Sonoqui Wash Channelization, Phase IIA

Chandler Heights Road to March Road

Letter of Map Revision (LOMR)

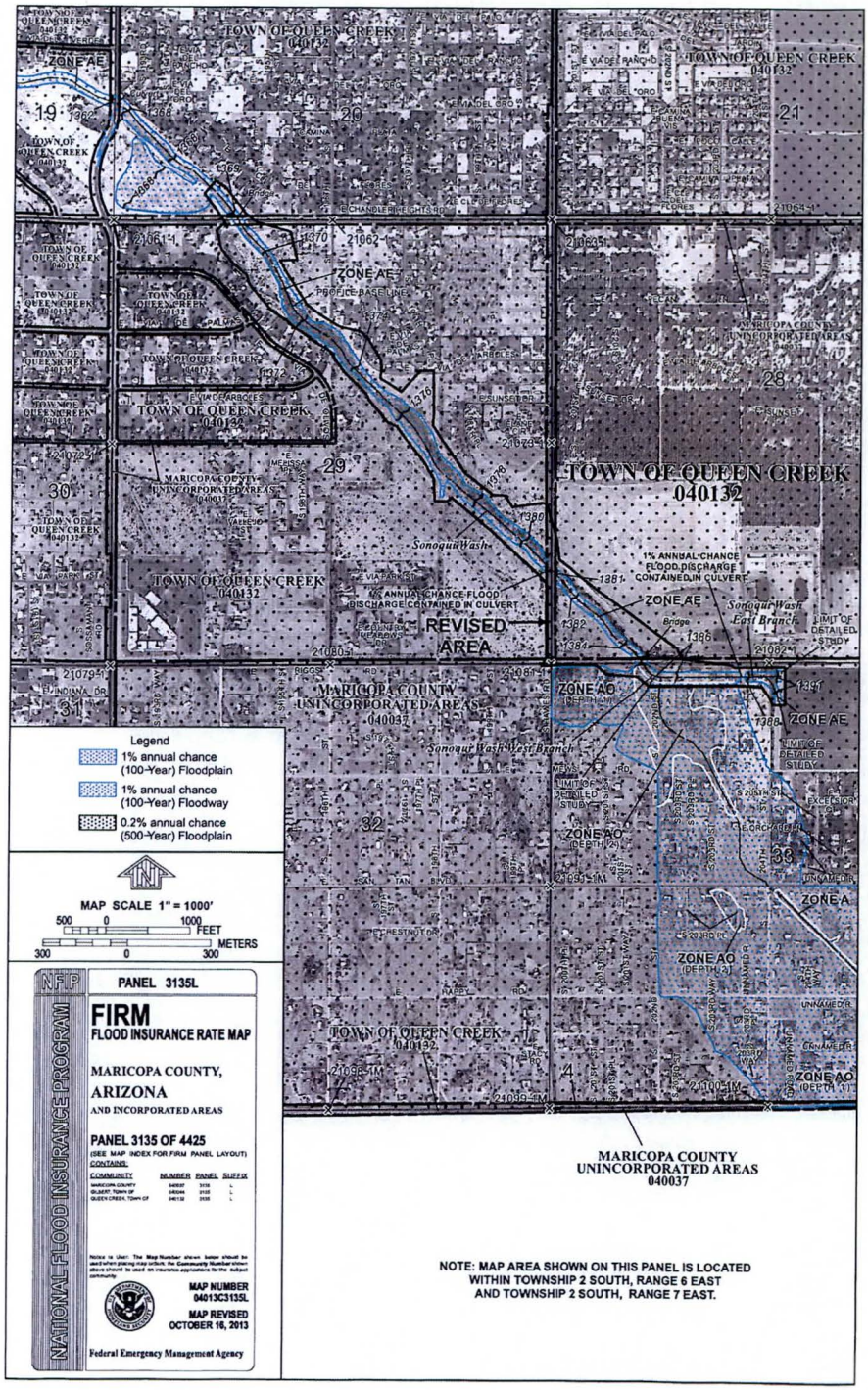
LOMR prepared Jan. 2014 by:

2801 West Durango Street
Phoenix, Arizona 85009
(602) 506-5897

CLOMR prepared Nov. 2011 by:

Stanley Consultants

1661 East Camelback Road Suite 400
Phoenix, Arizona 85016
(602) 333-2200



Sonoqui Wash Channelization – Phase II

Chandler Heights to Marsh Road
Data Notebook
January 2014

This folder contains the following documents:

1. Letter of Map Revision Determination Document for
   - Maricopa County
   - Town of Queen Creek
2. Annotated Flood Profiles
3. Annotated Flood Insurance Rate Map
4. LOMR Package Cover Letter
5. FEMA/FCD Comment & Response
6. Overview & Concurrence Forms
7. Payment Forms
8. Interoffice memo and routing form
9. Public Mailer and Mailing list
10. Conditional Letter of Map Revision Technical Data Notebook
11. HEC-RAS model report
12. HEC-RAS cross-sections

CD contents:

13. CLOMR TDN
14. TDN Appendices A – G
15. HEC-RAS Model (Effective *LOMR*)
16. Shapefiles
    - Cross-sections
    - Floodzone
    - Hydraulic Baseline
    - Post-project ground elevation contours
17. As-built Plans
    - Riggs Road Bridge TT254
    - Sonoqui Wash Phase IIA-1
    - Sonoqui Wash Phase IIA-2
    - Zatkin Engineered Fill Plan

Federal Emergency Management Agency

Washington, D.C. 20472

April 24, 2014

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 13-09-2145P

The Honorable Andy Kunasek
Chairman, Maricopa County Board of Supervisors
301 West Jefferson, 10th Floor
Phoenix, AZ 85003

Follows Conditional
Case No.: 12-09-0741R
Community Name: Maricopa County, AZ
Community No.: 040037
FIRM Panel Affected: 04013C3135L

116

Dear Mr. Kunasek:

In a Letter of Map Revision (LOMR) dated December 3, 2013, you were notified of proposed flood hazard determinations affecting the Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for Maricopa County, AZ. These determinations were for Sonoqui Wash - from approximately 540 feet downstream of East Chandler Heights Road to approximately 1,920 feet upstream of East Riggs Road; Sonoqui Wash West Branch - from the confluence with Sonoqui Wash to approximately 140 feet upstream; and Sonoqui Wash East Branch - from the confluence with Sonoqui Wash to approximately 300 feet upstream. The 90-day appeal period that was initiated on December 19, 2013, when the Department of Homeland Security's Federal Emergency Management Agency (FEMA) published a notice of proposed Flood Hazard Determinations in *The Arizona Business Gazette* has elapsed.

FEMA received no valid requests for changes to the modified flood hazard information. Therefore, the modified flood hazard information for your community that became effective on April 18, 2014, remains valid and revises the FIRM and FIS report that were in effect prior to that date.

The modifications are pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. The community number(s) and suffix code(s) are unaffected by this revision. The community number and appropriate suffix code as shown above will be used by the National Flood Insurance Program (NFIP) for all flood insurance policies and renewals issued for your community.

FEMA has developed criteria for floodplain management as required under the above-mentioned Acts of 1968 and 1973. To continue participation in the NFIP, your community must use the modified flood hazard information to carry out the floodplain management regulations for the NFIP. The modified flood hazard information will also be used to calculate the appropriate flood insurance premium rates for all new buildings and their contents and for the second layer of insurance on existing buildings and their contents.

If you have any questions regarding the necessary floodplain management measures for your community or the NFIP in general, please contact the Mitigation Division Director, FEMA Region IX, in Oakland, California, either by telephone at (510) 627-7100, or in writing at 1111 Broadway, Suite 1200, Oakland, California, 94607-4052. If you have any questions regarding the LOMR, the proposed flood hazard determinations, or mapping issues in general, please call the FEMA Map Information eXchange, toll free, at (877) 336-2627 (877-FEMA MAP).

Sincerely,

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

cc: The Honorable Gail Barney
Mayor, Town of Queen Creek

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

Ms. Kelli Sertich, AICP, CFM
FMS Division Manger
Flood Control District of Maricopa County

Ms. Catherine W. Regester, P.E., CFM
Flood Control District of Maricopa County

Mr. Jake Serago
Hydrologist
Flood Control District of Maricopa County

Mr. Brian Cosson, CFM
NFIP State Manager
Arizona Department of Water Resources

Mr. Kevin Lavalle
GIS Analyst
Flood Control District of Maricopa County

Federal Emergency Management Agency

Washington, D.C. 20472

April 24, 2014

FLOOD CONTROL DISTRICT
RECEIVED
APR 28 '14

	CH & GM		FINANCE
	PIO		R.E.D.
	ADMIN		O & M
	FMS		P & PM
X	ENG		FILE
	CONTRACTS		
	ROUTING		

Jake

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Gail Barney
Mayor, Town of Queen Creek
22350 South Ellsworth Road
Queen Creek, AZ 85142

IN REPLY REFER TO:
Case No.: 13-09-2[illegible]
Follows Conditional
Case No.: 12-09-07[illegible]
Community Name: Town of Queen Creek, AZ
Community No.: 040132
FIRM Panel Affected: 04013C3135L

116

Dear Mayor Barney:

In a Letter of Map Revision (LOMR) dated December 3, 2013, you were notified of proposed flood hazard determinations affecting the Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for the Town of Queen Creek, Maricopa County, AZ. These determinations were for Sonoqui Wash - from approximately 540 feet downstream of East Chandler Heights Road to approximately 1,920 feet upstream of East Riggs Road. The 90-day appeal period that was initiated on December 19, 2013, when the Department of Homeland Security's Federal Emergency Management Agency (FEMA) published a notice of proposed Flood Hazard Determinations in *The Arizona Business Gazette* has elapsed.

FEMA received no valid requests for changes to the modified flood hazard information. Therefore, the modified flood hazard information for your community that became effective on April 18, 2014, remains valid and revises the FIRM and FIS report that were in effect prior to that date.

The modifications are pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. The community number(s) and suffix code(s) are unaffected by this revision. The community number and appropriate suffix code as shown above will be used by the National Flood Insurance Program (NFIP) for all flood insurance policies and renewals issued for your community.

FEMA has developed criteria for floodplain management as required under the above-mentioned Acts of 1968 and 1973. To continue participation in the NFIP, your community must use the modified flood hazard information to carry out the floodplain management regulations for the NFIP. The modified flood hazard information will also be used to calculate the appropriate flood insurance premium rates for all new buildings and their contents and for the second layer of insurance on existing buildings and their contents.

If you have any questions regarding the necessary floodplain management measures for your community or the NFIP in general, please contact the Mitigation Division Director, FEMA Region IX, in Oakland, California, either by telephone at (510) 627-7100, or in writing at 1111 Broadway, Suite 1200, Oakland, California, 94607-4052. If you have any questions regarding the LOMR, the proposed flood hazard determinations, or mapping issues in general, please call the FEMA Map Information eXchange, toll free, at (877) 336-2627 (877-FEMA MAP).

Sincerely,

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

cc: The Honorable Andy Kunasek
Chairman, Maricopa County Board of Supervisors

Mr. Chris Dovel
Town Engineer
Town of Queen Creek

Mr. Tim Murphy, P.E.
Mitigation Planning and Technical Programs Manager
Floodplain Management and Services Division
Flood Control District of Maricopa County

Ms. Kelli Sertich, AICP, CFM
FMS Division Manger
Flood Control District of Maricopa County

Ms. Catherine W. Regester, P.E., CFM
Flood Control District of Maricopa County

Mr. Jake Serago
Hydrologist
Flood Control District of Maricopa County

Mr. Kevin Lavalle
GIS Analyst
Flood Control District of Maricopa County

Mr. Brian Cosson, CFM
NFIP State Manager
Arizona Department of Water Resources

Federal Emergency Management Agency

Washington, D.C. 20472

December 3, 2013

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Gail Barney
Mayor, Town of Queen Creek
22350 South Ellsworth Road
Queen Creek, AZ 85142

IN REPLY REFER TO:

Case No.:	13-09-2145P
Follows Conditional Case No.:	12-09-0741R
Community Name:	Town of Queen Creek, AZ
Community No.:	040132
Effective Date of This Revision:	**April 18, 2014**

Dear Mayor Barney:

The Flood Insurance Study Report and Flood Insurance Rate Map for your community have been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Oakland, California, at (510) 627-7175, or the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at http://www.fema.gov/business/nfip.

Sincerely,

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map
Annotated Flood Insurance Study Report

cc: The Honorable Andy Kunasek
Chairman, Maricopa County Board of Supervisors

Mr. Chris Dovel
Town Engineer
Town of Queen Creek

Mr. Tim Murphy, P.E.
Mitigation Planning and Technical Programs Manager
Floodplain Management and Services Division
Flood Control District of Maricopa County

Ms. Kelli Sertich, AICP, CFM
FMS Division Manger
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Mr. Kevin Lavalle
GIS Analyst
Flood Control District of Maricopa County

Mr. Brian Cosson, CFM
NFIP State Manager
Arizona Department of Water Resources

Follows Conditional Case No.: 12-09-0741R

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	Town of Queen Creek Maricopa County Arizona	BRIDGE CHANNEL RELOCATION CHANNELIZATION CULVERT	HYDRAULIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 040132		
IDENTIFIER	Sonoqui Wash Channelization Phase II	APPROXIMATE LATITUDE & LONGITUDE: 33.223, -111.652 SOURCE: USGS QUADRANGLE DATUM: NAD 83	

ANNOTATED MAPPING ENCLOSURES	ANNOTATED STUDY ENCLOSURES
TYPE: FIRM* NO.: 04013C3135L DATE: October 16, 2013	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: October 16, 2013 PROFILES: 1228P and 1229P

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map; ** FBFM - Flood Boundary and Floodway Map; *** FHBM - Flood Hazard Boundary Map

FLOODING SOURCE(S) & REVISED REACH(ES)

Sonoqui Wash - from approximately 540 feet downstream of East Chandler Heights Road to approximately 1,920 feet upstream of East Riggs Road

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Sonoqui Wash	Zone AE	Zone AE	YES	YES
	BFEs*	BFEs	NONE	YES

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

132942 PT202.BKR13092145P.H20 102-I-A-C

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

OTHER COMMUNITIES AFFECTED BY THIS REVISION

CID Number: 040037 **Name:** Maricopa County, Arizona

AFFECTED MAP PANELS	AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT
TYPE: FIRM* NO.: 04013C3135L DATE: October 16, 2013	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: October 16, 2013 PROFILES: 1228P, 1229P, 1739P, AND 1740P

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

COMMUNITY REMINDERS

We based this determination on the base (1-percent-annual-chance) flood discharges computed in the FIS for your community without considering subsequent changes in watershed characteristics that could increase flood discharges. Future development of projects upstream could cause increased flood discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on flood discharges subsequent to the publication of the FIS report for your community and could, therefore, establish greater flood hazards in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Sally M. Ziolkowski
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
1111 Broadway Street, Suite 1200
Oakland, CA 94607-4052
(510) 627-7175

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below and through FEMA's Flood Hazard Mapping website at https://www.floodmaps.fema.gov/fhm/Scripts/bfe_main.asp.

LOCAL NEWSPAPER Name: *The Arizona Business Gazette*
Dates: December 12, 2013 and December 19, 2013

Within 90 days of the second publication in the local newspaper, a citizen may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised flood hazard determination information presented in this LOMR may be changed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

December 3, 2013

FLOOD CONTROL DISTRICT
RECEIVED
DEC 10 '13
CH & GM | FINANCE
PIO | R.E.D.
ADMIN | O & M
FMS | P & PM
ENG | FILE
CONTRACTS
ROUTING

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Andy Kunasek
Chairman, Maricopa County Board of Supervisors
301 West Jefferson, 10th Floor
Phoenix, AZ 85003

IN REPLY REFER TO:

Case No.:	13-09-2145P
Follows Conditional Case No.:	12-09-0741R
Community Name:	Maricopa County, AZ
Community No.:	040037
Effective Date of This Revision:	**April 18, 2014**

Dear Mr. Kunasek:

The Flood Insurance Study Report and Flood Insurance Rate Map for your community have been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Oakland, California, at (510) 627-7175, or the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at http://www.fema.gov/business/nfip.

Sincerely,

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map
Annotated Flood Insurance Study Report

cc: The Honorable Gail Barney
Mayor, Town of Queen Creek

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

Ms. Kelli Sertich, AICP, CFM
FMS Division Manger
Flood Control District of Maricopa County

Ms. Catherine W. Regester, P.E., CFM
Flood Control District of Maricopa County

Mr. Jake Serago
Hydrologist
Flood Control District of Maricopa County

Mr. Brian Cosson, CFM
NFIP State Manager
Arizona Department of Water Resources

Mr. Kevin Lavalle
GIS Analyst
Flood Control District of Maricopa County

Follows Conditional Case No.: 12-09-0741R

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	Maricopa County Arizona (Unincorporated Areas)	BRIDGE CHANNEL RELOCATION CHANNELIZATION CULVERT	HYDRAULIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 040037		
IDENTIFIER	Sonoqui Wash Channelization Phase II	APPROXIMATE LATITUDE & LONGITUDE: 33.223, -111.652 SOURCE: USGS QUADRANGLE DATUM: NAD 83	

ANNOTATED MAPPING ENCLOSURES	ANNOTATED STUDY ENCLOSURES
TYPE: FIRM* NO.: 04013C3135L DATE: October 16, 2013	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: October 16, 2013 PROFILES: 1228P, 1229P, 1739P, AND 1740P

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map; ** FBFM - Flood Boundary and Floodway Map; *** FHBM - Flood Hazard Boundary Map

FLOODING SOURCE(S) & REVISED REACH(ES) See Page 2 for Additional Flooding Sources

Sonoqui Wash - from approximately 540 feet downstream of East Chandler Heights Road to approximately 1,920 feet upstream of East Riggs Road

Sonoqui Wash West Branch - from the confluence with Sonoqui Wash to approximately 140 feet upstream

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Sonoqui Wash	Zone AE	Zone AE	YES	YES
	BFEs*	BFEs	NONE	YES
Sonoqui Wash West Branch	Zone AO	Zone AE	NONE	NONE
	Depths	BFEs	NONE	YES

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

132942 PT202.BKR13092145P.H20 102-I-A-C

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

OTHER FLOODING SOURCES AFFECTED BY THIS REVISION

FLOODING SOURCE(S) & REVISED REACH(ES)

Sonoqui Wash East Branch - from the confluence with Sonoqui Wash to approximately 300 feet upstream

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Sonoqui Wash East Branch	Zone X (shaded)	Zone AE	YES	NONE
	No BFEs*	BFEs	NONE	YES

* BFEs - Base Flood Elevations

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

OTHER COMMUNITIES AFFECTED BY THIS REVISION

CID Number: 040132 **Name:** Town of Queen Creek, Arizona

AFFECTED MAP PANELS	AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT
TYPE: FIRM* NO.: 04013C3135L DATE: October 16, 2013	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: October 16, 2013 PROFILES: 1228P and 1229P

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

COMMUNITY REMINDERS

We based this determination on the base (1-percent-annual-chance) flood discharges computed in the FIS for your community without considering subsequent changes in watershed characteristics that could increase flood discharges. Future development of projects upstream could cause increased flood discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on flood discharges subsequent to the publication of the FIS report for your community and could, therefore, establish greater flood hazards in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Sally M. Ziolkowski
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
1111 Broadway Street, Suite 1200
Oakland, CA 94607-4052
(510) 627-7175

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

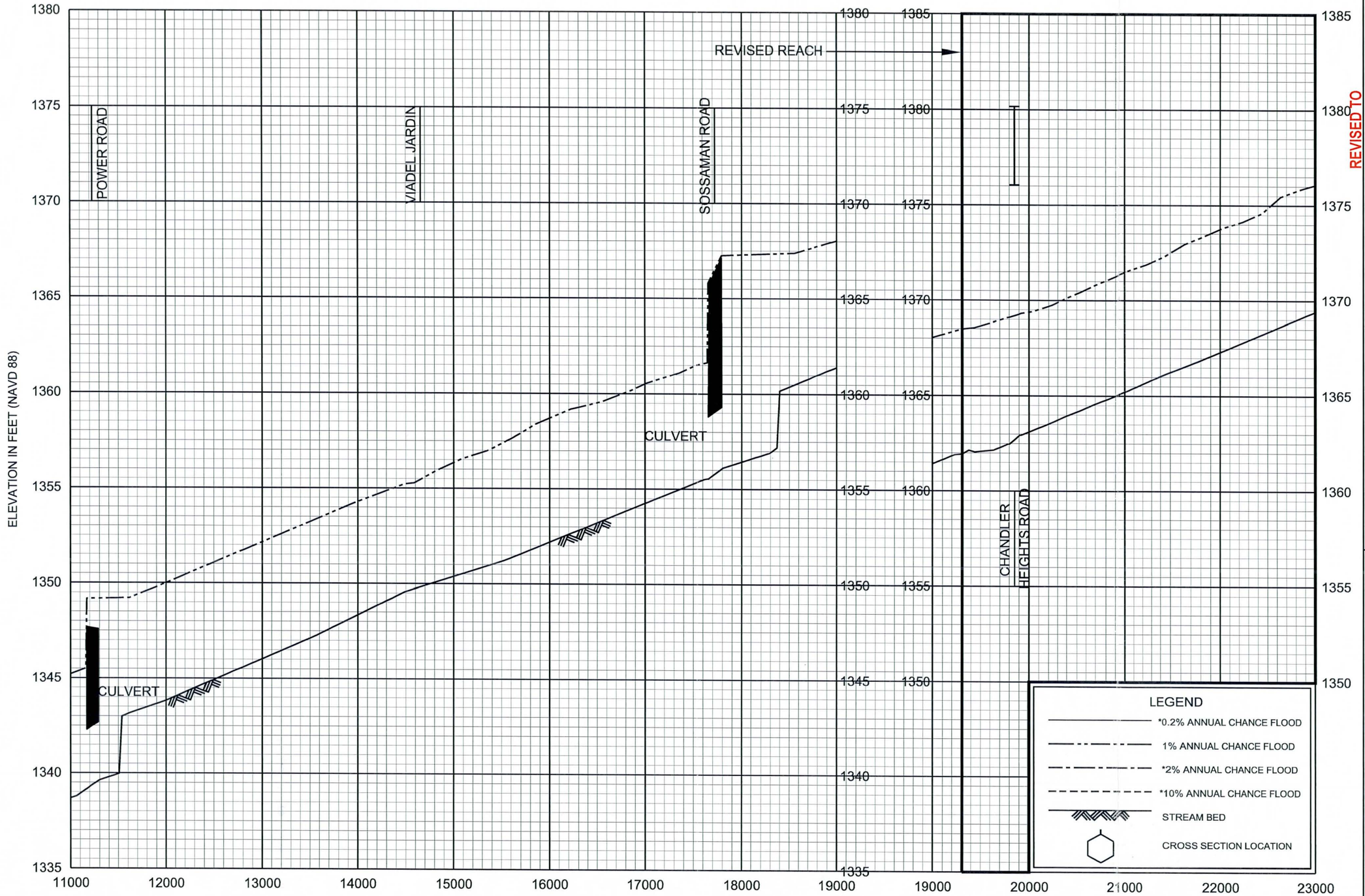
A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below and through FEMA's Flood Hazard Mapping website at https://www.floodmaps.fema.gov/fhm/Scripts/bfe_main.asp.

LOCAL NEWSPAPER Name: *The Arizona Business Gazette*
Dates: December 12, 2013 and December 19, 2013

Within 90 days of the second publication in the local newspaper, a citizen may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised flood hazard determination information presented in this LOMR may be changed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration



REVISED TO REFLECT LOMR EFFECTIVE: April 18, 2014

FLOOD PROFILES

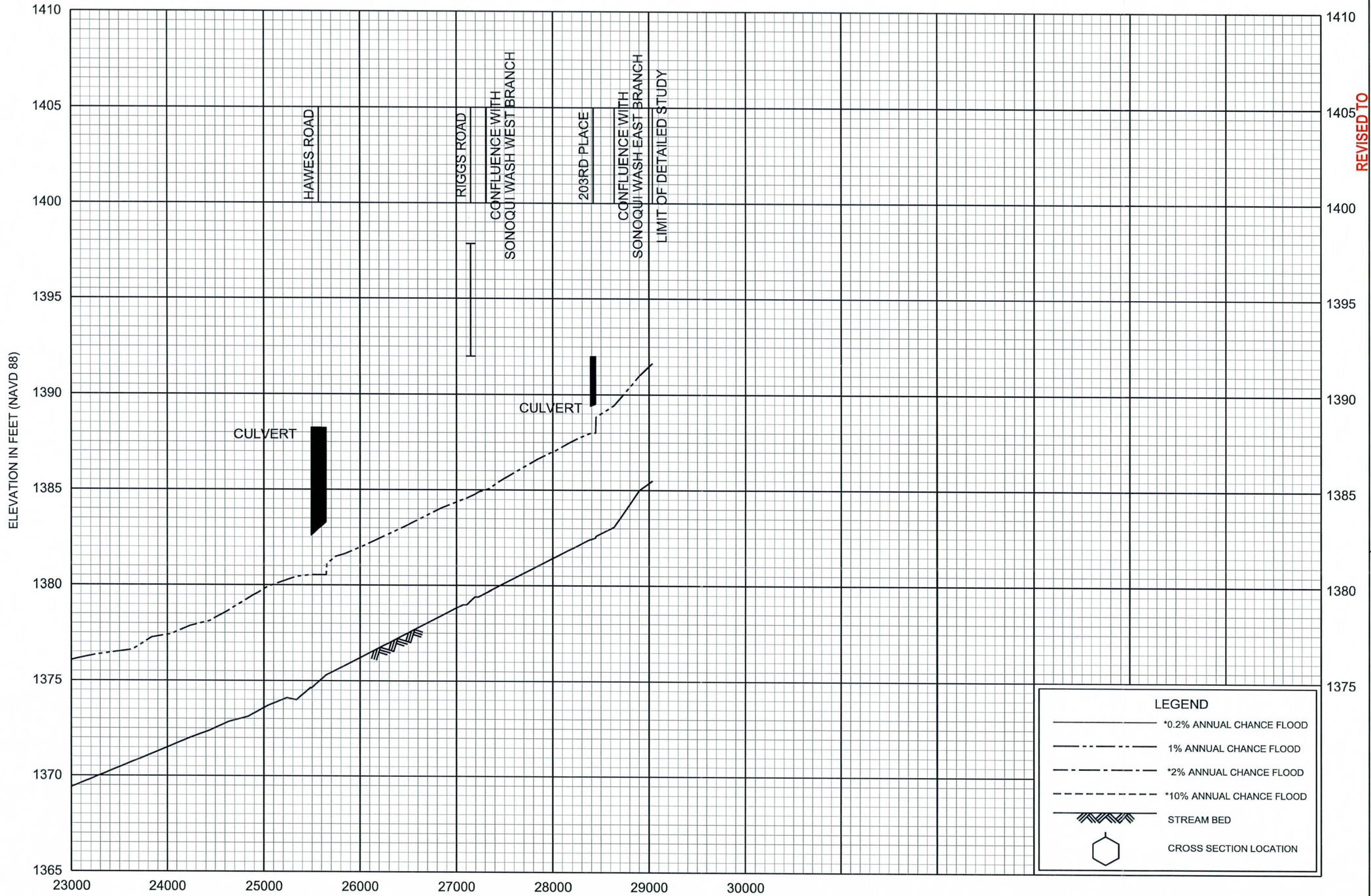
SONOQUI WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND INCORPORATED AREAS

1228P



REVISED TO REFLECT LOMR EFFECTIVE: April 18, 2014

FLOOD PROFILES

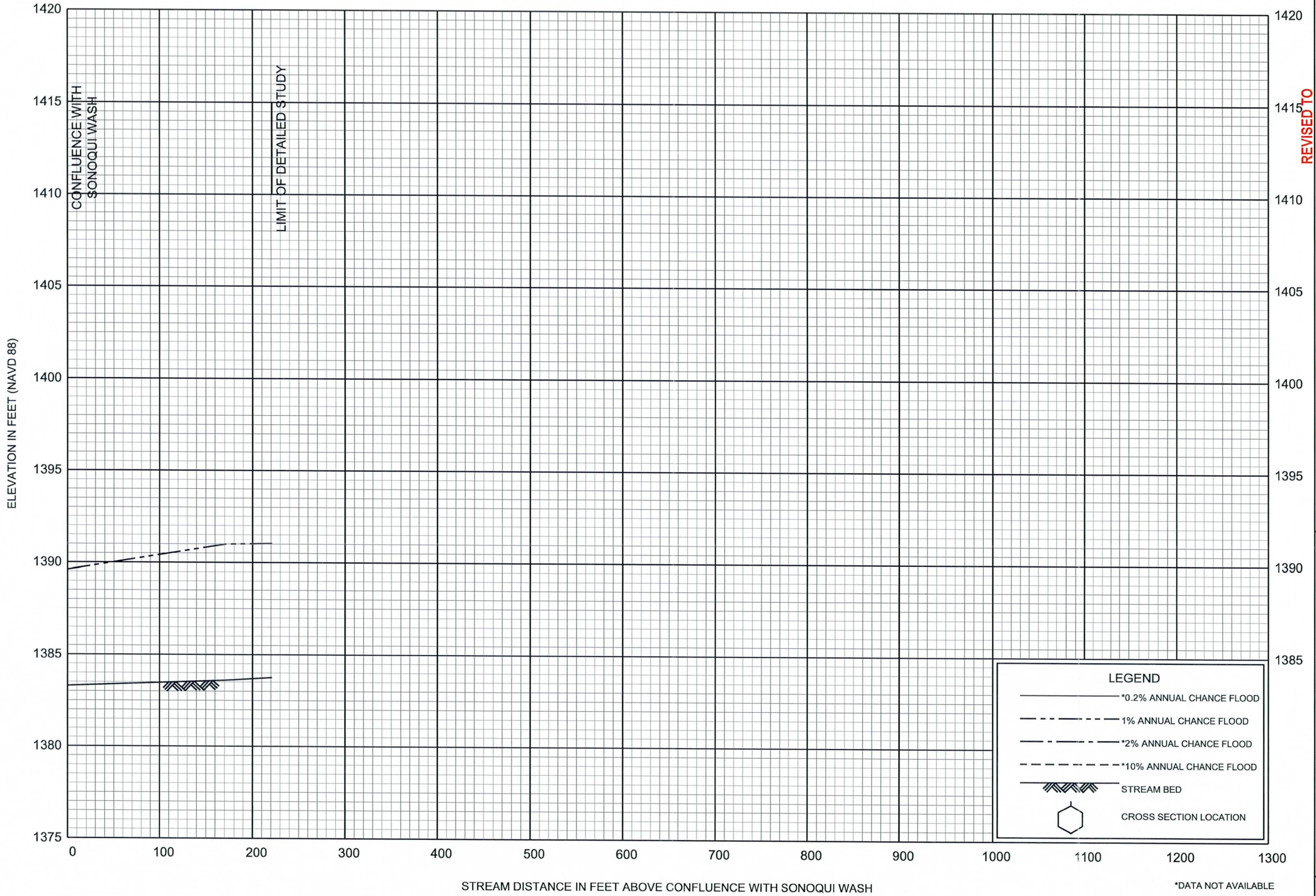
SONOQUI WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND INCORPORATED AREAS

1229P



REVISED TO REFLECT LOMR EFFECTIVE: April 18, 2014

FLOOD PROFILES

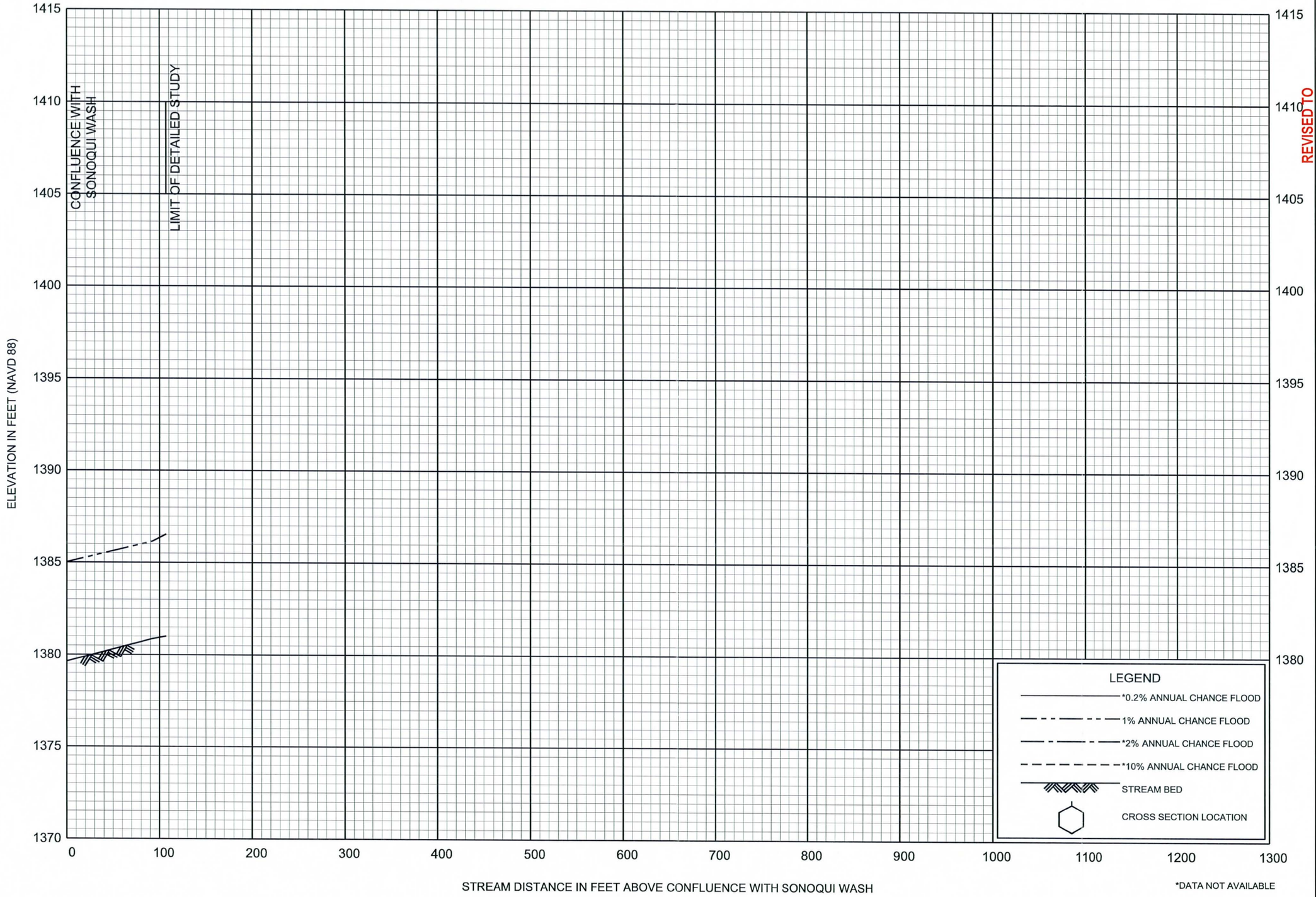
SONOQUI WASH EAST BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND INCORPORATED AREAS

1739P



REVISED TO REFLECT LOMR EFFECTIVE: April 18, 2014

FLOOD PROFILES

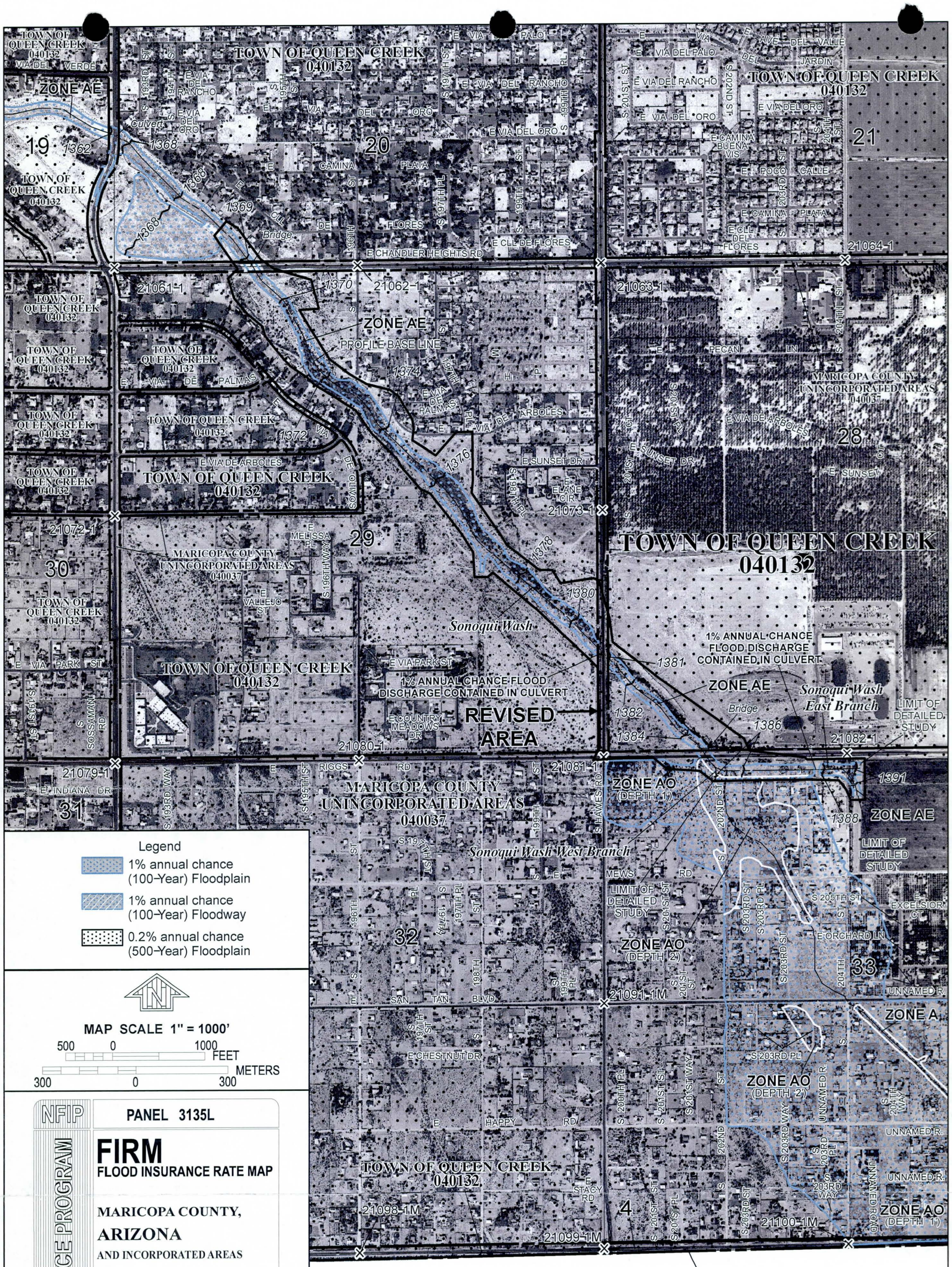
SONOQUI WASH WEST BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND INCORPORATED AREAS

1740P



Legend

- 1% annual chance (100-Year) Floodplain
- 1% annual chance (100-Year) Floodway
- 0.2% annual chance (500-Year) Floodplain

MAP SCALE 1" = 1000'

500 0 1000 FEET

300 0 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 3135L

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 3135 OF 4425

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	3135	L
GILBERT, TOWN OF	040044	3135	L
QUEEN CREEK, TOWN OF	040132	3135	L

REVISED TO REFLECT LOMR EFFECTIVE: April 18, 2014

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 04013C3135L

MAP REVISED OCTOBER 16, 2013

Federal Emergency Management Agency

MARICOPA COUNTY UNINCORPORATED AREAS 040037

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 2 SOUTH, RANGE 6 EAST AND TOWNSHIP 2 SOUTH, RANGE 7 EAST.

Flood Control District
of Maricopa County

Board of Directors
Denny Barney, District 1
Steve Chucri, District 2
Andrew Kunasek, District 3
Clint L. Hickman, District 4
Mary Rose Wilcox, District 5

www.fcd.maricopa.gov

2801 West Durango Street
Phoenix, Arizona 85009
Phone: 602-506-1501
Fax: 602-506-4601
TT: 602-505-5897

May 07, 2013

LOMC Clearinghouse
847 South Pickett Street
Alexandria, VA 22304-4605

ATTN: LOMR Manager

SUBJECT: Sonoqui Wash Channelization Project– Letters of Map Revision (LOMR) based on As-builts requests for:

COMMUNTIES: Town of Queen Creek and Unincorporated Areas, Maricopa County, Arizona Community No's 040132 & 040037, respectively

FLOODING SOURCES: Sonoqui Wash

FIRM PANELS AFFECTED: 04013C3060H

Dear LOMR Manager,

This letter is a formal request that the FEMA make a final determination on revising the FIRM 04013C3060H in consequence of the Sonoqui Wash Channelization Project Phase II-A having been constructed. Enclosed are the data required for a follow-up LOMR from the CLOMR issued June 26, 2012 in Case No. 12-09-0741R. Explanations to the responses of the requests for data made in the CLOMR comment document are all provided below:

1. Form 1, "Overview & Concurrence" is completed, one for each community affected; Maricopa County and Town of Queen Creek. Both paper and electronic copies are included. As-built conditions do not differ from the proposed conditions. Therefore, no new additional forms are submitted here.

2. The hydraulics and floodplain boundaries of the as-built condition are unchanged from the accepted CLOMR conditions. In response to a comment made during the review of the CLOMR a slender channel, which contains Sonoqui Wash channel backwater flow less than an average depth of 1.0 foot, has been marked on workmap 4 of 6. This was concerted through the CLOMR and has now been added to the annotated FIRM panel. The previously accepted HEC-RAS model is included.

3. An annotated copy of the FIRM shows the revised floodplain boundary, including the slender channel mentioned above. A paper and PDF copy to the scale of the effective FIRM are included.

Flood Control District
of Maricopa County

Board of Directors
Denny Barney, District 1
Steve Chucri, District 2
Andrew Kunasek, District 3
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Mary Rose Wilcox, District 5

www.fcd.maricopa.gov

2801 West Durango Street
Phoenix, Arizona 85009
Phone: 602-506-1501
Fax: 602-506-4601
TT: 602-505-5897

4. As-built drawings were reviewed and found to contain no significant deviations from the plans. PDF versions of the as-builts are included for the Sonoqui Wash Channelization Phase II A-1, Phase II A-2, Riggs Road Bridge and Zatkins Property. The bridge crosses the Wash approximately 1000 feet east of Hawes Road.

5. Documentation of the notification to property owners is not included because all land within the channelization is owned either in fee or as right-of-way by one of the project partners; the Flood Control District of Maricopa County or the Town of Queen Creek. Aside from these, there are no property owners within the project boundaries that are affected by widening, shifting or BFE increases along Sonoqui Wash. On the contrary, the SFHA has been narrowed and the BFE lowered.

6. The fee schedule, check payable to FEMA in the amount of $5000.00 (LOMR Based on As-Built Information (CLOMR previously issued by FEMA)) and Payment Information Form are grouped in the same folder.

Accessory information is provided for the assistance of the reviewer

1. Regarding the effects of the channelization project on the boundary between zones AE and AO south of Riggs Road; the entirety of the effective AE floodzone is contained within the Revised AE area. Effective zones continue to be divided by Riggs Road which means that AO zones both south of Riggs Road and south of Sonoqui Wash, are unaltered by this LOMR.

2. As-built drawings have been included for the engineered fill constructed on the Zatkins Property. The property is in the effective floodzone on the east and west bank of Sonoqui Wash just upstream of Chandler Heights Road. This property has been removed from the floodzone and as-builts are provided for verification.

If you have any questions regarding this overall submittal or the *Sonoqui Wash Channelization* project, please feel free to call me at 602-506-4973 or contact me by e-mail at jakeserago@mail.maricopa.gov.

Sincerely,

Jake M Serago, CFM
Hydrologist
Enclosures: LOMR Package

Jake Serago - FCDX

From: Lindsay, James <JGLindsay@mbakercorp.com>
Sent: Thursday, August 15, 2013 11:26 AM
To: Jake Serago - FCDX
Cc: Catherine Regester - FCDX
Subject: RE: Additional Data Required for Town of Queen Creek and Maricopa County, AZ (Case No. 13-09-2145P) – Receipt Requested

Mr. Serago,

Your response to comment one appears to be sufficient. As long as none of the mapping changes the updated model should be sufficient for this comment and I would just send in the same statement you have below with your submittal. Concerning comment two, I'm going to need the post project contours.

James Lindsay, CFM
Michael Baker Jr.
165 South Union Boulevard, Suite 200
Lakewood, CO 80228
720-514-1122

From: Jake Serago - FCDX [mailto:JakeSerago@mail.maricopa.gov]
Sent: Thursday, August 15, 2013 12:17 PM
To: Lindsay, James
Cc: Catherine Regester - FCDX
Subject: RE: Additional Data Required for Town of Queen Creek and Maricopa County, AZ (Case No. 13-09-2145P) – Receipt Requested

James,

Good morning, this electronic response is being sent to verify that the previous email containing the request for additional information has been received.

Also, before submitting the data I want to ascertain the work for which we are opting;

1. Following review and comparison of the as-built drawings and recent mapping, triggered by your comment, the cross-sections at stations 265+00, 269+00, and 274+00 were found to have an insufficient number of cross-section coordinates. Therefore, with respect to the top widths, the work maps are accurate and the minor error lies in the HEC-RAS model. New cross-section geometry was cut from the recent mapping for the three cross-sections, checked against the as-built drawings and incorporated into the model. Results show as much as 0.01% change in W.S.E. and top widths match the work map.

2. Shapefiles for the streamline and cross-sections will be included with the appropriate references and documentation on the projection. You requested a topographic contour shapefile. Would you like the pre- or post-project contours?

Please let me know if the procedure to address the first comment is suitable. Also, what kind of documentation would you like to see append the model?

Best,

Jake M. Serago, EIT
Hydrologist, FCDMC
602.506.4973

From: Lindsay, James [mailto:JGLindsay@mbakercorp.com]
Sent: Monday, August 05, 2013 1:05 PM
To: Jake Serago - FCDX
Cc: Catherine Regester - FCDX; Tim Phillips - FCDX; chris.dovel@queencreek.org; Kuechenmeister, Joseph
Subject: Additional Data Required for Town of Queen Creek and Maricopa County, AZ (Case No. 13-09-2145P) – Receipt Requested

Dear Mr. Serago:

This responds to your request dated May 7, 2013, that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas.

We have reviewed your request and determined that additional data are required to complete our review. The attached letter describes the data needed to continue reviewing your request. This e-mail replaces the paper copy of the letters previously issued by FEMA. We ask that you please respond directly to this e-mail to verify that it has been received.

If we do not receive all data items outlined in the attached letter within 90 days of the date of this e-mail, we will suspend our processing of your request. Any data submitted after 90 days will be treated as an original submittal and will be subject to all submittal/payment procedures, including the flat review and processing fee for requests of this type established by the current fee schedule. A copy of the current fee schedule is available on the FEMA web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm for your information.

If you have general questions about your request, FEMA policy, or the National Flood Insurance Program, please call the FEMA Map Information eXchange (FMIX), toll free, at 1-877-FEMA MAP (1-877-336-2627). If you have specific questions concerning your request, please contact the case reviewer using the information listed below, or the Revisions Coordinator for your request, Mr. Joseph Kuechenmeister, P.E., CFM, at jkuechenmeister@mbakercorp.com or at (720) 479-3181.

Please be assured we will do our best to respond to all inquiries in a timely manner.

Thank you,

Mr. James Lindsay, CFM
FEMA Production and Technical Services Contractor
165 South Union Boulevard, Suite 200
Lakewood, CO 80228
720-514-1122
JGLindsay@mbakercorp.com

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

Mr. Chris Dovel
Town Engineer
Town of Queen Creek

Ms. Catherine W. Regester, P.E., CFM
Flood Control District of Maricopa County

U.S. DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

O.M.B No. 1660-0016
Expires February 28, 2014

PAPERWORK BURDEN DISCLOSURE NOTICE

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

PRIVACY ACT STATEMENT

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

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

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

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

A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

☐ CLOMR: A letter from DHS-FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60, 65 & 72).

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

B. OVERVIEW

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

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Example: 480301 480287	City of Katy Harris County	TX TX	48473C 48201C	0005D 0220G	02/08/83 09/28/90
040132	Town of Queen Creek	AZ	04013C	3060H	09/30/05
040037	Maricopa County	AZ	04013C	3060H	09/30/05

2. a. Flooding Source: Sonoqui Wash

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

   ☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

3. Project Name/Identifier: Sonoqui Wash Channelization, Phase II - FCDMC #2008C025

4. FEMA zone designations affected: AO, 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 ☐ Base Map Changes

   ☐ Coastal Analysis ☒ Hydraulic Analysis ☐ Hydrologic Analysis ☐ Corrections

   ☐ Weir-Dam Changes ☐ Levee Certification ☐ Alluvial Fan Analysis ☐ Natural Changes

   ☒ New Topographic Data ☐ Other (Attach Description)

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

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

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

☐ Dam ☐ Fill ☐ Other (Attach Description)

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

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☒ Yes Fee amount: $5000.00

☐ No, Attach Explanation

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

D. SIGNATURE

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

Name: Jake Serago, Hydrologist	Company: Flood Control District of Maricopa Count	
Mailing Address: 2801 W Durango St Phoenix, AZ 85009	Daytime Telephone No.: 602-506-4973	Fax No.: 602-506-4601
	E-Mail Address: jakeserago@mail.maricopa.gov	
Signature of Requester (required):	Date: 05.09.2013	

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirements for when fill is placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. For Conditional LOMR requests, the applicant has documented Endangered Species Act (ESA) compliance to FEMA prior to FEMA's review of the Conditional LOMR application. For LOMR requests, I acknowledge that compliance with Sections 9 and 10 of the ESA has been achieved independently of FEMA's process. For actions authorized, funded, or being carried out by Federal or State agencies, documentation from the agency showing its compliance with Section 7(a)(2) of the ESA will be submitted. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 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: Timothy S. Phillips, P.E., Chief Engineeer & General Manager	Community Name: Maricopa County	
Mailing Address: 2801 W Durango St Phoenix, AZ 85009	Daytime Telephone No.: 602-506-4001	Fax No.: 602-506-7346
	E-Mail Address: tsp@mail.maricopa.gov	
Community Official's Signature (required):	Date: 5/9/13	

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 data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.2(b) and as described in the MT-2 Forms Instructions. 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: Catherine W. Regester	License No.: AZ 37883	Expiration Date: 9/30/2014
Company Name: Flood Control District of Maricopa County	Telephone No.: 602-506-4001	Fax No.: 602-506-4601
Signature: Catherine W. Regester	Date: 5/13/13	E-Mail Address: cwr@mail.maricopa.gov

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

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

Seal (Optional)

U.S. DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

O.M.B No. 1660-0016
Expires February 28, 2014

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This request is for a (check one):

☐ CLOMR: A letter from DHS-FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60, 65 & 72).

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

B. OVERVIEW

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

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Example: 480301 480287	City of Katy Harris County	TX TX	48473C 48201C	0005D 0220G	02/08/83 09/28/90
040132	Town of Queen Creek	AZ	04013C	3060H	09/30/05
040037	Maricopa County	AZ	04013C	3060H	09/30/05

2. a. Flooding Source: Sonoqui Wash

   b. Types of Flooding: ☒ Riverine ☐ Coastal ☐ Shallow Flooding (e.g., Zones AO and AH) ☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

3. Project Name/Identifier: Sonoqui Wash Channelization, Phase II - FCDMC #2008C025

4. FEMA zone designations affected: AO, 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 ☐ Base Map Changes
   ☐ Coastal Analysis ☒ Hydraulic Analysis ☐ Hydrologic Analysis ☐ Corrections
   ☐ Weir-Dam Changes ☐ Levee Certification ☐ Alluvial Fan Analysis ☐ Natural Changes
   ☒ New Topographic Data ☐ Other (Attach Description)

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

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

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

☐ Dam ☐ Fill ☐ Other (Attach Description)

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

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☒ Yes Fee amount: $5000.00

☐ No, Attach Explanation

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

D. SIGNATURE

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

Name: Jake Serago, Hydrologist	Company: Flood Control District of Maricopa Count	
Mailing Address: 2801 W Durango St Phoenix, AZ 85009	Daytime Telephone No.: 602-506-4973	Fax No.: 602-506-4601
	E-Mail Address: jakeserago@mail.maricopa.gov	
Signature of Requester (required):	Date: 05.09.2013	

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirements for when fill is placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. For Conditional LOMR requests, the applicant has documented Endangered Species Act (ESA) compliance to FEMA prior to FEMA's review of the Conditional LOMR application. For LOMR requests, I acknowledge that compliance with Sections 9 and 10 of the ESA has been achieved independently of FEMA's process. For actions authorized, funded, or being carried out by Federal or State agencies, documentation from the agency showing its compliance with Section 7(a)(2) of the ESA will be submitted. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 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: Chris Dovel, Town Engineer	Community Name: Town of Queen Creek	
Mailing Address: 22358 S. Ellsworth Road Queen Creek, AZ 85142	Daytime Telephone No.: 480-358-3067	Fax No.: 480-358-3105
	E-Mail Address: chris.dovel@queencreek.org	
Community Official's Signature (required):	Date: 5/7/2013	

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 data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.2(b) and as described in the MT-2 Forms Instructions. 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: Catherine W. Regester	License No.: AZ 37883	Expiration Date: 9/30/2014
Company Name: Flood Control District of Maricopa County	Telephone No.: 602-506-4001	Fax No.: 602-506-4601
Signature: Catherine W. Regester	Date: 5/13/13	E-Mail Address: cwr@mail.maricopa.gov

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

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

Seal (Optional)

FEDERAL EMERGENCY MANAGEMENT AGENCY

PAYMENT INFORMATION FORM

Community Name: Maricopa County

Project Identifier: Sonoqui Wash Channelization, Phase II - FCDMC #2008C025

THIS FORM MUST BE MAILED, ALONG WITH THE APPROPRIATE FEE, TO THE ADDRESS BELOW OR FAXED TO THE FAX NUMBER BELOW.

Please make check or money order payable to the National Flood Insurance Program.

Type of Request:

☐ MT-1 application
☒ MT-2 application

LOMC Clearinghouse
847 South Pickett Street
Alexandria, VA 22304-4605
Attn.: LOMC Manager

☐ EDR application

FEMA Project Library
847 South Pickett Street
Alexandria, VA 22304-4605
FAX (703) 212-4090

Request No. (if known): _____ **Check No.:** AD00330020727 **Amount:** $5000.00

☐ INITIAL FEE* ☐ FINAL FEE ☐ FEE BALANCE** ☐ MASTER CARD ☐ VISA ☒ CHECK ☐ MONEY ORDER

*Note: Check only for EDR and/or Alluvial Fan requests (as appropriate).

****Note: Check only if submitting a corrected fee for an ongoing request.**

COMPLETE THIS SECTION *ONLY* IF PAYING BY CREDIT CARD

CARD NUMBER EXP. DATE

				–					–					–					–		
1	2	3	4		5	6	7	8		9	10	11	12		13	14	15	16		Month		Year

_____ _____

Date Signature

NAME *(AS IT APPEARS ON CARD)*: _____
(please print or type)

ADDRESS: _____
(for your credit card receipt-please print or type) _____

DAYTIME PHONE: _____

Flood Control District
of Maricopa County

INTEROFFICE MEMORANDUM

Date: May 07, 2013

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

From: Jake M. Serago, Hydrologist, Hydrology and Hydraulics Branch JMS

Subject: LOMR for Sonoqui Wash Channelization Project Phase II, Chandler Heights Road to Marsh Road, Contract FCD 2008C025

This memo is a request for your signature on the MT-2 Overview & Concurrence form. This form is required by FEMA for processing a LOMR based on As-Built Information. The CLOMR was previously issued by FEMA on June 26, 2012. We are currently obtaining a concurrence signature from the Town of Queen Creek and will add that to the LOMR package before sending it to FEMA for review and approval.

This revision re-delineates approximately 1.7 linear miles of limited detail Zone AE floodplain resulting in the removal of approximately 20 parcels from the flood hazard zone. Additionally, Phase II will provide an outfall for Sonoqui Phase III, part of which is currently under construction.
If you have any questions regarding the document form or otherwise, please contact me at 64973.

Thanks,

Jake M. Serago, EIT, CFM

Enclosures: LOMR Package – CD
Overview & Concurrence form
Annotated FIRM (not to scale)

Coor: Amir Motamedi 5/7/13
Ed Raleigh 5/8/2013
Gary Wesch

2801 West Durango Street Phoenix, Arizona 85009 Phone: 602-506-1501 Fax: 602-506-4601

SONOQUI WASH PHASE II LOMR
CHIEF ENGINEER SIGNATURE REQUEST
ALL OTHERS IN BLUE - INITIAL REQUEST ON FCD MEMO

PLEASE RETURN TO OR CALL JMS 64973

Chief Eng[redacted]General Manager	Intl	Date
Phillips, T.		
Lemmon, J.		
Medina, A.		
PIO		
Munoz, J.		
Bono, J.		
Alexander, A.		
Smith, D.		
Administration Division		
Fazio, C.		
Human Resources		
Fite, Michele		
Contract Services		
Simonski, S.		
Mageo, H.		
Nesadurai, G.		
Rogers, S.		
Financial Services		
Turner, D.		
Scott, K.		
Arteaga, C.		
Campbell, J.		
Costa, D.		
Rose, D.		
Support Services		
Wilson, Deb		
Harrington, C.		
Charles, S.		
Delpier, C.		
Figueroa, L.		
Gonzalez, J.		
Lepe, N.		
Summers, A.		
Wu, S.		
Engineering Division		
Raleigh, E.	5/6	
Merkevicius, M.		
Special Projects		
Loomis, T.		
Melo-Rodriguez, P.		
Gerlach, S.		

Hydrology/Hydraulics	Intl	Date
Motamedi, A.	5/7	
Cox, J.		
Gross, K.		
Harris, R.		
Rakestraw, K.		
Regester, C.		
Serago, J.		
Shelton, J.		
Waskowsky, R.		
Civil/Structures		
Riddle, J.		
Brown, S.		
Garcia, Y.		
Glover, A.		
Guzman, J.		
Hanumaiah, K.		
Hardesty, A.		
Jones, M.		
Kehlenbach, F.		
Leahy, K.		
Shapiro, G.		
Wagner, J.		
Mapping & Surveying		
Stock, J.		
Ashley, J.		
Orr, J.		
Flood Warning		
Waters. S.		
Henz, D.		
Gardner, D.		
Miller, C.		
Hydromets		
Randez, R.		
Bushelman, J.		
Irizarry, B.		
Ontiveros, A.		
Water Quality		
Oller, M.		
Cziensch, J.		
Eng App Dev/ River Mechanics		
Zhao, B.		
Card, G.		
Carriaga, C.		
Chill, J.		
Li, S.		
GIS Division		
Smith, J.		

System Programmers-GIS[redacted]	Intl	Date
Wolfson, L.		
Akuoko, K.		
Bota, G.		
Furnas, C.		
Mapping Services-GIS.		
LaVallee, K.		
Blair, T.		
Bruffy, S.		
Feldman, E.		
McGlincy, B.		
Wong, N.		
O & M Division		
Klenner, C.		
Wiley, R.		
O&M Supervisor		
Rubin, S.		
O&M/WCC		
Leal, B		
Arntz, E.		
Moncayo, R.		
Peters, T.		
Ramirez, M.		
Wallace, N.		
Central Yard		
Barnes, J.		
North Yard		
Shaffer, R.		
Wise, J.		
East Yard		
Loy, E.		
Ecology		
Siegfried, T.		
Shop		
Browne, G.		
Chavez, S.		
Thompson, Q.		
Villalobos, I.		
Willard, M.		
PPM Division		
Rerick, D.		
Cooper, H.		
Holcomb, D.		
Reinbold, L.		
CIP/Policy		
Schafer, P.		

Planning	Intl	Date
Williams, D.		
Ahouraiyan, A.		
Ganados, B.		
Hathaway, J.		
Jones, G.		
Lokey, B.		
Pinto, T.		
Pokorski, J.		
Stuart, D.		
Swick, V.		
Terry, F.		
Structures Management Branch		
Renckly, T.		
Degerness, D.		
Duffy, D.		
Greenslade, M.		
Lawrence, D.		
Minero, A.		
Sherman S.		
Project Mgmt.		
Vogel, S.		
Beuche, A.		
Duncan, M.		
Maiers, G.		
Ohler, B.		
Stevens, B.		
Wesch, G.	5/7/13	
Construction		
Huber, F.		
Coulter, M.		
Lewis, M.		
Rodriguez Jr, J.		
Salisbury, D.		
Shivaswamy, S.		
Stanley, M.		
Towers, M.		
Real Estate Division.		
Wilson, M.		
Bell, L.		
Lawton, H.		
Prop. Acq.		
Scott, G.		
Berg, S.		
Leonard, G.		
Mertz, P.		
Paulson, P.		
Pettigrew, K.		
Romero, K.		
Sachs, R.		

Property Management.	Intl	Date
Cunningham, D.		
Amos, L.		
Anderssohn, K.		
Carlsmith, N.		
Johnston, T.		
Warburton, S.		
Property Engineering .		
Green, K.		
Burns, J.		
Campbell. J.		
Cummings, B.		
Hernandez, A.		
King, M.		
Sanchez, J.		
Van Schoyck, L.		
Stanczyk, S.		
Velasco, D.		
FMS Management & Services		
Sertich, K.		
Gorbenko, A.		
Marshall, S.		
MPTP		
Murphy, T.		
Brown, F.		
Tavassoli, F.		
McGuire, S.		
Frago, M.		
Technical Plan Review		
Thomas, L.		
DeRoulhac, K.		
DeVlieg, C.		
Lapp, S.		
Nangare, M.		
Teneva, M.		
FMS Floodplain		
Schneeman, J.		
Castillo, K.		
LeBeau, D.		
Mendoza, K.		
Enforcement /Inspections		
Smith, M.		
Bancod, F.		
Schwartz, G.		

Central Files.

File#

Comments

Conta

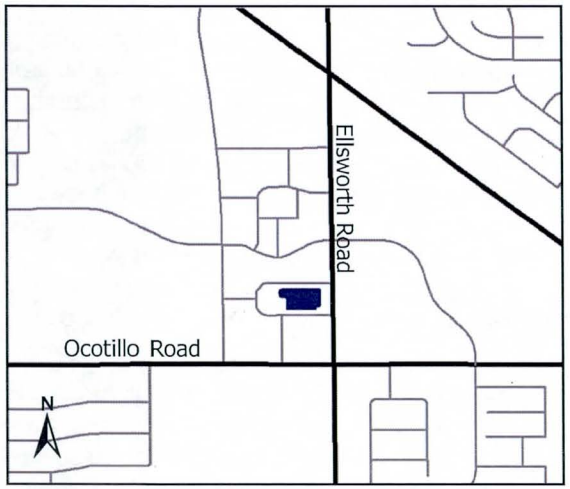
If you are unable to attend the final public meeting scheduled for the design phase of the project, please contact Gary Wesch, project manager, with any concerns or questions (especially between 1am and 4am in the morning:)

Gary Wesch, P.E.
Project Manager
Flood Control District of Maricopa County
(602) 506-4592
garywesch@mail.maricopa.gov

Dick Schaner, P.E.
Town of Queen Creek
(480) 358-3136
dick.schaner@queencreek.org

Open House

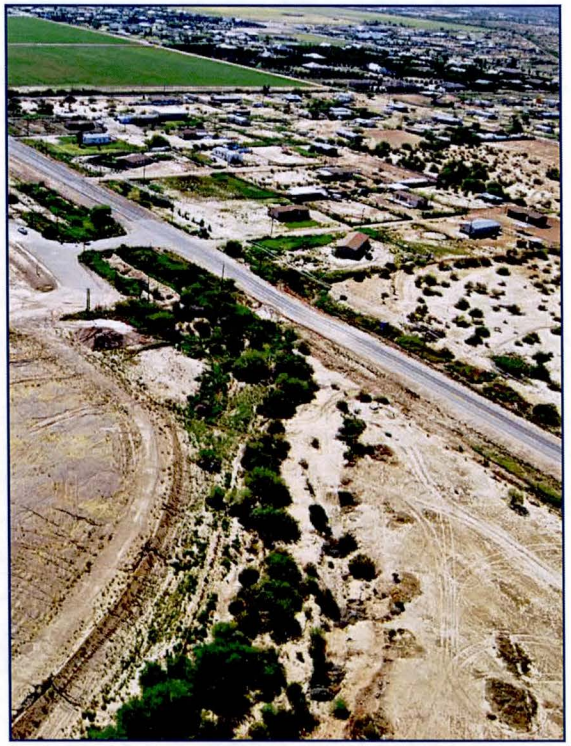
Sept. 15, 2009
6:00-7:30PM
Town of Queen Creek Branch Library
Zane Gray Conference Room
21802 S. Ellsworth Road, Queen Creek



Flood Control District of Maricopa County
2801 West Durango Street
Phoenix Arizona 85009

September 2009

Sonoqui Wash Channelization Phase II



Supervisor Fulton Brock, District 1
Mayor Art Sanders, Town of Queen Creek

www.fcd.maricopa.gov

Sonoqui Wash Channelization Phase II

Project Overview

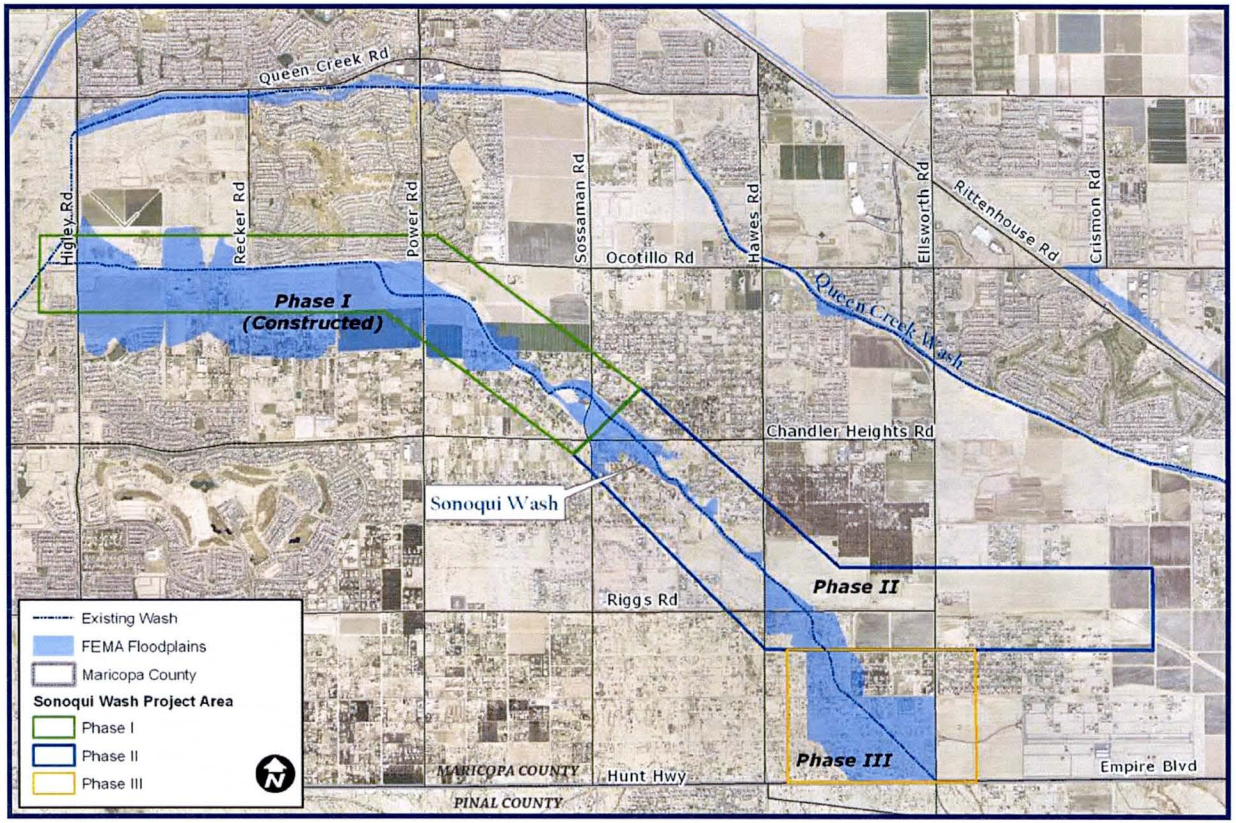
The Flood Control District of Maricopa County (District), in partnership with the Town of Queen Creek, continues the design of the second of three phases of Sonoqui Wash Channelization, a multi-use storm water conveyance channel in the East Valley capable of containing a 100-year storm event along the wash.

A second and final public meeting is scheduled for the design phase of the project that will illustrate specific details of the project's design progress to date. This will include the proposed improvements to Sonoqui Wash Phase II as it relates to the project's right-of-way, access, existing and proposed utilities, channel alignment and cross section, multi-use opportunities, landscape and grading treatments, and the aesthetic treatments of drainage structures.

The project began in 2000 with the Sonoqui Wash Floodplain Delineation Study and the Queen Creek and Sonoqui Wash Hydraulic Master Plan. The study indicated that significant ponding and flow breakouts occur along Sonoqui Wash. In most areas, the existing Sonoqui Wash does not contain a 100-year storm without inundating adjacent properties.

Phase I construction was completed and dedicated in spring 2008. Phase II consists of an earthen channel from Chandler Heights Road southeast to Riggs Road and along Riggs Road from just east of Hawes Road to Crismon Road. The total length of the project is approximately 3.5 miles. Multi-use features include increased opportunities for trails linking existing and planned park sites including the Horseshoe Park and Equestrian Centre.

The District and Town have conducted three Project Aesthetic Advisory Committee meetings and one Public Meeting to present initial alternatives, the preferred alternative, and preliminary landscape, multi-use, and aesthetic concepts for the project.



map not to scale

Project Benefits

- Reduces the existing floodplain width from one-quarter mile to approximately 200 feet;
- Provides a conveyance outfall for future Phase III;
- Provides fiscally responsible solutions for flood hazards, saving taxpayer dollars;
- Improves public safety and quality of life currently impacted by flooding;
- Increases opportunities for multi-use facilities; and
- Preserves open space

Related Projects

In coordination with the channel project, the Maricopa County Department of Transportation and the Town of Queen Creek are partnering on the Riggs Road crossing of Sonoqui Wash. The Riggs Road crossing will provide all-weather vehicular access along a crucial east-west corridor. The project is currently in the design phase.

Schedule

The completion of design is scheduled for November 2009. Construction is tentatively scheduled to begin in mid-2010.

OWNER ADDRESS	OWNER CITY	OWNER STATE	OWNER ZIP
17118 ROSITA DR	FOUNTAIN HILLS	AZ	85268
19602 CALLE DE FLORES	QUEEN CREEK	AZ	85242
PO BOX 67638	PHOENIX	AZ	85082
PO BOX 921	QUEEN CREEK	AZ	85242
22837 S 194TH PL	QUEEN CREEK	AZ	85242
22949 S 193RD ST	QUEEN CREEK	AZ	85242
PO BOX 9602	CHANDLER HEIGHTS	AZ	85227
19101 E VIA DE PALMAS	QUEEN CREEK	AZ	85242
PO BOX 326	QUEEN CREEK	AZ	85242
PO BOX 391	QUEEN CREEK	AZ	85242
20934 E ORCHARD LN	QUEEN CREEK	AZ	85242
20819 E MEWES RD	QUEEN CREEK	AZ	85242
21303 E MEWS RD	QUEEN CREEK	AZ	85242
19773 E CHERRY WOOD DR	QUEEN CREEK	AZ	85242
19933 E SAN TAN BLVD	QUEEN CREEK	AZ	85242
19901 E CHANDLER HEIGHTS RD NO 108	QUEEN CREEK	AZ	85242
21306 E EXCELSION AVE	QUEEN CREEK	AZ	85242
24714 S 211TH PL	QUEEN CREEK	AZ	85242
20959 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
19012 E VIA DE PALMAS	QUEEN CREEK	AZ	85242
3500 E LINCOLN DR	PHOENIX	AZ	85018
19133 E VIA DE ARBOLES	QUEEN CREEK	AZ	85242
1330 N 40TH ST STE 5	MESA	AZ	85205
PO BOX 546	QUEEN CREEK	AZ	85242
19590 E VIA DEL ORO	QUEEN CREEK	AZ	85242
1857 AMBER CT	PRESCOTT	AZ	86301
601 5TH AVE	SCOTTSBLUFF	NE	69361
7047 E GREENWAY PKWY NO 180	SCOTTSDALE	AZ	85254
24702 ROLLINGWOOD RD	LAKE FOREST	CA	92630
19124 E CLOUD RD	QUEEN CREEK	AZ	85242
3929 E DESERT FLOWER LN	PHOENIX	AZ	85044
2380 PERFORMANCE DR RGV D7 450	RICHARDSON	TX	75082
905 N CITRUS COVE	MESA	AZ	85213
19713 E CHERRY HILLS PL	QUEEN CREEK	AZ	85242
19418 E VIA DEL PALO	QUEEN CREEK	AZ	85242
23411 S VIA DEL ARROYO	QUEEN CREEK	AZ	85242
PO BOX 769	QUEEN CREEK	AZ	85242
PO BOX 769	QUEEN CREEK	AZ	85242
PO BOX 489	QUEEN CREEK	AZ	852420489
3363 E ORIOLE WY	CHANDLER	AZ	85249
1783 W 12TH AVE	APACHE JUNCTION	AZ	85220
30705 N 167TH DR	SURPRISE	AZ	85387
1121 W WARNER STE 109	TEMPE	AZ	85284
19622 E CALLE DE FLORES	QUEEN CREEK	AZ	85242
20811 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
26605 S 202ND ST	QUEEN CREEK	AZ	85242
19134 E CLOUD RD	QUEEN CREEK	AZ	85242
19212 E CLOUD RD	QUEEN CREEK	AZ	85242
9748 E LOMPOC AVE	MESA	AZ	85209
1543 E HORSESHOE AVE	GILBERT	AZ	85296
19324 E CLOUD RD	QUEEN CREEK	AZ	85242
20006 E PECAN LN	QUEEN CREEK	AZ	85242
2173 E CHESA PEAK DR	GILBERT	AZ	85234
22890 S 197TH WAY	QUEEN CREEK	AZ	85242
24650 S 195TH ST	QUEEN CREEK	AZ	85242
21087 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
19725 E VIA PARK ST	QUEEN CREEK	AZ	85242
4491 E OXFORD LN	HIGLEY	AZ	85236
24824 S 196TH PL	QUEEN CREEK	AZ	85242
19624 E VIA PARK ST	QUEEN CREEK	AZ	85242
26305 S HAWES RD	QUEEN CREEK	AZ	85242
19415 VIA DEL PALO	QUEEN CREEK	AZ	85242
21118 E PUMMELOS RD	QUEEN CREEK	AZ	85242
20122 E PECAN LN	QUEEN CREEK	AZ	85242

19615 E VIA DEL ORO	QUEEN CREEK	AZ	85242
20124 E HAPPY RD	QUEEN CREEK	AZ	85242
9447 S PALM DR	TEMPE	AZ	85284
24604 S 211TH PL	QUEEN CREEK	AZ	85242
19485 E VIA DEL ORO	QUEEN CREEK	AZ	85242
2676 S TUCANA CT	GILBERT	AZ	85297
19113 VIA DE ARBOLES	QUEEN CREEK	AZ	85242
23903 SE SCOTT RIDGE TERRACE	SHERWOOD	OR	97140
PO BOX 1046	QUEEN CREEK	AZ	85242
3856 E HOLMES	MESA	AZ	85206
545 E LINDA LN	GILBERT	AZ	85234
21029 E MEWES RD	QUEEN CREEK	AZ	852427340
23235 S 197TH PL	QUEEN CREEK	AZ	85242
21336 E ORCHARD LN	QUEEN CREEK	AZ	85242
21133 E ORCHARD LN	QUEEN CREEK	AZ	85242
26709 S 202ND PL	QUEEN CREEK	AZ	85242
18924 E CHANDLER HEIGHTS RD	QUEEN CREEK	AZ	85242
19404 E VIA DEL RANCHO	QUEEN CREEK	AZ	85242
19025 E CHANDLER HEIGHTS RD	QUEEN CREEK	AZ	85242
22884 S 194TH ST	QUEEN CREEK	AZ	85242
3765 E VAUGHN AVE	GILBERT	AZ	85296
26623 S 202ND PL	QUEEN CREEK	AZ	85242
20929 E MEWES	QUEEN CREEK	AZ	85242
21055 E ORCHARD LN	QUEEN CREEK	AZ	85242
19363 E VIA DEL PALO	QUEEN CREEK	AZ	85242
22320 S 211TH ST	QUEEN CREEK	AZ	85242
PO BOX 546	QUEEN CREEK	AZ	85242
26704 S 203RD STREET	QUEEN CREEK	AZ	85242
21258 E ORCHARD LN	QUEEN CREEK	AZ	85242
18108 E VENCINO ST	HIGLEY	AZ	85236
21268 PEGASUS PKWY	QUEEN CREEK	AZ	85242
21268 E PEGASUS PKWY	QUEEN CREEK	AZ	85242
19912 E SAN TAN RD	QUEEN CREEK	AZ	85242
21309 E EXCELSIOR AVE	QUEEN CREEK	AZ	852425566
19302 E VIA DE ARBOLES	QUEEN CREEK	AZ	85242
19653 E VIA PARK ST	QUEEN CREEK	AZ	85242
22015 E STONEY VISTA DR	QUEEN CREEK	AZ	85242
22015 E STONEY VISTA DR	QUEEN CREEK	AZ	85242
24527 S 210TH PL	QUEEN CREEK	AZ	85242
19632 E CALLE DE FLORES	QUEEN CREEK	AZ	85242
3121 E JEROME	MESA	AZ	85204
26116 S HOWES RD	QUEEN CREEK	AZ	85242
24721 S 211TH PL	QUEEN CREEK	AZ	85242
23565 S 223RD WY	QUEEN CREEK	AZ	85242
21406 E MEWES RD	QUEEN CREEK	AZ	85242
19676 E COUNTRY MEADOWS DR	QUEEN CREEK	AZ	85242
19914 CALLE DE FLORES	QUEEN CREEK	AZ	85242
2152 S VINEYARD 105	CHANDLER	AZ	85210
19750 E CHERRYWOOD DR	QUEEN CREEK	AZ	85242
21570 E PEGASUS PKWY	QUEEN CREEK	AZ	85021
21151 E MEWES RD	QUEEN CREEK	AZ	85242
261 W PECAN PL	TEMPE	AZ	85284
5538 E DRUMMER	MESA	AZ	85206
22828 S 195TH PL	QUEEN CREEK	AZ	85242
PO BOX 187	QUEEN CREEK	AZ	85242
20713 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
20201 E OCOTILLO RD	QUEEN CREEK	AZ	85242
19313 E VIA DE ARBOLES	QUEEN CREEK	AZ	852429734
12821 S 50TH WAY	PHOENIX	AZ	85044
19426 E VIA DEL PALO	QUEEN CREEK	AZ	85242
20133 E HAPPY RD	QUEEN CREEK	AZ	85242
19555 E VIA DEL ORO	QUEEN CREEK	AZ	852428232
PO BOX 60	GILBERT	AZ	85299
P O BOX 387	CHANDLER HEIGHTS	AZ	85227
24936 S 196TH PL	QUEEN CREEK	AZ	85242

3638 E SOUTHERN AVE STE C105-194	MESA	AZ	85206
21134 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
916 E BASELINE RD 201	MESA	AZ	85204
26016 S 201ST PL	QUEEN CREEK	AZ	85242
P O BOX 6531	CHANDLER	AZ	85246
956 W BRECKENRIDGE	GILBERT	AZ	85233
19880 E CALLE DE FLORES	QUEEN CREEK	AZ	85242
24803 S 194TH ST	QUEEN CREEK	AZ	85242
24508 S 194TH ST	QUEEN CREEK	AZ	85242
19668 E VIA PARK ST	QUEEN CREEK	AZ	85242
3263 S ADELLE	MESA	AZ	852121967
19230 E CLOUD RD	QUEEN CREEK	AZ	85242
23245 S 197TH PL	QUEEN CREEK	AZ	85242
23421 VIA DEL ARROYO	QUEEN CREEK	AZ	85242
P O BOX 31	QUEEN CREEK	AZ	85242
19119 E CHANDLER HEIGHTS RD	QUEEN CREEK	AZ	85242
2375 E SHERRI DR	GILBERT	AZ	85296
3422 E REMINGTON DR	GILBERT	AZ	85297
26215 S 201ST ST	QUEEN CREEK	AZ	85242
22816 S 193RD ST	QUEEN CREEK	AZ	85242
19829 E KARSTEN DR	QUEENCREEK	AZ	85242
22938 S 193RD ST	QUEEN CREEK	AZ	85242
24382 S 150TH ST	CHANDLER	AZ	852499603
19101 E VIA DEL VERDE	QUEEN CREEK	AZ	85242
23435 S 210ST WAY	QUEEN CREEK	AZ	85242
1138 W SEA FOG DR	GILBERT	AZ	85233
5523 WEST CREEKSIDE LANE	QUEEN CREEK	AZ	85242
26607 S 203RD ST	QUEEN CREEK	AZ	85242
19766 E CHERRY WOOD DR	QUEEN CREEK	AZ	85242
4708 N MERCANTILE DR	FORT WORTH	TX	76137
26304 S 201ST WAY	QUEEN CREEK	AZ	85242
21494 E PEGASUS PKWY	QUEEN CREEK	AZ	85242
22686 S 193RD ST	QUEEN CREEK	AZ	85242
21202 E EXCELSIO AVE	QUEEN CREEK	AZ	85242
24703 S 194TH ST	QUEEN CREEK	AZ	85242
1672 E SARATOGA ST	GILBERT	AZ	85296
19695 E COUNTRY MEADOWS	QUEEN CREEK	AZ	85242
26708 S 202ND ST	QUEEN CREEK	AZ	85242
4443 E AMBERWOOD	PHOENIX	AZ	85044
19901 E CHANDLER HEIGHTS RD	QUEEN CREEK	AZ	85242
21384 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
19212 APPLEBY RD	QUEEN CREEK	AZ	85242
24382 S 150 ST	CHANDLER	AZ	85249
21035 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
19739 E INDIANA DR	QUEEN CREEK	AZ	85242
21311 E ORCHARD LN	QUEEN CREEK	AZ	85242
20841 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
3527 E AHWATUKEE CT	PHOENIX	AZ	85044
19695 E VIA DEL ORO	QUEEN CREEK	AZ	85242
19412 E CLOUD	QUEEN CREEK	AZ	85242
19307 E VIA DEL ORO ST	QUEEN CREEK	AZ	85242
21280 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
19515 E VIA DEL ORO	QUEEN CREEK	AZ	85242
19405 E VIA DEL ORO	QUEEN CREEK	AZ	85242
20905 E OCOTILLO	QUEEN CREEK	AZ	852420000
19944 E VIA DE ARBOLES	QUEEN CREEK	AZ	85242
24553 S 194TH ST	QUEEN CREEK	AZ	85242
23580 S 223RD CT	QUEEN CREEK	AZ	85242
948 W 10TH ST	MESA	AZ	85201
25206 S 198TH ST	QUEEN CREEK	AZ	85242
1000 TECHNOLOGY DR MS314	FORT MILL	MO	29715
801 JOHN BARROW RD STE 1	LITTLE ROCK	AR	72205
6718 S CARNEY AVE	TEMPE	AZ	852830000
26620 S 202ND ST	QUEEN CREEK	AZ	85242
P O BOX 3282	CASA GRANDE E M C R B	AZ	85222

19532 E CAMINA PLATA	QUEEN CREEK	AZ	85242
139 E GAIL DR	GILBERT	AZ	85296
24521 S 213TH PL	QUEEN CREEK	AZ	85242
24603 S 194TH ST	QUEEN CREEK	AZ	85242
24615 S 213TH PL	QUEEN CREEK	AZ	85242
21442 E EXCELISIOR AVE	QUEEN CREEK	AZ	85242
19550 E VIA DEL ORO	QUEEN CREEK	AZ	85242
20966 E ORCHARD LN	QUEEN CREEK	AZ	85242
19540 E SILVER CREEK LN	QUEEN CREEK	AZ	85242
25326 S 199TH ST	QUEEN CREEK	AZ	85242
25408 S 198TH ST	QUEEN CREEK	AZ	85242
19712 E CAMINA PLATA	QUEEN CREEK	AZ	852420000
20955 E ORCHARD LN	QUEEN CREEK	AZ	85242
19700 E MEWS RD	QUEEN CREEK	AZ	85242
26619 S 202ND ST	QUEEN CREEK	AZ	85242
20938 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
3684 E REDFIELD CT	GILBERT	AZ	85234
24653 S 194TH ST	QUEEN CREEK	AZ	85242
21538 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
20833 E VIA DEL PALO	QUEEN CREEK	AZ	85242
PO BOX 195	QUEEN CREEK	AZ	85242
2812 N NORWALK 105	MESA	AZ	85215
19230 E VIA DE ARBOLES	QUEEN CREEK	AZ	85242
19823 E RIGGS RD	QUEEN CREEK	AZ	85242
19635 E VIA DEL ORO	QUEEN CREEK	AZ	85242
23265 E VIA DEL ARROYO	QUEEN CREEK	AZ	85242
19122 E VIA DE ARBOLES ST	QUEEN CREEK	AZ	85242
19631 E CAMINA PLATA	QUEEN CREEK	AZ	85242
19631 E CAMINA PLATA	QUEEN CREEK	AZ	85242
19722 E CAMINA PLATA	QUEEN CREEK	AZ	85242
2487 S GILBERT RD	GILBERT	AZ	85296
20314 E EMPIRE BLVD	QUEEN CREEK	AZ	85242
8559 YOUNG RD	CHILLIWACK	BC	V2P 4P2
21565 E ORCHARD PK	QUEEN CREEK	AZ	85242
838 ST MARKS AVE	BROOKLYN	NY	11213
3853 E LAFAYETTE AVE	GILBERT	AZ	85297
267 E CLIFTON AVE	GILBERT	AZ	85296
26216 S 200TH WAY	QUEEN CREEK	AZ	85242
19812 E CALLE DE FLORES	QUEEN CREEK	AZ	85242
25152 S 196TH PL	QUEEN CREEK	AZ	85242
2696 S TUSCANA CT	GILBERT	AZ	85295
321 N LAURA DR	CHANDLER	AZ	85225
19758 E VIA DEL OLIVOS	QUEEN CREEK	AZ	85242
6944 S STAR DR	GILBERT	AZ	85297
19702 CALLE DE FLORES	QUEEN CREEK	AZ	85242
19416 E VIA DEL RANCHO	QUEEN CREEK	AZ	85242
26219 S 201ST ST	QUEEN CREEK	AZ	85242
21030 E EXCELSIOR AVE	QUEEN CREEK	AZ	852427010
20309 E VIA DEL ORO	QUEEN CREEK	AZ	85242
21361 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
1140 W NORTHERN	COOLIDGE	AZ	85228
3053 S CANFIELD	MESA	AZ	85212
19515 E VIA DEL PALO	QUEEN CREEK	AZ	85242
21088 E ORCHARD LN	QUEEN CREEK	AZ	85242
19202 E VIA DE ARBOLES	QUEEN CREEK	AZ	85242
20032 E HAPPY RD	QUEEN CREEK	AZ	85242
23225 S 197TH PL	QUEEN CREEK	AZ	85242
24622 S 213TH PL	QUEEN CREEK	AZ	85242
19977 E VIA DE ARBOLES	QUEEN CREEK	AZ	85242
19303 E VIA DE ARBOLES	QUEEN CREEK	AZ	85242
21157 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
23411 S 197TH ST	QUEEN CREEK	AZ	85242
7832 S 162ND ST	OMAHA	NE	68136
19717 E INDIANA DR	QUEEN CREEK	AZ	85242
20107 E HAPPY RD	QUEEN CREEK	AZ	85242

19022 E VIA DE ARBOLES	QUEEN CREEK	AZ	85242
25814 S 199TH PL	QUEEN CREEK	AZ	85242
26022 S 201ST PL	QUEEN CREEK	AZ	85242
3769 E WOODSIDE LN	GILBERT	AZ	852977886
PO BOX 181	QUEEN CREEK	AZ	85242
20320 E EMPIRE BLVD	QUEEN CREEK	AZ	85242
PO BOX 20095	RENO	NV	89515
3415 VISION DR	COLUMBUS	OH	43219
PO BOX 682	HIGLEY	AZ	85236
1354 S PALOMINO CREEK DR	GILBERT	AZ	85296
19031 E VIA DE PALMAS	QUEEN CREEK	AZ	85242
3476 STATEVIEW BLVD	FORT MILL	SC	29715
3476 STATEVIEW BLVD	FORT MILLS	SC	29715
24708 S 194TH ST	QUEEN CREEK	AZ	85242
20987 E ORCHARD LN	QUEEN CREEK	AZ	85242
382 E NUNNELEY	GILBERT	AZ	85296
20414 E EMPIRE BLVD	QUEEN CREEK	AZ	85242
3638 E SOUTHERN AVE ST C105-194	MESA	AZ	85206
22408 S 211TH PL	QUEEN CREEK	AZ	85242
16148 E CLAXTON AVE	GILBERT	AZ	85297
8709 MOOVALYA DR	PARKER	AZ	85344
21312 E PUMMELOS RD	QUEEN CREEK	AZ	85242
20607 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
19670 E VIA DEL ORO ST	QUEEN CREEK	AZ	85242
3756 E EQUESTRIAN TR	PHOENIX	AZ	85044
26712 S 203RD ST	QUEEN CREEK	AZ	85242
18950 VIA DE PALMAS	HIGLEY	AZ	85236
2733 E CARLA VISTA DR	GILBERT	AZ	85296
25307 S 196TH WY	QUEEN CREEK	AZ	85242
24719 S 213TH PL	QUEEN CREEK	AZ	85242
20982 E ORCHARD LN	QUEENCREEK	AZ	85242
20954 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
24711 S 210 PL	QUEEN CREEK	AZ	85242
19115 E VIA DEL VERDE	QUEEN CREEK	AZ	85242
24419 S 211TH PL	QUEEN CREEK	AZ	85242
20834 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
20824 E ORCHARD LN	QUEEN CREEK	AZ	85242
20965 E MEWES	QUEEN CREEK	AZ	85242
21339 E ORCHARD LN	QUEEN CREEK	AZ	85242
21565 E MEWES RD	QUEEN CREEK	AZ	85242
P.O.BOX 93272	PHOENIX	AZ	85070
PO BOX 1757	QUEEN CREEK	AZ	85242
PO BOX 1757	QUEEN CREEK	AZ	85242
P O BOX 1757	QUEEN CREEK	AZ	85242
19304 E VIA DEL PALO	QUEEN CREEK	AZ	85242
6001 E SOUTHER #31	MESA	AZ	85205
22910 S 194TH ST	QUEEN CREEK	AZ	85242
PO BOX 209	QUEEN CREEK	AZ	85242
21102 E ORCHARD LN	QUEEN CREEK	AZ	85242
19964 E VIA DE ARBOLES	QUEEN CREEK	AZ	85242
24606 S 213TH PL	QUEEN CREEK	AZ	85242
26220 S 201ST ST	QUEEN CREEK	AZ	85242
437 N AUGUSTA LN	PLACENTIA	CA	92870
25711 S 207TH PL	QUEEN CREEK	AZ	85242
19522 E CAMINA PLATA	QUEEN CREEK	AZ	85242
20114 E HAPPY RD	QUEEN CREEK	AZ	85242
22843 S 195TH ST	QUEEN CREEK	AZ	85242
7065 S STAR DR	GILBERT	AZ	85297
628 E RANCH RD	GILBERT	AZ	85296
25424 S 199TH PL	QUEEN CREEK	AZ	85242
20513 SANTAN BLVD	QUEEN CREEK	AZ	85242
21335 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
19601 E CAMINA PLATA	QUEEN CREEK	AZ	852429726
3727 W LIND RD	QUEEN CREEK	AZ	85242
19120 E VIA DE PALMAS	QUEEN CREEK	AZ	85242

19134 VIA DE PALMAS	QUEEN CREEK	AZ	852424047
22857 S 194TH ST	QUEENCREEK	AZ	85242
20735 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
15729 E CHAPALA ST	GILBERT	AZ	85234
18949 E CHANDLER HEIGHTS RD	QUEEN CREEK	AZ	85242
3870 E THORNTON AVE	GILBERT	AZ	85297
PO BOX 529	LAKE HAVASUE CITY	AZ	86405
25413 S 198TH ST	QUEEN CREEK	AZ	85242
20943 E EXCELSIOR	QUEEN CREEK	AZ	85242
20247 E HAPPY RD	QUEEN CREEK	AZ	85242
19675 E VIA DEL ORO	QUEEN CREEK	AZ	85242
24626 S 211TH PL	QUEEN CREEK	AZ	85242
19906 E MEWS RD	QUEEN CREEK	AZ	85242
19403 E VIA DEL RANCHO CIR	QUEEN CREEK	AZ	85242
19673 E COUNTRY MEADOWS DR	QUEEN CREEK	AZ	85242
18939 E CHANDLER HEIGHTS	QUEEN CREEK	AZ	85242
19917 E CALLE DE FLORES	QUEEN CREEK	AZ	85204
19417 E VIA DEL ORO	QUEEN CREEK	AZ	85242
1188 W VIA DE ARBOLES	QUEEN CREEK	AZ	85242
16118 E RIDGEWOOD LN	GILBERT	AZ	85297
26611 S 203RD WY	QUEEN CREEK	AZ	85242
12623 S 71ST ST	TEMPE	AZ	85284
25410 S 198TH PL	QUEEN CREEK	AZ	85242
425 W STRAFORD DR	CHANDLER	AZ	85224
661 W SHAWNEE DR	CHJANDLER	AZ	85224
19021 E VIA DE PALMS	QUEEN CREEK	AZ	85242
15205 E SUNDOWN DR	FOUNTAIN HILLS	AZ	85268
24543 S 195TH ST	QUEEN CREEK	AZ	85242
19428 E VIA DEL RANCHO	QUEEN CREEK	AZ	85242
19814 W MEWS RD	QUEEN CREEK	AZ	85242
770 N WATER ST	MILWAUKEE	WI	53202
19575 E VALLEJO ST	QUEEN CREEK	AZ	85242
20939 E ORCHARD LN	QUEEN CREEK	AZ	852420000
20927 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
20970 E EXCELSIOR	QUEEN CREEK	AZ	852420000
2036 E LAIRD DR	SALT LAKE CITY	UT	84108
21159 E ORCHARD LN	QUEEN CREEK	AZ	85242
21107 E ORCHARD LN	QUEEN CREEK	AZ	85242
21055 E MEWS RD	QUEEN CREEK	AZ	85242
18 H PUTNAM RD	CHARLTON	MA	01507
19918 E MEWS RD	QUEEN CREEK	AZ	85242
301 W JEFFERSON STE 960	PHOENIX	AZ	850032278
537 W 3RD PL	MESA	AZ	85201
26106 S HAWES RD	QUEEN CREEK	AZ	85242
2922 E ENCANTO ST	MESA	AZ	85213
15 W HUNTER CIR	MESA	AZ	85201
19103 VIA DE ARBOLES	QUEEN CREEK	AZ	85242
19724 E INDIANA DR	QUEEN CREEK	AZ	85242
23421 S 197TH PL	QUEEN CREEK	AZ	852420000
63 E MAIN ST STE 100	MESA	AZ	85201
21105 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
25721 S 206TH PL	MESA	AZ	852427455
21056 E EXCESOIR AVE	QUEEN CREEK	AZ	85242
24722 S 195TH ST	QUEEN CREEK	AZ	85242
19619 E RIGGS RD	QUEEN CREEK	AZ	85242
4458 E SOURWOOD DR	GILBERT	AZ	85298
26508 S 203RD WY	QUEEN CREEK	AZ	85242
21082 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
19105 E CHANDLER HEIGHTS RD	QUEEN CREEK	AZ	85242
21029 ORCHARD LANE	QUEEN CREEK	AZ	85242
7448 E NAVARRO AVE	MESA	AZ	85206
19611 E CAMINO PLATA	QUEEN CREEK	AZ	85242
1565 N SINOVA	MESA	AZ	85205
19542 E VIA DEL PALO	QUEEN CREEK	AZ	85242
26520 S 203RD WY	QUEEN CREEK	AZ	85242

26709 S 202ND PL	QUEEN CREEK	AZ	85242
200 S ELIZABETH WAY	CHANDLER	AZ	85225
21183 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
21081 E ORCHARD LN	QUEEN CREEK	AZ	85242
28032 N SEDONA WAY	QUEEN CREEK	AZ	85243
3897 S SETON AVE	GILBERT	AZ	85297
21154 E ORCHARD LN	QUEEN CREEK	AZ	85242
19721 E CALLE DE FLORES	QUEEN CREEK	AZ	85246
21004 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
555 E CACTUS WREN	GILBERT	AZ	85296
1641 WL GILA LN	CHANDLER	AZ	85224
4099 E MEADOWVIEW DR	GILBERT	AZ	85297
1440 E DOWNING ST	MESA	AZ	85203
19704 E COUNTRY MEADOWS DR	QUEEN CREEK	AZ	85242
24409 S 210TH PL	QUEEN CREEK	AZ	85242
24435 S 195TH ST	QUEEN CREEK	AZ	85242
19371 E RAVEN DR	QUEEN CREEK	AZ	85242
19474 E VIA DEL PALO	QUEEN CREEK	AZ	85242
19474 E VIA DEL PALO	QUEEN CREEK	AZ	85242
25306 S 199TH ST	QUEEN CREEK	AZ	85242
741 S JONES AVE	MESA	AZ	85204
19746 E MEWS RD	QUEEN CREEK	AZ	85242
26207 S HAWES	QUEEN CREEK	AZ	85242
20085 E PECAN LN	QUEEN CREEK	AZ	85242
20129 PECAN LN	QUEEN CREEK	AZ	85242
P O BOX 322	COOLIDGE	AZ	85228
19809 E RIGGS RD	QUEEN CREEK	AZ	85242
635 E DETROIT ST	CHANDLER	AZ	85225
19312 E VIA DEL PALO	QUEEN CREEK	AZ	85242
21108 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
N/A	N/A	NA	N/A
20835 E MEWES RD	QUEEN CREEK	AZ	85242
24753 S 194TH ST	QUEEN CREEK	AZ	85242
19503 E VALLEJO ST	QUEEN CREEK	AZ	85242
PO BOX 1402	QUEEN CREEK	AZ	85242
20903 E MEWS RD	QUEEN CREEK	AZ	85242
20120 E PALM BEACH DR	QUEEN CREEK	AZ	85242
20971 E ORCHARD	QUEEN CREEK	AZ	85242
19112 VIA DE ARBOLES	QUEEK CREEK	AZ	85242
26711 S 202ND ST	QUEEN CREEK	AZ	85242
19312 VIA DE ARBOLES	QUEEN CREEK	AZ	85242
19323 E VIA DEL ORO	QUEEN CREEK	AZ	85242
23420 S VIA DEL ARROYO ST	QUEEN CREEK	AZ	85242
555 W PAMPA AVE	MESA	AZ	85202
20141 E PALM BEACH DR	QUEEN CREEK	AZ	85242
10502 E POSADA AVE	MESA	AZ	85212
19535 E VIA DEL ORO	QUEEN CREEK	AZ	85242
613 S MARINA DR	GILBERT	AZ	85233
20039 E HAPPY RD	QUEEN CREEK	AZ	85242
528 E STOTTLER DR	GILBERT	AZ	85296
7072 ZUBARON LN	CARLSONBAD	CA	92009
9362 E RAINTREE DR	SCOTTSDALE	AZ	85260
3941 E CHANDLER BLVD STE #106-117	CHANDLER	AZ	85048
24527 S 210TH PL	QUEEN CREEK	AZ	85242
23618 S 197TH PL	QUEEN CREEK	AZ	85242
21435 E MEWES RD	QUEEN CREEK	AZ	85242
25207 S 198TH ST	QUEEK CREEK	AZ	85242
2834 E MALVERN ST	TUCSON	AZ	85716
19530 E VIA DEL ORO ST	QUEEN CREEK	AZ	85242
20117 E CHESTNUT ST	QUEEN CREEK	AZ	85242
20038 EAST PALM BEACH DRIVE	QUEEN CREEK	AZ	85242
19820 E CAMINA PLATA	QUEEN CREEK	AZ	85242
21119 E MEWES RD	QUEEN CREEK	AZ	85242
19813 E MEWS	QUEEN CREEK	AZ	85242
19917 E CALLE DE FLORES	QUEEN CREEK	AZ	85242

1121 W WARNER RD STE 109	TEMPE	AZ	85284
1121 W WARNER RD STE 109	TEMPE	AZ	85284
19924 E VIA DE ARBOLES	QUEEN CREEK	AZ	85242
20127 E PALM BEACH DR	QUEEN CREEK	AZ	85242
26627 S 203RD RD	QUEEN CREEK	AZ	85242
25223 S 196TH WY	QUEEN CREEK	AZ	85242
260 E BAYLOR LN	GILBERT	AZ	85296
20011 E PECAN LN	QUEEN CREEK	AZ	85242
19460 E VIA DEL ORO	QUEEN CREEK	AZ	852428245
25224 S 196TH WY	QUEEN CREEK	AZ	85242
1121 W WARNER RD NO 109	TEMPE	AZ	85284
19602 E CAMINO PLATA ST	QUEEN CREEK	AZ	85242
19602 E CAMINO PLATA	QUEEN CREEK	AZ	85242
19731 E CHERRY HILLS PL	QUEEN CREEK	AZ	85242
19650 E VIA DEL ORO	QUEEN CREEK	AZ	85242
21003 E ORCHID LN	QUEEN CREEK	AZ	85242
21329 E MEWES RD	QUEEN CREEK	AZ	85242
24411 S 211TH PL	QUEEN CREEK	AZ	85242
24625 S 210TH PL	QUEEN CREEK	AZ	85252
21235 E MEWES RD	QUEEN CREEK	AZ	852425295
19815 E MEWS RD	QUEEN CREEK	AZ	85242
21283 E EXCELSOR AVE	QUEEN CREEK	AZ	85242
2189 W WILDHORSE DR	CHANDLER	AZ	852481144
891 E GAIL DR	GILBERT	AZ	85296
19202 E VIA DE PALMAS	QUEEN CREEK	AZ	85242
535 E MCKELLIPS STE 131	MESA	AZ	85203
1121 W WARNER RD STE 109	TEMPE	AZ	85254
3941 E CHANDLER BLVD 106-117	PHOENIX	AZ	85048
PO BOX 93272	PHOENIX	AZ	85070
22350 S ELLSWORTH RD	QUEEN CREEK	AZ	85242
19148 E VIA DE PALMAS ST	QUEEN CREEK	AZ	85242
861 N PINEVIEW DR	CHANDLER	AZ	85226
11435 N DRIVE NORTH	BATTLE CREEK	MI	49014
19595 E VIA DEL ORO	QUEEN CREEK	AZ	85242
19723 E INDIANA AVE	QUEEN CREEK	AZ	85242
19932 E SAN TAN BLVD	QUEEN CREEK	AZ	85242
5311 S PALM DR	TEMPE	AZ	852831918
23040 S SOSSAMAN RD	QUEEN CREEK	AZ	852420000
19361 E CALLE DE FLORES	QUEEN CREEK	AZ	85242
1102 W GREGORY RD	PHOENIX	AZ	85041
21362 E ORCHARD LN	QUEEN CREEK	AZ	85242
20078 E PECAN LN	QUEEN CREEK	AZ	85242
5424 S 32ND ST	PHOENIX	AZ	85040
5424 S 32ND ST	PHOENIX	AZ	85040
19212 E VIA DE ARBOLES	QUEEN CREEK	AZ	85242
19038 E VIA DE PALMAS	QUEEN CREEK	AZ	85242
22853 S 195TH PL	QUEEN CREEK	AZ	85242
5182 LOS ENCANTOS	LA PALMA	CA	90623
22960 S 194TH ST	QUEEN CREEK	AZ	85242
19480 E VIA DE ORO	QUEEN CREEK	AZ	852428245
6957 E LAGUNA AZUL CIR	MESA	AZ	85208
4001 OLD MILL RD	ALEXANDRIA	VA	22309
21535 E EXCELLIOR	QUEEN CREEK	AZ	85242
19229 E VIA DE ARBOLES	QUEEN CREEK	AZ	85242
23252 S VIA DEL ARROYO	QUEEN CREEK	AZ	85242
20861 E ORCHARD LN	QUEEN CREEK	AZ	852427001
933 N HAZELTON CT	CHANDLER	AZ	85226
19147 E VIA DEL VERDE	QUEEN CREEK	AZ	85242
20986 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
19531 E CAMINA PLATA	QUEEN CREEK	AZ	85242
20118 E HAPPY RD	QUEEN CREEK	AZ	85242
21284 E ORCHARD LN	QUEEN CREEK	AZ	85242
21287 E ORCHARD LN	QUEEN CREEK	AZ	852425458
10309 W CALYPSO AVE	MESA	AZ	85208
19106 E VIA DE PALMAS ST	QUEEN CREEK	AZ	85242

21533 E ORCHARD LN	QUEEN CREEK	AZ	85242
22816 S 194TH PL	QUEEN CREEK	AZ	85242
2125 W MISSOURI AVE	PHOENIX	AZ	85015
19510 E VIA DEL ORO	QUEEN CREEK	AZ	85242
21128 E ORCHARD LN	QUEEN CREEK	AZ	85242
24625 S 211TH PL	QUEEN CREEK	AZ	85242
1412 E CHICAGO CIRCLE	CHANDLER	AZ	852250000
PO BOX 712	QUEEN CREEK	AZ	85242
829 E KYLE CT	GILBERT	AZ	85296
907 E SAN REMO AVE	GILBERT	AZ	85234
25315 S 198TH PL	QUEEN CREEK	AZ	85242
19757 E CHERRYWOOD DR	QUEEN CREEK	AZ	85242
1514 W TODD DR STE B103	TEMPE	AZ	852834846
20740 S ELLSWORTH RD	QUEEN CREEK	AZ	85242
24708 S 194TH ST	QUEEN CREEK	AZ	85242
19201 E VIA DE PALMAS ST	QUEEN CREEK	AZ	85242
20123 E CHESTNUT DR	QUEEN CREEK	AZ	85242
19625 E VIA DEL RANCHE	QUEEN CREEK	AZ	85242
19302 E CLOUD RD	QUEEN CREEK	AZ	85242
25311 S 198TH PL	QUEEN CREEK	AZ	85242
19716 E INDIANA AVE	QUEEN CREEK	AZ	85242
20918 E ORCHARD LN	QUEEN CREEK	AZ	85242
PO BOX 20247	MESA	AZ	85277
24715 S 211TH ST	QUEEN CREEK	AZ	85242
3603 W FOX RIDGE LN NO C	PALOS VERDES PENINSULA	CA	90274
19632 E CAMINO PLATA	QUEEN CREEK	AZ	85242
4180 S SPLENDOR CT	GILBERT	AZ	85297
2825 E RANCH CT	GILBERT	AZ	85296
21135 E MEWES RD	QUEEN CREEK	AZ	85242
29 WINTER GREEN HILL	DANBURY	CT	06811
19150 E VIA DEL VERDE	QUEEN CREEK	AZ	85242
19442 E VIA DEL PALO	QUEEN CREEK	AZ	85242
19911 E SAN TAN BLVD	QUEEN CREEK	AZ	85242
400 N 5TH ST 1600	PHOENIX	AZ	85004
3636 N CENTRAL AVE STE 140	PHOENIX	AZ	850121971
3636 N CENTRAL AVE STE 140	PHOENIX	AZ	850121971
19701 E CALLE DE FLORES ST	QUEEN CREEK	AZ	85242
PO BOX 309	HIGLEY	AZ	852360309
21358 E ENCELSOIR AVE	QUEEN CREEK	AZ	85242
2220 W THOMPSON PL	CHANDLER	AZ	85248
1325 CHORRO ST	SAN LUIS OBISPO	CA	93401
20623 E EXCELSIOR	QUEEN CREEK	AZ	85242
20705 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
21160 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
19465 E VIA DEL ORO	QUEEN CREEK	AZ	85242
2666 CREEK BEND	TROY	MI	48098
20108 E PALM BEACH DR	QUEEN CREEK	AZ	85242
23431 S VIA DEL ARROYA	QUEEN CREEK	AZ	85242
23401 S 197TH PL	QUEEN CREEK	AZ	85242
19701 E CAMINA PLATA	QUEEN CREEK	AZ	85242
21257 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
25714 S 207TH ST	QUEEN CREEK	AZ	85242
PO BOX 1367	QUEEN CREEK	AZ	852421367
PO BOX 507	QUEEN CREEK	AZ	85242
25415 S 199TH PL	QUEEN CREEK	AZ	85242
20854 ORCHARD	QUEEN CREEK	AZ	85254
26222 S 20OTH WAY	QUEEN CREEK	AZ	85242
25807 S 199TH PL	QUEEN CREEK	AZ	85242
19542 E VIA DEL PALO	QUEEN CREEK	AZ	85242
21291 E MEWES RD	QUEEN CREEK	AZ	85242
3638 E SOUTHERN AVE STE C105	MESA	AZ	85206
21539 E MEWES RD	QUEEN CREEK	AZ	85242
7740 N 16TH ST STE 300	PHOENIX	AZ	85020
3740 E SOUTHERN AVE NO 205	MESA	AZ	85206
3740 E SOUTHERN AVE STE 205	MESA	AZ	852062512

3740 E SOUTHERN AVE STE 205	MESA	AZ	852062512
19711 E CALLE DE FLORES	QUEEN CREEK	AZ	85242
19725 E RIGGS RD	QUEEN CREEK	AZ	85242
26019 S 201ST PL	QUEEN CREEK	AZ	85242
19132 E VIA DE ARBOLES ST	QUEEN CREEK	AZ	85242
24520 S 211TH PL	QUEEN CREEK	AZ	85242
21 BOULDER RIDGE CT	AZUSA	CA	91702
19320 E VIA DEL PALO	QUEEN CREEK	AZ	85242
625 N JACKSON AVE B37	TACOMA	WA	98406
19612 E CALLE DE FLORES	QUEEN CREEK	AZ	85242
19612 E CALLE DEL FLORES	QUEEN CREEK	AZ	85242
19201 E VIA DE ARBOLES	QUEEN CREEK	AZ	85242
19032 E VIA DE ARBOLES	QUEEN CREEK	AZ	85242
19037 E CHANDLER HEIGHTS RD	QUEEN CREEK	AZ	852369570
14009 E LEXINGTON ST	GILBERT	AZ	85296
PO BOX 773	HIGLEY	AZ	852360773
21003 E MEWES RD	QUEEN CREEK	AZ	85242
7342 S BRIGHTON LN	QUEEN CREEK	AZ	85242
19654 E COUNTRY MEADOWS DR	QUEEN CREEK	AZ	85242
19901 E CHANDLER HEIGHTS RD UNIT 68	QUEEN CREEK	AZ	85242
16631 E CLOUD RD	HIGLEY	AZ	85236
23480 S 201ST WY	QUEEN CREEK	AZ	85242
21009 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
1417 N MAGNOLIA AVE	OCALA	FL	34475
20890 E SONOQUI DR	QUEEN CREEK	AZ	85242
19221 E VIA DE ARBOLES	QUEEN CREEK	AZ	852420000
19645 E VIA DEL RANCHO	QUEEN CREEK	AZ	85242
20041 E SAN TAN BLVD	QUEEN CREEK	AZ	85242
2826 N YUCCA ST	CHANDLER	AZ	85224
25 S ARIZONA PL STE 520	CHANDLER	AZ	85225
1121 W WARNER RD STE 109	TEMPE	AZ	85284
26118 S HAWES RD	QUEEN CREEK	AZ	85242
21332 E EXCELSIOR	QUEEN CREEK	AZ	85242
26222 S 203RD PL	QUEEN CREEK	AZ	85242
14625 S 141ST DR	GILBERT	AZ	85296
17840 E STOTTLER DR	HIGLEY	AZ	85236
21407 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
3735 E UTOPIA RD	PHOENIX	AZ	85050
19782 E CHERRY WOOD DR	QUEEN CREEK	AZ	85242
22350 S ELLSWORTH RD	QUEEN CREEK	AZ	852429311
21254 E EXCELSIOR	QUEEN CREEK	AZ	85242
20831 E ORCHARD LN	QUEEN CREEK	AZ	85242
19612 E CAMINA PLATA	QUEEN CREEK	AZ	85242
25806 S HAWES	QUEEN CREEK	AZ	85242
25904 S HAWES RD	QUEEN CREEK	AZ	85242
PO BOX 9391	CHANDLER HEIGHTS	AZ	85227
2935 E MENLO ST	MESA	AZ	85213
26616 S 201ST ST	QUEEN CREEK	AZ	85242
25708 S 207 PL	QUEEN CREEK	AZ	85242
6351 E ODESSA	MESA	AZ	85215
23618 S HAWES RD	QUEEN CREEK	AZ	85242
3415 VISION DR	COLUMBUS	OH	43219
19131 E VIA DEL VERDE	QUEEN CREEK	AZ	85242
26623 S 203RD ST	QUEEN CREEK	AZ	85242
4235 W EVA ST	PHOENIX	AZ	850513242
19575 E VIA DEL ORO	QUEEN CREEK	AZ	85242
19131 E VIA DE PALMAS	CHANDLER HEIGHTS	AZ	85227
PO BOX 100	QUEEN CREEK	AZ	85242
3205 E GEMINI CT	CHANDLER	AZ	85249
8490 S POWER ROAD STE 105189	GILBERT	AZ	85297
20804 E EXCELSIOR AVE	QUEEN CREEK	AZ	85242
19712 E CALLE DE FLORES	QUEEN CREEK	AZ	85242
24658 S 194TH ST	QUEEN CREEK	AZ	85242
19111 E VIA DE PALMAS	QUEEN CREEK	AZ	85242
2180 S NAVAJO WAY	CHANDLER	AZ	85248

1776 E BARRLETT PL	CHANDLER	AZ	85249
19123 VIA DE ARBOLES ST	QUEEN CREEK	AZ	85242
20907 E ORCHARD LN	QUEEN CREEK	AZ	85276
21205 E EXCELSIOR	QUEEN CREEK	AZ	85242
20902 E ORCHARD LN	QUEEN CREEK	AZ	85242
19134 VIA DEL VERDE	QUEEN CREEK	AZ	85242
5404 E FARMDALE AVE	MESA	AZ	85206
19402 E CLOUD RD	QUEEN CREEK	AZ	85242
22972 S 193RD ST	QUEEN CREEK	AZ	85242
19315 E VIA DEL ORO ST	QUEEN CREEK	AZ	85242
23255 S VIA DEL ARROYO	QUEEN CREEK	AZ	85242
20851 E MEWES RD	QUEEN CREEK	AZ	85242
19655 E VIA DEL ORO	QUEEN CREEK	AZ	85242
2380 PERFORMANCE DR RGV-D7-450	RICHARDSON	TX	75082
19312 E CLOUD RD	QUEEN CREEK	AZ	85242
81180 LEGENDS WY	LA QUINTA	CA	92253
24717 S 210TH ST	QUEEN CREEK	AZ	85242
24410 S ELLSWORTH	QUEEN CREEK	AZ	85242
23245 S VIA DEL ARROYO	QUEEN CREEK	AZ	85242
21185 ORCHARD LN	QUEEN CREEK	AZ	85242
23325 S VIA DEL ARROYO	QUEEN CREEK	AZ	85242
20950 E ORCHARD LN	QUEEN CREEK	AZ	85242
21232 E ORCHARD LN	QUEEN CREEK	AZ	85242
17944 E AVENIDA DEL VALLE DR	GILBERT	AZ	85297
24453 S 194TH ST	QUEEN CREEK	AZ	85242
19432 E VIA DE ORO	QUEEN CREEK	AZ	85242
19622 E CAMINO PLATA ST	QUEEN CREEK	AZ	85242
19221 E VIA DE PALMAS	QUEEN CREEK	AZ	85452
25424 S 199TH ST	QUEEN CREEK	AZ	85242
PO BOX 432	QUEEN CREEK	AZ	85242
PO BOX 953	QUEEN CREEK	AZ	85242
25520 N HAWES	QUEEN CREEK	AZ	85242
22929 S 193RD ST	QUEEN CREEK	AZ	85242
378 E INDIAN WELLS PL	CHANDLER	AZ	85249
19222 E CLOUD RD	QUEEN CREEK	AZ	85242
24511 S 211TH PL	QUEEN CREEK	AZ	85242
20011 E PECAN LN	QUEEN CREEK	AZ	85242
20911 E EXCELSOR AVE	QUEEN CREEK	AZ	85242

Sonoqui Wash Channelization, Phase II
Chandler Heights Road to Marsh Road

FCD 2008C025
PCN 480.04.32

Conditional Letter of Map Revision (CLOMR)

Technical Data Notebook

Prepared by:

Stanley Consultants, Inc.

Prepared for:

Flood Control District of Maricopa County
And
Town of Queen Creek

Registered Professional Engineer (Civil)
CERTIFICATE NO.
26837
G. SCOTT
BUCHANAN
Date Signed 12-7-11
ARIZONA U.S.A.
Expires 3-31-14

November 2011

SCI Proj # 21795

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1.0 INTRODUCTION

1.1 Purpose of Study

The Sonoqui Wash Channelization Phase II project area is located in southeastern Maricopa County in the south central area of the Town of Queen Creek, Arizona. Please refer to Figure 1 on the following page for location and vicinity. Project improvements are based on a design concept developed about 10 years ago by engineering consultant Huitt-Zollars for the Flood Control District of Maricopa County (FCDMC) in a regional study titled "Queen Creek / Sanokai Wash Hydraulic Master Plan." A pre-design study phase conducted by Stanley Consultants for Sonoqui Wash Phase II as part of the scope of work for this project further considered alignment and conveyance refinements and alternatives based on the Huitt-Zollars Hydraulic Master Plan.

The selected alternative for Sonoqui Wash Phase II consists of channel improvements from Chandler Heights Road to Riggs Road along the Main Branch of Sonoqui Wash, then east along the south side of Riggs Road past Ellsworth Road to Crismon Road along what is known as the East Branch of Sonoqui Wash. The Sonoqui Phase II project includes a large multi-barrel concrete box culvert crossing at Hawes Road and construction of a paved access road (Marsh Road) for parcels along the south side of Riggs Road between 202nd and 204th Streets which will no longer have direct access to Riggs Road after the Sonoqui channel is constructed. Hawes Road will be reconstructed across the new channel and numerous utilities along Hawes and Riggs Roads will be relocated to accommodate the proposed improvements.

Immediately south-east of the Chandler Heights Bridge are two properties, herein referred to as Zatkin, adjacent to the channel improvements that contain low lying ground. Concurrent with the Sonoqui Wash Phase II channel construction, the Zatkin properties were graded with engineered fill under separate design contract by consultant EPS Group, Inc.

A new bridge at Riggs Road will be constructed over the new Sonoqui channel by the Maricopa County Department of Transportation (MCDOT) in conjunction with the Sonoqui Phase II channel project. The Riggs Road Bridge is a separate project but will be bid and constructed the same time as the Sonoqui Channel. Downstream from Sonoqui Wash Phase II is Sonoqui Wash Phase I which was designed by Stanley Consultants in 2004 – 2005 and constructed in 2007 – 2008. A Conditional Letter of Map Revision (CLOMR) and Letter of Map Revision (LOMR) were submitted to FEMA and approved for Sonoqui Wash Phase I and for a new bridge constructed by MCDOT at Chandler Heights Road. The Sonoqui Phase II project will serve as an outfall for future Sonoqui Wash Phase III which is currently being designed by consultant JE Fuller for the FCDMC.

This Technical Data Notebook presents the documentation necessary to request a CLOMR for the Sonoqui Phase II Main Branch Channel from Chandler Heights Road to Marsh Road including culverts at Hawes Road and Marsh Road and the new MCDOT bridge at Riggs Road. A separate CLOMR request will be made by Consultant JE Fuller for future Sonoqui Phase III concurrently with this request. The Sonoqui East Branch Channel upstream from the Main Branch confluence will not be part of any current or

future CLOMR / LOMR because it is not recognized as a delineated 100-year flood zone.

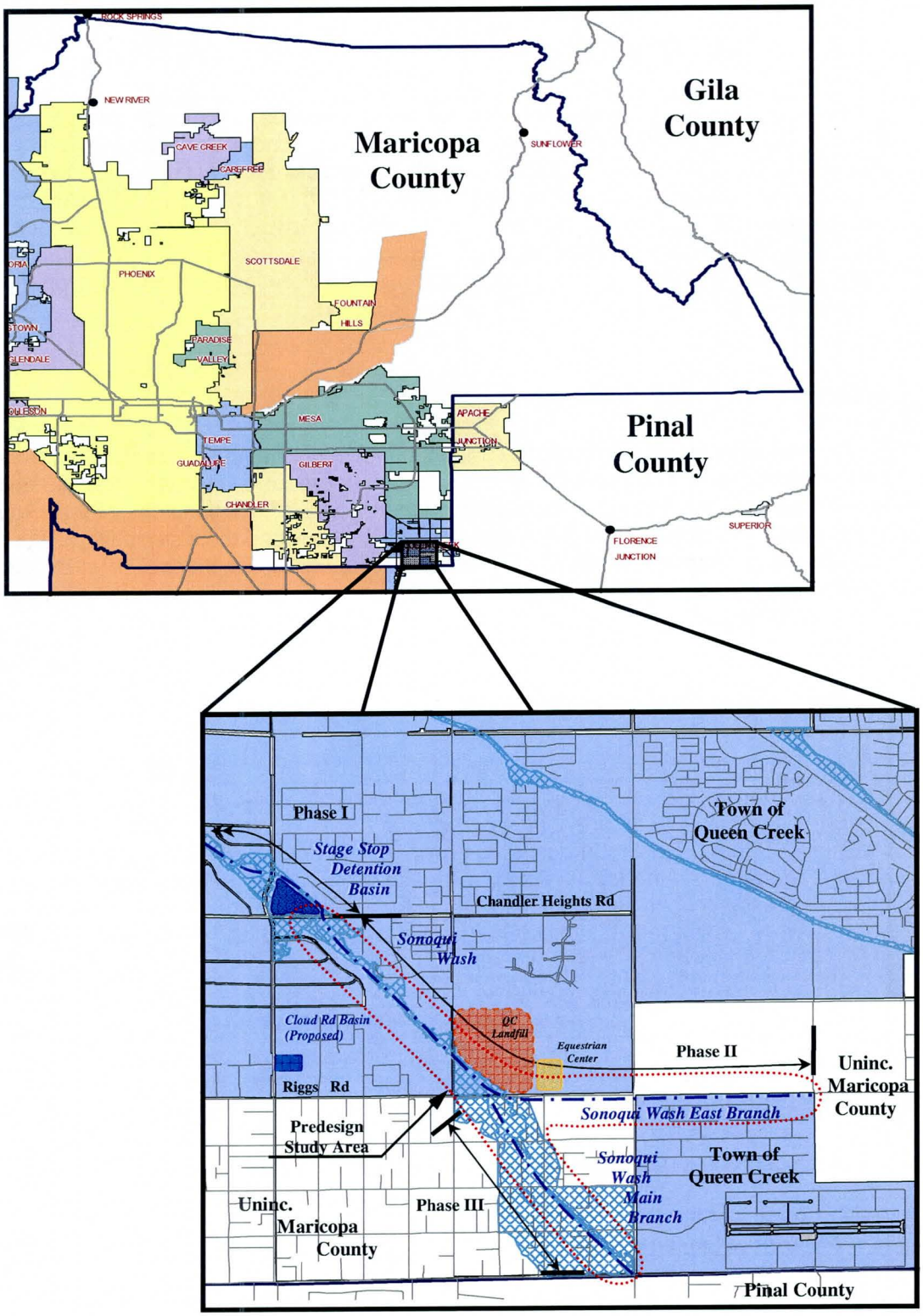


Figure 1. Project Location and Vicinity Map

1.2 Authority for Study

Stanley Consultants, Inc. performed the hydraulic analyses and design for this study for the Flood Control District of Maricopa County (FCDMC) under Contract FCD 2008C025. FCDMC is the primary contracting agency for this project but is acting in partnership with the Town of Queen Creek under Resolution FCD2001R001 and IGA FCD2008A008. Sub-consultants on Stanley's project team include AMEC Earth and Environmental (geotechnical), Logan Simpson Design (landscape architecture), Cooper Aerial (aerial mapping), and The TBE Group (subsurface utility exploration). Regional hydrology for the project was supplied by FCDMC.

1.3 Location of Study

The project area is located in eastern Maricopa County within the Town of Queen Creek and unincorporated Maricopa County. The project corridor is approximately 3.5 miles in length and extends along the existing Sonoqui Wash from Chandler Heights Road to Riggs Road and along Riggs Road from east of Hawes Road to Crismon Road along the East Branch of Sonoqui Wash. The project is located within Sections 27, 28, 29, 33, and 34 of Township 2 South, Range 7 East. The project location and vicinity maps are shown in Figure 1.

1.4 Summary of Methodology

Regional project hydrology was prepared using HEC-1 and provided by FCDMC. The existing-condition floodplain delineation study for Sonoqui Wash from Chandler Heights Road to Riggs Road was previously prepared by Entellus, Inc. using HEC-RAS. Aerial mapping of the project corridor was provided by Cooper Aerial using conventional photogrammetric methods. The proposed channel contours were used to generate channel cross-sections for input into HEC-RAS. Channel roughness coefficients ("n" values) were estimated using USGS methods. The U.S. Army Corps of Engineers' HEC-RAS software was used for the project: steady-flow modeling was used to determine the water surface elevations.

1.5 Coordination and Acknowledgements

This project has been coordinated with the following agencies:

- Flood Control District of Maricopa County
- Town of Queen Creek

This CLOMR is submitted as a combination of two separate projects, the Sonoqui Wash Channelization Phase II project sponsored jointly by the FCDMC and Town of Queen Creek and the Riggs Road Bridge sponsored solely by the Maricopa County Department

of Transportation (MCDOT). Further coordination with consultant JE Fuller has been made in light of its concurrent Sonoqui Wash Phase III CLOMR.

1.6 Study Results

Hydraulic analysis of the proposed design indicates reduction of the 1%-annual-chance floodplain and general containment including freeboard within the channel after construction of the improvements. The water surface is contained within the project right-of-way or within public road right-of way. Reduction of the floodplain allows for a revision of the delineation previously submitted by Entellus, Inc.

2.0 FEMA FORMS AND ADWR ABSTRACTS

FEMA MT-2, Revisions to NFIP Maps, forms are located in Appendix A.

2.1: Study Documentation Abstract for FEMA Submittals		
2.1.1	Date Study Accepted	
2.1.2	Study Contractor Contact(s) Address Phone Internal Reference Number	Stanley Consultants, Inc. Scott Buchanan, P.E. 1661 E. Camelback Rd, Suite 400 Phoenix, AZ 85016 602-333-2200 Stanley Proj.# 21795
2.1.3	FEMA Technical Review Contractor	Pending
2.1.4	FEMA Regional Reviewer/Phone	Pending
2.1.5	State Technical Reviewer/Phone	Pending
2.1.6	Local Technical Reviewer Phone	FCDMC, Jonathan Lesperance, 602-506-4699
2.1.7	Reach Description	Sonoqui Wash: Chandler Heights Rd to Marsh Rd (approx. 1.4 miles) FIRM 04013C3060H;

2.2: Mapping Information		
2.2.1	Mapping for Hydrologic Study	N/A
2.2.2	Mapping for Hydraulic Study Type/Source Scale/ Date /	 Aerial Photography 1" = 40' / Aug 5th, 2009 / Cooper Aerial

2.3: Hydrology		
2.3.1	Model or Method Used	HEC-1 (USACE, Version 4.1)
2.3.2	Storm Duration	24 hour
2.3.3	Hyetograph Type	N/A
2.3.4	Frequencies Determined	100
2.3.5	List of Gages Used	N/A
2.3.6	Rainfall Amounts and Reference	Miller et al, 1973, *Precipitation-Frequency Atlas for Arizona*
2.3.7	Unique Conditions and Problems	N/A
2.3.8	Coordination of Q's	N/A

2.4: Hydraulics		
2.4.1	Model or Method Used	HEC-RAS (USACE, Version 3.1.3)
2.4.2	Regime	Steady Subcritical Flow
2.4.3	Freq for which profiles were computed	100 year recurrence
2.4.4	Method of Floodway Calculation	N/A
2.4.5	Unique Conditions and Problems	None encountered

2.5: Additional Study Information		
Item	Description/Discussion	

3.0 MAPPING AND SURVEY INFORMATION

Stanley Consultants performed a horizontal and vertical survey of existing sectional monuments to serve as project control. Stanley Consultants also performed a control survey, set the aerial mapping panels, and conducted a field survey of local improvement features such as roadways, fences, above-ground utilities, and structures.

3.1 Field Survey Information

As-built data was obtained for the project from Maricopa County, the Town of Queen Creek, various utility owners and irrigation districts. The vertical datum for these plans varied. Existing topographic mapping was insufficient for the scale of this project.

Survey points for this study were collected using GPS survey equipment. Survey data point lists and copies of survey field books are included in Appendix C of this report.

All survey work performed for this study was done in accordance with Section 3.0 of the Flood Control District of Maricopa County's Consultant Guidelines dated December 1, 2003. All survey work meets the Federal Emergency Management Agency (FEMA) minimum criteria as defined in "FEMA Procedure Memorandum No. 61 – Standards for Lidar and other High Quality Digital Topography", September, 2010.

3.2 Mapping

Aerial mapping was sub-contracted to Cooper Aerial Surveys Co. and conducted under Cooper's Job No. 5060-0901018P. Two flight paths were used. Mapping was flown on February 5th, 2009. Detailed narrative explanation of the survey control for aerial mapping is provided in Appendix C. Aerial photogrammetric accuracy was verified by the FCDMC to their accuracy requirements. Because an existing hydrology model was used for this study, the aerial mapping was used solely for design and hydraulic analysis.

Earl Watts, R.L.S., with Cooper Aerial, is responsible for developing the mapping.

New one-foot contour mapping was developed for the length of the study as part of the Sonoqui Wash Phase II Channelization project. The topographic mapping generally extends at least 400 ft on each side of the channel project centerline. Aerial photogrammetric imaging technology was used to develop the new topographic map. Digital and hard (mylar) copies of the mapping were provided to FCDMC as part of a separate submittal.

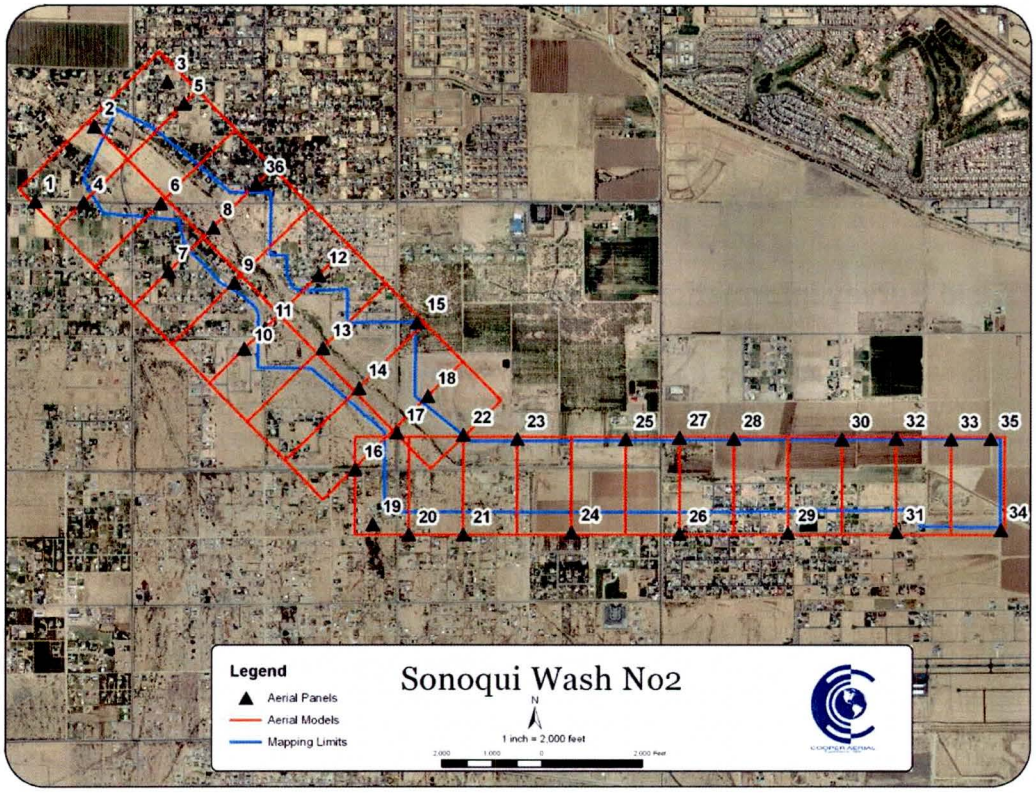


Figure 2. Aerial Mapping Model Layout and Ground Panels

4.0 HYDROLOGY

4.1 Method Description

The 100-year discharges for Sonoqui were obtained from the *Sonoqui Wash Floodplain Delineation Study* prepared by Entellus, Inc. on behalf of the Flood Control District of Maricopa County and submitted to FEMA September 2004 (FEMA Case No. 04-09-1717P).

4.2 Parameter Estimation

See *Sonoqui Wash Floodplain Delineation Study* by Entellus, Inc.

4.2.1 Drainage Area Boundaries

See *Sonoqui Wash Floodplain Delineation Study* by Entellus, Inc.

4.2.2 Watershed Work Maps

See *Sonoqui Wash Floodplain Delineation Study* by Entellus, Inc.

4.2.3 Gage Data

See *Sonoqui Wash Floodplain Delineation Study* by Entellus, Inc.

4.2.4 Statistical Parameters

See *Sonoqui Wash Floodplain Delineation Study* by Entellus, Inc.

4.2.5 Precipitation

See *Sonoqui Wash Floodplain Delineation Study* by Entellus, Inc.

4.2.6 Physical Parameters

See *Sonoqui Wash Floodplain Delineation Study* by Entellus, Inc.

4.3 Problems Encountered During the Study

See *Sonoqui Wash Floodplain Delineation Study* by Entellus, Inc.

4.3.1 Special Problems and Solutions

See *Sonoqui Wash Floodplain Delineation Study* by Entellus, Inc.

4.3.2 Modeling Warning and Error Messages

See *Sonoqui Wash Floodplain Delineation Study* by Entellus, Inc.

4.4 Calibration

No calibration of the hydrology was conducted as part of this project. See *Sonoqui Wash Floodplain Delineation Study* by Entellus, Inc.

4.5 Final Results

4.5.1 Hydrologic Analysis Results

Discharge applied to Sonoqui Wash Phase II ranges from 1270 cfs to 2400 cfs. See the Table below.

River	Sta	Q (cfs)
Sonoqui Wash	321+42	2400
Sonoqui Wash	289+00	2000
Sonoqui Wash	275+47	2100
Sonoqui Wash	225+00	1890
Sonoqui Wash	218+49	1270
Sonoqui Wash	213+00	1270

Table 1 – CLOMR Submittal Discharges

4.5.2 Verification of Results

Verification of hydrologic results of the previously accepted hydrology was not performed as part of this study.

5.0 HYDRAULICS

5.1 Method Description

The Sonoqui Wash Channel Improvements were designed using HEC-RAS (v. 3.1.3). The term "channel hydraulics" encompasses all of the aspects of channel design that were modeled with HEC-RAS including the main channel and culvert and bridge hydraulics at the roadway crossings.

The channel design typically incorporated landscape, aesthetic and multi-use input from sub-consultant Logan Simpson Design. A range of "n" values was desired to reflect future landscaping for the project. A discussion of "n" value selection is covered in more detail in Section 5.3.1.

HEC-RAS output files for the channel are included in Appendix E. HEC-RAS input files are on the CD in the back of this document.

Hydraulic sections were generally cut every 200 feet using INROADS software and imported into HEC-RAS. Cross sections were then added at bridge and culvert locations. The typical channel section has a 60 foot bottom with side slopes that vary between 4:1 to 8:1 (H:V).

A low flow channel section is typical for the reach between Chandler Heights Road and Hawes Road. A smaller bottom width was used throughout the low flow reach.

The channelized portion of Sonoqui Wash along Riggs Road that begins at 204th Street as well as the cross sections at the outlet of the Marsh Road box culvert upstream of Riggs Road, were both modeled with a flow of 2,400 cfs. This was considered a conservative approach. When the future Phase III of Sonoqui Wash is constructed, it will capture a large portion of the sheet flows upstream of Riggs Road and convey it within a channel that meets Phase II in approximate alignment with 204th Street. This will reduce the sheet flows that reach Marsh Road and the culvert under it (the Marsh Road box culvert) at approximately 202nd Street. Both the 204th Street channel and the Marsh Road culvert constitute the two hydraulic connections between the Phase II and Phase III projects. The Phase III project and CLOMR is outlined in further detail in the document, *Sonoqui Wash Phase III, Conditional Letter of Map Revision, Technical Data Notebook, FCD 2009C011, October 2011,* prepared under separate cover by JE Fuller.

Backwater effects on local tributary flow were not considered and delineation was terminated at the project right-of-way in backwater situations. Delineation of the 100-year floodplain is limited to Sonoqui Wash, as identified in the attached MT-2 forms.

5.2 Work Study Maps

The 100-scale work study maps can be found in Appendix G. The FEMA Flood Insurance Rate Map (FIRM) depicting the existing condition floodplain extents and

Annotated FIRM panel depicting the proposed floodplain extents are also included in Appendix G.

5.3 Parameter Estimation

This section generally covers the selection of Manning's Roughness Coefficients ("n" values) and expansion and contraction coefficients.

5.3.1 Manning's Roughness Coefficients

Estimating values for Manning's "n" roughness coefficients for open channel hydraulics is subjective with a range of potential values and associated outcomes depending largely on the approach and experience of the individual. In order to reduce subjectivity and increase consistency, standard reference tables and other documentation are typically used to narrow the range of outcome.

The Sonoqui Wash project uses a combination of methodology and references to estimate project n-values. The two primary references are:

1. "Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona" by B.W. Thomsen and H.W. Hjalmarson, Prepared by the U.S. Geological Survey, April 1991.

2. "Drainage Design Manual for Maricopa County, Arizona – Volume II, Hydraulics" January 28, 1996.

The methodology in the U.S.G.S. reference involves estimating a base "n" value that reflects the channel bed material then adds adjustment factors to account for surface irregularities, obstructions and vegetation. This reference incorporates examples primarily involving larger natural watercourses as opposed to engineered channels with designed landscaping. Since portions of Sonoqui Wash Phase II is intended to maintain natural channel characteristics and existing vegetation, the U.S.G.S. reference should help provide an adequate basis of estimate. Judgment will still be necessary to interpret and apply this reference.

Generally there will be three different channel n-value conditions. There will be a relatively straight and uniform excavated trapezoidal section that occurs from Sta 213+00 to Sta 229+00 and from Sta 277+16 to Sta 304+25 with little or no obstructions. There will be a more natural section with a small excavated low flow channel and larger trees and preserved vegetation found within the bed of the channel found from approximately Sta 231+00 to Sta 237+00. Finally there will be a more natural channel section with a larger excavated low flow channel and preserved vegetation that consists of fewer trees and less dense vegetation found from approximately Sta 237+00 to Sta 275+47. Because of the uniformity across most of the channel sections, roughness coefficients were not typically varied between the channel bank stations. However for the more natural channel sections, the "n" value developed for the excavated trapezoidal channel reaches was used for the excavated low flow channels

The most significant adjustment to base roughness per the U.S.G.S. reference will be due to landscaping for the trapezoidal sections. The key to selecting the appropriate roughness coefficient will be in relating the type of plant material, its placement, density and state of anticipated maintenance to a representative value. To accomplish this, photographs were taken of existing channels with similar anticipated landscape character and then compared to the photo examples in the U.S.G.S. reference. It is important to note that the project is utilizing exposed rip rap for the bank protection to a level approximately equal to the 100-year design storm event which will limit the placement of vegetation along the banks.

Tall pot planting and hydro-seeding will be provided as part of construction to help reduce soil loss and dust. However, it may be months or even years until the vegetation matures and the project is formally landscaped. Logan Simpson Design will provide a Landscape Master Plan that will serve as the basis for future landscaping. As a design guide, photos of comparably landscaped channels are presented at the back of this section to provide a visual image of what the future landscape design may look like.

Based on Logan Simpson Design's Landscape Master Plan and using the U.S.G.S. reference, roughness coefficients for the trapezoidal channel reaches fall in a range between 0.035 and 0.045. To help assure that the final constructed and landscaped channel is consistent with this range of "n" values and that the landscaping and irrigation system (if ever constructed) is appropriate for the application, the following suggestions and observations are offered:

1. It is anticipated that most of the landscape plant material will be placed on or above the constructed banks of the channel. Vegetation on the channel bottom should be limited to native grass, small shrubs, and a small number of trees relatively wide spaced.

2. Generally, trees can be planted on the channel banks and within the channel bottom but it is recommended that they be limited to single trunk specimens and not placed within the lowest portion of the cross-section. It is recommended that no cacti or succulent plants be placed on the channel bottom or within the lower half of the channel bank. It is also recommended that trees and large shrubs not be placed within 50 feet of culverts or bridges.

3. Because of the potential for scour it is recommended that no permanent irrigation system such as PVC pipe be used lower than about 3 or 4 feet above the channel invert.

The Manning's "n" value for the preservation areas will be based more on natural channel landscaping. New landscaping for the preservation areas will be limited more to the upland areas. The existing vegetation will be maintained where possible. All "n" values were developed based on the anticipated flow conditions for a 100-year event. The 100-year "n" values were not adjusted for use with other discharge frequencies. Manning's "n" values also assume a fixed bed condition even though it is anticipated that some scour of the channel bed will occur.

5.3.1.1 "n" Values from Previous Studies and Design Projects

Other previous studies and designs of similar projects were referenced to compare estimated roughness coefficients. Some of the observed coefficients from other studies and designs were adopted for use with the Sonoqui Wash project. For example:

1. The Entellus floodplain study for the District utilized "n" values of 0.068 and 0.056 for the left and right overbank respectively and 0.065 for channel.

2. Phase I of Sonoqui Wash utilized 0.045 for the channel for the high end and 0.035 for the low end of values.

Roughness coefficients were reviewed from the Queen Creek & Sanokai Wash Hydraulic Master Plan (HMP) prepared by consultant Huitt-Zollars. The HMP is a concept level master plan that serves as the basis for the Sonoqui Wash Channelization project. It contains a concept level HEC-RAS model. The HMP was not scoped to perform a detailed analysis of roughness coefficients. The "n" values from the HMP envisioned some level of landscaping and vegetation in the channel. The study utilized a "n" value of 0.042 for the Phase II reach.

5.3.2 Expansion and Contraction Coefficients

Expansion and contraction coefficients were established following the HEC-RAS "Hydraulic Reference Manual" guidance. Expansion and contraction coefficients of 0.30 and 0.10 (respectively) were used for all hydraulic models on all reaches with the exception of culverts and bridges where these coefficients were adjusted to 0.50 and 0.30 (respectively). Flow rates used for design were obtained from the HEC-1 model as detailed in Section 2: Hydrology and Local Inflow. Reference materials are available in Appendix E.

5.4 Cross Section Description

A digital terrain model (DTM) was created for the project using INROADS for the proposed channel. Cross sections were then cut using INROADS at 200 foot intervals and imported into HEC-RAS. Additional cross sections were added at bridge and culvert locations.

5.5 Modeling Considerations

The modeling of project features and related parameters are addressed in this section. General features include culverts and a bridge crossing.

5.5.1 Hydraulic Jump and Drop Analysis

No hydraulic jumps were encountered and no special analyses were conducted.

5.5.2 Bridges and Culverts

The design models for the project included the modeling of culverts for roadway crossings at Hawes Road, Marsh Road and 203rd Place and bridges for the crossings at Riggs Road and Chandler Heights Road.

Hawes Road was originally envisioned as a dip crossing with small low flow culverts under it. Due to geometric constraints of the roadway profile and the difficulty of creating a weir overflow depth that would not violate FCDMC standards, it was decided that a culvert would be designed to pass the 100-year design storm event. A 6-10'x7' box culvert was considered hydraulically adequate; however, the project team desired an 8-foot high culvert to accommodate pedestrian use. A 6-10'x8' box culvert is therefore proposed for construction as part of this project.

A two span bridge was modeled at Riggs Road based on MCDOT's DCR. Columns were placed at the middle of the channel. Due to the minimal disturbance to the main conveyance area within the channel, a debris load was not modeled on the columns. The section under the bridge was modeled with the same dimensions as the channel section upstream of the bridge.

The Marsh Road culvert is designed to pass a portion of the flows from south of Marsh Road. As evidenced by the existing Zone AO floodplain delineation upstream of Marsh Road, offsite flows currently approach Marsh Road as shallow sheet flow rather than concentrated flow. However, when the Phase III improvements are constructed, they are anticipated to channelize this flow to the Marsh Road culvert. The Marsh Road culvert was positioned at the existing low point along Marsh Road. A 3-10'x4' box culvert is utilized to convey the flows.

5.5.3 Levees and Dikes

No engineered levees or dikes are contained within the project limits.

5.5.4 Islands and Flow Splits

No islands or flow splits were included in the floodplain delineation analysis.

5.5.5 Ineffective Flow Areas

No ineffective flow areas were modeled as part of the analysis.

5.5.6 Supercritical Flow

Supercritical flow does not develop within the project area.

5.6 Floodway Modeling

A floodway analysis was not performed as part of this study.

5.7 Problems Encountered During the Study

5.7.1 Special Problems and Solutions

No special problems were encountered and no special solutions were necessary.

5.7.2 Modeling Warning and Error Messages

Messages output from HEC-RAS within the project area include:

- 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 calculation.
- The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
- The energy loss was greater than 1.0 ft between the current and previous cross section. This may indicate the need for additional cross sections.
- 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.
- Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
- Divided flow computed for this cross-section.
- Manning's n values were composited to a single value in the main channel.

These warning messages were reviewed and it was not considered necessary to modify the analysis to address remaining warning messages.

5.8 Calibration

General calibration was not required for this project as it is new construction.

5.9 Final Results

Plots of the final water surface profile and limits of inundation for the base flood are located in Appendix G.

5.9.1 Hydraulic Analysis Results

HEC-RAS output tables are located in Appendix E.

5.9.2 Verification of Results

The downstream water surface elevation at Sta 213+00 was compared with those from the existing-condition LOMR model and found to match within tolerances specified by FEMA.

6.0 EROSION AND SEDIMENT TRANSPORT

A preliminary sediment transport analysis was done as part of the pre-design portion of the Sonoqui Wash channel design. This analysis determined that this portion of Sonoqui Wash is in a state of aggradation. WEST Consultants also performed a sediment transport analysis for Sonoqui Wash, completed September, 2000, titled *Final Report Sediment Transport Analysis – Queen Creek & Sanokai Wash Hydraulic Master Plan East Maricopa Floodway Capacity Mitigation Study* that determined the same aggradation conclusions for this portion of Sonoqui Wash as well. However, at the request of FCDMC, long term scour along with the other components of channel scour were applied to this project. This project also utilized grade control structures along the study reach. A brief description of each scour parameter is given below. Refer to Appendix F for the calculations.

6.1 Method Description

Estimated channel scour depths were based upon the draft FCDMC River Mechanics Manual for DDMSW, Sept. 2009 and design criteria established by the FCDMC River Mechanics Branch. Scour depths are estimated based upon the 100-year discharge and consider long-term degradation, general scour, bend scour (incorporated into the general scour estimate), local scour, bed-form depth, low flow incisement, and a safety factor of 1.3.

Long-Term Degradation

Per the FCDMC, long term channel degradation was estimated using the Level I approach as provided in the Arizona State Standard 5-96.

General Scour/Bend Scour

General scour was based upon Lacey's equation as per FCDMC guidelines. Lacey's Equation includes a bend component that can be applied at significant bends in the channel. Consequently, a separate estimate of bend scour is not necessary.

Local Scour

Local scour was estimated separately for piers, abutments, drop structures, and other significant hydraulic structures and added as necessary to total scour estimates.

Bed-Form Depth

Bed form depth was estimated based upon FCDMC guidelines. It represents a very small component of total scour depth.

Low Flow Incisement

Generally, low flow incisement was observed to be minor under existing conditions and is expected to be similar under proposed conditions. At the request of the FCDMC, an estimate of 2 feet was assumed for low-flow incisement.

Factor of Safety

A factor of safety of 1.3 is applied to total scour calculations.

Grade Control Structures

At the request of the FCDMC, controlled low strength material (CLSM) grade control structures will be spaced along the channel. Reinforced concrete box culverts will also serve as grade control structures.

7.0 DRAFT FIS REPORT DATA

7.1 Summary of Discharges

Flow rates are per Entellus's *Sonoqui Wash Floodplain Delineation Study Technical Data Notebook*. Discharge from 1270 cfs to 2400 cfs was applied through Sonoqui Wash for floodplain delineation.

7.2 Floodway Data

No floodway delineation was performed.

7.3 Annotated Flood Insurance Rate Maps (FIRMs)

The Annotated Flood Insurance Rate Map is located in Appendix G. The applicable FIRM panel for the Sonoqui Wash Phase II Channelization is 3060H. Existing-condition floodplain extents are shown with post-project floodplain extents overlain. Neither set of extents is shown on current FIRM maps.

7.4 Flood Profiles

Flood profiles are located in Appendix G.

8.0 REFERENCES

8.1 Data Collection Summary

Entellus, Inc., *Sonoqui Wash Floodplain Delineation Study Technical Data Notebook*, FCD 2002C033-2 and -3; March 2004.

EPS Group, Inc., *Engineered Fill Plan for Zatkin Property at Sonoqui Wash*, 2011.

Huitt-Zollars, *Queen Creek/Sonokai Wash Hydraulic Master Plan* (QC/SW HMP), FCD 98-26, September 2000.

JE Fuller/Hydrology & Geomorphology, Inc., *Sonoqui Wash Phase III, Sonoqui Wash from Riggs Road to Empire Boulevard, Conditional Letter of Map Revision (CLOMR), Technical Data Notebook*, FCD 2009C011, October 2011.

Kirkham Michaels Consulting Engineers, RCHB.DAT, Chandler Heights Basin – Final Design HEC-1 Model, Flood Control District of Maricopa County; January 22, 2003.

Kirkham Michael Consulting Engineers, Plans for the Construction of Chandler Heights Peak Shaving Basin, 30% Design, Flood Control District of Maricopa County (FCD Contract No. 00-40); July 2002.

Wood Patel & Associates, Inc, Design *Study for Trilogy- Sanoqui Wash,* Town of Gilbert, City of Mesa and Flood Control District of Maricopa County; February 20, 2002.

8.2 Referenced Documents

Arizona Department of Transportation, *Roadway Design Guidelines*, May 1996.

Arizona Department of Water Resources, *State Standard 1-97, Requirements for Flood Study Technical Documentation,* November 1997.

Brown, S.A., and Clyde, E.S, *Hydraulic Engineering Circular 11: Design of Riprap Revetment* (HEC-11), Federal Highway Administration; Republished 2000.

Brunner, Gary W. and Goodell, Chris R, *HEC-RAS Hydraulic Reference Manual,* September 2002.

Federal Emergency Management Agency, *Guidelines and Specifications for Flood Hazard Mapping Partners,* April 2003.

Federal Emergency Management Agency, Procedure Memorandum No. 61 – Standards for Lidar and other High Quality Digital Topography, September 2010.

Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County, Arizona – Volume II, Hydraulics,* January 28, 1996.

Pemberton, E.L., and Lara, J.M., *Computing Degradation and Local Scour,* United States Bureau of Reclamation; January 1984.

Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County, Arizona – Volume I, Hydrology,* November 18, 2009, with revisions on June 14, 2010 and February 10, 2011.

Thomsen, B.W. and Hjalmerson, H.W., *Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona,* United States Geological Survey, April 1991.

Appendices

Appendix A: FEMA Forms

Appendix B: General Documentation & Correspondence
- *B.1 Special Problem Reports*
- *B.2 Telephone Reports*
- *B.3 Meeting Minutes*
- *B.4 General Correspondence*
- *B.5 Contract Documents*

Appendix C: Survey Field Notes
- *C.1 Survey Field notes for Aerial Mapping Control*
- *C.2 Survey Field Notes for Hydrologic Modeling*
- *C.3 Survey Field Notes for Hydraulic Modeling*

Appendix D: Hydrologic Analysis Documentation
- *D.1 Precipitation Data*
- *D.2 Physical Parameter Calculations*
- *D.3 Hydrograph Routing Data*
- *D.4 Reservoir Routing Data*
- *D.5 Flow Splits and Diversion Data*
- *D.6 Hydrologic Calculations*

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

Appendix F: Erosion & Sediment Transport Analyses Documentation
- *F.1 Soils Data*
- *F.2 Scour Analysis Documentation*

Appendix G: Maps, Profiles & Exhibits
- *G.1 Annotated FIRM Panels*
- *G.2 Existing Conditions Maps (FCDMC & Entellus)*
- *G.3 Flood Profiles*
- *G.4 Work Maps*
- *G.5 Other Maps & Exhibits*

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps 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: Sonoqui Wash Phase II Improvements 100%
Project File : SW2_100_Design.prj
Run Date and Time: 9/23/2013 1:55:30 PM

Project in English units

Project Description:
FEMA Model - August 2010 - Based on a portion of the design model for Sonoqui Wash Phase II Improvements. This model includes only that portion of the East Branch up to Sta 309+50.

Notes:
Peak discharges downstream of the East Branch/Main Branch confluence are based upon "Main Branch" (only) hydrology which produced larger values due to the smaller drainage area (than the combined watershed areas of the East Branch and Main Branch) and the use of areal reduction factors in the HEC-1 hydrology model.

The peak discharge used on the 202nd Street arm of the Upper Main Branch is per Effective FEMA discharge, Entellus, 2004).

The peak discharge used on the 204th Street arm of the Main Branch (1900 cfs) is per Sonoqui Wash Phase III inflow at that location

The design of the Riggs Road bridge is based on the 70% Kimley-Horn bridge design (August, 2010). This model reflects the bridge at the ultimate 7-lane width.

This model also reflects fill in the Zatkin property, adjacent to this project. The elevations shown in cross sections 22100 to 22900 that are outside the banks of this project reflect the approximate elevations shown on the plan, Engineered Fill Plan for Zatkin Property, EPS Group, Inc., February, 2011.

*Cross-sections at stations 265+00, 269+00, 274+00 modified by JMS of FCDMC on 08AUG2013 in response to FEMA comments on initial LOMR from CLOMR submittal - Case no. 13-09-2145P. The base floodplain topwidths in the original RAS model did not match the top widths shown on the submitted workmap. After review of the cross-section geometry and having checked them against the as-built plans and recent mapping, they were found to be insufficiently accurate. Cross-sections of the same width and location were re-cut using the new 2.0' mapping.

PLAN DATA

Plan Title: 100 Yr FEMA Submittal
Plan File : d:\HEC-RAS\SW2_100_Design.p03

Geometry Title: FEMA
Geometry File : d:\HEC-RAS\SW2_100_Design.g11

Flow Title : 100 Yr (for FEMA submittal)
Flow File : d:\HEC-RAS\SW2_100_Design.f01

Plan Description:
100Yr for FEMA submittal

Plan Summary Information:

Number of:	Cross Sections =	60	Multiple Openings =	0
	Culverts =	2	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

FLOW DATA

Flow Title: 100 Yr (for FEMA submittal)
Flow File : d:\HEC-RAS\SW2_100_Design.f01

Flow Data (cfs)

River	Reach	RS	PF 1
Sonoqui Wash	Up Main Br 204th	500	1900
Sonoqui Wash	East Branch	30950	2100
Sonoqui Wash	M Br 204-202	30700	2400
Sonoqui Wash	Up Main Br 202nd	10100	2400
Sonoqui Wash	Main Br DS 202nd	29290.	2400
Sonoqui Wash	Main Br DS 202nd	28900.	2000
Sonoqui Wash	Main Br DS 202nd	27547.	2100

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Sonoqui Wash	Up Main Br 202nd	PF 1	Normal S = 0.002	
Sonoqui Wash	Main Br DS 202nd	PF 1		Known WS = 1368.27

GEOMETRY DATA

Geometry Title: FEMA
Geometry File : d:\HEC-RAS\SW2_100_Design.g11

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
Sonoqui Wash	Up Main Br 204th		204th St Jct
Sonoqui Wash	East Branch		204th St Jct
Sonoqui Wash	M Br 204-202	204th St Jct	202nd Jct
Sonoqui Wash	Up Main Br 202nd		202nd Jct
Sonoqui Wash	Main Br DS 202nd	202nd Jct	

JUNCTION INFORMATION

Name: 204th St Jct
Description: 204th St Jct
Momentum computation Method
Add Friction
Add Weight

Length across Junction River	Reach		Tributary River	Reach	Length	Angle
Sonoqui Wash	East Branch	to	Sonoqui Wash	M Br 204-202	200	0
Sonoqui Wash	Up Main Br 204th	to	Sonoqui Wash	M Br 204-202	265	90

Name: 202nd Jct
Description:
Energy computation Method

Length across Junction River	Reach		Tributary River	Reach	Length	Angle
Sonoqui Wash	M Br 204-202	to	Sonoqui Wash	Main Br DS 202nd	110	
Sonoqui Wash	Up Main Br 202nd	to	Sonoqui Wash	Main Br DS 202nd	85	

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Up Main Br 204th RS: 500

INPUT
Description: Sta 103+35 204th St Channel
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6	1393.51	42.86	1393.78	44.41	1393.82	47.74	1394	53.21	1394.78
53.43	1394.82	53.9	1394.84	64.31	1395.48	69.72	1395.6	86.52	1395.88
87.38	1395.97	88.68	1396.12	91.8	1396.47	93.73	1396.69	98.67	1396.68
104.47	1396.72	110.8	1396.7	111.97	1396.67	113.4	1395.76	116.97	1395.76
118.08	1395.76	121.38	1395.76	131.35	1395.76	131.99	1395.76	135.13	1395.76
135.42	1395.76	136.05	1395.76	141.71	1395.76	143.96	1395.76	185	1385.5
215	1385.5	256.04	1395.76	259.08	1395.72	265.42	1395.55	278.48	1395.62
292.44	1395.59	359.6	1395.76	406	1395.9				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
6	.045	143.96	.045	256.04	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
143.96	256.04	35	35	35	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1392.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.50	Wt. n-Val.		0.045	
W.S. Elev (ft)	1391.65	Reach Len. (ft)	35.00	35.00	35.00
Crit W.S. (ft)		Flow Area (sq ft)		335.84	
E.G. Slope (ft/ft)	0.004387	Area (sq ft)		335.84	
Q Total (cfs)	1900.00	Flow (cfs)		1900.00	
Top Width (ft)	79.21	Top Width (ft)		79.21	
Vel Total (ft/s)	5.66	Avg. Vel. (ft/s)		5.66	
Max Chl Dpth (ft)	6.15	Hydr. Depth (ft)		4.24	
Conv. Total (cfs)	28687.0	Conv. (cfs)		28687.0	
Length Wtd. (ft)	35.00	Wetted Per. (ft)		80.72	
Min Ch El (ft)	1385.50	Shear (lb/sq ft)		1.14	
Alpha	1.00	Stream Power (lb/ft s)	406.00	0.00	0.00
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)		3.73	
C & E Loss (ft)	0.00	Cum SA (acres)		0.24	

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Up Main Br 204th RS: 400

INPUT
Description: Sta 103+00 204th St Channel
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7.5	1393.25	9.5	1393.27	15.57	1393.33	19.05	1393.35	31.38	1393.35
36.51	1393.41	43.02	1393.14	45.29	1393.4	48.2	1393.74	48.32	1393.75
48.42	1393.77	52.63	1394.79	53.56	1394.9	56.75	1395.35	73.9	1395.59
78.91	1395.72	85.48	1395.88	86.64	1395.87	89.65	1395.91	94.02	1396.77
94.06	1396.77	94.11	1396.77	103.87	1396.81	110.89	1396.78	112.84	1396.74
115.92	1395.8	116.74	1395.8	117.4	1395.8	118.67	1395.8	123.21	1395.8
125.26	1395.8	128.41	1395.8	129.21	1395.8	130.3	1395.8	130.64	1395.8
131.28	1395.8	132.71	1395.8	136.39	1395.8	142.8	1395.8	185	1385.37
215	1385.37	257.2	1395.8	262.47	1395.41	262.5	1395.41	262.53	1395.41
273.33	1395.45	286.23	1395.62	299.23	1395.84	407.5	1396.05		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7.5	.045	142.8	.045	257.2	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
142.8	257.2	100	100	100	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1391.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.50	Wt. n-Val.		0.045	
W.S. Elev (ft)	1391.49	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)		335.45	
E.G. Slope (ft/ft)	0.004427	Area (sq ft)		335.45	
Q Total (cfs)	1900.00	Flow (cfs)		1900.00	
Top Width (ft)	79.55	Top Width (ft)		79.55	

Vel Total (ft/s)	5.66	Avg. Vel. (ft/s)			5.66
Max Chl Dpth (ft)	6.12	Hydr. Depth (ft)			4.22
Conv. Total (cfs)	28554.7	Conv. (cfs)			28554.7
Length Wtd. (ft)	100.00	Wetted Per. (ft)			81.05
Min Ch El (ft)	1385.37	Shear (lb/sq ft)			1.14
Alpha	1.00	Stream Power (lb/ft s)	407.50		0.00
0.00					
Frctn Loss (ft)	0.47	Cum Volume (acre-ft)			3.46
C & E Loss (ft)	0.00	Cum SA (acres)			0.18

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Up Main Br 204th RS: 300

INPUT
Description:
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
15	1393.02	21.02	1393.06	32.9	1393.05	46.87	1393.02	57.52	1393.02
60.96	1393.19	65.49	1393.69	65.99	1393.74	66.35	1393.82	69.74	1394.69
70.26	1394.76	75.53	1395.3	77.73	1395.34	91.93	1395.5	98.33	1395.64
101.66	1395.86	102.22	1395.9	103.5	1395.99	105.17	1396.1	108.66	1396.19
108.7	1396.19	108.73	1396.19	108.76	1396.2	108.81	1396.2	108.86	1396.2
113.89	1396.72	118.96	1396.87	123.32	1396.85	129	1396.74	139	1396.5
185	1385	215	1385	261.48	1396.62	271.08	1396.47	275.14	1396.57
275.3	1396.57	277.86	1396.56	279.19	1396.61	288.74	1396.29	289.84	1396.25
291.04	1396.2	298.07	1395.9	302.39	1395.69	303.17	1395.62	304.84	1395.65
313.08	1395.65	331.95	1395.76	339.2	1395.8	345.68	1395.84	415	1395.94

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
15	.045	139	.045	261.48	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
139	261.48	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1391.52	Element		Left OB	Channel
Right OB					
Vel Head (ft)	0.54	Wt. n-Val.			0.045
W.S. Elev (ft)	1390.99	Reach Len. (ft)		265.00	265.00
265.00					
Crit W.S. (ft)		Flow Area (sq ft)			322.86
E.G. Slope (ft/ft)	0.004890	Area (sq ft)			322.86
Q Total (cfs)	1900.00	Flow (cfs)			1900.00
Top Width (ft)	77.88	Top Width (ft)			77.88
Vel Total (ft/s)	5.88	Avg. Vel. (ft/s)			5.88
Max Chl Dpth (ft)	5.99	Hydr. Depth (ft)			4.15
Conv. Total (cfs)	27169.5	Conv. (cfs)			27169.5
Length Wtd. (ft)	265.00	Wetted Per. (ft)			79.36
Min Ch El (ft)	1385.00	Shear (lb/sq ft)			1.24
Alpha	1.00	Stream Power (lb/ft s)		415.00	0.00
0.00					
Frctn Loss (ft)		Cum Volume (acre-ft)			2.70
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION

RIVER: Sonoqui Wash
REACH: East Branch RS: 30950

INPUT
Description: Sta 309+50, interpolated section from design model
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
88.28	1395.29	114.74	1394.75	128.67	1392.2	130.44	1391.93	157.76	1384.96
163.89	1384.19	200	1383.75	227.14	1384.05	239.88	1386.59	242.21	1387.3
259.3	1389.57	279.32	1394.32	279.58	1394.36	279.83	1394.4	285.34	1394.8
287.25	1394.94	291.88	1395.27	296.22	1395.9	296.38	1395.93	296.85	1396.05
297.21	1396.18	298.69	1396.72						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
88.28	.045	114.74	.045	279.83	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
114.74	279.83	50	50	50	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1391.19	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.14	Wt. n-Val.		0.045
W.S. Elev (ft)	1391.04	Reach Len. (ft)	50.00	50.00
50.00				
Crit W.S. (ft)		Flow Area (sq ft)		693.20
E.G. Slope (ft/ft)	0.000932	Area (sq ft)		693.20
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	131.60	Top Width (ft)		131.60
Vel Total (ft/s)	3.03	Avg. Vel. (ft/s)		3.03
Max Chl Dpth (ft)	7.29	Hydr. Depth (ft)		5.27
Conv. Total (cfs)	68774.9	Conv. (cfs)		68774.9
Length Wtd. (ft)	50.00	Wetted Per. (ft)		133.10
Min Ch El (ft)	1383.75	Shear (lb/sq ft)		0.30
Alpha	1.00	Stream Power (lb/ft s)	298.69	0.00
0.00				
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)		3.63
C & E Loss (ft)	0.00	Cum SA (acres)		0.15

CROSS SECTION

RIVER: Sonoqui Wash
REACH: East Branch RS: 30900

INPUT
Description: Sta 309+00
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
75.68	1395	120.78	1394.09	160.75	1384.1	200	1383.6	227	1383.9
242	1388.9	259	1389.6	278.92	1394	279.43	1394.04	284.85	1394.48
291.28	1395	295.71	1395.91	296.17	1396	297.98	1396.74		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
75.68	.045	120.78	.045	279.43	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
120.78	279.43	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1391.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.045	
W.S. Elev (ft)	1390.99	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)		Flow Area (sq ft)		672.88	
E.G. Slope (ft/ft)	0.001038	Area (sq ft)		672.88	
Q Total (cfs)	2100.00	Flow (cfs)		2100.00	
Top Width (ft)	132.07	Top Width (ft)		132.07	
Vel Total (ft/s)	3.12	Avg. Vel. (ft/s)		3.12	
Max Chl Dpth (ft)	7.39	Hydr. Depth (ft)		5.09	
Conv. Total (cfs)	65187.4	Conv. (cfs)		65187.4	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		133.90	
Min Ch El (ft)	1383.60	Shear (lb/sq ft)		0.33	
Alpha	1.00	Stream Power (lb/ft s)	297.98	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)		2.84	
C & E Loss (ft)		Cum SA (acres)			

Warning: The junction momentum weight force was very large. Due to the large value of the weight force, the program ignored
the weight force during the momentum calculations.

CROSS SECTION

RIVER: Sonoqui Wash
REACH: M Br 204-202 RS: 30700

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
120.8	1392.3	158	1384.2	200	1383.08	234.5	1384	272	1394

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
120.8	.045	120.8	.045	272	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
120.8	272	192	192	192	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1389.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.		0.045	
W.S. Elev (ft)	1389.44	Reach Len. (ft)	192.00	192.00	192.00
Crit W.S. (ft)		Flow Area (sq ft)		565.52	
E.G. Slope (ft/ft)	0.002143	Area (sq ft)		565.52	
Q Total (cfs)	2400.00	Flow (cfs)		2400.00	
Top Width (ft)	120.95	Top Width (ft)		120.95	
Vel Total (ft/s)	4.24	Avg. Vel. (ft/s)		4.24	
Max Chl Dpth (ft)	6.36	Hydr. Depth (ft)		4.68	
Conv. Total (cfs)	51842.2	Conv. (cfs)		51842.2	
Length Wtd. (ft)	192.00	Wetted Per. (ft)		122.26	

Min Ch El (ft)	1383.08	Shear (lb/sq ft)			0.62
Alpha	1.00	Stream Power (lb/ft s)	272.00		0.00
0.00					
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)			16.69
C & E Loss (ft)	0.02	Cum SA (acres)			3.68

CROSS SECTION

RIVER: Sonoqui Wash
REACH: M Br 204-202 RS: 30508

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
87.1	1391.88	119.1	1391.24	119.1	1391.74	129.6	1391.05	162.5	1383.08
200	1382.58	237.5	1383.08	269.4	1391.02	271.65	1391.64	273.01	1392.02
276.17	1392.05	277.5	1392.06	284.31	1392.12	291.34	1392.05	294.64	1392.02
300.67	1391.98								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
87.1	.045	129.6	.045	273.01	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
129.6	273.01	60	60	60	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
87.1	162.5	1392	F
237.5	300.67	1392	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1389.27	Element		Left OB	Channel
Right OB					
Vel Head (ft)	0.44	Wt. n-Val.			0.045
W.S. Elev (ft)	1388.82	Reach Len. (ft)		60.00	60.00
60.00					
Crit W.S. (ft)	1386.00	Flow Area (sq ft)			449.57
E.G. Slope (ft/ft)	0.002401	Area (sq ft)			583.96
Q Total (cfs)	2400.00	Flow (cfs)			2400.00
Top Width (ft)	121.79	Top Width (ft)			121.79
Vel Total (ft/s)	5.34	Avg. Vel. (ft/s)			5.34
Max Chl Dpth (ft)	6.24	Hydr. Depth (ft)			5.99
Conv. Total (cfs)	48982.9	Conv. (cfs)			48982.9
Length Wtd. (ft)	60.00	Wetted Per. (ft)			75.01
Min Ch El (ft)	1382.58	Shear (lb/sq ft)			0.90
Alpha	1.00	Stream Power (lb/ft s)		300.67	0.00
0.00					
Frctn Loss (ft)		Cum Volume (acre-ft)			14.16
C & E Loss (ft)		Cum SA (acres)			3.15

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CULVERT

RIVER: Sonoqui Wash
REACH: M Br 204-202 RS: 30478.9

INPUT
Description:
Distance from Upstream XS = 3
Deck/Roadway Width = 54
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
119	1392	1382	350	1392	1382

Upstream Bridge Cross Section Data
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
87.1	1391.88	119.1	1391.24	119.1	1391.74	129.6	1391.05	162.5	1383.08
200	1382.58	237.5	1383.08	269.4	1391.02	271.65	1391.64	273.01	1392.02
276.17	1392.05	277.5	1392.06	284.31	1392.12	291.34	1392.05	294.64	1392.02
300.67	1391.98								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
87.1	.045	129.6	.045	273.01	.045

Bank Sta: Left	Right	Coeff Contr.	Expan.
129.6	273.01	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
87.1	162.5	1392	F
237.5	300.67	1392	F

Downstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
119	1392	1382	440	1392	1382

Downstream Bridge Cross Section Data
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
87.2	1391.58	119.11	1390.95	119.11	1391.32	119.49	1391.3	119.49	1391.43
129.57	1390.77	162.5	1382.92	200	1382.42	237.5	1382.92	265.81	1389.98
270.88	1390.97	271.79	1391.15	274.21	1391.66	274.96	1391.83	275.67	1391.98
277.22	1391.97	278.66	1391.95	279.92	1391.94	286.37	1391.87	289.7	1391.79
290.94	1391.61	291.56	1391.53	292.55	1391.65	293.03	1391.71	293.4	1391.76
296.16	1391.65	301.87	1391.43						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
87.2	.045	129.57	.045	275.67	.045

Bank Sta: Left	Right	Coeff Contr.	Expan.
129.57	275.67	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
87.2	162.5	1392	F
237.5	301.87	1392	F

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 Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Box	7	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
3	54	.013	.013	0	.5	1

Number of Barrels = 6
Upstream Elevation = 1382.58
Centerline Stations

Sta.	Sta.	Sta.	Sta.	Sta.	Sta.
172.7	183.62	194.54	205.46	216.38	227.3

Downstream Elevation = 1382.42
Centerline Stations

Sta.	Sta.	Sta.	Sta.	Sta.	Sta.
172.7	183.62	194.54	205.46	216.38	227.3

CULVERT OUTPUT Profile #PF 1 Culv Group: Culvert #1

Q Culv Group (cfs)	2400.00	Culv Full Len (ft)	
# Barrels	6	Culv Vel US (ft/s)	7.38
Q Barrel (cfs)	400.00	Culv Vel DS (ft/s)	7.20
E.G. US. (ft)	1389.27	Culv Inv El Up (ft)	1382.58
W.S. US. (ft)	1388.82	Culv Inv El Dn (ft)	1382.42
E.G. DS (ft)	1388.54	Culv Frctn Ls (ft)	0.06
W.S. DS (ft)	1387.98	Culv Exit Loss (ft)	0.24
Delta EG (ft)	0.72	Culv Entr Loss (ft)	0.42
Delta WS (ft)	0.85	Q Weir (cfs)	
E.G. IC (ft)	1388.48	Weir Sta Lft (ft)	
E.G. OC (ft)	1389.27	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1388.00	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1387.98	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	3.83	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	3.68	Min El Weir Flow (ft)	1392.01

CROSS SECTION

RIVER: Sonoqui Wash
REACH: M Br 204-202 RS: 30448

INPUT
Description:
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
87.2	1391.58	119.11	1390.95	119.11	1391.32	119.49	1391.3	119.49	1391.43
129.57	1390.77	162.5	1382.92	200	1382.42	237.5	1382.92	265.81	1389.98
270.88	1390.97	271.79	1391.15	274.21	1391.66	274.96	1391.83	275.67	1391.98
277.22	1391.97	278.66	1391.95	279.92	1391.94	286.37	1391.87	289.7	1391.79
290.94	1391.61	291.56	1391.53	292.55	1391.65	293.03	1391.71	293.4	1391.76
296.16	1391.65	301.87	1391.43						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
87.2	.045	129.57	.045	275.67	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
129.57	275.67	148	148	148	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
87.2	162.5	1392	F
237.5	301.87	1392	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1388.54	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.56	Wt. n-Val.		0.045
W.S. Elev (ft)	1387.98	Reach Len. (ft)	148.00	148.00
148.00				
Crit W.S. (ft)	1385.85	Flow Area (sq ft)		398.11
E.G. Slope (ft/ft)	0.003600	Area (sq ft)		503.07
Q Total (cfs)	2400.00	Flow (cfs)		2400.00
Top Width (ft)	116.50	Top Width (ft)		116.50
Vel Total (ft/s)	6.03	Avg. Vel. (ft/s)		6.03
Max Chl Dpth (ft)	5.56	Hydr. Depth (ft)		5.31
Conv. Total (cfs)	39999.1	Conv. (cfs)		39999.1
Length Wtd. (ft)	148.00	Wetted Per. (ft)		75.01
Min Ch El (ft)	1382.42	Shear (lb/sq ft)		1.19
Alpha	1.00	Stream Power (lb/ft s)	301.87	0.00
0.00				
Frctn Loss (ft)	0.47	Cum Volume (acre-ft)		14.05
C & E Loss (ft)	0.07	Cum SA (acres)		2.98

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Sonoqui Wash
REACH: M Br 204-202 RS: 30300.

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
87.5	1390.4	119.5	1389.76	119.5	1390.2	129.5	1389.5	162.5	1382.54
200	1382.04	237.5	1382.54	276	1392.05	284.54	1392		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
87.5	.045	129.5	.045	276	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
129.5	276	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1388.00	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.33	Wt. n-Val.		0.045

W.S. Elev (ft)	1387.67	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)		Flow Area (sq ft)		519.35	
E.G. Slope (ft/ft)	0.002816	Area (sq ft)		519.35	
Q Total (cfs)	2400.00	Flow (cfs)		2400.00	
Top Width (ft)	120.11	Top Width (ft)		120.11	
Vel Total (ft/s)	4.62	Avg. Vel. (ft/s)		4.62	
Max Chl Dpth (ft)	5.63	Hydr. Depth (ft)		4.32	
Conv. Total (cfs)	45224.9	Conv. (cfs)		45224.9	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		121.27	
Min Ch El (ft)	1382.04	Shear (lb/sq ft)		0.75	
Alpha	1.00	Stream Power (lb/ft s)	284.54	0.00	0.00
Frctn Loss (ft)	0.57	Cum Volume (acre-ft)		12.31	
C & E Loss (ft)	0.00	Cum SA (acres)		2.58	

CROSS SECTION

RIVER: Sonoqui Wash
REACH: M Br 204-202 RS: 30100.

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
87.5	1389.74	119.5	1389.1	119.5	1389.6	130	1388.3	162.5	1382.02
181.25	1381.52	200	1381.7	237.5	1382.02	275	1391.29	284.7	1391.75
288.64	1391.49	294.22	1391.12	295.96	1391	302.87	1390.19		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
87.5	.045	130	.045	275	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
130	275	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1387.43	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.		0.045	
W.S. Elev (ft)	1387.10	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)		Flow Area (sq ft)		518.31	
E.G. Slope (ft/ft)	0.002887	Area (sq ft)		518.31	
Q Total (cfs)	2400.00	Flow (cfs)		2400.00	
Top Width (ft)	121.84	Top Width (ft)		121.84	
Vel Total (ft/s)	4.63	Avg. Vel. (ft/s)		4.63	
Max Chl Dpth (ft)	5.58	Hydr. Depth (ft)		4.25	
Conv. Total (cfs)	44663.3	Conv. (cfs)		44663.3	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		122.95	
Min Ch El (ft)	1381.52	Shear (lb/sq ft)		0.76	
Alpha	1.00	Stream Power (lb/ft s)	302.87	0.00	0.00
Frctn Loss (ft)	0.54	Cum Volume (acre-ft)		9.93	
C & E Loss (ft)	0.02	Cum SA (acres)		2.03	

CROSS SECTION

RIVER: Sonoqui Wash

REACH: M Br 204-202 RS: 29900.

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
87.5	1389.02	119.5	1388.38	119.5	1388.88	129.5	1387.75	162.5	1381
200	1381.25	237.54	1381.5	250.24	1384.13	250.37	1384.16	250.69	1384.17
266.7	1384.65	287.67	1390.1	297.64	1390.1	302.61	1389.22	303.25	1389
303.73	1388.99	306.61	1388.9	308.82	1388.97	309.72	1389	315.24	1388.94
315.94	1388.93								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
87.5	.045	129.5	.045	287.67	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
129.5	287.67	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1386.88	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.28	Wt. n-Val.		0.045
W.S. Elev (ft)	1386.60	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		570.17
E.G. Slope (ft/ft)	0.002504	Area (sq ft)		570.17
Q Total (cfs)	2400.00	Flow (cfs)		2400.00
Top Width (ft)	139.11	Top Width (ft)		139.11
Vel Total (ft/s)	4.21	Avg. Vel. (ft/s)		4.21
Max Chl Dpth (ft)	5.60	Hydr. Depth (ft)		4.10
Conv. Total (cfs)	47965.7	Conv. (cfs)		47965.7
Length Wtd. (ft)	200.00	Wetted Per. (ft)		140.21
Min Ch El (ft)	1381.00	Shear (lb/sq ft)		0.64
Alpha	1.00	Stream Power (lb/ft s)	315.94	0.00
0.00				
Frctn Loss (ft)	0.53	Cum Volume (acre-ft)		7.43
C & E Loss (ft)	0.01	Cum SA (acres)		1.43

CROSS SECTION

RIVER: Sonoqui Wash
REACH: M Br 204-202 RS: 29700.

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
97.5	1388.51	119.5	1387.87	119.5	1388.37	129.5	1387.3	162.5	1380.48
200	1380.7	237.51	1380.96	253.15	1384.87	273	1390	288.05	1390
293.68	1390	304.57	1388.59						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
97.5	.045	129.5	.045	273	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
129.5	273	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1386.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.		0.045	
W.S. Elev (ft)	1386.02	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)		Flow Area (sq ft)		523.41	
E.G. Slope (ft/ft)	0.002799	Area (sq ft)		523.41	
Q Total (cfs)	2400.00	Flow (cfs)		2400.00	
Top Width (ft)	121.89	Top Width (ft)		121.89	
Vel Total (ft/s)	4.59	Avg. Vel. (ft/s)		4.59	
Max Chl Dpth (ft)	5.54	Hydr. Depth (ft)		4.29	
Conv. Total (cfs)	45365.8	Conv. (cfs)		45365.8	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		123.08	
Min Ch El (ft)	1380.48	Shear (lb/sq ft)		0.74	
Alpha	1.00	Stream Power (lb/ft s)	304.57	0.00	0.00
Frctn Loss (ft)	0.58	Cum Volume (acre-ft)		4.92	
C & E Loss (ft)	0.00	Cum SA (acres)		0.83	

CROSS SECTION

RIVER: Sonoqui Wash
REACH: M Br 204-202 RS: 29500.

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
86.5	1388	118.5	1387.36	118.5	1387.86	129	1387	162.5	1379.96
200	1380.21	237.5	1380.46	260.05	1386	277.5	1390.3	292.86	1390.3
294.6	1390.43	295.18	1390.59	296.67	1390.21	297.46	1390	298.23	1389.76
299.99	1389.27	300.77	1389	303.5	1388.22	304.28	1388	307.22	1387.14

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
86.5	.045	129	.045	277.5	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
129	277.5	100	100	100	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1385.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.34	Wt. n-Val.		0.045	
W.S. Elev (ft)	1385.42	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)		512.23	
E.G. Slope (ft/ft)	0.002985	Area (sq ft)		512.23	
Q Total (cfs)	2400.00	Flow (cfs)		2400.00	
Top Width (ft)	121.21	Top Width (ft)		121.21	
Vel Total (ft/s)	4.69	Avg. Vel. (ft/s)		4.69	
Max Chl Dpth (ft)	5.46	Hydr. Depth (ft)		4.23	
Conv. Total (cfs)	43930.1	Conv. (cfs)		43930.1	
Length Wtd. (ft)	100.00	Wetted Per. (ft)		122.38	
Min Ch El (ft)	1379.96	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)	307.22	0.00	0.00

Frctn Loss (ft)	0.32	Cum Volume (acre-ft)	2.54
C & E Loss (ft)	0.00	Cum SA (acres)	0.27

CROSS SECTION

RIVER: Sonoqui Wash
REACH: M Br 204-202 RS: 29400.

INPUT
Description:
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
78.87	1387	79.43	1386.96	80.82	1386.94	88.19	1386.77	89.09	1386.77
94.69	1386.9	98.54	1387	99.76	1387.4	101.56	1388	131	1388
162.5	1379.7	200	1379.95	237.5	1380.2	277	1390.3	281.65	1390.3
284.29	1389.26	287	1389.48	287.71	1389.41	291.25	1389	301.91	1388.35
309.61	1388	317.31	1387.88	323.99	1386.88	336	1385.8		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
78.87	.045	131	.045	277	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
131	277	190	110	30	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1385.45	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.38	Wt. n-Val.		0.045
W.S. Elev (ft)	1385.06	Reach Len. (ft)	110.00	110.00
110.00				
Crit W.S. (ft)		Flow Area (sq ft)		484.47
E.G. Slope (ft/ft)	0.003335	Area (sq ft)		484.47
Q Total (cfs)	2400.00	Flow (cfs)		2400.00
Top Width (ft)	114.38	Top Width (ft)		114.38
Vel Total (ft/s)	4.95	Avg. Vel. (ft/s)		4.95
Max Chl Dpth (ft)	5.36	Hydr. Depth (ft)		4.24
Conv. Total (cfs)	41561.2	Conv. (cfs)		41561.2
Length Wtd. (ft)	110.00	Wetted Per. (ft)		115.69
Min Ch El (ft)	1379.70	Shear (lb/sq ft)		0.87
Alpha	1.00	Stream Power (lb/ft s)	336.00	0.00
0.00				
Frctn Loss (ft)	0.28	Cum Volume (acre-ft)		1.40
C & E Loss (ft)	0.04	Cum SA (acres)		

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Up Main Br 202nd RS: 10100

INPUT
Description: Upper Main Br at 202nd, DS face of Marsh Rd culvert
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
168.7	1388	183.7	1388	183.7	1381.01	200	1381.01	216.3	1381.01
216.3	1388	219.3	1388						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

168.7	.045	183.7	.012	216.3	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
183.7	216.3	15	15	15	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1389.29	Element	Left OB	Channel
Right OB				
Vel Head (ft)	2.76	Wt. n-Val.		0.012
W.S. Elev (ft)	1386.53	Reach Len. (ft)	15.00	15.00
15.00				
Crit W.S. (ft)	1386.53	Flow Area (sq ft)		179.98
E.G. Slope (ft/ft)	0.001753	Area (sq ft)		179.98
Q Total (cfs)	2400.00	Flow (cfs)		2400.00
Top Width (ft)	32.60	Top Width (ft)		32.60
Vel Total (ft/s)	13.33	Avg. Vel. (ft/s)		13.33
Max Chl Dpth (ft)	5.52	Hydr. Depth (ft)		5.52
Conv. Total (cfs)	57315.1	Conv. (cfs)		57315.1
Length Wtd. (ft)	15.00	Wetted Per. (ft)		43.64
Min Ch El (ft)	1381.01	Shear (lb/sq ft)		0.45
Alpha	1.00	Stream Power (lb/ft s)	219.30	0.00
0.00				
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)		0.85
C & E Loss (ft)	0.04	Cum SA (acres)		0.01

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: 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: Sonoqui Wash
REACH: Up Main Br 202nd RS: 10085

INPUT
Description: Upper Main Br at 202nd, 15 ft DS of Marsh Rd culvert
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
172.9	1390	181	1388	181	1380.87	200	1380.87	216	1380.87
216	1388	226	1388						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
172.9	.045	181	.012	216	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
181	216	85	85	85	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1388.77	Element	Left OB	Channel
Right OB				
Vel Head (ft)	2.63	Wt. n-Val.		0.012

W.S. Elev (ft)	1386.14	Reach Len. (ft)	85.00	85.00	85.00
Crit W.S. (ft)	1386.14	Flow Area (sq ft)		184.27	
E.G. Slope (ft/ft)	0.001715	Area (sq ft)		184.27	
Q Total (cfs)	2400.00	Flow (cfs)		2400.00	
Top Width (ft)	35.00	Top Width (ft)		35.00	
Vel Total (ft/s)	13.02	Avg. Vel. (ft/s)		13.02	
Max Chl Dpth (ft)	5.26	Hydr. Depth (ft)		5.26	
Conv. Total (cfs)	57949.0	Conv. (cfs)		57949.0	
Length Wtd. (ft)	85.00	Wetted Per. (ft)		45.53	
Min Ch El (ft)	1380.87	Shear (lb/sq ft)		0.43	
Alpha	1.00	Stream Power (lb/ft s)	226.00	0.00	0.00
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)		0.79	
C & E Loss (ft)	0.72	Cum SA (acres)			

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: Sonoqui Wash
REACH: Main Br DS 202nd RS: 29290.

INPUT
Description: U/S of Riggs Road Bridge (future by others)
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
93.62	1387	118.6	1387	154.28	1379.41	199.99	1379.68	246.89	1379.99
295	1388.27	372.76	1388.27	400	1389.6				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
93.62	.045	118.6	.045	295	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
118.6	295	160	160	160	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1385.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.		0.045	
W.S. Elev (ft)	1384.89	Reach Len. (ft)	36.84	36.84	36.84
Crit W.S. (ft)	1382.30	Flow Area (sq ft)		621.50	
E.G. Slope (ft/ft)	0.002015	Area (sq ft)		621.50	
Q Total (cfs)	2400.00	Flow (cfs)		2400.00	

Top Width (ft)	146.83	Top Width (ft)			146.83
Vel Total (ft/s)	3.86	Avg. Vel. (ft/s)			3.86
Max Chl Dpth (ft)	5.48	Hydr. Depth (ft)			4.23
Conv. Total (cfs)	53460.2	Conv. (cfs)			53460.2
Length Wtd. (ft)	36.84	Wetted Per. (ft)			147.82
Min Ch El (ft)	1379.41	Shear (lb/sq ft)			0.53
Alpha	1.00	Stream Power (lb/ft s)		400.00	0.00
0.00					
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)		1.33	104.92
C & E Loss (ft)	0.00	Cum SA (acres)		0.34	27.55

BRIDGE

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 29209.9

INPUT
Description: Riggs Rd Bridge (Future) (to be constructed by others)
Distance from Upstream XS = 36.84
Deck/Roadway Width = 86.33
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 7

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1397.02	0	104.72	1397.65	1392	107.97	1397.67	1392
199.999	1398.05	1392	292.02	1397.83	1392	295.27	1397.82	1392
400	1397.5	0						

Upstream Bridge Cross Section Data
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
93.62	1387	118.6	1387	154.28	1379.41	199.99	1379.68	246.89	1379.99
295	1388.27	372.76	1388.27	400	1389.6				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
93.62	.045	118.6	.045	295	.045

Bank Sta: Left	Right	Coeff Contr.	Expan.
118.6	295	.1	.3

Downstream Deck/Roadway Coordinates
num= 7

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1397.02	0	104.72	1397.65	1392	107.97	1397.67	1392
199.999	1398.05	1392	292.02	1397.83	1392	295.27	1397.82	1392
400	1397.5	0						

Downstream Bridge Cross Section Data
Station Elevation Data num= 73

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1390	2.91	1389.57	18.67	1389.78	23.88	1389.49	25.45	1389.51
25.75	1389.51	27.62	1389.53	35.37	1389.61	38.89	1389.65	43.37	1389.71
46.71	1389.75	49.17	1389.78	51.43	1389.81	52.41	1389.86	56.15	1389.88
57.99	1389.91	60.69	1389.91	63.47	1389.92	64.69	1389.94	68.9	1389.94
69.87	1389.95	86.7	1389.44	93.99	1389	102.75	1388.12	103.34	1388.06
103.84	1388	112.02	1387.13	113.13	1387	117.41	1386.26	119.63	1385.88
154.02	1379	199.99	1379.26	245.72	1379.56	280.4	1386.72	282.78	1387.21
286.62	1388	294.18	1388.44	294.5	1388.45	295.69	1388.49	297.63	1388.56
300.21	1388.65	303.02	1388.79	305.87	1388.88	309.79	1388.97	309.99	1388.98

310.85	1389	313.11	1388.8	314.11	1388.7	316.24	1388.5	318.87	1388.23
319.59	1388.16	321.4	1388	322.19	1387.92	322.66	1387.86	324.79	1387.61
328.12	1387.13	328.5	1387.08	328.67	1387.06	329.13	1387	331.06	1386.69
332.97	1386.36	333.95	1386.2	335.08	1386	337.71	1385.99	338.06	1385.98
341.93	1385.96	345.19	1385.94	346.54	1385.91	350.03	1385.88	352.28	1385.83
355.03	1385.81	358.61	1385.72	365.2	1385.64				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	93.99	.045	310.85	.045

Bank Sta: Left	Right	Coeff Contr.	Expan.
93.99	310.85	.1	.3

Upstream Embankment side slope = 4 horiz. to 1.0 vertical
Downstream Embankment side slope = 4 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 = 1

Pier Data
Pier Station Upstream= 199.999 Downstream= 199.999
Upstream num= 4

Width	Elev	Width	Elev	Width	Elev	Width	Elev
4	1375	4	1387	5	1387	5	1394

Downstream num= 4

Width	Elev	Width	Elev	Width	Elev	Width	Elev
4	1375	4	1387	5	1387	5	1394

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

BRIDGE OUTPUT Profile #PF 1

		Element	Inside BR US	Inside BR DS
E.G. US. (ft)	1385.12			
W.S. US. (ft)	1384.89	E.G. Elev (ft)	1385.03	1384.82
Q Total (cfs)	2400.00	W.S. Elev (ft)	1384.77	1384.57
Q Bridge (cfs)	2400.00	Crit W.S. (ft)	1382.38	1381.98

Q Weir (cfs)	5.57	Max Chl Dpth (ft)	5.36
Weir Sta Lft (ft)	3.98	Vel Total (ft/s)	4.11
Weir Sta Rgt (ft)	603.55	Flow Area (sq ft)	584.09
Weir Submerg	0.34	Froude # Chl	0.36
Weir Max Depth (ft)	1776.58	Specif Force (cu ft)	1677.32
Min El Weir Flow (ft)	1397.51	Hydr Depth (ft)	4.12
Min El Prs (ft)	1392.00	W.P. Total (ft)	152.76
Delta EG (ft)	0.38	Conv. Total (cfs)	47161.3
Delta WS (ft)	0.39	Top Width (ft)	141.60
BR Open Area (sq ft)	1849.89	Frctn Loss (ft)	0.21
BR Open Vel (ft/s)	4.11	C & E Loss (ft)	0.00
Coef of Q	0.57	Shear Total (lb/sq ft)	0.62
Br Sel Method	Energy only	Power Total (lb/ft s)	93.62
	0.00		

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 29130.

INPUT
Description: D/S of Riggs Road Bridge (future by others)
Station Elevation Data num= 73

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1390	2.91	1389.57	18.67	1389.78	23.88	1389.49	25.45	1389.51
25.75	1389.51	27.62	1389.53	35.37	1389.61	38.89	1389.65	43.37	1389.71
46.71	1389.75	49.17	1389.78	51.43	1389.81	52.41	1389.86	56.15	1389.88
57.99	1389.91	60.69	1389.91	63.47	1389.92	64.69	1389.94	68.9	1389.94
69.87	1389.95	86.7	1389.44	93.99	1389	102.75	1388.12	103.34	1388.06
103.84	1388	112.02	1387.13	113.13	1387	117.41	1386.26	119.63	1385.88
154.02	1379	199.99	1379.26	245.72	1379.56	280.4	1386.72	282.78	1387.21
286.62	1388	294.18	1388.44	294.5	1388.45	295.69	1388.49	297.63	1388.56
300.21	1388.65	303.02	1388.79	305.87	1388.88	309.79	1388.97	309.99	1388.98
310.85	1389	313.11	1388.8	314.11	1388.7	316.24	1388.5	318.87	1388.23
319.59	1388.16	321.4	1388	322.19	1387.92	322.66	1387.86	324.79	1387.61
328.12	1387.13	328.5	1387.08	328.67	1387.06	329.13	1387	331.06	1386.69
332.97	1386.36	333.95	1386.2	335.08	1386	337.71	1385.99	338.06	1385.98
341.93	1385.96	345.19	1385.94	346.54	1385.91	350.03	1385.88	352.28	1385.83
355.03	1385.81	358.61	1385.72	365.2	1385.64				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	93.99	.045	310.85	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
93.99	310.85	100	230	330	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1384.74	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.24	Wt. n-Val.		0.045
W.S. Elev (ft)	1384.50	Reach Len. (ft)	100.00	230.00
330.00				
Crit W.S. (ft)		Flow Area (sq ft)		614.26
E.G. Slope (ft/ft)	0.002027	Area (sq ft)		614.26
Q Total (cfs)	2400.00	Flow (cfs)		2400.00
Top Width (ft)	143.11	Top Width (ft)		143.11
Vel Total (ft/s)	3.91	Avg. Vel. (ft/s)		3.91
Max Chl Dpth (ft)	5.50	Hydr. Depth (ft)		4.29
Conv. Total (cfs)	53307.7	Conv. (cfs)		53307.7
Length Wtd. (ft)	230.00	Wetted Per. (ft)		144.17
Min Ch El (ft)	1379.00	Shear (lb/sq ft)		0.54
Alpha	1.00	Stream Power (lb/ft s)	365.20	0.00
0.00				
Frctn Loss (ft)	0.46	Cum Volume (acre-ft)	1.33	102.72
C & E Loss (ft)	0.00	Cum SA (acres)	0.34	27.03

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 28900.

INPUT
Description:
Station Elevation Data num= 79

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1387.43	112.69	1389	113.62	1389	113.76	1388.97	117.86	1388
121.63	1387.05	121.83	1387	124.75	1386.6	129.05	1386	129.35	1385.96
132.7	1385.46	135.77	1385	136.32	1384.92	142.95	1384	167.5	1378.9
200	1378.4	232.5	1378.99	241.46	1379.42	241.64	1379.43	246.08	1379.65
260.2	1382.67	261.25	1382.91	263.95	1383.53	268.75	1384.62	273.88	1385.79
278.02	1386.73	283.57	1388	284.27	1388.11	286.53	1388.46	290.23	1389
293.27	1388.58	297.15	1388	300.11	1387.84	302.24	1387.71	306.07	1387.79
307.26	1387.81	311.96	1387.91	312.28	1387.92	312.59	1387.93	312.7	1387.93
314.54	1388	320.64	1388.84	321.8	1389	322.27	1389.08	324.2	1389.4
325.34	1389.6	325.45	1389.58	328.71	1389	330.35	1388.7	339.76	1386.74
340.08	1386.82	341.12	1387.09	343.6	1387.84	343.79	1387.89	344.04	1388.02
346.5	1389.42	348.17	1390.34	349.04	1390.79	350.03	1390.57	351.26	1390.27
354.99	1390.7	359.69	1391.18	362.62	1391.16	363.42	1391.16	372.38	1391.34
378.96	1391.89	383.2	1392.71	384.02	1392.88	384.28	1392.86	384.52	1392.92
388.65	1393.71	390.77	1394.21	393.38	1394.61	395.09	1395.01	395.72	1395.13
397.02	1395.19	398.03	1395.28	399.08	1395.53	400	1395.74		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	113.76	.045	290.23	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
113.76	290.23	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1384.27	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.23	Wt. n-Val.		0.045
W.S. Elev (ft)	1384.04	Reach Len. (ft)	200.00	200.00
200.00				

Crit W.S. (ft)		Flow Area (sq ft)			521.69
E.G. Slope (ft/ft)	0.001997	Area (sq ft)			521.69
Q Total (cfs)	2000.00	Flow (cfs)			2000.00
Top Width (ft)	123.56	Top Width (ft)			123.56
Vel Total (ft/s)	3.83	Avg. Vel. (ft/s)			3.83
Max Chl Dpth (ft)	5.64	Hydr. Depth (ft)			4.22
Conv. Total (cfs)	44752.6	Conv. (cfs)			44752.6
Length Wtd. (ft)	200.00	Wetted Per. (ft)			124.59
Min Ch El (ft)	1378.40	Shear (lb/sq ft)			0.52
Alpha	1.00	Stream Power (lb/ft s)	400.00		0.00
0.00					
Frctn Loss (ft)	0.45	Cum Volume (acre-ft)	1.33		99.72
C & E Loss (ft)	0.01	Cum SA (acres)	0.34		26.33

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 28700.

INPUT
Description:
Station Elevation Data num= 70

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1386.02	128.56	1388.03	129.02	1388	129.88	1387.78	129.97	1387.76
130.08	1387.73	130.21	1387.7	130.39	1387.65	132.38	1387.16	134.27	1386.68
141.01	1385	167.5	1378.38	200	1377.88	232.5	1378.38	259.07	1384.33
266.52	1386	270.87	1386.95	272.34	1387.27	284.53	1387.56	288.35	1387.65
289.72	1387.96	289.94	1388	292.3	1388.22	298.88	1388.82	300.79	1389
301.62	1388.95	305.92	1388.66	306.97	1388.68	311.01	1388.76	315.04	1388.84
316.1	1388.87	316.91	1388.89	317.01	1388.9	319.95	1389	322.15	1389.26
328.84	1390	330.57	1390.33	331.14	1390.41	333.27	1390.78	334.9	1390.95
335.94	1390.96	338.34	1390.72	340.45	1390.58	345.32	1390	354.55	1385.62
355.06	1385.64	355.91	1385.86	356.48	1386.03	359.59	1386.62	360	1386.66
360.33	1386.68	364.09	1387.33	366.83	1387.58	368.12	1387.95	371.6	1389.19
372.23	1389.36	373.34	1390.3	373.62	1390.29	374.81	1390.42	377.54	1391.48
377.96	1391.62	385.08	1392	394.16	1392.5	395.59	1392.69	397.04	1392.9
397.35	1392.84	398.32	1393.09	398.48	1393.11	399.11	1393.16	400	1393.24

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	128.56	.045	292.3	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
128.56	292.3	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1383.82	Element	Left OB	Channel	
Right OB					
Vel Head (ft)	0.29	Wt. n-Val.		0.045	
W.S. Elev (ft)	1383.53	Reach Len. (ft)	200.00	200.00	
200.00					
Crit W.S. (ft)		Flow Area (sq ft)		463.19	
E.G. Slope (ft/ft)	0.002509	Area (sq ft)		463.19	
Q Total (cfs)	2000.00	Flow (cfs)		2000.00	
Top Width (ft)	108.60	Top Width (ft)		108.60	
Vel Total (ft/s)	4.32	Avg. Vel. (ft/s)		4.32	
Max Chl Dpth (ft)	5.65	Hydr. Depth (ft)		4.27	
Conv. Total (cfs)	39929.6	Conv. (cfs)		39929.6	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		109.81	

Min Ch El (ft)	1377.88	Shear (lb/sq ft)		0.66
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.50	Cum Volume (acre-ft)	1.33	97.46
C & E Loss (ft)	0.00	Cum SA (acres)	0.34	25.79

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 28500.

INPUT
Description:
Station Elevation Data num= 69

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1387.15	80.57	1388.98	83.04	1388.92	84.03	1388.96	84.3	1389
85.83	1389.25	89.62	1389.45	93.84	1390	94.8	1390.11	95.61	1390.18
99.88	1390.59	100.19	1390.56	102.48	1390.34	105.38	1390.05	105.62	1390.03
105.99	1390	109.37	1389.46	112.19	1389	117.07	1388.2	124.05	1387
125.2	1386.86	131.66	1385.93	135.87	1385.34	138.26	1385	167.5	1377.86
200	1377.36	231.16	1377.83	232.5	1377.86	264.83	1386	269.43	1387.1
272.5	1387.82	273.29	1388	277.11	1388.64	278.96	1388.95	279.25	1389
280.27	1389.04	285.17	1389.21	307.1	1390	308.12	1390.28	309.79	1390.86
310.94	1390.46	312.24	1390	318.32	1389.31	320.99	1389	339.34	1385.33
341.7	1385.81	343.15	1386.15	343.8	1386.33	351.4	1388.57	355.24	1389.86
360	1391.47	361.42	1392.1	367.39	1394.69	370.4	1396.15	371.11	1396.5
371.9	1396.77	373	1397.11	373.99	1397.51	376.57	1398.75	377.3	1398.54
380.82	1397.09	382.08	1397	383.07	1396.87	387.6	1397.15	388.46	1397.21
390.68	1397.42	397.9	1398.06	399.46	1398.39	400	1398.51		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	99.88	.045	307.1	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
99.88	307.1	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1383.32	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.29	Wt. n-Val.		0.045
W.S. Elev (ft)	1383.02	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		459.29
E.G. Slope (ft/ft)	0.002521	Area (sq ft)		459.29
Q Total (cfs)	2000.00	Flow (cfs)		2000.00
Top Width (ft)	106.63	Top Width (ft)		106.63
Vel Total (ft/s)	4.35	Avg. Vel. (ft/s)		4.35
Max Chl Dpth (ft)	5.66	Hydr. Depth (ft)		4.31
Conv. Total (cfs)	39833.3	Conv. (cfs)		39833.3
Length Wtd. (ft)	200.00	Wetted Per. (ft)		107.90
Min Ch El (ft)	1377.36	Shear (lb/sq ft)		0.67
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.50	Cum Volume (acre-ft)	1.33	95.34
C & E Loss (ft)	0.00	Cum SA (acres)	0.34	25.30

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 28300.

INPUT
Description:
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1386	99.12	1389	99.68	1389.04	104.53	1389.37	105.92	1389.27
110.3	1389	111.6	1388.8	125.79	1386.75	130.04	1386.1	130.71	1386
167.5	1377.33	200	1376.83	232.5	1377.33	242.86	1379.95	266.89	1386
268.56	1386.57	269.84	1387	272.5	1387.38	272.96	1387.45	276.71	1388
278.08	1388.11	281.13	1388.48	281.93	1388.52	284.19	1388.47	285.7	1388.48
286.81	1388.48	288.02	1388.57	298.87	1388.59	299.48	1388.57	299.79	1388.56
300.98	1388.5	301.2	1388.49	301.87	1388.47	306.15	1388.3	311.2	1388.08
313.64	1388	314.97	1387.94	323.42	1387.6	326.81	1387.58	332.52	1387.71
333.85	1387.76	334.15	1387.77	335.33	1387.82	337.66	1387.92	339.95	1388
344.27	1387.26	356.52	1384.89	358.37	1385.56	363.94	1387.7	370.24	1390.92
371.75	1391.6	381.28	1396.47	381.85	1396.79	382.92	1397.27	389.35	1399.99
389.84	1400.17	390.81	1400.71	393.83	1402.19	396.61	1403.34	397.2	1403.64
399.73	1405.19	400	1405.37						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	105.92	.045	281.13	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
105.92	281.13	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1382.82	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.29	Wt. n-Val.		0.045
W.S. Elev (ft)	1382.53	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		465.04
E.G. Slope (ft/ft)	0.002449	Area (sq ft)		465.04
Q Total (cfs)	2000.00	Flow (cfs)		2000.00
Top Width (ft)	107.67	Top Width (ft)		107.67
Vel Total (ft/s)	4.30	Avg. Vel. (ft/s)		4.30
Max Chl Dpth (ft)	5.70	Hydr. Depth (ft)		4.32
Conv. Total (cfs)	40413.2	Conv. (cfs)		40413.2
Length Wtd. (ft)	200.00	Wetted Per. (ft)		108.92
Min Ch El (ft)	1376.83	Shear (lb/sq ft)		0.65
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.48	Cum Volume (acre-ft)	1.33	93.22
C & E Loss (ft)	0.00	Cum SA (acres)	0.34	24.81

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 28100.

INPUT
Description:
Station Elevation Data num= 42

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.39	125.59	1386	167.5	1376.81	200	1376.31	232.5	1376.81
245.15	1379.99	261.11	1384	264.79	1384.92	265.09	1385	270.28	1385.95

270.5	1386	270.99	1386.09	272.5	1386.39	274.36	1386.75	275.64	1387
281.74	1387.92	282.28	1388	282.7	1387.98	287.41	1387.81	290.24	1387.94
291.31	1388	294.3	1387.92	297.85	1387.83	301	1387.75	302.38	1387.72
308.68	1387.57	309.78	1387.55	314.94	1387.43	319.93	1387.61	321.53	1387.64
332.35	1387.72	334.03	1387.77	337.83	1387.81	340.03	1387.91	342.1	1388
359.83	1385.06	361.92	1385.89	370.68	1389.34	378.22	1392.33	387.38	1395.77
395.85	1399	400	1400.68						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	125.59	.045	282.7	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
125.59	282.7	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1382.33	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.28	Wt. n-Val.		0.045
W.S. Elev (ft)	1382.06	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		475.01
E.G. Slope (ft/ft)	0.002341	Area (sq ft)		475.01
Q Total (cfs)	2000.00	Flow (cfs)		2000.00
Top Width (ft)	109.82	Top Width (ft)		109.82
Vel Total (ft/s)	4.21	Avg. Vel. (ft/s)		4.21
Max Chl Dpth (ft)	5.75	Hydr. Depth (ft)		4.33
Conv. Total (cfs)	41332.9	Conv. (cfs)		41332.9
Length Wtd. (ft)	200.00	Wetted Per. (ft)		111.04
Min Ch El (ft)	1376.31	Shear (lb/sq ft)		0.63
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.45	Cum Volume (acre-ft)	1.33	91.06
C & E Loss (ft)	0.01	Cum SA (acres)	0.34	24.31

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 27900.

INPUT
Description:
Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1384.84	84.18	1390.92	95.89	1388.04	99.98	1387	102.1	1387.77
105.43	1389	107.48	1389.17	108.29	1389.24	108.74	1389.2	111.21	1389
115.31	1388.31	123.36	1387	132.13	1385.12	132.67	1385	167.5	1376.29
200	1375.79	232.5	1376.29	240.01	1377.92	248.57	1379.77	257.59	1380.04
264.86	1380.25	280.57	1384.22	283.65	1385	286.17	1385.54	288.16	1385.95
293.15	1387	301.37	1387.21	305.43	1387.32	314.72	1387.08	317.74	1387
333.16	1384.71	337.53	1385.08	339.71	1385.51	340.14	1385.66	342.36	1386.77
351.71	1389.88	365.93	1395.18	391.59	1403.9	394.64	1405.47	397.84	1406.88
398.7	1407.34	398.87	1407.28	400	1407.24				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	111.21	.045	293.15	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.

111.21 293.15 100 100 100 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1381.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.045	
W.S. Elev (ft)	1381.63	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)		508.23	
E.G. Slope (ft/ft)	0.002198	Area (sq ft)		508.23	
Q Total (cfs)	2000.00	Flow (cfs)		2000.00	
Top Width (ft)	124.17	Top Width (ft)		124.17	
Vel Total (ft/s)	3.94	Avg. Vel. (ft/s)		3.94	
Max Chl Dpth (ft)	5.84	Hydr. Depth (ft)		4.09	
Conv. Total (cfs)	42663.0	Conv. (cfs)		42663.0	
Length Wtd. (ft)	100.00	Wetted Per. (ft)		125.39	
Min Ch El (ft)	1375.79	Shear (lb/sq ft)		0.56	
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00	0.00
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	1.33	88.80	
C & E Loss (ft)	0.01	Cum SA (acres)	0.34	23.77	

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 27800.

INPUT
Description:
Station Elevation Data num= 120

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
72.5	1385.63	74.25	1385.5	77.88	1385.24	79.51	1385.09	82.16	1385
83.79	1385	84.48	1385	87.63	1385	90	1385	91.43	1385
94.65	1385	95.18	1385	95.4	1385	97.51	1385	98.84	1385
99.72	1385	102.17	1385	103.26	1385	104.39	1385	105.5	1385
106.79	1385	108.82	1385	110.31	1385	111.23	1385	112.23	1385
113.61	1385	114.98	1385	116.02	1385	117.41	1385	118.74	1385
119.8	1385	121.2	1385	122.5	1385	123.58	1385	124.98	1385
125.19	1385	125.27	1385	125.35	1385	125.43	1385	127.13	1385
127.22	1385	127.31	1385	127.46	1385	127.55	1385	127.7	1385
128.06	1384.73	129.73	1383.64	129.78	1383.64	129.84	1383.63	129.9	1383.62
129.95	1383.61	130	1383.61	130.04	1383.6	130.09	1383.59	130.13	1383.58
130.16	1383.57	130.2	1383.57	130.52	1383.49	131.43	1383.36	132.22	1383.24
132.26	1383.24	132.3	1383.23	132.34	1383.22	133	1383.14	133.05	1383.13
133.09	1383.11	133.12	1383.1	133.16	1383.09	133.19	1383.08	133.21	1383.07
133.24	1383.06	133.26	1383.05	141.88	1380.91	167.5	1376.03	200	1375.53
231.9	1375.87	232.72	1375.88	240.94	1375.97	241.7	1375.98	255.45	1379.5
276.69	1385	277	1385.07	278.7	1385.5	280.71	1386	283.93	1386.77
284.13	1386.82	284.88	1387	285.08	1387.01	285.61	1387.02	287.84	1387.08
289.45	1387.04	290.8	1387	298.69	1386.59	309.86	1386	311.34	1385.85
313.39	1385.64	316.06	1385.91	316.9	1386	327.63	1384.15	329.08	1384.54
330.41	1384.87	339.17	1388.02	356.13	1395.46	370.7	1402.14	374.34	1403.68
375.18	1404.06	378.26	1406.14	380.19	1407.11	381.27	1407.04	381.84	1407.09
384.99	1408.3	385.25	1408.42	385.31	1408.4	386.53	1407.86	387.36	1407.8
388.88	1407.82	389.63	1407.76	396.27	1407.82	399.21	1408.46	400	1408.66

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
72.5	.045	127.7	.045	280.71	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
127.7	280.71	13.95	83.95	153.95	.3	.5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1381.67	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.20	Wt. n-Val.		0.045
W.S. Elev (ft)	1381.47	Reach Len. (ft)	13.95	83.95
153.95				
Crit W.S. (ft)		Flow Area (sq ft)		560.13
E.G. Slope (ft/ft)	0.001578	Area (sq ft)		560.13
Q Total (cfs)	2000.00	Flow (cfs)		2000.00
Top Width (ft)	123.47	Top Width (ft)		123.47
Vel Total (ft/s)	3.57	Avg. Vel. (ft/s)		3.57
Max Chl Dpth (ft)	5.94	Hydr. Depth (ft)		4.54
Conv. Total (cfs)	50352.5	Conv. (cfs)		50352.5
Length Wtd. (ft)	83.95	Wetted Per. (ft)		124.70
Min Ch El (ft)	1375.53	Shear (lb/sq ft)		0.44
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	1.33	87.57
C & E Loss (ft)	0.05	Cum SA (acres)	0.34	23.49

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 27716.05

INPUT
Description: U/S of Hawes Road Culvert
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1388	31.27	1390.31	40.059	1388.61	42.18	1388.42	46.2	1387.48
48.949	1387.43	55.44	1386.43	57.031	1386.36	62.93	1386.05	64.562	1385.95
71.36	1385.59	77.67	1385.21	80.508	1385.06	81.256	1385	95.389	1385
99.001	1385.21	99.269	1385.22	99.78	1385.25	100.23	1385.26	100.449	1385.27
105.472	1385.34	108.93	1385.17	110.682	1385.18	111.34	1385.17	112.011	1385.16
112.7	1385.14	113.059	1385.13	115.678	1385	128.87	1381.86	136.829	1379.97
139.83	1379.26	143.12	1378.47	154.09	1375.9	199.999	1375.32	202.34	1375.33
211.22	1375.41	215.96	1375.44	217.36	1375.45	245.961	1375.64	253.66	1376.97
258.67	1378.1	265.25	1379.49	265.54	1379.53	265.869	1379.58	266.23	1379.64
266.66	1379.71	267.16	1379.79	267.76	1379.9	268.259	1380	268.981	1380.17
272.351	1381	273.01	1381.28	273.25	1381.38	280.3	1383.56	281.18	1383.6
285.149	1385	285.979	1385	294.528	1384.83	296.042	1384.8	296.259	1384.79
297.59	1384.77	303.61	1384.53	304.35	1384.52	308.34	1384.48	326.516	1384.4
328.32	1384.39	329.831	1384.39	331.66	1384.37	333.11	1384.37	334.971	1384.36
336.359	1384.36	340.23	1384.32	341.49	1384.32	343.498	1384.3	344.378	1384.3
346.46	1384.28	347.773	1384.28	349.859	1384.26	351.12	1384.27	354.45	1384.24
355.03	1384.24	358.55	1384.21	359.989	1384.21	363.57	1384.18	364.17	1384.18
367.919	1384.15	368.999	1384.15	372.98	1384.12	373.369	1384.12	377.54	1384.08
377.821	1384.08	382.21	1384.05	382.44	1384.05	387	1384.01	388.172	1384
396.092	1383.74	397.021	1383.71	399.17	1383.64	400	1383.61		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	115.678	.045	285.979	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.

115.678	285.979	169.05	169.05	169.05	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	162.999	1388.22	F
236	400	1388.22	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1381.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.37	Wt. n-Val.		0.045	
W.S. Elev (ft)	1381.09	Reach Len. (ft)	169.05	169.05	169.05
Crit W.S. (ft)	1378.35	Flow Area (sq ft)		407.87	
E.G. Slope (ft/ft)	0.002224	Area (sq ft)		642.74	
Q Total (cfs)	2000.00	Flow (cfs)		2000.00	
Top Width (ft)	140.45	Top Width (ft)		140.45	
Vel Total (ft/s)	4.90	Avg. Vel. (ft/s)		4.90	
Max Chl Dpth (ft)	5.77	Hydr. Depth (ft)		5.59	
Conv. Total (cfs)	42405.0	Conv. (cfs)		42405.0	
Length Wtd. (ft)	169.05	Wetted Per. (ft)		73.00	
Min Ch El (ft)	1375.32	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	1.33	86.42	
C & E Loss (ft)		Cum SA (acres)	0.34	23.23	

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CULVERT

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 27631.2

INPUT
Description: Hawes Rd (New)
Distance from Upstream XS = 4
Deck/Roadway Width = 155.5
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 21

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1388.17	1374	185.262	1388.22	1374	234.692	1388.27	1374
298.456	1388.34	1374	326.061	1387.71	1374	357.838	1388.59	1374
376.407	1388.56	1374	411.424	1388.5	1374	424.263	1388.48	1374
450.922	1388.49	1374	521.647	1388.51	1374	536.072	1388.51	1374
592.357	1388.52	1374	663.07	1388.54	1374	671.37	1388.54	1374
733.779	1388.56	1374	744.542	1388.56	1374	804.49	1388.57	1374
834.302	1388.58	1374	841.514	1388.58	1374	848.529	1388.51	1374

Upstream Bridge Cross Section Data
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1388	31.27	1390.31	40.059	1388.61	42.18	1388.42	46.2	1387.48
48.949	1387.43	55.44	1386.43	57.031	1386.36	62.93	1386.05	64.562	1385.95
71.36	1385.59	77.67	1385.21	80.508	1385.06	81.256	1385	95.389	1385
99.001	1385.21	99.269	1385.22	99.78	1385.25	100.23	1385.26	100.449	1385.27
105.472	1385.34	108.93	1385.17	110.682	1385.18	111.34	1385.17	112.011	1385.16

112.7	1385.14	113.059	1385.13	115.678	1385	128.87	1381.86	136.829	1379.97
139.83	1379.26	143.12	1378.47	154.09	1375.9	199.999	1375.32	202.34	1375.33
211.22	1375.41	215.96	1375.44	217.36	1375.45	245.961	1375.64	253.66	1376.97
258.67	1378.1	265.25	1379.49	265.54	1379.53	265.869	1379.58	266.23	1379.64
266.66	1379.71	267.16	1379.79	267.76	1379.9	268.259	1380	268.981	1380.17
272.351	1381	273.01	1381.28	273.25	1381.38	280.3	1383.56	281.18	1383.6
285.149	1385	285.979	1385	294.528	1384.83	296.042	1384.8	296.259	1384.79
297.59	1384.77	303.61	1384.53	304.35	1384.52	308.34	1384.48	326.516	1384.4
328.32	1384.39	329.831	1384.39	331.66	1384.37	333.11	1384.37	334.971	1384.36
336.359	1384.36	340.23	1384.32	341.49	1384.32	343.498	1384.3	344.378	1384.3
346.46	1384.28	347.773	1384.28	349.859	1384.26	351.12	1384.27	354.45	1384.24
355.03	1384.24	358.55	1384.21	359.989	1384.21	363.57	1384.18	364.17	1384.18
367.919	1384.15	368.999	1384.15	372.98	1384.12	373.369	1384.12	377.54	1384.08
377.821	1384.08	382.21	1384.05	382.44	1384.05	387	1384.01	388.172	1384
396.092	1383.74	397.021	1383.71	399.17	1383.64	400	1383.61		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	115.678	.045	285.979	.045

Bank Sta: Left	Right	Coeff Contr.	Expan.
115.678	285.979	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	162.999	1388.22	F
236	400	1388.22	F

Downstream Deck/Roadway Coordinates
num= 21

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1388.17	1374	185.262	1388.22	1374	234.692	1388.27	1374
298.456	1388.34	1374	326.061	1387.71	1374	357.838	1388.59	1374
376.407	1388.56	1374	411.424	1388.5	1374	424.263	1388.48	1374
450.922	1388.49	1374	521.647	1388.51	1374	536.072	1388.51	1374
592.357	1388.52	1374	663.07	1388.54	1374	671.37	1388.54	1374
733.779	1388.56	1374	744.542	1388.56	1374	804.49	1388.57	1374
834.302	1388.58	1374	841.514	1388.58	1374	848.529	1388.51	1374

Downstream Bridge Cross Section Data
Station Elevation Data num= 100

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.44	10.222	1385.39	45.101	1385.19	50.782	1385.04	51.441	1385
56.01	1384.67	56.651	1384.63	57.45	1384.57	58.58	1384.48	64.089	1384
68.69	1384.05	75.972	1384.12	81.691	1384.16	86.53	1384.2	91.122	1384.15
93.448	1384.12	98.151	1384.07	102.779	1384.04	104.178	1383.78	104.36	1383.76
104.599	1383.74	104.73	1383.74	108.836	1383.85	109.9	1383.88	114.418	1384.01
116.171	1383.96	117.599	1383.86	118.781	1383.74	118.969	1383.75	119.19	1383.71
120.3	1383.6	121.27	1383.54	123.171	1383.23	124.36	1383.08	124.751	1383
128.651	1382.04	149.779	1375	152.611	1374.63	155.04	1374.63	160.502	1374.63
164.762	1374.63	165.3	1374.63	183.958	1374.63	185.69	1374.63	199.999	1374.63
240.57	1374.63	244.759	1374.63	248.96	1375	278.961	1382.07	279.979	1382.29
282.609	1382.86	283.35	1383	286.291	1383.6	288.18	1384	288.461	1384.1
289.54	1384.3	291.85	1384.81	293.28	1385	296.059	1385.43	300.45	1385.94
301.148	1386.03	301.799	1386.1	306.34	1386.04	309.74	1386	311.77	1385.91
318.45	1385.6	322.568	1385.38	325.109	1385.26	329.87	1385	331.65	1384.96
332.359	1384.96	334.831	1384.91	334.841	1384.91	338.481	1384.85	341.459	1384.82
343.701	1384.79	347.119	1384.75	350.47	1384.73	353.949	1384.71	360.39	1384.68
364.46	1384.66	366.929	1384.67	371.141	1384.65	375.221	1384.66	387.41	1384.15
388.329	1384.07	389.448	1384	391.379	1384.11	391.84	1384.13	392.079	1384.15
392.789	1384.18	393.221	1384.19	393.871	1384.19	394.631	1384.22	394.759	1384.23

```
  395.54  1384.2  397.62  1384.2  398.24 1384.18  399.35 1384.17     400 1384.15

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .045 118.969    .045  300.45    .045

Bank Sta: Left   Right    Coeff Contr.   Expan.
       118.969  300.45             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     162 1388.22       F
     237     400 1388.22       F

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 =     .98
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       8      10
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 3 - Wingwall flared 0 deg. (sides extended straight)
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef
Exit Loss Coef
                  7  155.78     .013     .013        0                    .5
1
Number of Barrels =  6
Upstream   Elevation =  1375.3
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.    Sta.
   172.5  183.42  194.34  205.26  216.18   227.1
Downstream Elevation =  1374.63
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.    Sta.
   172.5  183.42  194.34  205.26  216.18   227.1

CULVERT OUTPUT  Profile #PF 1  Culv Group:  Culvert #1

  Q Culv Group (cfs)       2000.00    Culv Full Len (ft)
  # Barrels                      6    Culv Vel US (ft/s)          6.40
  Q Barrel (cfs)            333.33    Culv Vel DS (ft/s)          5.65
  E.G. US. (ft)            1381.46    Culv Inv El Up (ft)      1375.30
  W.S. US. (ft)            1381.09    Culv Inv El Dn (ft)      1374.63
  E.G. DS (ft)             1380.88    Culv Frctn Ls (ft)          0.12
  W.S. DS (ft)             1380.53    Culv Exit Loss (ft)         0.15
  Delta EG (ft)               0.58    Culv Entr Loss (ft)         0.32
  Delta WS (ft)               0.56    Q Weir (cfs)
  E.G. IC (ft)             1380.82    Weir Sta Lft (ft)
  E.G. OC (ft)             1381.46    Weir Sta Rgt (ft)
  Culvert Control           Outlet    Weir Submerg
  Culv WS Inlet (ft)       1380.51    Weir Max Depth (ft)
  Culv WS Outlet (ft)      1380.53    Weir Avg Depth (ft)
  Culv Nml Depth (ft)         2.95    Weir Flow Area (sq ft)
  Culv Crt Depth (ft)         3.26    Min El Weir Flow (ft)    1388.22
```

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 27547.

INPUT
Description: D/S of Hawes Road Culvert
Station Elevation Data num= 100

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.44	10.222	1385.39	45.101	1385.19	50.782	1385.04	51.441	1385
56.01	1384.67	56.651	1384.63	57.45	1384.57	58.58	1384.48	64.089	1384
68.69	1384.05	75.972	1384.12	81.691	1384.16	86.53	1384.2	91.122	1384.15
93.448	1384.12	98.151	1384.07	102.779	1384.04	104.178	1383.78	104.36	1383.76
104.599	1383.74	104.73	1383.74	108.836	1383.85	109.9	1383.88	114.418	1384.01
116.171	1383.96	117.599	1383.86	118.781	1383.74	118.969	1383.75	119.19	1383.71
120.3	1383.6	121.27	1383.54	123.171	1383.23	124.36	1383.08	124.751	1383
128.651	1382.04	149.779	1375	152.611	1374.63	155.04	1374.63	160.502	1374.63
164.762	1374.63	165.3	1374.63	183.958	1374.63	185.69	1374.63	199.999	1374.63
240.57	1374.63	244.759	1374.63	248.96	1375	278.961	1382.07	279.979	1382.29
282.609	1382.86	283.35	1383	286.291	1383.6	288.18	1384	288.461	1384.1
289.54	1384.3	291.85	1384.81	293.28	1385	296.059	1385.43	300.45	1385.94
301.148	1386.03	301.799	1386.1	306.34	1386.04	309.74	1386	311.77	1385.91
318.45	1385.6	322.568	1385.38	325.109	1385.26	329.87	1385	331.65	1384.96
332.359	1384.96	334.831	1384.91	334.841	1384.91	338.481	1384.85	341.459	1384.82
343.701	1384.79	347.119	1384.75	350.47	1384.73	353.949	1384.71	360.39	1384.68
364.46	1384.66	366.929	1384.67	371.141	1384.65	375.221	1384.66	387.41	1384.15
388.329	1384.07	389.448	1384	391.379	1384.11	391.84	1384.13	392.079	1384.15
392.789	1384.18	393.221	1384.19	393.871	1384.19	394.631	1384.22	394.759	1384.23
395.54	1384.2	397.62	1384.2	398.24	1384.18	399.35	1384.17	400	1384.15

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	118.969	.045	300.45	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
118.969	300.45	250	147	65	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	162	1388.22	F
237	400	1388.22	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1380.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.35	Wt. n-Val.		0.045	
W.S. Elev (ft)	1380.53	Reach Len. (ft)	250.00	147.00	65.00
Crit W.S. (ft)	1377.51	Flow Area (sq ft)		442.60	
E.G. Slope (ft/ft)	0.001936	Area (sq ft)		694.83	
Q Total (cfs)	2100.00	Flow (cfs)		2100.00	
Top Width (ft)	139.25	Top Width (ft)		139.25	
Vel Total (ft/s)	4.74	Avg. Vel. (ft/s)		4.74	
Max Chl Dpth (ft)	5.90	Hydr. Depth (ft)		5.90	
Conv. Total (cfs)	47727.1	Conv. (cfs)		47727.1	
Length Wtd. (ft)	147.00	Wetted Per. (ft)		75.00	
Min Ch El (ft)	1374.63	Shear (lb/sq ft)		0.71	
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00	0.00

Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	1.33	86.10
C & E Loss (ft)	0.11	Cum SA (acres)	0.34	22.69

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 27400.

INPUT
Description: Interpolated
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1387.43	7.51	1387.44	20.76	1387.31	27.03	1387.28	44.2	1386.91
50.09	1386.79	57.51	1386.66	59.83	1386.73	71.73	1386.89	77.48	1387.48
80.95	1387.88	89.81	1387.7	90.76	1387.69	93.05	1387.35	107.09	1385.27
115.8	1383.79	125.85	1381.78	134.8	1379.72	147.7	1376.67	151.45	1375.83
155.82	1375.02	158.88	1374.23	172.42	1374.64	177.22	1374.8	182.14	1374.78
200.68	1374.73	205.51	1374.72	209.85	1374.56	226.52	1373.99	226.96	1374.02
227.45	1374.04	230.39	1374.16	232.57	1374.25	238.49	1374.24	242.89	1374.24
249.32	1375.09	250.79	1375.28	253.01	1375.68	260.2	1376.84	265.84	1377.81
276.22	1379.59	291.71	1382.68	294.6	1383.21	297.04	1383.58	306.42	1384.53
323.31	1386.11	332.42	1385.6	336.42	1385.54	361.11	1385.74	361.54	1385.76
367.49	1386.02	379.77	1386.54	380.78	1386.55	381.2	1386.55	381.95	1386.56
388.14	1386.6	390.77	1386.63	392.47	1386.65	395.42	1386.69	398.14	1386.73
399.01	1386.75	400.06	1386.76						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	89.81	.045	323.31	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
89.81	323.31	100	100	100	.3	.5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1380.57	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.14	Wt. n-Val.		0.045
W.S. Elev (ft)	1380.44	Reach Len. (ft)	100.00	100.00
100.00				
Crit W.S. (ft)		Flow Area (sq ft)		708.02
E.G. Slope (ft/ft)	0.001019	Area (sq ft)		708.02
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	148.78	Top Width (ft)		148.78
Vel Total (ft/s)	2.97	Avg. Vel. (ft/s)		2.97
Max Chl Dpth (ft)	6.45	Hydr. Depth (ft)		4.76
Conv. Total (cfs)	65778.8	Conv. (cfs)		65778.8
Length Wtd. (ft)	100.00	Wetted Per. (ft)		150.02
Min Ch El (ft)	1373.99	Shear (lb/sq ft)		0.30
Alpha	1.00	Stream Power (lb/ft s)	400.06	0.00
0.00				
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	1.33	83.74
C & E Loss (ft)	0.01	Cum SA (acres)	0.34	22.20

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 27300.

INPUT
Description:
Station Elevation Data num= 91

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.06	91.11	1385.56	92.78	1386	95.7	1386.29	99.87	1386.65
104.18	1386.25	106.83	1386	107.36	1385.92	113.17	1385	115.49	1384.72
121.84	1384	124.43	1383.7	130.53	1383	134.52	1381.96	135.92	1381.6
140.62	1380.39	143.27	1379.71	156.21	1376.36	159.57	1375.51	165.09	1374.1
190.01	1374.1	197.62	1374.1	200	1374.1	207.22	1374.1	215.35	1374.1
234.18	1374.1	234.2	1374.1	241.35	1376	241.98	1376.17	242.17	1376.22
242.36	1376.27	242.53	1376.31	242.69	1376.36	243.37	1376.54	244.11	1376.73
244.27	1376.77	244.55	1376.85	244.9	1376.94	245.05	1376.98	245.49	1377.1
246.04	1377.24	246.17	1377.28	246.29	1377.31	248.9	1378	249.88	1378.26
252.49	1378.95	274.14	1378.57	281.24	1378.49	282.95	1378.56	285.89	1378.69
293.34	1379	297.26	1379.16	300.05	1379.28	304.92	1379.86	306.07	1380
322.83	1381.98	324.79	1382.21	327.27	1382.5	330.49	1382.88	331.56	1383
337.91	1383.73	338.17	1383.76	338.38	1383.79	338.54	1383.81	338.68	1383.82
342.46	1384.28	347.99	1385	349.11	1385.16	351.3	1385.47	351.52	1385.48
351.73	1385.49	351.94	1385.49	352.13	1385.49	352.31	1385.49	352.46	1385.48
353.32	1385.58	354.17	1385.68	354.38	1385.68	354.58	1385.67	355.88	1385.82
356.11	1385.81	367.1	1386.28	367.41	1386.29	367.73	1386.3	368.06	1386.3
368.38	1386.31	374.53	1386.5	382.31	1386.27	390.81	1386	393.54	1385.46
395.23	1385.1								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	99.87	.045	355.88	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
99.87	355.88	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1380.44	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.16	Wt. n-Val.		0.045
W.S. Elev (ft)	1380.27	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		644.80
E.G. Slope (ft/ft)	0.001629	Area (sq ft)		644.80
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	167.30	Top Width (ft)		167.30
Vel Total (ft/s)	3.26	Avg. Vel. (ft/s)		3.26
Max Chl Dpth (ft)	6.17	Hydr. Depth (ft)		3.85
Conv. Total (cfs)	52029.2	Conv. (cfs)		52029.2
Length Wtd. (ft)	200.00	Wetted Per. (ft)		168.80
Min Ch El (ft)	1374.10	Shear (lb/sq ft)		0.39
Alpha	1.00	Stream Power (lb/ft s)	395.23	0.00
0.00				
Frctn Loss (ft)	0.32	Cum Volume (acre-ft)	1.33	82.18
C & E Loss (ft)	0.00	Cum SA (acres)	0.34	21.84

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 27100.

INPUT
Description:
Station Elevation Data num= 58

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1384.18	78.86	1384.72	83.5	1384.85	89.09	1385	95.8	1384.28
98.26	1384	100.77	1383.67	105.86	1383	108.09	1382.53	111.99	1381.65
116.55	1380.65	119.54	1380	147.45	1373.92	148.25	1373.75	148.58	1373.68
154.46	1373.68	156.63	1373.68	170	1373.68	174.85	1373.68	178.53	1373.68
186.81	1373.68	195.16	1373.68	198.04	1373.68	200	1373.68	204.7	1373.68
206.52	1373.68	211.01	1373.68	211.58	1373.68	211.96	1373.68	213.57	1374.2
214.15	1374.39	214.93	1374.64	215.41	1374.8	219.05	1376	224.09	1377.67
225.11	1378	225.97	1378.28	228.7	1379.18	233.11	1379.19	236.6	1379.19
240.25	1379.19	244.45	1379.19	301.86	1379.56	309.45	1380.68	332.6	1384
333.74	1384.02	337.03	1384.07	346.79	1384.23	362.86	1384.5	369.17	1385.57
372.65	1386.25	374.37	1385.73	376.88	1384.96	377.52	1384.76	383.49	1382.72
387.78	1381.21	391.58	1382.48	396.08	1383.98				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	89.09	.045	228.7	.065	301.86	.045	332.6	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
89.09	332.6	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1380.11	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.20	Wt. n-Val.		0.045
W.S. Elev (ft)	1379.91	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		585.18
E.G. Slope (ft/ft)	0.001600	Area (sq ft)		585.18
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	184.29	Top Width (ft)		184.29
Vel Total (ft/s)	3.59	Avg. Vel. (ft/s)		3.59
Max Chl Dpth (ft)	6.23	Hydr. Depth (ft)		3.18
Conv. Total (cfs)	52493.3	Conv. (cfs)		52493.3
Length Wtd. (ft)	200.00	Wetted Per. (ft)		185.87
Min Ch El (ft)	1373.68	Shear (lb/sq ft)		0.31
Alpha	1.00	Stream Power (lb/ft s)	396.08	0.00
0.00				
Frctn Loss (ft)	0.48	Cum Volume (acre-ft)	1.33	79.36
C & E Loss (ft)	0.01	Cum SA (acres)	0.34	21.03

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.

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 26900.

INPUT
Description:
Station Elevation Data num= 100

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1386.2	2.36	1386.2	16.5	1385.9	16.62	1385.9	30.81	1385.09

32.16	1385.13	48.44	1385.68	52.33	1386.7	54.95	1387.41	57.97	1387.38
61.63	1387.43	63.72	1386.98	66.04	1386.54	77.9	1385.5	87.85	1384.63
93.87	1383	101.72	1380.9	109.74	1378.81	115.91	1377.27	127.38	1374.43
127.6	1374.37	128.57	1374.15	133.08	1373.12	136.98	1373.19	143.2	1373.3
146.91	1373.36	155.04	1373.49	166.74	1373.7	169.02	1373.73	171.73	1374.25
174.49	1374.73	181.11	1376.72	188.6	1378.89	194.64	1378.98	202.05	1379.19
203.46	1378.22	204.11	1377.58	211.72	1377.83	222.45	1378.21	227.07	1378.18
241.31	1378.07	243.31	1378.07	244.03	1377.93	252.63	1376.29	262.41	1378.35
262.71	1378.43	263.32	1378.53	264.41	1378.52	280.28	1377.63	291.6	1379.5
312.33	1383.08	320.71	1383.3	323.49	1383.49	328.65	1383.79	333.17	1384.09
345.34	1384.92	347.78	1384.92	354.89	1384.9	355.55	1384.9	364.03	1384.88
376.1	1383.92	378.85	1383.71	380.43	1383.23	386.6	1381.28	395.05	1382.68
397.31	1383.04	400.6	1382.9	414.17	1382.95	430.26	1383.2	431.23	1383.2
431.86	1383.22	437.55	1383.65	444.66	1383.88	445.22	1383.9	445.64	1383.91
453.47	1384.07	457.81	1384.22	458.33	1384.24	463.16	1384.94	466.43	1385.48
466.48	1385.48	471.76	1385.54	477.46	1385.58	479.37	1385.71	483	1385.79
485.12	1385.88	487.44	1385.89	489.42	1385.98	497.31	1385.66	501.16	1385.38
507.01	1384.73	509.96	1384.27	512.94	1384.52	516.14	1384.64	517.27	1384.67
520.62	1384.78	522.34	1384.82	522.9	1384.93	526.43	1385.47	528.59	1385.49

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	66.04	.045	194.64	.065	291.6	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
93.87	320.71	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1379.62	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.29	Wt. n-Val.		0.047
W.S. Elev (ft)	1379.33	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		482.94
E.G. Slope (ft/ft)	0.003942	Area (sq ft)		482.94
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	182.78	Top Width (ft)		182.78
Vel Total (ft/s)	4.35	Avg. Vel. (ft/s)		4.35
Max Chl Dpth (ft)	6.21	Hydr. Depth (ft)		2.64
Conv. Total (cfs)	33446.8	Conv. (cfs)		33446.8
Length Wtd. (ft)	200.00	Wetted Per. (ft)		185.37
Min Ch El (ft)	1373.12	Shear (lb/sq ft)		0.64
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.66	Cum Volume (acre-ft)	1.33	76.91
C & E Loss (ft)	0.00	Cum SA (acres)	0.34	20.19

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 26700.

INPUT
Description:
Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.95	84.35	1385	91.19	1384.21	93.01	1384	149.85	1372.84
153.31	1372.84	154.57	1372.84	155.9	1372.84	188.64	1372.84	190.06	1372.84
190.77	1372.84	192.36	1372.84	193.76	1372.84	194.81	1372.84	197.28	1372.84

199.05	1372.84	199.24	1372.89	200	1373.1	206.53	1374.92	208.22	1375.4
210.39	1376	210.89	1376.14	212.65	1376.63	213.42	1376.85	214.43	1377.13
214.53	1377.16	214.61	1377.18	214.68	1377.2	214.74	1377.21	215.31	1377.38
271.5	1378.21	277.47	1379.37	277.72	1379.42	281.11	1380.08	282.44	1380.34
294.8	1382.52	295.92	1382.71	297.55	1383	300.8	1383.26	307.32	1383.71
310.14	1383.92	311.4	1384	328.32	1384.15	335.55	1384.24	345.18	1384.33
358.5	1384.5	359.54	1384.52	376.83	1384.38	377.38	1383.84	379.03	1383.78
380.79	1383.35	382.52	1382.77	388.8	1380.68	395.18	1382.8	398.48	1383.9

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	84.35	.045	215.31	.065	271.5	.045	311.4	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
84.35	311.4	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1378.97	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.30	Wt. n-Val.		0.046
W.S. Elev (ft)	1378.67	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		480.84
E.G. Slope (ft/ft)	0.002797	Area (sq ft)		480.84
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	153.70	Top Width (ft)		153.70
Vel Total (ft/s)	4.37	Avg. Vel. (ft/s)		4.37
Max Chl Dpth (ft)	5.83	Hydr. Depth (ft)		3.13
Conv. Total (cfs)	39706.7	Conv. (cfs)		39706.7
Length Wtd. (ft)	200.00	Wetted Per. (ft)		154.93
Min Ch El (ft)	1372.84	Shear (lb/sq ft)		0.54
Alpha	1.00	Stream Power (lb/ft s)	398.48	0.00
0.00				
Frctn Loss (ft)	0.57	Cum Volume (acre-ft)	1.33	74.70
C & E Loss (ft)	0.01	Cum SA (acres)	0.34	19.42

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 26500.

INPUT
Description:
Station Elevation Data num= 57

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1385.03	.89	1385.03	14.25	1384.98	33.59	1384.78	35.9	1384.75
38.11	1385.04	40	1385.28	40.78	1384.93	41.98	1384.38	45.07	1384.33
52.88	1384.21	57.81	1384.8	61.64	1385.27	65.43	1385.35	65.95	1385.36
66.52	1385.21	70.69	1384.06	74.66	1384.17	81.2	1384.4	97.61	1383.69
104.15	1383.33	108.17	1382.53	127.81	1378.44	132.53	1377.4	141.62	1375.36
150.2	1373.43	150.57	1373.33	154.4	1372.38	158.98	1372.48	173.33	1372.78
190.14	1372.74	206.38	1372.68	209.51	1373.06	211.71	1373.35	220.99	1376.13
224.53	1377.09	239.07	1377.3	247.63	1377.52	255.56	1377.59	262.24	1377.59
278.7	1377.34	288.37	1377.23	298.15	1377.21	318.46	1376.34	319.98	1376.3
325.25	1377.45	346.63	1382.04	349.33	1382.32	354.92	1382.9	363.88	1383.84
367.35	1383.84	373.11	1383.84	385.6	1382.66	388.17	1382.43	397.18	1380.2
399.78	1379.57	400.35	1380.11						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	38.11	.045	224.53	.065	318.46	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
104.15	354.92	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1378.38	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.26	Wt. n-Val.		0.046
W.S. Elev (ft)	1378.12	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		509.79
E.G. Slope (ft/ft)	0.002953	Area (sq ft)		509.79
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	199.08	Top Width (ft)		199.08
Vel Total (ft/s)	4.12	Avg. Vel. (ft/s)		4.12
Max Chl Dpth (ft)	5.74	Hydr. Depth (ft)		2.56
Conv. Total (cfs)	38642.0	Conv. (cfs)		38642.0
Length Wtd. (ft)	200.00	Wetted Per. (ft)		200.53
Min Ch El (ft)	1372.38	Shear (lb/sq ft)		0.47
Alpha	1.00	Stream Power (lb/ft s)	400.35	0.00
0.00				
Frctn Loss (ft)	0.34	Cum Volume (acre-ft)	1.33	72.42
C & E Loss (ft)	0.04	Cum SA (acres)	0.34	18.61

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.

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 26300.

INPUT
Description:
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383.32	75.44	1383	80.71	1383.4	85.21	1383.75	88.41	1384
90.54	1383.47	91.73	1383.16	96.55	1381.93	97.7	1381.63	111.66	1378.08
115.35	1377.11	122.75	1376.88	127.11	1376.74	129.88	1376.66	131.85	1376.59
142.36	1373.53	147.61	1372	200	1372	206.36	1372	220.31	1372
234.53	1372	239.15	1372	246.82	1373.89	252.61	1375.32	255.08	1375.92
255.37	1375.99	255.9	1376.12	311.57	1379.74	315.08	1380.35	320.52	1381.3
320.53	1381.3	330.37	1383	333.15	1383.46	336.76	1384	343.12	1384.25
351.43	1384.64	355.19	1384.75	363.17	1385	363.3	1385.01	363.55	1385.01
364.45	1385.02	365.54	1385	372.51	1384.44	377.29	1384	378.89	1384.43
379.15	1384.5	379.56	1384.43	380.32	1384.33	382.37	1384.05	391.43	1381.03
395.52	1379.66	396.38	1379.37	396.76	1379.25	397.53	1378.99	399.34	1379.59
400	1379.81								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	88.41	.045	255.9	.065	311.57	.045	336.76	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.

88.41	336.76	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1378.00	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.14	Wt. n-Val.		0.045
W.S. Elev (ft)	1377.86	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		696.66
E.G. Slope (ft/ft)	0.001129	Area (sq ft)		696.66
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	170.11	Top Width (ft)		170.11
Vel Total (ft/s)	3.01	Avg. Vel. (ft/s)		3.01
Max Chl Dpth (ft)	5.86	Hydr. Depth (ft)		4.10
Conv. Total (cfs)	62486.5	Conv. (cfs)		62486.5
Length Wtd. (ft)	200.00	Wetted Per. (ft)		171.42
Min Ch El (ft)	1372.00	Shear (lb/sq ft)		0.29
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.30	Cum Volume (acre-ft)	1.33	69.65
C & E Loss (ft)	0.01	Cum SA (acres)	0.34	17.76

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 26100.

INPUT
Description:
Station Elevation Data num= 82

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1383	2.14	1383.01	2.81	1383.01	3.95	1383.03	11.66	1383.07
18.54	1383.33	20.87	1383.37	24.9	1383.44	109.87	1382.83	122.76	1383
125.63	1382.32	127	1382	128.59	1381.69	132.1	1381	135.77	1380.36
137.81	1380	140.25	1379.44	142.17	1379	144.83	1378.45	146.91	1378
149.67	1377.37	151.28	1377	152.53	1376.7	155.35	1376	156.09	1375.8
158.98	1375	162.86	1374.15	163.56	1374	163.7	1373.97	168.18	1373
169.42	1372.76	173.09	1372	174.17	1371.79	174.19	1371.79	184.03	1371.76
186.46	1371.75	187.71	1371.75	189.11	1371.74	199.63	1371.72	199.75	1371.72
200	1371.72	203.93	1371.71	209.01	1371.7	222.49	1371.64	224.87	1371.63
228.81	1371.61	235.77	1371.58	237.25	1372.01	237.77	1372.15	237.96	1372.2
238.05	1372.22	238.32	1372.29	245.9	1374.39	251.67	1375.95	252.61	1376.21
253.83	1376.54	315.01	1377.13	317.62	1377.62	324.2	1378.82	342.86	1382.23
342.99	1382.26	344.77	1382.57	347.45	1383	347.74	1383.01	349.19	1383.03
349.95	1383.04	350.14	1383.04	350.39	1383.04	351.99	1383.03	359.77	1383.01
362.04	1383.01	362.36	1383.02	364.98	1383.02	366.13	1383.08	367.5	1383.12
369	1383.2	370.17	1383.3	372.78	1383.16	376.19	1383	377.1	1382.81
378.07	1382.61	378.21	1382.58						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	122.76	.045	253.83	.065	315.01	.045	347.45	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
122.76	347.45	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1377.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.		0.045	
W.S. Elev (ft)	1377.43	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)		Flow Area (sq ft)		523.74	
E.G. Slope (ft/ft)	0.002168	Area (sq ft)		523.74	
Q Total (cfs)	2100.00	Flow (cfs)		2100.00	
Top Width (ft)	167.23	Top Width (ft)		167.23	
Vel Total (ft/s)	4.01	Avg. Vel. (ft/s)		4.01	
Max Chl Dpth (ft)	5.85	Hydr. Depth (ft)		3.13	
Conv. Total (cfs)	45098.5	Conv. (cfs)		45098.5	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		168.57	
Min Ch El (ft)	1371.58	Shear (lb/sq ft)		0.42	
Alpha	1.00	Stream Power (lb/ft s)	378.21	0.00	0.00
Frctn Loss (ft)	0.27	Cum Volume (acre-ft)	1.33	66.85	
C & E Loss (ft)	0.04	Cum SA (acres)	0.34	16.99	

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.

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 25900.

INPUT
Description:
Station Elevation Data num= 61

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.73	76.96	1383.13	85.44	1383	87.56	1382.53	89.91	1382
93.23	1381.26	94.38	1381	96.96	1380.42	98.85	1380	101.7	1379.36
103.32	1379	107.29	1378.11	107.79	1378	109.74	1377.56	112.26	1377
112.89	1376.86	116.73	1376	118.49	1375.6	121.2	1375	124.09	1374.35
125.67	1374	129.69	1373.1	130.13	1373	131.88	1372.61	134.6	1372
135.02	1371.91	135.88	1371.72	136.27	1371.63	136.45	1371.63	136.49	1371.63
138.28	1371.6	138.54	1371.6	140.62	1371.58	141.06	1371.58	143.13	1371.57
200	1371.26	212.77	1371.19	216.56	1371.19	216.59	1371.19	218.12	1371.18
218.41	1371.18	231.44	1371.16	231.6	1371.16	233.02	1371.16	237.11	1372.06
246.98	1374.49	247.68	1374.66	252.74	1375.86	253.07	1375.94	255.22	1376.5
338.24	1376.94	352.09	1379.46	359.75	1380.84	362.66	1381.38	362.68	1381.38
366.09	1382	366.76	1382.16	366.91	1382.2	373.66	1382.2	377.82	1382.2
400	1382.17								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	85.44	.045	255.22	.065	338.24	.045	366.76	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
85.44	366.76	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1377.38	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.		0.045	

W.S. Elev (ft)	1377.26	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)		Flow Area (sq ft)		764.09	
E.G. Slope (ft/ft)	0.000910	Area (sq ft)		764.09	
Q Total (cfs)	2100.00	Flow (cfs)		2100.00	
Top Width (ft)	228.88	Top Width (ft)		228.88	
Vel Total (ft/s)	2.75	Avg. Vel. (ft/s)		2.75	
Max Chl Dpth (ft)	6.10	Hydr. Depth (ft)		3.34	
Conv. Total (cfs)	69628.7	Conv. (cfs)		69628.7	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		230.17	
Min Ch El (ft)	1371.16	Shear (lb/sq ft)		0.19	
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00	0.00
Frctn Loss (ft)	0.32	Cum Volume (acre-ft)	1.33	63.89	
C & E Loss (ft)	0.03	Cum SA (acres)	0.34	16.08	

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.

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 25700.

INPUT
Description:
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1382.11	114.37	1381.85	114.97	1381.86	125.59	1382	145.8	1377.09
156.71	1374.45	171.98	1370.74	176.02	1370.74	180.22	1370.74	183.87	1370.74
186.84	1370.74	200	1370.74	201.28	1370.74	201.7	1370.74	202.44	1370.74
202.93	1370.74	203.61	1370.74	204.13	1370.74	205.72	1370.74	207.09	1370.74
208.19	1370.74	211.07	1370.74	216.06	1370.74	216.16	1370.74	230.61	1374.36
234.77	1375.4	235	1375.46	238.22	1376.29	321.02	1376.7	333.59	1378.19
341.92	1379.17	342.51	1379.24	362.8	1381.56	362.82	1381.56	366.7	1382
373.83	1381.96	379.3	1381.93	380.6	1381.92	381.87	1381.92	399.87	1381.81
400	1381.81								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	125.59	.045	238.22	.065	321.02	.045	366.7	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
125.59	366.7	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1377.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.41	Wt. n-Val.		0.045	
W.S. Elev (ft)	1376.62	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)		Flow Area (sq ft)		410.38	
E.G. Slope (ft/ft)	0.003554	Area (sq ft)		410.38	
Q Total (cfs)	2100.00	Flow (cfs)		2100.00	
Top Width (ft)	156.72	Top Width (ft)		156.72	
Vel Total (ft/s)	5.12	Avg. Vel. (ft/s)		5.12	
Max Chl Dpth (ft)	5.88	Hydr. Depth (ft)		2.62	

Conv. Total (cfs)	35224.3	Conv. (cfs)			35224.3
Length Wtd. (ft)	200.00	Wetted Per. (ft)			158.12
Min Ch El (ft)	1370.74	Shear (lb/sq ft)			0.58
Alpha	1.00	Stream Power (lb/ft s)	400.00		0.00
0.00					
Frctn Loss (ft)	0.34	Cum Volume (acre-ft)	1.33		61.20
C & E Loss (ft)	0.08	Cum SA (acres)	0.34		15.19

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.

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 25500.

INPUT
Description:
Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1381.61	70.49	1381.25	77.15	1381	80.88	1380.85	81.37	1380.83
83.68	1380.88	86.54	1381	90.46	1381.39	95.72	1382	95.91	1381.97
98.24	1381.54	99.74	1381.27	137.91	1374.17	158.52	1370.32	185.3	1370.32
198.96	1370.32	200	1370.32	239.4	1370.32	242.55	1370.98	248.1	1372.16
259.45	1374.61	332.94	1376.94	344.04	1378.32	363.52	1380.95	368.25	1381.59
371.34	1382	372.43	1382.08	375.07	1382.23	377.02	1382.13	379.41	1382
380.93	1381.94	386.62	1381.82	386.98	1381.82	387.22	1381.82	388.88	1381.85
394.6	1381.93	396.6	1381.99	397.19	1382	397.95	1382.02	400	1382.12

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	95.91	.045	259.45	.065	332.94	.045	375.07	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
95.91	375.07	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1376.60	Element		Left OB	Channel
Right OB					
Vel Head (ft)	0.13	Wt. n-Val.			0.045
W.S. Elev (ft)	1376.48	Reach Len. (ft)		200.00	200.00
200.00					
Crit W.S. (ft)		Flow Area (sq ft)			735.27
E.G. Slope (ft/ft)	0.000976	Area (sq ft)			735.27
Q Total (cfs)	2100.00	Flow (cfs)			2100.00
Top Width (ft)	192.85	Top Width (ft)			192.85
Vel Total (ft/s)	2.86	Avg. Vel. (ft/s)			2.86
Max Chl Dpth (ft)	6.16	Hydr. Depth (ft)			3.81
Conv. Total (cfs)	67233.5	Conv. (cfs)			67233.5
Length Wtd. (ft)	200.00	Wetted Per. (ft)			193.90
Min Ch El (ft)	1370.32	Shear (lb/sq ft)			0.23
Alpha	1.00	Stream Power (lb/ft s)		400.00	0.00
0.00					
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)		1.33	58.57
C & E Loss (ft)	0.01	Cum SA (acres)		0.34	14.39

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 25300.

INPUT
Description:
Station Elevation Data num= 58

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1380.43	55.48	1380.9	57.51	1380.81	75.77	1380	96.39	1377.25
99.06	1376.91	101.24	1376.64	107.04	1375.9	117.64	1374.55	134.61	1372.35
142.63	1371.35	154.21	1369.9	157.33	1369.9	158.55	1369.9	158.66	1369.9
160.49	1369.9	160.9	1369.9	163.55	1369.9	171.2	1369.9	174.97	1369.9
181.89	1369.9	183.35	1369.9	184.84	1369.9	188.76	1369.9	194.65	1369.9
197.97	1369.9	200	1369.9	200.93	1369.9	208.69	1369.9	211.49	1369.9
216.06	1369.9	223.32	1369.9	224.1	1369.9	228.17	1369.9	228.93	1369.9
235.42	1369.9	237.95	1369.9	239.41	1370.19	242.18	1370.74	245.68	1371.49
245.89	1371.53	247.43	1371.85	248.33	1372.04	250.14	1372.46	251.39	1372.73
252.84	1373.07	253.23	1373.16	253.83	1373.29	257.26	1374.13	348.26	1377.27
361.98	1380	366.37	1380.19	371.1	1380.39	371.87	1380.42	373.85	1380.34
381.97	1380	392.15	1379.77	400	1379.61				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	55.48	.045	257.26	.065	348.26	.045	371.1	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
55.48	371.1	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1376.43	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.09	Wt. n-Val.		0.045
W.S. Elev (ft)	1376.34	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		858.00
E.G. Slope (ft/ft)	0.000711	Area (sq ft)		858.00
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	217.55	Top Width (ft)		217.55
Vel Total (ft/s)	2.45	Avg. Vel. (ft/s)		2.45
Max Chl Dpth (ft)	6.44	Hydr. Depth (ft)		3.94
Conv. Total (cfs)	78737.3	Conv. (cfs)		78737.3
Length Wtd. (ft)	200.00	Wetted Per. (ft)		218.46
Min Ch El (ft)	1369.90	Shear (lb/sq ft)		0.17
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)	1.33	54.91
C & E Loss (ft)	0.00	Cum SA (acres)	0.34	13.45

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 25100.

INPUT
Description:
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1379.84	69.36	1380.76	69.76	1380.78	70.46	1380.64	75.2	1379.65
80.81	1379.45	87.44	1379.21	90.17	1379.11	92.49	1379.02	105.44	1376.91

105.88	1376.85	106.85	1376.7	107.4	1376.62	108.3	1376.49	109.2	1376.35
109.98	1376.24	111.34	1376.03	124.05	1374.02	127.23	1373.55	129.76	1373.18
131.67	1372.9	136.17	1372.23	142.73	1371.25	146.63	1370.65	150.58	1370.07
154.6	1369.48	162.67	1369.48	171.25	1369.48	178.89	1369.48	180.37	1369.48
186.97	1369.48	200	1369.48	204.34	1369.48	220.46	1373.68	332.59	1375.14
340.57	1376.32	348.64	1377.52	355.27	1378.5	365.41	1380	372.29	1380.77
374.37	1381	375.01	1381.05	381.08	1381.57	386.14	1382	392.41	1382.2
394.19	1382.26	396.37	1382.19	400	1382.07				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	69.76	.045	220.46	.065	332.59	.045	374.37	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
69.76	374.37	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1376.24	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.12	Wt. n-Val.		0.047
W.S. Elev (ft)	1376.12	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		745.15
E.G. Slope (ft/ft)	0.001255	Area (sq ft)		745.15
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	228.42	Top Width (ft)		228.42
Vel Total (ft/s)	2.82	Avg. Vel. (ft/s)		2.82
Max Chl Dpth (ft)	6.64	Hydr. Depth (ft)		3.26
Conv. Total (cfs)	59269.7	Conv. (cfs)		59269.7
Length Wtd. (ft)	200.00	Wetted Per. (ft)		229.54
Min Ch El (ft)	1369.48	Shear (lb/sq ft)		0.25
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	1.33	51.23
C & E Loss (ft)	0.00	Cum SA (acres)	0.34	12.42

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 24900.

INPUT
Description:
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1379.18	101.88	1380.07	108.12	1380.06	108.76	1380.08	108.79	1380.08
130.16	1375.64	144.13	1372.94	151.3	1371.49	162.83	1369.32	164.41	1369.29
165.49	1369.27	169.27	1369.19	171.52	1369.14	200	1369.08	208.18	1369.06
222.38	1369.06	238.8	1373.61	340.45	1377.82	353.52	1380	354.94	1380.1
355.1	1380.1	355.28	1380.12	360.51	1380.48	373.06	1380.86	374.83	1380.84
377.13	1380.83	379.42	1380.81	382.4	1380.78	385.41	1380.75	388.73	1380.71
391.14	1380.68	400	1380.47						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	108.79	.045	238.8	.065	340.45	.045	353.52	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
108.79	353.52	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1375.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.		0.045	
W.S. Elev (ft)	1375.82	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)		Flow Area (sq ft)		642.00	
E.G. Slope (ft/ft)	0.001238	Area (sq ft)		642.00	
Q Total (cfs)	2100.00	Flow (cfs)		2100.00	
Top Width (ft)	162.89	Top Width (ft)		162.89	
Vel Total (ft/s)	3.27	Avg. Vel. (ft/s)		3.27	
Max Chl Dpth (ft)	6.76	Hydr. Depth (ft)		3.94	
Conv. Total (cfs)	59694.8	Conv. (cfs)		59694.8	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		164.18	
Min Ch El (ft)	1369.06	Shear (lb/sq ft)		0.30	
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00	0.00
Frctn Loss (ft)	0.30	Cum Volume (acre-ft)	1.33	48.05	
C & E Loss (ft)	0.01	Cum SA (acres)	0.34	11.53	

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 24700.

INPUT
Description:
Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1378.68	109.17	1379.64	114.26	1380	117.09	1379.84	120.83	1379.64
162.65	1368.64	166.18	1368.64	173.91	1368.64	200	1368.64	201.64	1368.64
202.43	1368.81	203.24	1368.98	209.3	1370.27	217.43	1372.04	255.54	1373.42
265.41	1375.73	271.79	1375.98	282.28	1376.37	285.69	1376.7	289.98	1377
299.5	1377.8	301.71	1378	304.04	1378.22	307.03	1378.46	307.04	1378.46
307.49	1378.5	309.77	1378.78	311.6	1379	317.33	1379.55	322.21	1380
323.76	1380.05	331.45	1380.29	335.9	1380.43	337.07	1380.46	338.56	1380.5
341.91	1380.52	346.38	1380.54	347.82	1380.54	351.31	1380.52	355.2	1380.5
365.3	1380.13	368.62	1380	380.26	1379.75	388.01	1379.59	399.39	1379.35
400	1379.34								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	120.83	.045	217.43	.065	255.54	.045	323.76	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
120.83	323.76	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1375.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.		0.047	
W.S. Elev (ft)	1375.45	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)		Flow Area (sq ft)		547.07	
E.G. Slope (ft/ft)	0.001871	Area (sq ft)		547.07	
Q Total (cfs)	2100.00	Flow (cfs)		2100.00	
Top Width (ft)	127.46	Top Width (ft)		127.46	

Vel Total (ft/s)	3.84	Avg. Vel. (ft/s)		3.84
Max Chl Dpth (ft)	6.81	Hydr. Depth (ft)		4.29
Conv. Total (cfs)	48555.0	Conv. (cfs)		48555.0
Length Wtd. (ft)	200.00	Wetted Per. (ft)		128.96
Min Ch El (ft)	1368.64	Shear (lb/sq ft)		0.50
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.54	Cum Volume (acre-ft)	1.33	45.32
C & E Loss (ft)	0.03	Cum SA (acres)	0.34	10.86

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.

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 24500.

INPUT
Description:
Station Elevation Data num= 54

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1378.28	126.73	1379	131.85	1379.19	132.57	1379.22	160.47	1370.77
169.04	1368.22	190.41	1368.22	197.88	1368.22	200	1368.22	202.9	1368.22
204.77	1368.83	219.45	1373.72	251.93	1374.31	287.17	1378	287.41	1378.02
297.48	1378.98	297.5	1378.98	297.66	1379	301.22	1379.22	301.36	1379.23
301.49	1379.24	301.65	1379.24	301.98	1379.23	307.13	1379.07	309.04	1379.01
309.29	1379	309.35	1379	311.57	1378.95	311.9	1378.94	314.13	1379
315.98	1379.06	318.94	1379.16	320.38	1379.18	320.6	1379.17	322.28	1379.17
326.1	1379.01	326.31	1379	326.6	1378.99	326.67	1378.98	335.16	1378.54
343.45	1378.03	343.82	1378.03	344.46	1378.03	350	1378.46	356.75	1379
358.92	1379.01	367.04	1379.05	370.4	1379.07	376.53	1379.1	383.19	1379.15
387.24	1379.18	397.66	1379.26	398.38	1379.27	400	1379.28		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	132.57	.045	219.45	.065	251.93	.045	301.22	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
132.57	301.22	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1375.11	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.52	Wt. n-Val.		0.045
W.S. Elev (ft)	1374.58	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		361.61
E.G. Slope (ft/ft)	0.004326	Area (sq ft)		361.61
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	106.64	Top Width (ft)		106.64
Vel Total (ft/s)	5.81	Avg. Vel. (ft/s)		5.81
Max Chl Dpth (ft)	6.36	Hydr. Depth (ft)		3.39
Conv. Total (cfs)	31928.6	Conv. (cfs)		31928.6
Length Wtd. (ft)	200.00	Wetted Per. (ft)		108.48
Min Ch El (ft)	1368.22	Shear (lb/sq ft)		0.90

Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.62	Cum Volume (acre-ft)	1.33	43.23
C & E Loss (ft)	0.07	Cum SA (acres)	0.34	10.32

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 24300.

INPUT
Description:
Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1377.93	130.89	1379	138.56	1378.8	141.69	1378.08	172.48	1371.05
186.64	1367.82	186.72	1367.8	200	1367.8	211.17	1367.8	235.61	1367.8
251.62	1371.52	263.86	1372.91	274.43	1374.11	295.78	1377	298.13	1377.18
302.87	1377.56	305.5	1377.7	305.96	1377.72	310.86	1378	312.7	1378.08
326.28	1378.68	327.32	1378.69	343.63	1378.82	344.63	1378.81	344.97	1378.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	138.56	.045	326.28	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
138.56	326.28	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1374.41	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.27	Wt. n-Val.		0.045
W.S. Elev (ft)	1374.14	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		499.31
E.G. Slope (ft/ft)	0.002342	Area (sq ft)		499.31
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	115.64	Top Width (ft)		115.64
Vel Total (ft/s)	4.21	Avg. Vel. (ft/s)		4.21
Max Chl Dpth (ft)	6.33	Hydr. Depth (ft)		4.32
Conv. Total (cfs)	43396.5	Conv. (cfs)		43396.5
Length Wtd. (ft)	200.00	Wetted Per. (ft)		116.93
Min Ch El (ft)	1367.80	Shear (lb/sq ft)		0.62
Alpha	1.00	Stream Power (lb/ft s)	344.97	0.00
0.00				
Frctn Loss (ft)	0.39	Cum Volume (acre-ft)	1.33	41.25
C & E Loss (ft)	0.03	Cum SA (acres)	0.34	9.81

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 24100.

INPUT
Description:
Station Elevation Data num= 61

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1377.61	83.34	1378.44	85.69	1379	89.27	1378.56	93.86	1378
95.63	1378.51	96.19	1378.67	98.32	1378.29	102.21	1377.58	109.01	1377.33
116.79	1377.05	118.22	1377	119.47	1376.95	140.43	1372.59	142.86	1372.08

147.93	1371.02	152.24	1370.11	158.39	1368.83	163.95	1367.66	165.29	1367.38
183.25	1367.38	190.07	1367.38	191.73	1367.38	196.64	1367.38	199.39	1367.38
200	1367.38	204.67	1367.38	207.31	1367.38	211.78	1367.38	216.89	1368.51
227.98	1370.96	299.97	1372.33	313.84	1374	314.59	1374.09	315.97	1374.26
321.41	1374.9	322.22	1375	322.26	1375.04	322.3	1375	324.51	1375.22
332.15	1376	332.49	1376.03	334.82	1376.22	336.86	1376.29	339.56	1376.37
346.31	1376.71	351.23	1376.87	355.38	1376.95	355.89	1376.96	357.04	1376.93
358.16	1376.92	362.37	1376.83	362.42	1376.83	363.29	1376.84	365.71	1376.91
366.8	1376.94	369.04	1377	370.61	1377.24	376.37	1378	378.91	1378.32
380.14	1378.46								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	119.47	.045	227.98	.065	299.97	.045	355.38	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
119.47	355.38	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1373.99	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.17	Wt. n-Val.		0.047
W.S. Elev (ft)	1373.82	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		640.05
E.G. Slope (ft/ft)	0.001623	Area (sq ft)		640.05
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	177.87	Top Width (ft)		177.87
Vel Total (ft/s)	3.28	Avg. Vel. (ft/s)		3.28
Max Chl Dpth (ft)	6.44	Hydr. Depth (ft)		3.60
Conv. Total (cfs)	52121.7	Conv. (cfs)		52121.7
Length Wtd. (ft)	200.00	Wetted Per. (ft)		179.03
Min Ch El (ft)	1367.38	Shear (lb/sq ft)		0.36
Alpha	1.00	Stream Power (lb/ft s)	380.14	0.00
0.00				
Frctn Loss (ft)	0.38	Cum Volume (acre-ft)	1.33	38.64
C & E Loss (ft)	0.01	Cum SA (acres)	0.34	9.14

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 23900.

INPUT
Description:
Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1377.7	110.5	1377.97	116.92	1376.82	119.95	1376.25	132.95	1373.83
144.33	1371.67	169.78	1366.98	171.71	1366.97	172.8	1366.97	177.44	1366.97
198.13	1366.96	198.66	1366.96	199.53	1366.96	200	1366.96	200.48	1366.96
200.99	1366.96	203.54	1366.96	203.72	1366.96	205.08	1366.96	206.77	1366.96
213.19	1368.33	222.84	1370.39	303.59	1373.15	310.41	1374	312.5	1374.19
324.96	1374.81	325.77	1374.85	327.38	1374.83	327.75	1374.83	328.16	1374.84
329.38	1374.9	329.83	1374.93	330.94	1375	330.96	1375	331.32	1375.03
333.07	1375.17	343.06	1376	345.52	1376.06	349.62	1376.13	355.92	1376.26
360.82	1376.16	368.47	1376	372.01	1375.74	374.65	1375.51	375.11	1375.48
375.32	1375.46	375.58	1375.44	375.61	1375.44	386.13	1375.91	386.33	1375.91
387.4	1376	392.43	1376.6	395.26	1377	399.05	1377.57	400	1377.71

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	110.5	.045	222.84	.065	303.59	.045	355.92	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
110.5	355.92	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1373.60	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.22	Wt. n-Val.		0.047
W.S. Elev (ft)	1373.38	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		553.77
E.G. Slope (ft/ft)	0.002296	Area (sq ft)		553.77
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	170.10	Top Width (ft)		170.10
Vel Total (ft/s)	3.79	Avg. Vel. (ft/s)		3.79
Max Chl Dpth (ft)	6.42	Hydr. Depth (ft)		3.26
Conv. Total (cfs)	43825.5	Conv. (cfs)		43825.5
Length Wtd. (ft)	200.00	Wetted Per. (ft)		171.11
Min Ch El (ft)	1366.96	Shear (lb/sq ft)		0.46
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.48	Cum Volume (acre-ft)	1.33	35.90
C & E Loss (ft)	0.02	Cum SA (acres)	0.34	8.34

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 23700.

INPUT
Description:
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1377.35	94.47	1377.95	97.56	1377.97	97.71	1377.98	97.74	1377.98
97.77	1377.99	97.95	1378	98.08	1377.99	98.16	1377.99	98.23	1377.98
99.35	1377.91	104.95	1377.54	139.09	1368.45	144.39	1367.05	146.31	1366.54
151.4	1366.54	156.5	1366.54	172.62	1368.57	301.84	1370.92	309.13	1371.05
335.37	1377.19	338.82	1378	355.28	1378.78	360.02	1379		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	99.35	.045	172.62	.065	301.84	.045	338.82	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
99.35	338.82	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1373.10	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.15	Wt. n-Val.		0.055
W.S. Elev (ft)	1372.95	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		665.49
E.G. Slope (ft/ft)	0.002496	Area (sq ft)		665.49
Q Total (cfs)	2100.00	Flow (cfs)		2100.00

Top Width (ft)	195.04	Top Width (ft)			195.04
Vel Total (ft/s)	3.16	Avg. Vel. (ft/s)			3.16
Max Chl Dpth (ft)	6.41	Hydr. Depth (ft)			3.41
Conv. Total (cfs)	42035.2	Conv. (cfs)			42035.2
Length Wtd. (ft)	200.00	Wetted Per. (ft)			196.25
Min Ch El (ft)	1366.54	Shear (lb/sq ft)			0.53
Alpha	1.00	Stream Power (lb/ft s)	360.02		0.00
0.00					
Frctn Loss (ft)	0.55	Cum Volume (acre-ft)	1.33		33.10
C & E Loss (ft)	0.01	Cum SA (acres)	0.34		7.50

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 23500.

INPUT
Description:
Station Elevation Data num= 58

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1376.37	99.21	1377.04	111.15	1377.12	117.62	1377.12	117.63	1377.12
161.26	1366.12	166.4	1366.12	171.54	1366.12	187.55	1367.61	243.78	1368.09
244.72	1368.26	248.21	1368.93	249.2	1369.13	253.26	1369.9	255	1370.24
258.03	1370.81	260.24	1371.25	261.63	1371.51	263.5	1371.86	264.96	1372.14
265.64	1372.26	266.59	1372.44	268.31	1372.78	269.59	1373.02	270.74	1373.23
271.27	1373.32	272.33	1373.54	272.45	1373.56	274.21	1373.88	274.8	1374
277.51	1374.56	279.7	1374.97	283.22	1375.7	287.55	1376.6	289.53	1377.01
289.67	1377.04	290.06	1377.12	293.22	1377.32	295.19	1377.44	295.27	1377.44
296.58	1377.53	298.38	1377.64	304.66	1378	307.85	1378.07	311.2	1378.13
311.84	1378.15	315.6	1378.05	318.18	1378	319.94	1377.2	320.07	1377.14
320.44	1377.3	321.91	1378	325.13	1378.53	328.01	1379	333.51	1379.84
334.62	1380	336.45	1380.03	337.45	1380.04				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	117.62	.045	187.55	.065	243.78	.045	290.06	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
117.62	290.06	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1372.54	Element		Left OB	Channel
Right OB					
Vel Head (ft)	0.25	Wt. n-Val.			0.053
W.S. Elev (ft)	1372.29	Reach Len. (ft)		200.00	200.00
200.00					
Crit W.S. (ft)		Flow Area (sq ft)			521.21
E.G. Slope (ft/ft)	0.003088	Area (sq ft)			521.21
Q Total (cfs)	2100.00	Flow (cfs)			2100.00
Top Width (ft)	128.98	Top Width (ft)			128.98
Vel Total (ft/s)	4.03	Avg. Vel. (ft/s)			4.03
Max Chl Dpth (ft)	6.17	Hydr. Depth (ft)			4.04
Conv. Total (cfs)	37787.9	Conv. (cfs)			37787.9
Length Wtd. (ft)	200.00	Wetted Per. (ft)			130.22
Min Ch El (ft)	1366.12	Shear (lb/sq ft)			0.77
Alpha	1.00	Stream Power (lb/ft s)		337.45	0.00
0.00					
Frctn Loss (ft)	0.50	Cum Volume (acre-ft)		1.33	30.37
C & E Loss (ft)	0.04	Cum SA (acres)		0.34	6.76

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 23300.

INPUT
Description:
Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1375.98	70.03	1376.63	77.14	1376.7	79.27	1376.7	80.87	1376.7
84.59	1376.7	85.18	1376.7	86.91	1376.22	88.83	1375.68	89.59	1375.47
93.25	1374.46	94.5	1374.11	99.31	1372.78	114.86	1368.51	115.78	1368.25
116.32	1368.11	241.59	1367.37	243.28	1367.28	247.42	1366.32	247.85	1366.22
250.05	1365.7	253.8	1365.7	254.96	1365.7	256.58	1365.7	259.43	1365.7
260.49	1365.7	260.98	1365.82	267.24	1367.36	274.02	1369.04	286.83	1372.37
290.27	1373.24	291.2	1373.47	294.32	1374.27	294.57	1374.33	301.38	1376.13
304.67	1377	321.94	1377.91	323.68	1378	328.93	1376.7		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	84.59	.045	116.32	.065	241.59	.045	304.67	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
84.59	304.67	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1372.00	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.13	Wt. n-Val.		0.059
W.S. Elev (ft)	1371.87	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		727.84
E.G. Slope (ft/ft)	0.002095	Area (sq ft)		727.84
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	182.28	Top Width (ft)		182.28
Vel Total (ft/s)	2.89	Avg. Vel. (ft/s)		2.89
Max Chl Dpth (ft)	6.17	Hydr. Depth (ft)		3.99
Conv. Total (cfs)	45881.4	Conv. (cfs)		45881.4
Length Wtd. (ft)	200.00	Wetted Per. (ft)		183.74
Min Ch El (ft)	1365.70	Shear (lb/sq ft)		0.52
Alpha	1.00	Stream Power (lb/ft s)	328.93	0.00
0.00				
Frctn Loss (ft)	0.35	Cum Volume (acre-ft)	1.33	27.51
C & E Loss (ft)	0.01	Cum SA (acres)	0.34	6.04

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 23100.

INPUT
Description:
Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1375.64	61.46	1376.25	64.09	1376.28	70.63	1376.28	71.8	1376

91.5	1371.26	97.93	1369.81	101.94	1369	107.82	1367.72	109.84	1367.26
124.97	1367.26	131.68	1367.26	148.87	1367.26	153.59	1367.26	155.36	1367.26
158.33	1367.26	229.04	1367.26	238.89	1367.26	241.52	1367.26	250.98	1367.26
253.16	1366.73	256.38	1365.95	259.13	1365.28	259.83	1365.28	269.35	1365.28
269.8	1365.28	271.42	1365.28	272.38	1365.28	303.69	1373.12	313.37	1375.54
314.26	1375.77	315.21	1376.01	319.13	1377	319.92	1377.01	320.82	1377.02
321.24	1377.02	323.1	1377.03	323.57	1377.03	324.69	1377.04	325.26	1377.04
325.57	1377.04	326.46	1377.04	340.66	1377.09	342.39	1376.81		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.045	70.63	.045	109.84	.065	250.98	.045	319.13	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
70.63	319.13	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1371.64	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.09	Wt. n-Val.		0.059
W.S. Elev (ft)	1371.55	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		851.56
E.G. Slope (ft/ft)	0.001465	Area (sq ft)		851.56
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	207.09	Top Width (ft)		207.09
Vel Total (ft/s)	2.47	Avg. Vel. (ft/s)		2.47
Max Chl Dpth (ft)	6.27	Hydr. Depth (ft)		4.11
Conv. Total (cfs)	54863.7	Conv. (cfs)		54863.7
Length Wtd. (ft)	200.00	Wetted Per. (ft)		208.57
Min Ch El (ft)	1365.28	Shear (lb/sq ft)		0.37
Alpha	1.00	Stream Power (lb/ft s)	342.39	0.00
0.00				
Frctn Loss (ft)	0.31	Cum Volume (acre-ft)	1.33	23.88
C & E Loss (ft)	0.01	Cum SA (acres)	0.34	5.15

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 22900.

INPUT
Description:
Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1375.5	86.05	1375	87.73	1375.53	89.24	1376	96.29	1375.94
97.93	1375.92	98.49	1375.92	98.55	1375.92	98.62	1375.92	98.77	1375.91
98.83	1375.91	99.56	1375.91	99.59	1375.91	104.15	1375.86	115.64	1373.93
119.85	1373.13	121.27	1372.89	122.69	1372.64	131.71	1370.91	140.66	1369.3
141.21	1369.2	157.16	1366.04	157.39	1365.99	157.44	1365.98	157.48	1365.98
158.19	1365.83	159.25	1365.79	169.08	1365.41	172.16	1365.31	174.06	1365.28
174.64	1365.28	178.24	1365.22	179.92	1365.19	186.37	1365.08	198.88	1364.86
219.54	1365.21	225.75	1365.32	229.77	1365.39	257.17	1371	276.56	1375
278	1375.3	278.23	1375.35	281.55	1376	291.44	1376.42	305.3	1377
315.89	1375.86								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	104.15	.045	281.55	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
104.15	281.55	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1371.32	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.21	Wt. n-Val.		0.045
W.S. Elev (ft)	1371.11	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		574.20
E.G. Slope (ft/ft)	0.001660	Area (sq ft)		574.20
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	127.03	Top Width (ft)		127.03
Vel Total (ft/s)	3.66	Avg. Vel. (ft/s)		3.66
Max Chl Dpth (ft)	6.25	Hydr. Depth (ft)		4.52
Conv. Total (cfs)	51536.1	Conv. (cfs)		51536.1
Length Wtd. (ft)	200.00	Wetted Per. (ft)		128.13
Min Ch El (ft)	1364.86	Shear (lb/sq ft)		0.46
Alpha	1.00	Stream Power (lb/ft s)	315.89	0.00
0.00				
Frctn Loss (ft)	0.38	Cum Volume (acre-ft)	1.33	20.61
C & E Loss (ft)	0.01	Cum SA (acres)	0.34	4.38

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 22700.

INPUT
Description:
Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1374.5	50	1374	94.26	1375.71	107.92	1376.05	109.09	1376.44
114.05	1376.44	115.55	1376.44	119.16	1376.44	122	1376.44	148.69	1370.05
170.06	1364.94	189.75	1364.61	200	1364.44	214.78	1364.69	229.88	1364.94
230.15	1364.94	230.73	1365.08	273.14	1375	273.58	1375.08	278	1375.9
278.57	1376	280.04	1376.13	280.73	1376.2	310	1376	400	1377

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	122	.045	280.73	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
122	280.73	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1370.93	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.28	Wt. n-Val.		0.045
W.S. Elev (ft)	1370.65	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		495.96
E.G. Slope (ft/ft)	0.002200	Area (sq ft)		495.96
Q Total (cfs)	2100.00	Flow (cfs)		2100.00

Top Width (ft)	108.37	Top Width (ft)			108.37
Vel Total (ft/s)	4.23	Avg. Vel. (ft/s)			4.23
Max Chl Dpth (ft)	6.21	Hydr. Depth (ft)			4.58
Conv. Total (cfs)	44774.3	Conv. (cfs)			44774.3
Length Wtd. (ft)	200.00	Wetted Per. (ft)			109.71
Min Ch El (ft)	1364.44	Shear (lb/sq ft)			0.62
Alpha	1.00	Stream Power (lb/ft s)		400.00	0.00
0.00					
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)		1.33	18.15
C & E Loss (ft)	0.00	Cum SA (acres)		0.34	3.84

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 22500.

INPUT
Description:
Station Elevation Data num= 36

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1375.5	96.8	1374	99.8	1374	107.4	1375.45	109.09	1376.02
114.05	1376.02	115.55	1376.02	119.16	1376.02	122	1376.02	157.83	1367.41
170	1364.48	191.25	1364.16	200	1364.02	209.29	1364.16	227.41	1364.43
229.85	1364.47	239.55	1366.82	273.25	1375	276.68	1375.76	277.8	1376
278	1376.01	279.1	1376.08	281.08	1376.2	283.64	1376.03	284.05	1376
286.43	1375.84	295.59	1375.2	303.62	1375.7	309.01	1376.02	310.79	1375.43
312.08	1375	314.93	1374.05	315.08	1374	317.27	1373	320	1373
400	1375.5								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	122	.045	279.1	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
122	279.1	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1370.49	Element		Left OB	Channel
Right OB					
Vel Head (ft)	0.28	Wt. n-Val.			0.045
W.S. Elev (ft)	1370.20	Reach Len. (ft)		200.00	200.00
200.00					
Crit W.S. (ft)		Flow Area (sq ft)			492.36
E.G. Slope (ft/ft)	0.002225	Area (sq ft)			492.36
Q Total (cfs)	2100.00	Flow (cfs)			2100.00
Top Width (ft)	107.29	Top Width (ft)			107.29
Vel Total (ft/s)	4.27	Avg. Vel. (ft/s)			4.27
Max Chl Dpth (ft)	6.18	Hydr. Depth (ft)			4.59
Conv. Total (cfs)	44518.6	Conv. (cfs)			44518.6
Length Wtd. (ft)	200.00	Wetted Per. (ft)			108.66
Min Ch El (ft)	1364.02	Shear (lb/sq ft)			0.63
Alpha	1.00	Stream Power (lb/ft s)		400.00	0.00
0.00					
Frctn Loss (ft)	0.45	Cum Volume (acre-ft)		1.33	15.88
C & E Loss (ft)	0.00	Cum SA (acres)		0.34	3.35

CROSS SECTION

RIVER: Sonoqui Wash

REACH: Main Br DS 202nd RS: 22300.

INPUT
Description:
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1376	101.3	1374	104.3	1374	104.64	1374.11	104.68	1374.13
105.44	1374.38	106	1374.57	106.42	1374.7	109.11	1375.6	114.07	1375.6
115.56	1375.6	119.16	1375.6	122	1375.6	162.4	1365.92	170	1364.1
174.75	1364.02	200	1363.6	221.34	1363.96	230	1364.1	241.06	1366.75
251.3	1369.21	264.13	1372.28	272.3	1372.42	280.4	1372.55	287.41	1374.28
292.75	1375.6	292.89	1375.62	294.28	1375.79	295.98	1376	297.68	1376.08
300.28	1376.2	302.4	1376.05	303.24	1376	304.81	1375.89	308.94	1375.6
309.99	1375.25	310.75	1375	312.01	1374.57	313.71	1374	316.71	1374
400	1374.8								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	122	.045	297.68	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
122	297.68	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1370.03	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.29	Wt. n-Val.		0.045
W.S. Elev (ft)	1369.74	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		486.43
E.G. Slope (ft/ft)	0.002310	Area (sq ft)		486.43
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	107.09	Top Width (ft)		107.09
Vel Total (ft/s)	4.32	Avg. Vel. (ft/s)		4.32
Max Chl Dpth (ft)	6.14	Hydr. Depth (ft)		4.54
Conv. Total (cfs)	43691.2	Conv. (cfs)		43691.2
Length Wtd. (ft)	200.00	Wetted Per. (ft)		108.43
Min Ch El (ft)	1363.60	Shear (lb/sq ft)		0.65
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.39	Cum Volume (acre-ft)	1.33	13.64
C & E Loss (ft)	0.02	Cum SA (acres)	0.34	2.85

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 22100.

INPUT
Description:
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1373.5	99	1373	102.13	1373	103.75	1373.54	105.13	1374
106.75	1374.54	108.68	1375.18	111.08	1375.18	115.38	1375.18	119.18	1375.18
121.06	1375.18	121.87	1375.18	122	1375.18	132.22	1372.73	155.3	1367.2
165.7	1364.71	167.72	1364.23	170.01	1363.68	171.56	1363.66	200.05	1363.18
207.3	1363.31	236.07	1363.8	240.17	1363.89	242.28	1363.94	243.43	1364.2
245.07	1364.58	273.55	1371.15	290.17	1375.19	294.72	1375.83	295.76	1376
296.99	1376.03	299.72	1376.09	301.16	1376.13	304.05	1376.05	306.35	1376

308.01	1375.46	308.85	1375.2	309.38	1375.02	309.45	1375	309.99	1374.82
310.06	1374.8	310.26	1374.73	310.42	1374.68	312.48	1374	320	1371.5
330	1372	360	1374.5	400	1376				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	122	.045	294.72	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
122	294.72	60	120	180	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1369.62	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.22	Wt. n-Val.		0.045
W.S. Elev (ft)	1369.40	Reach Len. (ft)	60.00	120.00
180.00				
Crit W.S. (ft)		Flow Area (sq ft)		559.62
E.G. Slope (ft/ft)	0.001679	Area (sq ft)		559.62
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	119.86	Top Width (ft)		119.86
Vel Total (ft/s)	3.75	Avg. Vel. (ft/s)		3.75
Max Chl Dpth (ft)	6.22	Hydr. Depth (ft)		4.67
Conv. Total (cfs)	51248.3	Conv. (cfs)		51248.3
Length Wtd. (ft)	120.00	Wetted Per. (ft)		121.17
Min Ch El (ft)	1363.18	Shear (lb/sq ft)		0.48
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	1.33	11.23
C & E Loss (ft)	0.02	Cum SA (acres)	0.34	2.33

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 21980.

INPUT
Description: U/S of Chandler Hts Bridge
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
92.122	1374.8	96.175	1374.8	98.623	1374.8	101.671	1374.8	107.179	1374.81
112.918	1374.82	112.941	1374.82	114.696	1374.52	116.151	1374.28	117.318	1374.08
122.063	1373.27	125.989	1372.61	129.546	1372.01	133.772	1371.3	138.125	1370.56
138.922	1370.43	139.696	1370.3	142.421	1369.84	147.467	1368.99	179.094	1363.65
180.641	1363.39	181.727	1363.38	184.429	1363.35	199.313	1363.22	208.816	1363.13
215.71	1363.06	228.631	1362.93	232.441	1362.99	234.958	1363.03	247.868	1363.22
258.664	1363.37	261.205	1363.41	265.292	1363.47	268.052	1364.09	275.269	1365.72
276.932	1366.11	279.865	1366.63	293.04	1369.49	299.703	1370.57	307.681	1372.22
317.381	1373.67	321.018	1374.38	333.027	1376.01	333.177	1376.01	342.172	1376.01
356.375	1376.39	357.738	1376.33	361.063	1376.02	363.28	1376.02	365.867	1376.02
369.227	1375.27								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
92.122	.045	112.941	.045	333.027	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
112.941	333.027	131	131	131	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1369.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.045	
W.S. Elev (ft)	1369.30	Reach Len. (ft)	11.90	11.90	11.90
Crit W.S. (ft)	1365.74	Flow Area (sq ft)		699.02	
E.G. Slope (ft/ft)	0.001041	Area (sq ft)		699.02	
Q Total (cfs)	2100.00	Flow (cfs)		2100.00	
Top Width (ft)	146.54	Top Width (ft)		146.54	
Vel Total (ft/s)	3.00	Avg. Vel. (ft/s)		3.00	
Max Chl Dpth (ft)	6.37	Hydr. Depth (ft)		4.77	
Conv. Total (cfs)	65074.1	Conv. (cfs)		65074.1	
Length Wtd. (ft)	11.90	Wetted Per. (ft)		147.67	
Min Ch El (ft)	1362.93	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)	369.23	0.00	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	1.33	9.50	
C & E Loss (ft)	0.00	Cum SA (acres)	0.34	1.97	

BRIDGE

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 21917.08

INPUT
Description: Chandler Heights Rd Bridge (Existing)
Distance from Upstream XS = 11.9
Deck/Roadway Width = 104
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 9

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1379.96	1365	106.95	1379.96	1375.86	110	1379.98	1375.86
121.244	1379.98	1375.86	166.001	1380.17	1376.05	234	1380.17	1376.05
290	1379.98	1375.86	293.05	1379.96	1375.86	404.145	1379.96	1375.86

Upstream Bridge Cross Section Data
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
92.122	1374.8	96.175	1374.8	98.623	1374.8	101.671	1374.8	107.179	1374.81
112.918	1374.82	112.941	1374.82	114.696	1374.52	116.151	1374.28	117.318	1374.08
122.063	1373.27	125.989	1372.61	129.546	1372.01	133.772	1371.3	138.125	1370.56
138.922	1370.43	139.696	1370.3	142.421	1369.84	147.467	1368.99	179.094	1363.65
180.641	1363.39	181.727	1363.38	184.429	1363.35	199.313	1363.22	208.816	1363.13
215.71	1363.06	228.631	1362.93	232.441	1362.99	234.958	1363.03	247.868	1363.22
258.664	1363.37	261.205	1363.41	265.292	1363.47	268.052	1364.09	275.269	1365.72
276.932	1366.11	279.865	1366.63	293.04	1369.49	299.703	1370.57	307.681	1372.22
317.381	1373.67	321.018	1374.38	333.027	1376.01	333.177	1376.01	342.172	1376.01
356.375	1376.39	357.738	1376.33	361.063	1376.02	363.28	1376.02	365.867	1376.02
369.227	1375.27								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
92.122	.045	112.941	.045	333.027	.045

Bank Sta: Left	Right	Coeff Contr.	Expan.
112.941	333.027	.1	.3

Downstream Deck/Roadway Coordinates
num= 8

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1379.96	1375.84	106.95	1379.96	1375.84	110	1379.98	1375.86
166.001	1380.17	1376.05	234	1380.17	1376.05	290	1379.98	1375.86
293.05	1379.96	1375.84	404.145	1379.96	1375.84			

Downstream Bridge Cross Section Data
Station Elevation Data num= 94

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1377.02	4.21	1377.05	4.931	1377.05	17.15	1377.24	17.499	1377.25
17.51	1377.25	17.72	1377.25	20.41	1377.23	20.66	1377.23	21.64	1377.21
26	1377.12	26.98	1377.11	40.51	1376.86	43.19	1376.86	44.84	1376.87
62.649	1377.06	64.2	1377.07	67.28	1377.15	74.35	1376.9	76.2	1376.97
77.84	1376.94	82.64	1377.08	87.4	1375.99	91.42	1375.57	93.8	1375.39
94.28	1375.33	105.32	1372.81	108.84	1371.81	113.18	1370.88	113.76	1370.76
114.159	1370.68	120.88	1369.38	123.09	1368.9	124.461	1368.59	132.17	1366.52
144.1	1364.91	144.829	1364.81	144.9	1364.79	148.58	1363.64	151.17	1363.74
153.35	1363.64	155.38	1363.6	155.97	1363.58	163.69	1363.04	168.3	1362.73
176.89	1362.47	177.73	1362.48	179.76	1362.48	192.27	1362.49	193.83	1362.52
198.6	1362.64	200	1362.67	206.09	1362.79	210.64	1362.88	214.89	1363.1
228.74	1363.53	232.71	1363.89	235.6	1364.18	238.39	1364.49	247.41	1366.5
253.4	1367.47	253.72	1367.53	259.48	1368.49	261.121	1368.93	264.02	1369.38
270.89	1371.19	272.12	1371.44	272.61	1371.57	274.87	1372.04	278.44	1372.27
278.79	1372.3	281.34	1372.59	292.14	1373.81	292.71	1373.9	299.621	1375.18
307.79	1375.91	309.7	1375.99	311.45	1376.05	314.41	1376.37	316.89	1376.64
319.83	1377.02	320.57	1377.03	322.09	1376.83	323.28	1376.81	334.33	1376.47
342.829	1376.55	347.38	1376.58	350.629	1376.56	358.83	1376.65	371.86	1376.8
385.03	1376.87	389.68	1376.82	399.609	1376.65	400	1376.63		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	82.64	.045	319.83	.045

Bank Sta: Left	Right	Coeff Contr.	Expan.
82.64	319.83	.1	.3

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 = 1380
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
Pier Station Upstream= 184 Downstream= 160
Upstream num= 2

Width	Elev	Width	Elev
3	1360	3	1380

Downstream num= 2

Width	Elev	Width	Elev
3	1360	3	1380

Pier Data
Pier Station Upstream= 252 Downstream= 229
Upstream num= 2

Width	Elev	Width	Elev

```
       3    1360       3    1380
Downstream     num=       2
    Width   Elev    Width   Elev
       3    1360       3    1380

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

BRIDGE OUTPUT  Profile #PF 1

  E.G. US. (ft)                1369.44    Element                  Inside BR US  Inside
BR DS
  W.S. US. (ft)                1369.30    E.G. Elev (ft)               1369.42
1369.27
  Q Total (cfs)                2100.00    W.S. Elev (ft)               1369.27
1369.10
  Q Bridge (cfs)               2100.00    Crit W.S. (ft)               1365.86
1365.73
  Q Weir (cfs)                            Max Chl Dpth (ft)               6.34
6.63
  Weir Sta Lft (ft)                       Vel Total (ft/s)                3.19
3.30
  Weir Sta Rgt (ft)                       Flow Area (sq ft)             658.35
636.78
  Weir Submerg                            Froude # Chl                    0.26
0.27
  Weir Max Depth (ft)                     Specif Force (cu ft)         2016.85
1987.03
  Min El Weir Flow (ft)        1380.00    Hydr Depth (ft)                 4.70
4.75
  Min El Prs (ft)              1376.05    W.P. Total (ft)               165.10
157.79
  Delta EG (ft)                   0.20    Conv. Total (cfs)            54665.6
53298.8
  Delta WS (ft)                   0.21    Top Width (ft)                140.18
134.01
  BR Open Area (sq ft)         1803.13    Frctn Loss (ft)                 0.16
0.02
  BR Open Vel (ft/s)              3.30    C & E Loss (ft)                 0.00
0.00
  Coef of Q                               Shear Total (lb/sq ft)          0.37
0.39
  Br Sel Method            Energy only    Power Total (lb/ft s)          92.12
0.00

CROSS SECTION
```

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 21849.

INPUT
Description: D/S of Chandler Hts Bridge
Station Elevation Data num= 94

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1377.02	4.21	1377.05	4.931	1377.05	17.15	1377.24	17.499	1377.25
17.51	1377.25	17.72	1377.25	20.41	1377.23	20.66	1377.23	21.64	1377.21
26	1377.12	26.98	1377.11	40.51	1376.86	43.19	1376.86	44.84	1376.87
62.649	1377.06	64.2	1377.07	67.28	1377.15	74.35	1376.9	76.2	1376.97
77.84	1376.94	82.64	1377.08	87.4	1375.99	91.42	1375.57	93.8	1375.39
94.28	1375.33	105.32	1372.81	108.84	1371.81	113.18	1370.88	113.76	1370.76
114.159	1370.68	120.88	1369.38	123.09	1368.9	124.461	1368.59	132.17	1366.52
144.1	1364.91	144.829	1364.81	144.9	1364.79	148.58	1363.64	151.17	1363.74
153.35	1363.64	155.38	1363.6	155.97	1363.58	163.69	1363.04	168.3	1362.73
176.89	1362.47	177.73	1362.48	179.76	1362.48	192.27	1362.49	193.83	1362.52
198.6	1362.64	200	1362.67	206.09	1362.79	210.64	1362.88	214.89	1363.1
228.74	1363.53	232.71	1363.89	235.6	1364.18	238.39	1364.49	247.41	1366.5
253.4	1367.47	253.72	1367.53	259.48	1368.49	261.121	1368.93	264.02	1369.38
270.89	1371.19	272.12	1371.44	272.61	1371.57	274.87	1372.04	278.44	1372.27
278.79	1372.3	281.34	1372.59	292.14	1373.81	292.71	1373.9	299.621	1375.18
307.79	1375.91	309.7	1375.99	311.45	1376.05	314.41	1376.37	316.89	1376.64
319.83	1377.02	320.57	1377.03	322.09	1376.83	323.28	1376.81	334.33	1376.47
342.829	1376.55	347.38	1376.58	350.629	1376.56	358.83	1376.65	371.86	1376.8
385.03	1376.87	389.68	1376.82	399.609	1376.65	400	1376.63		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	82.64	.045	319.83	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
82.64	319.83	100	149	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1369.24	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.15	Wt. n-Val.		0.045
W.S. Elev (ft)	1369.09	Reach Len. (ft)	100.00	149.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		669.50
E.G. Slope (ft/ft)	0.001132	Area (sq ft)		669.50
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	139.91	Top Width (ft)		139.91
Vel Total (ft/s)	3.14	Avg. Vel. (ft/s)		3.14
Max Chl Dpth (ft)	6.62	Hydr. Depth (ft)		4.79
Conv. Total (cfs)	62426.0	Conv. (cfs)		62426.0
Length Wtd. (ft)	149.00	Wetted Per. (ft)		141.09
Min Ch El (ft)	1362.47	Shear (lb/sq ft)		0.34
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)	1.33	7.54
C & E Loss (ft)	0.00	Cum SA (acres)	0.34	1.55

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 21700.

INPUT
Description:
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1376.3	7.42	1376.25	10.9	1376.17	17.04	1376.11	20.36	1376.04
23.27	1376	32.72	1375.76	43.76	1375.56	53.24	1375.33	59.4	1375.14
64.19	1374.91	68.53	1374.55	69.42	1374.5	69.49	1374.51	75.94	1373.94
80.56	1373.6	83.89	1373.41	87.6	1373.31	94.97	1372.93	98.82	1372.84
100.72	1372.77	102.56	1372.66	107.54	1372.31	109.82	1372.24	110.72	1372.16
114.16	1371.73	117.09	1370.92	117.47	1370.58	117.98	1370.16	118.29	1369.92
120.29	1369.46	121.83	1369.14	122.45	1369.11	122.68	1368.98	126.92	1368.2
127.06	1368.16	127.59	1367.92	131.75	1366.33	132.72	1366.1	134.74	1365.44
135.77	1365.08	136.45	1364.89	137.9	1364.55	138.12	1364.42	139.62	1364.28
140.98	1364.45	145.88	1364.28	148.36	1364.15	151.59	1364.3	155.37	1364.05
157.63	1363.62	158.83	1363.28	160.41	1362.79	181.73	1362.15	185.27	1362.15
190.44	1362.19	194.82	1362.33	199.42	1362.58	200	1362.6	206.64	1362.8
213.94	1362.91	222.46	1363.26	226.69	1363.47	228.55	1364.05	231.31	1365.11
233.97	1365.77	240.72	1367.37	242.47	1367.81	245.04	1368.48	254.87	1370.37
257.26	1370.66	267.12	1372.26	284.03	1374.2	294.54	1375.34	296.57	1375.6
304.36	1375.84	312.08	1376.09	315.75	1376.2	319.45	1376.28	321.67	1376.03
322.74	1375.94	326.01	1375.95	330.12	1376.14	335.42	1375.9	344.77	1376.09
345.36	1376.09	345.79	1375.74	346.18	1375.46	347.08	1375.02	358.44	1375.08
358.65	1375.1	360.06	1375.35	361.87	1375.52	362.44	1375.63	362.59	1375.69
363.09	1375.8	380.66	1375.83	383.66	1375.84	400	1375.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	109.82	.045	267.12	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
109.82	267.12	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1369.05	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.19	Wt. n-Val.		0.045
W.S. Elev (ft)	1368.86	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)		Flow Area (sq ft)		601.48
E.G. Slope (ft/ft)	0.001382	Area (sq ft)		601.48
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	123.70	Top Width (ft)		123.70
Vel Total (ft/s)	3.49	Avg. Vel. (ft/s)		3.49
Max Chl Dpth (ft)	6.71	Hydr. Depth (ft)		4.86
Conv. Total (cfs)	56497.0	Conv. (cfs)		56497.0
Length Wtd. (ft)	200.00	Wetted Per. (ft)		125.37
Min Ch El (ft)	1362.15	Shear (lb/sq ft)		0.41
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.29	Cum Volume (acre-ft)	1.33	5.37
C & E Loss (ft)	0.00	Cum SA (acres)	0.34	1.10

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 21500.

INPUT
Description:

Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1365.27	2.12	1365.31	3.28	1365.29	3.91	1365.3	8.69	1365.36
10.26	1365.32	13.96	1365.38	16.8	1365.34	21.25	1365.33	24.81	1365.28
28.09	1365.33	30.61	1365.35	34.52	1365.46	35.4	1365.48	38.35	1365.54
43.87	1365.72	44.61	1365.86	45.14	1365.87	47.35	1365.69	47.76	1365.64
47.86	1365.65	51.06	1366.11	53.93	1366.39	62.31	1367	64.25	1367.12
64.38	1367.14	65.21	1367.19	66.94	1367.36	74.03	1368.06	79.79	1368.66
84.61	1369.21	89.22	1369.67	91.02	1369.87	93.3	1370.12	97.56	1370.32
103.97	1370.57	107.56	1370.62	108.53	1370.61	111.58	1370.54	115.58	1370.52
122.34	1370.47	123.47	1370.45	124.42	1370.43	126.55	1370.3	128.02	1370.22
132.38	1369.19	140.37	1367.38	147.5	1365.51	148.29	1365.31	150.3	1364.87
156.22	1363.58	158.91	1362.92	160.4	1362.52	165.47	1362.44	186.75	1362.11
188.37	1362.09	190.97	1362.05	200	1362.06	210.38	1362.07	210.54	1362.07
219.17	1362.29	222.69	1362.57	227.54	1362.91	230.08	1363.51	233.19	1364.34
239.95	1365.73	241.27	1365.94	242.86	1366.25	243.42	1366.35	244.86	1366.59
256.4	1369.02	257.99	1369.5	259.06	1369.73	260.23	1370.02	262.62	1370.37
266.87	1371.24	270.94	1372.05	273.69	1372.57	274.57	1372.72	280.06	1373.5
285.05	1374.2	286.66	1374.39	298.31	1375.11	301.19	1375.07	302.16	1375.12
309.86	1375.43	312.98	1375.45	342.7	1375.73	344.33	1375.76	346.18	1375.75
347.48	1375.74	347.8	1375.75	355.73	1375.54	362.85	1375.46	373.09	1375.48
378.83	1375.45	386.12	1375.46	396.18	1375.4	400	1375.41		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	115.58	.045	266.87	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
115.58	266.87	200	200	200	.1	.3

Left Levee Station= 128.02 Elevation= 1372

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1368.76	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.21	Wt. n-Val.		0.045
W.S. Elev (ft)	1368.55	Reach Len. (ft)	200.00	200.00
200.00				
Crit W.S. (ft)	1365.27	Flow Area (sq ft)		571.54
E.G. Slope (ft/ft)	0.001550	Area (sq ft)		571.54
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	118.94	Top Width (ft)		118.94
Vel Total (ft/s)	3.67	Avg. Vel. (ft/s)		3.67
Max Chl Dpth (ft)	6.50	Hydr. Depth (ft)		4.81
Conv. Total (cfs)	53341.7	Conv. (cfs)		53341.7
Length Wtd. (ft)	200.00	Wetted Per. (ft)		120.28
Min Ch El (ft)	1362.05	Shear (lb/sq ft)		0.46
Alpha	1.00	Stream Power (lb/ft s)	400.00	128.02
0.00				
Frctn Loss (ft)	0.29	Cum Volume (acre-ft)	1.33	2.68
C & E Loss (ft)	0.00	Cum SA (acres)	0.34	0.54

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Sonoqui Wash
REACH: Main Br DS 202nd RS: 21300.

INPUT
Description:
Station Elevation Data num= 64

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1363.43	10.54	1363.51	18.18	1363.57	29.02	1363.6	52.59	1363.6
76.15	1363.96	87.66	1364.19	95.32	1364.36	119.83	1364.94	122.71	1365.54
125.71	1366.22	144.96	1366.16	146.46	1366.16	149.65	1365.31	162.12	1362.02
166.76	1361.97	173.35	1361.92	177.81	1361.8	184.25	1361.7	197.47	1361.65
200	1361.64	201.53	1361.63	204.05	1361.74	206.15	1361.79	209.54	1361.88
212.98	1361.91	213.79	1361.92	216.65	1362.02	221.35	1362.21	229.26	1362.53
233.77	1363.41	234.42	1363.53	235.17	1363.65	248.74	1365.63	256.11	1366.89
263.87	1368.21	277.18	1370.52	279.2	1370.88	281.39	1371.36	285.86	1372.36
291.58	1373.53	295.8	1374.4	296.51	1374.58	300.48	1375.51	303.77	1375.61
304.57	1375.65	305.11	1375.93	306.14	1376.32	312.36	1375.09	312.46	1375.08
312.63	1375.05	318.84	1373.79	322.39	1373.75	322.86	1373.74	328.19	1373.63
330.9	1373.58	341.95	1372.97	345.43	1372.78	345.76	1372.76	349.85	1372.36
355.3	1372.06	356.92	1371.96	393.41	1372.06	400	1372.09		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	146.46	.045	277.18	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
146.46	277.18	0	0	0	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	146.46	1370	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1368.46	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.19	Wt. n-Val.		0.045
W.S. Elev (ft)	1368.27	Reach Len. (ft)		
Crit W.S. (ft)	1364.90	Flow Area (sq ft)		593.95
E.G. Slope (ft/ft)	0.001341	Area (sq ft)	580.09	593.95
Q Total (cfs)	2100.00	Flow (cfs)		2100.00
Top Width (ft)	264.22	Top Width (ft)	146.46	117.76
Vel Total (ft/s)	3.54	Avg. Vel. (ft/s)		3.54
Max Chl Dpth (ft)	6.64	Hydr. Depth (ft)		5.04
Conv. Total (cfs)	57348.7	Conv. (cfs)		57348.7
Length Wtd. (ft)		Wetted Per. (ft)		118.79
Min Ch El (ft)	1361.63	Shear (lb/sq ft)		0.42
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)		Cum Volume (acre-ft)		
C & E Loss (ft)		Cum SA (acres)		

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

SUMMARY OF MANNING'S N VALUES

River:Sonoqui Wash

Reach	River Sta.	n1	n2	n3	n4	n5
Up Main Br 204th	500	.045	.045	.045		

Up Main Br 204th	400	.045	.045	.045		
Up Main Br 204th	300	.045	.045	.045		
East Branch	30950	.045	.045	.045		
East Branch	30900	.045	.045	.045		
M Br 204-202	30700	.045	.045	.045		
M Br 204-202	30508	.045	.045	.045		
M Br 204-202	30478.9	Culvert				
M Br 204-202	30448	.045	.045	.045		
M Br 204-202	30300.	.045	.045	.045		
M Br 204-202	30100.	.045	.045	.045		
M Br 204-202	29900.	.045	.045	.045		
M Br 204-202	29700.	.045	.045	.045		
M Br 204-202	29500.	.045	.045	.045		
M Br 204-202	29400.	.045	.045	.045		
Up Main Br 202nd	10100	.045	.012	.045		
Up Main Br 202nd	10085	.045	.012	.045		
Main Br DS 202nd	29290.	.045	.045	.045		
Main Br DS 202nd	29209.9	Bridge				
Main Br DS 202nd	29130.	.045	.045	.045		
Main Br DS 202nd	28900.	.045	.045	.045		
Main Br DS 202nd	28700.	.045	.045	.045		
Main Br DS 202nd	28500.	.045	.045	.045		
Main Br DS 202nd	28300.	.045	.045	.045		
Main Br DS 202nd	28100.	.045	.045	.045		
Main Br DS 202nd	27900.	.045	.045	.045		
Main Br DS 202nd	27800.	.045	.045	.045		
Main Br DS 202nd	27716.05	.045	.045	.045		
Main Br DS 202nd	27631.2	Culvert				
Main Br DS 202nd	27547.	.045	.045	.045		
Main Br DS 202nd	27400.	.045	.045	.045		
Main Br DS 202nd	27300.	.045	.045	.045		
Main Br DS 202nd	27100.	.045	.045	.065	.045	.045
Main Br DS 202nd	26900.	.045	.045	.065	.045	
Main Br DS 202nd	26700.	.045	.045	.065	.045	.045
Main Br DS 202nd	26500.	.045	.045	.065	.045	
Main Br DS 202nd	26300.	.045	.045	.065	.045	.045
Main Br DS 202nd	26100.	.045	.045	.065	.045	.045
Main Br DS 202nd	25900.	.045	.045	.065	.045	.045
Main Br DS 202nd	25700.	.045	.045	.065	.045	.045
Main Br DS 202nd	25500.	.045	.045	.065	.045	.045
Main Br DS 202nd	25300.	.045	.045	.065	.045	.045
Main Br DS 202nd	25100.	.045	.045	.065	.045	.045
Main Br DS 202nd	24900.	.045	.045	.065	.045	.045
Main Br DS 202nd	24700.	.045	.045	.065	.045	.045
Main Br DS 202nd	24500.	.045	.045	.065	.045	.045
Main Br DS 202nd	24300.	.045	.045	.045		
Main Br DS 202nd	24100.	.045	.045	.065	.045	.045
Main Br DS 202nd	23900.	.045	.045	.065	.045	.045
Main Br DS 202nd	23700.	.045	.045	.065	.045	.045
Main Br DS 202nd	23500.	.045	.045	.065	.045	.045
Main Br DS 202nd	23300.	.045	.045	.065	.045	.045
Main Br DS 202nd	23100.	.045	.045	.065	.045	.045
Main Br DS 202nd	22900.	.045	.045	.045		
Main Br DS 202nd	22700.	.045	.045	.045		
Main Br DS 202nd	22500.	.045	.045	.045		
Main Br DS 202nd	22300.	.045	.045	.045		
Main Br DS 202nd	22100.	.045	.045	.045		
Main Br DS 202nd	21980.	.045	.045	.045		
Main Br DS 202nd	21917.08	Bridge				
Main Br DS 202nd	21849.	.045	.045	.045		

Main Br DS 202nd	21700.	.045	.045	.045
Main Br DS 202nd	21500.	.045	.045	.045
Main Br DS 202nd	21300.	.045	.045	.045

SUMMARY OF REACH LENGTHS

River: Sonoqui Wash

Reach	River Sta.	Left	Channel	Right
Up Main Br 204th	500	35	35	35
Up Main Br 204th	400	100	100	100
Up Main Br 204th	300	0	0	0
East Branch	30950	50	50	50
East Branch	30900	0	0	0
M Br 204-202	30700	192	192	192
M Br 204-202	30508	60	60	60
M Br 204-202	30478.9	Culvert		
M Br 204-202	30448	148	148	148
M Br 204-202	30300.	200	200	200
M Br 204-202	30100.	200	200	200
M Br 204-202	29900.	200	200	200
M Br 204-202	29700.	200	200	200
M Br 204-202	29500.	100	100	100
M Br 204-202	29400.	190	110	30
Up Main Br 202nd	10100	15	15	15
Up Main Br 202nd	10085	85	85	85
Main Br DS 202nd	29290.	160	160	160
Main Br DS 202nd	29209.9	Bridge		
Main Br DS 202nd	29130.	100	230	330
Main Br DS 202nd	28900.	200	200	200
Main Br DS 202nd	28700.	200	200	200
Main Br DS 202nd	28500.	200	200	200
Main Br DS 202nd	28300.	200	200	200
Main Br DS 202nd	28100.	200	200	200
Main Br DS 202nd	27900.	100	100	100
Main Br DS 202nd	27800.	13.95	83.95	153.95
Main Br DS 202nd	27716.05	169.05	169.05	169.05
Main Br DS 202nd	27631.2	Culvert		
Main Br DS 202nd	27547.	250	147	65
Main Br DS 202nd	27400.	100	100	100
Main Br DS 202nd	27300.	200	200	200
Main Br DS 202nd	27100.	200	200	200
Main Br DS 202nd	26900.	200	200	200
Main Br DS 202nd	26700.	200	200	200
Main Br DS 202nd	26500.	200	200	200
Main Br DS 202nd	26300.	200	200	200
Main Br DS 202nd	26100.	200	200	200
Main Br DS 202nd	25900.	200	200	200
Main Br DS 202nd	25700.	200	200	200
Main Br DS 202nd	25500.	200	200	200
Main Br DS 202nd	25300.	200	200	200
Main Br DS 202nd	25100.	200	200	200
Main Br DS 202nd	24900.	200	200	200
Main Br DS 202nd	24700.	200	200	200
Main Br DS 202nd	24500.	200	200	200
Main Br DS 202nd	24300.	200	200	200
Main Br DS 202nd	24100.	200	200	200
Main Br DS 202nd	23900.	200	200	200
Main Br DS 202nd	23700.	200	200	200

Main Br DS 202nd	23500.		200	200	200
Main Br DS 202nd	23300.		200	200	200
Main Br DS 202nd	23100.		200	200	200
Main Br DS 202nd	22900.		200	200	200
Main Br DS 202nd	22700.		200	200	200
Main Br DS 202nd	22500.		200	200	200
Main Br DS 202nd	22300.		200	200	200
Main Br DS 202nd	22100.		60	120	180
Main Br DS 202nd	21980.		131	131	131
Main Br DS 202nd	21917.08	Bridge			
Main Br DS 202nd	21849.		100	149	200
Main Br DS 202nd	21700.		200	200	200
Main Br DS 202nd	21500.		200	200	200
Main Br DS 202nd	21300.		0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Sonoqui Wash

Reach	River Sta.		Contr.	Expan.
Up Main Br 204th	500		.1	.3
Up Main Br 204th	400		.1	.3
Up Main Br 204th	300		.1	.3
East Branch	30950		.1	.3
East Branch	30900		.1	.3
M Br 204-202	30700		.1	.3
M Br 204-202	30508		.1	.3
M Br 204-202	30478.9	Culvert		
M Br 204-202	30448		.1	.3
M Br 204-202	30300.		.1	.3
M Br 204-202	30100.		.1	.3
M Br 204-202	29900.		.1	.3
M Br 204-202	29700.		.1	.3
M Br 204-202	29500.		.1	.3
M Br 204-202	29400.		.1	.3
Up Main Br 202nd	10100		.1	.3
Up Main Br 202nd	10085		.1	.3
Main Br DS 202nd	29290.		.1	.3
Main Br DS 202nd	29209.9	Bridge		
Main Br DS 202nd	29130.		.1	.3
Main Br DS 202nd	28900.		.1	.3
Main Br DS 202nd	28700.		.1	.3
Main Br DS 202nd	28500.		.1	.3
Main Br DS 202nd	28300.		.1	.3
Main Br DS 202nd	28100.		.1	.3
Main Br DS 202nd	27900.		.1	.3
Main Br DS 202nd	27800.		.3	.5
Main Br DS 202nd	27716.05		.3	.5
Main Br DS 202nd	27631.2	Culvert		
Main Br DS 202nd	27547.		.3	.5
Main Br DS 202nd	27400.		.3	.5
Main Br DS 202nd	27300.		.1	.3
Main Br DS 202nd	27100.		.1	.3
Main Br DS 202nd	26900.		.1	.3
Main Br DS 202nd	26700.		.1	.3
Main Br DS 202nd	26500.		.1	.3
Main Br DS 202nd	26300.		.1	.3
Main Br DS 202nd	26100.		.1	.3
Main Br DS 202nd	25900.		.1	.3

Main Br DS 202nd	25700.	.1	.3
Main Br DS 202nd	25500.	.1	.3
Main Br DS 202nd	25300.	.1	.3
Main Br DS 202nd	25100.	.1	.3
Main Br DS 202nd	24900.	.1	.3
Main Br DS 202nd	24700.	.1	.3
Main Br DS 202nd	24500.	.1	.3
Main Br DS 202nd	24300.	.1	.3
Main Br DS 202nd	24100.	.1	.3
Main Br DS 202nd	23900.	.1	.3
Main Br DS 202nd	23700.	.1	.3
Main Br DS 202nd	23500.	.1	.3
Main Br DS 202nd	23300.	.1	.3
Main Br DS 202nd	23100.	.1	.3
Main Br DS 202nd	22900.	.1	.3
Main Br DS 202nd	22700.	.1	.3
Main Br DS 202nd	22500.	.1	.3
Main Br DS 202nd	22300.	.1	.3
Main Br DS 202nd	22100.	.1	.3
Main Br DS 202nd	21980.	.1	.3
Main Br DS 202nd	21917.08 Bridge		
Main Br DS 202nd	21849.	.1	.3
Main Br DS 202nd	21700.	.1	.3
Main Br DS 202nd	21500.	.1	.3
Main Br DS 202nd	21300.	.1	.3

Profile Output Table - Standard Table 1

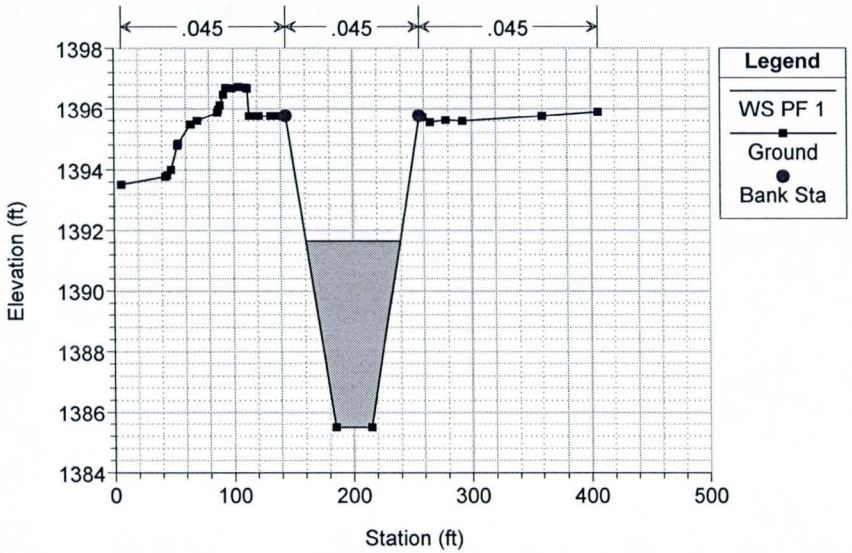
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Up Main Br 204th	500	1900.00	1385.50	1391.65		1392.15	0.004387	5.66	335.84	79.21	0.48
Up Main Br 204th	400	1900.00	1385.37	1391.49		1391.99	0.004427	5.66	335.45	79.55	0.49
Up Main Br 204th	300	1900.00	1385.00	1390.99		1391.52	0.004890	5.88	322.86	77.88	0.51
East Branch	30950	2100.00	1383.75	1391.04		1391.19	0.000932	3.03	693.20	131.60	0.23
East Branch	30900	2100.00	1383.60	1390.99		1391.14	0.001038	3.12	672.88	132.07	0.24
M Br 204-202	30700	2400.00	1383.08	1389.44		1389.72	0.002143	4.24	565.52	120.95	0.35
M Br 204-202	30508	2400.00	1382.58	1388.82	1386.00	1389.27	0.002401	5.34	449.57	121.79	0.38
M Br 204-202	30478.9	Culvert									
M Br 204-202	30448	2400.00	1382.42	1387.98	1385.85	1388.54	0.003600	6.03	398.11	116.50	0.46
M Br 204-202	30300.	2400.00	1382.04	1387.67		1388.00	0.002816	4.62	519.35	120.11	0.39
M Br 204-202	30100.	2400.00	1381.52	1387.10		1387.43	0.002887	4.63	518.31	121.84	0.40
M Br 204-202	29900.	2400.00	1381.00	1386.60		1386.88	0.002504	4.21	570.17	139.11	0.37
M Br 204-202	29700.	2400.00	1380.48	1386.02		1386.34	0.002799	4.59	523.41	121.89	0.39

M Br 204-202	29500.		2400.00	1379.96	1385.42			
1385.77	0.002985	4.69	512.23	121.21		0.40		
M Br 204-202	29400.		2400.00	1379.70	1385.06			
1385.45	0.003335	4.95	484.47	114.38		0.42		
Up Main Br 202nd	10100		2400.00	1381.01	1386.53		1386.53	
1389.29	0.001753	13.33	179.98	32.60		1.00		
Up Main Br 202nd	10085		2400.00	1380.87	1386.14		1386.14	
1388.77	0.001715	13.02	184.27	35.00		1.00		
Main Br DS 202nd	29290.		2400.00	1379.41	1384.89		1382.30	
1385.12	0.002015	3.86	621.50	146.83		0.33		
Main Br DS 202nd	29209.9		Bridge					
Main Br DS 202nd	29130.		2400.00	1379.00	1384.50			
1384.74	0.002027	3.91	614.26	143.11		0.33		
Main Br DS 202nd	28900.		2000.00	1378.40	1384.04			
1384.27	0.001997	3.83	521.69	123.56		0.33		
Main Br DS 202nd	28700.		2000.00	1377.88	1383.53			
1383.82	0.002509	4.32	463.19	108.60		0.37		
Main Br DS 202nd	28500.		2000.00	1377.36	1383.02			
1383.32	0.002521	4.35	459.29	106.63		0.37		
Main Br DS 202nd	28300.		2000.00	1376.83	1382.53			
1382.82	0.002449	4.30	465.04	107.67		0.36		
Main Br DS 202nd	28100.		2000.00	1376.31	1382.06			
1382.33	0.002341	4.21	475.01	109.82		0.36		
Main Br DS 202nd	27900.		2000.00	1375.79	1381.63			
1381.87	0.002198	3.94	508.23	124.17		0.34		
Main Br DS 202nd	27800.		2000.00	1375.53	1381.47			
1381.67	0.001578	3.57	560.13	123.47		0.30		
Main Br DS 202nd	27716.05		2000.00	1375.32	1381.09		1378.35	
1381.46	0.002224	4.90	407.87	140.45		0.37		
Main Br DS 202nd	27631.2		Culvert					
Main Br DS 202nd	27547.		2100.00	1374.63	1380.53		1377.51	
1380.88	0.001936	4.74	442.60	139.25		0.34		
Main Br DS 202nd	27400.		2100.00	1373.99	1380.44			
1380.57	0.001019	2.97	708.02	148.78		0.24		
Main Br DS 202nd	27300.		2100.00	1374.10	1380.27			
1380.44	0.001629	3.26	644.80	167.30		0.29		
Main Br DS 202nd	27100.		2100.00	1373.68	1379.91			
1380.11	0.001600	3.59	585.18	184.29		0.35		
Main Br DS 202nd	26900.		2100.00	1373.12	1379.33			
1379.62	0.003942	4.35	482.94	182.78		0.47		
Main Br DS 202nd	26700.		2100.00	1372.84	1378.67			
1378.97	0.002797	4.37	480.84	153.70		0.44		
Main Br DS 202nd	26500.		2100.00	1372.38	1378.12			
1378.38	0.002953	4.12	509.79	199.08		0.45		
Main Br DS 202nd	26300.		2100.00	1372.00	1377.86			
1378.00	0.001129	3.01	696.66	170.11		0.26		
Main Br DS 202nd	26100.		2100.00	1371.58	1377.43			
1377.68	0.002168	4.01	523.74	167.23		0.40		
Main Br DS 202nd	25900.		2100.00	1371.16	1377.26			
1377.38	0.000910	2.75	764.09	228.88		0.27		
Main Br DS 202nd	25700.		2100.00	1370.74	1376.62			
1377.03	0.003554	5.12	410.38	156.72		0.56		
Main Br DS 202nd	25500.		2100.00	1370.32	1376.48			
1376.60	0.000976	2.86	735.27	192.85		0.26		
Main Br DS 202nd	25300.		2100.00	1369.90	1376.34			
1376.43	0.000711	2.45	858.00	217.55		0.22		
Main Br DS 202nd	25100.		2100.00	1369.48	1376.12			
1376.24	0.001255	2.82	745.15	228.42		0.27		
Main Br DS 202nd	24900.		2100.00	1369.06	1375.82			
1375.99	0.001238	3.27	642.00	162.89		0.29		

Main Br DS 202nd	24700.	2100.00	1368.64	1375.45				
1375.68	0.001871	3.84	547.07	127.46	0.33			
Main Br DS 202nd	24500.	2100.00	1368.22	1374.58				
1375.11	0.004326	5.81	361.61	106.64	0.56			
Main Br DS 202nd	24300.	2100.00	1367.80	1374.14				
1374.41	0.002342	4.21	499.31	115.64	0.36			
Main Br DS 202nd	24100.	2100.00	1367.38	1373.82				
1373.99	0.001623	3.28	640.05	177.87	0.30			
Main Br DS 202nd	23900.	2100.00	1366.96	1373.38				
1373.60	0.002296	3.79	553.77	170.10	0.37			
Main Br DS 202nd	23700.	2100.00	1366.54	1372.95				
1373.10	0.002496	3.16	665.49	195.04	0.30			
Main Br DS 202nd	23500.	2100.00	1366.12	1372.29				
1372.54	0.003088	4.03	521.21	128.98	0.35			
Main Br DS 202nd	23300.	2100.00	1365.70	1371.87				
1372.00	0.002095	2.89	727.84	182.28	0.25			
Main Br DS 202nd	23100.	2100.00	1365.28	1371.55				
1371.64	0.001465	2.47	851.56	207.09	0.21			
Main Br DS 202nd	22900.	2100.00	1364.86	1371.11				
1371.32	0.001660	3.66	574.20	127.03	0.30			
Main Br DS 202nd	22700.	2100.00	1364.44	1370.65				
1370.93	0.002200	4.23	495.96	108.37	0.35			
Main Br DS 202nd	22500.	2100.00	1364.02	1370.20				
1370.49	0.002225	4.27	492.36	107.29	0.35			
Main Br DS 202nd	22300.	2100.00	1363.60	1369.74				
1370.03	0.002310	4.32	486.43	107.09	0.36			
Main Br DS 202nd	22100.	2100.00	1363.18	1369.40				
1369.62	0.001679	3.75	559.62	119.86	0.31			
Main Br DS 202nd	21980.	2100.00	1362.93	1369.30	1365.74			
1369.44	0.001041	3.00	699.02	146.54	0.24			
Main Br DS 202nd	21917.08	Bridge						
Main Br DS 202nd	21849.	2100.00	1362.47	1369.09				
1369.24	0.001132	3.14	669.50	139.91	0.25			
Main Br DS 202nd	21700.	2100.00	1362.15	1368.86				
1369.05	0.001382	3.49	601.48	123.70	0.28			
Main Br DS 202nd	21500.	2100.00	1362.05	1368.55	1365.27			
1368.76	0.001550	3.67	571.54	118.94	0.30			
Main Br DS 202nd	21300.	2100.00	1361.63	1368.27	1364.90			
1368.46	0.001341	3.54	593.95	264.22	0.28			

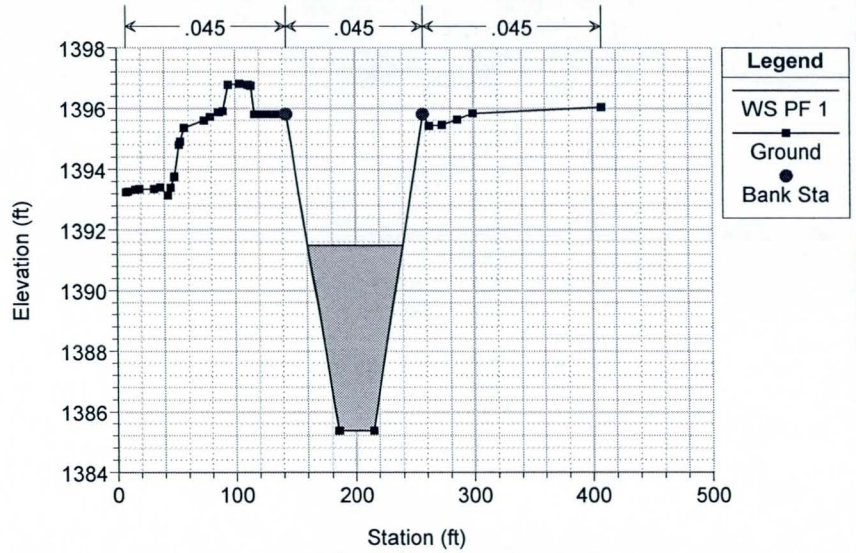
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 500 Sta 103+35 204th St Channel



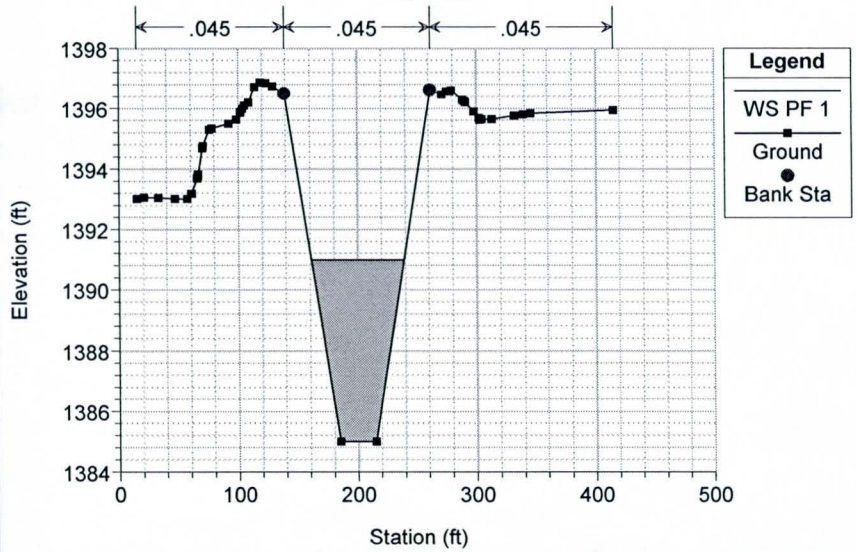
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 400 Sta 103+00 204th St Channel



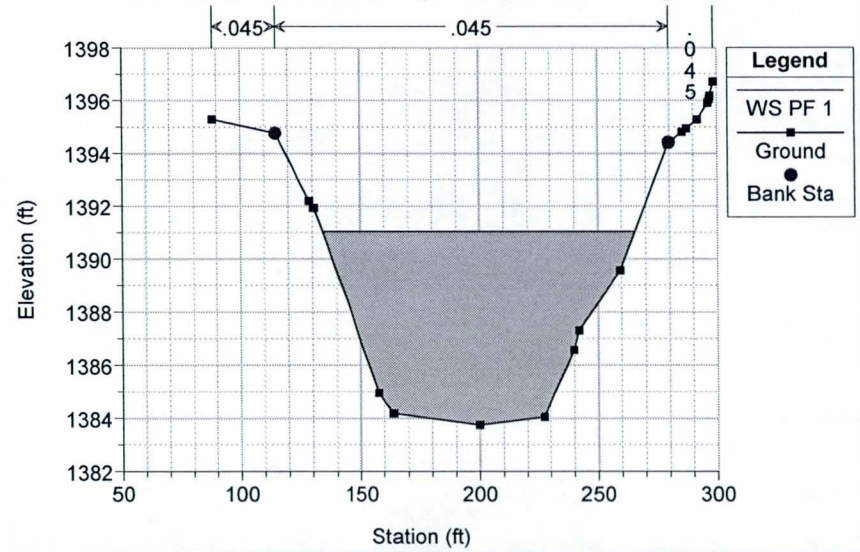
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 300



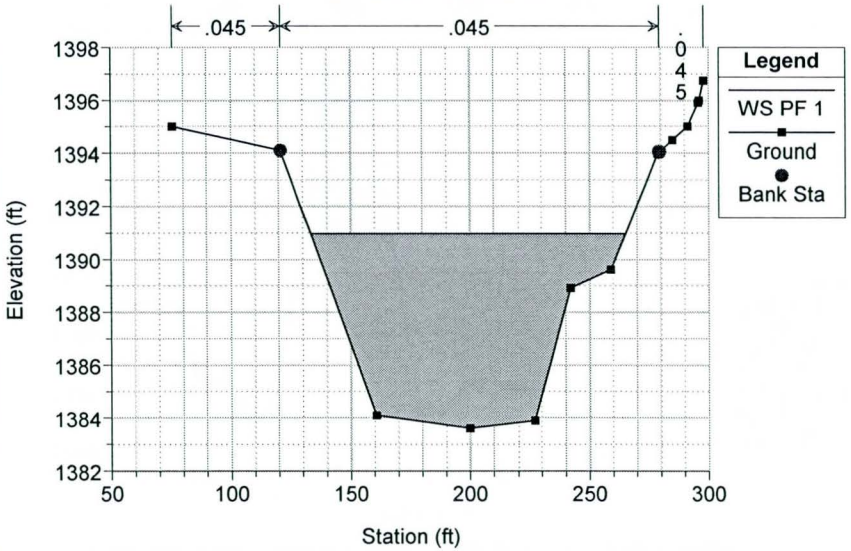
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 30950 Sta 309+50, interpolated section from design model



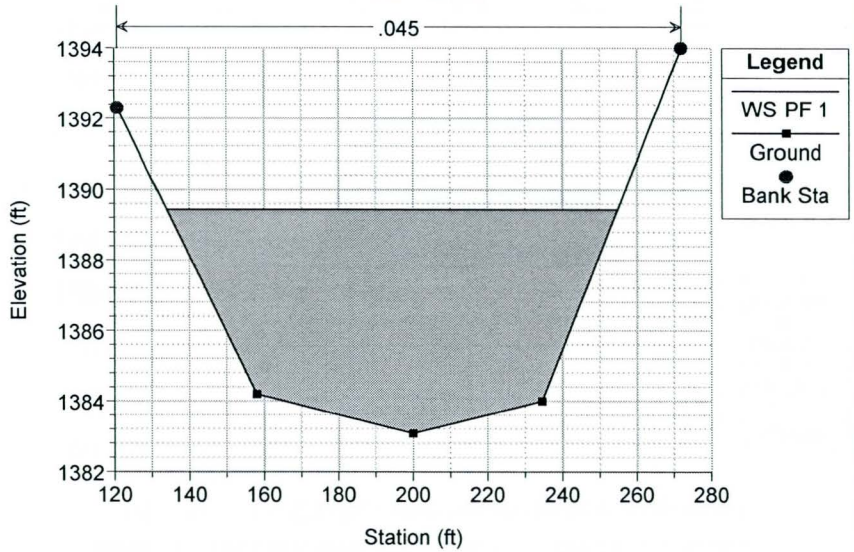
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 30900 Sta 309+00



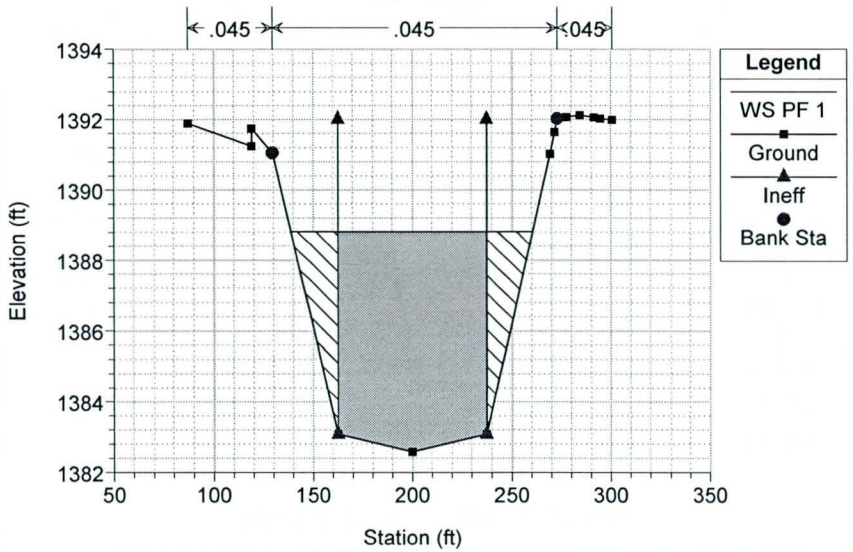
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 30700



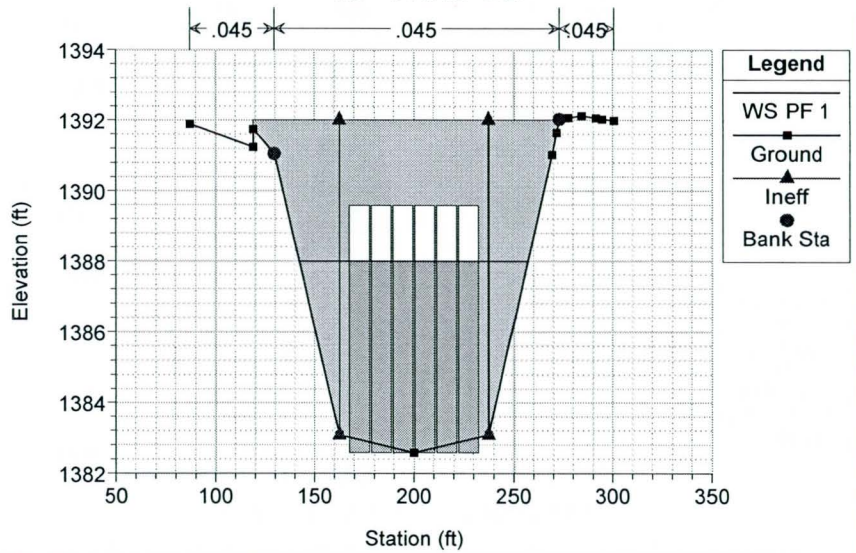
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 30508



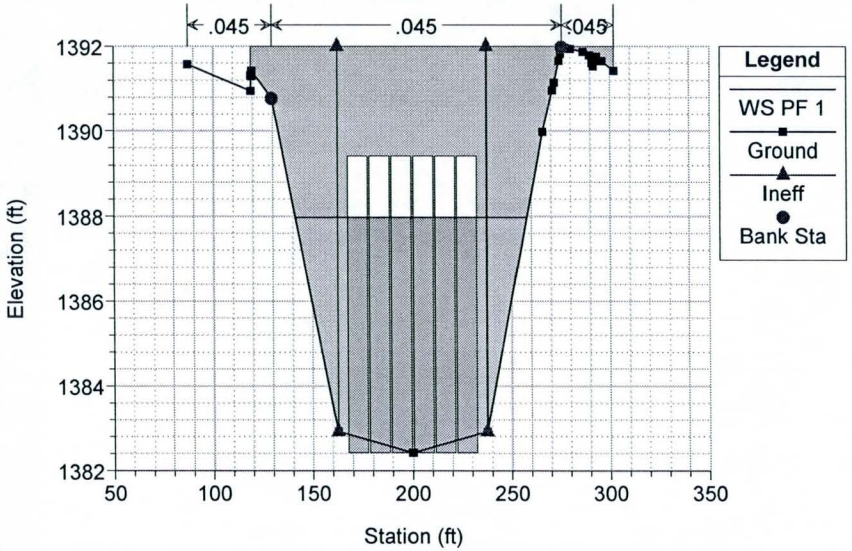
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 30478.9 Culv



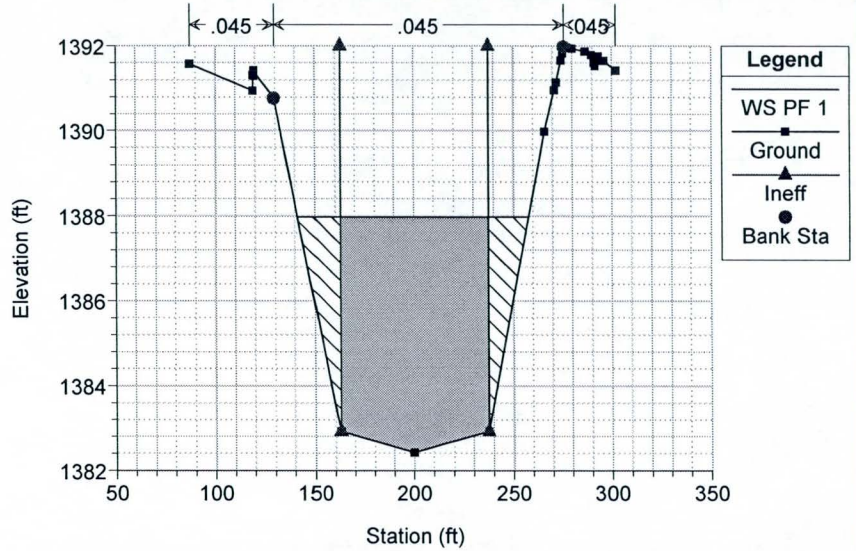
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 30478.9 Culv



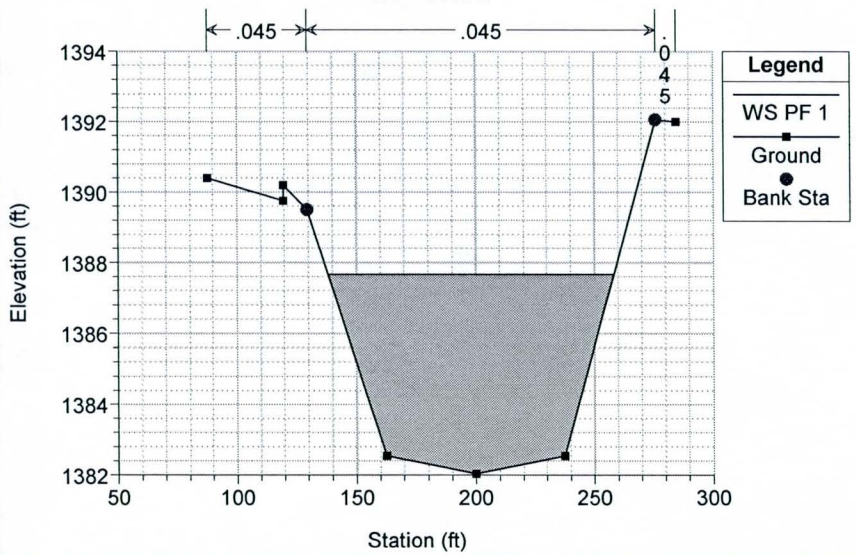
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 30448



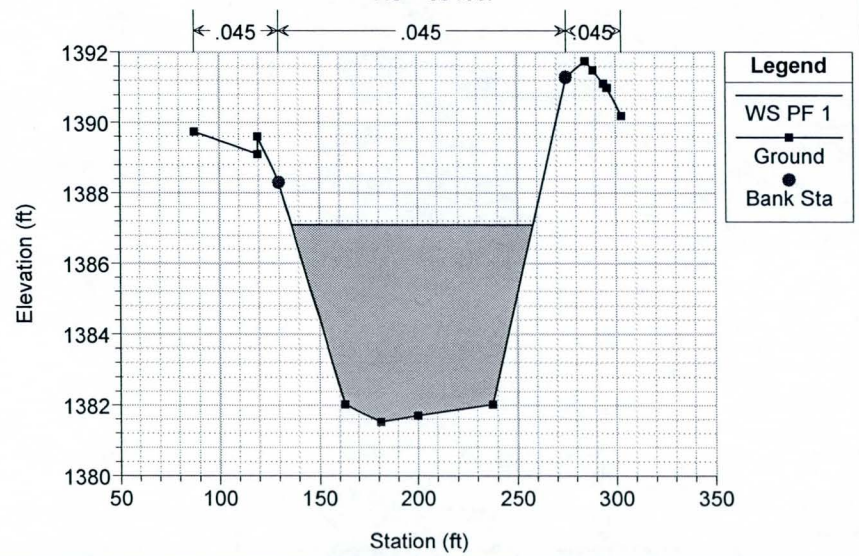
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 30300.



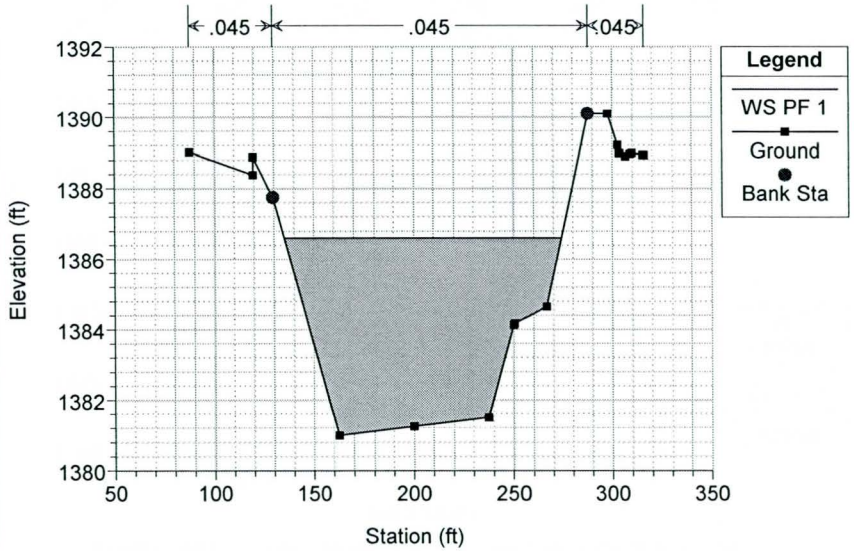
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 30100.



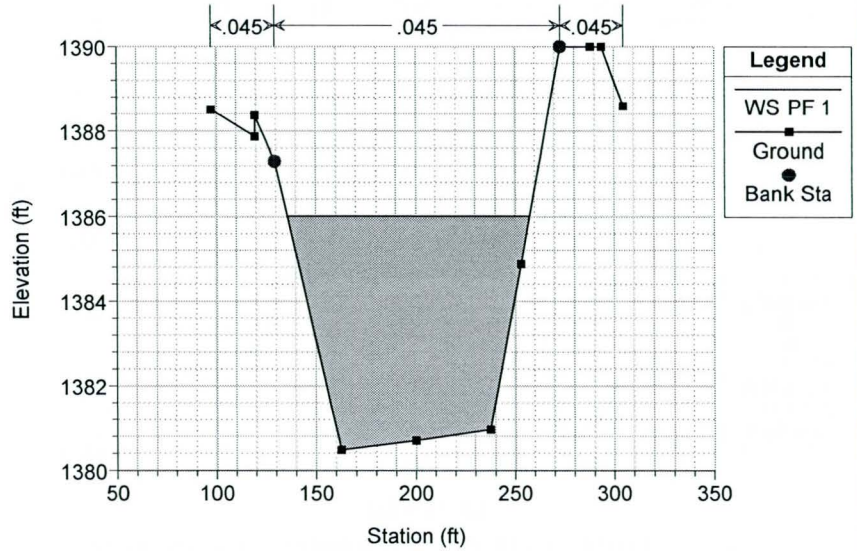
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 29900.



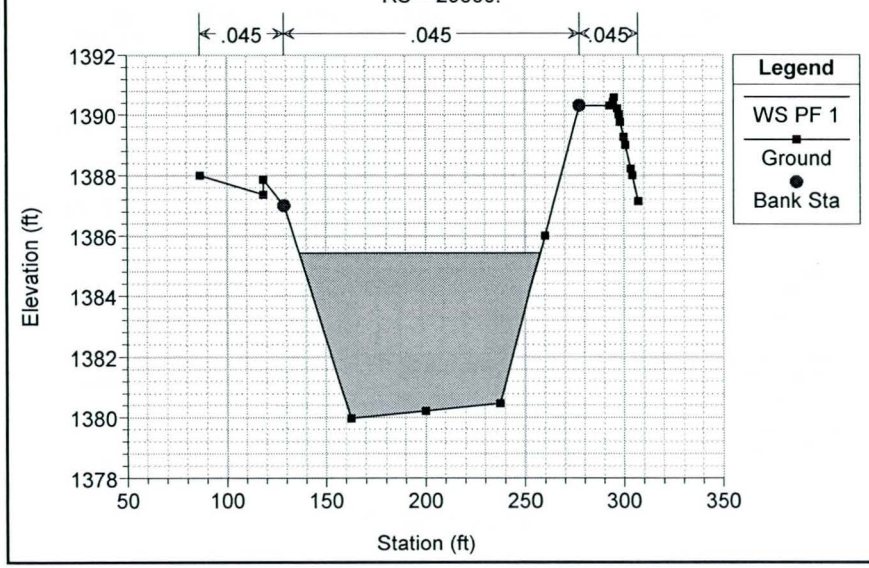
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 29700.



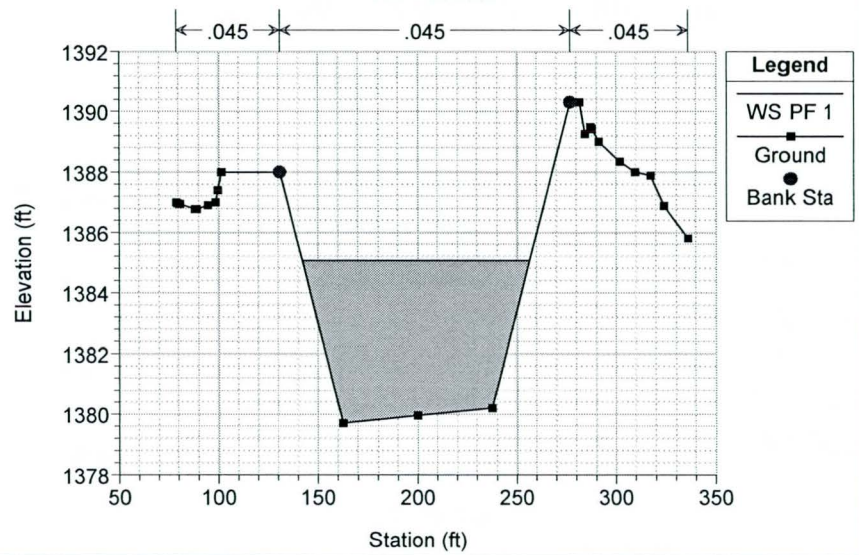
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 29500.



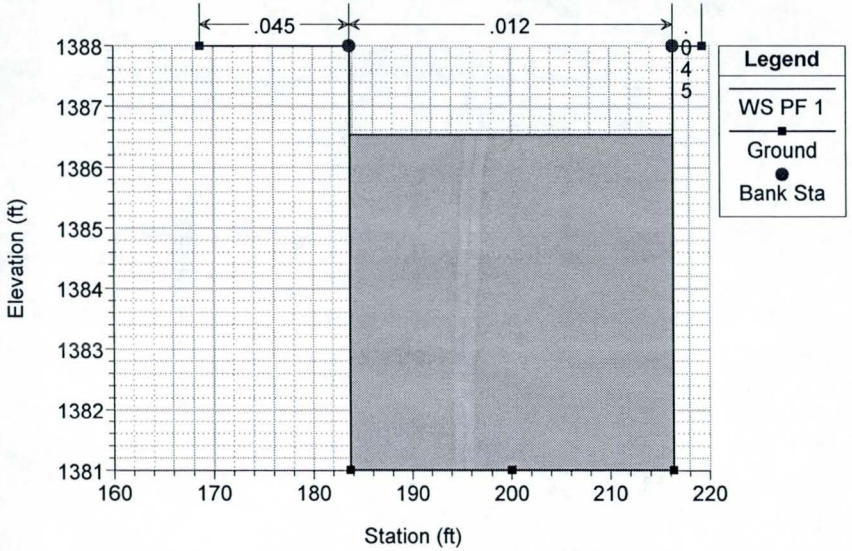
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 29400.



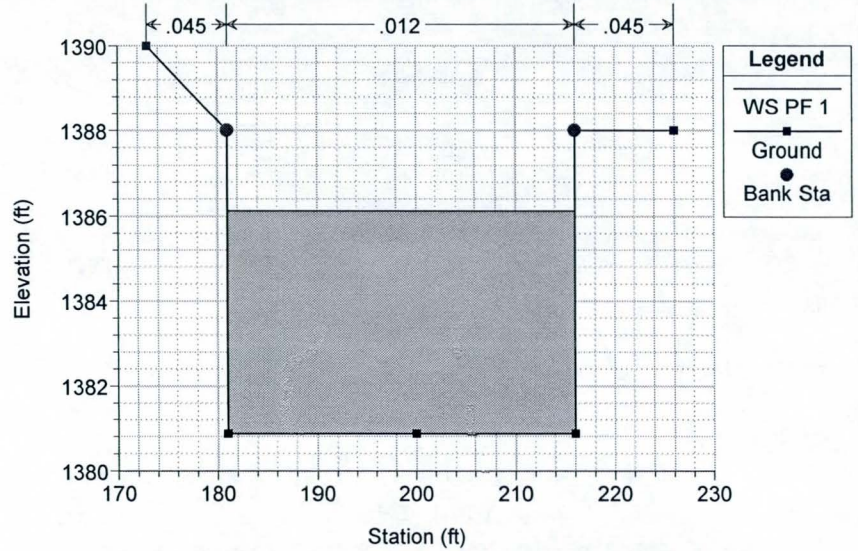
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 10100 Upper Main Br at 202nd, DS face of Marsh Rd culvert



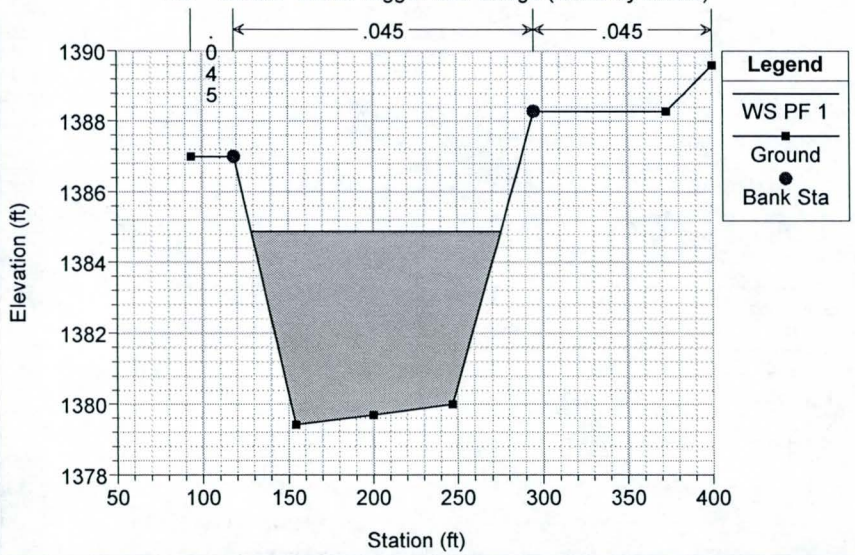
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 10085 Upper Main Br at 202nd, 15 ft DS of Marsh Rd culvert



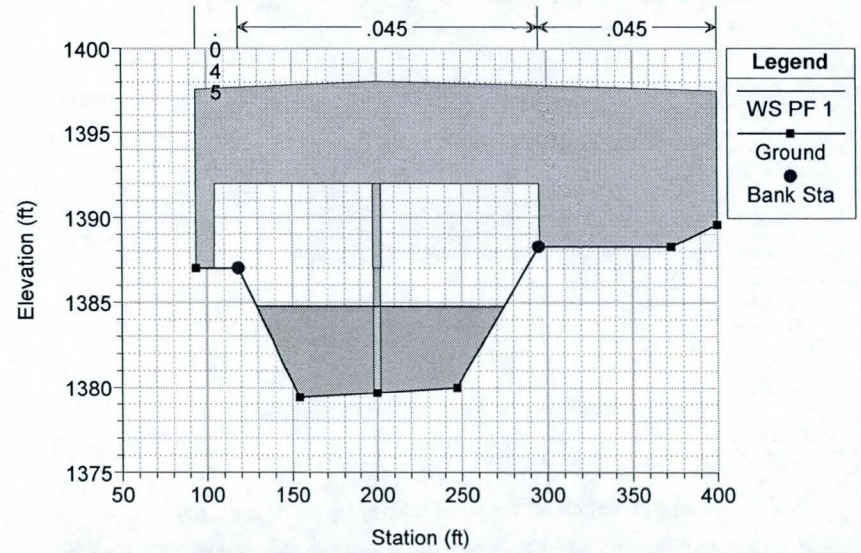
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 29290. U/S of Riggs Road Bridge (future by others)



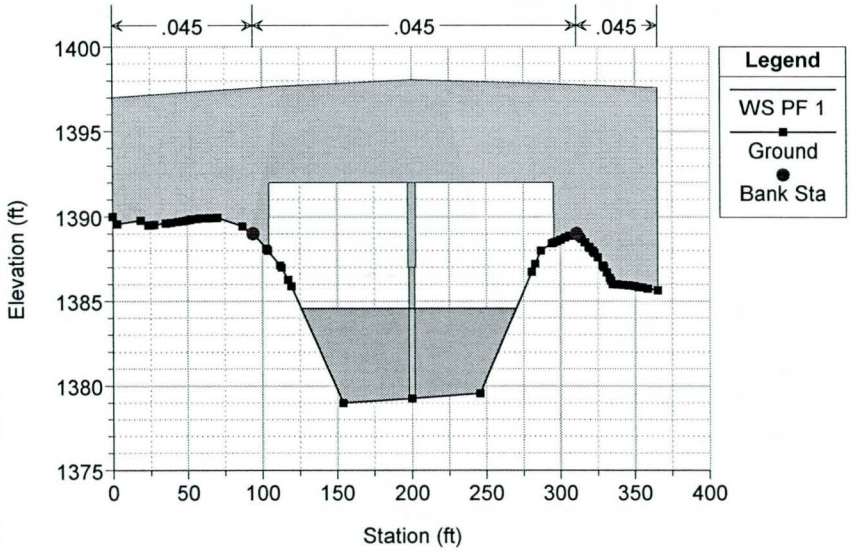
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 29209.9 BR Riggs Rd Bridge (Future) (to be constructed by others)



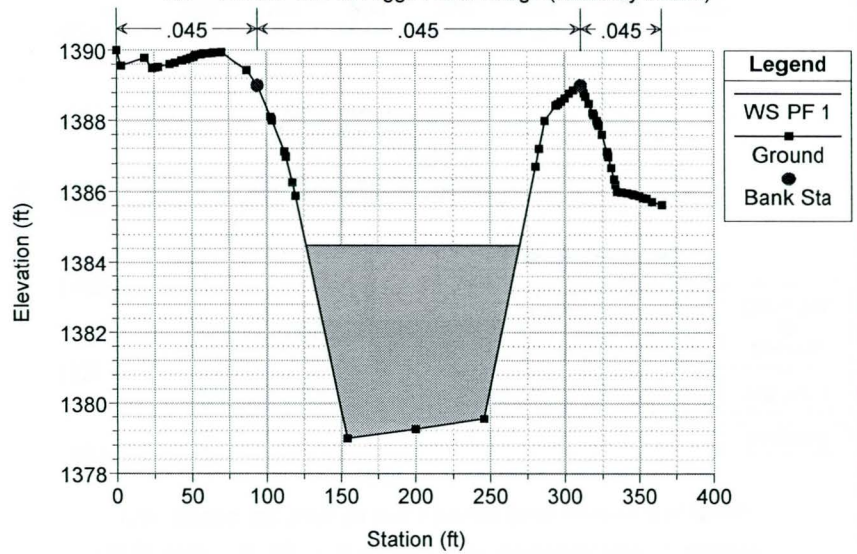
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 29209.9 BR Riggs Rd Bridge (Future) (to be constructed by others)



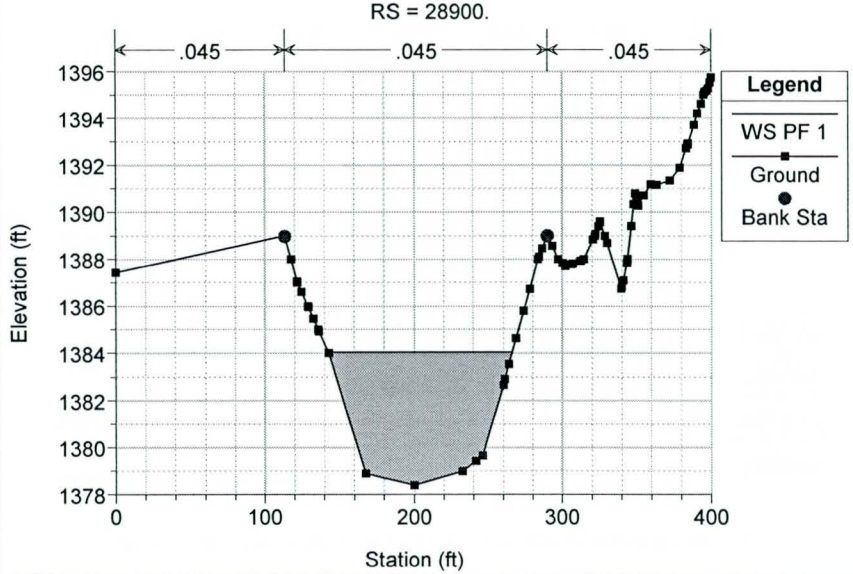
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 29130. D/S of Riggs Road Bridge (future by others)



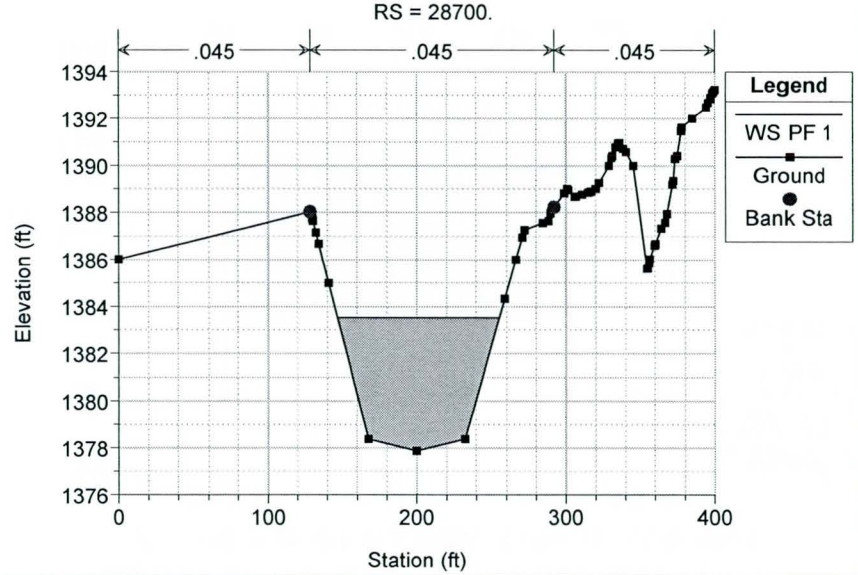
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 28900.



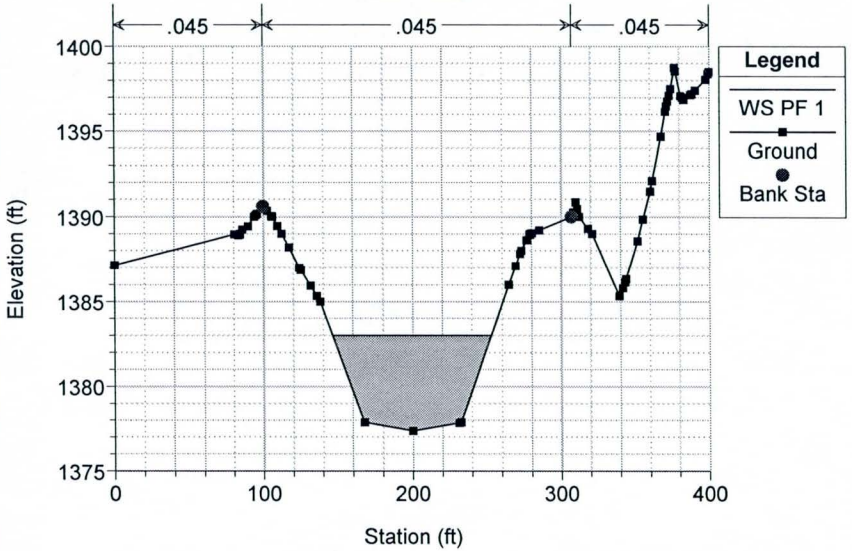
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 28700.



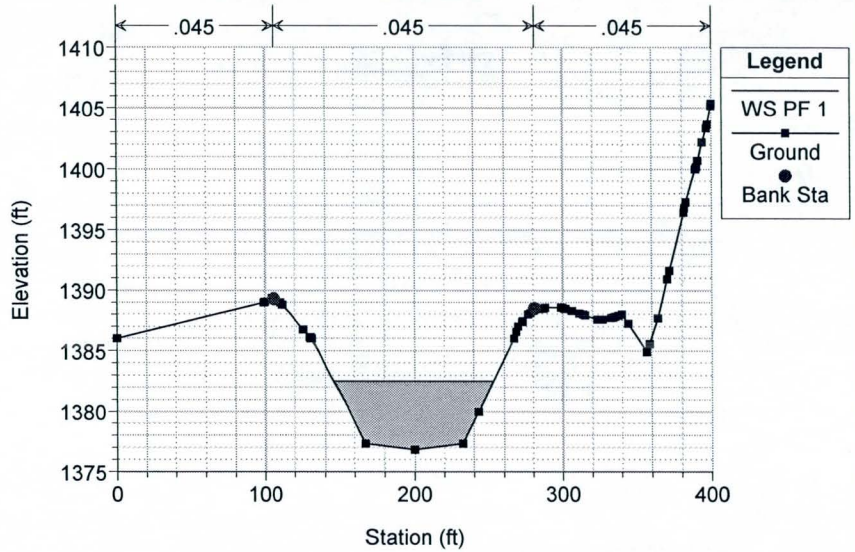
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 28500.



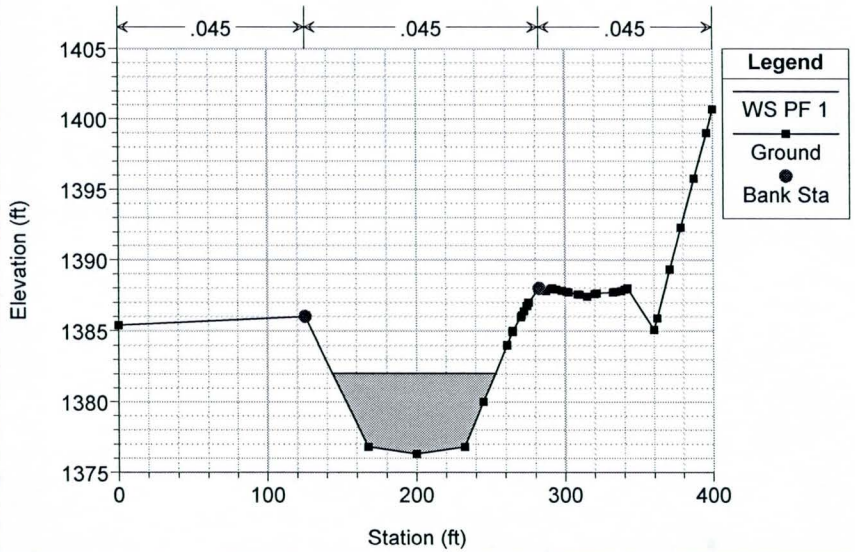
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 28300.



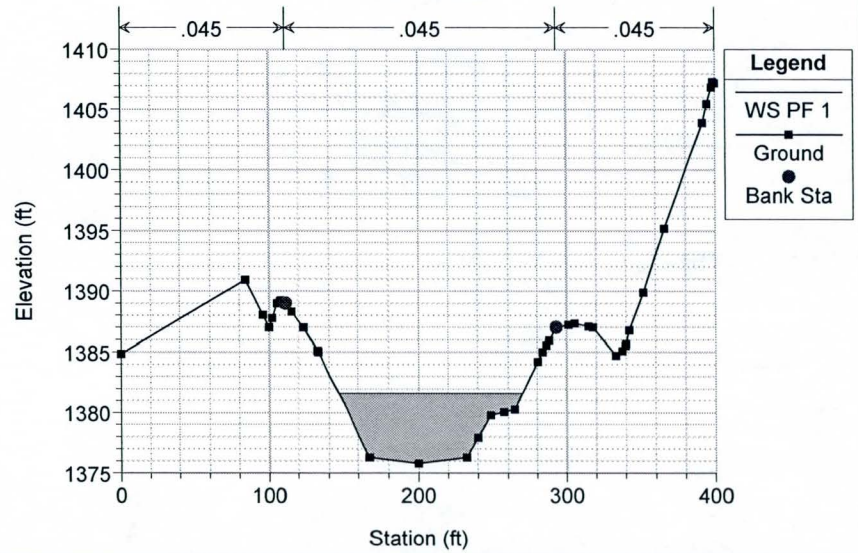
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 28100.



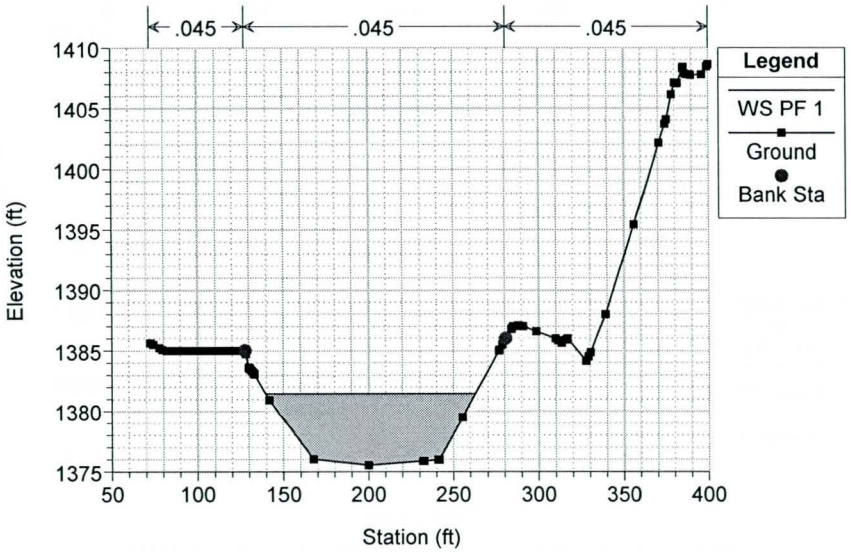
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 27900.



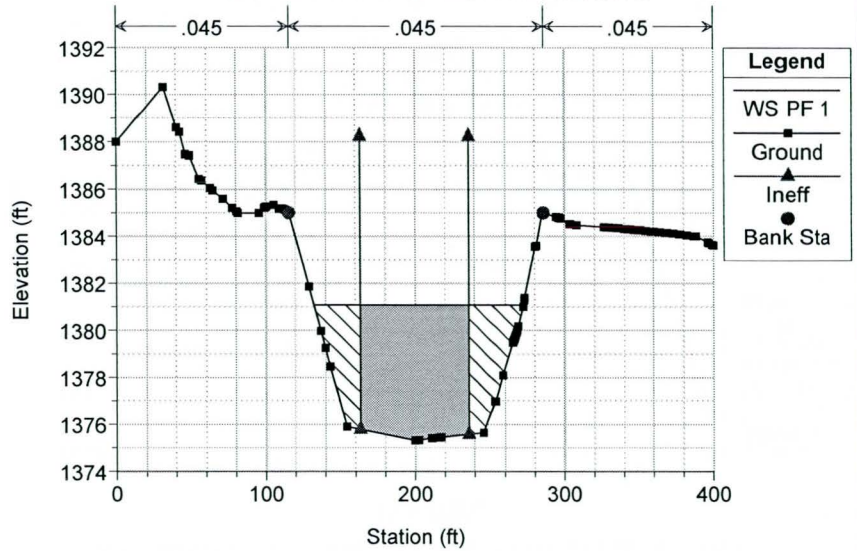
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 27800.



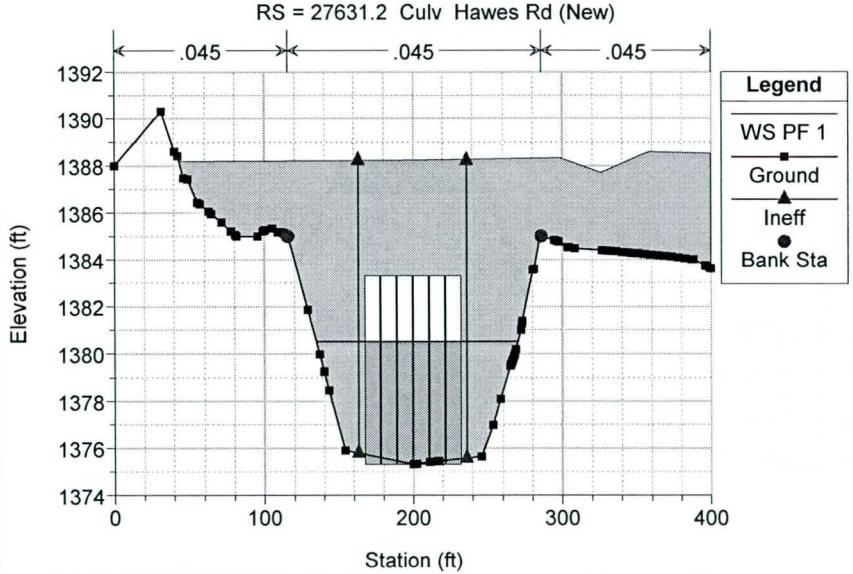
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 27716.05 U/S of Hawes Road Culvert



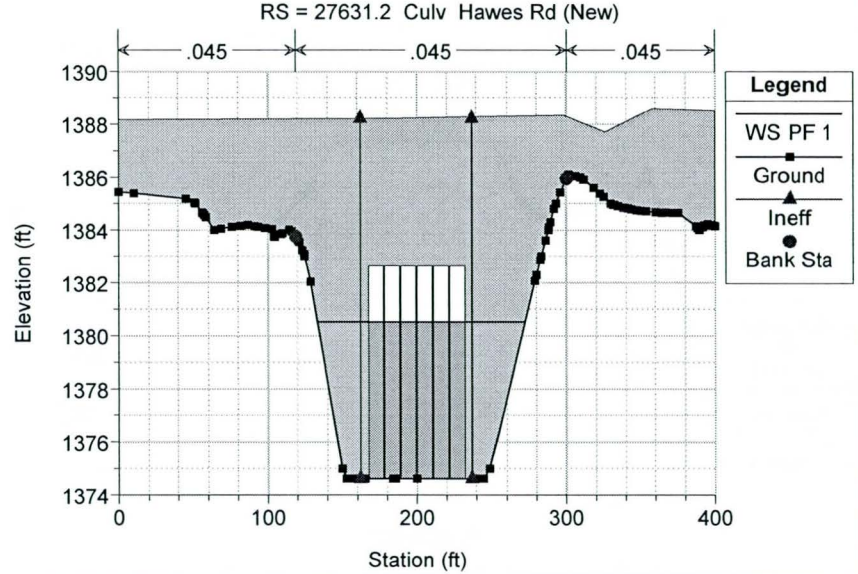
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 27631.2 Culv Hawes Rd (New)



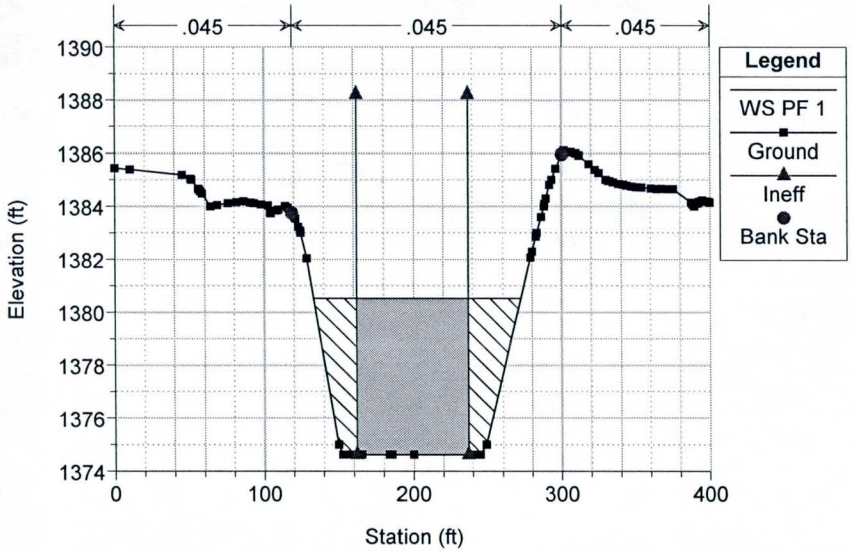
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 27631.2 Culv Hawes Rd (New)



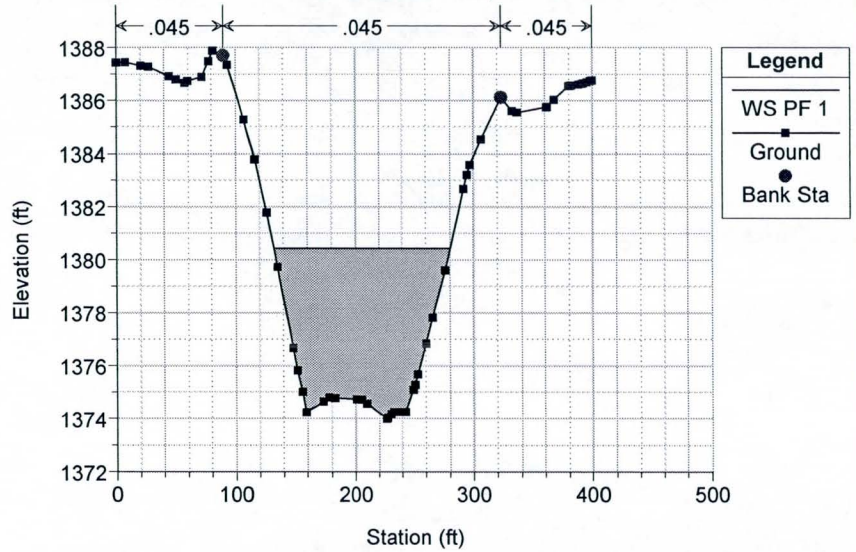
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 27547. D/S of Hawes Road Culvert



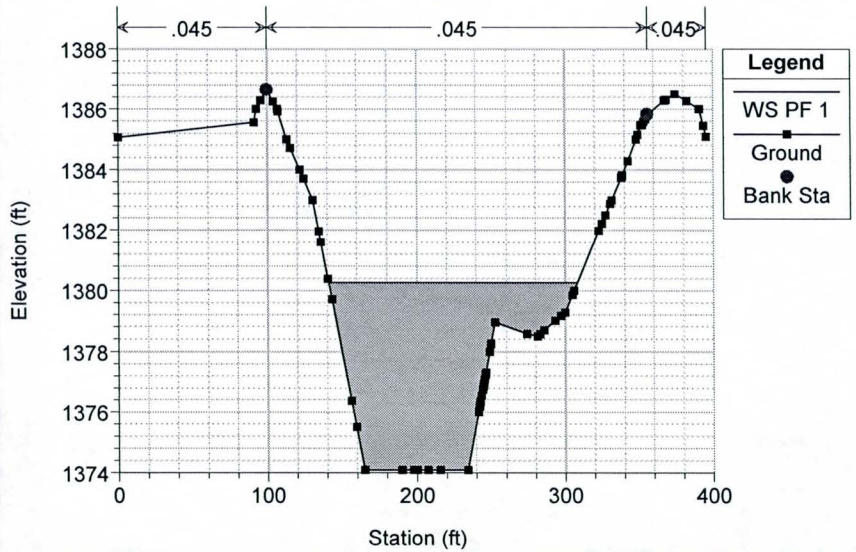
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 27400. Interpolated



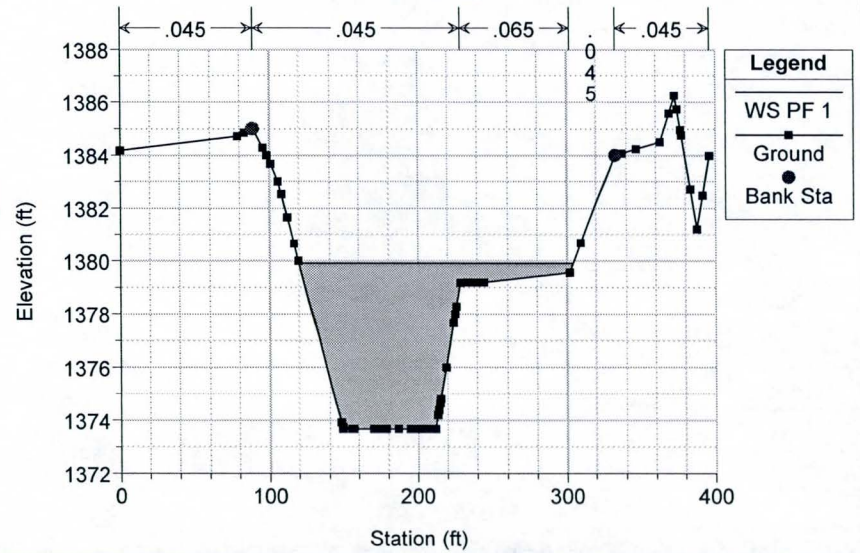
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 27300.



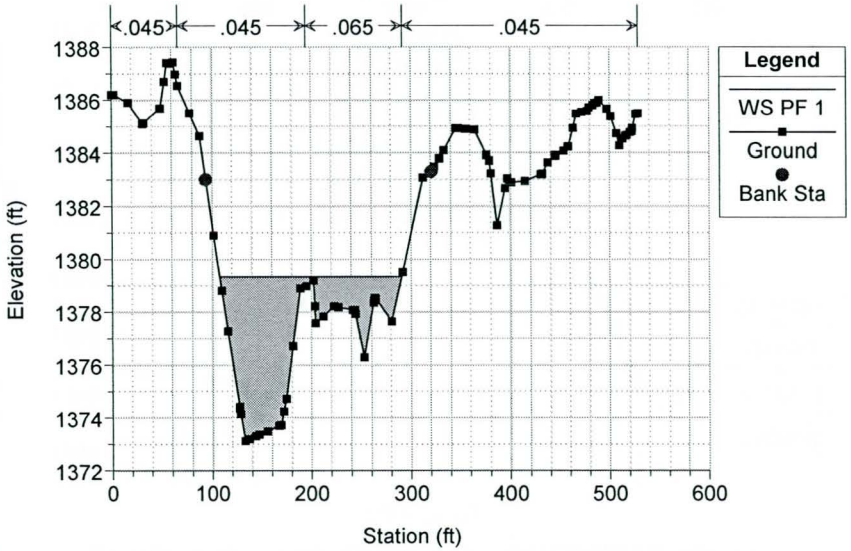
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 27100.



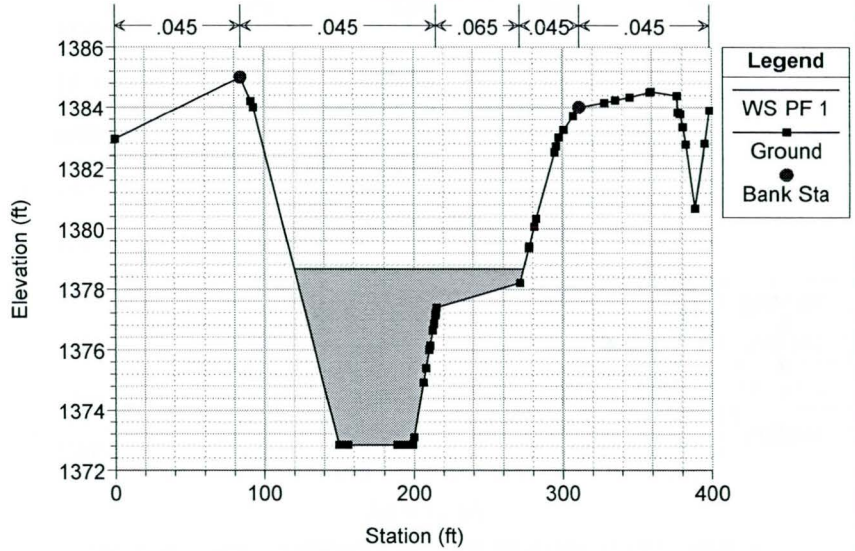
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 26900.



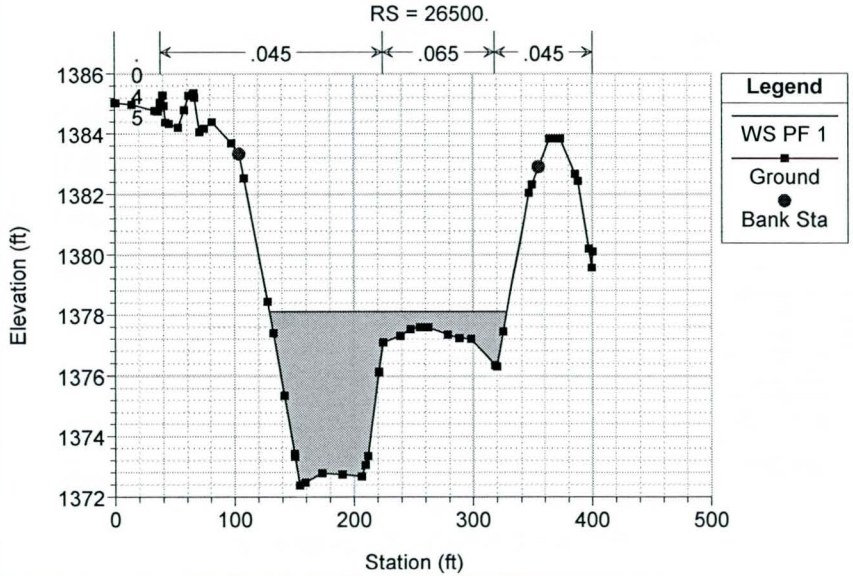
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 26700.



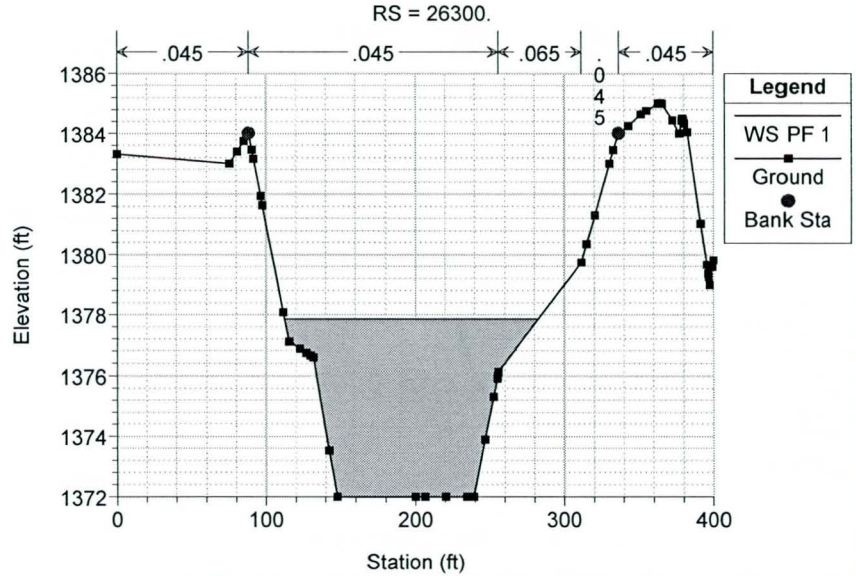
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 26500.



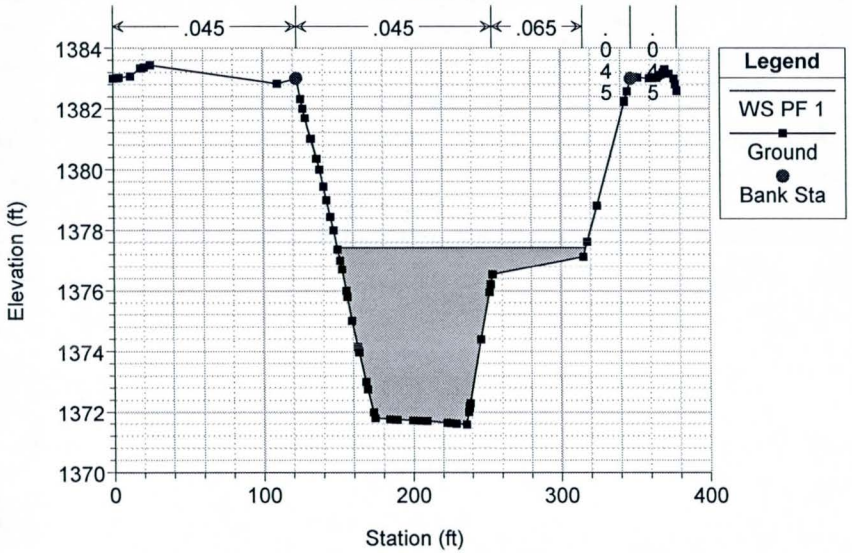
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 26300.



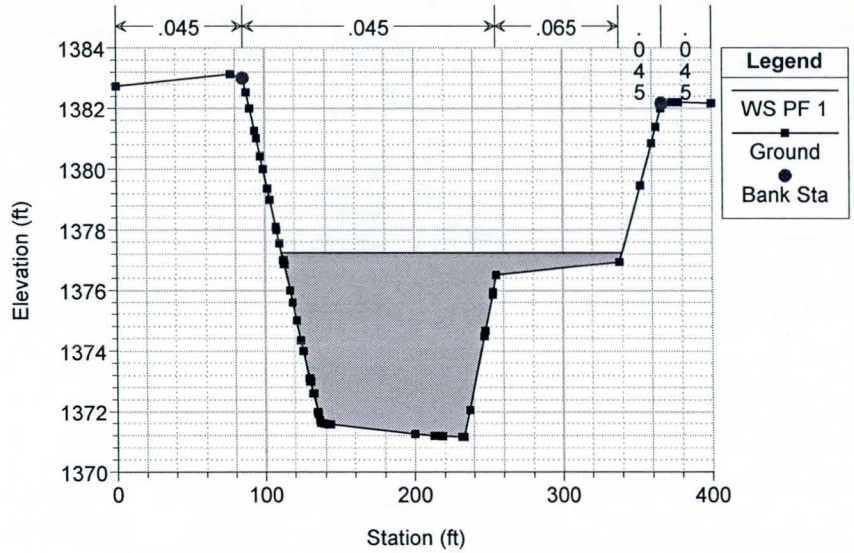
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 26100.



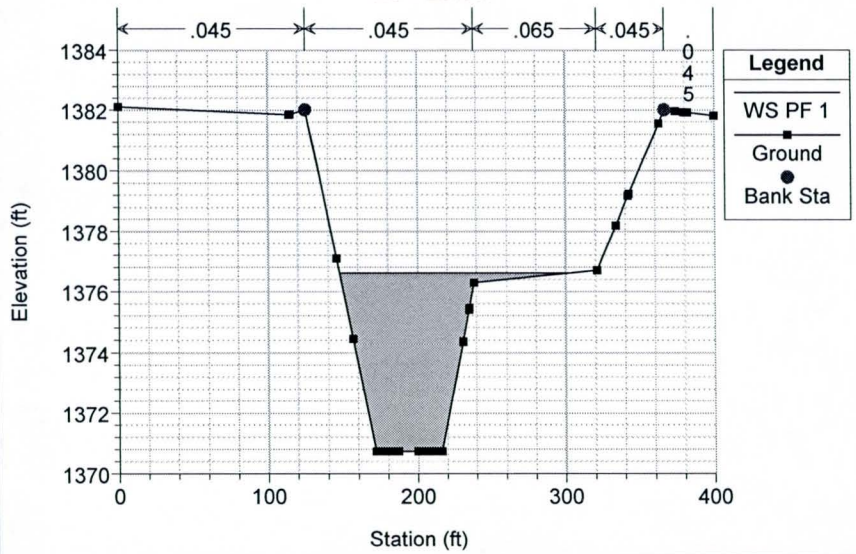
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 25900.



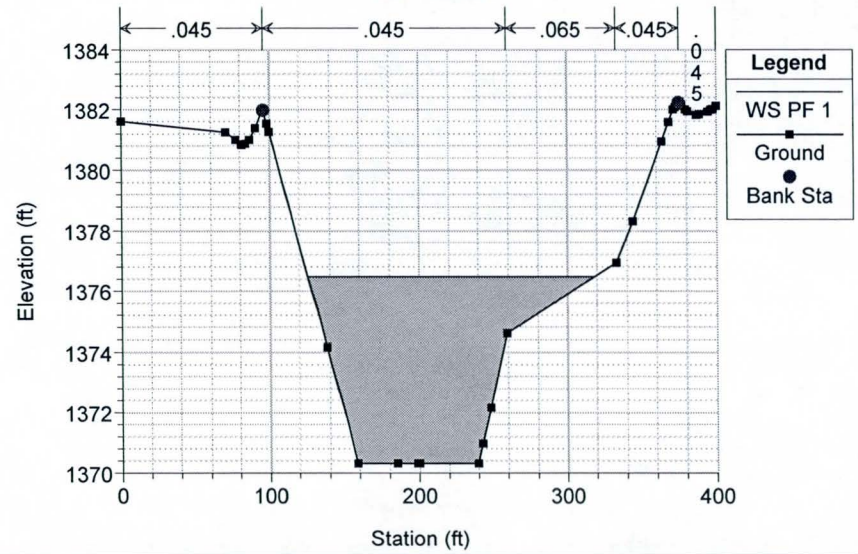
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 25700.



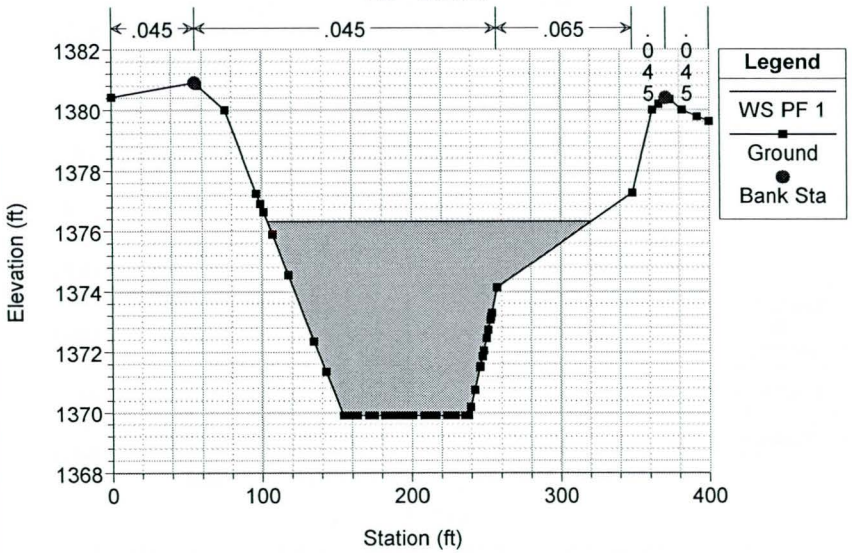
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 25500.



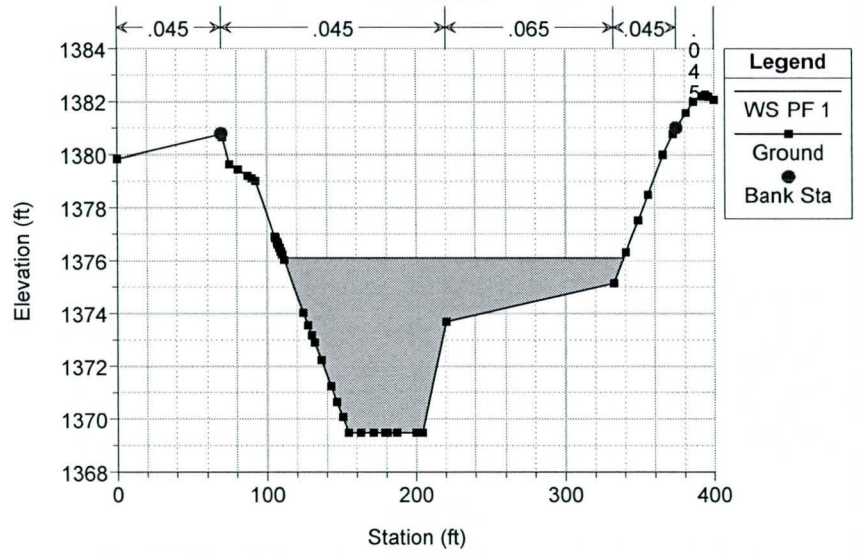
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 25300.



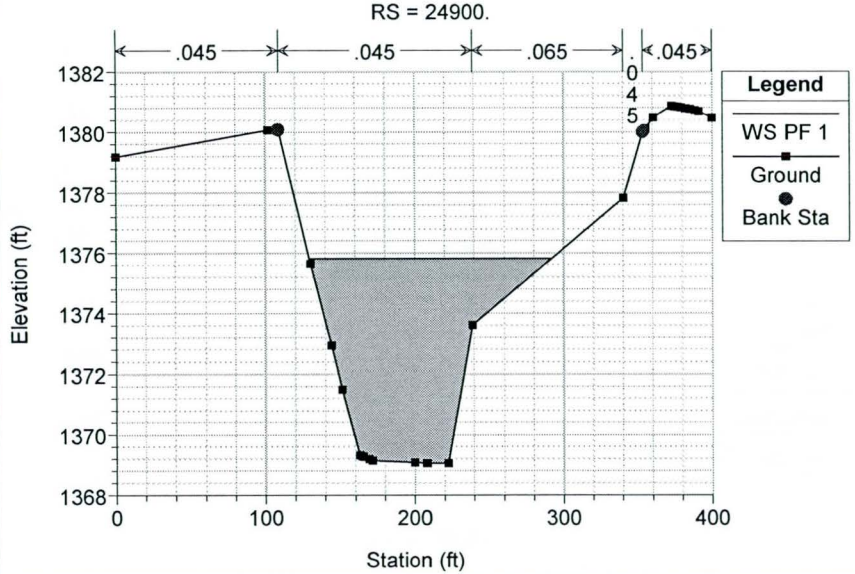
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 25100.



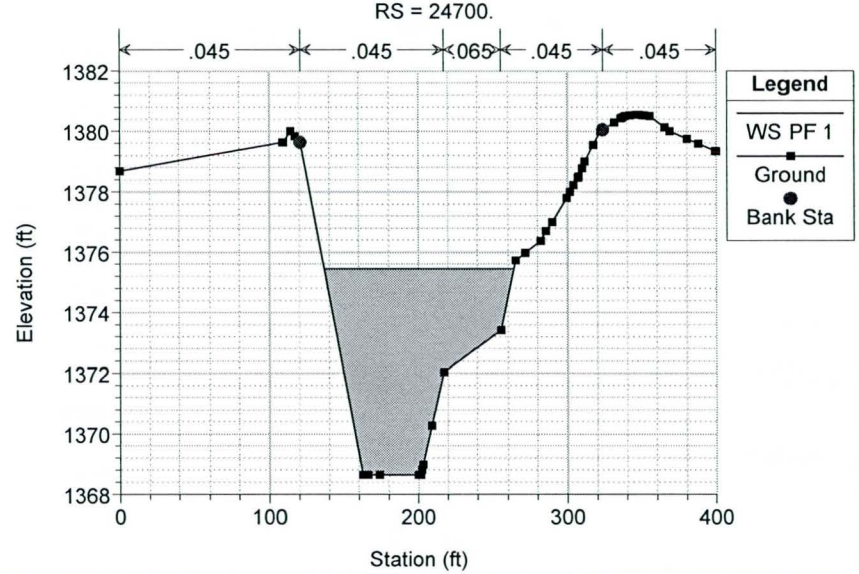
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 24900.



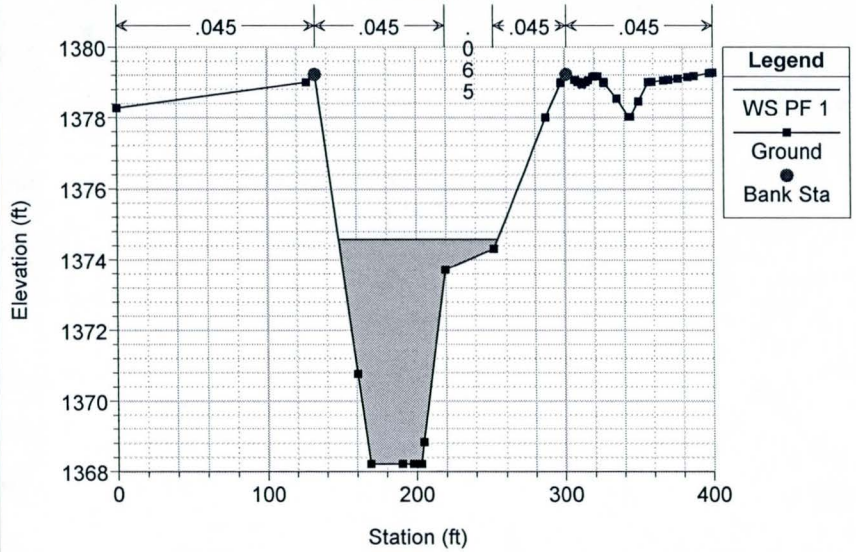
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 24700.



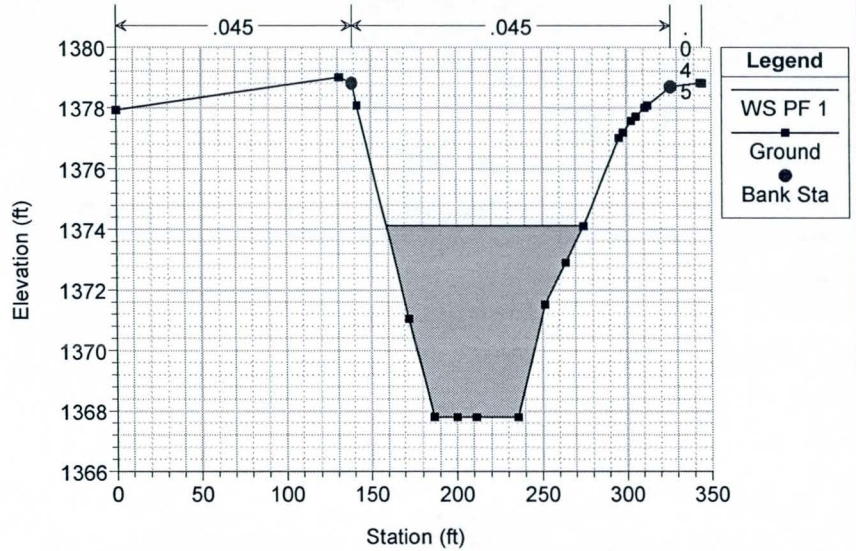
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 24500.



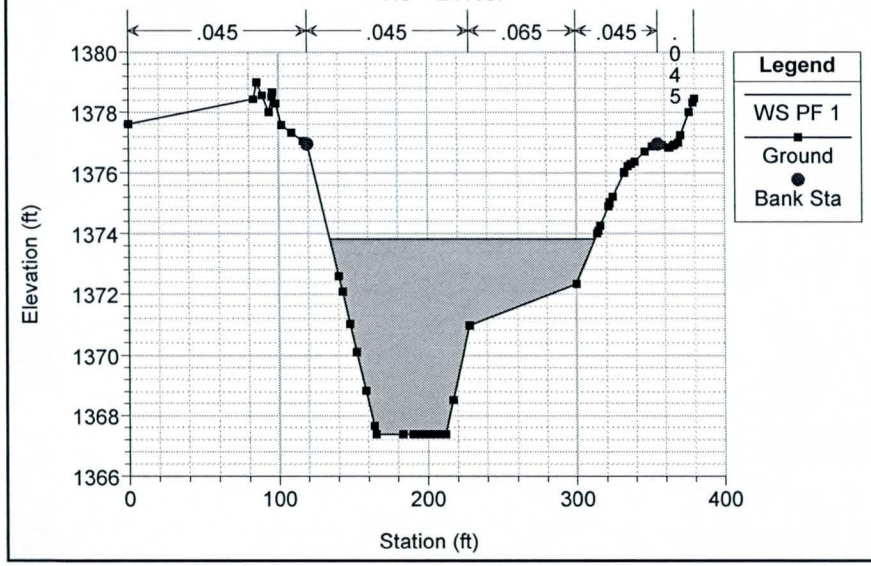
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 24300.



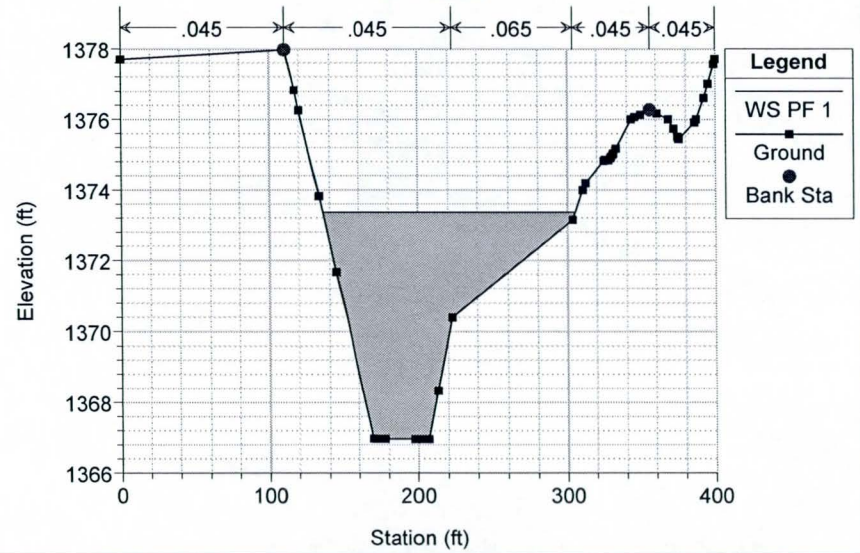
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 24100.



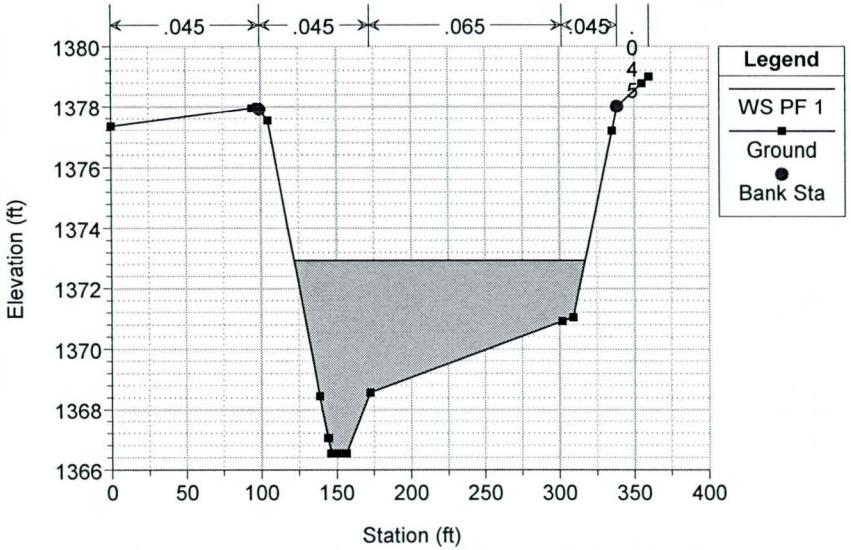
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 23900.



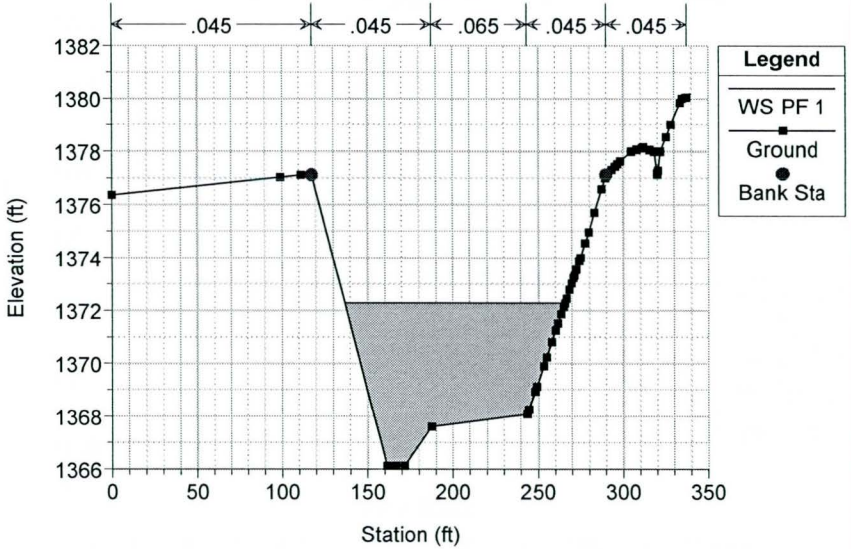
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 23700.



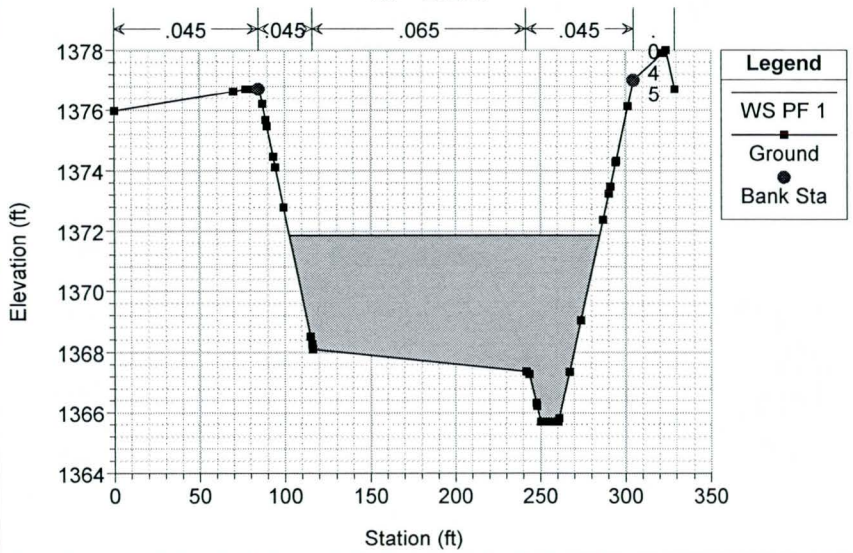
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 23500.



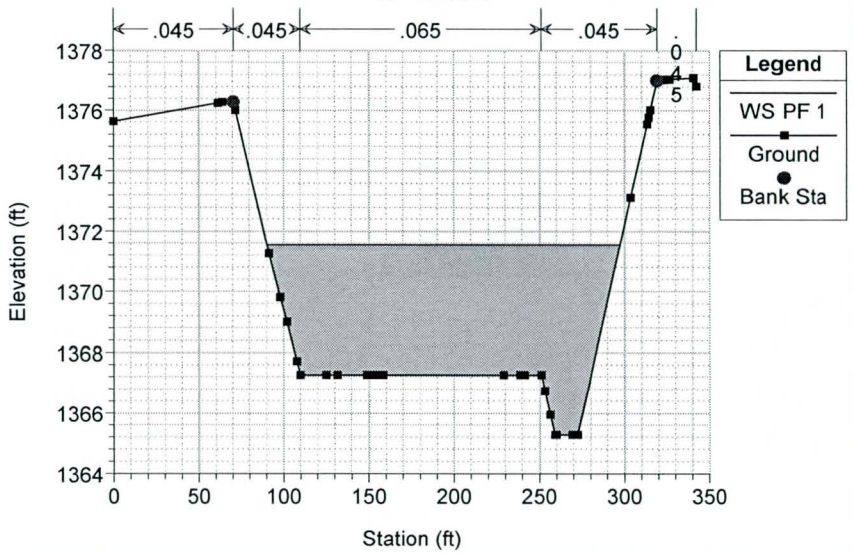
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 23300.



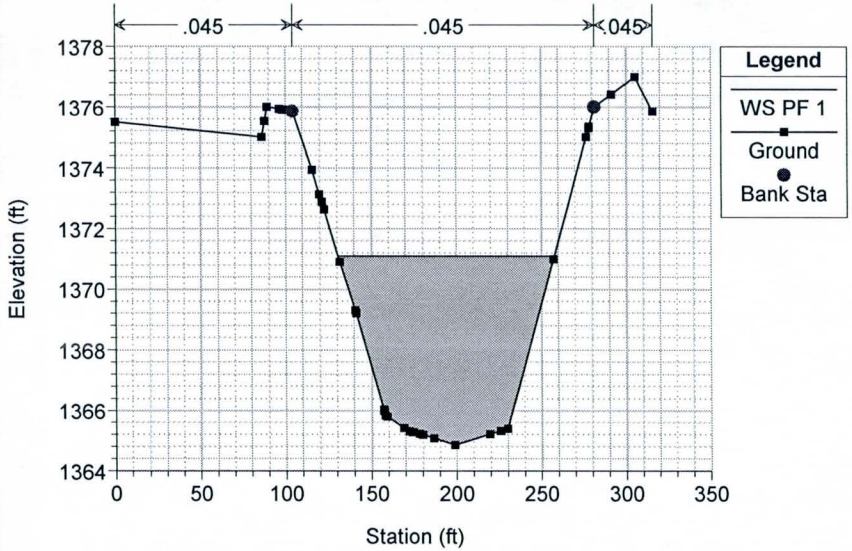
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 23100.



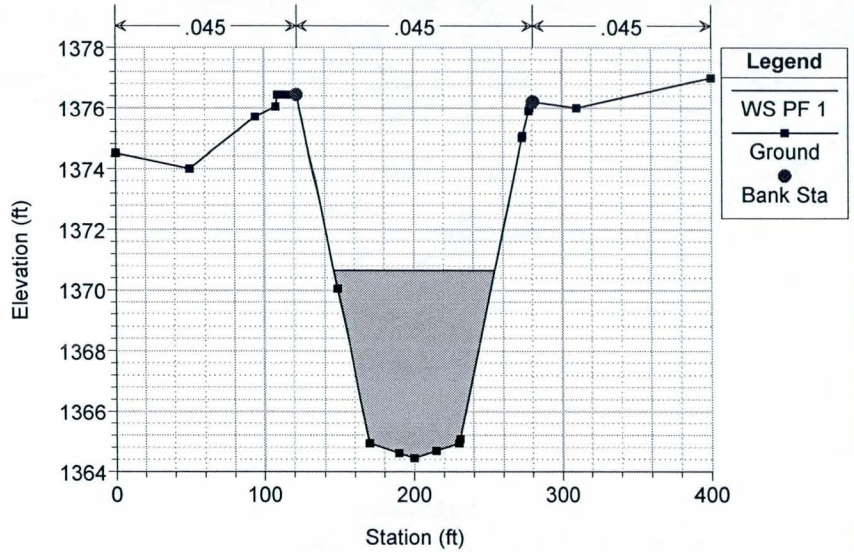
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 22900.



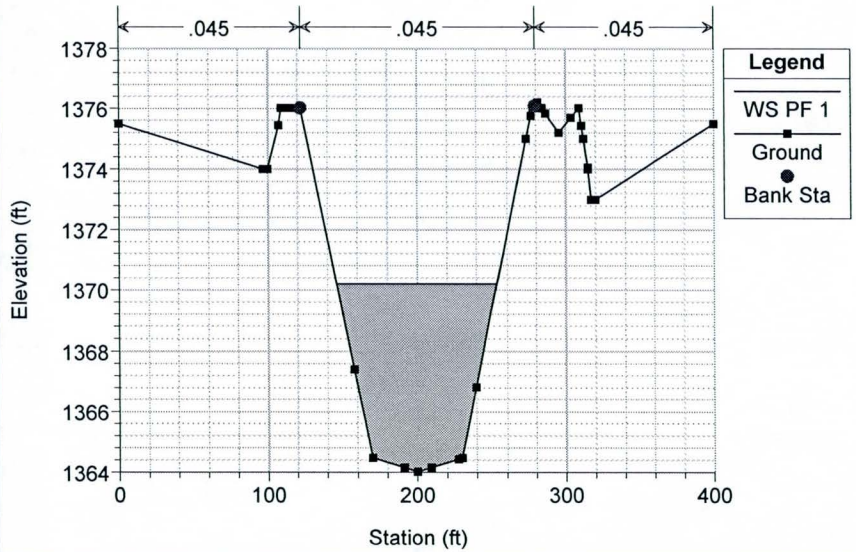
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 22700.



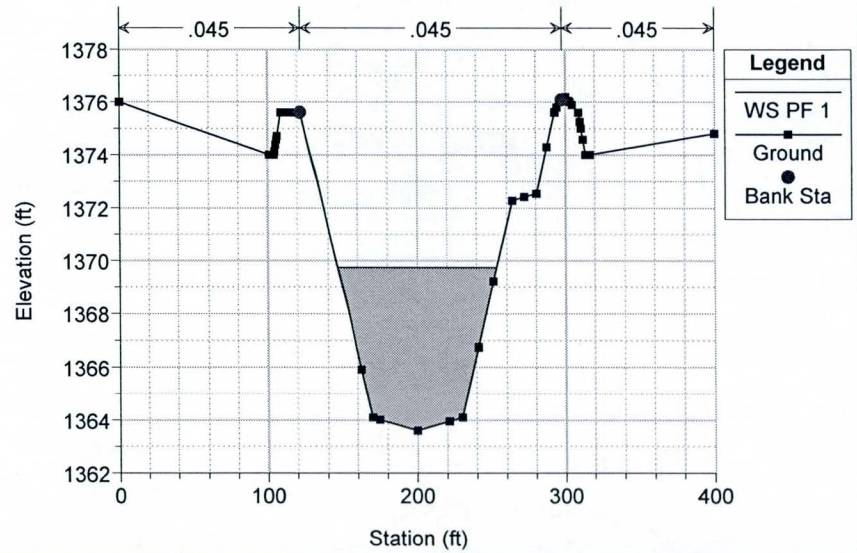
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 22500.



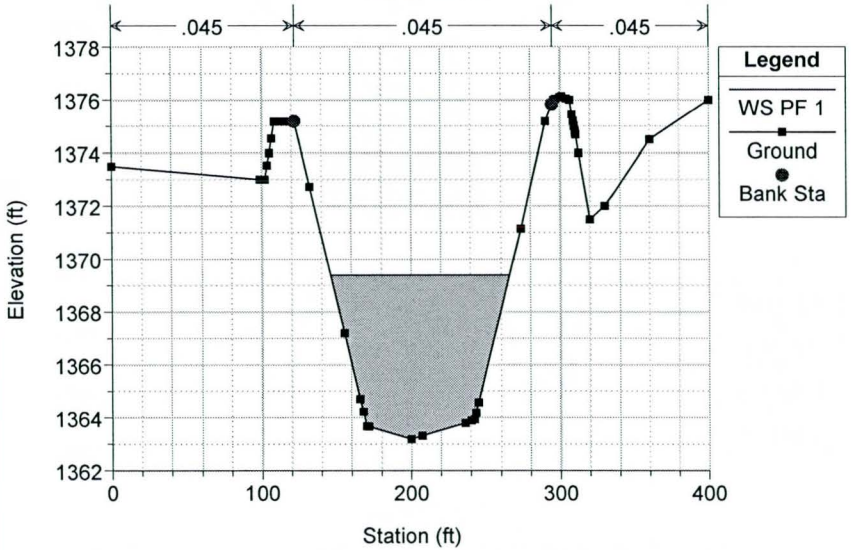
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 22300.



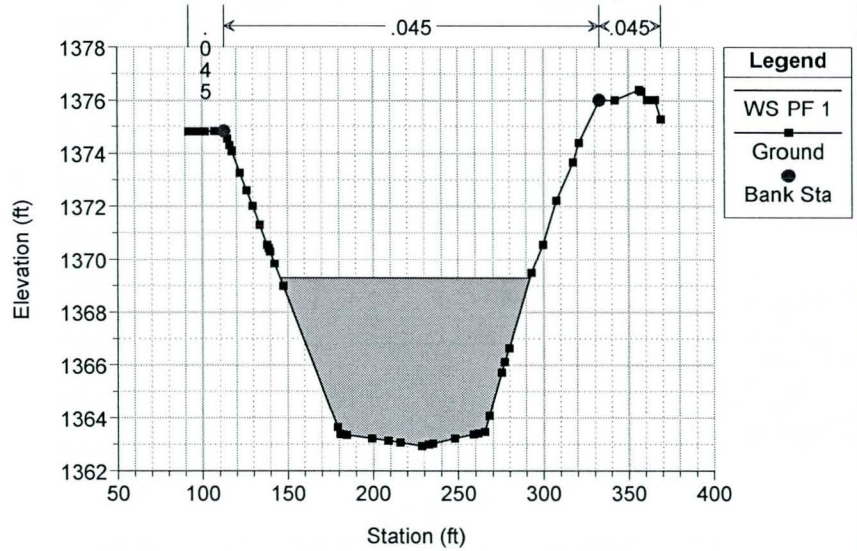
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 22100.



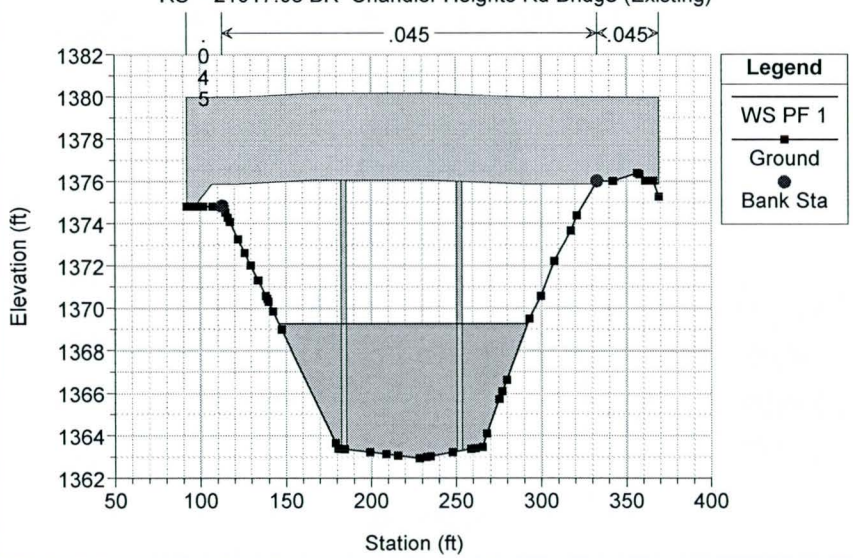
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 21980. U/S of Chandler Hts Bridge



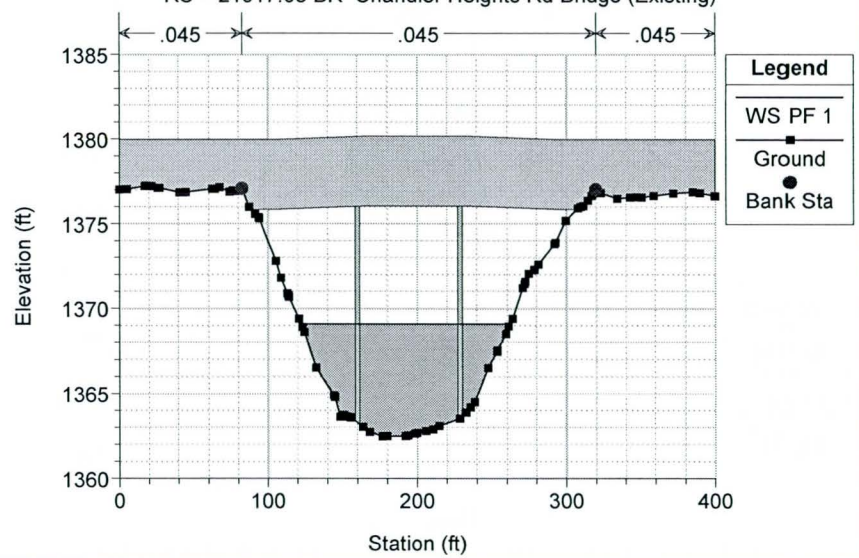
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 21917.08 BR Chandler Heights Rd Bridge (Existing)



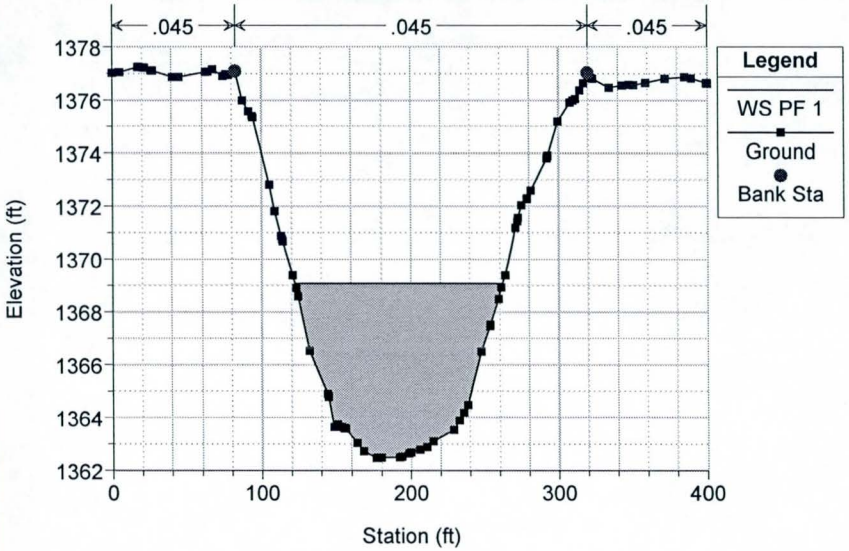
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 21917.08 BR Chandler Heights Rd Bridge (Existing)



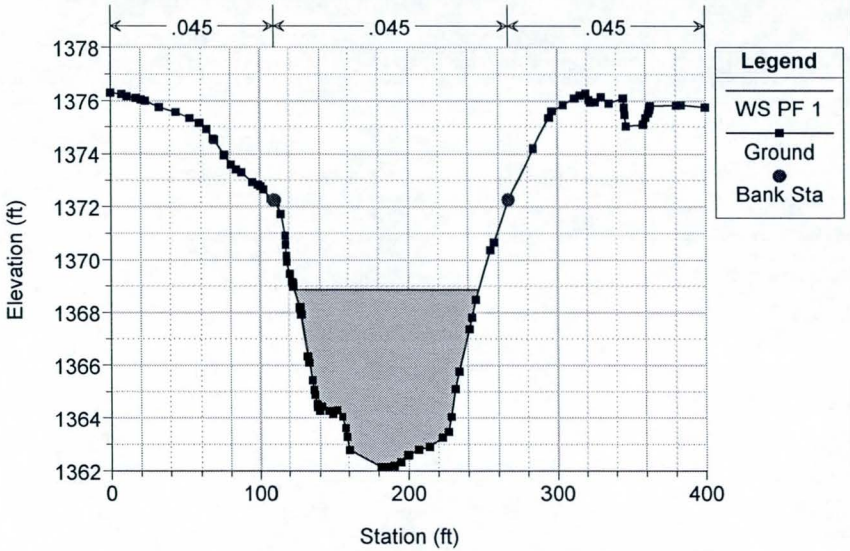
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 21849. D/S of Chandler Hts Bridge



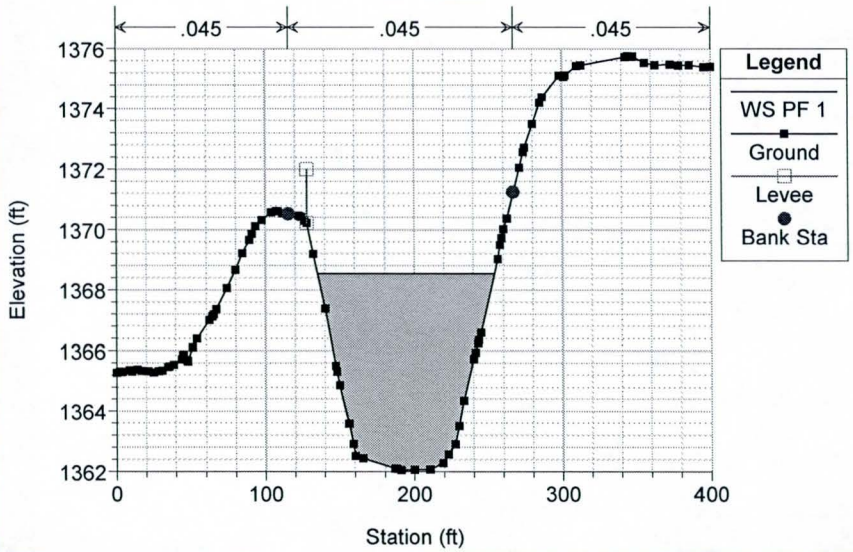
Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

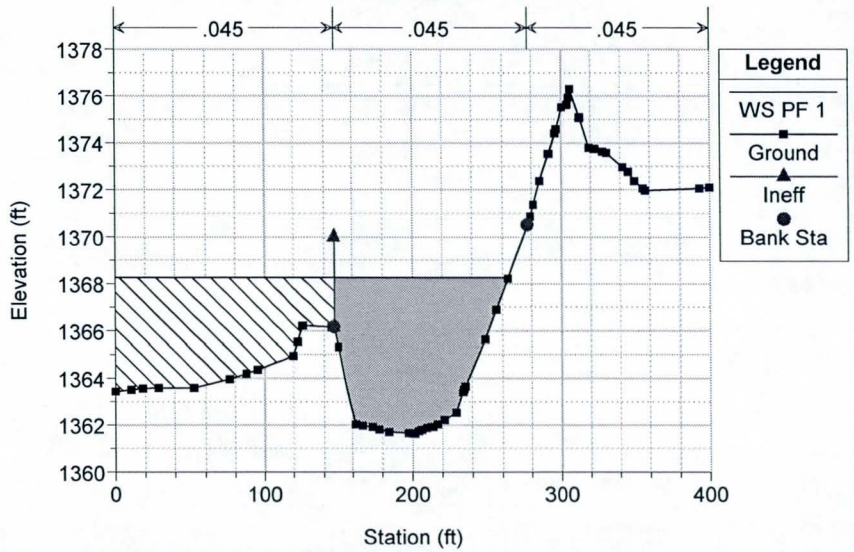
RS = 21700.



Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 21500.



Sonoqui Wash Phase II Improvements 100% Plan: 100 Yr FEMA Submittal 9/23/2013

RS = 21300.