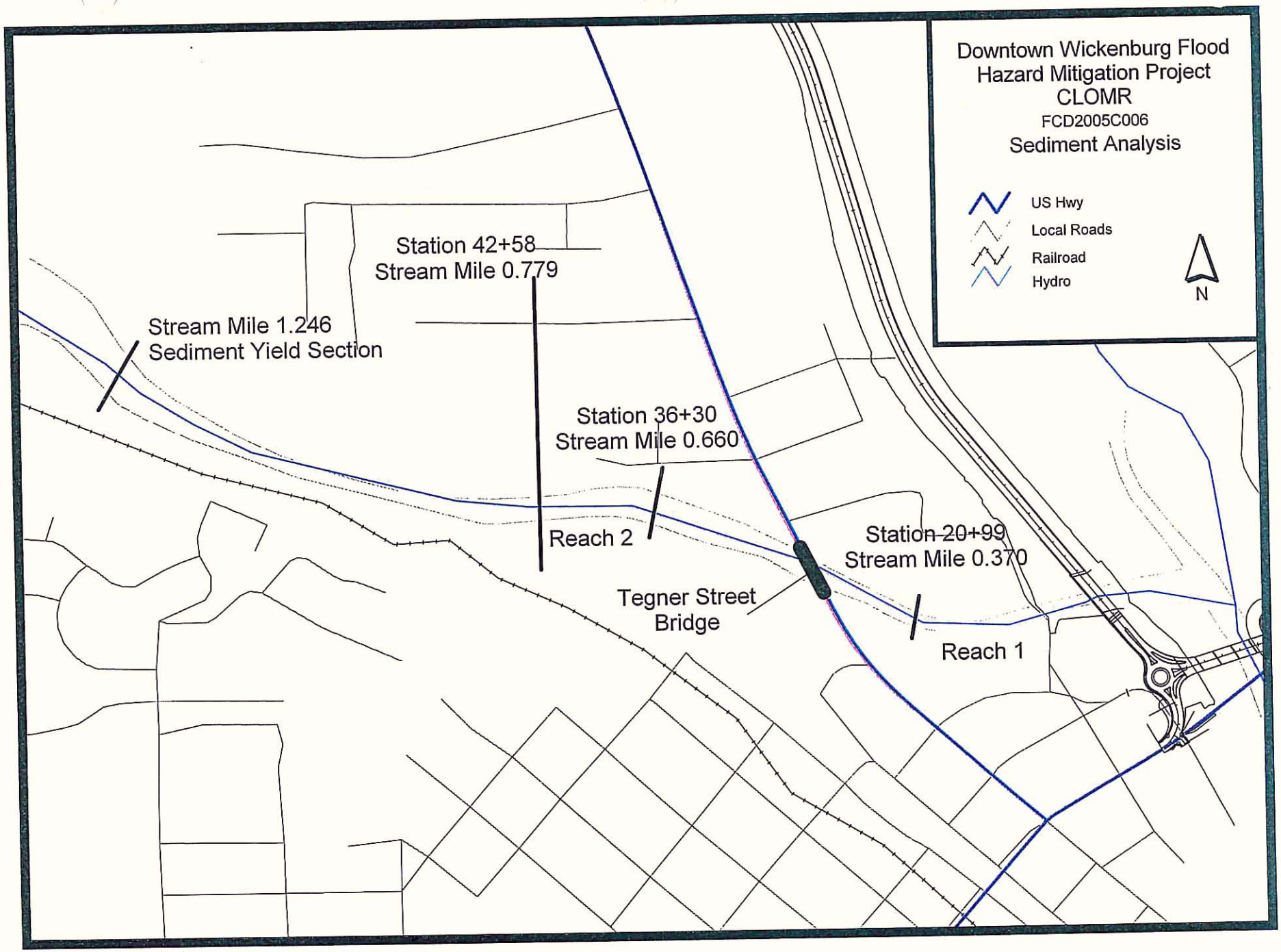
FREEBOARD CALCULATIONS

Freeboard Calculation Table

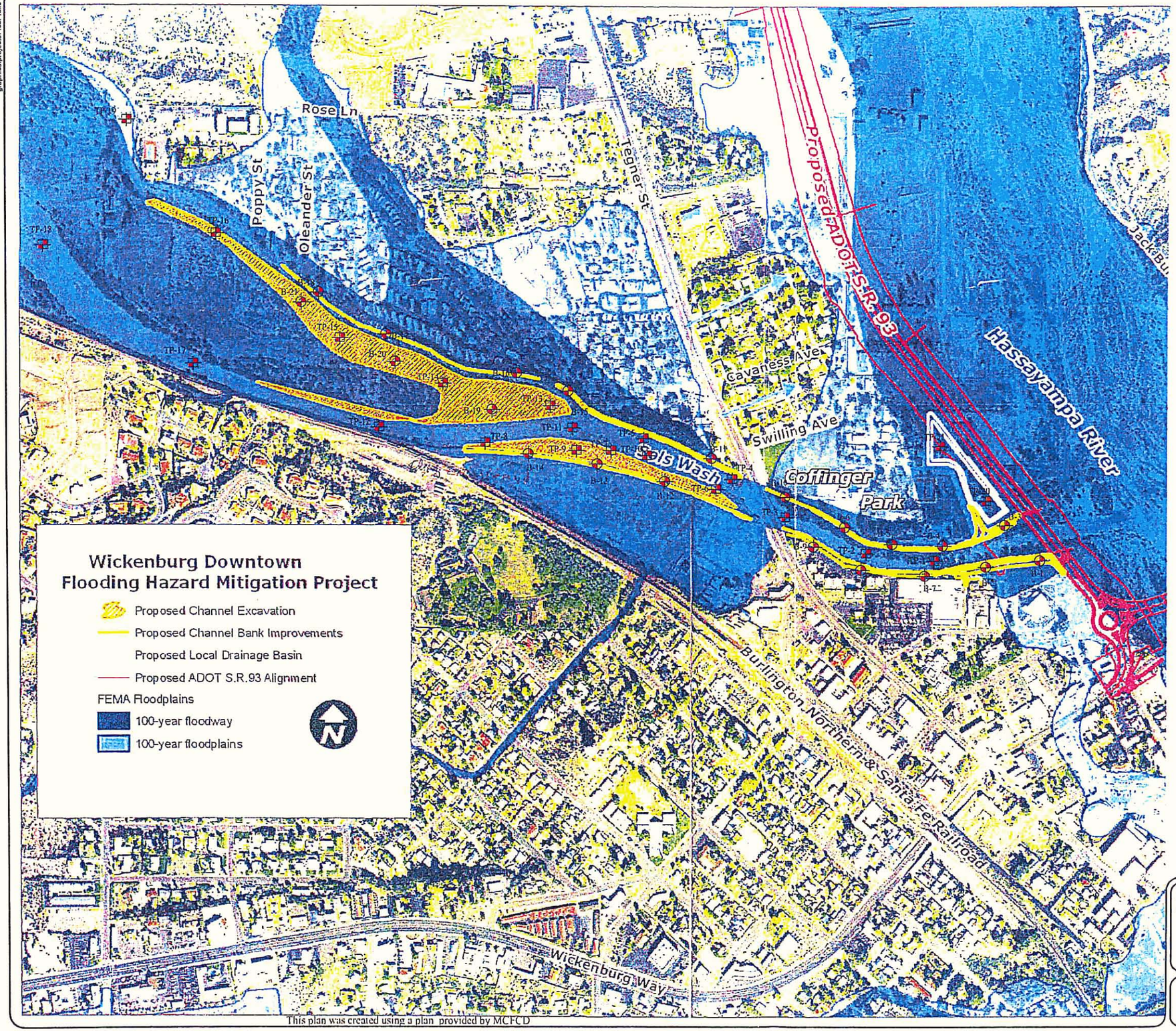
River Mile	CL Sta	NB Sta	SB Sta	Q Total	W.S. Elev	Required Freeboard North Bank (FEMA)	Required Freeboard South Bank (FEMA)	Design Top of Floodwall /Levee (North Bank)	Design Top of Floodwall /Levee (South Bank)	Freeboard Provided North Bank	Freeboard Provided South Bank
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
0.668	39+85	140+37	239+56	14459	2068.95	3.0	N/A	2072.50	-	3.55	-
0.642	38+50	138+46	238+20	14459	2068.53	3.0	N/A	2072.50	-	3.97	-
0.614	37+00	137+39	236+72	14459	2067.27	3.0	N/A	2071.50	-	4.23	-
0.592	35+80	136+05	235+58	14459	2066.89	3.0	N/A	2071.50	2071.00	4.61	4.11
0.557	34+00	134+20	233+84	14459	2066.79	3.0	3.0	2070.50	2071.00	3.71	4.21
0.529	32+50	132+61	232+39	14459	2066.78	3.0	3.0	2070.50	2071.00	3.72	4.22
0.505	31+20	131+22	231+20	14459	2066.50	3.0	3.0	2070.50	2070.50	4.00	4.00
0.485	30+20	130+20	230+19	15045	2065.98	3.0	3.0	2070.50	2070.50	4.52	4.52
0.467	29+20	129+13	229+37	15045	2065.80	4.0	3.0	2070.50	2070.50	4.70	4.70
0.447	28+25	-	228+25	15045	2065.87	4.0	3.0	-	2070.50	-	4.63
0.442	28+00	-	228+97	15045	2065.73	4.0	4.0	-	2070.50	-	4.77
0.423	27+00			Bridge							
0.412	26+30	127+10	225+20	15045	2061.01	4.0	4.0	2065.50	2065.50	4.49	4.49
0.389	25+10	125+10	225+10	15045	2060.76	3.0	4.0	2065.50	2065.50	4.74	4.74
0.359	23+55	123+54	223+55	15045	2060.08	3.0	3.0	2064.30	2065.50	4.22	5.42
0.306	20+76	120+83	220+57	15045	2059.42	3.0	3.0	2063.80	2064.50	4.38	5.08
0.288	19+76	119+89	219+50	15045	2059.30	3.0	3.0	2063.00	2063.50	3.70	4.20
0.227	16+58	116+91	216+12	15045	2057.96	3.0	3.0	2062.30	2062.50	4.34	4.54
0.220	16+18	116+51	215+68	15045	2057.53	3.0	3.0	2062.30	2062.50	4.77	4.97
0.212	15+78	116+13	215+28	15045	2057.22	4.0	3.0	2061.30	2061.72	4.08	4.50
0.204	15+38	115+75	214+86	15045	2056.67	4.0	4.0	2061.30	2061.44	4.63	4.77
0.201	15+18	115+57	214+63	15045	2055.03	4.0	4.0	2060.30	2061.30	5.27	6.27
0.198	15+03	115+41	214+49	15045	2054.17	4.0	4.0	2060.30	2060.72	6.13	6.55
0.195	14+84	115+26	214+34	15045	2054.17	4.0	4.0	2059.80	2060.16	5.63	5.99
0.192	14+73	115+12	214+20	15045	2054.17	4.0	4.0	2059.80	2059.64	5.63	5.47
0.189	14+59	114+99	214+05	15045	2054.17	4.0	4.0	2058.67	2059.30	4.50	5.13
0.187	14+45	114+84	213+92	15045	2054.17	4.0	4.0	2058.65	2059.30	4.48	5.13
0.184	14+35	114+68	213+78	15045	2054.17	4.0	4.0	2058.63	2059.30	4.46	5.13
0.182	14+18	114+56	213+65	15045	2054.17	4.0	4.0	2058.62	2059.30	4.45	5.13
0.180	14+08	114+45	213+53	15045	2054.17	4.0	4.0	2058.60	2059.30	4.43	5.13
0.169	13+50	113+89	212+95	15045	2054.17	4.0	4.0	2058.53	2059.11	4.36	4.94
0.159	13+00	113+38	212+42	15045	2054.17	4.0	3.0	2058.46	2058.94	4.29	4.77
0.150	12+50	113+01	211+83	15045	2054.17	4.0	3.0	2058.41	2058.76	4.24	4.59
0.140	12+00	112+70	211+15	15045	2054.17	4.0	4.0	2058.37	2058.55	4.20	4.38
0.132	11+60	-	-	15045	2054.17	4.0	4.0	-	-	-	-
0.121	11+00			Bridge							

Note: From cross-section 0.198 to 0.132, the 100-year backwater from the Hassayampa is controlling. The WSE is 2054.17.

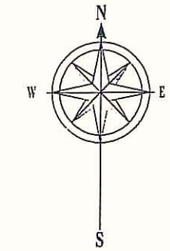
Appendix F.2
SCOUR CALCULATIONS


Downtown Wickenburg Flood
Hazard Mitigation Project
CLOMR
FCD2005C006
Sediment Analysis
US Hwy
Local Roads
Railroad
Hydro
N
Station 42+58
Stream Mile 0.779
Stream Mile 1.246
Sediment Yield Section
Station 36+30
Stream Mile 0.660
Reach 2
Station 20+99
Stream Mile 0.370
Tegner Street
Bridge
Reach 1

graphics\projects\ .cdr /akc



This plan was created using a plan provided by MCFCD



Not To Scale

Testpit

Boring

Note:

*At the request of FCDMC, excavation of test pits TP-6 thru TP-8 were omitted as information for the existing gabions was available.

**Test pits TP-20 and TP-21 were not excavated due access conflicts.

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Sols Wash
Wickenburg Downtown Flooding Hazard Mitigation
Wickenburg, Arizona

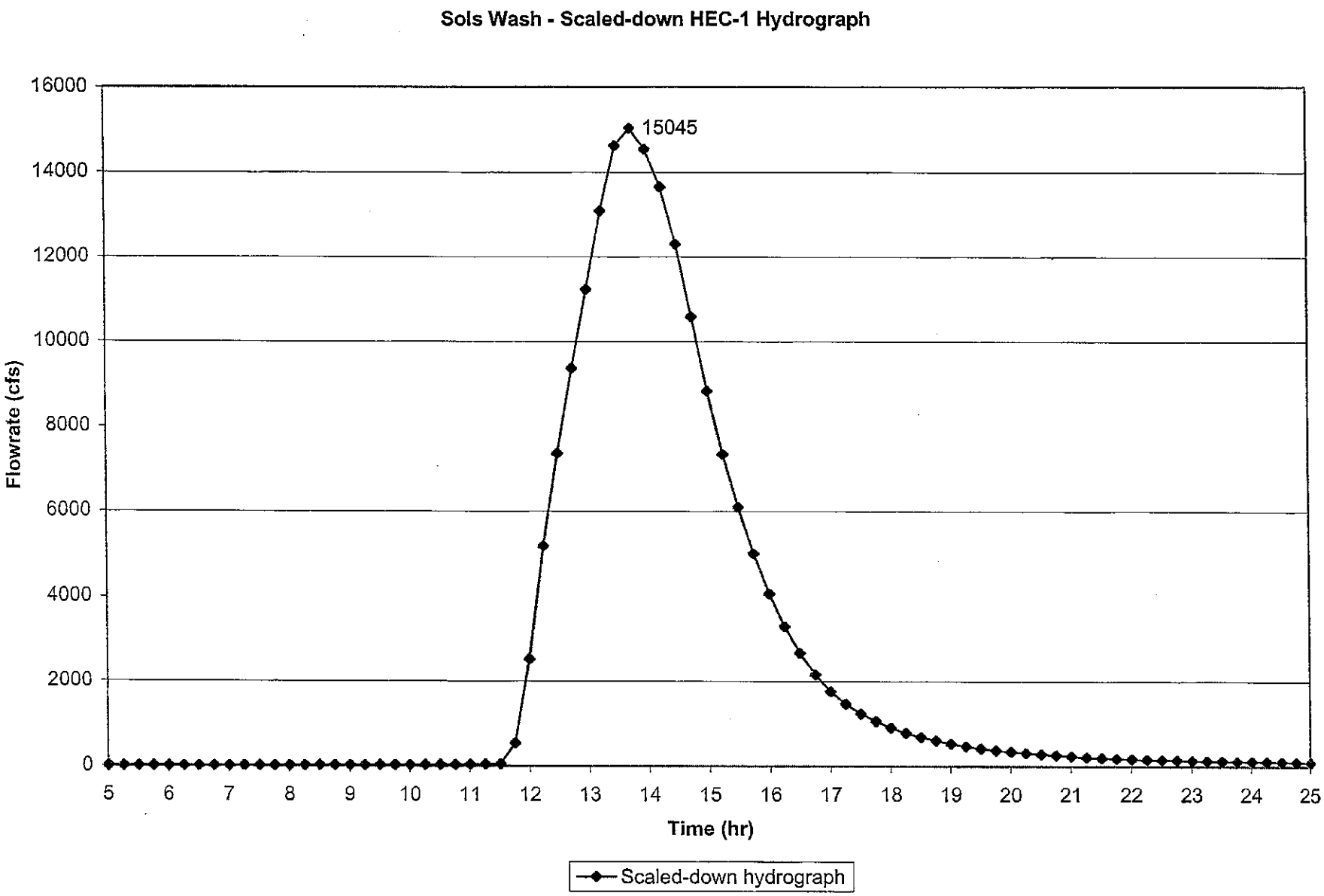
Approximate Boring & Test Pit Locations Map

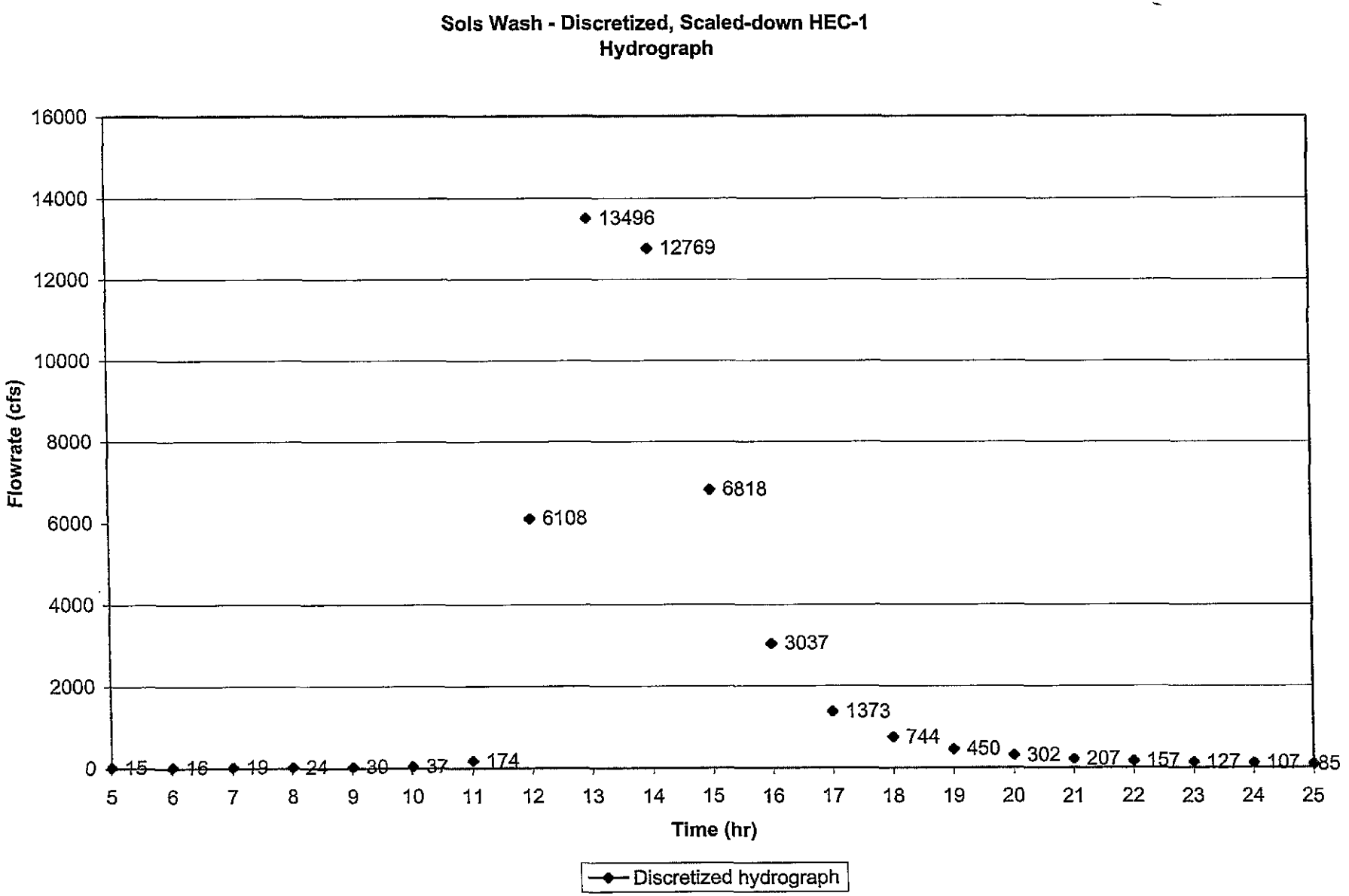
FIGURE 1

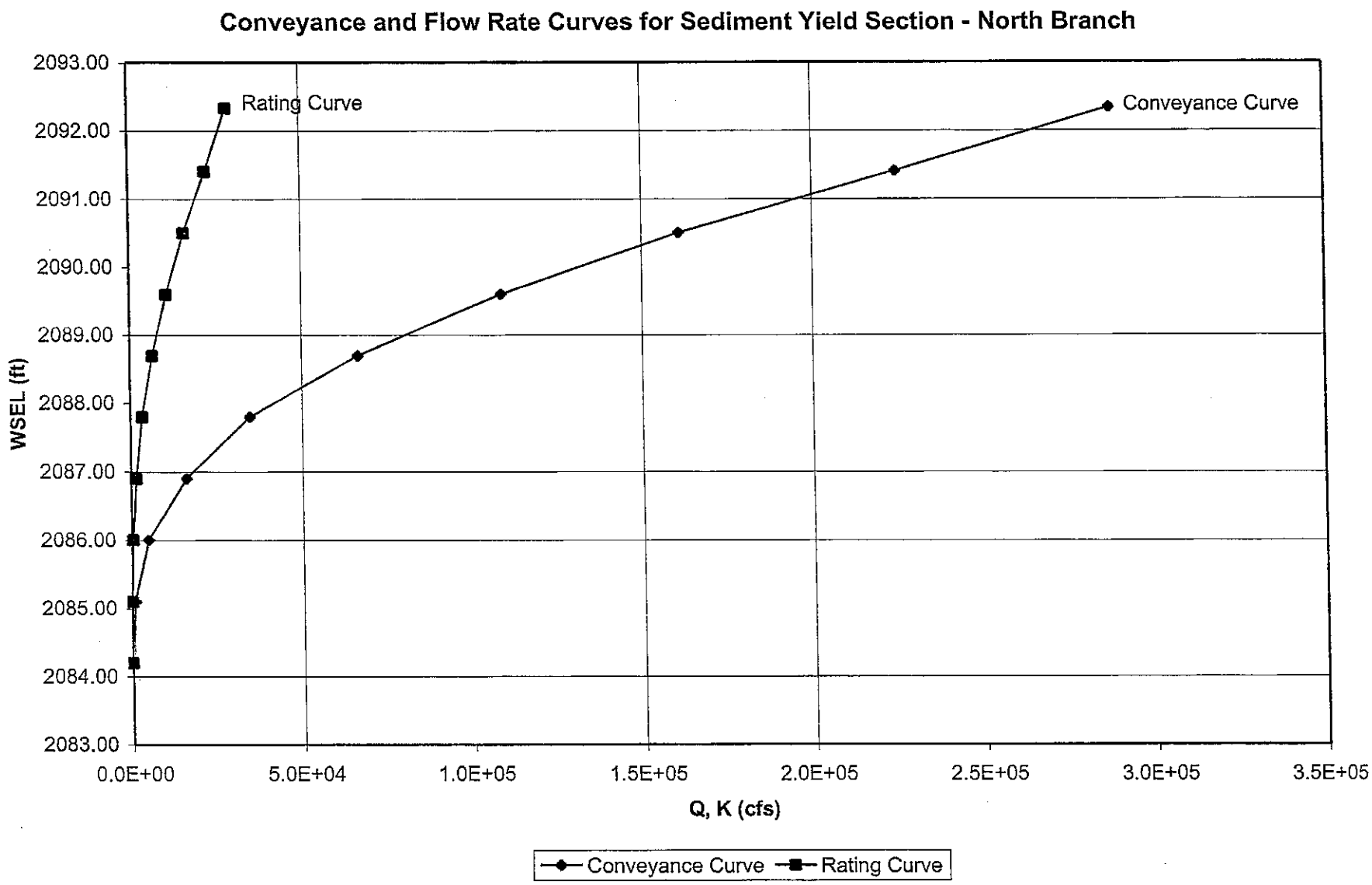
KLEINFELDER

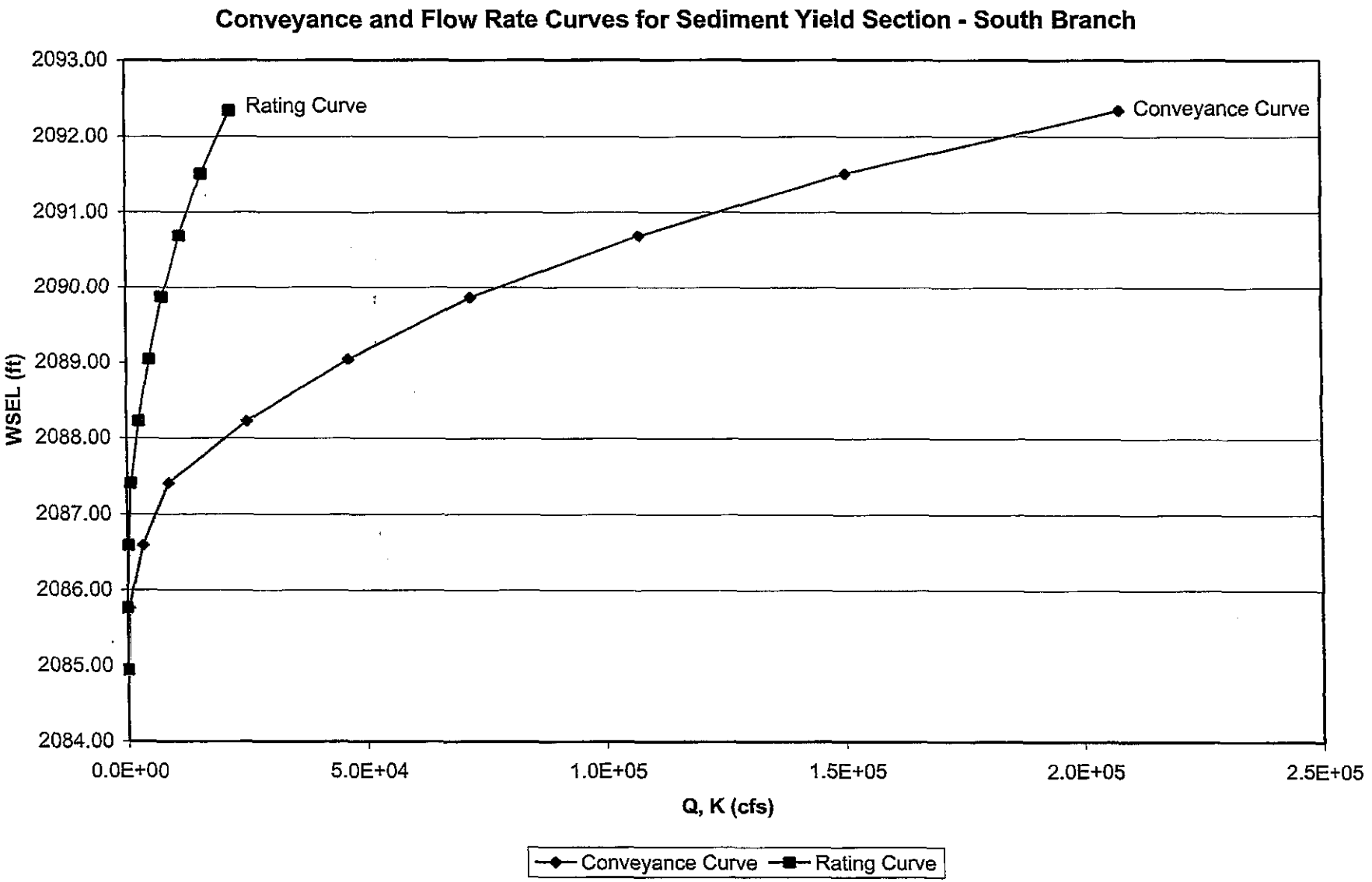
Project Number: 63683 (1)

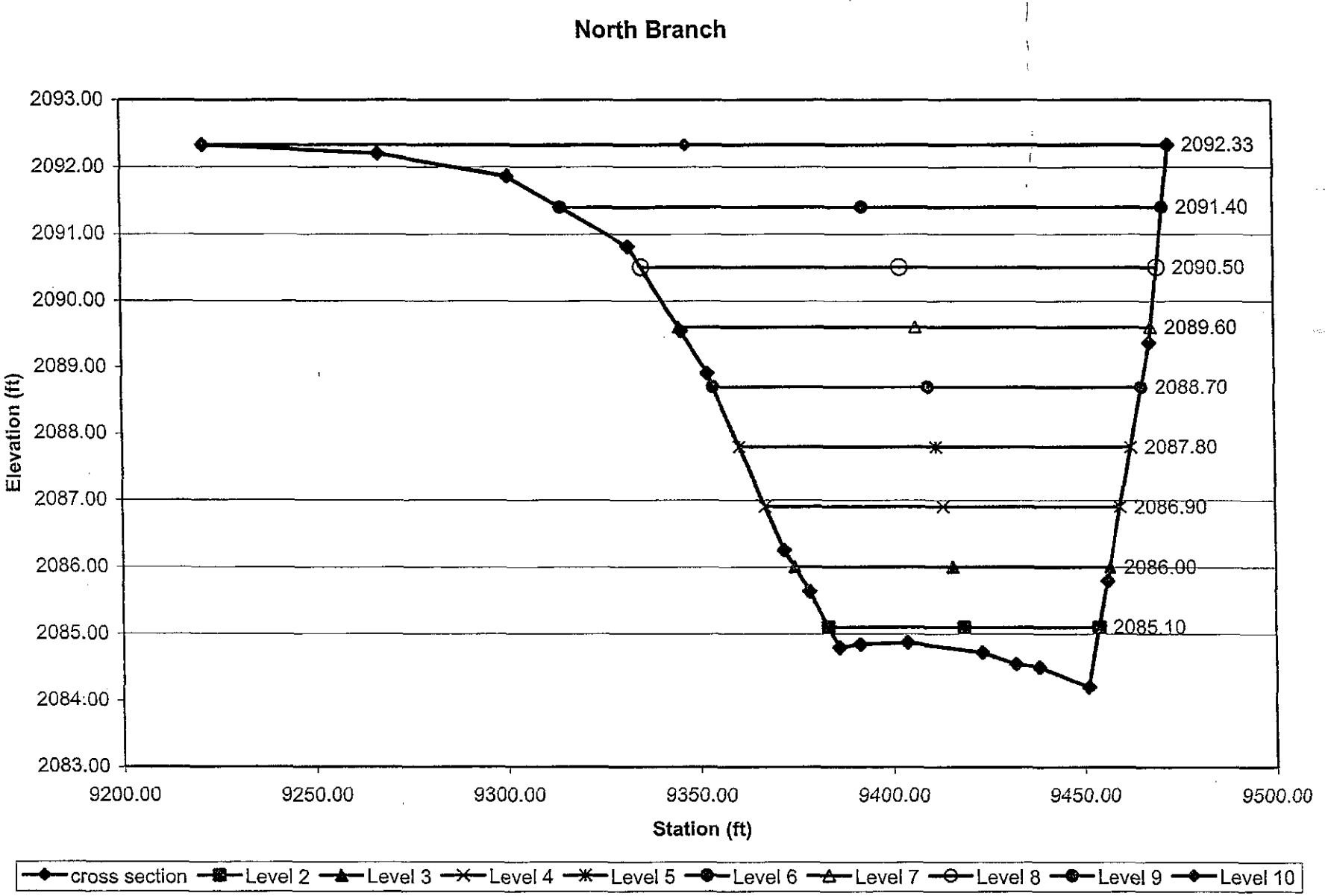
January, 2006

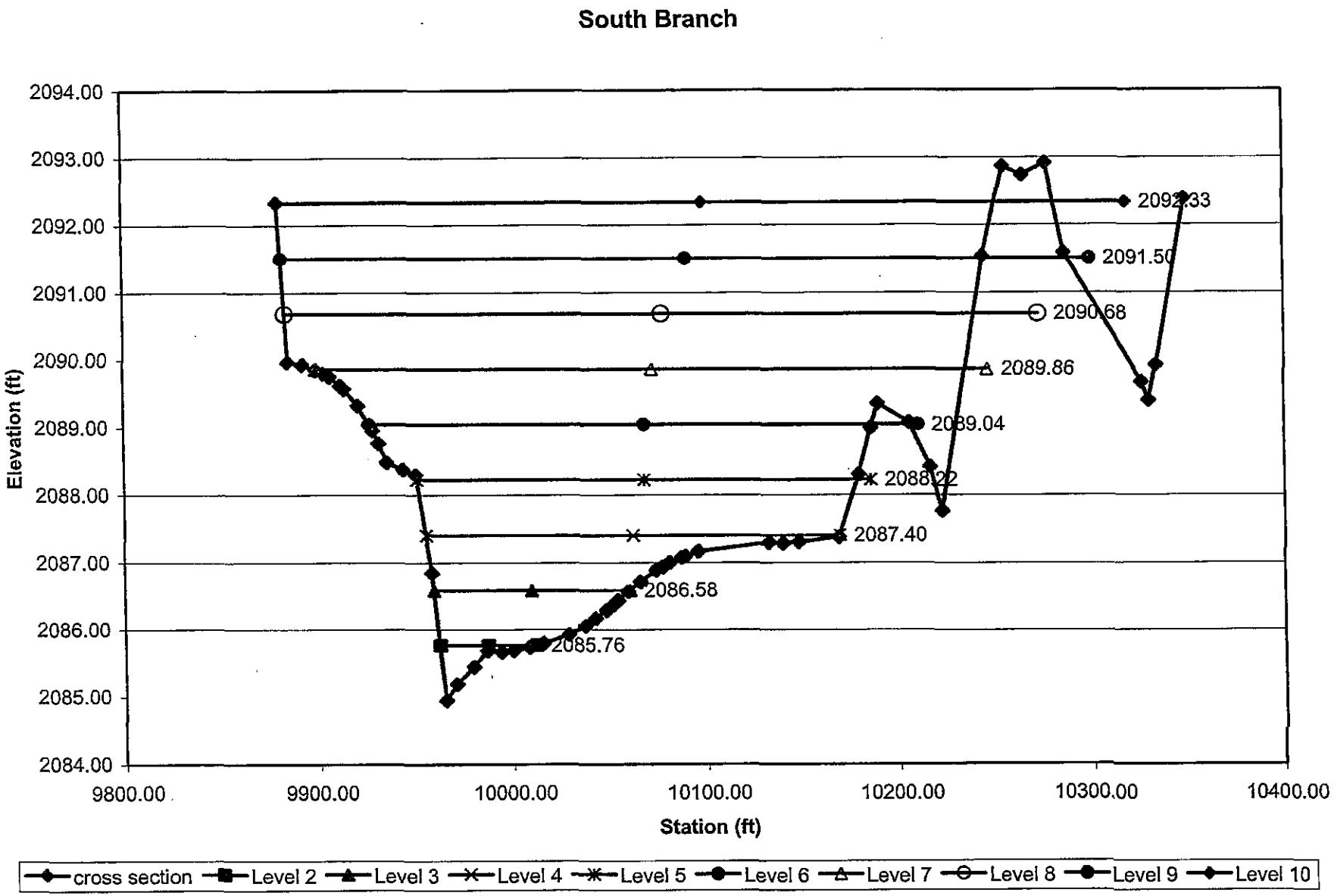

Sols Wash - Scaled-down HEC-1 Hydrograph
16000
14000
12000
10000
8000
6000
4000
2000
0
Flowrate (cfs)
15045
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
Time (hr)
Scaled-down hydrograph


Sols Wash - Discretized, Scaled-down HEC-1 Hydrograph
Flowrate (cfs)
16000
14000
12000
10000
8000
6000
4000
2000
0
13496
12769
6818
6108
3037
1373
744
450
302
207
157
127
107
85
15
16
19
24
30
37
174
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
Time (hr)
Discretized hydrograph


Conveyance and Flow Rate Curves for Sediment Yield Section - North Branch
Rating Curve
Conveyance Curve
WSEL (ft)
2093.00
2092.00
2091.00
2090.00
2089.00
2088.00
2087.00
2086.00
2085.00
2084.00
2083.00
0.0E+00
5.0E+04
1.0E+05
1.5E+05
2.0E+05
2.5E+05
3.0E+05
3.5E+05
Q, K (cfs)
Conveyance Curve
Rating Curve


Conveyance and Flow Rate Curves for Sediment Yield Section - South Branch
2093.00
2092.00
2091.00
2090.00
2089.00
2088.00
2087.00
2086.00
2085.00
2084.00
WSEL (ft)
Rating Curve
Conveyance Curve
0.0E+00
5.0E+04
1.0E+05
1.5E+05
2.0E+05
2.5E+05
Q, K (cfs)
Conveyance Curve
Rating Curve


North Branch
2093.00
2092.00
2091.00
2090.00
2089.00
2088.00
2087.00
2086.00
2085.00
2084.00
2083.00
Elevation (ft)
9200.00
9250.00
9300.00
9350.00
9400.00
9450.00
9500.00
Station (ft)
2092.33
2091.40
2090.50
2089.60
2088.70
2087.80
2086.90
2086.00
2085.10
cross section
Level 2
Level 3
Level 4
Level 5
Level 6
Level 7
Level 8
Level 9
Level 10


South Branch
2094.00
2093.00
2092.00
2091.00
2090.00
2089.00
2088.00
2087.00
2086.00
2085.00
2084.00
Elevation (ft)
9800.00
9900.00
10000.00
10100.00
10200.00
10300.00
10400.00
Station (ft)
2092.33
2091.50
2090.68
2089.86
2089.04
2088.22
2087.40
2086.58
2085.76
cross section
Level 2
Level 3
Level 4
Level 5
Level 6
Level 7
Level 8
Level 9
Level 10

	Left Branch			Right Branch			Total	
Stage (ft)	K (cfs)	Q (cfs)	V (ft/sec)	K (cfs)	Q (cfs)	V (ft/sec)	K (cfs)	Q (cfs)
2084.2	0	0	0	0	0	0	0	0
2085.1	705.61	70.58	2.38	298.22	31.46	2.24	1003.83	102.04
2086	4709.09	471	4.79	3312.6	349.43	4.43	8021.69	820.43
2086.9	11552.57	1155.49	6.53	8690.29	916.69	4.83	20242.86	2072.18
2087.8	20728.9	2073.3	7.93	25156.32	2653.6	7.1	45885.22	4726.9
2088.7	32033.33	3203.97	9.11	46415.33	4896.1	8.35	78448.66	8100.07
2089.6	47965.29	4797.49	10.29	72044.48	7599.58	9.05	120009.8	12397.07
2090.5	65328.98	6534.2	11.23	107431.2	11332.33	9.97	172760.2	17866.53
2091.4	81369.71	8138.6	11.47	150509.8	15876.46	10.94	231879.5	24015.06
2092.33	81613.22	8162.95	9.27	208043.1	21945.34	12	289656.3	30108.29

General Scour - Sediment Yield Section

Project Title: Wickenburg Downtown Flooding Mitigation Hazard Project

Project No.: ST0503-201 EEC 304021
Prepared By: FB Checked By: LV

Time (hr)	Qavg (cfs)	n	A (sq.ft.)	B (ft)	V (ft/s)	G	Yh (ft)	D50 (mm)	qs (cfs/ft)	Qs (cfs)
10	37	0.034	15.8	43.78	2.34	3.36	0.36	1.23	0.001	0.04
11	174	0.033	57.1	127.01	3.05	3.36	0.45	1.23	0.004	0.51
12	6108	0.032	759.1	360.91	8.05	3.36	2.10	1.23	0.144	51.97
13	13496	0.032	1389.1	481.21	9.72	3.36	2.89	1.23	0.295	141.96
14	12769	0.032	1334.3	474.10	9.57	3.36	2.81	1.23	0.279	132.27
15	6818	0.031	822.9	373.26	8.29	3.36	2.20	1.23	0.152	56.74
16	3037	0.032	464.2	317.43	6.54	3.36	1.46	1.23	0.066	20.95
17	1373	0.032	260.9	237.68	5.26	3.36	1.10	1.23	0.028	6.66
18	744	0.032	177.3	183.42	4.63	3.36	0.97	1.23	0.017	3.12
19	450	0.033	108.4	151.09	4.15	3.36	0.72	1.23	0.012	1.81
20	302	0.033	80.9	138.18	3.73	3.36	0.59	1.23	0.008	1.11
21	207	0.033	63.2	129.89	3.28	3.36	0.49	1.23	0.005	0.65
22	157	0.033	53.9	125.53	2.91	3.36	0.43	1.23	0.003	0.38
23	127	0.033	48.3	122.91	2.63	3.36	0.39	1.23	0.002	0.25
24	107	0.033	44.6	121.16	2.40	3.36	0.37	1.23	0.001	0.12
25	85	0.033	36.4	100.57	2.34	3.36	0.36	1.23	0.001	0.1
26	66	0.034	28.3	78.09	2.34	3.36	0.36	1.23	0.001	0.08
27	50	0.034	21.4	59.16	2.34	3.36	0.36	1.23	0.001	0.06
28	39	0.034	16.7	46.14	2.34	3.36	0.36	1.23	0.001	0.05
									Total	418.83

General Scour - Reach 2

Project Title: Wickenburg Downtown Flooding Mitigation Hazard Project

Project No.: ST0503-201 EEC 304021
Prepared By: FB Checked By: LV

Time (hr)	Qavg (cfs)	n	A (sq.ft.)	B (ft)	V (ft/s)	G	Yh (ft)	D50 (mm)	qs (cfs/ft)	Qs (cfs)
10	37	0.03	17.1	50.14	2.16	3.75	0.34	1.23	0.001	0.05
11	174	0.03	70.4	169.50	2.47	3.75	0.42	1.23	0.001	0.17
12	6108	0.03	643.2	204.74	9.50	3.75	3.14	1.23	0.245	50.16
13	13496	0.03	1073.0	222.76	12.58	3.75	4.82	1.23	0.724	161.28
14	12769	0.03	1035.0	221.30	12.34	3.75	4.68	1.23	0.672	148.71
15	6818	0.03	690.7	207.44	9.87	3.75	3.33	1.23	0.284	58.91
16	3037	0.03	411.2	191.01	7.39	3.75	2.15	1.23	0.093	17.76
17	1373	0.03	249.8	180.87	5.50	3.75	1.38	1.23	0.03	5.43
18	744	0.03	171.0	175.97	4.35	3.75	0.97	1.23	0.012	2.11
19	450	0.03	125.6	173.08	3.58	3.75	0.73	1.23	0.006	1.04
20	302	0.03	98.5	171.33	3.07	3.75	0.57	1.23	0.003	0.51
21	207	0.03	78.3	170.01	2.64	3.75	0.46	1.23	0.002	0.34
22	157	0.03	66.2	169.22	2.37	3.75	0.39	1.23	0.001	0.17
23	127	0.03	57.6	164.37	2.20	3.75	0.35	1.23	0.001	0.16
24	107	0.03	50.5	153.16	2.12	3.75	0.33	1.23	0.001	0.15
25	85	0.03	37.6	103.17	2.26	3.75	0.36	1.23	0.001	0.1
26	66	0.03	26.2	61.26	2.52	3.75	0.43	1.23	0.001	0.06
27	50	0.03	21.4	55.67	2.34	3.75	0.38	1.23	0.001	0.06
28	39	0.03	17.8	51.11	2.19	3.75	0.35	1.23	0.001	0.05

Total 447.22
Sediment Imbalance -28.39

General Scour - Reach 1

Project Title: Wickenburg Downtown Flooding Mitigation Hazard Project

Project No.: ST0503-201 EEC 304021
Prepared By: FB Checked By: LV

Time (hr)	Qavg (cfs)	n	A (sq.ft.)	B (ft)	V (ft/s)	G	Yh (ft)	D50 (mm)	qs (cfs/ft)	Qs (cfs)
10	37	0.03	18.3	55.45	2.02	4.91	0.33	1.37	0.001	0.06
11	174	0.03	53.3	78.35	3.27	4.91	0.68	1.37	0.004	0.31
12	6108	0.03	532.7	110.99	11.47	4.91	4.80	1.37	0.514	57.05
13	13496	0.03	915.2	128.18	14.75	4.91	7.14	1.37	1.353	173.43
14	12769	0.03	876.2	124.66	14.57	4.91	7.03	1.37	1.289	160.69
15	6818	0.03	570.3	111.00	11.96	4.91	5.14	1.37	0.604	67.04
16	3037	0.03	343.8	109.01	8.83	4.91	3.15	1.37	0.189	20.6
17	1373	0.03	211.7	109.00	6.49	4.91	1.94	1.37	0.058	6.32
18	744	0.03	145.9	108.99	5.10	4.91	1.34	1.37	0.023	2.51
19	450	0.03	107.7	108.98	4.18	4.91	0.99	1.37	0.011	1.2
20	302	0.03	84.1	107.14	3.59	4.91	0.78	1.37	0.006	0.64
21	207	0.03	62.4	89.71	3.32	4.91	0.70	1.37	0.004	0.36
22	157	0.03	49.3	75.23	3.19	4.91	0.66	1.37	0.004	0.3
23	127	0.03	42.5	71.40	2.99	4.91	0.60	1.37	0.003	0.21
24	107	0.03	37.7	68.62	2.84	4.91	0.55	1.37	0.002	0.14
25	85	0.03	32.3	65.68	2.63	4.91	0.49	1.37	0.002	0.13
26	66	0.03	27.2	62.51	2.43	4.91	0.44	1.37	0.001	0.06
27	50	0.03	22.5	58.86	2.22	4.91	0.38	1.37	0.001	0.06
28	39	0.03	19	56.01	2.05	4.91	0.34	1.37	0.001	0.06

Total 491.17
Sediment Imbalance -43.95

General Scour - Summary Table

Project Title: Wickenburg Downtown Flooding Mitigation Hazard Project

Project No.: ST0503-201 EEC 304021

Prepared By: FB Checked By: LV

Reach	DQs	Dt	Partition	Length	Width	Vertical Movement (n=0.4)	
						Unbulked	Bulked
	(cfs)	(hr)		(ft)	(ft)	(ft)	(ft)
2	-28.39	1	CH	1489	206	-0.33	-0.55
1	-43.95	1	CH	1494	109	-0.97	-1.62

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Project Title _____ Project No. _____ Date _____

Subject Toe-down, Reach 1 Prepared By FB Checked By LV Page 1

Toe-down Requirements for Stabilization System.

Reach 1 Mi 0.191 to Mi 0.474

Sta: 11+54 to Sta: 26+48

$L = 1,494$ feet.

$S = 0.00724$ '/ft.

$Q_{100} = 15,045$ cfs

$B_{TW} = 139.00$ ft. (median value) @ Mi 0.370

$A = 1262.96$ sq. ft.

$S_E = 0.003519$ '/ft.

1. Armor potential

Shield's $\quad \Delta_c = \dfrac{\tau}{0.047(\gamma_s - \gamma)}$

d = hydraulic depth $= \dfrac{A}{B_{TW}} = 9.09$ ft. (HEC-RAS)

aspect ratio (width/depth) $\quad \dfrac{B_{TW}}{d} = \dfrac{139}{9.09} = 15.29 > 10$

$\Rightarrow \gamma d S_E \simeq \gamma R S$

$\Rightarrow$ From Fig 4.4 $\Rightarrow \dfrac{\tau_{max}}{\gamma d S_E} = 1.0$

$\Rightarrow \tau_{max} = \gamma d S_E = (62.4) \times (9.09) \times (0.003519)$

Project Title _____ Project No. _____ Date _____

Subject _____ Prepared By _____ Checked By _____ Page 21

$\Rightarrow \underline{\tau_{max}} = 1.996$ lb/sq.ft. say $\underline{2.0}$ lb/sq.ft.

$$R = \frac{A}{P} = \frac{1262.96}{154.70} = 8.164 \text{ ft.}$$

$$\Rightarrow \tau_{max} = \gamma R S = (62.4) \times (8.164) \times (0.00741)$$
$$= \underline{\underline{3.77}} \text{ lb/sq.ft.}$$

$\hookrightarrow$ Use $\underline{\tau_{max} = 3.77 \text{ lb/sq.ft.}}$

Per geotechnical report (Page 8) $\gamma_s = 110$ lb/cf for silty gravel, sandy gravel, clayey gravel.

$$\Rightarrow \quad D_c = \frac{3.77}{0.047(110 - 62.4)} = 1.68 \text{ ft.}$$

According to Geotechnical Report (Page 8), no testable undisturbed samples of gravel were obtained. Hence, assuming $\gamma_s = 165$ lb/cf.

$$\Rightarrow D_c = \frac{3.77}{0.047(165 - 62.4)} = 0.78 \text{ ft.}$$

Granulometric Curves for TP-1, TP-2, TP-3 within 0' to 8' do not show any particles that large

$\Rightarrow$ No armoring is likely.

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Project Title _____ Project No. _____ Date _____

Subject _____ Prepared By _____ Checked By _____ Page 3/

2. Long Term Aggradation / Degradation

a). $Q_{100} = 15{,}045$ cfs.

$Q_{10} = 7{,}019$ cfs

b) Sediment supply, Q_{100}.

Supply section → TP-18, TP-19

From Geotechnical Report ⇒ TP-18 (right), 0'-8' ⇒ $D_{50} = 1.22$ mm

$D_{15.9} = 0.37$ mm

$D_{84.1} = 4.21$ mm

TP-19 (left), 0'-8' ⇒ $D_{50} = 1.23$ mm

$D_{15.9} = 0.39$ mm

$D_{84.1} = 4.36$ mm

G = gradation coefficient

$$= \frac{1}{2}\left(\frac{D_{84.1}}{D_{50.0}} + \frac{D_{50}}{D_{15.9}}\right)$$

G left = 3.37

G right = 3.35

Left branch

$Q_{100} = 5413$ cfs

$S = 0.01103$ '/ft

$n = 0.030$

$y = 5.56$ ft.

$Q_{CH} = 5413$ cfs.

$Q_{OB} = 0$ cfs

$V_{CH} = 11.16$ ft/s

$V_{OB} = 0$ ft/s

$A_{CH} = 484.94$ sq.ft.

$A_{OB} = 0$ sq.ft

Right Branch.

$Q_{100} = 9000$ cfs.

$S = 0.01103$ '/ft

$n = 0.030$

$y = 5.81$ ft.

$Q_{CH} = 8837$ cfs.

$Q_{OB} = 163$ cfs.

$V_{CH} = 10.53$ ft/s

$V_{OB} = 3.18$ ft/s

$A_{CH} = 838.92$ sq.ft.

$A_{OB} = 580.94$ sq.ft.

Project Title _____ Project No. _____ Date _____

Subject _____ Prepared By _____ Checked By _____ Page 4

Per Zeller and Fullerton. (5.86)

$$q_s = 0.0064 \frac{n^{1.77} V^{4.32} G^{0.45}}{Y_h^{0.3} D_{50}^{0.61}}$$

CHANNEL - Left branch

$B_{TW} = 124.35$ ft.

$Y_h = 3.9$ ft. (HEC-RAS)

$q_{s_{CH\,left}} = 0.44$ cfs/ft.

$Q_{s_{CH\,left}} = 54.71$ cfs.

$Q_{s_{OB\,left}} = 0$ cfs

CHANNEL - Right branch

$B_{TW} = 290.54$ ft.

$Y_h = 2.89$ ft (HEC-RAS)

$q_{s_{CH\,right}} = 0.372$ cfs/ft.

$Q_{s_{CH\,right}} = 108.08$ cfs

Overbank - Right

$B_{TW} = 234.43$ ft.

$Y_h = 1.11$ ft (HEC-RAS)

$q_{s_{OB\,right}} = 0.00694$ cfs/ft

$Q_{s_{OB\,right}} = 1.63$ cfs

$$\Rightarrow Q_{s_{TOT}}^{100} = Q_{s_{CH\,left}} + Q_{s_{CH\,right}} + Q_{s_{OB\,right}} = 164.42 \text{ cfs}$$

$$\boxed{Q_{s_{TOT}} = 164.42 \text{ cfs}}$$

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Project Title _____ Project No. _____ Date _____

Subject _____ Prepared By _____ Checked By _____ Page 5

c. Sediment Supply, Q_{10}

Left Branch

$Q_{10} = 2129$ cfs.
$S = 0.01103$ ft/ft
$n = 0.030$
$Y = 3.37$ ft
$Q_{CH} = 2129$ cfs.
$Q_{OB} = 0$ cfs
$V_{CH} = 8.84$ ft/s.
$V_{OB} = 0$ ft/s.
$A_{CH} = 240.94$ sq ft
$A_{OB} = 0$ sq. ft.

Right Branch

$Q_{10} = 4890$ cfs.
$S = 0.01103$ ft/ft
$n = 0.030$
$Y = 5.16$ ft.
$Q_{CH} = 4854$ cfs.
$Q_{OB} = 36$ cfs.
$V_{CH} = 7.38$ cfs.
$V_{OB} = 1.57$ cfs.
$A_{CH} = 657.47$ sq ft
$A_{OB} = 22.67$ sq ft.

CHANNEL - Left Branch.

$B_{TW} = 99.67$ ft.
$Y_h = 2.42$ ft.
$q_{s_{CH\,left}} = 0.186$ cfs/ft.
$Q^{10}_{s_{CH\,left}} = 18.54$ cfs.
$Q^{10}_{s_{OB\,left}} = 0$

CHANNEL - Right Branch.

$B_{TW} = 269.90$ ft.
$Y_h = 2.44$ ft.
$q_{s_{CH\,right}} = 0.0843$ cfs/ft.
$Q^{10}_{s_{CH\,right}} = 22.76$ cfs.

OVERBANK - Right

$B_{TW} = 42.39$
$Y_h = 0.53$ } HEC-RAS
$q_{s_{OB\,right}} = 0.00016$ cfs/ft
$Q^{10}_{s_{OB\,right}} = 0.01$ cfs.

Project Title _____ Project No. _____ Date _____

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$Q_{s_{TOT}}^{10} = Q_{s_{CH\,left}}^{10} + Q_{s_{CH\,right}}^{10} + Q_{s_{OB\,right}}^{10} = 41.31$ cfs.

$$\boxed{Q_{s_{TOT}}^{10} = 41.31 \text{ cfs}}$$

d. Equilibrium Slope, Q_{100}

$Q_{100} = 15{,}045$ cfs

$B_{TW} = 139.0$ ft. (median value)

$A = 1263$ sq. ft.

$S_E = 0.003519$ '/ft.

From TP-2 0'-8' (Geotechnical Report)

$d_{50} = 1.14$ mm

$d_{15.9} = 0.23$ mm.

$d_{84.1} = 3.72$ mm

From TP-3 0'-8' (Geotechnical Report)

$d_{50} = 1.59$ mm

$d_{15.9} = 0.35$ mm.

$d_{84.1} = 10.24$ mm.

From TP-3 8'-14' (Geotechnical Report)

$d_{50} = 0.075$ mm

$d_{15.9} = 0.075$ mm

$d_{84.1} = 4.11$ mm

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Project Title _____ Project No. _____ Date _____

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TP-2, TP-3, 0'-8' Average: $\Delta_{50} = 1.37$ mm

$\Delta_{15.9} = 0.29$ mm

$\Delta_{84.1} = 6.98$ mm.

$$G_{average} = \frac{1}{2}\left(\frac{6.98}{1.37} + \frac{1.37}{0.29}\right) = 4.91$$

$$q_{s_{av}} = 0.0064 \frac{n^{1.77} V^{4.32} G^{0.45}}{Y_h^{0.3} D_{50}^{0.61}}$$

Iteration 1

$S = S_E = 0.003519$ 1/ft.

$V = 11.91$ ft/s.

$Y_h = 9.09$ ft.

$$q_s = 0.0064 \frac{(0.03)^{1.77} (11.91)^{4.32} (4.91)^{0.45}}{(9.09)^{0.3} (1.37)^{0.61}} = 0.5 \text{ cfs/ft}$$

$Q_s = 0.5 \times 139.0 = 69.5$ cfs

Iteration 2

Assume $S = 0.007$ 1/ft.

$V = 14.93$ ft/s (Flow Master)

$$Y_h = \frac{1007.4}{147.24} = 6.84 \text{ ft.}$$

$q_s = 1.644$ cfs./ft.

$Q_s = 1.444 \times 134.63 = 194.41$ cfs

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Iteration 3 Assume $S = 0.00600$ ft/ft

$\Rightarrow$ $V = 14.15$ ft/s (Flow Master)

$Y_h = \frac{1063.6}{137.18} = 7.75$ ft.

$q_s = 1.103$ cfs/ft

$Q_s^{100} = 1.103 \times 137.18 \Rightarrow Q_s^{100} = 151.31$ cfs.

Iteration 4 Assume $S = 0.00635$ ft/ft.

$\Rightarrow$ $V = 14.43$ ft/s (Flow Master)

$Y_h = \frac{1042.5}{136.23} = 7.65$ ft.

$q_s = 1.206$ cfs

$Q_s^{100} = 1.206 \times 136.23 = 164.29$ while $Q_{STOT}^{100} = 164.42$ cfs.

$\Rightarrow$ $S_{eq}^{100} = 0.00635$ for Reach 1

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3. Low Flow Incisement

Based on visual observations, a 8-12 in low-flow incisement should be considered.

Use 12 in = 1.00 ft

4. Local Scour.

There is no apparent potential for local scour on Reach 1. The flow lines are smooth and no obstructions protrudes from the banks into the wash.

Project Title _____ Project No. _____ Date _____

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5. General Scour

The hydrograph generated by the HEC-1 model of Sols Wash produced in early 90's by Black and Veatch yielded a 19,375 cfs peak flow. This hydrograph was scaled down to fit the Q_{100}^{peak} of 15,045 cfs, and discretised in 1-hour intervals (see attached charts).

For the purpose of this analysis, the median cross-section for Reach 1 was used (Mi 0,370, Sta: 20+99).

Q_s from u/s calculated previously is 193.2 cfs for equilibrium slope.

$S^{R1} = 0.00728$ '/ft.

$S_{eq}^{R1} = 0.00694$ '/ft.

$\Rightarrow S^{R1} > S_{eq}^{R1} \Rightarrow$ erosion will occur in Reach 1

$$Q_{s_{in}} - Q_{s_{out}} = \frac{d\,Vols}{dt}$$

$\Delta Q_{s_{TOT}} = -43.95$ cfs

$L = 1{,}494.0$ ft ; $B_w = 139$ ft ; $b = 109$ ft.

Project Title _____ Project No. _____ Date _____

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Assuming porosity of $n = 0.4$

$$\Rightarrow \frac{-43.95}{(1494)(109)} \times 3600 = -0.97 \text{ ft. Unbulked.}$$

$$\Rightarrow \frac{-0.97}{(1-0.4)} = -1.62 \text{ ft bulked.}$$

$$\Rightarrow \text{General Scour} = \underline{1.62 \text{ ft}} = \Delta Z_{GS}$$

6. Bend. Scour.

Bend Scour occurs on the south bank.

$$\Delta Z_{bs} = \frac{0.0685\, Y V^{0.8}}{Y_h^{0.4}\, S_e^{0.3}} \left[2.1 \left(\frac{\sin^2 \frac{\alpha}{2}}{\cos \alpha} \right)^{0.2} - 1 \right]$$

Use Cross section @ Mi 0.370 (Sta: 20+99)

$V = 11.91$ ft/s
$Y = 11.34$ ft.
$Y_h = 9.09$ ft
$S_e = 0.003519$ '/ft.
$\alpha = 27^\circ$

$$\Rightarrow 2.1 \left[\frac{\sin^2 (13.5)}{\cos 27} \right]^{0.2} - 1 =$$

$$= 0.2$$

Project Title _____ Project No. _____ Date _____

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$$\Delta z_{bs} = \frac{0.0685 \times (11.34) \times (11.91)^{0.8}}{(9.09)^{0.4} \; (0.003519)^{0.3}} \times 0.2$$

$$= 2.54 \text{ ft.}$$

$\Rightarrow$ Bend Scour $\Delta z_{bs} = \underline{\underline{2.55 \text{ ft}}}$

7. Sand Wave Troughs

$$h_a = 0.027 V^2 = 0.027 \times (11.91)^2 = 3.829 \text{ ft}$$

$$\Rightarrow \frac{1}{2} h_a = 1.915 \text{ say } \underline{\underline{1.92 \text{ ft}}}$$

Total scour.

$$\Delta z_{tot} = \Delta z_{deg} + \Delta z_{ls} + \Delta z_{gs} + \Delta z_{bs} + \Delta z_i + \frac{1}{2} h_a$$

$$\Delta z_{deg} = \frac{Q_{STOT}^{10}}{b \times L} \times 3600 = 0.913 \text{ say } 0.92 \text{ ft.} = \Delta z_{degs}$$

$\Delta z_{ls} = 0$, $\Delta z_{gs} = 1.62$, $\Delta z_{bs} = 2.55$, $\Delta z_i = 1$, $\frac{1}{2} h_a = 1.92$

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$\Delta z_{tot} = 0.92 + 0 + 1.62 + 2.55 + 1 + 1.92 =$

$= 8.01$ ft.

Using a 1.1 safety factor,

$\Rightarrow \Delta z_{tot} = 1.1 \times 8.01 = \underline{\underline{8.81 \text{ ft}}}$

Using a 1.3 safety factor,

$\Rightarrow \Delta z_{tot} = 1.3 \times 8.01 = \underline{\underline{10.41 \text{ ft}}}$

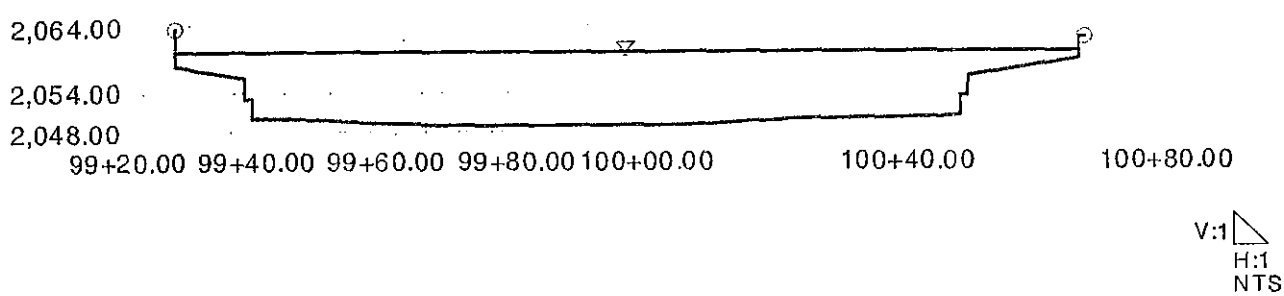
Based on engineering judgment, a

$\Delta z_{tot} = \underline{\underline{10.5 \text{ ft}}}$ is suggested

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	Reach 1- 0.370 (STA 20+98.67) - design
Flow Element	*Irregular Channel*
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.030
Slope	0.003519 ft/ft
Water Surface Elevation	2,060.14 ft
Elevation Range	2,048.80 to 2,063.50
Discharge	15,045.00 cfs



Reach 1- 0.370 (STA 20+98.67) - design
Worksheet for Irregular Channel

Project Description	
Worksheet	Reach 1- 0.370 (STA 20+98.67) - design
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.003519	ft/ft
Discharge	15,045.00	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.030	
Water Surface Elevation	2,060.14	ft
Elevation Range	2,048.80 to 2,063.50	
Flow Area	1,262.7	ft²
Wetted Perimeter	154.64	ft
Top Width	139.00	ft
Actual Depth	11.34	ft
Critical Elevation	2,058.08	ft
Critical Slope	0.007596	ft/ft
Velocity	11.91	ft/s
Velocity Head	2.21	ft
Specific Energy	2,062.35	ft
Froude Number	0.70	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
99+27.00	100+67.00	0.030

Natural Channel Points

Station (ft)	Elevation (ft)
99+27.00	2,063.50
99+27.02	2,058.00
99+37.00	2,056.10
99+38.00	2,056.10
99+38.02	2,053.10
99+39.00	2,053.10
99+39.02	2,050.10
99+50.65	2,049.64
99+53.47	2,049.50
99+68.23	2,049.02
99+79.56	2,049.00
99+86.85	2,048.93
99+90.12	2,048.90

Reach 1- 0.370 (STA 20+98.67) - design
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
100+00.00	2,048.80
100+06.19	2,048.89
100+12.29	2,049.19
100+22.61	2,049.83
100+44.78	2,050.11
100+48.00	2,050.25
100+48.02	2,053.25
100+49.00	2,053.25
100+49.02	2,056.25
100+66.00	2,059.00
100+66.02	2,062.00
100+67.00	2,062.00

Reach 1- 0.370 (STA 20+98.67) - design
Worksheet for Irregular Channel

Project Description	
Worksheet	Reach 1- 0.370 (STA 20+98.67) - design
Flow Element	Irregular Channel
Method	*Manning's Formula*
Solve For	Channel Depth

Input Data		
Slope	*0.007000*	ft/ft
Discharge	15,045.00	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.030	
Water Surface Elevation	2,058.29	ft
Elevation Range	2,048.80 to 2,063.50	
Flow Area	1,007.4	ft²
Wetted Perimeter	147.24	ft
Top Width	134.63	ft
Actual Depth	9.49	ft
Critical Elevation	2,058.08	ft
Critical Slope	0.007596	ft/ft
Velocity	14.93	ft/s
Velocity Head	3.47	ft
Specific Energy	2,061.76	ft
Froude Number	0.96	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
99+27.00	100+67.00	0.030

Natural Channel Points

Station (ft)	Elevation (ft)
99+27.00	2,063.50
99+27.02	2,058.00
99+37.00	2,056.10
99+38.00	2,056.10
99+38.02	2,053.10
99+39.00	2,053.10
99+39.02	2,050.10
99+50.65	2,049.64
99+53.47	2,049.50
99+68.23	2,049.02
99+79.56	2,049.00
99+86.85	2,048.93
99+90.12	2,048.90

Reach 1- 0.370 (STA 20+98.67) - design
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
100+00.00	2,048.80
100+06.19	2,048.89
100+12.29	2,049.19
100+22.61	2,049.83
100+44.78	2,050.11
100+48.00	2,050.25
100+48.02	2,053.25
100+49.00	2,053.25
100+49.02	2,056.25
100+66.00	2,059.00
100+66.02	2,062.00
100+67.00	2,062.00

Reach 1- 0.370 (STA 20+98.67) - design
Worksheet for Irregular Channel

Project Description	
Worksheet	*Reach 1- 0.370 (STA 20+98.67) - design*
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.006000	ft/ft
Discharge	15,045.00	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	*Improved Lotter's Method*
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.030	
Water Surface Elevation	2,058.71	ft
Elevation Range	2,048.80 to 2,063.50	
Flow Area	1,063.6	ft²
Wetted Perimeter	150.24	ft
Top Width	137.18	ft
Actual Depth	9.91	ft
Critical Elevation	2,058.08	ft
Critical Slope	0.007596	ft/ft
Velocity	14.15	ft/s
Velocity Head	3.11	ft
Specific Energy	2,061.82	ft
Froude Number	0.90	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
99+27.00	100+67.00	0.030

Natural Channel Points

Station (ft)	Elevation (ft)
99+27.00	2,063.50
99+27.02	2,058.00
99+37.00	2,056.10
99+38.00	2,056.10
99+38.02	2,053.10
99+39.00	2,053.10
99+39.02	2,050.10
99+50.65	2,049.64
99+53.47	2,049.50
99+68.23	2,049.02
99+79.56	2,049.00
99+86.85	2,048.93
99+90.12	2,048.90

Reach 1- 0.370 (STA 20+98.67) - design
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
100+00.00	2,048.80
100+06.19	2,048.89
100+12.29	2,049.19
100+22.61	2,049.83
100+44.78	2,050.11
100+48.00	2,050.25
100+48.02	2,053.25
100+49.00	2,053.25
100+49.02	2,056.25
100+66.00	2,059.00
100+66.02	2,062.00
100+67.00	2,062.00

Reach 1- 0.370 (STA 20+98.67) - design
Worksheet for Irregular Channel

Project Description	
Worksheet	Reach 1- 0.370 (STA 20+98.67) - design
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.006350	ft/ft
Discharge	15,045.00	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.030	
Water Surface Elevation	2,058.55	ft
Elevation Range	2,048.80 to 2,063.50	
Flow Area	1,042.5	ft²
Wetted Perimeter	149.12	ft
Top Width	136.23	ft
Actual Depth	9.75	ft
Critical Elevation	2,058.08	ft
Critical Slope	0.007596	ft/ft
Velocity	14.43	ft/s
Velocity Head	3.24	ft
Specific Energy	2,061.79	ft
Froude Number	0.92	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
99+27.00	100+67.00	0.030

Natural Channel Points

Station (ft)	Elevation (ft)
99+27.00	2,063.50
99+27.02	2,058.00
99+37.00	2,056.10
99+38.00	2,056.10
99+38.02	2,053.10
99+39.00	2,053.10
99+39.02	2,050.10
99+50.65	2,049.64
99+53.47	2,049.50
99+68.23	2,049.02
99+79.56	2,049.00
99+86.85	2,048.93
99+90.12	2,048.90

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Reach 1- 0.370 (STA 20+98.67) - design
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
100+00.00	2,048.80
100+06.19	2,048.89
100+12.29	2,049.19
100+22.61	2,049.83
100+44.78	2,050.11
100+48.00	2,050.25
100+48.02	2,053.25
100+49.00	2,053.25
100+49.02	2,056.25
100+66.00	2,059.00
100+66.02	2,062.00
100+67.00	2,062.00

eec

Project Title Sols Wash - Final Design Project No. 3050020.01 Date 1/1/2006

Subject Toe-down, Reach 2 Prepared By FB Checked By _____ Page 1

Toe-down Requirements for Stabilization System

1. Armor Potential

Reach 2: $Q_{100} = 14,459$ cfs.

$B_{TW} = 243$ ft (median value) (Mi .0.666)

$A = 1,427.15$ sq. ft.

$S_{Energy} = 0.003938$ ft/ft

$S_{Reach2} = 0.003036$ ft/ft

a. Shields =>

$$\tau_c = \frac{\tau}{0.047(\gamma_s - \gamma)}$$

$$d = \text{hydraulic depth} = \frac{A}{B_{TW}} = \frac{1,427.15}{243} = 5.87 \text{ ft.}$$

$$\text{aspect ratio (width-depth)} = \frac{B_{TW}}{d} = \frac{243}{5.87} = 41.40$$

$$\frac{B_{TW}}{d} > 10 \Rightarrow \gamma d S_E \simeq \gamma R S$$

$$\Rightarrow \text{From Fig 4.4} \Rightarrow \frac{\tau_{max}}{\gamma d S} = 1.0$$

$$\Rightarrow \tau_{max} = \gamma d S_E = (62.4)(5.87)(0.003938)$$

$$= 1.44 \text{ lb/ft}^2$$

Use ← (1.45 lb/ft² HEC-RAS)

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$$\Rightarrow D_c = \frac{1.45}{0.047(165-62.4)} = 0.3\,ft = 3.6\,in.$$

$$= 91.4\,mm.$$

↳ assumed

⇒ Granulometric curve does not show any particles that large ⇒ NO armoring occurs

2. Long Term Aggradation / Degradation

See calculations for Reach 1.

$$\Rightarrow \begin{cases} Q_{s_{TOT}}^{100} = 164.42\ cfs. \\ Q_{s_{TOT}}^{10} = 41.31\ cfs. \end{cases}$$

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Subject _____ Prepared By _____ Checked By _____ Page 3

C. Equilibrium Slope

Reach 2

$Q_{100} = 14,459$ cfs

$B_{TW1} = 243$ ft (median value)

$A = 1,427.15$ sq. ft.

$S_E = 0.003938$ 1/ft

$n = 0.030$

From TP-10, 5', 8' in Geotechnical Report,

$\Delta_{50} = 1.23$ mm.

$\Delta_{15.9} = 0.39$ mm

$\Delta_{84.1} = 5.35$ mm.

$$G = \frac{1}{2}\left(\frac{\Delta_{84.1}}{\Delta_{50}} + \frac{\Delta_{50}}{\Delta_{15.9}}\right) = \frac{1}{2}\left(\frac{5.35}{1.23} + \frac{1.23}{0.39}\right) =$$

$$= 3.75$$

$$q_s = 0.0064 \frac{n^{1.77} V^{4.32} G^{0.45}}{Y_h^{0.3} \Delta_{50}^{0.61}}$$

Iteration 1. $S = S_E = 0.003939$ 1/ft

$V = 10.13$ ft/s. (HEC-RAS)

$Y_h = 5.98$ ft (HEC-RAS)

$$q_s = 0.0064 \frac{(0.03)^{1.77} (10.13)^{4.32} (3.75)^{0.45}}{(5.98)^{0.3} (1.23)^{0.61}} = 0.2663 \text{ cfs/ft.}$$

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$Q_s = 243 \times 0.2663 = 64.712$ cfs

K = conveyance $= Q/\sqrt{S}$

$S = 0.00897$ 1/ft. $\Rightarrow$

$$\Rightarrow K = \frac{14459}{\sqrt{0.00897}} = \underline{152{,}666 \text{ cfs}}$$

Iteration 2 $S = 0.00897$ 1/ft.

$V = 13.35$ ft/s (FLOW MASTER)

$Y_h = 4.85$ ft.

$$Q_s = 0.0064 \frac{(6.03)^{1.77}(13.35)^{4.32}(3.75)^{0.45}}{(4.85)^{0.3}(1.23)^{0.61}} = 0.934 \text{ cfs/ft}$$

$\Rightarrow Q_s = 0.934 \times 223.13 = 208.40$ cfs.

Define $X = 0.0064 \dfrac{(6.03)^{1.77}(3.75)^{0.45}}{(1.23)^{0.61}} = 2.06137 \cdot 10^{-5}$

$$Q_s = X \cdot \frac{V^{4.32}}{Y_h^{0.3}} B_{TW}$$

Iteration 3

$S = 0.008$ 1/ft.

$V = 12.86$ ft/s.

$B_{TW} = 224.70$ ft.

$Y_h = 5$ ft.

$\Rightarrow Q_s = 177.06$ cfs

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Iteration 4

From FLOW MASTER =>
$$\begin{cases} S = 0.0076 \text{ ft/ft} \\ V = 12.65 \text{ ft/s} \\ B_{TW} = 225.42 \text{ ft} \\ Y_h = 5.07 \text{ ft} \end{cases} \Rightarrow Q_s^{100} = 164.78 \text{ cfs}$$

$$\simeq Q_{s_{TOT}}^{100} = 164.42 \text{ cfs}$$

=> Existing Slope Reach 2 $S = 0.00897$ '/ft

Equilibrium Slope Reach 2 $S_{eq} = 0.0076$ '/ft

3. Low Flow Incisement

Visual observations yield a 8-12 in low flow incisement. Analysis of 1-foot contour topographic mapping revealed similar depths.

Use 12 in = 1.00 ft

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4. Local Scour

Potential for local scour occurs at the downstream end of the island, west of Tegner Street Bridge. Here, the North Branch of Sols Wash reaches the South Branch at a 45°-50° angle. Such configuration pushes the flow towards the south bank. However, the planned excavation of the downstream end of the island would modify this pattern and the confluence section would become a constriction section, with the north bank being exposed to the flow at a 45°-50° angle.

A bridge abutment formula may be applied for such a condition to evaluate the local scour on the north bank.

$$\frac{\Delta z_{ls}}{Y} = 1.1\left(\frac{a}{Y}\right)^{0.4} Fr^{0.33}, \quad \frac{a}{Y} < 25 \qquad (5.17b)$$

or.

$$\frac{\Delta z_{ls}}{Y} = 4\, Fr^{0.33}, \quad \frac{a}{Y} > 25 \qquad (5.18)$$

where: Δz_{ls} - equilibrium depth of the scour hole

Y - upstream depth of flow

a - embankment length (perpendicular to the flow)

Fr - upstream Froude number.

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Both formula apply to sloping embankments.

Cross Section Sta: 37+56.59 (River Mi 0.684)

U/S Cross Section Sta: 40+46.99. (River Mi 0.739).

Sta 40+46.99, left overbank (Flow Master)

$Y = 5.66$ ft; $Y_h = \frac{A}{B_{TW}} = \frac{709.9}{181.71} = 3.91$ ft.

Use $Y_h = 3.91$ ft.

$\Rightarrow Fr = 0.59$

$a = 189$ ft.

$a/Y_h = \frac{189}{3.91} = 48.33 \Rightarrow$

(Eq. 5.18) $\Rightarrow \frac{\Delta z_{ls}}{Y_h} = 4 F_r^{0.33} = 4 \cdot (0.59)^{0.33} = 3.36$

$\Rightarrow \Delta z_{ls} = 3.36 \times 3.91 = \underline{13.14 \text{ ft.}}$

~~U/S Cross Section Sta: 39+30.83 (River Mi 0.717)~~

~~Sta 39+30.83, left overbank (FLOW MASTER)~~

Δz_{ls} is calculated for an obstruction normal to direction of flow. Hence the result over estimates the local scour.

From Geotechnical Report, TP-11, 0'-8', bed material is sand or silty sand. From 8'-13', bed material is sand with layers of Silty Gravel.

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Hence, an angle of repose of 30° (for dry sand) is assumed for the scour hole => local scour will extend 46 feet on each side

$$l = 2 \times \frac{\Delta z_{ls}}{tg\,30} = 45.51\,ft. \text{ say } \underline{46\,ft}$$

<u>Contraction Scour</u>

$$z_s = 0.0064 \frac{n^{1.77} V^{4.32} G^{0.45}}{Y_4^{0.3}\, D_{50}^{0.61}}$$

$$z_{s2} = \frac{B_{TW1}}{B_{TW2}} z_{s1}$$

Section 1 - Sta 40+66.99

Section 2 - Sta 37+56.59.

$B_{TW1} = 446.35\,ft.$

$B_{TW2} = 256.17\,ft.$

$\Delta z_{gs} = Y_2 - Y_2'$; Y_2' - original flow depth at contraction

$Y_2' = 6.21\,ft.$

$$Y_2 = \left(\frac{z_{s2}}{a\, q_2^{\,c}}\right)^{\frac{1}{6-c}}$$

From Table 5.6a =>

$D_{50} = 1.25\,mm$, say $1\,mm$.

$G = 3.75$, say 4

$a = 4.31 \times 10^{-5}$

$b = 0.324$

$c = 3.70$

=>

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$$q_{s_1} = 4.31 \times 10^{-5}\, Y_{h_1}^{0.324}\, V_1^{3.70}$$

$$Y_{h_1} = 5.37 \text{ ft.}$$

$$V_1 = 6.66 \text{ ft/s.}$$

$$q_{s_1} = 0.0828 \text{ cfs/ft.}$$

$$q_{s2} = \frac{B_{TW1}}{B_{TW2}} q_{s1} = \frac{446.35}{256.17} 0.0828 = 0.1443 \text{ cfs/ft.}$$

Specific flow rate in section 2 is

$$q_2 = \frac{Q_{100}}{B_{TW2}} = \frac{14,459}{256.17} = 56.44 \text{ cfs/ft.}$$

Flow depth in section 2 after equilibrium.

$$Y_2 = \left[\frac{0.1443}{(4.31 \times 10^{-5})\,(56.44)^{3.70}}\right]^{\left(\frac{1}{0.324 - 3.70}\right)}$$

$$= 7.51 \text{ ft.}$$

$$\underline{\Delta z_{gs}} = Y_2 - Y_2' = 7.51 - 6.21 = \underline{1.3 \text{ ft}}$$

Contraction Scour.

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Bend Scour

Bend scour on Reach 2, between Sta 36+00 and Sta 30+00, on the north bank.

$$\Delta z_{bs} = \frac{0.0685\, Y V^{0.8}}{Y_h^{0.4}\, S_e^{0.3}} \left[2.1 \left(\frac{\sin^2 \frac{\alpha}{2}}{\cos \alpha} \right)^{0.2} - 1 \right]$$

Δz_{bs} – bend scour depth.

V – mean velocity of u/s flow

Y – maximum depth of u/s flow

Y_h – hydraulic depth of u/s flow

S_e – u/s energy slope

α – angle of projection of centerline and tangent to outer bank at the point of intersection.

Use u/s Sta 36+29.87 (from HEC-RAS):

$\Rightarrow$ $V = 10.13$ ft/s

$Y = 7.15$ ft.

$Y_h = 5.98$ ft.

$S_e = 0.003938$ ft/ft.

$\alpha = 28°$

$$\Rightarrow 2.1 \left(\frac{\sin^2 14}{\cos 28} \right)^{0.2} - 1 = 0.22.$$

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$$\Delta Z_{bs} = \frac{0.0685\, Y V^{0.8}}{Y_h^{0.4}\, S_e^{0.3}} (0.22) =$$

$$= \frac{(0.0685) \times (7.15) \times (10.13)^{0.8}}{(5.98)^{0.4} (0.003938)^{0.3}} (0.22) = 1.768$$

say $\Delta Z_{bs} = \underline{\underline{1.77 \text{ ft}}}$ bend scour.

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5. General Scour

See Reach 1 as for how the storm hydrograph was processed.

For the purpose of this analysis, the median cross-section for Reach 2 was used (Mi 0.666, Sta 36+30)

ΔQ_s from spreadsheet for Reach 2 is -28.39.

$\Delta Q_{s_{TOT}} = -28.39$ cfs.

$L = 1,489$ ft.

$B_{w1} = 243$ ft

$b = 206$ ft.

Assuming porosity of $n = 0.4$

$$\Rightarrow \frac{-28.39}{(1489)(206)} \times 3600 = -0.33 \text{ ft unbulked.}$$

$$\Rightarrow \frac{-0.33}{(1-0.4)} = -0.55 \text{ ft bulked.}$$

$\Rightarrow$ General scour $\underline{\underline{\Delta z_{GS}}} = \underline{\underline{0.55}}$ ft.

eec

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6. Bend Scour

Was calculated above, after contraction scour.

$$\Delta z_{bs} = 1.77 \text{ ft.}$$

7. Sand Wave Troughs

$$h_a = 0.027 V^2 = 0.027 \times (10.13)^2 = 2.77 \text{ ft.}$$

$$\frac{1}{2} h_a = 1.385 \text{ ft} \quad \text{say } \underline{1.39 \text{ ft.}}$$

Total Scour

$$\Delta z_{TOT} = \Delta z_{deg} + \Delta z_{ls} + \Delta z_{gs} + \Delta z_{bs} + \Delta z_{l} + \frac{1}{2} h_a$$

$$\Delta z_{deg} = 0.92, \quad \Delta z_{ls} = 1.3 \text{ (contraction)}, \quad \Delta z_{gs} = 0.55, \quad \Delta z_{bs} = 1.77, \quad \Delta z_{l} = \perp, \quad \frac{1}{2} h_a = 1.39$$

$$\Rightarrow \Delta z_{tot} = 6.93 \text{ ft.}$$

Using a 1.1 safety factor.

$$\Delta z_{tot} = 1.1 \times 6.93 = \underline{7.63 \text{ ft}}$$

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Using a 1.3 safety factor.

$\Rightarrow \Delta z_{tot} = 1.3 \times 6.93 = \underline{9.01 \text{ ft.}}$

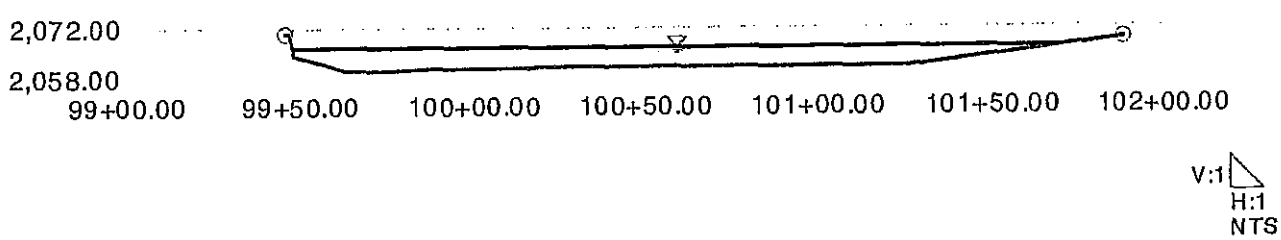
Based on engineering judgment

$\Delta z_{tot} = \underline{8.00 \text{ ft}}$

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	Reach 2 - 0.660 (STA 36+29.87) - design
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.030	
Slope	0.008970	ft/ft
Water Surface Elevation	2,066.28	ft
Elevation Range	2,059.96 to 2,070.23	
Discharge	14,459.00	cfs



Reach 2 - 0.660 (STA 36+29.87) - design
Worksheet for Irregular Channel

Project Description	
Worksheet	Reach 2 - 0.660 (STA 36+29.87) - design
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.008970	ft/ft
Discharge	14,459.00	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.030	
Water Surface Elevation	2,066.28	ft
Elevation Range	2,059.96 to 2,070.23	
Flow Area	1,082.8	ft²
Wetted Perimeter	225.47	ft
Top Width	223.13	ft
Actual Depth	6.32	ft
Critical Elevation	2,066.51	ft
Critical Slope	0.007763	ft/ft
Velocity	13.35	ft/s
Velocity Head	2.77	ft
Specific Energy	2,069.05	ft
Froude Number	1.07	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
99+45.00	101+88.00	0.030

Natural Channel Points

Station (ft)	Elevation (ft)
99+45.00	2,070.23
99+46.00	2,070.23
99+47.74	2,064.52
99+55.78	2,062.23
99+62.38	2,059.96
99+75.86	2,060.19
99+87.99	2,060.29
99+95.56	2,060.35
99+98.21	2,060.42
100+00.00	2,060.47
100+06.19	2,060.56
100+08.42	2,060.60
100+14.64	2,060.69

Reach 2 - 0.660 (STA 36+29.87) - design
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
100+18.64	2,060.76
100+23.08	2,060.82
100+48.41	2,061.03
100+56.86	2,060.99
100+79.95	2,061.00
100+82.19	2,061.05
100+94.31	2,061.10
101+03.66	2,060.87
101+26.00	2,060.87
101+88.00	2,068.43

Reach 2 - 0.660 (STA 36+29.87) - design
Worksheet for Irregular Channel

Project Description	
Worksheet	Reach 2 - 0.660 (STA 36+29.87) - design
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.008000	ft/ft
Discharge	14,459.00	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.030	
Water Surface Elevation	2,066.46	ft
Elevation Range	2,059.96 to 2,070.23	
Flow Area	1,124.0	ft²
Wetted Perimeter	227.19	ft
Top Width	224.70	ft
Actual Depth	6.50	ft
Critical Elevation	2,066.51	ft
Critical Slope	0.007763	ft/ft
Velocity	12.86	ft/s
Velocity Head	2.57	ft
Specific Energy	2,069.03	ft
Froude Number	1.01	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
99+45.00	101+88.00	0.030

Natural Channel Points

Station (ft)	Elevation (ft)
99+45.00	2,070.23
99+46.00	2,070.23
99+47.74	2,064.52
99+55.78	2,062.23
99+62.38	2,059.96
99+75.86	2,060.19
99+87.99	2,060.29
99+95.56	2,060.35
99+98.21	2,060.42
100+00.00	2,060.47
100+06.19	2,060.56
100+08.42	2,060.60
100+14.64	2,060.69

Reach 2 - 0.660 (STA 36+29.87) - design
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
100+18.64	2,060.76
100+23.08	2,060.82
100+48.41	2,061.03
100+56.86	2,060.99
100+79.95	2,061.00
100+82.19	2,061.05
100+94.31	2,061.10
101+03.66	2,060.87
101+26.00	2,060.87
101+88.00	2,068.43

Reach 2 - 0.660 (STA 36+29.87) - design
Worksheet for Irregular Channel

Project Description	
Worksheet	Reach 2 - 0.660 (STA 36+29.87) - design
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.007600	ft/ft
Discharge	14,459.00	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.030	
Water Surface Elevation	2,066.54	ft
Elevation Range	2,059.96 to 2,070.23	
Flow Area	1,143.1	ft²
Wetted Perimeter	227.97	ft
Top Width	225.42	ft
Actual Depth	6.58	ft
Critical Elevation	2,066.51	ft
Critical Slope	0.007763	ft/ft
Velocity	12.65	ft/s
Velocity Head	2.49	ft
Specific Energy	2,069.03	ft
Froude Number	0.99	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
99+45.00	101+88.00	0.030

Natural Channel Points

Station (ft)	Elevation (ft)
99+45.00	2,070.23
99+46.00	2,070.23
99+47.74	2,064.52
99+55.78	2,062.23
99+62.38	2,059.96
99+75.86	2,060.19
99+87.99	2,060.29
99+95.56	2,060.35
99+98.21	2,060.42
100+00.00	2,060.47
100+06.19	2,060.56
100+08.42	2,060.60
100+14.64	2,060.69

Reach 2 - 0.660 (STA 36+29.87) - design
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
100+18.64	2,060.76
100+23.08	2,060.82
100+48.41	2,061.03
100+56.86	2,060.99
100+79.95	2,061.00
100+82.19	2,061.05
100+94.31	2,061.10
101+03.66	2,060.87
101+26.00	2,060.87
101+88.00	2,068.43

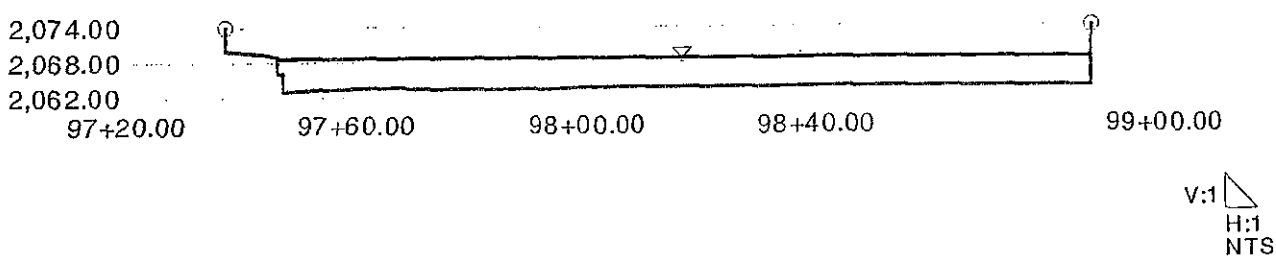
Reach 2 - 0.660 (STA 36+29.87) - design
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
100+18.64	2,060.76
100+23.08	2,060.82
100+48.41	2,061.03
100+56.86	2,060.99
100+79.95	2,061.00
100+82.19	2,061.05
100+94.31	2,061.10
101+03.66	2,060.87
101+26.00	2,060.87
101+88.00	2,068.43

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	0.717 (STA 39+30.83) - LEFT
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Slope

Section Data		
Mannings Coefficient	0.030	
Slope	0.003135	ft/ft
Water Surface Elevation	2,068.74	ft
Elevation Range	2,063.00 to 2,074.00	
Discharge	5,870.00	cfs



0.717 (STA 39+30.83) - LEFT
Worksheet for Irregular Channel

Project Description	
Worksheet	0.717 (STA 39+30.83) - LEFT
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Slope

Input Data		
Water Surface Elevation	2,068.74	ft
Discharge	5,870.00	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.030	
Slope	0.003135	ft/ft
Elevation Range	2,063.00 to 2,074.00	
Flow Area	737.9	ft²
Wetted Perimeter	151.88	ft
Top Width	141.00	ft
Actual Depth	5.74	ft
Critical Elevation	2,067.28	ft
Critical Slope	0.009062	ft/ft
Velocity	7.96	ft/s
Velocity Head	0.98	ft
Specific Energy	2,069.72	ft
Froude Number	0.61	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
97+37.00	98+87.00	0.030

Natural Channel Points

Station (ft)	Elevation (ft)
97+37.00	2,074.00
97+37.01	2,070.00
97+46.00	2,069.00
97+46.01	2,066.00
97+47.00	2,066.00
97+47.01	2,063.00
97+55.00	2,063.20
97+67.74	2,063.53
97+68.92	2,063.41
97+70.34	2,063.40
97+72.29	2,063.40
97+92.53	2,063.21
98+01.62	2,063.60

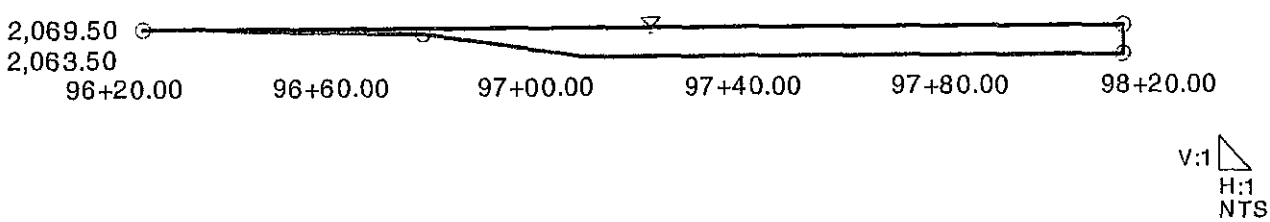
0.717 (STA 39+30.83) - LEFT
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	*Elevation* (ft)
98+87.00	2,063.60
98+87.00	2,074.00

Cross Section
Cross Section for Irregular Channel

Project Description	
Worksheet	0.739 (STA 40+46.99) - LEFT
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	*Channel Slope*

Section Data	
Mannings Coefficient	0.034
Slope	0.004022 ft/ft
Water Surface Elevation	2,069.33 ft
Elevation Range	2,063.67 to 2,069.41
Discharge	*4,730.00 cfs*



0.739 (STA 40+46.99) - LEFT
Worksheet for Irregular Channel

Project Description	
Worksheet	0.739 (STA 40+46.99) - LEFT
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Slope

Input Data		
Water Surface Elevation	2,069.33	ft
Discharge	4,730.00	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.034	
Slope	0.004022	ft/ft
Elevation Range	2,063.67 to 2,069.41	
Flow Area	709.9	ft²
Wetted Perimeter	187.70	ft
Top Width	181.71	ft
Actual Depth	5.66	ft
Critical Elevation	2,067.56	ft
Critical Slope	0.011850	ft/ft
Velocity	6.66	ft/s
Velocity Head	0.69	ft
Specific Energy	2,070.02	ft
Froude Number	0.59	
Flow Type	Subcritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
96+23.54	96+77.39	0.048
96+77.39	98+12.54	0.030
98+12.54	98+12.54	0.001

Natural Channel Points

Station (ft)	Elevation (ft)
96+23.54	2,069.41
96+27.14	2,069.37
96+33.59	2,069.30
96+36.30	2,069.25
96+43.64	2,069.01
96+63.51	2,068.66
96+77.39	2,068.26
96+85.97	2,067.11
96+88.65	2,066.91
97+08.65	2,063.67
97+26.82	2,063.70

0.739 (STA 40+46.99) - LEFT
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
98+12.54	2,063.70
98+12.54	2,069.41

Project Title Sols Wash - Final Design Project No. 3050200.01 Date 5/8/06

Subject Local Scour d/s drop str. Prepared By FB Checked By LAY Page 1

Local scour downstream of drop structure is evaluated per procedures described in:

"Computing Degradation and Local Scour" - Technical Guideline for Bureau of Reclamation, U.S. Department of the Interior, January 1984, Table 6, page 81 and Equation Type 0, page 40.

Equations Type 0 are aplicable to hydraulic structures accross the channel (Table 6). The reccomended equations are:

a. Schoklitsch (1932)

$$d_s = \frac{K\,(H)^{0.2}\,q^{0.57}}{D_{90}^{0.32}} - d_m$$

where:

d_s - depth of scour below streambed, ft (m)

$K = 3.15$ (standard)

$= 4.70$ (metric)

H - Vertical distance between water level upstream and downstream of the structure, ft (m)

q - design discharge per unit width, ft (m)

D_{90} - particle size for which 90% is finer than (mm)

d_m - downstream water depth (ft)

Project Title _____ Project No. _____ Date _____

Subject _____ Prepared By _____ Checked By _____ Page 2

b. Veronese (1937)

$$d_s = K\, H_T^{0.225}\, q^{0.54} - d_m$$

where:

d_s – depth of scour, ft (m)

$K = 1.32$ (standard)

$= 1.90$ (metric)

H_T – the head from upstream reservoir to tailwater level, ft (m)

q – design discharge per unit width, $ft^3/s \cdot ft$ ($m^3/s \cdot m$)

d_m – downstream mean water depth, ft (m)

c. Zimmerman and Maniatis (1967)

$$d_s = K \left(\frac{q^{0.82}}{D_{85}^{0.23}} \right) \left(\frac{d_m}{q^{2/3}} \right)^{0.93} - d_m$$

where: $K = 1.95$ (standard)

$= 2.89$ (metric)

q – discharge per unit width, $ft^3/s \cdot ft$ ($m^3/s \cdot m$)

D_{85} – Particle size for which 85% is finer than, mm

d_m – downstream mean water depth, ft (m)

Project Title _____ Project No. _____ Date _____

Subject _____ Prepared By _____ Checked By _____ Page 3

From "Sols Wash Geotechnical Report - Draft" by Kleinfelder, Inc. January 2006, data for Test Pit No. 2 was extracted and plotted to represent the granulometric curve.

According to the curve, we calculated:

- $D_{85} = 3.895$ mm and
- $D_{90} = 5.106$ mm
- $d_m = 10.6$ ft (averaged from HEC-RAS cross sections between drop structure and US-93 bypass bridge for the 100yr Sols - 10yr Hassayampa condition).
- $H, H_T = 2057.93 - (2041.80 + 10.6) = 5.53$ ft.
  (XS 1618)
- $q_{100} = \frac{Q_{100}}{b_{(XS\ 1408)}} = \frac{15045}{120} = 125.38$ cuft/s·ft.

q_{100} was calculated neglecting the trapezoidal shape of cross section.

eec

Project Title _____ Project No. _____ Date _____

Subject _____ Prepared By _____ Checked By _____ Page 4

Hence:

a) Schoklitsch

$$d_s = \frac{3.15 \times (5.53)^{0.2} (125.38)^{0.57}}{(5.106)^{0.32}} - 10.6 = 30.7 \text{ ft}$$

b) Veronese

$$d_s = (1.32) \times (5.53)^{0.225} (125.38)^{0.54} - 10.6 = 15.8 \text{ ft}$$

c) Zimmerman and Maniak

$$d_s = (1.95) \times \left(\frac{125.38^{0.82}}{3.895^{0.23}} \right) \left(\frac{10.6}{125.38^{2/3}} \right)^{0.93} - 10.6 =$$

$$= 23.1 \text{ ft.}$$

Median $d_{sm} = 23.1$ ft.
Average $\overline{d_s} = 23.2$ ft.

=> Reccomend 24 ft

$$\Rightarrow d_s = 24 \text{ ft}$$

=> Provide a gabion mattress downstream of drop structure that extends $L = 2 \times d_s = 48$ ft. and

Project Title _____ Project No. _____ Date _____

Subject _____ Prepared By _____ Checked By _____ Page 5

covers the bed from bank to bank.
The mattress thickness should be 12", and it should be placed under a 1-foot min layer of native bed material.

KLEINFELDER

PROJECT:	SOLS WASH	**PROJECT NO:**	63683
LOCATION:	WICKENBURG, ARIZONA	**WORK ORDER NO:**	05457
MATERIAL:	SEE BELOW	**DATE SAMPLED:**	12/14 - 12/16/2005
SAMPLE SOURCE:	SEE BELOW	**REVIEWED BY:**	S.STEEL

MECHANICAL SIEVE ANALYSIS
GROUP SYMBOL, USCS (ASTM D-2487)

SIEVE SIZES

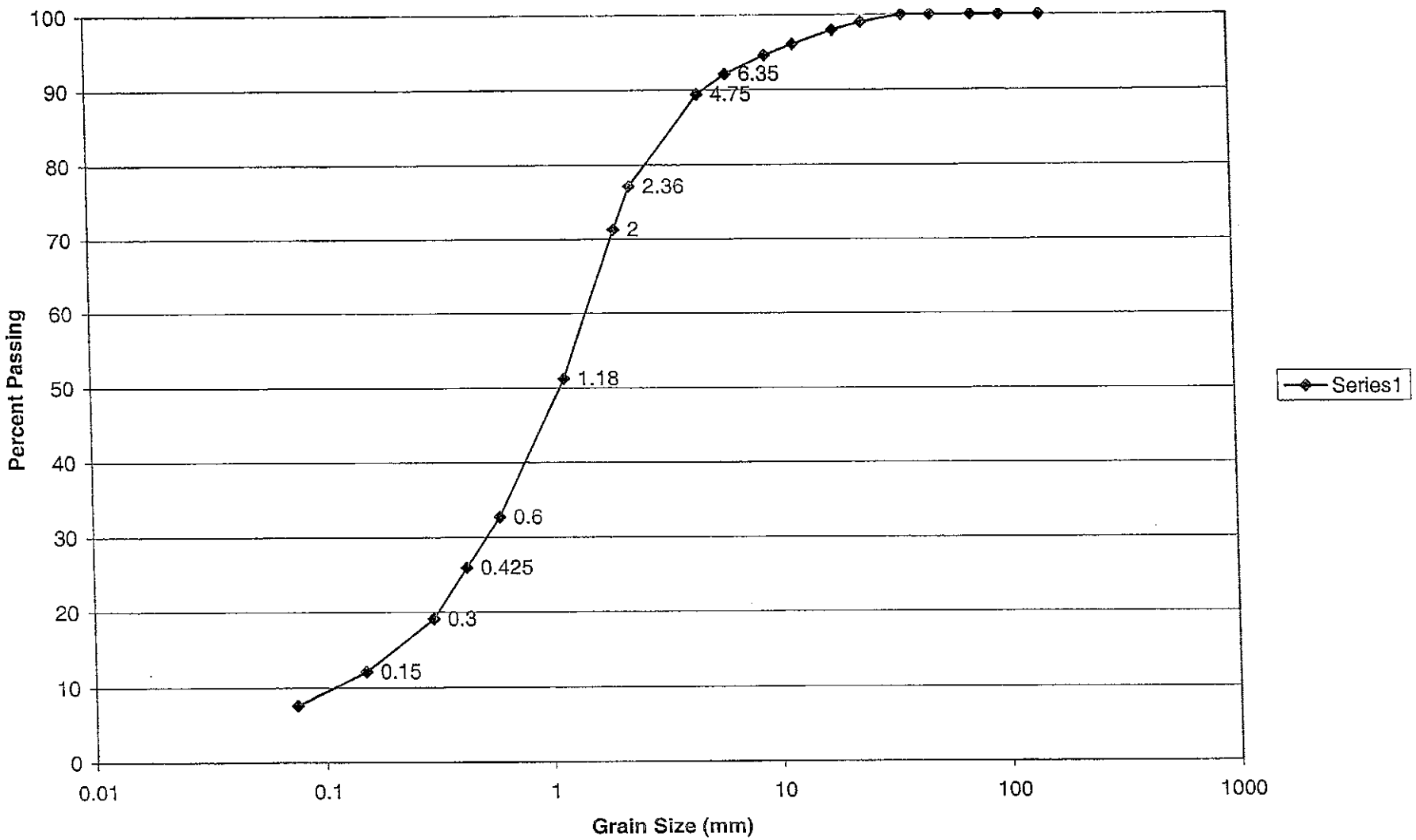
					COBBLES		GRAVEL								SAND								Silt or	
							Coarse				Fine				Coarse		Medium			Fine			Clay	
Location & Depth	USCS	LL	PL	PI	6"	4"	3"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	1/4"	#4	#8	#10	#16	#30	#40	#50	#100	#200	Lab #

PERCENT PASSING BY WEIGHT

TP-19 0-8'	SP	NV	NP	NP	100	100	100	100	100	100	99.2	96.8	94.6	90.3	86.3	72.8	67.7	48.9	48.8	18.0	10.8	5.1	3.6	1
TP-19 8-13'	SP-SM	20	18	2	100	100	100	100	100	98.9	97.8	95.2	93.0	88.1	84.1	71.9	67.5	52.4	35.2	28.2	21.8	14.8	11.6	2
TP-15 4'	CL	34	18	16	100	100	100	100	100	100	99.7	99.3	99.0	98.6	98.2	96.6	96.1	94.7	92.6	91.4	89.3	83.0	74.1	4
TP-16 6'	CL	28	16	12	100	100	100	100	100	99.3	98.9	98.1	97.4	95.7	94.6	91.0	89.9	87.0	82.2	78.8	73.5	62.7	53.4	6
TP-14 6'	SC	35	17	18	100	100	100	100	100	100	99.6	99.5	99.4	99.2	99.0	85.9	80.8	61.1	38.7	30.2	23.3	16.3	13.2	8
TP-13 SURFACE	CL	30	20	10	100	100	100	100	100	100	100	100	100	100	100	99.8	99.8	99.5	98.8	98.2	97.0	92.1	82.2	9
TP-2 0-8'	SP-SM	NV	NP	NP	100	100	100	100	100	99.0	97.9	96.1	94.6	92.1	89.4	77.1	71.3	51.2	32.7	25.9	19.1	12.1	7.6	13
TP-1 8-11.5'	SP	NV	NP	NP	71.0	71.0	71.0	71.0	69.8	67.5	65.5	61.7	59.2	55.4	52.6	43.7	40.8	30.9	18.0	11.8	6.6	2.4	1.5	16
TP-3 0-8'	SP-SM	NV	NP	NP	100	100	100	98.9	97.0	95.1	92.5	87.2	83.2	77.2	72.7	60.8	56.8	43.1	26.4	19.3	13.6	8.2	6.2	17
TP-3 8-14'	CL	36	20	16	100	100	100	96.6	96.6	94.5	93.4	90.6	89.0	86.7	85.2	81.1	79.7	75.6	69.9	67.2	64.9	61.3	57.0	18

1335 WEST AUTO DRIVE, TEMPE, ARIZONA PHONE: (480) 763-1200 FAX: (480) 763-1212
ISSUED: 1/11/2006

TP-2 (0' to 8') Granulometric Curve



Latitude and Longitude:	N 33° 58.303' W 112° 43.85'	Elevation (ft):	
Groundwater (ft):	Initial (∓ 12.00		
Excavation Co. :	Riggs Enterprise	Equipment:	CAT Backhoe
Excavation Method:	Backhoe with 24" bucket		

Date Started:	12/14/2005
Date Completed:	12/14/2005
Logged By:	SCH
Total Depth (ft):	11.5

FIELD			LABORATORY								
Sample Interval	Sample Type	Nuclear Gage Dry Density (lbs/ft³)	Moisture Content (%)	Liquid Limit	Plasticity Index	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests	Graphical Log	USCS Classification	DESCRIPTION 0.0 to 11.5 feet Surface Condition: Sols Wash - East of Tegner Bridge
	BULK									SP	**Sand,** fine to medium grained sand, slightly moist, sub-angular, light brown
										GW	**Gravel,** fine to coarse grained, sub-angular, brown
										SP	**Sand,** fine to medium grained sand, moist, sub-angular, light brown
										GW	**Gravel,** fine grained, sub-angular, brown, moist
										SP	**Sand,** fine to medium grained sand, moist, sub-angular, light brown
										GC	**Clayey Gravel,** fine grained sand, fine grained gravel, sub-angular, brown, moist Note: Large rebar present Note: Roots present
	BULK									SC	**Clayey Sand,** fine grained sand, sub-angular, wet, higher plasticity, close to water table
											Test Pit terminated at 11.5 feet Sampling stopped at 11.5 feet

5 10 15 20 25 30 35

KLEINFELDER

LOG OF Test Pit TP-01
Wickenburg Downtown Flooding Hazard Mitigation Project
Maricopa County Flood Control District
Sols Wash
Wickenburg, Arizona

Test Pit
TP-01

Drafted By: SCH
Date: January, 2006
Project Number: 63683

GEO ADOT TEST-PIT ER1 63683.GPJ 1/11/2006

Latitude and Longitude: N 33° 58.301' W 112° 43.914'	Elevation (ft):	Date Started:	12/14/2005
Groundwater (ft): Initial (∓ 12.00		Date Completed:	12/14/2005
Excavation Co. : Riggs Enterprise	Equipment: CAT Backhoe	Logged By:	SCH
Excavation Method: Backhoe with 24" bucket		Total Depth (ft):	12.0

FIELD			LABORATORY								DESCRIPTION 0.0 to 12.0 feet
Sample Interval	Sample Type	Nuclear Gage Dry Density (lbs/ft³)	Moisture Content (%)	Liquid Limit	Plasticity Index	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests	Graphical Log	USCS Classification	Surface Condition: Sols Wash - East of Tegner Bridge
	BULK									SP	**Sand,** fine to medium grained sand, slightly moist, sub-angular, light brown
										GW	**Gravel,** fine to coarse grained gravel, sub-angular, brown
										SP	**Sand,** fine to medium grained sand, slightly moist, sub-angular, light brown
										GW	**Gravel,** fine to coarse grained gravel, sub-angular, brown, slightly moist
										SP	**Sand,** fine to medium grained sand, slightly moist, sub-angular, light brown
										GW	**Gravel,** fine to coarse grained gravel, sub-angular, brown, moist Note: Increase in moisture, trace cobbles from 5'-8' throughout soil layers
										SC	**Clayey Sand,** fine grained sand, sub-angular, moist, dark brown
										GW	**Gravel,** fine to coarse grained gravel, sub-angular, brown, moist
	BULK									SP	**Sand,** fine to medium grained sand, moist, sub-angular, light brown, wet
											Test Pit terminated at 12.0 feet Sampling stopped at 12.0 feet

5 10 15 20 25 30

KLEINFELDER

Drafted By: SCH

Date: January, 2006

Project Number: 63683

LOG OF Test Pit TP-02
Wickenburg Downtown Flooding Hazard Mitigation Project
Maricopa County Flood Control District
Sols Wash
Wickenburg, Arizona

Test Pit

TP-02

GEO ADOT TEST-PIT ... 63683.GPJ 1/11/2006

KLINGFIELD

PROJECT:	SOLS WASH	PROJECT NO:	63683
LOCATION:	WICKENBURG, ARIZONA	WORK ORDER NO:	05457
MATERIAL:	SEE BELOW	DATE SAMPLED:	12/14 - 12/16/2005
SAMPLE SOURCE:	SEE BELOW	REVIEWED BY:	S.STEEL

MECHANICAL SIEVE ANALYSIS
GROUP SYMBOL, USCS (ASTM D-2487)

SIEVE SIZES

					COBBLES		GRAVEL								SAND								Silt or	
							Coarse				Fine				Coarse		Medium			Fine			Clay	
Location & Depth	USCS	LL	PL	PI	6"	4"	3"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	1/4"	#4	#8	#10	#16	#30	#40	#50	#100	#200	Lab #

PERCENT PASSING BY WEIGHT

TP-18 0-8'	SW-SM	NV	NP	NP	100	100	100	100	97.7	96.6	95.9	94.1	92.5	89.5	86.7	75.1	69.5	48.9	26.9	18.8	12.5	7.4	5.7	19
TP-18 8-12'	SP-SC	21	17	4	100	100	100	100	100	99.3	97.9	96.0	94.5	91.5	89.4	74.1	68.5	47.7	24.0	15.7	10.1	6.5	5.6	20
TP-17 0-8'	SP	NV	NP	NP	100	100	100	100	99.4	98.8	97.9	96.1	94.2	90.6	87.2	74.4	67.9	44.2	19.8	12.3	7.6	4.0	3.0	21
TP-12 0-8'	SC-SM	22	18	4	100	100	100	100	98.9	98.5	98.2	96.8	95.4	92.6	90.3	76.4	72.3	54.8	36.8	29.3	22.7	15.3	12.1	23
TP-12 8-13'	SP-SM	NV	NP	NP	100	100	86.0	86.0	84.9	81.0	77.9	72.6	69.4	64.4	61.1	52.5	49.3	38.4	24.9	18.8	13.2	8.1	6.3	24
TP-11 0-8'	SP-SM	NV	NP	NP	100	100	100	100	100	98.9	98.5	96.9	95.4	92.2	89.8	81.4	78.1	65.1	46.3	35.9	24.8	11.9	8.0	25
TP-4 0-8'	SM	NV	NP	NP	100	100	100	97.5	95.9	94.8	93.8	92.6	91.6	89.6	88.1	82.1	79.9	71.1	56.6	47.6	37.8	22.8	15.2	27
TP-5 0-8'	ML	NV	NP	NP	100	100	100	100	100	98.9	98.4	95.7	93.8	90.3	86.8	86.3	86.2	85.4	83.8	81.9	79.0	71.1	60.8	29
TP-5 8-13'	SP	NV	NP	NP	100	100	94.9	92.8	91.7	91.2	90.4	88.9	87.8	85.4	83.3	72.4	67.6	48.1	25.3	16.7	10.5	5.7	4.4	30
TP-10 5' & 8'	SP	NV	NP	NP	100	100	100	100	100	98.7	97.6	94.9	92.1	86.8	82.5	70.5	66.1	49.0	26.1	17.6	11.6	6.3	4.8	31&32

1335 WEST AUTO DRIVE, TEMPE, ARIZONA PHONE: (480) 763-1200 FAX: (480) 763-1212
ISSUED: [illegible]/2006

KLEINFELDER

PROJECT:	SOLS WASH	**PROJECT NO:**	63683
LOCATION:	WICKENBURG, ARIZONA	**WORK ORDER NO:**	05457
MATERIAL:	SEE BELOW	**DATE SAMPLED:**	12/14 - 12/16/2005
SAMPLE SOURCE:	SEE BELOW	**REVIEWED BY:**	S.STEEL

MECHANICAL SIEVE ANALYSIS
GROUP SYMBOL, USCS (ASTM D-2487)

SIEVE SIZES

					COBBLES		GRAVEL								SAND								Silt or Clay	
							Coarse				Fine				Coarse		Medium			Fine				
Location & Depth	USCS	LL	PL	PI	6"	4"	3"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	1/4"	#4	#8	#10	#16	#30	#40	#50	#100	#200	Lab #

PERCENT PASSING BY WEIGHT

TP-19 0-8'	SP	NV	NP	NP	100	100	100	100	100	100	99.2	96.8	94.6	90.3	86.3	72.8	67.7	48.9	48.8	18.0	10.8	5.1	3.6	1
TP-19 8-13'	SP-SM	20	18	2	100	100	100	100	100	98.9	97.8	95.2	93.0	88.1	84.1	71.9	67.5	52.4	35.2	28.2	21.8	14.8	11.6	2
TP-15 4'	CL	34	18	16	100	100	100	100	100	100	99.7	99.3	99.0	98.6	98.2	96.6	96.1	94.7	92.6	91.4	89.3	83.0	74.1	4
TP-16 6'	CL	28	16	12	100	100	100	100	100	99.3	98.9	98.1	97.4	95.7	94.6	91.0	89.9	87.0	82.2	78.8	73.5	62.7	53.4	6
TP-14 6'	SC	35	17	18	100	100	100	100	100	100	99.6	99.5	99.4	99.2	99.0	85.9	80.8	61.1	38.7	30.2	23.3	16.3	13.2	8
TP-13 SURFACE	CL	30	20	10	100	100	100	100	100	100	100	100	100	100	100	99.8	99.8	99.5	98.8	98.2	97.0	92.1	82.2	9
TP-2 0-8'	SP-SM	NV	NP	NP	100	100	100	100	100	99.0	97.9	96.1	94.6	92.1	89.4	77.1	71.3	51.2	32.7	25.9	19.1	12.1	7.6	13
TP-1 8-11.5'	SP	NV	NP	NP	71.0	71.0	71.0	71.0	69.8	67.5	65.5	61.7	59.2	55.4	52.6	43.7	40.8	30.9	18.0	11.8	6.6	2.4	1.5	16
TP-3 0-8'	SP-SM	NV	NP	NP	100	100	100	98.9	97.0	95.1	92.5	87.2	83.2	77.2	72.7	60.8	56.8	43.1	26.4	19.3	13.6	8.2	6.2	17
TP-3 8-14'	CL	36	20	16	100	100	100	96.6	96.6	94.5	93.4	90.6	89.0	86.7	85.2	81.1	79.7	75.6	69.9	67.2	64.9	61.3	57.0	18

1335 WEST AUTO DRIVE, TEMPE, ARIZONA PHONE: (480) 763-1200 FAX: (480) 763-1212
ISSUED: 1/11/2006

PROJECT:	SOLS WASH	**PROJECT NO:**	63683
LOCATION:	WICKENBURG, ARIZONA	**WORK ORDER NO:**	05457
MATERIAL:	SEE BELOW	**DATE SAMPLED:**	12/14 - 12/16/2005
SAMPLE SOURCE:	SEE BELOW	**REVIEWED BY:**	S.STEEL

MECHANICAL SIEVE ANALYSIS
GROUP SYMBOL, USCS (ASTM D-2487)

SIEVE SIZES

					COBBLES		GRAVEL								SAND								Silt or	
							Coarse				Fine				Coarse		Medium			Fine			Clay	
Location & Depth	USCS	LL	PL	PI	6"	4"	3"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	1/4"	#4	#8	#10	#16	#30	#40	#50	#100	#200	Lab #

PERCENT PASSING BY WEIGHT

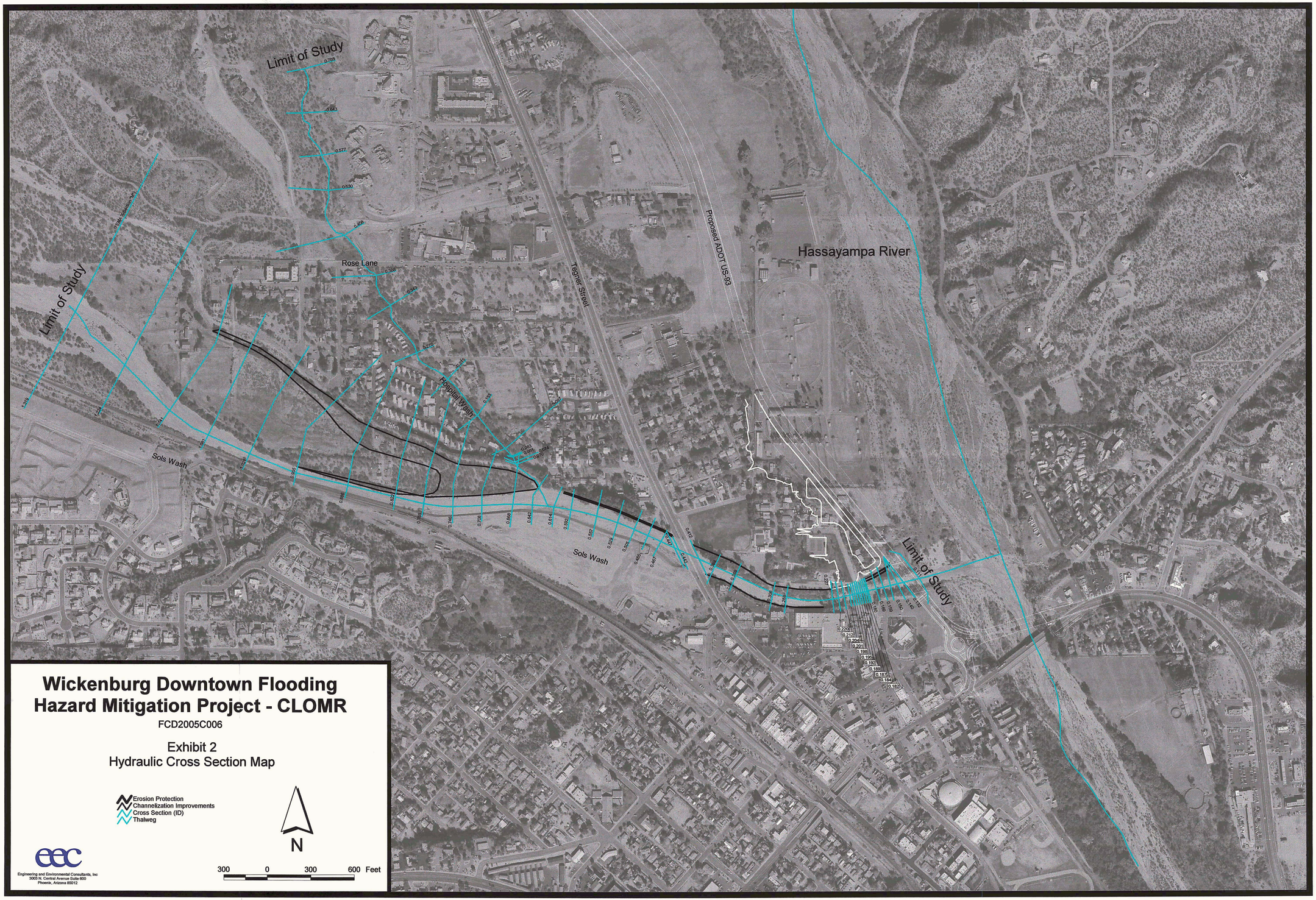
TP-10 10', 12.5', 13.5'	SP	NV	NP	NP	100	100	94.1	92.1	90.3	88.4	86.1	80.8	76.4	69.1	63.8	49.1	44.3	29.6	16.4	11.5	7.4	3.6	0.0	33-35
TP-14 SURFACE	SM	NV	NP	NP	100	100	100	100	100	100	100	99.8	99.6	99.5	99.3	98.9	98.7	97.3	91.3	82.1	64.7	32.0	18.3	7

1335 WEST AUTO DRIVE, TEMPE, ARIZONA PHONE: (480) 763-1200 FAX: (480) 763-1212
ISSUED: [illegible]/2006

Appendix G
STRUCTURAL CALCULATIONS

Appendix G

See attached report entitled "Final Structural Calculations. Wickenburg Downtown Flooding Hazard Mitigation Project" by Gannett Fleming (September 2005).



Wickenburg Downtown Flooding Hazard Mitigation Project - CLOMR

FCD2005C006

Exhibit 2
Hydraulic Cross Section Map

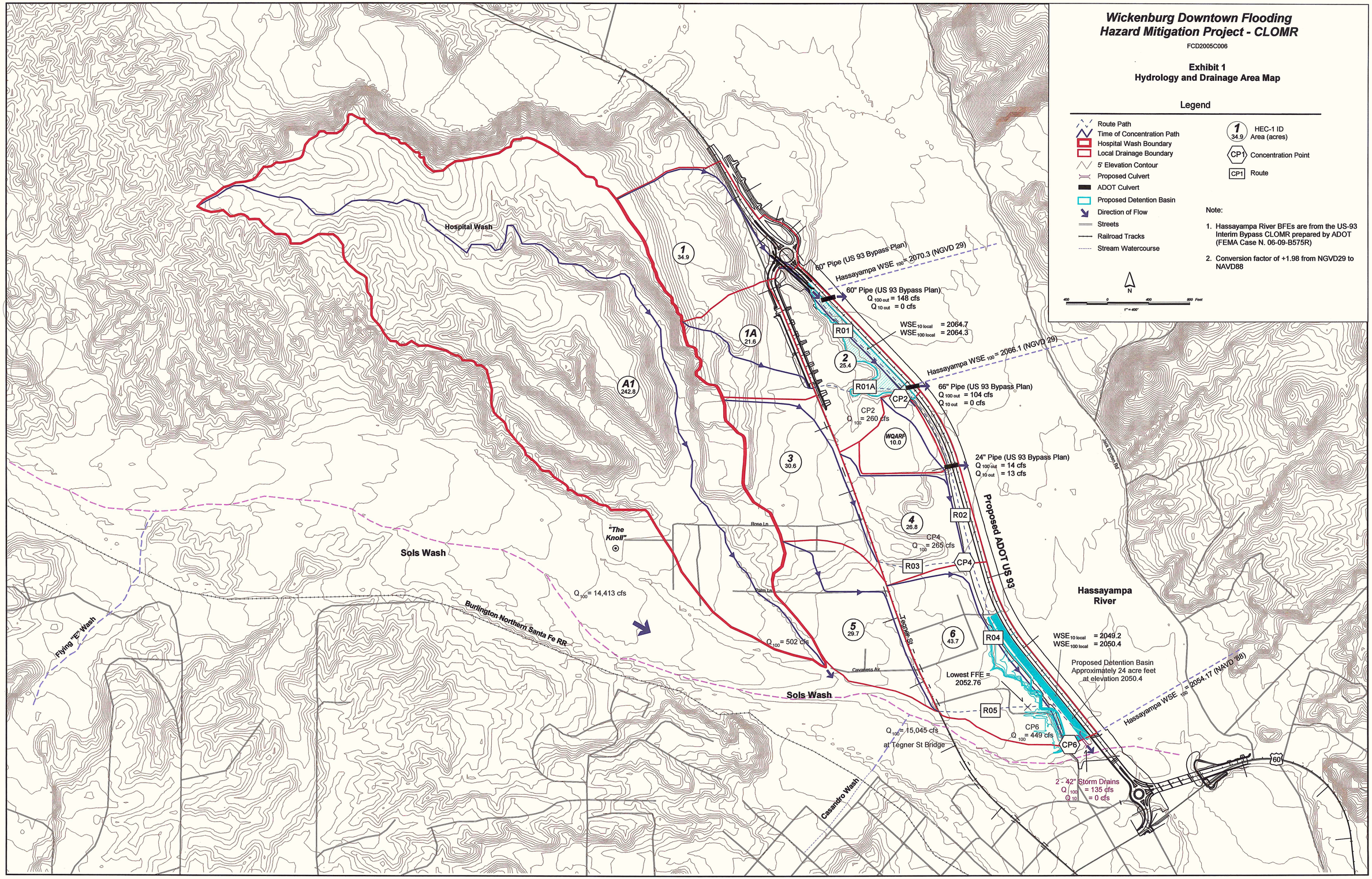
Erosion Protection
Channelization Improvements
Cross Section (ID)
Thalweg

Engineering and Environmental Consultants, Inc
3003 N. Central Avenue Suite 600
Phoenix, Arizona 85012

Wickenburg Downtown Flooding Hazard Mitigation Project - CLOMR

FCD2005C006

Exhibit 1
Hydrology and Drainage Area Map



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 landward of 0.0' 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, GRS80 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 this 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:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(310) 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 1:8000 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 floodplains 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 distances 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.

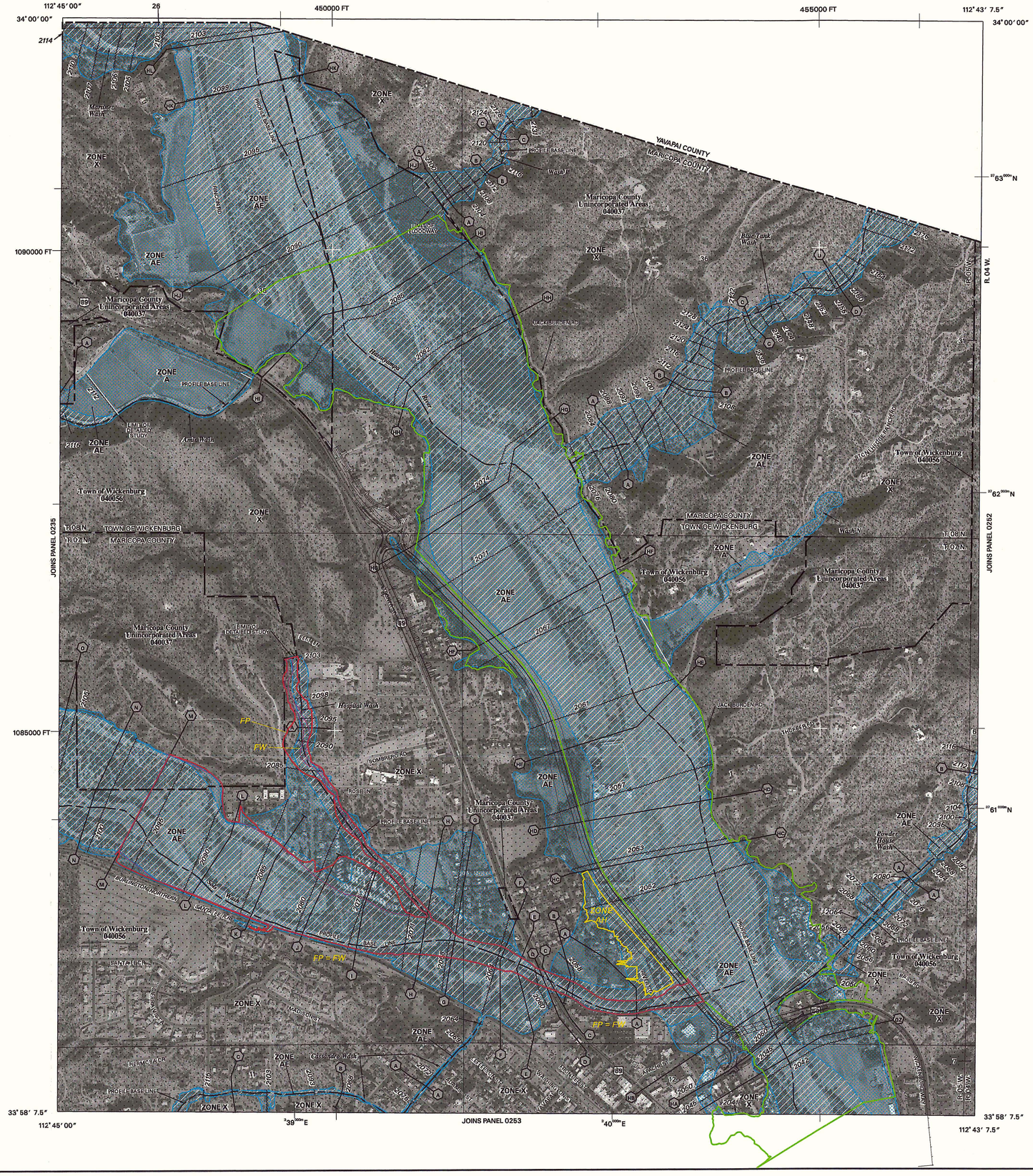
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available 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.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMAMAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/.

Legend

- Floodway
- Floodplain
- Floodplain (per US-93 Bypass CLOMR prepared by West and Assoc)



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V 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 AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 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 floodway 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 areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	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 D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones, and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	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)	Transect line
112° 07′ 08″, 33° 25′ 41″	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere.
4076000mE	1000-meter Universal Transverse Mercator grid tick values zone 12.
875000 FT	5000-foot grid tick values: Arizona State Plane coordinate system, central zone (FIPSZONE 3176) NAD83 (Transverse Mercator)
×DV2313	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORY
Refer to Repositories Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
April 16, 1988

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 Base Flood Elevations, 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.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

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	040037	0251	H
WICKENBURG, TOWN OF	040056	0251	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

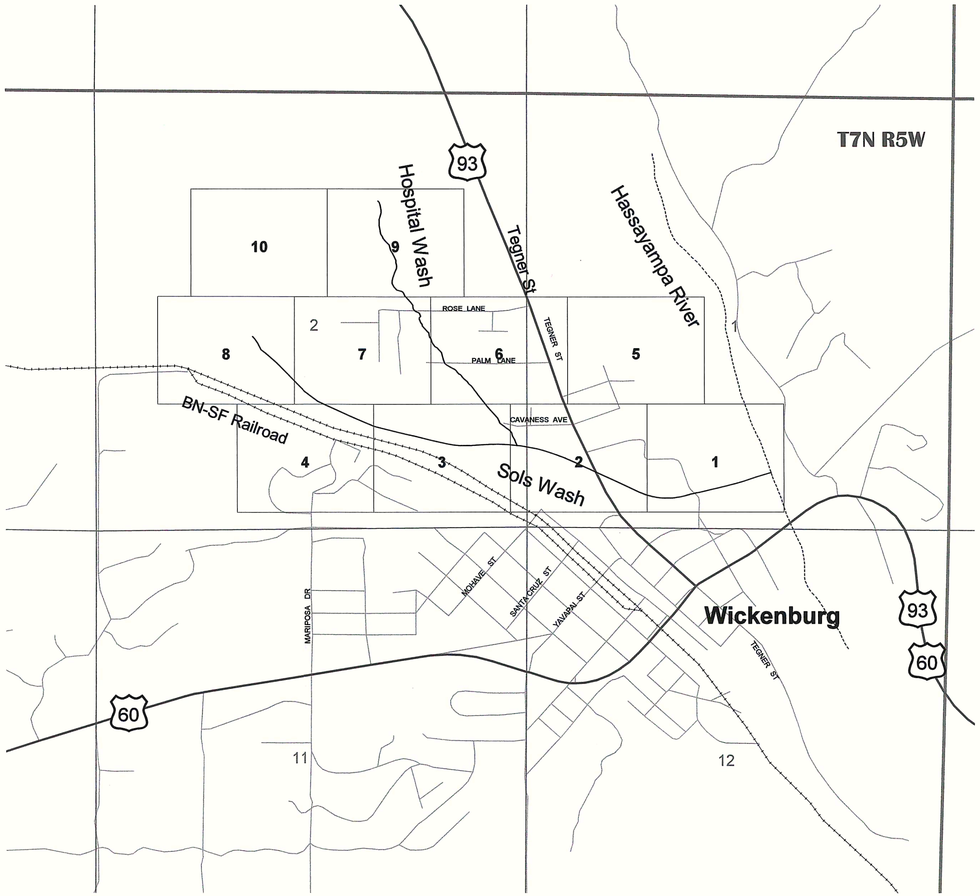
MAP NUMBER
04013C0251H

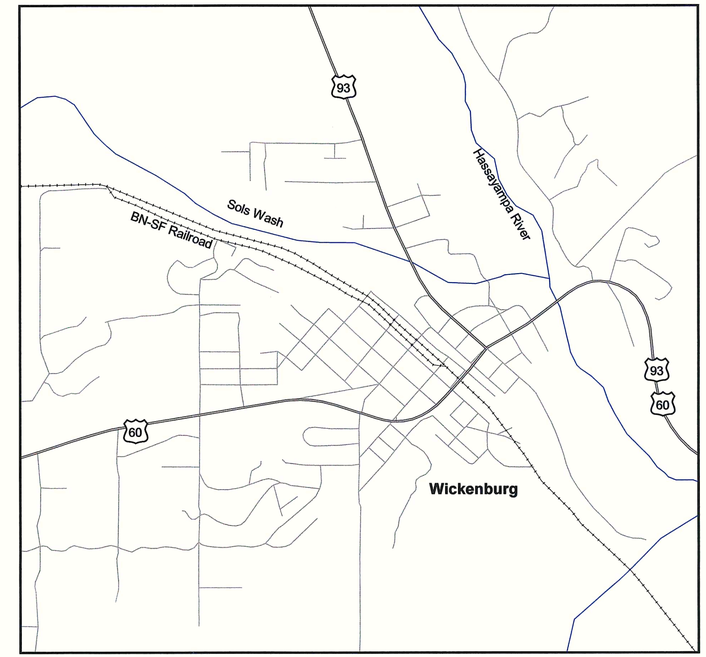
MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

SOLS WASH CLOMR
FCD CONTRACT NUMBER FCD2005C006





DATUM

HORIZONTAL: NORTH AMERICAN DATUM OF 1983
VERTICAL: NORTH AMERICAN VERTICAL DATUM OF 1988

STATEMENTS BY PROFESSIONAL REGISTRANTS

THE FOLLOWING STATEMENTS APPLY TO THE INDIVIDUAL SEALS AFFIXED TO EACH OF THE MAPS FOLLOWING THE COVER SHEET.

THE FLOODPLAIN AND FLOODWAY DELINEATION WERE PREPARED UNDER MY DIRECT SUPERVISION:

Registered Professional Engineer (Civil)
CERTIFICATE NO.
37890
LLOYD A.
VICK
Date Signed 12-20-06
ARIZONA, U.S.A.

AERIAL MAPPING

STEWART GEO-TECHNOLOGIES
NOVEMBER 2004
2' CONTOUR INTERVAL

HYDRAULICS

ENGINEERING AND ENVIRONMENTAL CONSULTANTS, INC.
3003 NORTH CENTRAL AVENUE, SUITE 600
PHOENIX, ARIZONA 85012

LIMIT OF ACCURACY

TOWNSHIP AND RANGE LINES WERE DIGITIZED FROM THE USGS 7.5' TOPOGRAPHICAL QUADRANGLE MAPS.

Matchline Sheet 5

Matchline Sheet 2

(CLOMR Prepared by
West Consultants, Inc.)

ADOT
R-O-W

US 93 BYPASS

DETENTION BASIN BEING BUILT BY ADOT AS
PART OF WICKENBURG BYPASS 093-B-(008)

Hassayampa
River

River St

Zone AH
(2050.4)

Basin
Bottom
2043'

Detention
Basin
Elev = 2050.4'

Limit of Study

Sols Wash

Sols Wash

Floodplain/Floodway

Zone AE

0.288 0.227 0.220 0.212 0.204 0.198 0.194 0.187 0.182 0.180 0.169 0.159 0.150 0.140 0.132 0.111 0.201

T7N R5W

Scale: 1" = 60'
Contour Interval = 5'

N

60 0 60 120 Feet

Reach	River Sta	Q Total (cfs)	FP W.S. Elev (ft)	FW W.S. Elev (ft)
Sols Wash Main	0.288	15045	2059.30	2059.30
Sols Wash Main	0.227	15045	2057.96	2057.96
Sols Wash Main	0.220	15045	2057.53	2057.53
Sols Wash Main	0.212	15045	2057.22	2057.22
Sols Wash Main	0.204	15045	2056.67	2056.67
Sols Wash Main	0.201	15045	2055.03	2055.04
Sols Wash Main	0.198	15045	2051.71*	2051.71
Sols Wash Main	0.195	15045	2052.37*	2052.37
Sols Wash Main	0.192	15045	2052.49*	2052.49
Sols Wash Main	0.189	15045	2052.60*	2052.60
Sols Wash Main	0.187	15045	2052.75*	2052.75
Sols Wash Main	0.184	15045	2052.82*	2052.82
Sols Wash Main	0.182	15045	2051.61*	2051.61
Sols Wash Main	0.180	15045	2051.73*	2051.73
Sols Wash Main	0.169	15045	2052.14*	2052.14
Sols Wash Main	0.159	15045	2052.33*	2052.33
Sols Wash Main	0.150	15045	2052.45*	2052.45
Sols Wash Main	0.140	15045	2052.49*	2052.49
Sols Wash Main	0.132	15045	2052.45*	2052.45
Sols Wash Main	0.111	15045	2049.75*	2049.74

* 100-yr backwater elevation of 2054.17' governs.

Legend

- Cross Section
- Hydraulic Baseline
- Existing Elevation Contour (1' Interval)
- Proposed Elevation Contour (1' Interval)
- Township Boundary
- Section Boundary
- New 1% Annual Chance of Flood Hazard Boundary
- New Floodway
- Floodplain from West CLOMR
- Highway
- Local Road
- Railroad
- 1.862 River Mile

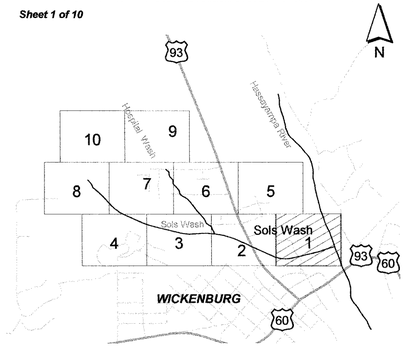
ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NAVD88

NOTES

1. THE HYDRAULIC BASE LINE IS CROSS SECTION STATION 10,000 UNLESS OTHERWISE NOTED
2. SEE ADOT GRADING PLANS FOR WICKENBURG BYPASS [093-B-(008)] DETAILED INFORMATION.

Sheet 1 of 10



No.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

SOLS WASH CLOMR

FCD Contract No. FCD2005C006

Registered Professional Engineer (Civil) CERTIFICATE NO. 37690 LLOYD A. VICK Date Signed 12-2-06 ARIZONA, U.S.A.

eec Engineering and Environmental Consultants, Inc.

	BY	DATE
DESIGN	CTG	12 - 06
DESIGN CHK	LAV	12 - 06
PLANS	ESM	12 - 06
PLANS CHK	LAV	12 - 06

SHEET 1 OF 10

Reach	River Sta	Q Total (cfs)	FP W.S. Elev (ft)	FW W.S. Elev (ft)
Sols Wash Main	0.642	14459	2068.53	2068.52
Sols Wash Main	0.614	14459	2067.27	2067.27
Sols Wash Main	0.592	14459	2066.89	2066.88
Sols Wash Main	0.557	14459	2066.79	2066.79
Sols Wash Main	0.529	14459	2066.78	2066.78
Sols Wash Main	0.505	14459	2066.50	2066.50
Sols Wash Main	0.485	15045	2065.98	2065.98
Sols Wash Main	0.467	15045	2065.80	2065.80
Sols Wash Main	0.447	15045	2065.87	2065.87
Sols Wash Main	0.442	15045	2065.73	2065.73
Sols Wash Main	0.412	15045	2061.01	2061.01
Sols Wash Main	0.389	15045	2060.76	2060.76
Sols Wash Main	0.359	15045	2060.08	2060.08
Sols Wash Main	0.306	15045	2059.42	2059.42

Legend

- Cross Section
- Hydraulic Baseline
- Existing Elevation Contour (1' Interval)
- Poposed Elevation Contour (1' Interval)
- Township Boundary
- Section Boundary
- New 1% Annual Chance of Flood Hazard Boundary
- New Floodway
- Floodplain from West CLOMR
- Highway
- Local Road
- Railroad
- 1.862 River Mile

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NAVD88

NOTES

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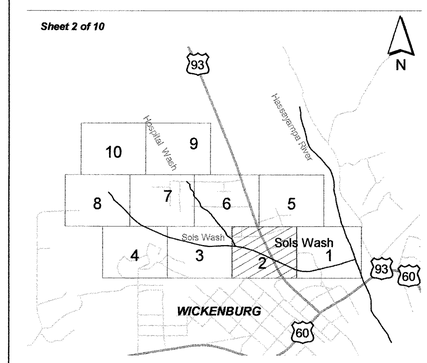
2. SEE ADOT GRADING PLANS FOR WICKENBURG BYPASS [093-B-(008)] DETAILED INFORMATION.

Sheet 2 of 10



No.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

SOLS WASH CLOMR

FCD Contract No. FCD2005C006

Engineering and Environmental Consultants, Inc.

	BY	DATE
DESIGN	CTG	12 - 06
DESIGN CHK	LAV	12 - 06
PLANS	ESM	12 - 06
PLANS CHK	LAV	12 - 06

Registered Professional Engineer (Civil) CERTIFICATE NO. 37890 LLOYD A. VICK Date Signed 12-6-06 ARIZONA, U.S.A.

SHEET 2 OF 10

Reach	River Sta	Q Total (cfs)	FP W.S. Elev (ft)	FW W.S. Elev (ft)
Hospital Wash	0.097	500	2069.66	2069.66
Hospital Wash	0.083	500	2068.47	2068.47
Hospital Wash	0.081	500	2068.94	2068.94
Hospital Wash	0.074	500	2066.66	2066.66
Hospital Wash	0.070	500	2066.37	2066.37
Sols Wash Main	0.955	14459	2079.85	2079.85
Sols Wash Main	0.886	14459	2076.77	2076.77
Sols Wash Main	0.822	14459	2074.79	2074.80
Sols Wash Main	0.785	14459	2072.86	2072.85
Sols Wash Main	0.746	14459	2070.59	2070.59
Sols Wash Main	0.708	14459	2069.15	2069.15
Sols Wash Main	0.668	14459	2068.94	2068.94
Sols Wash Main	0.642	14459	2068.53	2068.52

Legend

- Cross Section
- Hydraulic Baseline
- Existing Elevation Contour (1' Interval)
- Proposed Elevation Contour (1' interval)
- Township Boundary
- Section Boundary
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- Floodplain from West CLOMR
- Highway
- Local Road
- Railroad
- 1.862 River Mile

ELEVATION REFERENCE MARKS

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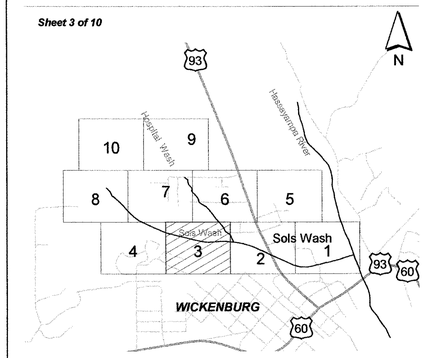
Sheet 3 of 10



No.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

SOLS WASH CLOMR

FCD Contract No. FCD2005C006

Engineering and Environmental Consultants, Inc.

Registered Professional Engineer (Civil) CERTIFICATE NO. 37590 LLOYD A. VICK Date Signed 12/20/06 ARIZONA U.S.A.

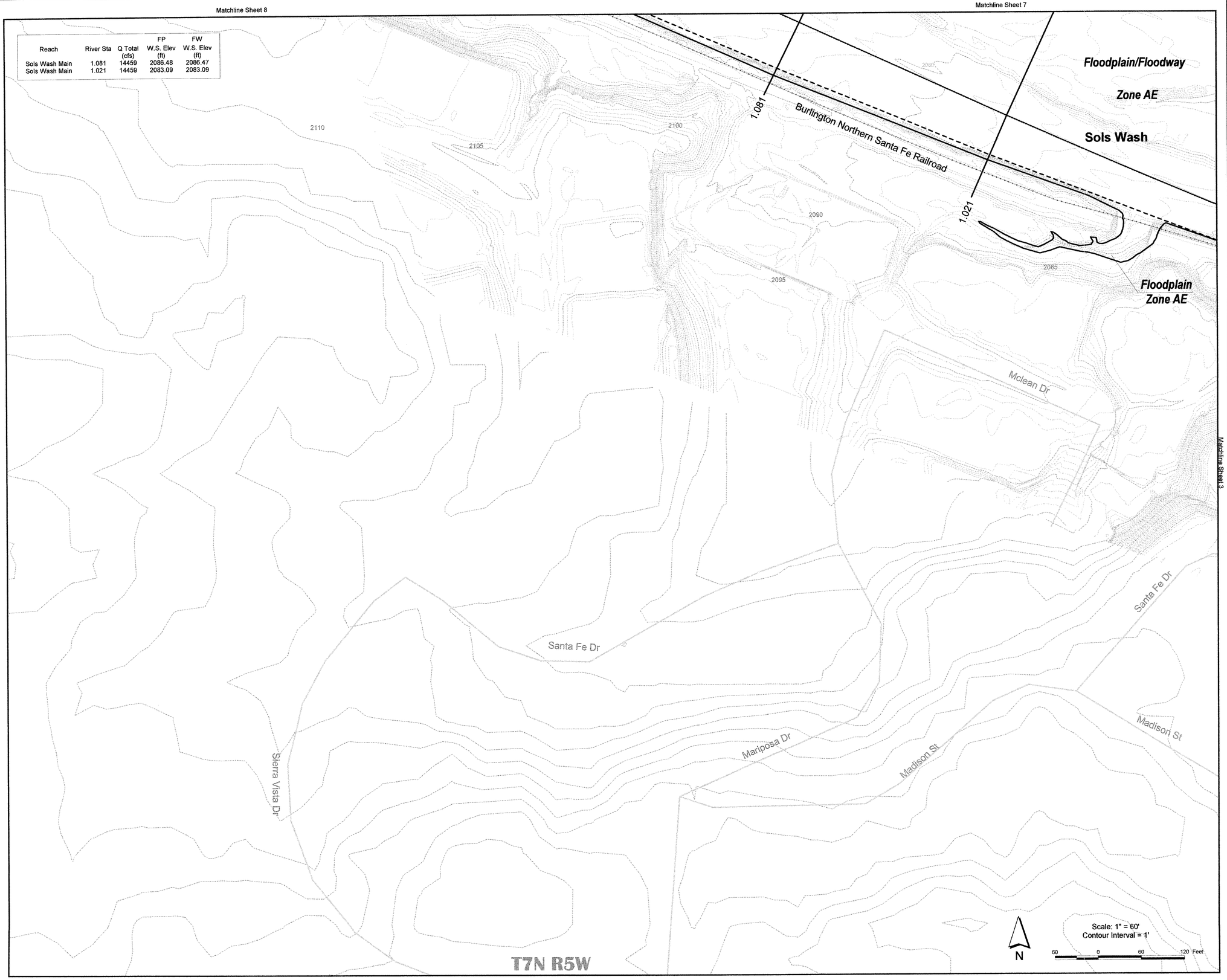
	BY	DATE
DESIGN	CTG	12 - 06
DESIGN CHK	LAV	12 - 06
PLANS	ESM	12 - 06
PLANS CHK	LAV	12 - 06

SHEET 3 OF 10

Matchline Sheet 8

Matchline Sheet 7

Reach	River Sta	Q Total (cfs)	FP W.S. Elev (ft)	FW W.S. Elev (ft)
Sols Wash Main	1.081	14459	2086.48	2086.47
Sols Wash Main	1.021	14459	2083.09	2083.09



Matchline Sheet 3

Legend

- Cross Section
- Hydraulic Baseline
- Existing Elevation Contour (1' Interval)
- Proposed Elevation Contour (1' Interval)
- Township Boundary
- Section Boundary
- New 1% Annual Chance of Flood Hazard Boundary
- New Floodway
- Floodplain from West CLOMR
- Highway
- Local Road
- Railroad
- 1.862 River Mile

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NAVD88

NOTES

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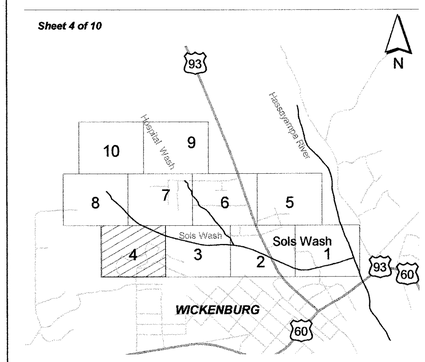
Sheet 4 of 10



No.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

SOLS WASH CLOMR

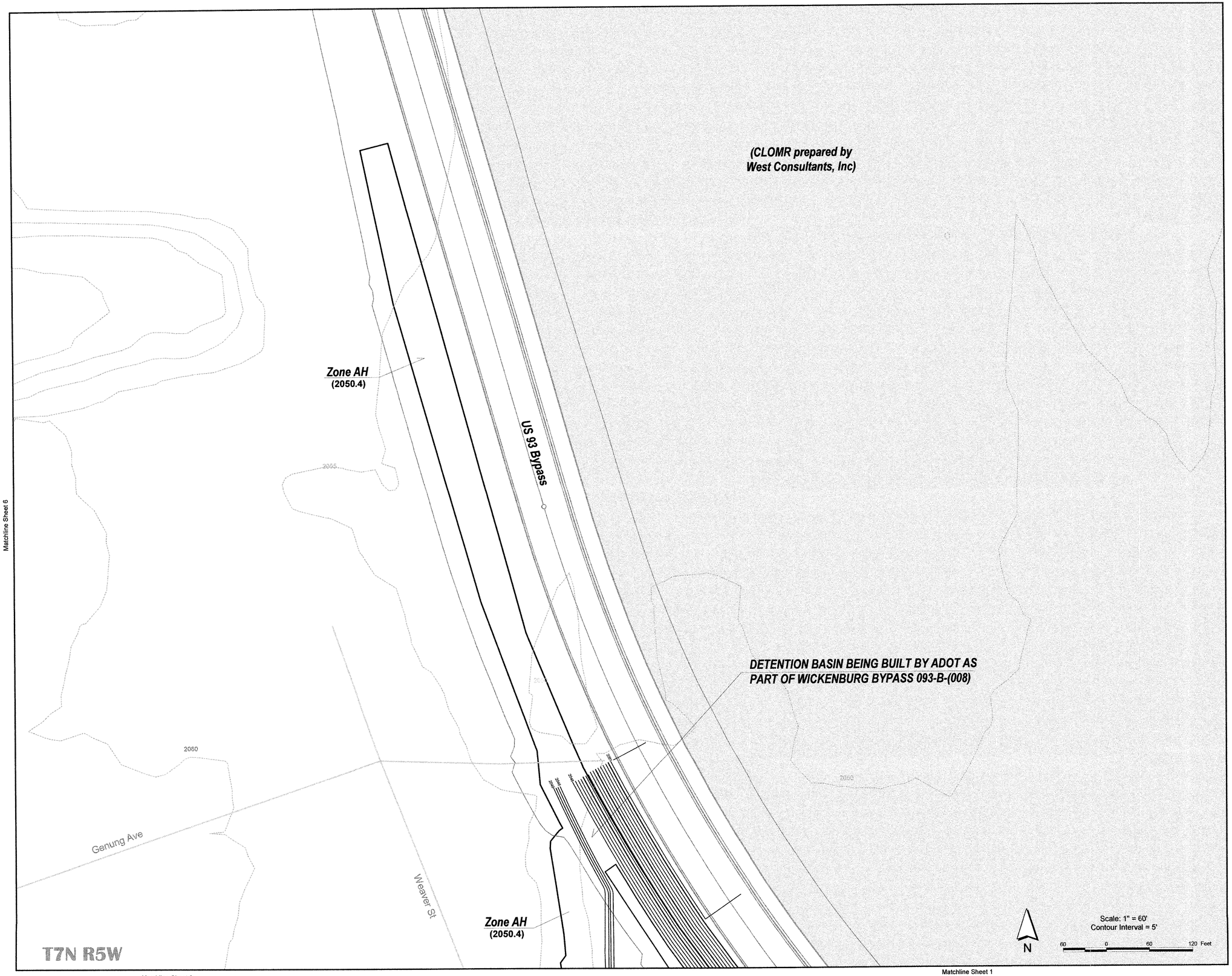
FCD Contract No. FCD2005C006

Engineering and Environmental Consultants, Inc.

Registered Professional Engineer (Civil) CERTIFICATE NO. 37890 LLOYD A. VICK Date Signed 12-20-06 ARIZONA, U.S.A.

	BY	DATE
DESIGN	CTG	12 - 06
DESIGN CHK	LAV	12 - 06
PLANS	ESM	12 - 06
PLANS CHK	LAV	12 - 06

SHEET 4 OF 10



Legend

- Cross Section
- Hydraulic Baseline
- Existing Elevation Contour (1' Interval)
- Proposed Elevation Contour (1' Interval)
- Township Boundary
- Section Boundary
- New 1% Annual Chance of Flood Hazard Boundary
- New Floodway
- Floodplain from West CLOMR
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- Local Road
- Railroad
- 1.862 River Mile

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NAVD88

NOTES

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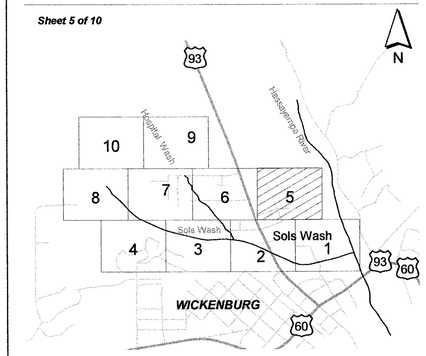
2. SEE ADOT GRADING PLANS FOR WICKENBURG BYPASS [093-B-(008)] DETAILED INFORMATION.
3. SEE ADOT GRADING PLAN FOR HOW CONTOURS TIE INTO GRADING PLAN.

Sheet 5 of 10



No.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

SOLS WASH CLOMR

FCD Contract No. FCD2005C006

Registered Professional Engineer (Civil) CERTIFICATE NO. 37880 LLOYD A. VICK Date Signed 12/20/06 ARIZONA, U.S.A.

eec Engineering and Environmental Consultants, Inc.

	BY	DATE
DESIGN	CTG	12 - 06
DESIGN CHK	LAV	12 - 06
PLANS	ESM	12 - 06
PLANS CHK	LAV	12 - 06

SHEET 5 OF 10

Matchline Sheet 9

Reach	River Sta	Q Total (cfs)	FP W.S. Elev (ft)	FW W.S. Elev (ft)
Hospital Wash	0.343	500	2077.26	2077.79
Hospital Wash	0.270	500	2073.98	2073.98
Hospital Wash	0.215	500	2071.38	2071.38
Hospital Wash	0.153	500	2070.43	2070.44
Sols Wash Main	0.822	14459	2074.79	2074.80

Matchline Sheet 7

Matchline Sheet 5

Matchline Sheet 3

Matchline Sheet 2

Legend

- Cross Section
- Hydraulic Baseline
- Existing Elevation Contour (5' Interval)
- Proposed Elevation Contour (1' Interval)
- Township Boundary
- Section Boundary
- New 1% Annual Chance of Flood Hazard Boundary
- New Floodway
- Floodplain from West CLOMR
- Highway
- Local Road
- Railroad
- 1.862 River Mile

ELEVATION REFERENCE MARKS

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NOTES

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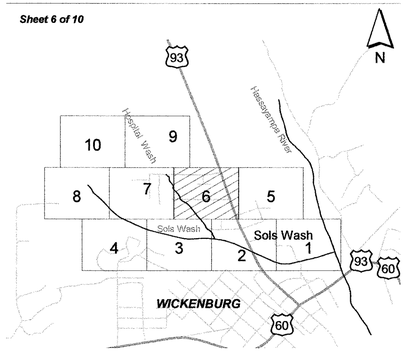
Sheet 6 of 10



No.	REVISION	BY	DATE
2			
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FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

SOLS WASH CLOMR

FCD Contract No. FCD2005C006

Engineering and Environmental Consultants, Inc.

Registered Professional Engineer (Civil) CERTIFICATE NO. 37890 LLOYD A. VICK Date Signed 12/28/06 Arizona, U.S.A.

	BY	DATE
DESIGN	CTG	12 - 06
DESIGN CHK	LAV	12 - 06
PLANS	ESM	12 - 06
PLANS CHK	LAV	12 - 06

SHEET 6 OF 10

Matchline Sheet 10

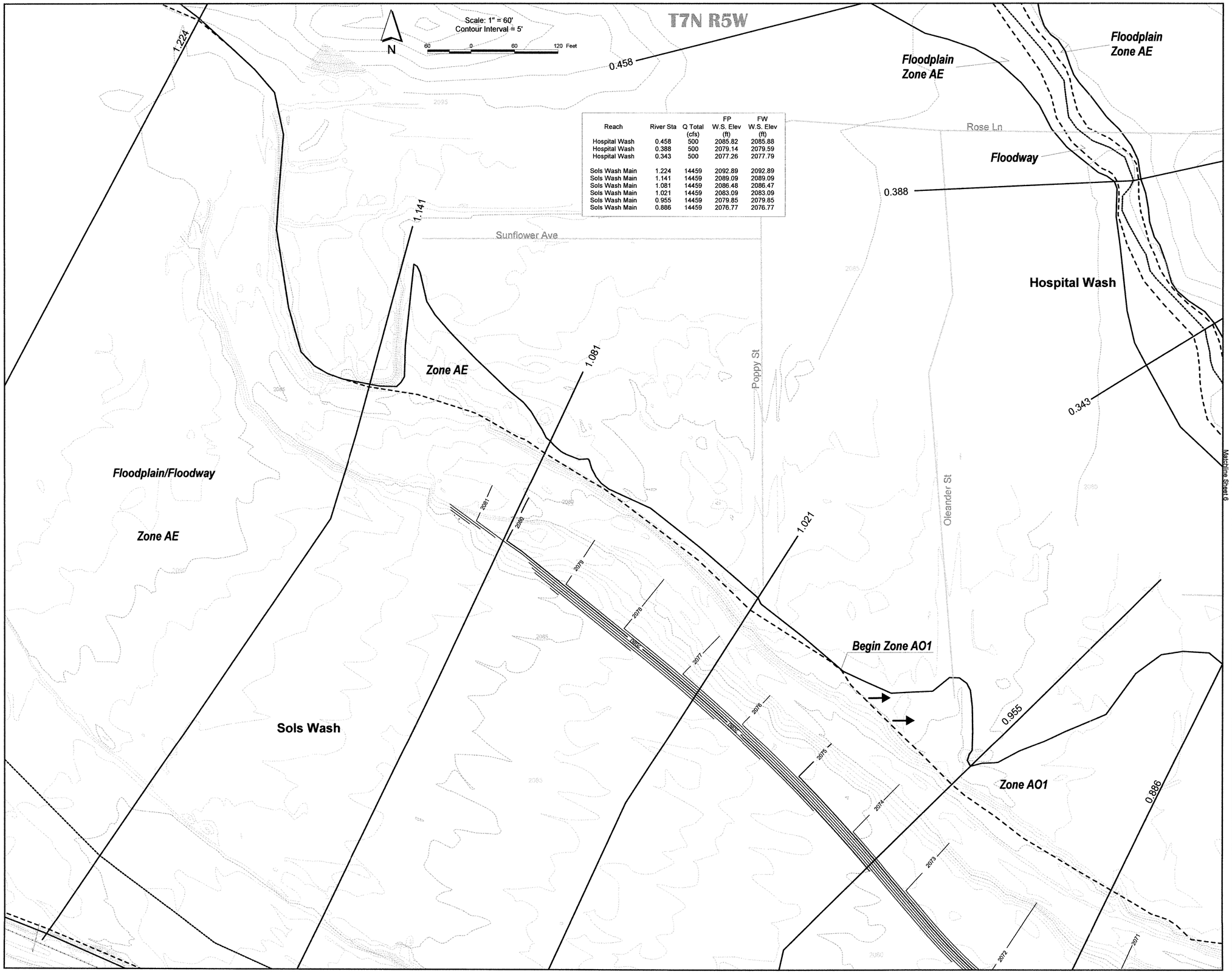
Matchline Sheet 9

Matchline Sheet 8

Matchline Sheet 6

Matchline Sheet 4

Matchline Sheet 3



Reach	River Sta	Q Total (cfs)	FP W.S. Elev (ft)	FW W.S. Elev (ft)
Hospital Wash	0.458	500	2085.82	2085.88
Hospital Wash	0.388	500	2079.14	2079.59
Hospital Wash	0.343	500	2077.26	2077.79
Sols Wash Main	1.224	14459	2092.89	2092.89
Sols Wash Main	1.141	14459	2089.09	2089.09
Sols Wash Main	1.081	14459	2086.48	2086.47
Sols Wash Main	1.021	14459	2083.09	2083.09
Sols Wash Main	0.955	14459	2079.85	2079.85
Sols Wash Main	0.886	14459	2076.77	2076.77

Legend

- Cross Section
- Hydraulic Baseline
- Existing Elevation Contour (5' Interval)
- Proposed Elevation Contour (1' Interval)
- Township Boundary
- Section Boundary
- New 1% Annual Chance of Flood Hazard Boundary
- New Floodway
- Floodplain from West CLOMR
- Highway
- Local Road
- Railroad
- 1.862 River Mile

ELEVATION REFERENCE MARKS

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NOTES

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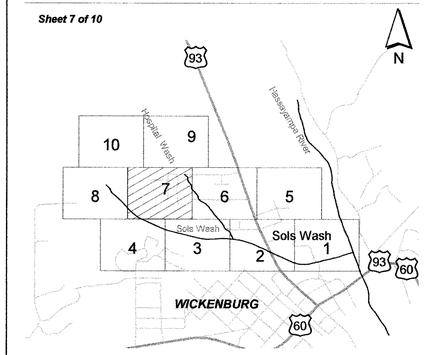
Sheet 7 of 10



No.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

SOLS WASH CLOMR

FCD Contract No. FCD2005C006

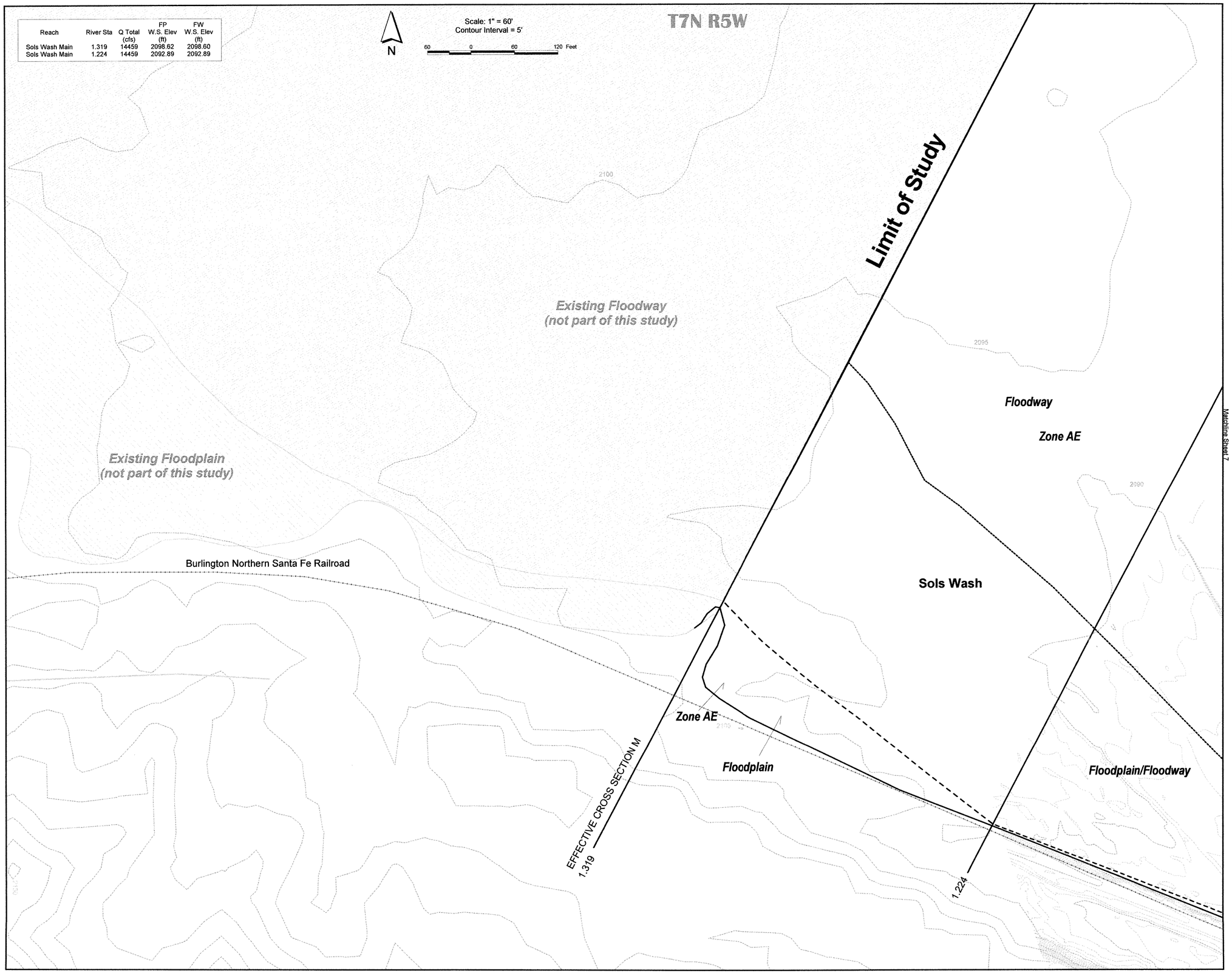
Engineering and Environmental Consultants, Inc.

Registered Professional Engineer (Civil) CERTIFICATE NO. 37890 LLOYD A. VICK Date Signed 12/29/06 ARIZONA, U.S.A.

	BY	DATE
DESIGN	CTG	12 - 06
DESIGN CHK	LAV	12 - 06
PLANS	ESM	12 - 06
PLANS CHK	LAV	12 - 06

SHEET 7 OF 10

Reach	River Sta	Q Total (cfs)	FP W.S. Elev (ft)	FW W.S. Elev (ft)
Sols Wash Main	1.319	14459	2098.62	2098.60
Sols Wash Main	1.224	14459	2092.89	2092.89



Legend

- Cross Section
- Hydraulic Baseline
- Existing Elevation Contour (5' Interval)
- Proposed Elevation Contour (1' Interval)
- Township Boundary
- Section Boundary
- New 1% Annual Chance of Flood Hazard Boundary
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- Existing Floodplain
- Existing Floodway
- Floodplain from West CLOMR
- Highway
- Local Road
- Railroad
- 1.862 River Mile

ELEVATION REFERENCE MARKS

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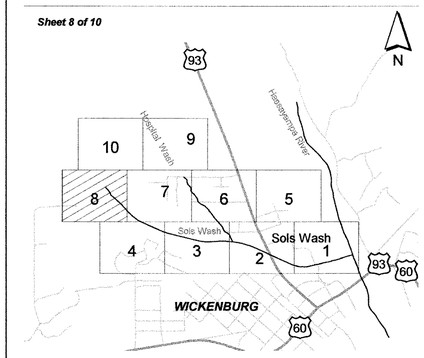
Sheet 8 of 10



No.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

SOLS WASH CLOMR

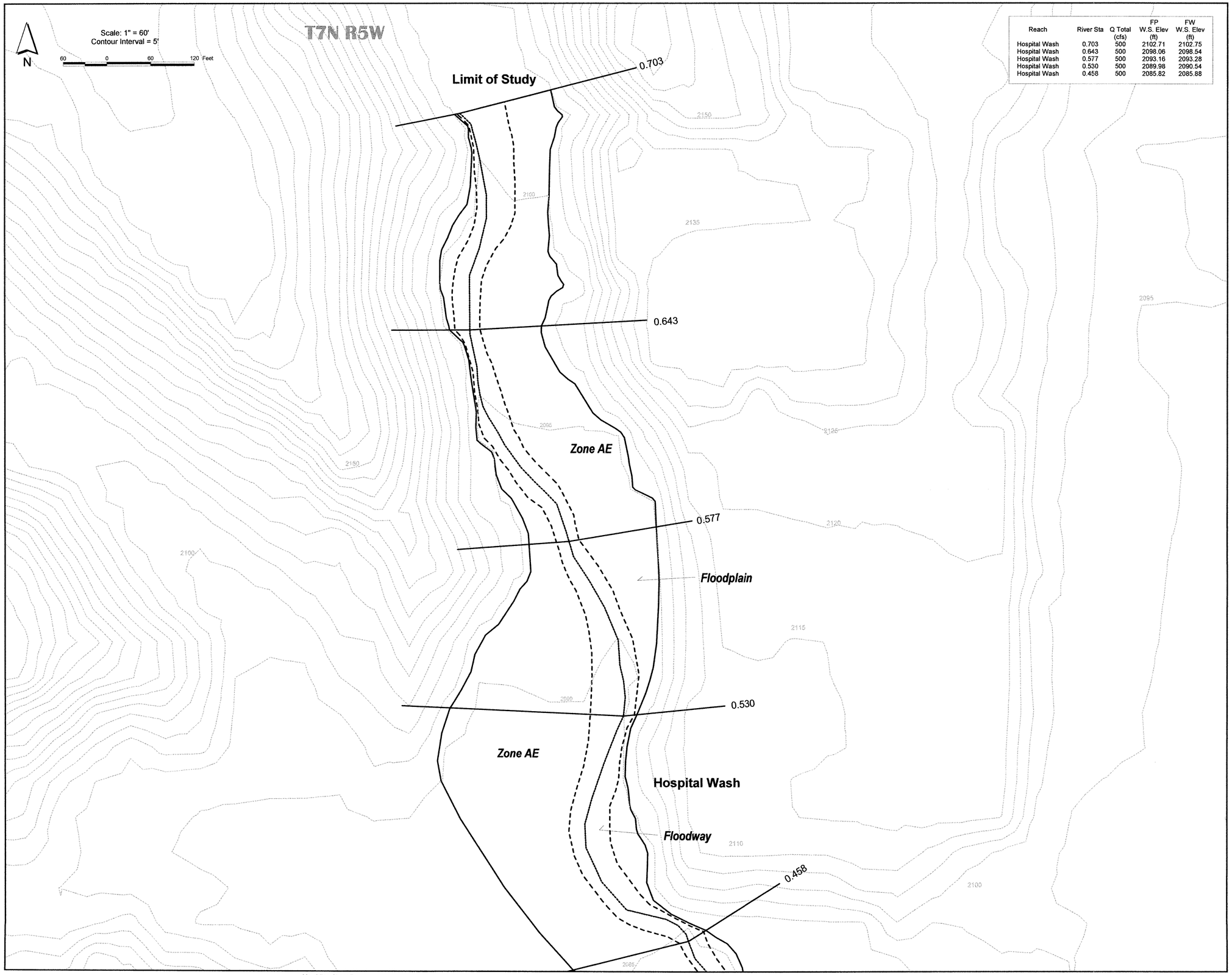
FCD Contract No. FCD2005C006

Engineering and Environmental Consultants, Inc.

	BY	DATE
DESIGN	CTG	12 - 06
DESIGN CHK	LAV	12 - 06
PLANS	ESM	12 - 06
PLANS CHK	LAV	12 - 06

Registered Professional Engineer (Civil) CERTIFICATE NO. 37890 LLOYD A. VICK Date Signed 12/20/06 ARIZONA U.S.A.

SHEET 8 OF 10



Reach	River Sta	Q Total (cfs)	FP W.S. Elev (ft)	FW W.S. Elev (ft)
Hospital Wash	0.703	500	2102.71	2102.75
Hospital Wash	0.643	500	2098.06	2098.54
Hospital Wash	0.577	500	2093.16	2093.28
Hospital Wash	0.530	500	2089.98	2090.54
Hospital Wash	0.458	500	2085.82	2085.88

Legend

- Cross Section
- Hydraulic Baseline
- Existing Elevation Contour (5' Interval)
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ELEVATION REFERENCE MARKS

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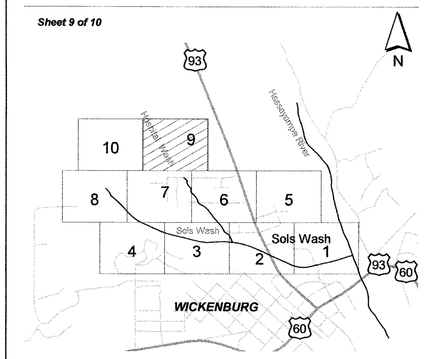
Sheet 9 of 10



No.	REVISION	BY	DATE
2			
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FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

SOLS WASH CLOMR

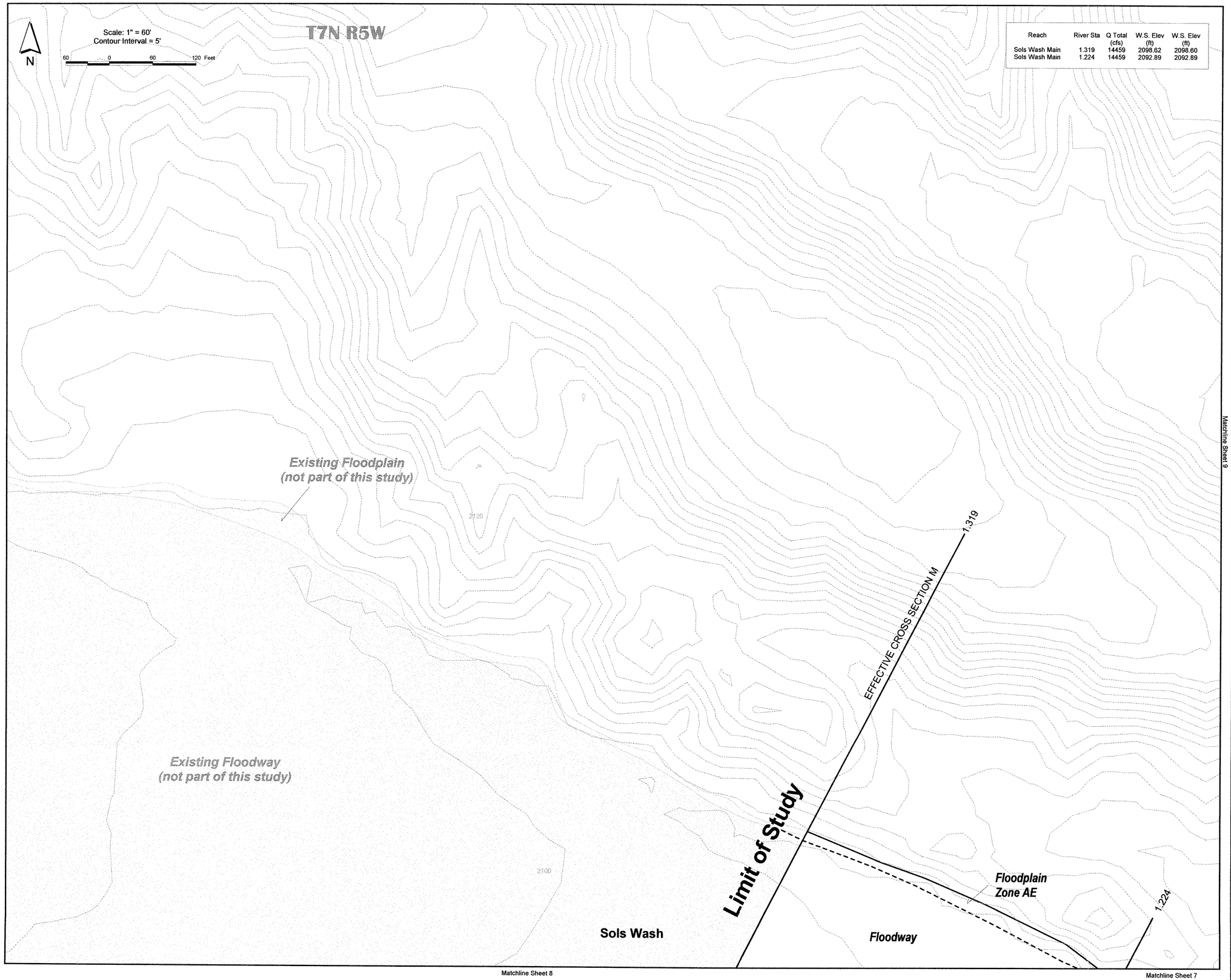
FCD Contract No. FCD2005C006

Engineering and Environmental Consultants, Inc.

Registered Professional Engineer (Civil) CERTIFICATE NO. 37690 LLOYD A. VICK Date Signed 12/21/06 ARIZONA U.S.A.

	BY	DATE
DESIGN	CTG	12 - 06
DESIGN CHK	LAV	12 - 06
PLANS	ESM	12 - 06
PLANS CHK	LAV	12 - 06

SHEET 9 OF 10



Reach	River Sta	Q Total (cfs)	W.S. Elev (ft)	W.S. Elev (ft)
Sols Wash Main	1.319	14459	2098.62	2098.60
Sols Wash Main	1.224	14459	2092.89	2092.89

Legend

- Cross Section
- Hydraulic Baseline
- Existing Elevation Contour (5' Interval)
- Proposed Elevation Contour (1' Interval)
- Township Boundary
- Section Boundary
- New 1% Annual Chance of Flood Hazard Boundary
- New Floodway
- Existing Floodplain
- Existing Floodway
- Floodplain from West CLOMR
- Highway
- Local Road
- Railroad
- 1.862 River Mile

ELEVATION REFERENCE MARKS

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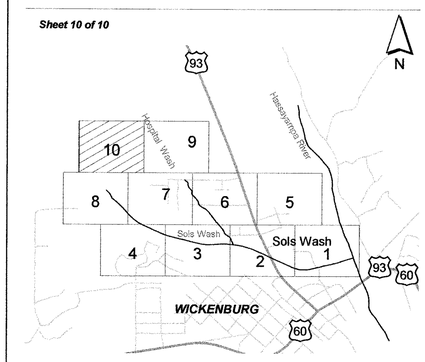
Sheet 10 of 10



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FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

SOLS WASH CLOMR

FCD Contract No. FCD2005C006

Engineering and Environmental Consultants, Inc.

Registered Professional Engineer (Civil) CERTIFICATE NO. 37890 LLOYD A. VICK Date Signed 10/20/06 ARIZONA, U.S.A.

	BY	DATE
DESIGN	CTG	12 - 06
DESIGN CHK	LAV	12 - 06
PLANS	ESM	12 - 06
PLANS CHK	LAV	12 - 06

SHEET 10 OF 10