Flood Control District
of Maricopa County

INTEROFFICE MEMORANDUM

Date: December 13, 2011

See preliminary in superceded drawer for date started regulating

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

From: Cathy Regester, P.E., CFM

Subject: Rodger Creek Floodplain Re-Delineation Study, Contract FCD 2010C003 – WA #2

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

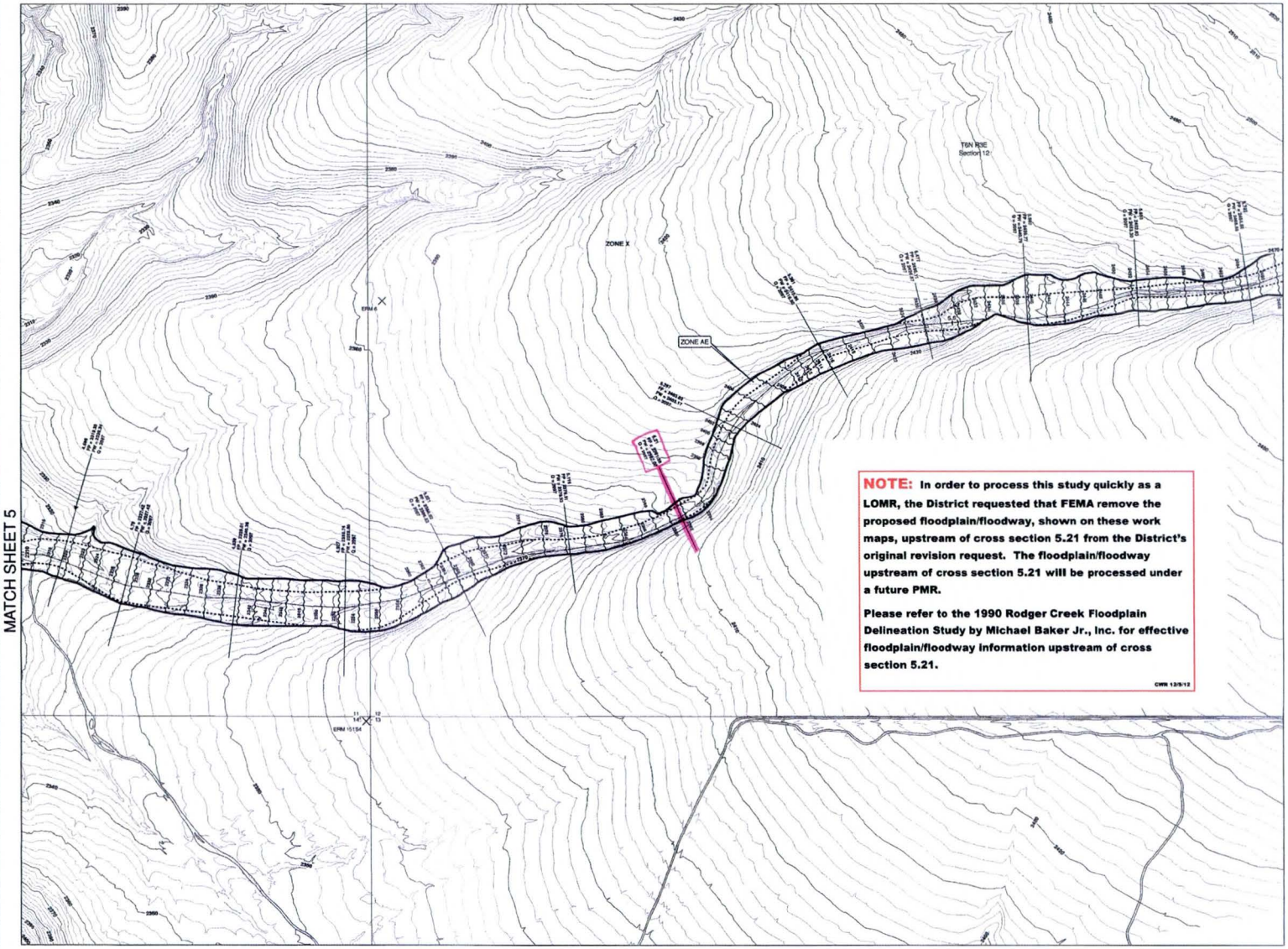
The background for the study includes the following:

> The study re-delineates approximately 6.4 linear miles of Zone AE floodplain and floodway originally delineated by Michael Baker Jr., Inc in 1990 on 4-ft contour interval mapping. The topographic basis for the re-study is new 2-foot contour interval mapping in NAVD88 vertical datum flown April 7, 2010. The re-study also includes revised hydrologic calculations based on the District's current methodology. Michael Baker Jr., Inc. was the consultant for the re-study. The project manager for the Consultant was Teri George, P.E., CFM. The project manager for the District was Cathy Regester, P.E., CFM.

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

Date 1/9/12	
Timothy S. Phillips, P.E., Chief Engineer and General Manager	
Date 12/22/2011	Date 12/27/2011
Ed Raleigh, P.E. Engineering Division Manager	Kelli Sertich, AICP Floodplain Management & Services Division Manager
Date 12,19,11	
Amir Motamedi, P.E. Hydrology/Hydraulics Branch Manager	
Catherine W. Regester Date 12/13/11	Date 12/15/11
Catherine Regester, P.E., CFM Project Manager	Richard Harris, P.E., CFM Contract Manager
File Copies: 1. FCD2010C003 2. _____	☐ GIS Posted (Pending Floodplain Only) Date:_____

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



LEGEND

- 100-Year Floodplain
- Floodway
- 0.5 Hydraulic Base Line with River Mile
- Cross-Sections
  - FP=100-Year Floodplain Elevation
  - FW=Floodway Elevation
  - Q=100-Year Discharge in CFS
- Section Lines
- Base Flood Elevations
- Skunk Creek Effective 100-Year Floodway
- Skunk Creek Effective 100-Year Floodplain
- Elevation Reference Marks
- Structures
- Roads

NOTES

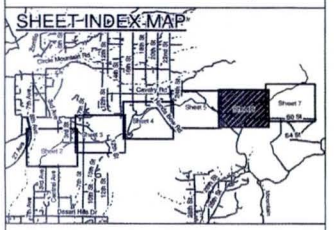
ALL ELEVATIONS ARE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

El(NGVD29) = EL(NAVD88) - 2.03 ft

ELEVATION REFERENCE MARKS

ID Number	Elevation(Ft)	DESCRIPTION
6	2383.14	Aluminum cap, stamped FCD 6, in desert area, no intersections nearby.
15154	2363.78	Aluminum cap, stamped FCD 5154, in desert area, no intersections nearby.

SHEET INDEX MAP



N W E S

0 100 200 400 800 Feet

1 inch = 200 feet

2' CONTOUR INTERVAL

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS FOR 1"=200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS

AERIAL MAPPING PROVIDED BY FLOOD CONTROL DISTRICT OF MARICOPA COUNTY FOR RODGER CREEK MAPPING, FCD CONTRACT NO. 08-20, FLIGHT DATE APRIL 7, 2010.

GROUND CONTROL SURVEY DATA PROVIDED BY FLOOD CONTROL DISTRICT OF MARICOPA COUNTY AND PERFORMED FOR FLOOD CONTROL DISTRICT OF MARICOPA COUNTY UNDER SEPARATE CONTRACTS.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RODGER CREEK FLOODPLAIN DELINEATION STUDY

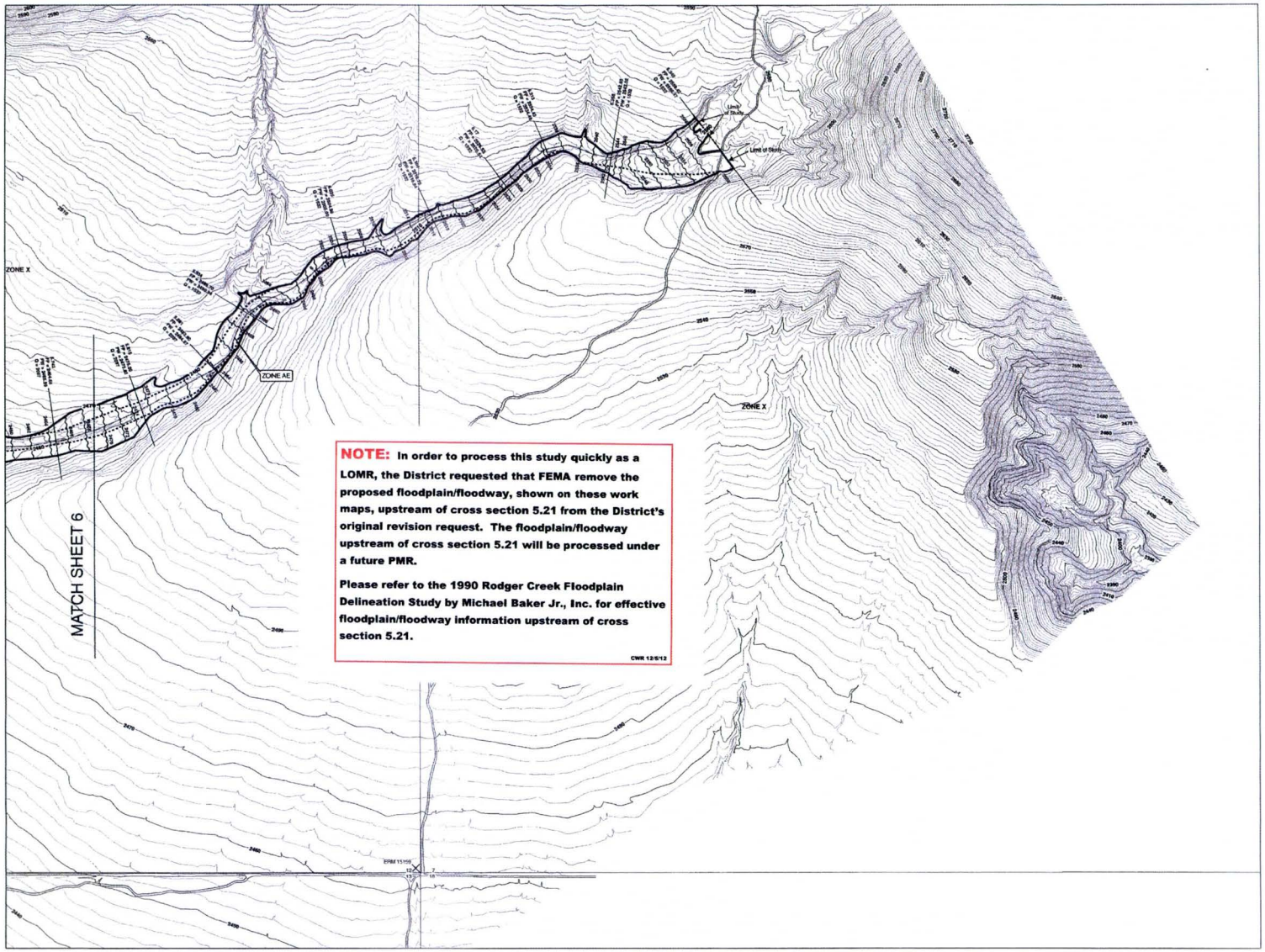
FCD CONTRACT 2010-C003

46199 CYNTHIA M.S. DuPONT

EXPIRES 12/31/2012

MICHAEL BAKER JR., INC.
Baker
2929 N. Central Ave.
Suite 800
Phoenix, AZ, 85012
(602) 279-1234

W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Work Study Maps\Rodger Creek Work Study Maps Sheet 6.mxd



NOTE: **In order to process this study quickly as a LOMR, the District requested that FEMA remove the proposed floodplain/floodway, shown on these work maps, upstream of cross section 5.21 from the District's original revision request. The floodplain/floodway upstream of cross section 5.21 will be processed under a future PMR.**

Please refer to the 1990 Rodger Creek Floodplain Delineation Study by Michael Baker Jr., Inc. for effective floodplain/floodway information upstream of cross section 5.21.

CWR 12/5/12

LEGEND

- 100-Year Floodplain
- Floodway
- 0.5 Hydraulic Base Line with River Mile
- Cross-Sections
  - FP=100-Year Floodplain Elevation
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NOTES

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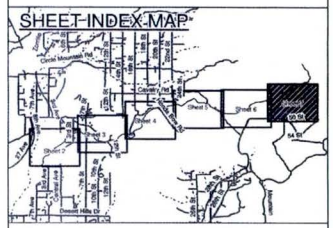
El(NGVD29) = EL(NAVD88) - 2.03 ft

ELEVATION REFERENCE MARKS

ID Number	Elevation(Ft)	DESCRIPTION
15159	2462.62	Aluminum cap, stamped FCD 5159, in desert area, no intersections nearby.

SHEET INDEX MAP



N W E S

0 100 200 400 600 Feet

1 inch = 200 feet

2' CONTOUR INTERVAL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RODGER CREEK FLOODPLAIN DELINEATION STUDY

FCD CONTRACT 2010-C003

CYNTHIA M.S. DeFINIS — EXPIRES 12/31/2012

MICHAEL BAKER JR., INC.
Baker
2929 N. Central Ave.
Suite 800
Phoenix, AZ, 85012
(602) 279-1234

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS FOR 1"=200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS

AERIAL MAPPING PROVIDED BY FLOOD CONTROL DISTRICT OF MARICOPA COUNTY FOR RODGER CREEK MAPPING, FCD CONTRACT NO. 08-30, FLIGHT DATE APRIL 7, 2010.

GROUND CONTROL SURVEY DATA PROVIDED BY FLOOD CONTROL DISTRICT OF MARICOPA COUNTY AND PERFORMED FOR FLOOD CONTROL DISTRICT OF MARICOPA COUNTY UNDER SEPARATE CONTRACTS.

W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Work Study Map\Rodger Creek Work Study Maps Sheet 7.mxd

RODGER CREEK FLOODPLAIN DELINEATION STUDY

Technical Data Notebook Volume 1 of 1

April, 2012

Prepared for the Flood Control District of Maricopa County

2801 West Durango Street
Phoenix, AZ 85009
(602) 506-1501

FCD Contract 2010-C003, Assignment #2, FEMA Grant #EMF-2009-GR-0909

Prepared by
Michael Baker Corporation
2929 North Central Avenue Ste #800
Phoenix, AZ 85012
(602) 279-1234

In Coordination with

Cardno WRG
9977 North 90th Street Ste 350
Scottsdale, AZ 85258
(602) 977-8000

NOTE: In order to process this study quickly as a LOMR, the District requested that FEMA remove the proposed floodplain/floodway, shown on these work maps, upstream of cross section 5.21 from the District's original revision request. The floodplain/floodway upstream of cross section 5.21 will be processed under a future PMR.

Please refer to the 1990 Rodger Creek Floodplain Delineation Study by Michael Baker Jr., Inc. for effective floodplain/floodway information upstream of cross section 5.21.

CWR 12/5/12

NOTE: In order to process this study quickly as a LOMR, the District requested that FEMA remove the proposed floodplain/floodway, shown on these work maps, upstream of cross section 5.21 from the District's original revision request. The floodplain/floodway upstream of cross section 5.21 will be processed under a future PMR.

Please refer to the 1990 Rodger Creek Floodplain Delineation Study by Michael Baker Jr., Inc. for effective floodplain/floodway information upstream of cross section 5.21.

CWR 12/5/12

Flood Control District
of Maricopa County

Board of Directors
Fulton Brock, District 1
Don Stapley, District 2
Andrew Kunasek, District 3
Max Wilson, 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

June 11, 2012

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

ATTN: Mr. Dan Saltsman, CFM, STARR

RE: Rodger Creek Floodplain Delineation Study, LOMR
FEMA Case No.: 12-09-1031P
Town of Cave Creek and Unincorporated County, Maricopa County, Arizona

Dear Mr. Saltsman:

As we discussed last week, the District, hereby, formally requests that the revision area for the subject study be shortened to include only that area from the confluence with Skunk Creek up to HEC-RAS cross section 5.21. The area upstream of cross section 5.21 will be removed from the study per this request.

Please find enclosed a CD containing the revised HEC-RAS model and the revised proposed floodplain/floodway delineation shape files. The HEC-RAS model is the same model included in our April 12, 2012 submittal to FEMA except that all cross sections upstream of cross section 5.21 have been removed from the model. Similarly, the delineation shape files have been revised to tie-in to the effective delineation between proposed cross section 5.21 and FEMA effective cross section AB.

If you have any questions or require additional information, please feel free to call me at 602-506-4001 or contact me by e-mail at cwr@mail.maricopa.gov.

Yours truly,

Catherine W. Regester

Catherine W. Regester, P.E., CFM
Senior Civil Engineer

Enclosures: 1 CD (contents noted above)

Federal Emergency Management Agency

Washington, D.C. 20472

July 23, 2012

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Don Stapley
Maricopa County Supervisor
301 W. Jefferson St., 10th Floor
Phoenix, AZ 85003

IN REPLY REFER TO:
Case No.: 12-09-1031P
Community Name: Maricopa County, AZ
Community No.: 040037
Effective Date of
This Revision: December 7, 2012

Dear Mr. Stapley:

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(s) 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 (FMIX) 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/nfip.

Sincerely,

Beth A Norton

Beth A. Norton, Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

For: 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: Mrs. Catherine Regester, P.E., CFM
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

Mr. Timothy S. Phillips, P.E.
Chief Engineer Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

Ms. Teri S. George, P.E.
Michael Baker Jr., Inc.
2929 North Central Avenue
Phoenix, AZ 85012

Mr. Brian Cosson, CFM
State NFIP Coordinator
3550 N. Central Ave.
Phoenix, AZ 85012-2105

FLOOD CONTROL DISTRICT
RECEIVED
JUL 30 12

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

ROUTING CWR

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)	NO PROJECT	FLOODWAY HYDRAULIC ANALYSIS HYDROLOGIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 040037		
IDENTIFIER	Rodger Creek Floodplain Delineation Study	APPROXIMATE LATITUDE & LONGITUDE: 33.868, -112.063 SOURCE: USGS QUADRANGLE DATUM: NAD 83	

ANNOTATED MAPPING ENCLOSURES			ANNOTATED STUDY ENCLOSURES
TYPE: FIRM*	NO.: 04013C0780H	DATE: September 30, 2005	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: September 30, 2005
TYPE: FIRM*	NO.: 04013C0785J	DATE: September 30, 2005	PROFILE(S): 513P, 514P, 515P, 516P, and 517P
TYPE: FIRM*	NO.: 04013C0395H	DATE: September 30, 2005	FLOODWAY DATA TABLE: TABLE 5
			SUMMARY OF DISCHARGES TABLE: TABLE 3

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map

FLOODING SOURCE(S) & REVISED REACH(ES)

Rodger Creek - from its confluence with Skunk Creek to approximately 4,500 feet upstream of its confluence with Tributary R-2

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Rodger Creek	Zone AE	Zone AE	YES	YES
	Zone X (shaded)	Zone X (shaded)	YES	YES
	*BFEs	*BFEs	YES	YES
	Floodway	Floodway	YES	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 (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the Engineering Library, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Beth A Norton

Beth A. Norton, Program Specialist
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.

We provide the floodway designation to your community as a tool to regulate floodplain development. Therefore, the floodway revision we have described in this letter, while acceptable to us, must also be acceptable to your community and adopted by appropriate community action, as specified in Paragraph 60.3(d) of the NFIP regulations.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance discharges computed in the submitted hydrologic model. Future development of projects upstream could cause increased discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on discharges and could, therefore, indicate that greater flood hazards exist 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 (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the Engineering Library, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Beth A Norton

Beth A. Norton, Program Specialist
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(s) 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 (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the Engineering Library, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Beth A Norton

Beth A. Norton, Program Specialist
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

PUBLIC NOTIFICATION

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 Republic*

Dates: **August 2, 2012 and August 9, 2012**

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 (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the Engineering Library, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Beth A Norton

Beth A. Norton, Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

Table 3. Summary of Discharges (Continued)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
Tributary X2					
At confluence with Tributary C-6	0.43	--[1]	--[1]	390	--[1]
Tributary X1					
600 feet west of 20th Street	0.60	--[1]	--[1]	708	--[1]
Tributary X5					
At confluence with Cline Creek	0.38	--[1]	--[1]	301	--[1]
Tributary C-8					
At confluence with Tributary C-6	1.42	--[1]	--[1]	2,280	--[1]
Morgan City Wash					
At confluence with Agua Fria River	22.97	--[1]	--[1]	14,400	--[1]
At confluence with Tributary M-12	21.16	--[1]	--[1]	14,200	--[1]
At confluence with Tributary M-10	18.90	--[1]	--[1]	13,900	--[1]
At confluence with Tributary M-8	15.64	--[1]	--[1]	12,300	--[1]
At confluence with Tributary M-7	13.25	--[1]	--[1]	12,000	--[1]
At confluence with Tributary M-4	8.12	--[1]	--[1]	8,130	--[1]
At confluence with Tributary M-3	5.45	--[1]	--[1]	4,820	--[1]

REVISED TO REFLECT LOMR EFFECTIVE DECEMBER 7, 2012

Rodger Creek					
At confluence with Skunk Creek	5.17	--[1]	--[1]	5,006	--[1]
Just upstream of 16th Street	4.20	--[1]	--[1]	4,681	--[1]
1,000 feet downstream of 20th Street	3.82	--[1]	--[1]	4,320	--[1]
400 feet downstream of 24th Street	3.54	--[1]	--[1]	4,163	--[1]
2,800 feet upstream of 24th Street	3.03	--[1]	--[1]	3,626	--[1]
3, 100 feet upstream of 24th Street	2.36	--[1]	--[1]	2,948	--[1]
Upstream of 40th Street	--[2]	--[1]	--[1]	2,870	--[1]

--[1] Not Computed

--[2] Not Available

REVISED AREA

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Rodger Creek								
A	0.209	285	805	6.2	1,927.2	1,927.2	1,927.7	0.5
B	0.487	148	548	9.1	1,944.9	1,944.9	1,945.8	0.9
C	0.625	95	451	11.1	1,954.4	1,954.4	1,954.8	0.4
D	0.862	78	442	11.3	1,968.1	1,968.1	1,968.6	0.5
E	0.954	142	561	8.9	1,973.9	1,973.9	1,974.7	0.8
F	1.128	115	483	10.4	1,987.5	1,987.5	1,987.5	0.0
G	1.324	94	687	7.3	2,002.6	2,002.6	2,002.9	0.3
H	1.519	170	803	6.2	2,015.3	2,015.3	2,016.3	1.0
I	1.664	123	652	7.7	2,025.7	2,025.7	2,026.5	0.8
J	1.831	112	720	7.0	2,036.3	2,036.3	2,037.2	0.9
K	2.071	101	505	9.9	2,059.8	2,059.8	2,060.4	0.6
L	2.258	86	557	9.0	2,074.7	2,074.7	2,075.7	1.0
M	2.529	48	402	10.7	2,096.5	2,096.5	2,097.4	0.9
N	2.675	67	340	12.7	2,110.8	2,110.8	2,111.0	0.2
O	2.868	125	600	7.2	2,128.5	2,128.5	2,129.5	1.0
P	3.018	84	429	10.1	2,141.7	2,141.7	2,142.7	1.0
Q	3.221	59	402	10.4	2,160.4	2,160.4	2,161.1	0.7
R	3.394	95	432	9.6	2,178.2	2,178.2	2,178.3	0.1
S	3.582	65	508	10.1	2,197.1	2,197.1	2,198.1	1.0
T	3.733	79	429	9.7	2,212.1	2,212.1	2,212.7	0.6
U	3.922	121	526	6.9	2,231.6	2,231.6	2,231.9	0.3
V	4.136	95	437	8.3	2,255.4	2,255.4	2,255.5	0.1
W	4.293	90	471	7.7	2,271.2	2,271.2	2,272.2	1.0
X	4.478	143	285	7.4	2,289.4	2,289.4	2,290.1	0.7
Y	4.696	113	405	5.2	2,317.3	2,317.3	2,318.3	1.0
Z	4.839	135	433	4.9	2,337.5	2,337.5	2,338.3	0.8

REVISED AREA

[1]Miles above confluence with Skunk Creek

REVISED TO RELFECT LOMR EFFECTIVE DECEMBER 7, 2012

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ AND INCORPORATED AREAS

FLOODWAY DATA

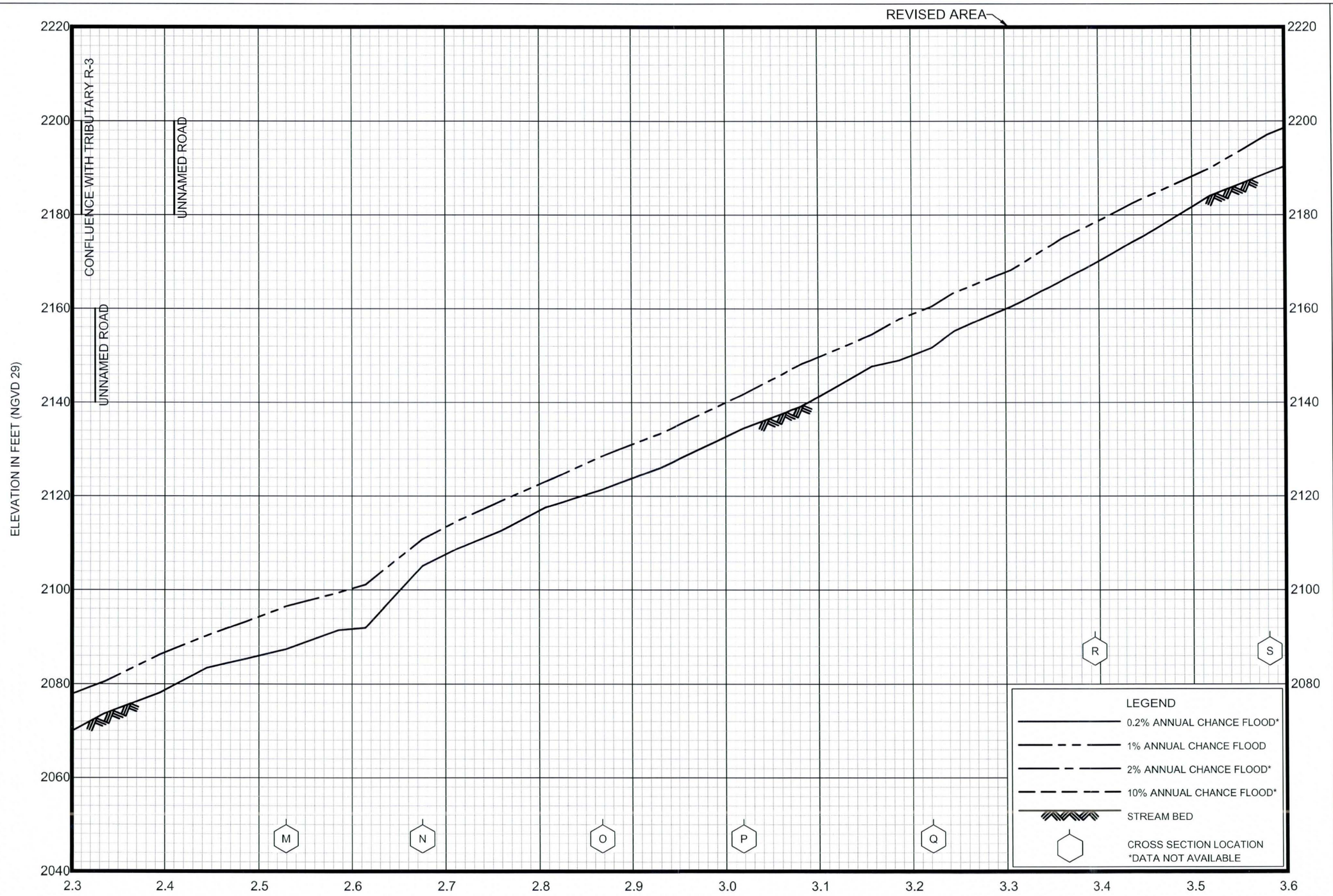
RODGER CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Rodger Creek (Cont'd)								
AA	5.021	99	376	5.6	2,364.0	2,364.0	2,364.6	0.6
AB	5.210	60	305	6.9	2,389.6	2,389.6	2,390.1	0.5
AC	5.414	108	362	8.0	2,415.4	2,415.4	2,415.5	0.1
AD	5.591	204	424	6.8	2,440.1	2,440.1	2,440.1	0.0
AE	5.970	84	322	9.0	2,493.1	2,493.1	2,493.1	0.0
AF	6.153	89	368	7.9	2,520.2	2,520.2	2,520.2	0.0
AG	6.349	244	479	6.0	2,555.4	2,555.4	2,555.4	0.0

REVISED AREA

[1]Miles above confluence with Skunk Creek

REVISED TO RELFECT LOMR EFFECTIVE DECEMBER 7, 2012



REVISED TO REFLECT LOMR EFFECTIVE DECEMBER 7, 2012

STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH SKUNK CREEK

FLOOD PROFILES

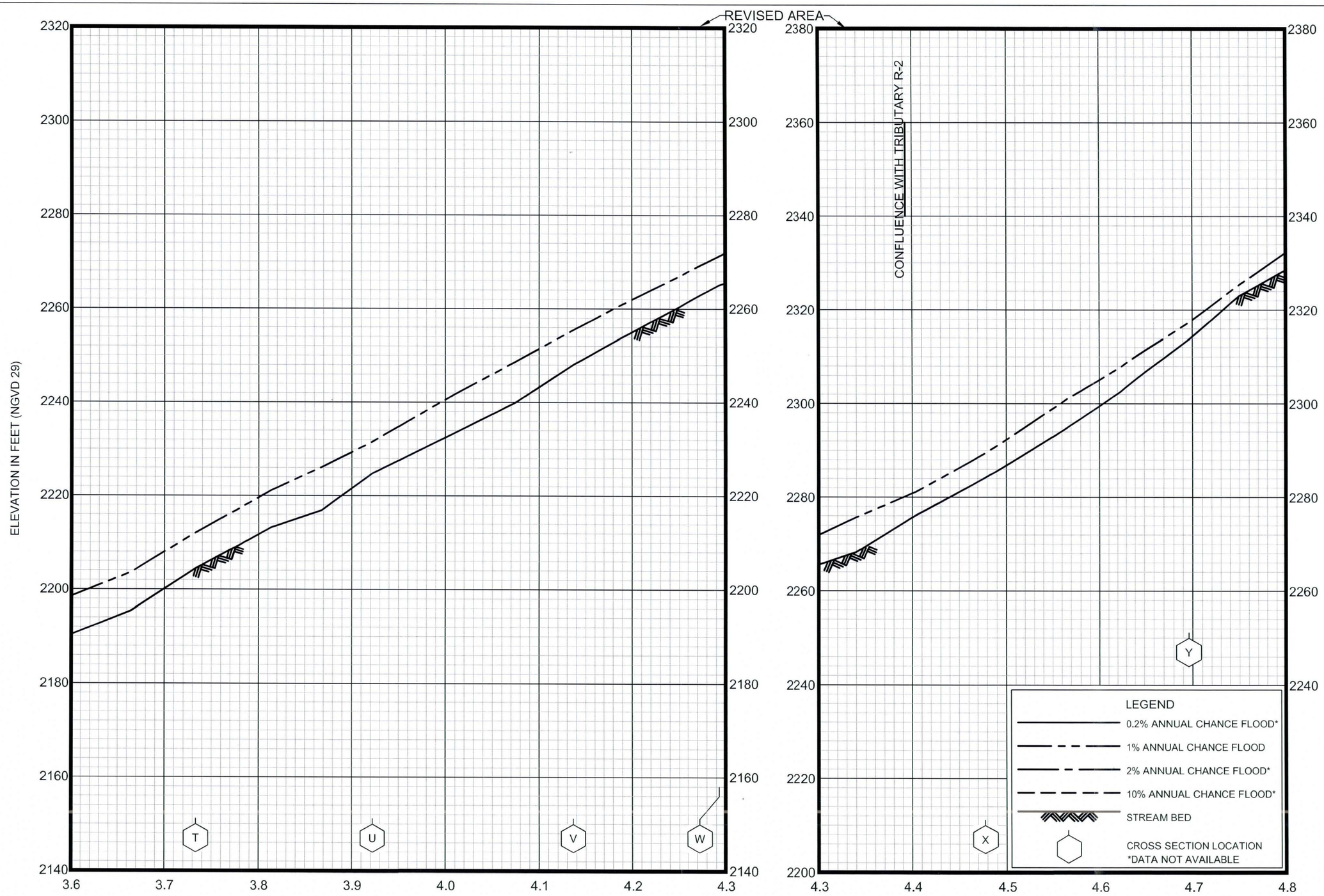
RODGER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND INCORPORATED AREAS

515P



REVISED TO REFLECT LOMR EFFECTIVE DECEMBER 7, 2012

STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH SKUNK CREEK

FLOOD PROFILES

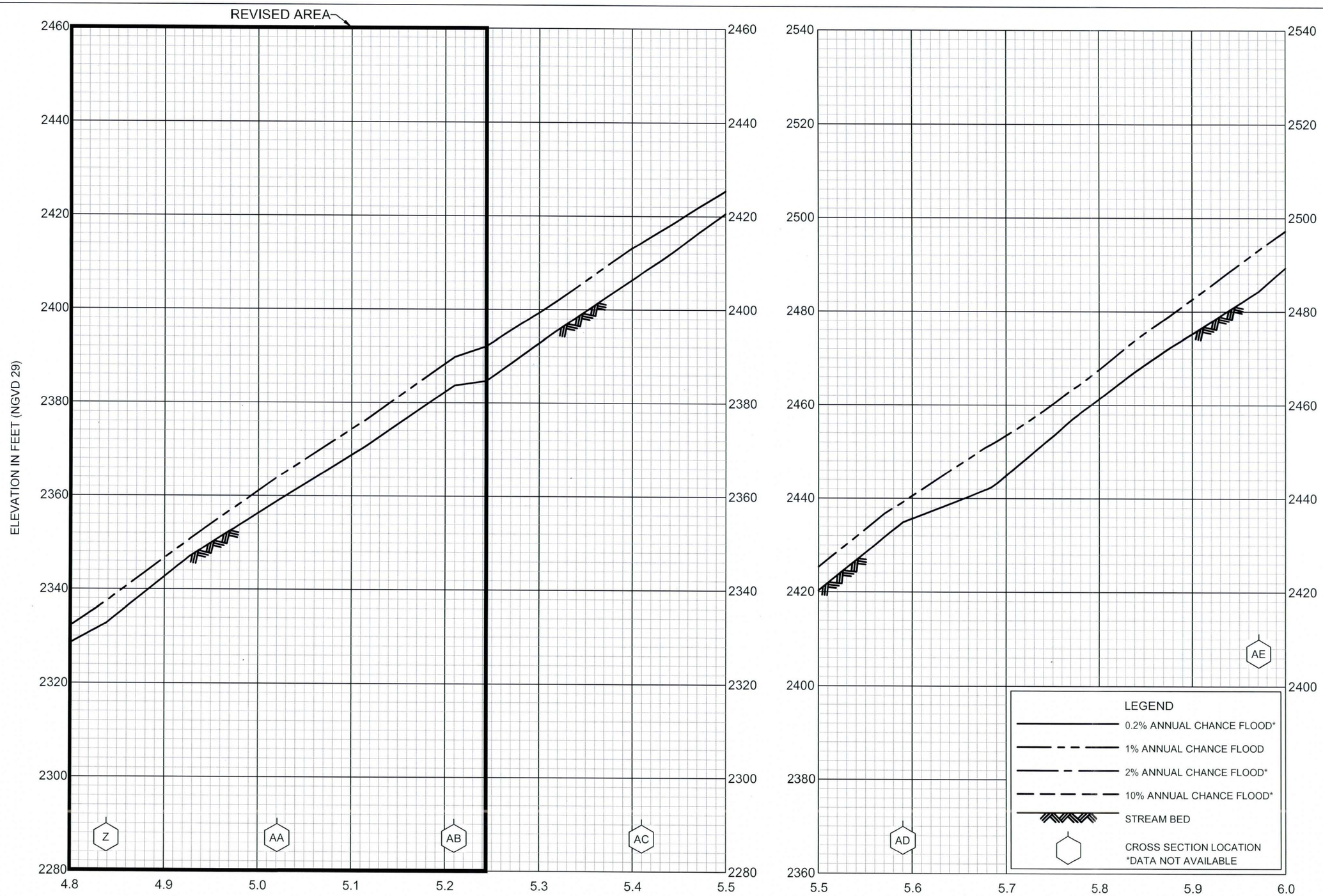
RODGER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND INCORPORATED AREAS

516P



REVISED TO REFLECT LOMR EFFECTIVE DECEMBER 7, 2012

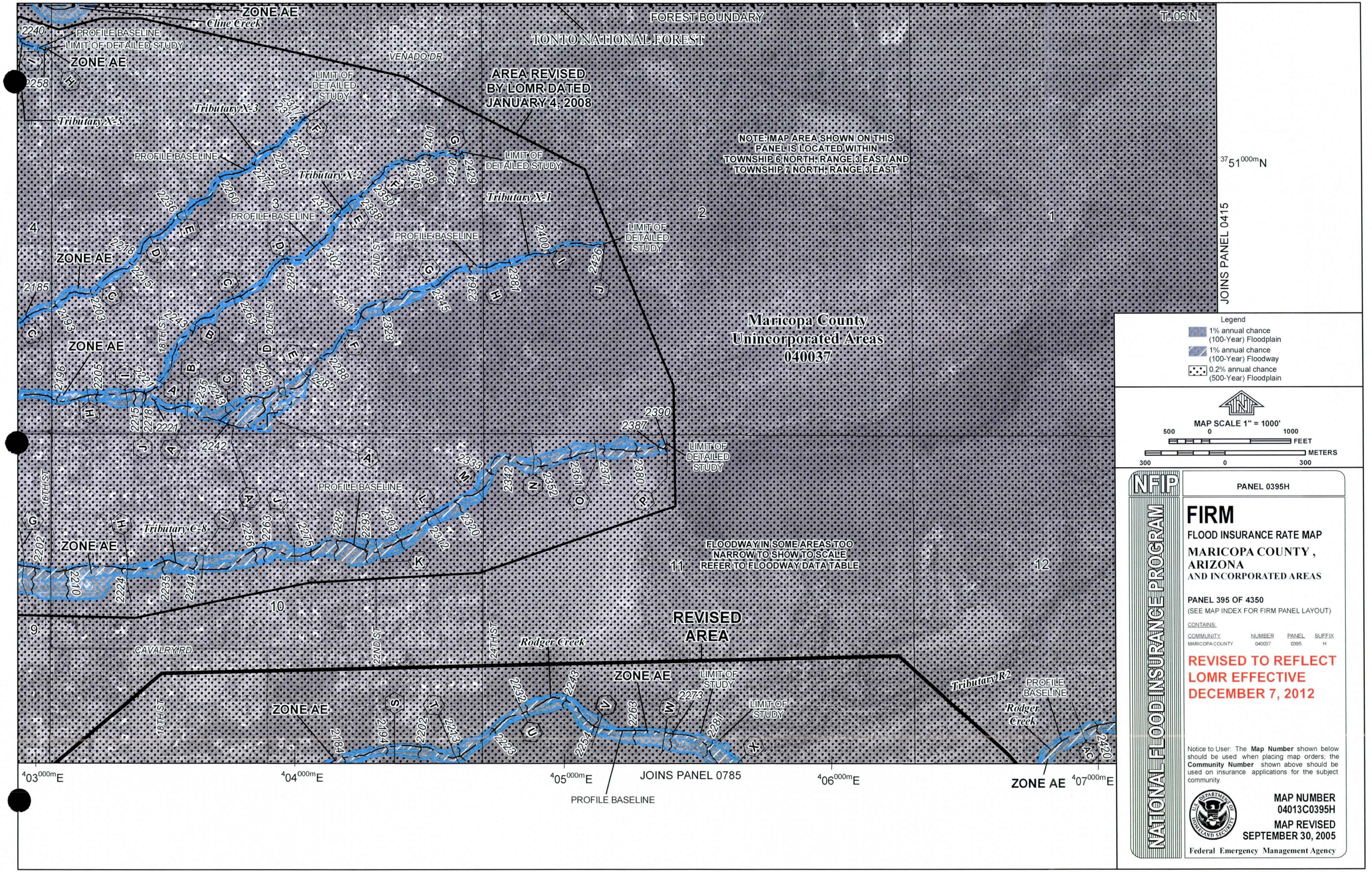
FLOOD PROFILES

RODGER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND INCORPORATED AREAS



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 0395H

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 395 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	0395	H

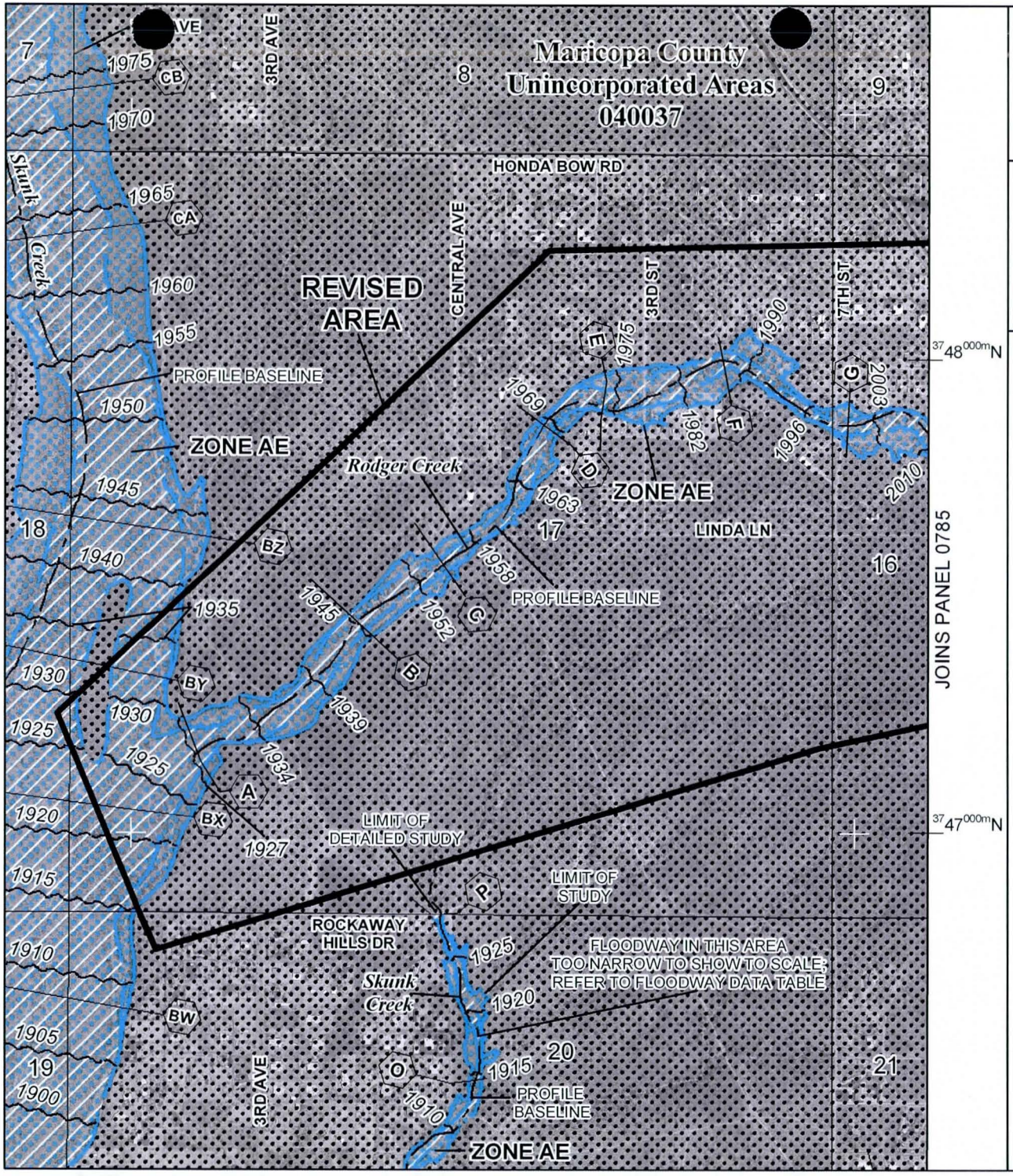
REVISED TO REFLECT LOMR EFFECTIVE DECEMBER 7, 2012

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 04013C0395H

MAP REVISED SEPTEMBER 30, 2005

Federal Emergency Management Agency



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 0780H

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 780 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	0780	H
PHOENIX, CITY OF	040051	0780	H

REVISED TO REFLECT LOMR EFFECTIVE DECEMBER 7, 2012

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
04013C0780H

MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles, Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NGVD 29). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was *Arizona State Plane Zone 3176 (central Arizona)*. The **horizontal datum** was *NAD83, GRS80 spheroid*. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the *National Geodetic Vertical Datum of 1929*. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(310) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov

Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by Maricopa County. Orthophoto images were produced at a scale of 1:6000 using HARN for control. Aerial photography is dated December 2000 to December 2002.

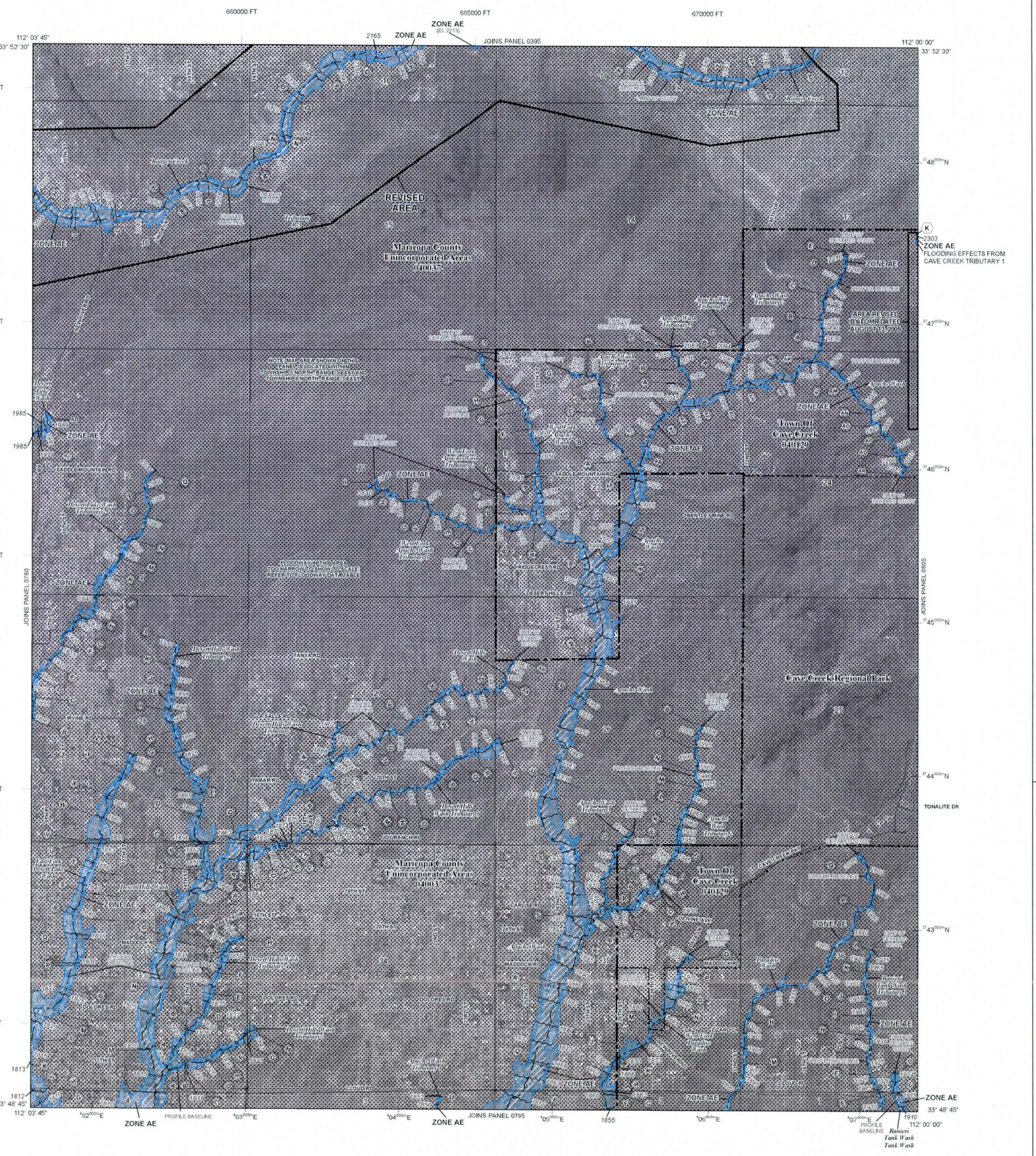
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMAMAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1929

(A)———(A)	Cross section line
(23)- - - - -(23)	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
89 N	1000-meter Universal Transverse Mercator grid values, zone 12.
875000 FT	5000-foot grid tick values : Arizona State Plane coordinate system, central zone (FIPSZONE 3176) NAD83 (Transverse Mercator)
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
April 15, 1988

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
September 4, 1991, December 3, 1993, July 19, 2001

September 30, 2005 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to change zone designations, to add roads and road names, to incorporate previously issued Letters of Map Revision, to incorporate previously issued Letters of Map Amendment.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0785J

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS

PANEL 785 OF 4350
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CAVE CREEK, TOWN OF	040129	0785	J
MARICOPA COUNTY	040037	0785	J

REVISED TO REFLECT
LOMR EFFECTIVE
DECEMBER 7, 2012

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
04013C0785J

MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

RODGER CREEK FLOODPLAIN DELINEATION STUDY

Technical Data Notebook Volume 1 of 2

April, 2012

Prepared for the Flood Control District of Maricopa County

Registered Professional Engineer (Civil) CERTIFICATE NO. 30013 TERI S. GEORGE Date Signed 4/2/12 ARIZONA U.S.A.

Expires 3/31/14

Registered Professional Engineer (Civil) CERTIFICATE NO. 45155 CYNTHIA M.S. DePONTI Date Signed 4/2/12 ARIZONA, U.S.A.

Expires 12/31/2012

2801 West Durango Street
Phoenix, AZ 85009
(602) 506-1501

FCD Contract 2010-C003, Assignment #2, FEMA Grant #EMF-2009-GR-0909

Prepared by
Michael Baker Corporation
2929 North Central Avenue Ste #800
Phoenix, AZ 85012
(602) 279-1234

In Coordination with

Cardno WRG
9977 North 90th Street Ste 350
Scottsdale, AZ 85258
(602) 977-8000

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Registered Professional Engineer (Civil) CERTIFICATE NO 30013 TERI S. GEORGE Date Signed 4/2/12 ARIZONA U.S.A.

Expires 3/31/14

Registered Professional Engineer (Civil) CERTIFICATE NO 45155 CYNTHIA M.S. DePONTI Date Signed 4/2/12 ARIZONA, U.S.A.

Expires 12/31/12

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Expires 3/31/14

Expires 12/31/2012

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- B.1 MEETING MINUTES OR REPORTS
- B.2 CONTRACT DOCUMENTS
- B.3 AFFIDAVIT OF PUBLICATION
- B.4 STUDY ANNOUNCEMENT & PUBLIC MEETING MATERIALS
- B.5 FEMA CORRESPONDENCES
- B.6 RESPONSE TO FEMA COMMENTS

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APPENDIX D: HYDROLOGIC ANALYSIS SUPPORTING DOCUMENTATION

APPENDIX E: HYDRAULIC ANALYSIS SUPPORTING DOCUMENTATION

- E.1 MANNING'S N VALUE DETERMINATIONS
- E.2 CROSS SECTION PLOTS
- E.3 EXPANSION AND CONTRACTION COEFFICIENTS
- E.4 ANALYSIS OF STRUCTURES
- E.5 HYDRAULIC CALCULATIONS
- E.6 DVD CONTAINING HYDRAULIC DOCUMENTATION
- E.7 HYDRAULIC WORK MAPS

SECTION 1.0 INTRODUCTION/PURPOSE

1.1 Purpose of Study

The purpose of this study was to re-delineate approximately six miles of Zone AE floodplains and floodway for the 5.17- square mile Rodger Creek watershed. Rodger Creek flows southwesterly and joins Skunk Creek. This study uses updated topographic data and current rainfall standards and analysis procedures to replace the effective August 1990 study prepared by Michael Baker Jr., Inc. (Baker). Findings from this study are being submitted as a Letter of Map Revision (LOMR) request in order to map the results on the Digital Flood Insurance Rate Maps (DFIRMs) that impact the study area. The funding for this study has been provided by FEMA'S CTP Program under the Grant ID EMF-2009-GR-0909.

1.2 Authority for Study

The Flood Control District of Maricopa County (the FCDMC) serves as the floodplain administration agency for the unincorporated areas of Maricopa County. The FCDMC determines and authorizes necessary floodplain studies pursuant to the National Flood Insurance Program (NFIP). The hydrologic and the hydraulic analyses for this study were performed by Cardno WRG and Baker respectively, for the FCDMC under contract No. FCD-2010-C003. The project manager for FCDMC was Ms. Catherine Regester, P.E., CFM.

1.3 Location

Rodger Creek is located within unincorporated Maricopa County, Arizona, and the portion east of 24th Street is located within the Town of Cave Creek, Arizona. This creek is an eastern tributary to Skunk Creek and is located north of Carefree Highway and extends east of 24th Street. The Rodger Creek floodplain study area is about six miles in length, located within Township 6 North and Range 3 East within Sections 10, 11, 12, 13, 15, 16, and 17; and Township 6 North and Range 4 East within Section 7. See Figure 1.3.1: Location Map and Figure 1.3.2: Vicinty Map.

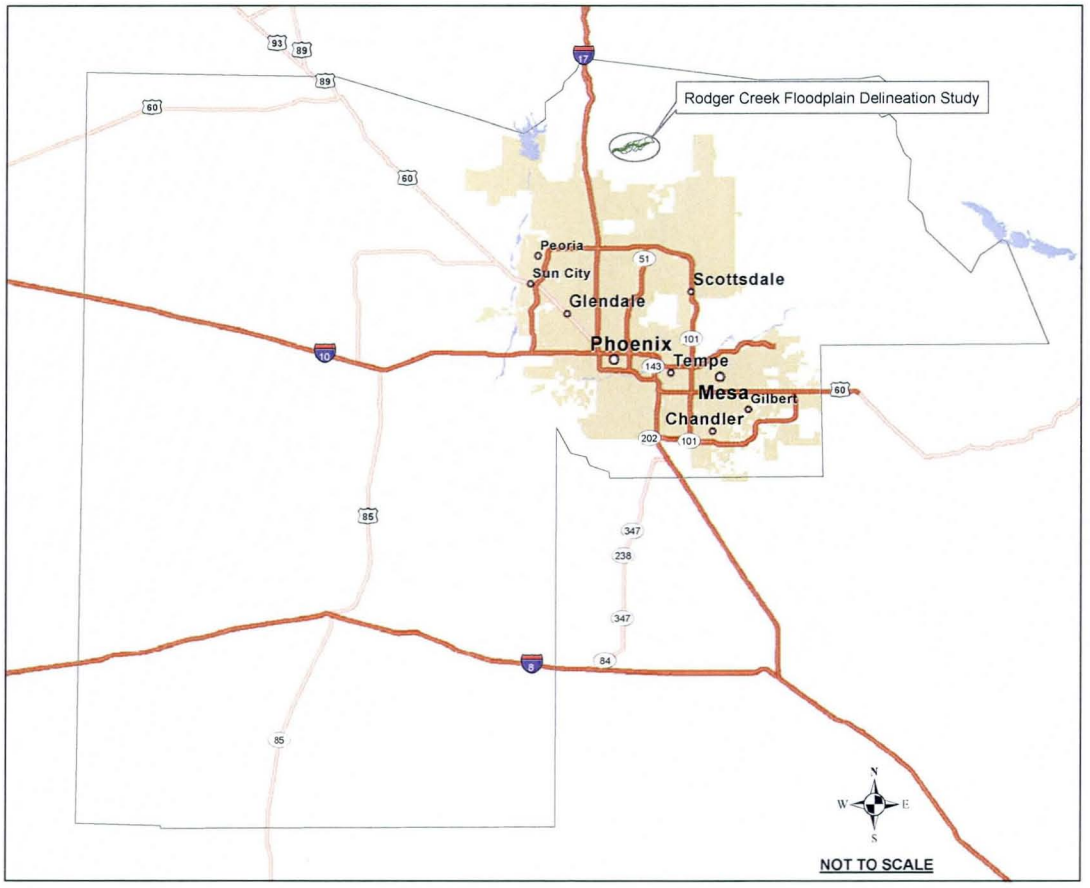

Figure 1.3.1: Location Map

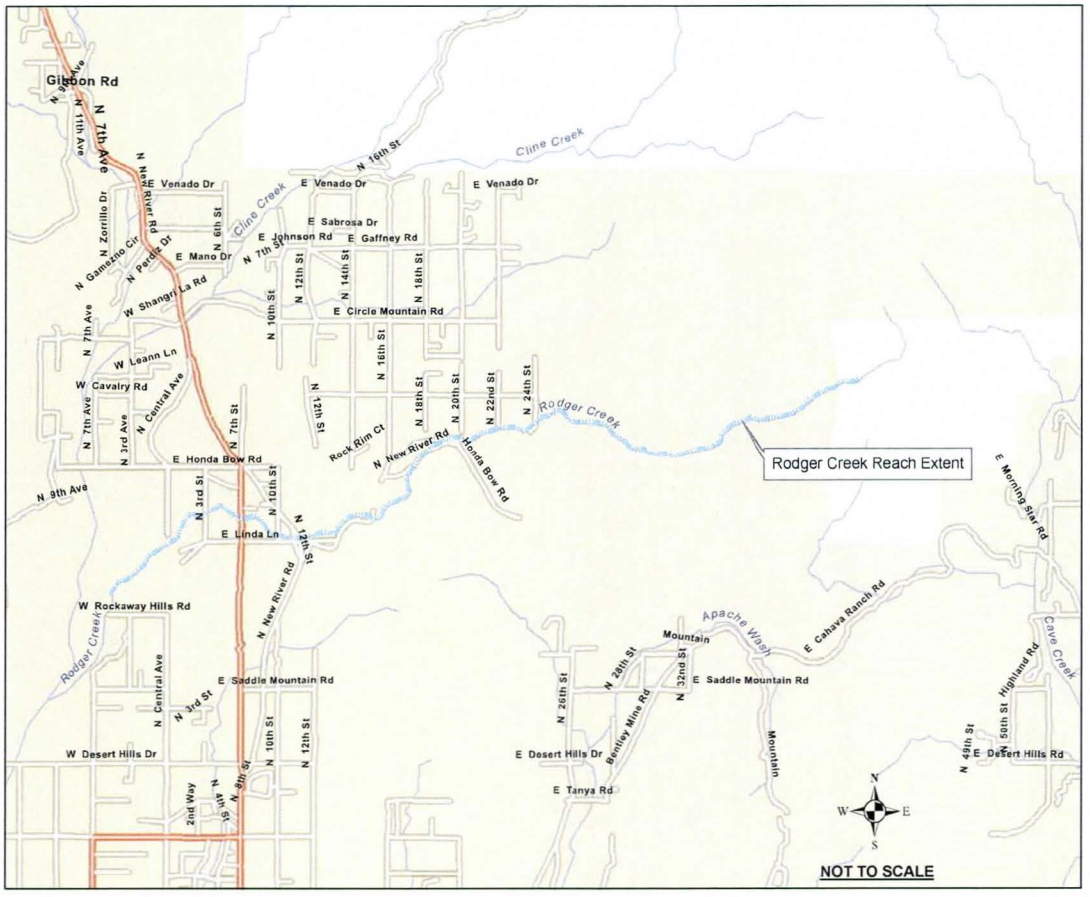

Figure 1.3.2: Vicinty Map

1.4 Methodology

1.4.1 Hydrology

The hydrologic analysis was performed by Cardno WRG using topographic mapping from the FCDMC with respect to the North American Vertical Datum 1988 (NAVD88) and using methods outlined within the FCDMC's *Drainage Policies and Standards* and the *Drainage Design Manual Volume I, Hydrology 4th Edition*, 2009.

Nine drainage areas were delineated for the Rodger Creek watershed area. The US Army Corps of Engineers (USACE) Hydrologic Engineering Center – 1 software program (HEC-1) was used to generate the 100-year 6-hour and 100-year 24-hour storm events. Rainfall data was obtained from the National Oceanic and Atmospheric Administration Atlas 14 Precipitation-Frequency estimates. To estimate infiltration losses, Green and Ampt infiltration loss equations were used in conjunction with soil types from GIS data provided by the FCDMC, and land-use types were identified using aerial photography, field

reconnaissance and coordination with the FCDMC. The S-Graph Unit Hydrograph was used for all the watersheds, and normal-depth storage routing was used between watersheds.

1.4.2 Hydraulics and Floodplain Delineations

To perform the hydraulic analysis and the floodplain delineation, ESRI's ArcMap version 9.3 was used in conjunction with USACE Hydrologic Engineering Center's River Analysis System (HEC-RAS) within GIS; HEC-GeoRAS. 2-foot contour intervals that were provided by the FCDMC were used to generate a surface within ArcMap from which the cross-sections were cut. These sections, along with the river reach, were imported into HEC-RAS version 4.1.0.

The downstream boundary condition ties into an existing effective floodplain for Skunk Creek. At this location, the downstream slope of 0.012 ft/ft was used as the downstream boundary condition. Cross-sections were located at a minimum distance of 500 feet apart, oriented perpendicular to the direction of flow, and are numbered from downstream to upstream in river miles, from left to right looking downstream. Cross-sections are located more frequently than 500 feet as necessary to account for changes in floodplain width or Manning's *n*-values, or to account for structures or channel bends. The baseline location for each channel has been designated with a 10,000 station.

1.5 Acknowledgements

Baker would like to thank Cathy Regester of the Flood Control District of Maricopa County for the opportunity to work on this project.

1.6 Results

Approximately 6 miles of floodplain and floodway were delineated for this project that ties into Skunk Creek. A LOMR request will be submitted to FEMA to reflect the modeling and resulting mapping of the floodplain and floodway to be included in the effective DFIRM.

SECTION 2.0 ADWR/FEMA FORMS

2.1 Study Documentation Abstract for FEMA Submittals

Documentation Abstract For FEMA Submittals	Initial Study		Restudy	x	CLOMR		LOMR		Other	

Section 2.1 – Study Documentation Abstract for FEMA Submittals – Rodger Creek FDS		
2.1.1	Date Study Accepted	N/A
2.1.2	Study Contractor	Michael Baker, Jr., Inc 2929 N. Central Ave, Ste 800 Phoenix, AZ 85012 Contact: Ms. Teri George, PE, CFM, PMP Phone: 602-279-1234 Fax: 602-279-1411 Contract No. FCD 2010-C003 Assignment #2
2.1.3	FEMA Technical Review Contractor	N/A
2.1.4	FEMA Regional Reviewer	N/A
2.1.5	State Coordinator	Mr. Brian Cosson, CFM, ADWR NFIP Program Coordinator
2.1.6	Local Technical Reviewer	Ms. Catherine Regester, PE, CFM
2.1.7	Reach Descriptions	Rodger Creek
2.1.8	USGS Quad Sheets	None. Two foot topographic and aerial mapping was provided by the FCDMC
2.1.9	Unique Conditions and Problems	None
2.1.10	Coordination of Peak Discharges	Hydrology Report for Rodger Creek FDS by Cardno WRG. Dated June, 2011

2.2 FEMA MT-2 Forms

FEMA forms may be found on the following pages.

Additional explanations to the FEMA MT-2 Forms are provided below.

Form 1 – Part C

The map changes requested as part of this LOMR application are based on flood hazard information meant to improve upon effective information shown on the flood map and within the flood study. This study was conducted for the Flood Control District of Maricopa County. Therefore, no review fee has been included.

Form 2 – Part A - Question 5

Sediment transport was not considered since this is a Floodplain Delineation Study, and sediment transport analysis is not typically included in such a project. Note that no design work was completed as part of this project.

Form 2 – Part B - Question 1

The effective values reported in this section were from FEMA Digital Flood Insurance Rate Map (DFIRM) obtained from the Flood Control District of Maricopa County. The datum for these files is NAVD88 and therefore no conversion is necessary. The proposed downstream cross-section 0.209 crosses an effective BFE of Skunk Creek located 0.24 miles upstream from the Skunk Creek/Rodger Creek confluence that has an effective elevation of 1930 (NAVD88). The upstream cross-section 6.345 corresponds to the effective lettered cross-section AG of Rodger Creek that has a water surface elevation of 2557.37 (NAVD88).

Form 2 – Part D - Question 1b

This LOMR causes an increase in the BFE within the undeveloped portion of the study reach, and it decreases in the developed areas of the study reach.

Form 3 – Part C – Question 3

Survey for the New River Road culvert has been provided in Appendix C.2

Form 3 – Part C – Question 4

Sediment transport was not considered since this is a Floodplain Delineation Study, and sediment transport analysis is not typically included in such a project. Note that no design work was completed as part of this project.

FEMA MT-2 FORMS
FORM 1 (FCDMC)

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
Ex: 480301 480287	City of Katy Harris County	TX TX	48473C 48201C	0005D 0220G	02/08/83 09/28/90
040037	Maricopa County	AZ	04013C	0780H, 0415G	09/30/05
040037	Maricopa County	AZ	04013C	0395H, 0785J	09/30/05

2. a Flooding Source: Rodger Creek

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

3. Project Name/Identifier: Rodger Creek Floodplain Delineation Study

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

5. Basis for Request and Type of Revision: Improved Methodology/Data

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

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

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

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

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

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

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☐ Yes, Fee Amount: $_____

☒ No, Attach Explanation

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

D. SIGNATURE

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

Name	Company	
Ms. Catherine Regester, PE, CFM	Flood Control District of Maricopa County	
Mailing Address 2801 W Durango St Phoenix, AZ 85009	Daytime Telephone No. 602-506-4001	FAX No. 602.5064601
	EMAIL ADDRESS cwr@mail.maricopa.gov	
Signature of Requester (Required) Catherine W. Regester		Date 12/13/11

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

Community Official's Name and Title	Community Name	
Mr. Timothy S. Phillips, PE, Chief Engineer and General Manager	Maricopa County	
Mailing Address Flood Control District of Maricopa County 2801 W Durango St Phoenix, AZ 85009	Daytime Telephone No. 602.5061501	FAX No. 602.5064601
	EMAIL ADDRESS tsp@mail.maricopa.gov	
Community Official's signature (required) — SR		Date 1/9/12

CERTIFICATION BY REGISTRATION PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

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

Certifier's Name	License No.	Expiration Date
Ms. Teri S. George	30013	3.312014
Company Name	**Telephone No.**	**Fax No.**
Michael Baker Jr., Inc.	602.2942257	602.2791411
Signature	**E-mail Address**	**Date**
Teri S. George	tsgeorge@mbakercorp.com	12/9/11

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

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

FEMA MT-2 FORMS

FORM 1 (Cave Creek)

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

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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
040129	Town of Cave Creek	AZ AZ	04013C 04013C	0395H 0415G	9/30/05 9/30/05
040129	Town of Cave Creek	AZ	04013C	0785J	9/30/05

2. a. Flooding Source: Rodger Creek

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

3. Project Name/Identifier: Rodger Creek Floodplain Delineation Study

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

5. Basis for Request and Type of Revision:

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

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

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

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

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

☐ Dam ☐ Fill ☐ Other (Attach Description)

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

C. REVIEW FEE

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

☒ No, Attach Explanation

Please see the DHS-FEMA 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: Catherine W. Regester, P.E., CFM	Company: Flood Control District of Maricopa Co.	
Mailing Address: 2801 W Durango St Phoenix, AZ 85009	Daytime Telephone No.: 602-506-4001	Fax No.: 602-506-4601
	E-Mail Address: cwr@mail.maricopa.gov	
Signature of Requester (required): Catherine W. Regester	Date: 12/13/11	

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: Wayne Anderson - Town Engineer	Community Name: Town of Cave Creek	
Mailing Address: 37622 N. Cave Creek Road Cave Creek, AZ 85331	Daytime Telephone No.(480) 488-6626	Fax No.(480) 488-6627
	E-Mail Address: wanderson@cavecreek.org	
Community Official's Signature (required): Wayne E Anderson	Date: 8/10/11	

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: TERI S. George	License No.: 30013	Expiration Date 3/31/14
Company Name: Michael Baker Jr., Inc.	Telephone No.: 602-294-2257	Fax No.: 602-279-1411
Signature: TERI S. George	Date: 12/5/11 E-Mail Address: tsgeorge@mbakercorp.com	

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

FEMA MT-2 FORMS
FORM 2

DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

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

PRIVACY ACT STATEMENT

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

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

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

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

Flooding Source: Rodger Creek

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

A. HYDROLOGY

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

☐ Not revised (skip to section B) ☐ No existing analysis ☒ Improved data

☒ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

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

Location	Drainage Area (Sq. Mi.)	Effective FIS (cfs)	Revised (cfs)
At Skunk Creek Confluence	4.73	6170	5006
At 18th Street	3.54	5450	4163
US of 28th Street	1.70	2870	2097

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

☐ Statistical Analysis of Gage Records ☒ Precipitation/runoff Model Specify Model HEC-1

☐ Regional Regression Equations ☐ Other (please attach description)

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

4. Review/Approval of Analysis.

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

5. Impacts of Sediment Transport on Hydrology

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

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

B. HYDRAULICS

1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevations (ft.) Effective	Proposed/Revised
Downstream Limit	0.24 Miles from Skunk Creek	0.209	1930	1930
Upstream Limit	6.345 Miles upstream from	6.345	2557.37	2559.42

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

2. Hydraulic Method/Model Used HEC-RAS Version 4.1.0

3. Pre-Submittal Review of Hydraulic Models

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

4. Models Submitted	Natural Run		Floodway Run		Datum
Duplicate Effective Model*	File Name	Plan Name	File Name	Plan Name	
Corrective Effective Model*	File Name	Plan Name	File Name	Plan Name	
Existing or Pre-Project Conditions Model	File Name	Plan Name	File Name	Plan Name	
Revised or Post-Project Conditions Model	File Name RodgerCreek.prj	Plan Name Rodger Creek Plan	File Name RodgerCre	Plan Name Rodger Creek	NAVD 88
Other - (attach description)	File Name	Plan Name	File Name	Plan Name	

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

☒ Digital Models Submitted? (Required)

C. MAPPING REQUIREMENTS

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

☒ Digital Mapping (GIS/CADD) Data Submitted

Topographic Information Rodger Creek Floodplain Delineation Study Work Maps, total 7 sheets

Source Flood Control District of Maricopa County, Michael Baker Jr., Inc. Date July, 2011

Accuracy 1 Inch = 200 Feet

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

☒ Annotated FIRM and/or FBFM (Required)

D. COMMON REGULATORY REQUIREMENTS*

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

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

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

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

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

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

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

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

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

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

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

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

FEMA MT-2 FORMS
FORM 3

DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

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

PAPERWORK BURDEN DISCLOSURE NOTICE

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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; Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

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

Flooding Source: Rodger Creek

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

A. GENERAL

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

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

Description of Modeled Structure

1. Name of Structure: New River Road Culvert

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

Location of Structure: New River Road

Downstream Limit/Cross Section: 1.751

Upstream Limit/Cross Section: 1.763

2. Name of Structure:

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

Location of Structure:

Downstream Limit/Cross Section:

Upstream Limit/Cross Section:

3. Name of Structure:

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

Location of Structure:

Downstream Limit/Cross Section:

Upstream Limit/Cross Section:

NOTE: FOR MORE STRUCTURES, ATTACH ADDITIONAL PAGES AS NEEDED.

B. CHANNELIZATION

Flooding Source: _____

Name of Structure: _____

1. Hydraulic Considerations

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

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

☐ Subcritical flow ☐ Critical flow ☐ Super critical flow ☐ Energy grade line

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

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

☐ Other locations (specify): _____

2. Channel Design Plans

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

3. Accessory Structures

The Channelization includes (check one):

☐ Levees [Attach Section (E Levee/Floodwall)] ☐ Drop structures ☐ Super elevated sections

☐ Transitions in cross sectional geometry ☐ Debris basin/design basin [Attach Section D (Dam/Basin)] ☐ Energy dissipater

☐ Weir ☐ Other (describe): _____

4. Sediment Transport Considerations

Are the hydraulics of the channel affected by sediment transport? ☐ Yes ☐ No

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

C. BRIDGE/CULVERT

Flooding Source: Rodger Creek

Name of Structure: New River Road Culvert

1. This revision reflects (check one):

☐ Bridge/culvert not modeled in the FIS

☐ Modified bridge/culvert previously modeled in the FIS

☒ New analysis of bridge/culvert previously modeled in the FIS

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

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

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

4. Sediment Transport Considerations

Are the hydraulics of the structure affected by sediment transport? ☐ Yes ☒ No

If Yes, then fill out Section F (Sediment Transport) of Form 3. If no, then attach an explanation.

D. DAM/BASIN

Flooding Source: _____

Name of Structure: _____

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

2. The dam/basin was designed by (check one): ☐ Federal agency ☐ State agency ☐ Private organization ☐ Local government agency

   Name of the agency or organization: _____

3. The dam was permitted as (check one): ☐ Federal Dam ☐ State Dam

   Provide the permit or identification number (ID) for the dam and the appropriate permitting agency or organization

   Permit or ID number _____ Permit Agency or Organization: _____

   ☐ Local Government Dam ☐ Private Dam

Provide related drawings, specifications and supporting design information.

4. Does the project involve revised hydrology? ☐ Yes ☐ No

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

Was the dam/basin designed using critical duration storm? (Must account for the maximum volume of runoff)

☐ Yes, provide supporting documents with your completed Form 2.

☐ No, provide written explanation and justification for not using the critical duration storm.

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

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

6. Does the Base Flood Elevation behind the dam/basin or downstream of the dam/basin change? ☐ Yes ☐ No

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

FEQUENCY (% annual chance)	Stillwater Elevation Behind the Dam/Basin FIS	REVISED
10-year (10%)		
50-year (2%)		
100-year (1%)		
500-year (0.2%)		
Normal Pool Elevation		

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

E. LEVEE/FLOODWALL

1. System Elements

   a. This Levee/Floodwall analysis is based on (check one): ☐ upgrading of an existing levee/ floodwall system ☐ a newly constructed levee/ floodwall system ☐ reanalysis of an existing levee/ floodwall system

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

   ☐ earthen embankment, dike, berm, etc. Station ____ to ____

   ☐ structural floodwall Station ____ to ____

   ☐ other (describe): _____ Station ____ to ____

   c. Structural Type (check one): ☐ monolithic cast-in place reinforced concrete ☐ reinforced concrete masonry block ☐ sheet piling

   ☐ other (describe): _____

   d. Has the levee/floodwall system been certified by a Federal agency to provide protection from the base flood? ☐ Yes ☐ No

   If Yes, by which agency? _____

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

   1. Plan of the levee embankment and floodwall structures Sheet Numbers _____
   2. A profile of the levee/floodwall system showing the Base Flood Elevation (BFE), levee and/or wall crest and foundation, and closure locations for the total levee system. Sheet Numbers _____
   3. A profile of the BFE, closure opening outlet and inlet invert elevations, type and size of opening, and kind of closure. Sheet Numbers _____

4. A layout detail for the embankment protection measures. Sheet Numbers _____

5. Location, layout, and size and shape of the levee embankment features, foundation treatment, floodwall structure, closure structures, and pump stations. Sheet Numbers _____

2. Freeboard

a. The minimum freeboard provided above the BFE is:

Riverine

3.0 feet or more at the downstream end and throughout ☐ Yes ☐ No

3.5 feet or more at the upstream end ☐ Yes ☐ No

4.0 feet within 100 feet upstream of all structures and/or constrictions ☐ Yes ☐ No

Coastal

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

2.0 feet above the 1%-annual-chance stillwater surge elevation ☐ Yes ☐ No

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

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

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

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

3. Closures

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

If opening exists, list all closures:

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

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

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

4. Embankment Protection

a. The maximum levee slope land side is: _____

b. The maximum levee slope flood side is: _____

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

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

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

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

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

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

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

Attach engineering analysis to support construction plans.

5. Embankment and Foundation Stability

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

_____

☐ Overall height: Sta.: _____ , height _____ ft.

☐ Limiting foundation soil strength

Strength ϕ = _____ degrees, c = _____ psf

Slope: SS = _____ (h) to _____ (v)

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

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

_____

c. Summary of stability analysis results:

Case	Loading Conditions	Critical Safety Factor	Criteria Min.
I	End of construction		1.3
II	Sudden drawdown		1.0
III	Critical flood stage		1.4
IV	Steady seepage at flood stage		1.4
VI	Earthquake (Case I)		1.0

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

5. Embankment and Foundation Stability (continued)

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

If Yes, describe methodology used: _____

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

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

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

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

Attach engineering analysis to support construction plans.

6. Floodwall and Foundation Stability

a. Describe analysis submittal based on Code (check one): ☐ UBC (1988) ☐ Other (specify): _____

b. Stability analysis submitted provides for: ☐ Overturning ☐ Sliding If not, explain: _____

c. Loading included in the analysis were: ☐ lateral earth @ P_A= _____psf; Pp = psf

☐ Surcharge-Slope @ _____, ☐ surface _____psf

☐ Wind @ Pw = _____psf

☐ Seepage (Uplift): _____ ☐ Earthquake @ Peq = _____%g

☐ 1%-annual-chance significant wave height _____ft.

☐ 1%-annual-chance significant wave period _____sec.

d. Summary of Stability Analysis Results: Factors of Safety.
Itemize for each range in site layout dimension and loading condition limitation for each respective reach.

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

(Ref: FEMA 114 Sept. 1986; USACE EM 1110-2-2502)
Note: (Extend table on an added sheet as needed and reference)

e. Foundation bearing strength for each soil type:

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

f. Foundation scour protection ☐ is, ☐ is not provided. If provided, attach explanation and supporting documentation.
Attach engineering analysis to support construction plans.

7. Settlement

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

b. The computed range of settlement is _____ ft. to _____ ft.

7. Settlement (continued)

c. Settlement of the levee crest is determined to be primarily from: ☐ Foundation consolidation ☐ Embankment compression

☐ Other (describe): _____

d. Differential settlement of floodwalls ☐ has ☐ has not been accommodated in the structural design and construction.

Attach engineering analysis to support construction plans.

8. Interior Drainage

a. Specify size of each interior watershed:

Draining to pressure conduit: _____ acres

Draining to ponding area: _____ acres

b. Relationships Established

Ponding elevation vs. storage	☐ Yes	☐ No
Ponding elevation vs. gravity flow	☐ Yes	☐ No
Differential head vs. gravity flow	☐ Yes	☐ No

c. The river flow duration curve is enclosed: ☐ Yes ☐ No

d. Specify the discharge capacity of the head pressure conduit: _____ cfs

e. Which flooding conditions were analyzed?

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

If No for any of the above, attach explanation.

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

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

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

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

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

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

Will the operation be automatic? ☐ Yes ☐ No

8. Interior Drainage (continued)

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

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

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

9. Other Design Criteria

a. The following items have been addressed as stated:

Liquefaction ☐ is ☐ is not a problem

Hydrocompaction ☐ is ☐ is not a problem

Heave differential movement due to soils of high shrink/swell ☐ is ☐ is not a problem

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

Attach supporting documentation.

c. If the levee/floodwall is new or enlarged, will the structure adversely impact flood levels and/or flow velocities flood side of the structure?

☐ Yes ☐ No Attach supporting documentation.

d. Sediment Transport Considerations:

Was sediment transport considered? ☐ Yes ☐ No

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

10. Operational Plan and Criteria

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

b. Does the operation plan incorporate all the provisions for closure devices as required in Paragraph 65.10(c)(1) of the NFIP regulations?

☐ Yes ☐ No

c. Does the operation plan incorporate all the provisions for interior drainage as required in Paragraph 65.10(c)(2) of the NFIP regulations?

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

11. Maintenance Plan

a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP regulations?

☐ Yes ☐ No If No please attach supporting documentation.

12. Operations and Maintenance Plan

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

CERTIFICATION OF THE LEVEE DOCUMENTATION

This certification is to be signed and sealed by a licensed registered professional engineer authorized by law to certify elevation information data, hydrologic and hydraulic, and any other supporting information as per NFIP regulations paragraph 65.10(e) 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 statements may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name	License No.	Expiration Date
Company Name	Telephone No.	Fax No.
Signature	Date	E-Mail Address

F. SEDIMENT TRANSPORT

Flooding Source: _____

Name of Structure: _____

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

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

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

Sediment transport rate _____ (percent concentration by volume)

Method used to estimate sediment transport: _____

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

Method used to estimate scour and/or deposition: _____

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

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

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

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Technical Data Notebook
Section 3

March 29, 2012

Rodger Creek Floodplain Delineation Study

FCDMC Contract # 2010C003
Assignment #2

Maricopa County, Arizona

5H. 9-30-12

Exp. 3-31-12

Civil Engineering
Land Planning
Land Surveying
Landscape Architecture
LEED/Sustainability
Master Planning
Transportation
Water Resources

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Project #:
Cardno WRG 4109563000

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APPENDICES

Appendix C – Survey Supporting Documentation

SECTION 3.0 MAPPING & SURVEY INFORMATION

3.1 Field Survey Information

The survey data for this study are based on the North American Vertical Datum of 1988 (NAVD88) with the horizontal datum based on the North American Datum of 1983 (NAD83) and presented in the Arizona State Plane Coordinate System. Elevation Reference Marks (ERM) were based on data gathered by the Maricopa County Department of Transportation as a part of their Geodetic Densification and Cadastral Survey (GDACS) project. Several of the GDACS monuments were field verified by Cardno WRG for use in the field survey. Monuments 46058-1 and 46057-1M were field verified with adequate results and monument 46052-1M was located in the field and determined to be damaged. Several survey monuments were set as a part of the topographic mapping project used in this study. Seven of these monuments and two of the GDACS monuments (46058-1 and 46057-1M) were used as Elevation Reference Marks (ERM) for the Rodger Creek Floodplain Delineation Study. These Elevation Reference Marks are shown on the study work maps. The Elevation Reference Marks used in the study have been tabulated and included in Appendix C. This tabulation includes the point identification, the State Plane coordinates, elevations, and descriptions. The GDACS data sheets as provided by the Maricopa County Department of Transportation have also been included in the appendix.

Detailed pipe culvert and roadway survey data were obtained for the purposes of this study. This data included elevation and horizontal location data for the 7th Street/New River Road roadway deck and pipe culverts located at the Rodger Creek crossing. In addition, a field cross-section was obtained upstream and downstream of the culvert. A graphic illustration of the survey data is included in Appendix C.

At the request of Maricopa County, Cardno WRG has performed a field verification of the topography used in this study, on behalf of the Flood Control

District of Maricopa County. Specifically, this verification consisted of surveying a cross-section of the 7th Street/New River Road roadway crossing, generally at the roadway centerline. Topographic elements of this verified cross-section were found to generally match that of the aerial topography. The Topography Verification Cross-Section included in the Appendix graphically illustrates a comparison between the aerial photography and the field surveyed cross-section. Refer to Appendix C for Survey Supporting Documentation.

3.2 Mapping

The topographic mapping used for the purposes of this study is that provided by the Flood Control District of Maricopa County. Several topographic data sets have been procured in the vicinity of Rodger Creek. These are in reverse chronological order based on flight date below in Table 3.2 – *Topographic Data.*

Table 3.2 – *Topographic Data*

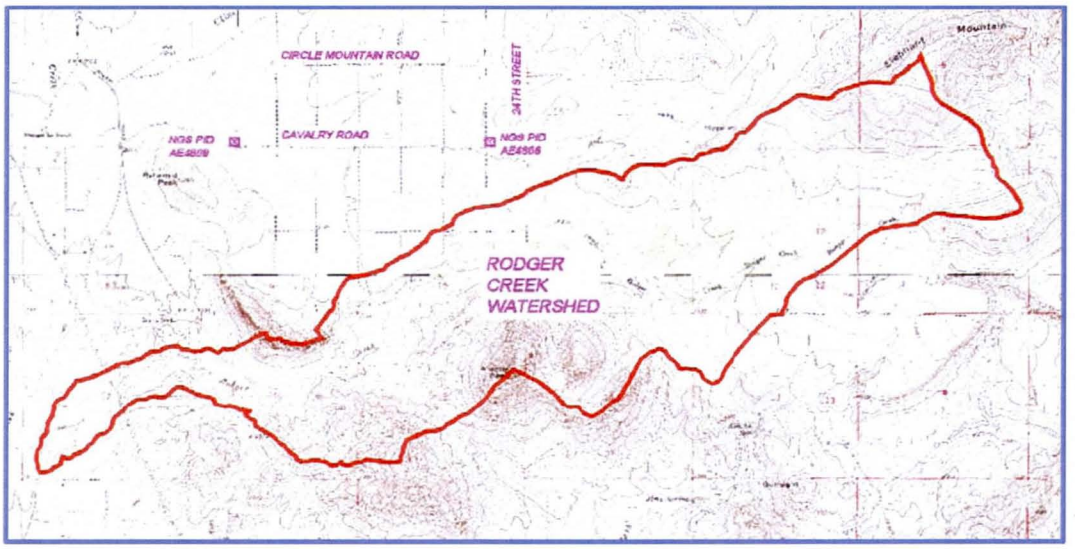
FCDMC Project ID	FCDMC Contract No	TOPO ID	Flight Date	Contour Interval	DATUM	
					VERTICAL	HORIZONTAL
1303	08-20	300	04/07/2010	2 ft	NAVD88	NAD83
1254	03-48	700	10/20/2004	2 ft	NAVD88	NAD83
1218	01-19	100	03/26/2002	2 ft	NAVD88	NAD83
1050	96-06	100	03/20/1997	2 ft	NGVD29	NAD83

Mapping Project ID 1303 encompasses the Rodger Creek floodplain and has been used for the purposes of the floodplain re-delineation presented herein.

3.3 NGVD29 Datum Elevation Conversion Equation

As mentioned, the topographic data has been obtained with respect to the NAVD88 vertical datum. The FCDMC has requested that an elevation conversion to the National Geodetic Vertical Datum of 1929, referred to as NGVD29, be

provided as a part of this study. Published National Geodetic Service (NGS) control points and their associated Permanent Identifiers (PID) were researched for the purposes of this conversion. Several PID points are located in the vicinity of the Rodger Creek watershed, with the closest identified as AE4806. PID AE4806 is generally located in the vicinity of the intersection of the Circle Mountain Road and 22nd Street alignments. The NGS Data Sheet for PID AE4806 is included in the Appendix.



The conversion of the topographic data to the NGVD29 vertical datum was obtained from the National Geodetic Survey website using the latitude and longitude for the project. The datum conversion equation for the project is listed below.

NAVD 88 – 2.03' = NGVD 29

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Technical Data Notebook
Section 4

July 12, 2011

Rodger Creek Floodplain Delineation Study

FCDMC Contract # 2010C003
Assignment #2

Maricopa County, Arizona

Civil Engineering
Land Planning
Land Surveying
Landscape Architecture
LEED/Sustainability
Master Planning
Transportation
Water Resources

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Project #:
Cardno WRG 4109563000

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APPENDICES

Appendix D – Hydrologic Analysis Supporting Documentation

EXHIBITS

Exhibit 4.2.1 – Schematic Map

Exhibit 4.2.2 – Watershed Map

Exhibit 4.2.6.1 – Soils Map

Exhibit 4.2.6.2 – Land Use Map

Exhibit 4.5.1 – Flow Map

SECTION 4.0 HYDROLOGY

4.1 Method Description

The hydrology analysis presented herein was performed as set forth in the FCDMC's *Drainage Policies and Standards* and the District's *Drainage Design Manual, Volume I, Hydrology, 4th Edition* (2009).

Hydrologic peak flow estimates were obtained for a series of nine distinct sub-basins within the Rodger Creek Watershed. These peak flow estimates were obtained with the use of the U.S. Army Corps of Engineers HEC-1 Flood Hydrograph computer software, version 4.1. The FCDMC's Drainage Design Management System for Windows (DDMSW) Version 4.6.0 was used to estimate the hydrologic parameters for the Rodger Creek Watershed and to execute the HEC-1 hydrology model.

The 100-year, 6-hour storm and the 100-year, 24-hour storm were each utilized to obtain peak flow estimates throughout the watershed. The 100-year, 24-hour storm was generally found to yield higher peak flows and is therefore used as the basis for the floodplain delineation presented herein. Refer to Appendix D for Hydrologic Analysis Supporting Documentation.

4.2 Parameter Estimation

4.2.1 Drainage Area Boundaries

The Rodger Creek watershed boundary was initially delineated with the use of United States Geological Survey (USGS) 7.5 minute series quadrangle topography, and then summarily cross-checked with detailed aerial photography provided by the FCDMC, and field reconnaissance. The Rodger Creek sub-basin drainage boundaries were delineated in an effort to provide sufficient detail to allow estimation of peak discharges at structures, road crossings and confluences,

based on the detailed 2-foot contour interval topographic data provided by the FCDMC where available. The 10-foot contour interval topographic maps were used in the areas that were not encompassed within the limits of the 2-foot contour interval topographic maps.

Exhibit 4.2.1 – *Schematic Map* graphically illustrates the Rodger Creek Watershed topography, sub-basins, concentration points, and HEC-1 routing logic.

4.2.2 Watershed Work Maps

Refer to Exhibit 4.2.2 – *Watershed Map* for an illustration of the Rodger Creek watershed, lag flow paths, and interior sub-basin delineation, locations of associated concentration points, and a tabulation of corresponding estimated 100-year peak flows.

4.2.3 Gage Data

The Flood Control District maintains a series of 304 automated precipitation gages as a part of the Automated Local Evaluation in Real Time (ALERT) system. However, there are currently no ALERT stations located within the boundaries of the Rodger Creek Watershed.

There are several precipitation gage stations that are located outside the study reach. The precipitation gages in the vicinity of the Rodger Creek Watershed are included in the data collection section of this Technical Data Notebook. No consideration was given in regard to peak flow calibration, to these ALERT stations peripheral to the watershed.

4.2.4 Statistical Parameters

As mentioned, no ALERT stations currently exist within the Rodger Creek Watershed and therefore no statistical analysis has been conducted as a part of this study.

4.2.5 Precipitation

Peak flow estimates presented herein for 100-year, 24-hour and 100-year, 6 hour rainfall events are based on precipitation data as presented in the National Oceanic and Atmospheric Administration's (NOAA) Atlas 14.

4.2.6 Physical Parameters

In accordance with the FCDMC's *Rodger Creek Floodplain Delineation Study General Scope of Work, Contract FCD 2010C003 Assignment #2*, the Green and Ampt Infiltration methodology was utilized to estimate precipitation losses within the Rodger Creek Watershed. The parameters required for coding into the LG record in HEC-1 for use with the Green and Ampt equations are the initial abstraction parameters (IA), volumetric moisture deficit (DTHETA), wetting front capillary suction (PSIF), hydraulic conductivity (XKSAT), and percent of impervious area of the sub-basin directly connected to the outlet (RTIMP).

The U.S. Department of Agriculture's *Soil Survey of Aguila-Carefree Area, Parts of Maricopa and Pinal Counties, Arizona* Soils Maps were used to identify soil types within the Rodger Creek Watershed for use in estimation of Green and Ampt soil infiltration parameters. A soils data GIS shape file was provided by the FCDMC for use in estimation of weighted soil parameters. Table 4.2.6.1 – *Rodger Creek Watershed Soils Summary* lists the soil types found within the watershed along with associated hydraulic conductivity and rock outcropping percentage. Exhibit 4.2.6.1 – *Soils Map* illustrates the location of soil unit boundaries within the Rodger Creek Watershed.

Table 4.2.6.1 – *Rodger Creek Watershed Soils Summary*

FCDMC SOIL ID	SOIL DESCRIPTION	XKSAT [inches/ hour]	ROCK[1] [%]
6453	Antho-Carrizo-Maripo complex	0.58	0
64512	Carefree cobbly clay loam, 1 to 8 percent slopes	0.01	0
64526	Continental cobbly clay loam, 1 to 8 percent slopes	0.01	0
64544	Ebon very gravelly loam, 1 to 8 percent slopes	0.03	0
64552	Gachado-Lomitas-Rock outcrop complex, 7 to 55 percent slopes	0.16	20
64566	Greyeagle-Suncity Variant complex, 1 to 7 percent slopes	0.23	0
64568	Gunsight-Cipriano complex, 1 to 7 percent slopes	0.63	0
64572	Lehmans-Rock outcrop complex, 8 to 65 percent slopes	0.09	30
64593	Nickel-Cave complex, 8 to 30 percent slopes	0.33	0
64595	Ohaco gravelly loam	0.04	0
64596	Pinaleno-Tres Hermanos complex, 1 to 10 percent slopes	0.07	0
64598	Pinamt-Tremant complex, 1 to 10 percent slopes	0.37	0
645110	Suncity-Cipriano complex, 1 to 7 percent slopes	0.13	0

Notes:
1. RTIMP was adjusted to 60% of published rock outcropping percentage data to account for continuous effective impervious area.

The aerially weighted logarithms of the XKSAT values for each of the nine sub-basins in the Rodger Creek Watershed were then used to determine wetting front suction (PSIF) and volumetric moisture deficit (DTHETA). A normal moisture deficit condition was assumed for determination of volumetric moisture deficit.

Land use within the Rodger Creek Watershed was identified based on review of aerial photography, field reconnaissance, and coordination with the FCDMC. The land use criteria was utilized to establish remaining soil infiltration parameters which include initial abstraction (IA), percent of impervious sub-basin area (RTIMP), and the vegetation cover percentage (V_c.) utilized to adjust hydraulic conductivity. The land uses identified within the watershed along with the

associated soil infiltration parameters are tabulated below in Table 4.2.6.2 – *Rodger Creek Watershed Land Use Summary*. Exhibit 4.2.6.2 – *Land Use Map* illustrates the location of the land uses within the Rodger Creek Watershed.

Table 4.2.6.2 – *Rodger Creek Watershed Land Use Summary*

FCDMC LAND USE ID	DESCRIPTION	IA [inches]	RTIMP [%]	VEGETATION COVER [%]
120	Estate Residential (1/5 du per acre to 1 du per acre)	0.30	5	30
730	Passive open space (Includes mountain preserves and washes)	0.10	0	45

The Green and Ampt soil infiltration parameters are summarized for each sub-basin in Table 4.2.6.3 – *Green and Ampt Soil Infiltration Parameter Summary.*

Table 4.2.6.3 – *Green and Ampt Soil Infiltration Parameter Summary*

SUB-BASIN	IA [inches]	DTHETA	PSIF [inches]	XKSAT [inches/hour]	RTIMP [%]
10	0.10	0.15	8.80	0.07	14
20	0.10	0.13	10.10	0.04	5
30	0.10	0.15	8.80	0.07	10
40	0.10	0.15	7.30	0.13	9
50	0.19	0.15	8.00	0.09	9
60	0.19	0.15	9.70	0.05	10
70	0.10	0.15	7.30	0.13	17
80	0.12	0.15	7.30	0.12	15
90	0.16	0.23	6.20	0.19	6

Rainfall data was identified from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 Precipitation-Frequency Atlas for Maricopa County as found in DDMSW version 4.6.0. Precipitation depths of 4.815 inches and 3.181 inches for the 100-year, 24-hour and 100-year, 6-hour, respectively, were used for the hydrologic modeling of the Rodger Creek watershed.

The S-Graph Unit Hydrograph was used for all the sub-basins within the Rodger Creek Watershed. The drainage area, flowpath length, slope, and Lca were estimated from aerial topography provided by the FCDMC. The appropriate S-graph for each basin was selected from one of the four S-graphs typically used in flood hydrology studies in Maricopa County. These S-graphs include the Phoenix Mountain, the Phoenix Valley, the Desert/Rangeland, and Agricultural S-graphs. Table 4.2.6.4 – *Rodger Creek Watershed Sub-Basin Parameters* summarizes the parameter values utilized for hydrologic modeling within each of the sub-basins.

Table 4.2.6.4 – *Rodger Creek Watershed Sub-Basin Parameters*

SUB-BASIN ID	DRAINAGE AREA [mi^2]	FLOWPATH LENGTH [mi]	BASIN ELEVATION		S-GRAPH PARAMETERS		
			USGE	DSGE	TYPE	L_{CA} [mi]	K_N
10	0.855	1.637	3830	2482	MOUNTAIN	0.99	0.050
20	0.849	1.891	2708	2280	MOUNTAIN	0.58	0.050
30	0.657	2.015	3225	2280	MOUNTAIN	1.06	0.050
40	0.670	1.385	2632	2216	MOUNTAIN	0.42	0.050
50	0.507	1.445	2648	2150	MOUNTAIN	0.49	0.041
60	0.284	1.146	2269	2079	MOUNTAIN	0.57	0.041
70	0.380	1.292	3220	2079	MOUNTAIN	0.57	0.050
80	0.529	1.434	2226	2026	MOUNTAIN	0.42	0.048
90	0.442	1.866	2550	1909	MOUNTAIN	0.97	0.044

Normal depth storage routing was used for six reaches within the HEC-1 model. Manning's "n" values were based off of a field examination of the washes. Drainage lengths and slopes were calculated using ten foot contours, and aerial photography using AutoCAD. Representative 8-point channel cross-sections for each routing reach were extracted from the detailed aerial topography provided by the FCDMC for the Rodger Creek Watershed, in conjunction with field reconnaissance. The routing parameters utilized for each routing reach within the Rodger Creek Watershed are tabulated below in Table 4.2.6.5 – *Rodger Creek Watershed Routing Parameters*.

Table 4.2.6.5 – *Rodger Creek Watershed Routing Parameters*

ROUTE ID	HYDROGRAPH		LENGTH [ft]	SLOPE [ft/ft]	MANNING'S ROUGHNESS COEFFICIENTS		
	UPSTREAM	DOWNSTREAM			LOB	CHAN	ROB
RT10	10	20	8281	0.0244	0.055	0.075	0.055
RTCP30	CP30	40	3127	0.0205	0.050	0.065	0.050
RTCP40	CP40	50	3387	0.0195	0.050	0.055	0.050
RTCP50	CP50	60	4427	0.0158	0.050	0.060	0.050
RTCP70	CP70	80	3365	0.0155	0.050	0.060	0.050
RTCP80	CP80	90	9218	0.0117	0.055	0.060	0.055

4.3 Problems Encountered During Study

4.3.1 Special Problems and Solutions

An effort was made to validate the hydrograph routing parameters associated with the normal depth storage routing methodology utilized in the Rodger Creek HEC-1 hydrologic model. Flow velocity was utilized as a basis for validation of the routing parameters.

The hypothetical velocity was determined for each routing reach within the Rodger Creek Watershed based on the equation below.

$$V_{ROUTEREACH} = \frac{L_{ROUTINGREACH}}{\Delta t_p}$$

This hypothetical velocity is determined by the ratio of route length to difference in time of peak reported by the HEC-1 model output for the downstream and upstream hydrographs respectively. The difference in time of peak is based on a computational time interval of 5 minutes. These hypothetical velocities were then compared to velocities estimated with the use of normal depth methodology as well as those yielded by the Rodger Creek HEC-RAS model presented herein.

Specifically, the eight point cross-section, reach slope, and manning's roughness coefficients for each routing reach utilized in the Rodger Creek HEC-1 model were analyzed. Additionally, the minimum and maximum velocities yielded by the series of HEC-RAS cross-sections found to lie within each specific reach extent were reviewed with comparison made to the hypothetical velocity. Hypothetical velocities are compared to those yielded by the use of normal depth methodology and the HEC-RAS model in Table 4.3.1.1 – *Velocity Comparison.*

Table 4.3.1.1 – *Velocity Comparison*

HEC-1 ROUTE ID	HYPOTHETICAL VELOCITY[ft3/sec]	NORMAL DEPTH VELOCITY [ft^3/sec]	HEC-RAS VELOCITY [ft3/sec]	
			MIN	MAX
RT10	5.5	4.6	4.9	9.4
RTCP30	10.9	7.7	4.8	7.4
RTCP40	5.5	7.8	5.8	10.8
RTCP50	7.7	7.2	5.6	10.4
RTCP70	11.7	7.5	6.3	9.4
RTCP80	10.2	6.6	4.1	12.1

Consideration must be given to the computational time interval of 5 minutes which by definition, yields an actual time frame ranging from 2.5 to 7.5 minutes.

4.3.2 Modeling Warning and Error Messages

No modeling warning and error messages were produced for the peak flow estimation of the Study Reach's watershed.

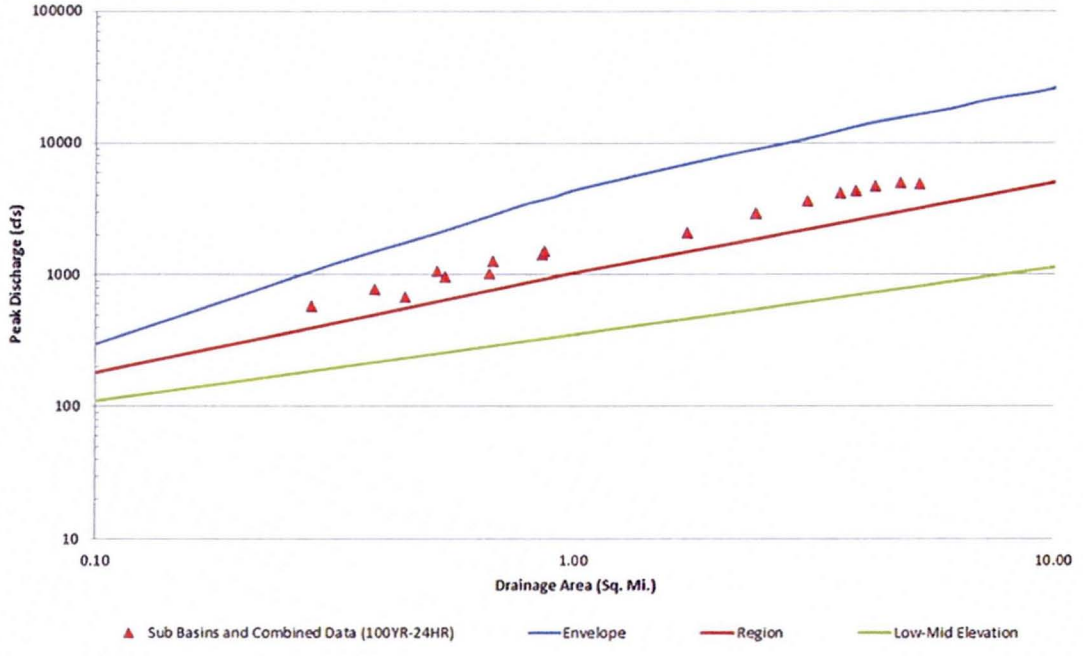
4.4 Calibration

Peak flows produced by the hydrologic model were checked for reasonableness against the existing study and USGS Regional Regression Equations. Table 4.4 – *USGS Regression Peak Flows* lists peak flows estimated with the use of USGS Envelope Curve methodology.

SUB-BASIN ID	PEAK FLOW (ft^3/sec)			
	USGS LOW-MID	USGS REGION	USGS ENVELOPE	(HEC-1) 100-Year, 24-Hour
10	328	934	3732	1,532
CP-20	105	1489	6836	2,097
CP-30	547	1870	8885	2,948
CP-40	624	2224	10770	3,626
CP-50	674	2468	12368	4,163
CP-60	702	2602	13245	4,320
CP-70	737	2776	14257	4,681
CP-80	783	3009	15443	5,006
CP-90	819	3198	16379	4,904

Cardno WRG

100 Year Peak Discharge - Drainage Area
USGS Comparative Graphs - 12 Central Arizona Region
Rodger Creek



4.5 Final Results

4.5.1 Hydrologic Analysis Results

The results of the hydrologic analysis along with the peak discharges for both 100-year, 24-hour and 100-year, 6-hour rainfall events are provided in Table 4.5.1 – *100-Year Peak Flow Summary* below. Exhibit 4.5.1 – *Flow Map* illustrates the location of peak flows within the Rodger Creek Watershed.

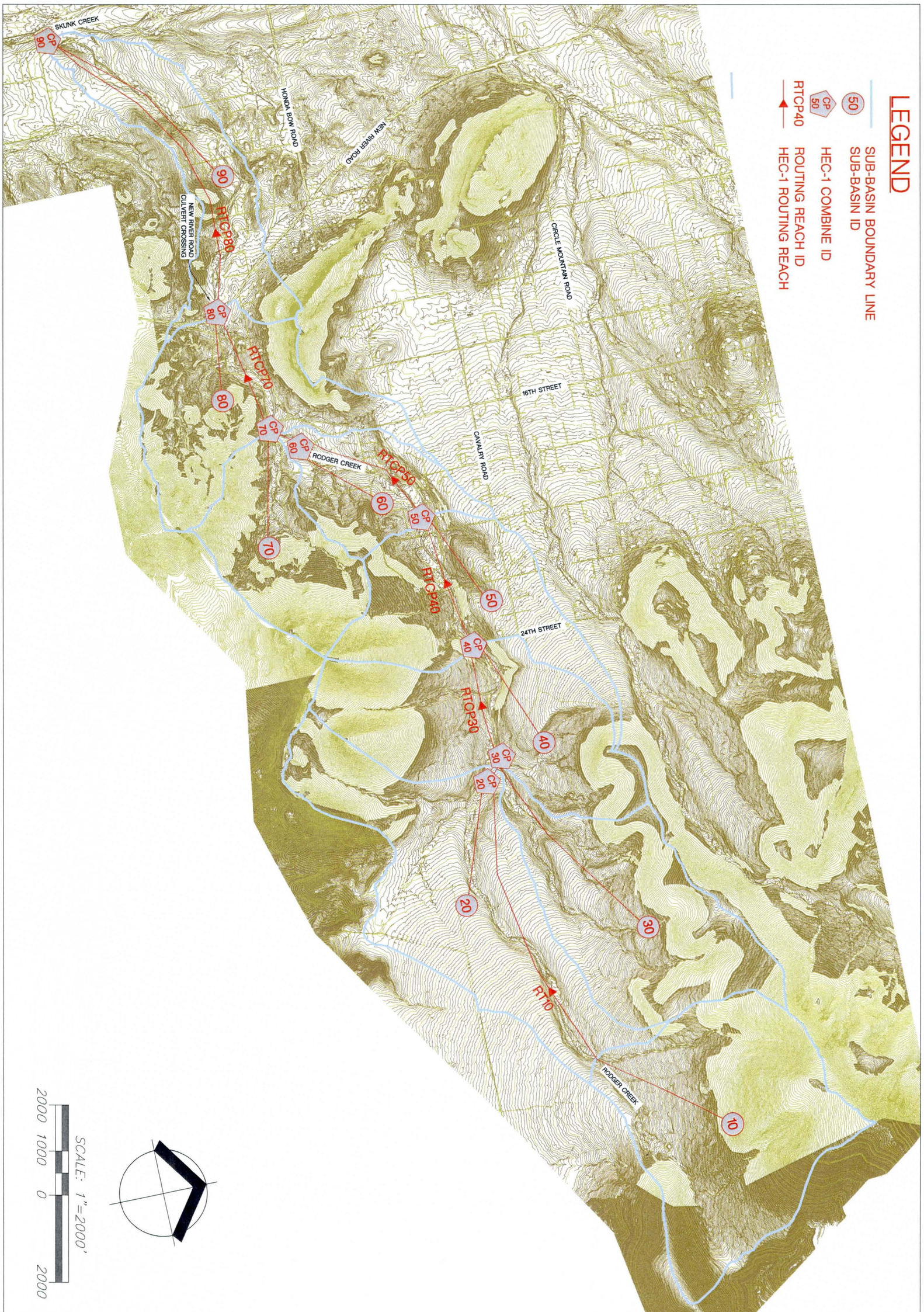
Table 4.5.1 - *100-Year Peak Flow Summary*

SUB-BASIN ID	PEAK FLOW (ft^3/sec)	
	100-Year, 6-Hour	100-Year, 24-Hour
10	1523	1,532
CP-20	1996	2,097
CP-30	2622	2,948
CP-40	3134	3,626
CP-50	3462	4,163
CP-60	3609	4,320
CP-70	3877	4,681
CP-80	4140	5,006
CP-90	4082	4,904

4.5.2 Verification of Results

The peak flows generated by this model are found to be reasonable when compared to existing studies performed on this watershed and when comparing the USGS Regional Regression Equations.

Exhibits



PROJECT NO.	4109563000
DATE:	2010-02-02
BY:	MRP
EXHIBIT NO.	4.2.1

HEC-1 SCHEMATIC
RODGER CREEK FLOODPLAIN DELINEATION STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
MARICOPA COUNTY, ARIZONA

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PROJECT NO.	4109563000
DATE:	04-29-2011
BY:	MRP
EXHIBIT NO.	4.2.2

WATERSHED MAP
RODGER CREEK FLOODPLAIN DELINEATION STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
MARICOPA COUNTY, ARIZONA

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Legend

Soils

MUSYM, SOIL_DFN

- 104---Rock outcrop-Lehmans complex, 15 to 65 percent slopes
- 109---Schenco-Rock outcrop complex, 25 to 60 percent slopes
- 110---Suncity-Cipriano complex, 1 to 7 percent slopes
- 112---Tremant gravelly sandy loams
- 113---Tremant gravelly loams
- 12---Carefree cobbly clay loam, 1 to 8 percent slopes
- 120---Tres Hermanos gravelly sandy loams
- 126---Lakes, ponds, reservoirs - perennial
- 13---Carefree-Beardsley complex
- 26---Continental cobbly clay loam, 1 to 8 percent slopes
- 28---Continental-Ohaco complex
- 3---Antho-Carrizo-Maripo complex
- 31---Dixaleta-Rock outcrop complex, 25 to 65 percent slopes
- 33---Eba very gravelly loam, 1 to 8 percent slopes
- 34---Eba very gravelly loam, 8 to 20 percent slopes
- 44---Ebon very gravelly loam, 1 to 8 percent slopes
- 45---Ebon very gravelly loam, 8 to 20 percent slopes
- 50---Estrella loams
- 52---Gachado-Lomitas-Rock outcrop complex, 7 to 55 percent slopes
- 6---Anthony-Arizo complex
- 61---Gran-Wickenburg complex, 1 to 10 percent slopes
- 63---Gran-Wickenburg-Rock outcrop complex, 1 to 7 percent slopes
- 66---Greyeagle-Suncity Variant complex, 1 to 7 percent slopes
- 68---Gunsight-Cipriano complex, 1 to 7 percent slopes
- 72---Lehmans-Rock outcrop complex, 8 to 65 percent slopes
- 8---Arizo cobbly sandy loam
- 93---Nickel-Cave complex, 8 to 30 percent slopes
- 95---Ohaco gravelly loam
- 96---Pinaleno-Tres Hermanos complex, 1 to 10 percent slopes
- 98---Pinamt-Tremant complex, 1 to 10 percent slopes

SOILS MAP
RODGER CREEK FLOODPLAIN DELINEATION STUDY
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
MARICOPA COUNTY, ARIZONA

PROJECT NO. 4109563000
DATE: 04-29-2011
BY: MRP
FIGURE NO: 4.2.6.1

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Legend

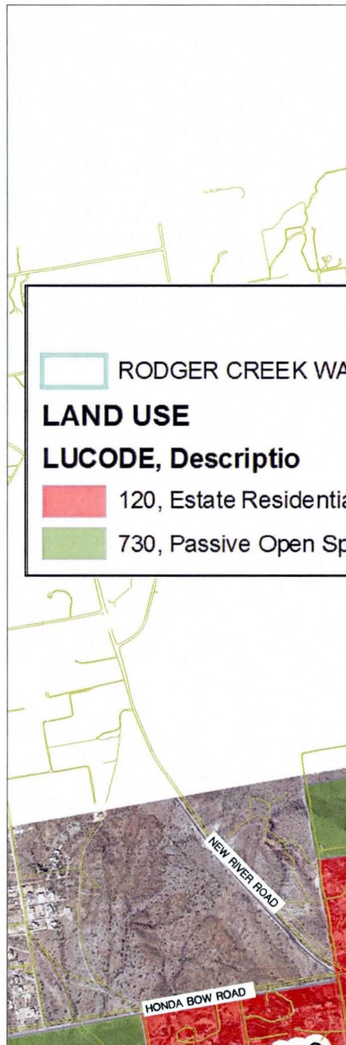
RODGER CREEK WATERSHED

LAND USE

LUCODE, Descriptio

120, Estate Residential (1/5 to 1 du per acre)

730, Passive Open Space (Mountain Preserves and Washes)



16TH ST
24TH STREET
CAVALRY ROAD
RODGER CREEK
SKUNK CREEK

10
20
30
40
50
60
70
80
90
120
730

SCALE: 1"=2000'

2000 1000 0 2000

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LAND USE MAP
RODGER CREEK FLOODPLAIN DELINEATION STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
MARICOPA COUNTY, ARIZONA

PROJECT NO.	410956300
DATE:	04-29-2011
BY:	MRP
EXHIBIT NO:	4.2.6.2

LEGEND

- RODGER CREEK WATERSHED BOUNDARY
- (90) SUB-BASIN ID
- Q_{100} =4681cfs — 100-Year 24-Hour Peak Flows
- CONCENTRATION POINT LOCATION

CIRCLE MOUNTAIN ROAD
16TH STREET
CAVALRY ROAD
24TH STREET
NEW RIVER ROAD
HONDA BOW ROAD
RODGER CREEK
SKUNK CREEK

10
20
30
40
50
60
70
80
90

Q_{100} =1532cfs
Q_{100} =2948cfs
Q_{100} =3626cfs
Q_{100} =4163cfs
Q_{100} =4681cfs
Q_{100} =5006cfs
Q_{100} =4904cfs

SCALE: 1" = 2000'
2000 1000 0 2000

FLOW MAP
RODGER CREEK FLOODPLAIN DELINEATION STUDY
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
MARICOPA COUNTY, ARIZONA

PROJECT NO.	4109563000
DATE:	04-29-2011
BY:	MRP
EXHIBIT NO:	4.5.1

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SECTION 5.0 HYDRAULICS

5.1 Method Description

Rodger Creek is a 6.4-mile tributary to Skunk Creek located in unincorporated areas of Maricopa County, Arizona and the Town of Cave Creek, Arizona. Rodger Creek was modeled as a single reach, without additional tributaries. The Creek is well-defined with variations in channel material that range from rock outcropping to large boulders, with variations in the amount of vegetation within the channel and within the overbanks. Overall, the slope of channel is roughly 2%.

Base Flood Elevations (BFEs) for Rodger Creek were calculated using HEC-RAS Version 4.1.0. Topography of 2' intervals was obtained from the FCDMC and was used in conjunction with field survey information of New River Road and the existing double-barrel 96-inch culvert. Cross sections were oriented perpendicular to the flow and stationed left to right looking downstream. Locations of selected cross sections are located in Appendix E.7.

The downstream boundary condition applies a downstream normal depth with a slope of 0.012 ft/ft. This slope was calculated about 117 feet along the baseline of the most-downstream cross-section (0.209) to the 1920 contour. This boundary condition results in a lower starting water surface elevation than shown on the effective floodplain, but is more appropriate because the peaks between Skunk Creek and Rodger Creek have been verified to be non-coincident. According to the *Flood Insurance Study No. 04013CV001A Volume 1 (*the FIS*)* dated September 30, 2005 page 53, the drainage area for Skunk Creek above the Rodger Creek confluence is 32.67 square miles. The Rodger Creek drainage area from this current study is 5.17 square miles. The ratio of these drainage areas of 0.16 is outside the coincident peak range of 0.6 to 1.4, indicating non-coincident peaks.

Generated water surface elevations for this study are lower than the August 1990 study of the reach because the original study included a higher 100-year discharge of 6000 cfs, had 4-foot contour intervals, implemented USACE HEC-2 step water-surface profile computer software, and set a downstream water surface elevation at 1933. The HEC-RAS model is RodgerCreek.prj and the model outputs are included in Appendix E.5.

5.2 Study Work Maps

The work maps for this study are on 24" x 36" sheets plotted at 1" = 200' scale. The mapping interval is 2' and referenced to NAVD 88. See Appendix E.7 for index map and figures.

5.3 Parameter Estimation

5.3.1 Roughness Coefficients

Manning's *n* values were determined using the procedures described in the United States Geological Survey (USGS) manual dated 2006 for the Flood Control District entitled, *Selection of Manning's Roughness Coefficient for Natural and Constructed Vegetated and Non-Vegetated Channels, and Vegetation Maintenance Plan Guidelines for Vegetated Channels in Central Arizona.* The Manning's *n* Value Determination Report that describes the derivation of the *n* values used in the FDS may be found in Appendix E.1.

Federal Emergency Management Agency (FEMA) software Check-RAS version 1.4 (revision date July 2008) was used to check and verify input and output data of the Rodger Creek hydraulic modeling. The Manning's *n* check had generated warnings for some cross-sections that the overbank and channel bank *n*-values were the same and in other cross-sections, the overbank areas had smaller *n*-values than the channel. The former warning corresponds to Area 7 (see Figure 1 of Appendix E.1) and the latter to Area 8, both the most upstream segments of Rodger Creek that are described in the Manning's *n* Value Determination report in Appendix E.1. To account for the same n-value in Area 7, many large boulders are present in the channel that are not present in the overbank areas, and channel meandering is prevalent. To account for higher *n*-values in the channel than the overbanks in Area 8, the channel is composed of nearly 50% large boulders, many greater than 1-foot in diameter and the overbanks are relatively free of boulders or cobbles. The Manning's *n* values in these areas were calculated and applied with careful consideration acknowledging that the values were not typical of relative channel and overbank values. Both of these a-typical results are discussed in further detail in Appendix E.1.

5.3.2 Expansion and Contraction Coefficients

The HEC-RAS default coefficient for expansion is 0.3 and for contraction is 0.1. At the culvert crossing located at North New River Road, these coefficients were modified using the standard step profile between cross sections 1.751 and 1.802. These calculations determined the appropriate coefficients to be 0.5 at the expansion, at the structure outlet, and 0.3 at the contraction, at the structure inlet.

5.4 Cross-Section Description

Cross-section station and elevation data were extrapolated from the surface DTM that was provided by the FCDMC. Cross-sections were set initially 500-feet apart oriented perpendicular to the direction of the 100-year flow, drawn left to right looking downstream, with some deviation based on the concentration points set by the hydrology model. The baseline of each section is set at station 10,000. Additional cross-sections were placed at road

intersections and upstream of buildings located adjacent to or within the effective floodplain in the 1990 study.

The bounding four cross sections of this culvert going downstream to upstream are sections (1.706 through 1.802). The first downstream section (1.706) is set approximately 250 feet downstream of the outlet of the culvert, as dictated by the expansion reach. The two inner cross-sections (1.751 and 1.763) are located about 8-feet upstream and 8-feet downstream of the culvert outlet and inlet, respectively. Cross-section 1.802, the fourth section, is located about 235 feet upstream of the culvert inlet, set outside of the contraction reach that was originally identified by the 1996 effective floodplain. See Appendix E.2 for cross-section plots.

5.5 Modeling Considerations

5.5.1 Hydraulic Jump and Drop Analysis

No hydraulic jumps or drops occurred in the study reach. However, many locations exhibit critical flow depth. This is because the model was run using a subcritical regime, as required by FEMA for floodplain mapping studies. The model defaults to critical depth while run in subcritical mode when a steepened slope or a widened section is encountered that would necessitate a supercritical flow regime.

5.5.2 Bridges and Culverts

One 48-foot long double-barrel 96-inch corrugated metal pipe (CMP) culvert is located at North New River Road and is included in the HEC-RAS model. All associated dimensions and elevations were obtained from the field survey completed by Cardno WRG on March 10, 2011. From inspection during the field investigation, this culvert was found to be in good condition, with little to no debris inhibiting the efficiency.

HEC-RAS results indicate the culvert overtops during the 100-year storm event. The effective floodplain in the 1990 study is shown to extend about 825-feet upstream of the culvert, which is much wider than the floodplain at other cross section locations.

The HEC-RAS results for a double barrel 96-inch CMP were verified using the Federal Highways Administration (FHWA) HY-8 (Version 7.0) software by defining the constant tailwater elevation that was reflected in the HEC-RAS results. The pipes were modeled using a Manning's *n* value of 0.027, the same that was used in the HEC-RAS model, with the slope calculated at the downstream side (0.96%) of the culvert. The table below gives the percent of difference between the outputs of each model.

Table 5.5.1: Culvert Verification Results

Method	Discharge per Pipe (cfs)	Headwater Depth (ft)	Velocity (fps)
HEC-RAS	448.14	2036.12	8.92
HY-8	431.30	2036.45	8.58
%Difference	3.7%	0.9%	3.8%

%Difference calculation for headwater depth is based on values of 36.12 feet (2036.12 – 2000) and 36.45 feet (2036.45 – 2000).

The resulting percent difference is less than 5%, and therefore suggests the HEC-RAS analysis is acceptable. Output report for the HY-8 analysis is located within Appendix E.4.

5.5.3 Levees and Dikes

No structural levees or dikes are located within the project area. However, the levee option within HEC-RAS has been utilized instead of truncating cross sectional ground data. By placing a HEC-RAS "levee" at the natural ground, flow is prevented from being placed in isolated low points or minor incoming tributaries that are contained within the cross sectional data. A decision was made to retain the cross sectional elevation data for future analyses that might be made in those areas which might reflect analysis of a larger storm event or future changes to the floodplain.

HEC-RAS "levees" were placed on the left bank at cross-sections 0.913, 0.954, 2.529, 3.246, and 3.449. HEC-RAS "levees" have also been placed on the right bank at cross-sections 1.213 and 1.237.

5.5.4 Islands and Flow Splits

Divided flows occur at many cross-sections within the model. They are located within cross-sections 1.050, 1.290, 1.706, 1.751, 2.675, and 2.713, 3.221, 3.260, 3.305, 3.361, 3.394, 4.478, 4.624, and 6.345. Most of these islands cover less than 2 acres and therefore are not significant enough to depict on the Work Study Maps or included in the FIRM. Only the divided flow at 6.345 is shown on the Work Study Maps. The divided flow at 6.345 was depicted because there was 76-foot divide, the greatest divide of any of the other split flows.

One predominant flow split, or tributary to Rodger Creek is located west of 20th Street, about 90-feet south of the reach baseline. This split was verified during the field investigation on January 19, 2011. Partial flows from sub-basin 50, the boundary of which extends north and south of Rodger Creek at cross-section 3.186, may enter at the flow split upstream at cross-section 3.221. The field investigation verified that the split flow had been terminated with the development of the driveway located west of 20th Street.

5.5.5 Ineffective Flow Areas

Ineffective flow areas were placed on the upstream and downstream cross-sections of the New River Road pipe culvert. At cross-section 1.763, the upstream cross-section of the culvert, the ineffective area was set to the lowest top of deck elevation of 2033.33. Similarly, at cross-section 1.751, the downstream cross-section of the culvert, the ineffective area was set at an elevation located half-way between the top of the culvert and the top of the deck, 2032.60.

Additional ineffective flow areas are located within cross-section 1.184 at station 10155.37, within cross-section 1.425 at station 9745.09, within cross-section 2.713 at station 10065.49, within cross-section 3.221 at station 9908.18, and within cross-section 3.260 at station 9949.27. These ineffective areas were placed due to abrupt changes in floodplain width. These sections are located where tributaries become defined within the cross-sections and the flow is divided. Upstream of these sections, the levee option in HEC-RAS was utilized to prevent the flow from deviating from the main wash, as described in Section 5.5.3.The location of the ineffective flow has been determined based on the location of the tributary entering Rodger Creek.

5.5.6 Supercritical Flow

The hydraulic modeling is based on the subcritical flow regime within HEC-RAS per FEMA criteria. The program would default to critical flow where subcritical flow cannot be computed due to naturally occurring steep slopes.

5.5.7 Lateral Weirs

No lateral weirs were present within the project limits and were not modeled. All cross-sections contained the 100-year floodplain.

5.6 Floodway Modeling

A floodway was modeled along the length of the reach allowing an increase of 1-foot in the water surface elevation initially using Encroachment Method 4, and then refined using Encroachment Method 1 for each cross-section. Where possible, the floodway limits were set at the stations within each cross-section where the effective limits were identified. In many cross-sections, this was not possible because the effective limits were identified to be outside the proposed floodplain limits. In these cases, the floodway was set at the corresponding proposed floodplain station.

The mapped floodway tie-in location at proposed cross-section 0.209 at Skunk Creek is based on the Floodway Data Table of the Effective FIS for Skunk Creek at cross-sections BX and BY. Both of these cross-sections show an increase in the floodway 0.4 feet above the effective water surface elevations. Therefore the proposed floodway at proposed cross-section 0.209 is depicted 0.4 feet above the back-water surface elevation from Skunk Creek elevation at that cross-section to 1931.40.

5.7 Floodplain Mapping

The 100-year storm floodplain and the floodway were imported from HEC-RAS into HEC-GeoRAS and exported into shapefiles. The locations of the floodplain was compared to the water surface extents and modified to the extents as necessary. The floodplain located between cross-sections was manipulated by hand to extend up to smaller tributaries that were included in the effective model, but was terminated at larger tributaries that were not included in the effective model. The effective floodway was used as a guide in many locations.

5.8 Problems Encountered During Study

5.8.1 Special problems and solutions

No problems were encountered during the study.

5.8.2 Modeling warning and error messages

CHECK-RAS was run for the Manning's *n* values, the cross-sections, the structure, and the floodway. The following warnings were indicated during the model runs: where there is a divided flow, where the velocity head would change by more than 0.5 feet, the conveyance ratio was less than 0.7 or greater than 1.4 indicating the need for more cross-sections, where the energy loss was greater than 1.0 foot, where critical depth was used. These warnings would suggest the use of more cross-sections, but the allotted spacing has been found to be sufficient. The CHECK-RAS outputs are located in Appendix E.5.

5.9 Calibration

Calibration data such as gage data or well-documented high water marks were not available for this study and therefore calibration was not employed.

5.10 Final Results

Final results indicate changes in the base flood elevations, the floodplain limits, and the floodway boundaries when compared to the effective study. The proposed base flood elevations have dropped from the effective study within the developed portions of the reach. And although no homes were affected, the BFEs have increased east of 24th Street.

The proposed floodplain has expanded beyond the effective floodplain in some locations due to more detailed topographic mapping, and this resulted in some homes added to the floodplain. Overall, however, the floodplain has been reduced resulting in some structures being removed. The floodway also has been reduced in many locations, thereby removing some homes.

Table 5.5.2: Discharges Used in Model located on the next page, shows the flows that were used in the model and for which cross-sections. These are consistent with the locations of the concentration points provided in the hydrologic analsysis. The result of the hydraulic analysis is located in Appendix E.5.

Table 5.5.2: Discharges Used in Model

HEC-1 Point ID	100-Year 24-Hour Flow Rate (cfs)	US Cross-Section	DS Cross-Section
10	1532	6.345	5.934
CP20	2097	5.881	4.478
CP30	2948	4.404	N/A^
CP40	3626	4.339	3.813
CP50	4163	3.733	3.157
CP60	4320	3.082	2.395
CP70	4681	2.335	N/A^
CP80	5006	2.258	0.209
CP90	4904*		

*4909 discharge was not included in the model for conservatism. ^These discharges were applied at one cross-section only.

SECTION 6.0 EROSION AND SEDIMENT TRANSPORT

No erosion or sediment transport analyses were performed as part of this study.

SECTION 7.0 DRAFT FIS REPORT DATA

The Rodger Creek tributary area is approximately 5.17 square miles and is located within unincorporated Maricopa County, Arizona and the Town of Cave Creek. The 100-year 24-hour and 6-hour storm events were computed using methodology as set forth within the FCDMC's *Drainage Design Manual, Volume I, Hydrology 4th Edition* dated 2009.

The Rodger Creek study length is approximately 6 miles. The overall slope of the Creek is about 2%, and the channel bed material ranges from boulders to sand. HEC-RAS Version 4.1.0 was used to generate the water surface elevations for the 100-year 24-hour floodplain and the floodway, and the model was run using a subcritical flow regime. The downstream boundary condition was analyzed as having non-coincident peaks, and therefore normal depth condition was used and the downstream slope of 0.012 ft/ft was applied.

The RASPLOT flood profiles were generated using RASPLOT version 2.5. Each profile exhibits the profile of the 100-year 24-hour floodplain. The backwater from Skunk Creek is shown in the profile to tie into the downstream cross-section at water surface elevation 1931 ft and at cross section 0.209.

7.1 Summary of Discharges

The following section includes the required summary table, Annotated FIRM panels, and flood profiles required to be integrated into the County's Flood Insurance Study Report.

Table 7.1.1: Summary of Discharges

Flooding Sources and Location	Drainage Area (Square Miles)	Peak Discharges (cfs)			
		10-year	50-year	100-year	500-year
Rodger Creek Wash @ Cross Section 6.345	0.86	N/A	N/A	1532	N/A
Rodger Creek Wash @ Cross Section 5.881	1.7	N/A	N/A	2097	N/A
Rodger Creek Wash @ Cross Section 4.404	2.36	N/A	N/A	2948	N/A
Rodger Creek Wash @ Cross Section 4.339	3.03	N/A	N/A	3626	N/A
Rodger Creek Wash @ Cross Section 3.733	3.54	N/A	N/A	4163	N/A
Rodger Creek Wash @ Cross Section 3.082	3.82	N/A	N/A	4320	N/A
Rodger Creek Wash @ Cross Section 2.335	4.2	N/A	N/A	4681	N/A
Rodger Creek Wash @ Cross Section 2.258	4.73	N/A	N/A	5006	N/A

N/A – These storm events and associated discharges were not computed.

7.2 Floodway Data

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Rodger Creek								
0.209	0.209	285	805	6.2	1931.0[2]	1929.3	1929.7	0.4
0.241	0.241	123	491	10.2	1931.7	1931.7	1932.3	0.6
0.299	0.299	209	761	6.6	1936.0	1936.0	1936.9	0.9
0.394	0.394	149	602	8.3	1941.2	1941.2	1941.5	0.3
0.487	0.487	148	548	9.1	1947.0	1947.0	1947.9	0.9
0.580	0.580	155	629	8.0	1953.7	1953.7	1954.4	0.7
0.625	0.625	95	451	11.1	1956.4	1956.4	1956.8	0.4
0.701	0.701	80	521	9.6	1961.0	1961.0	1961.9	0.9
0.769	0.769	117	689	7.3	1964.6	1964.6	1964.9	0.3
0.862	0.862	78	442	11.3	1970.1	1970.1	1970.6	0.5
0.913	0.913	132	818	6.1	1973.8	1973.8	1974.8	1.0
0.954	0.954	142	561	8.9	1975.9	1975.9	1976.7	0.8
1.007	1.007	157	614	8.2	1979.9	1979.9	1980.9	1.0
1.050	1.050	230	830	6.0	1983.2	1983.2	1984.2	1.0
1.128	1.128	115	483	10.4	1989.5	1989.5	1989.6	0.1
1.184	1.184	100	600	8.4	1993.5	1993.5	1994.5	1.0
1.213	1.213	68	406	12.3	1995.4	1995.4	1995.8	0.4
1.237	1.237	74	600	8.4	1998.0	1998.0	1999.0	1.0
1.290	1.290	54	371	13.5	2000.9	2000.9	2001.0	0.1
1.324	1.324	94	687	7.3	2004.7	2004.7	2005.0	0.3
1.369	1.369	139	662	7.6	2005.8	2005.8	2006.8	1.0

[1] Miles Above Confluence with Skunk Creek

[2] Elevation Based on Backwater Effect

TABLE 7.2

FEDERAL EMERGENCY MANAGEMENT AGENCY
MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

RODGER CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Rodger Creek								
1.425	1.425	119	498	10.1	2010.5	2010.5	2010.6	0.1
1.519	1.519	170	802	6.2	2017.4	2017.4	2018.3	0.9
1.554	1.554	150	564	8.9	2020.3	2020.3	2021.3	1.0
1.615	1.615	151	765	6.5	2025.4	2025.4	2026.2	0.8
1.664	1.664	123	652	7.7	2027.7	2027.7	2028.5	0.8
1.706	1.706	169	790	6.3	2030.0	2030.0	2031.0	1.0
1.751	1.751	246	900	7.9	2034.3	2034.3	2034.7	0.4
1.763	1.763	225	955	5.6	2036.1	2036.1	2037.0	0.9
1.802	1.802	100	754	6.6	2037.7	2037.7	2038.3	0.6
1.831	1.831	112	709	7.1	2038.2	2038.2	2039.1	0.9
1.871	1.871	91	484	10.4	2040.2	2040.2	2040.8	0.6
1.894	1.894	108	589	8.5	2042.2	2042.2	2043.2	1.0
1.986	1.986	170	599	8.4	2053.2	2053.2	2054.1	0.9
2.071	2.071	101	505	9.9	2061.8	2061.8	2062.4	0.6
2.166	2.166	87	498	10.1	2069.6	2069.6	2070.6	1.0
2.258	2.258	86	557	9.0	2076.7	2076.7	2077.7	1.0
2.335	2.335	94	517	9.1	2082.5	2082.5	2083.0	0.5
2.395	2.395	167	524	8.2	2088.3	2088.3	2088.3	0.0
2.444	2.444	65	391	11.1	2092.3	2092.3	2092.6	0.3
2.529	2.529	48	402	10.7	2098.5	2098.5	2099.4	0.9

[1] Miles Above Confluence with Skunk Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Rodger Creek								
2.586	2.586	52	365	11.8	2101.5	2101.5	2102.0	0.5
2.614	2.614	72	497	8.7	2103.1	2103.1	2104.1	1.0
2.675	2.675	67	340	12.7	2112.8	2112.8	2113.0	0.2
2.713	2.713	112	503	8.6	2116.8	2116.8	2117.6	0.8
2.759	2.759	135	584	7.4	2121.0	2121.0	2122.0	1.0
2.807	2.807	96	467	9.3	2125.1	2125.1	2125.9	0.8
2.868	2.868	125	600	7.2	2130.6	2130.6	2131.5	0.9
2.929	2.929	116	517	8.4	2135.3	2135.3	2136.1	0.8
3.018	3.018	84	429	10.1	2143.7	2143.7	2144.7	1.0
3.082	3.082	70	457	9.5	2150.2	2150.2	2150.6	0.4
3.157	3.157	68	389	10.7	2156.5	2156.5	2157.4	0.9
3.186	3.186	59	440	9.5	2159.7	2159.7	2160.5	0.8
3.221	3.221	59	402	10.4	2162.5	2162.5	2163.2	0.7
3.246	3.246	95	575	7.2	2165.5	2165.5	2165.9	0.4
3.260	3.260	95	519	8.0	2166.6	2166.6	2166.6	0.0
3.305	3.305	81	390	10.7	2170.2	2170.2	2170.5	0.3
3.361	3.361	89	434	9.6	2176.9	2176.9	2177.0	0.1
3.394	3.394	95	432	9.6	2180.2	2180.2	2180.3	0.1
3.449	3.449	89	461	9.0	2185.5	2185.5	2185.8	0.3
3.518	3.518	65	359	11.6	2191.9	2191.9	2192.8	0.9
3.582	3.582	65	509	8.2	2199.2	2199.2	2200.1	0.9

[1] Miles Above Confluence with Skunk Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Rodger Creek								
3.664	3.664	63	456	9.1	2205.6	2205.6	2206.6	1.0
3.733	3.733	79	429	9.7	2214.1	2214.1	2214.7	0.6
3.813	3.813	60	430	8.4	2223.1	2223.1	2224.0	0.9
3.868	3.868	81	471	7.7	2228.2	2228.2	2228.8	0.6
3.922	3.922	121	526	6.9	2233.6	2233.6	2233.9	0.3
4.010	4.010	62	352	10.3	2243.8	2243.8	2243.9	0.1
4.074	4.074	85	486	7.5	2250.7	2250.7	2251.7	1.0
4.136	4.136	95	437	8.3	2257.5	2257.5	2257.5	0.0
4.194	4.194	60	395	9.2	2263.4	2263.4	2263.9	0.5
4.293	4.293	90	471	7.7	2273.3	2273.3	2274.3	1.0
4.339	4.339	64	415	8.7	2277.7	2277.7	2278.6	0.9
4.404	4.404	125	574	5.1	2283.1	2283.1	2284.1	1.0
4.478	4.478	143	285	7.4	2291.4	2291.4	2292.1	0.7
4.567	4.567	55	300	7.0	2303.1	2303.1	2304.1	1.0
4.624	4.624	51	214	9.8	2309.9	2309.9	2310.7	0.8
4.696	4.696	113	405	5.2	2319.3	2319.3	2320.2	0.9
4.750	4.750	193	312	6.7	2327.4	2327.4	2327.4	0.0
4.839	4.839	135	433	4.9	2339.5	2339.5	2340.3	0.8
4.927	4.927	162	290	7.2	2352.7	2352.7	2352.8	0.1
5.021	5.021	99	376	5.6	2366.0	2366.0	2366.6	0.6

[1] Miles Above Confluence with Skunk Creek

TABLE 7.2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND INCORPORATED AREAS

FLOODWAY DATA

RODGER CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Rodger Creek								
5.115	5.115	61	213	9.9	2378.3	2378.3	2378.3	0.0
5.210	5.210	60	305	6.9	2391.6	2391.6	2392.1	0.5
5.297	5.297	75	224	9.4	2403.0	2403.0	2403.2	0.2
5.391	5.391	69	307	6.8	2416.0	2416.0	2416.9	0.9
5.477	5.477	51	231	9.1	2426.1	2426.1	2426.6	0.5
5.562	5.562	111	322	6.5	2439.8	2439.8	2440.8	1.0
5.653	5.653	40	226	9.3	2452.6	2452.6	2453.3	0.7
5.743	5.743	54	256	8.2	2464.7	2464.7	2465.6	0.9
5.815	5.815	63	256	8.2	2475.2	2475.2	2475.8	0.6
5.881	5.881	47	252	8.3	2483.9	2483.9	2484.9	1.0
5.934	5.934	36	217	7.1	2489.7	2489.7	2490.3	0.6
6.025	6.025	45	150	10.2	2505.0	2505.0	2505.0	0.0
6.104	6.104	38	219	7.0	2516.7	2516.7	2516.8	0.1
6.170	6.170	42	148	10.4	2526.5	2526.5	2526.5	0.0
6.213	6.213	62	244	6.3	2534.4	2534.4	2534.5	0.1
6.268	6.268	59	167	9.2	2542.6	2542.6	2543.0	0.4
6.345	6.345	187	318	4.8	2559.4	2559.4	2559.5	0.1

[1] Miles Above Confluence with Skunk Creek

TABLE 7.2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

RODGER CREEK

7.3 Annotated Flood Insurance Rate Maps

JOINS PANEL 0390

650000 FT

112° 03′ 45″

33° 52′ 30″

37°48′000″N

37°47′000″N

37°46′000″N

ZONE AE

ZONE X

7TH AVE

11TH AVE

3RD AVE

NEW RIVER RD

HONDA BOW RD

CENTRAL AVE

3RD ST

7TH ST

LINDA LN

ROCKAWAY HILLS DR

SADDLE MOUNTAIN RD

3RD AVE

Skunk Creek

Rodger Creek

Desert Lake Wash

PROFILE BASE LINE

PROFILE BASE LINE

LIMIT OF DETAILED STUDY

LIMIT OF STUDY

Floodway too narrow to show to scale. Refer to Floodway Data table.

1980 1975 1970 1965 1960 1955 1950 1945 1940 1935 1930 1925 1920 1915 1910 1905 1900 1895 1890 2010 2000 1990 1980 1970 1960 1950 1940 1933 1925 1920 1915 1910 1905 1900 1895 1970 1965 1960 1955 1950 1945

7 8 9 16 17 18 19 20 21

CB CA BZ BY BX BW BV BU A B C D E F G N O P X Y Z AA

Rodger Creek
Floodplain Delineation Study
Annotated FIRM Panel 0780H

Revised Floodplain

Revised Floodway

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0780H

FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS

PANEL 780 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	0780	H
PHOENIX, CITY OF	040051	0780	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
04013C0780H
MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

Rodger Creek
Floodplain Delineation Study
Annotated FIRM Panel 0785H

Revised Floodplain

Revised Floodway

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0785J

FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS

PANEL 785 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

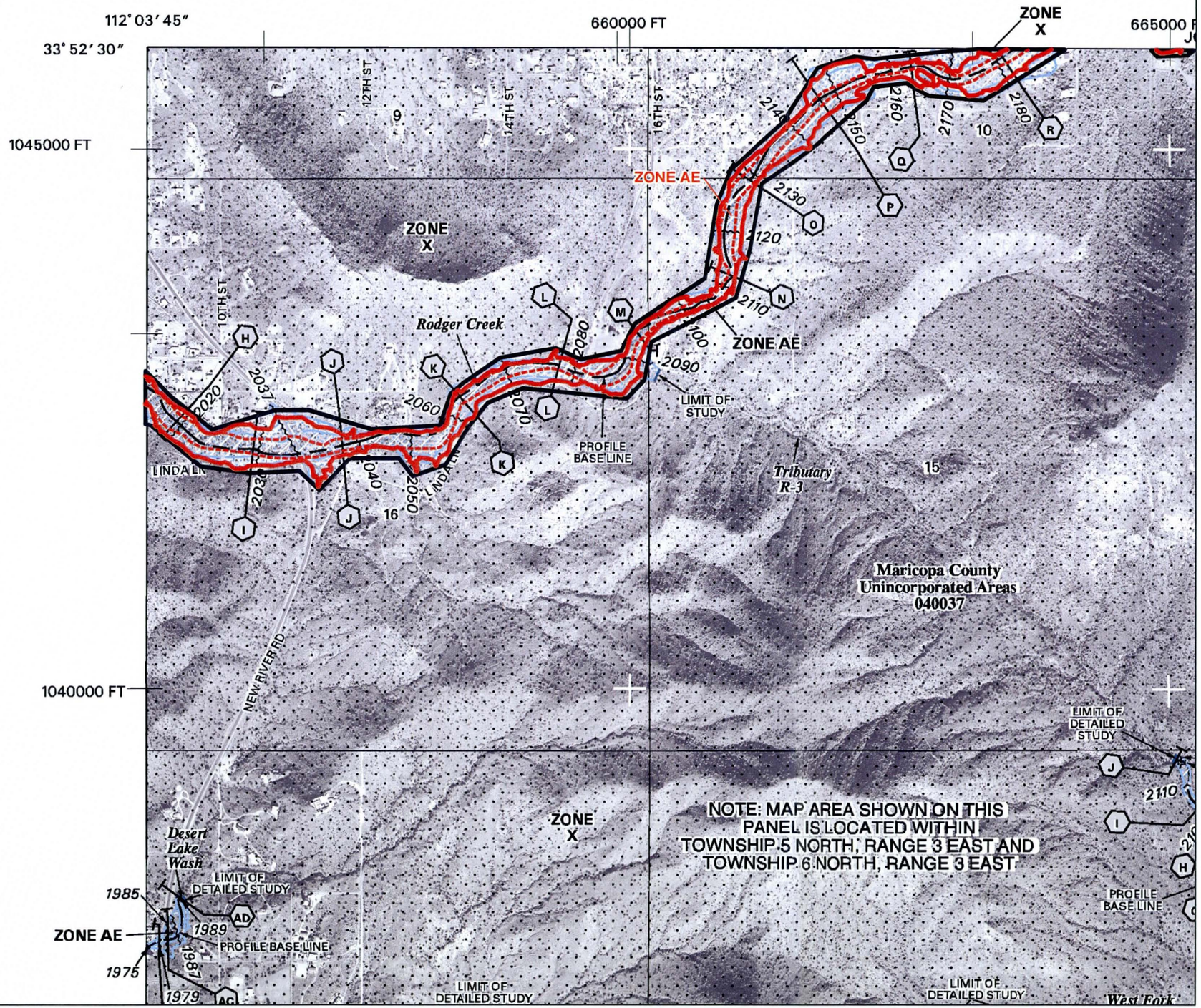
CONTAINS:

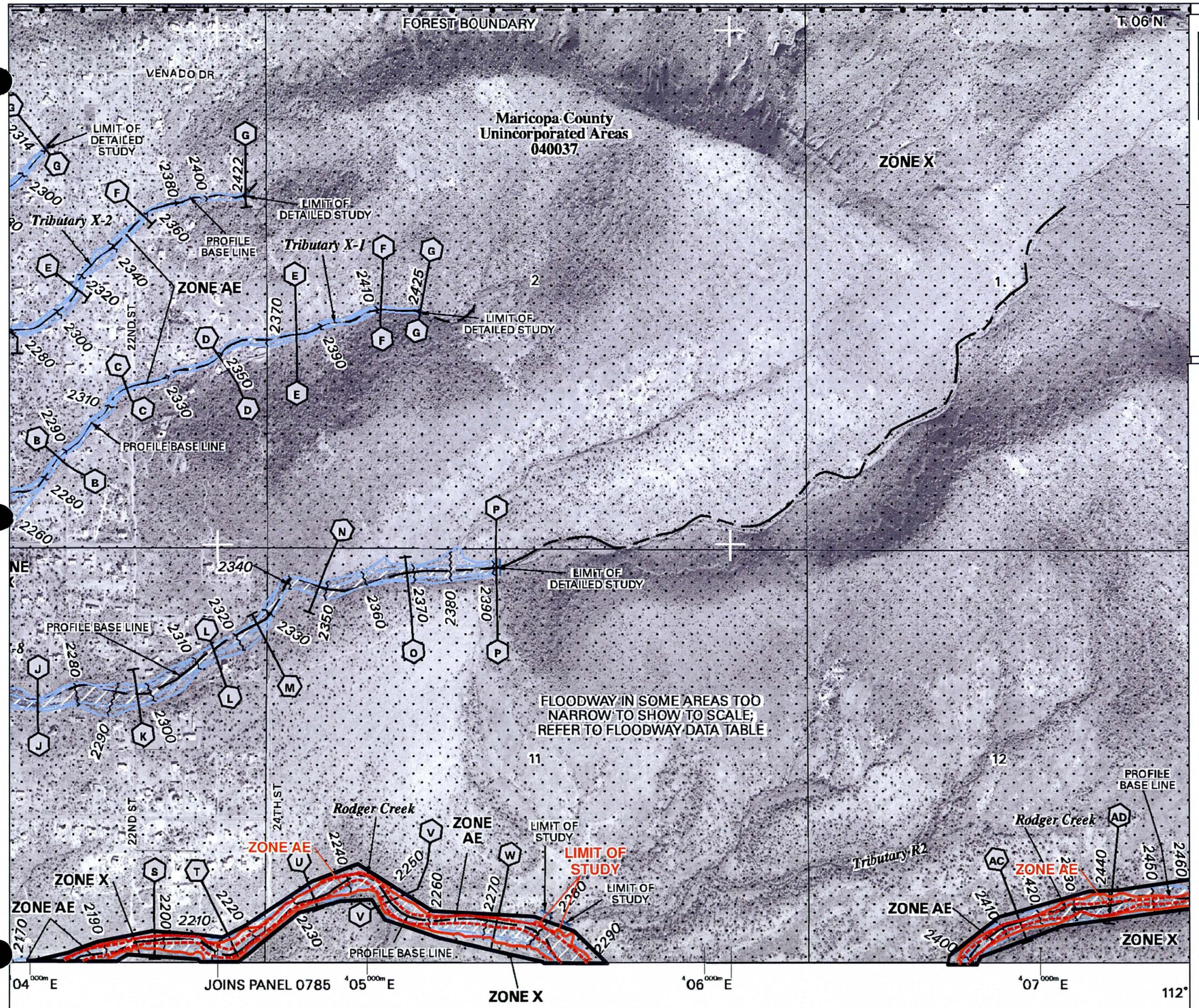
COMMUNITY	NUMBER	PANEL	SUFFIX
CAVE CREEK, TOWN OF	040129	0785	J
MARICOPA COUNTY	040037	0785	J

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
04013C0785J
MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency





Rodger Creek
Floodplain Delineation Study
Annotated FIRM Panel 0395H

Revised Floodplain

Revised Floodway

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0395H

FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS

PANEL 395 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	0395	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
04013C0395H
MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

Rodger Creek
Floodplain Delineation Study
Annotated FIRM Panel 0785H

Revised Floodplain

Revised Floodway

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0785J

FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS

PANEL 785 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

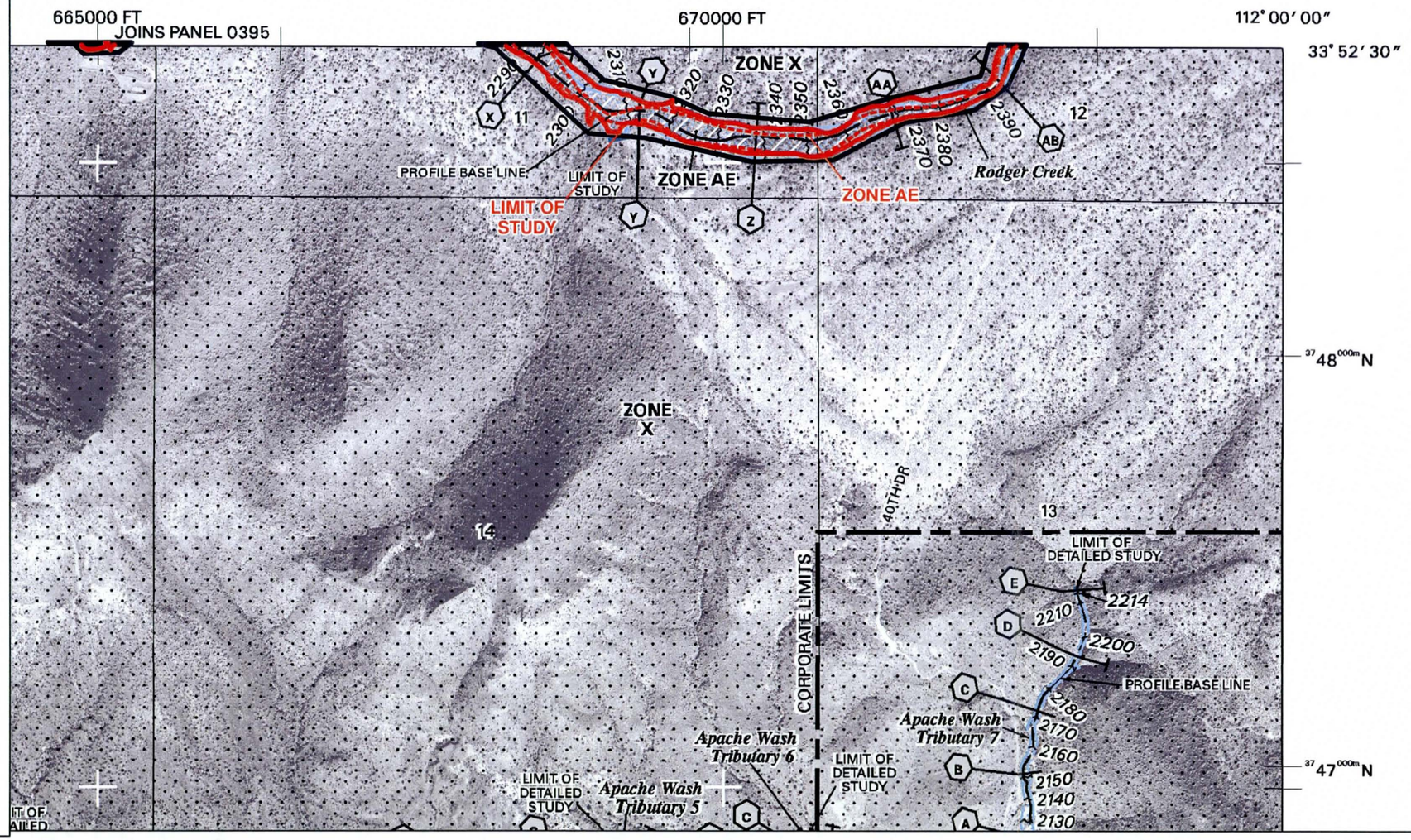
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CAVE CREEK, TOWN OF	040129	0785	J
MARICOPA COUNTY	040037	0785	J

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
04013C0785J
MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency



Rodger Creek
Floodplain Delineation Study
Annotated FIRM Panel 0415H

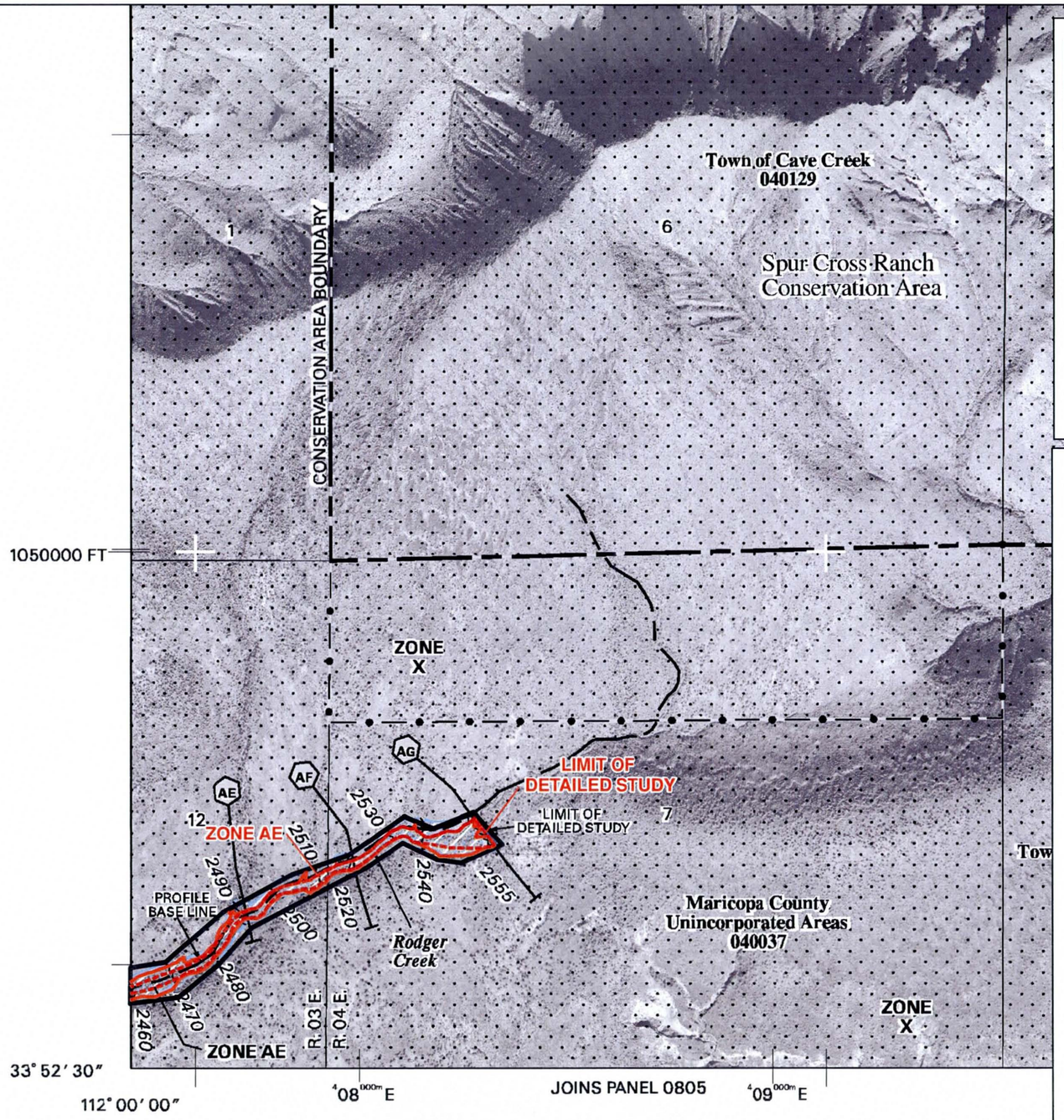
Revised Floodplain

Revised Floodway

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS



NFIP

PANEL 0415G

FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS

PANEL 415 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CAVE CREEK, TOWN OF	040129	0415	G
MARICOPA COUNTY	040037	0415	G

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
04013C0415G
MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

7.4 Flood Profiles

FLOOD PROFILES

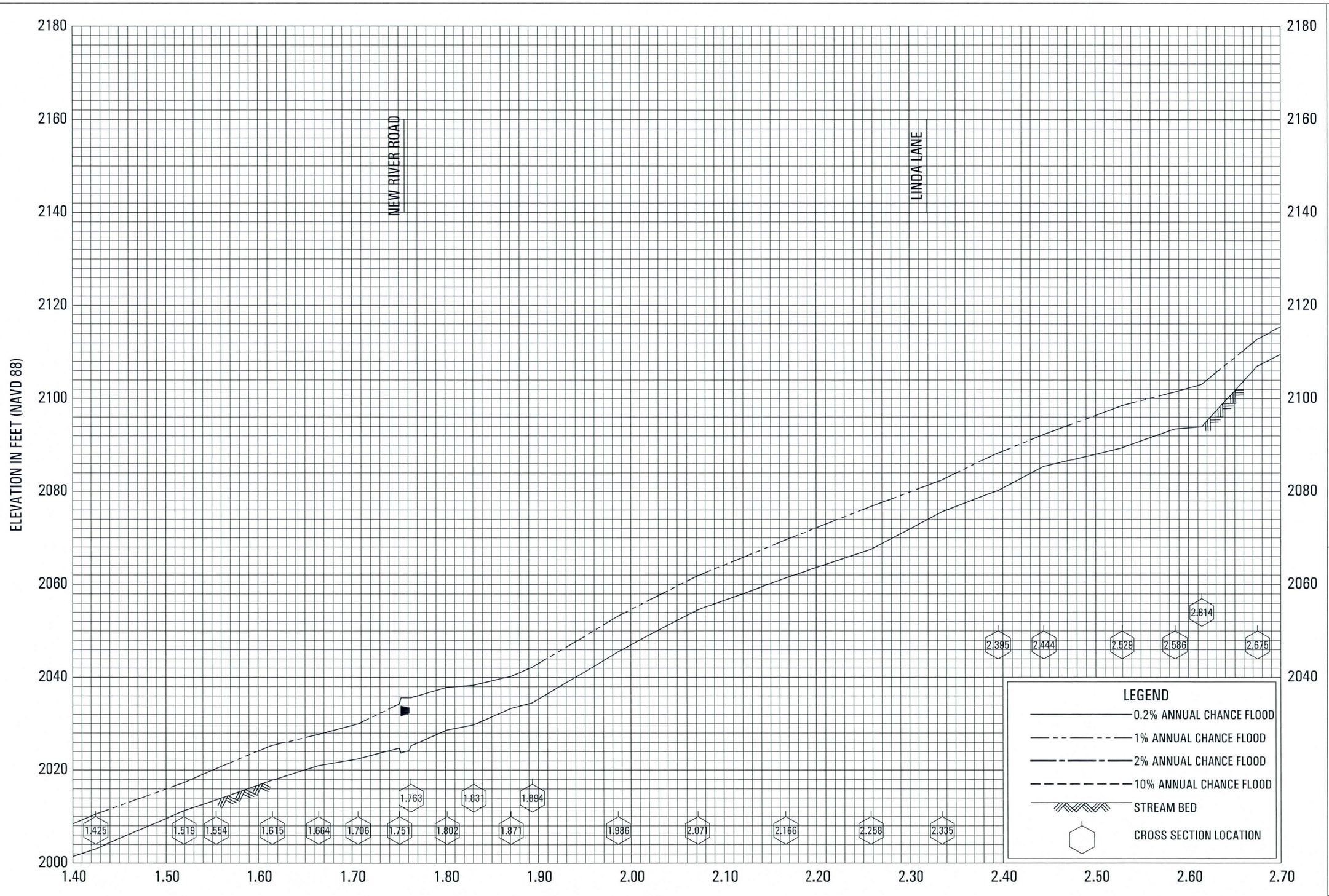
RODGER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND UNINCORPORATED AREAS

01P



FLOOD PROFILES

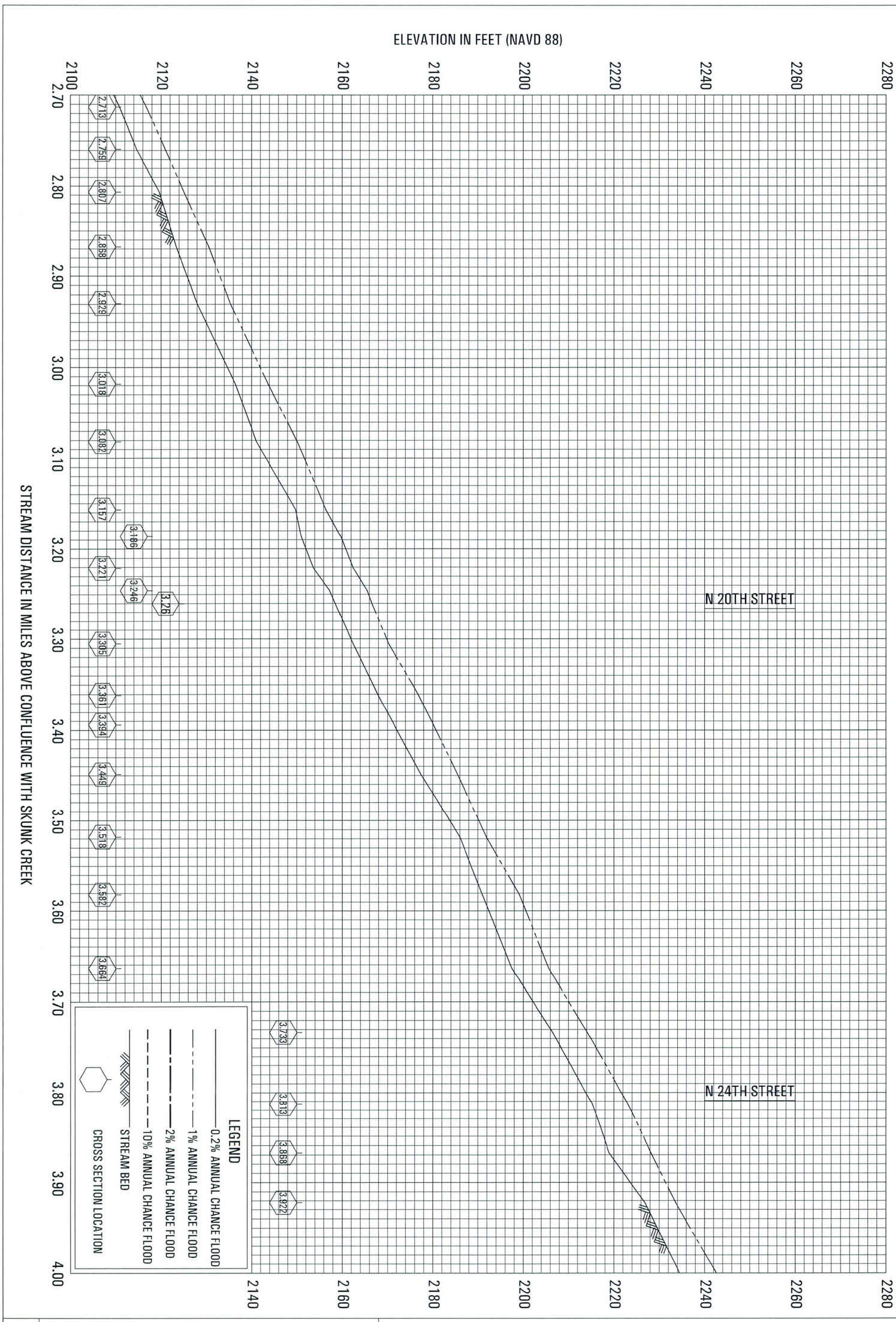
RODGER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND UNINCORPORATED AREAS

02P



03P

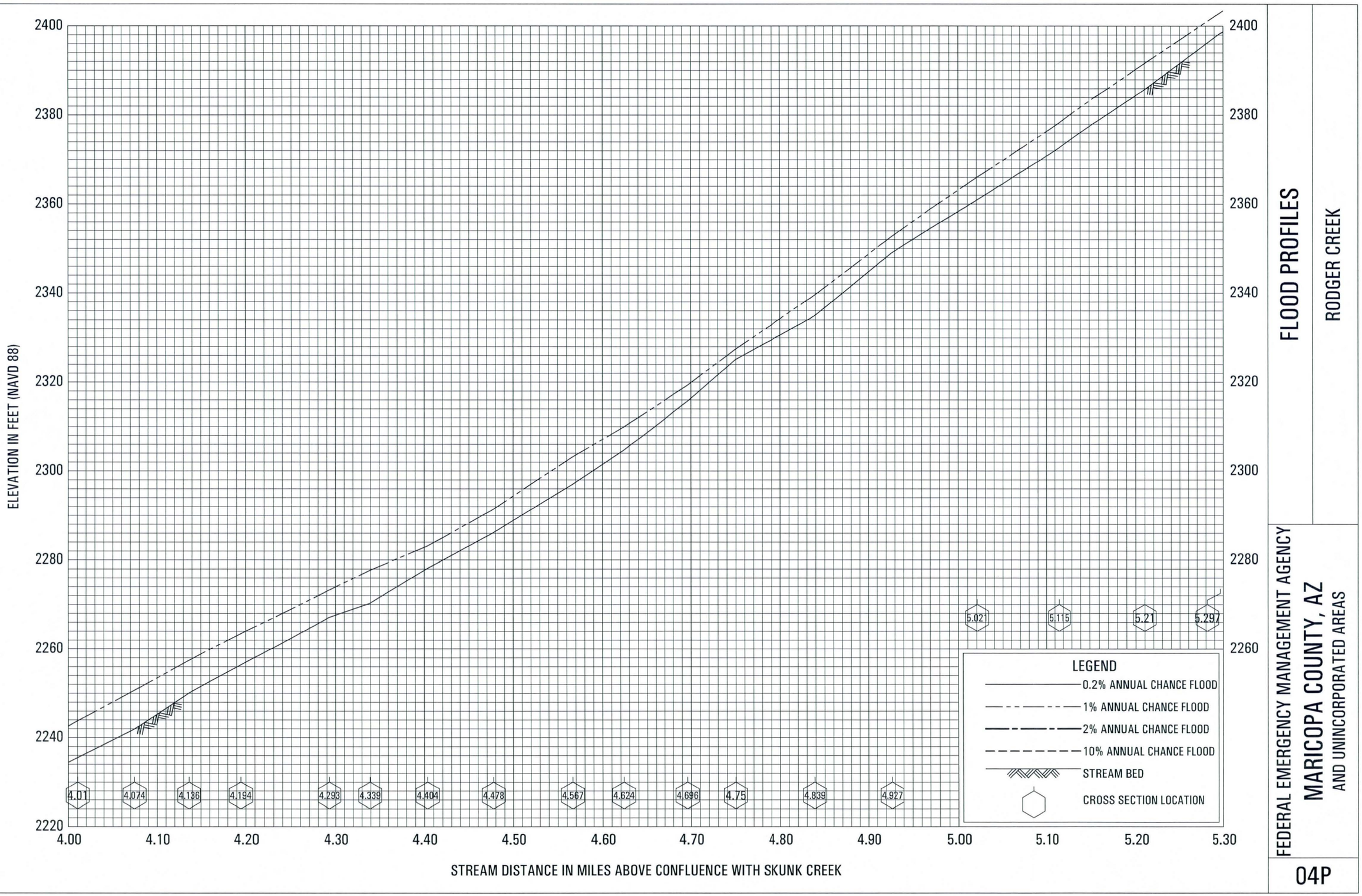
FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND UNINCORPORATED AREAS

FLOOD PROFILES

RODGER CREEK



FLOOD PROFILES

RODGER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND UNINCORPORATED AREAS

FLOOD PROFILES

RODGER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND UNINCORPORATED AREAS

APPENDIX A
REFERENCES

REFERENCE DOCUMENTS

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

Federal Emergency Management Agency, *RASPLOT User's Guide,* Version 2.5, March 200.5.

Federal Emergency Management Agency CHECK-RAS software Version 1.4 (revision date July 2008).

Flood Control District of Maricopa County *Drainage Design Manual Volume I Hydrology (Draft)* November 2003.

Flood Control District of Maricopa County *Drainage Design Manual Volume II Hydraulics (Draft)* November 2003.

Phillips, J. V. and Tadayon, S., *Selection of Manning's Roughness Coefficient for Natural and Constructed Vegetated and Non-Vegetated Channels, and Vegetation Maintenance Plan Guidelines for Vegetated Channels in Central Arizona,* dated September 30, 2005, in cooperation with the Flood Control District of Maricopa County, Arizona.

State Standards for Floodplain Management, Arizona Department of Water Resources, Flood Mitigation Section, November 1997.

US Army Corps of Engineers *Hydraulic Engineering Center River Analysis System (HEC-RAS)* Version 4.1.0, January 2010.

United States Department of Transportation, Federal Highway Administration in Cooperation with Environmental Modeling Systems Inc., and Environmental Modeling Research Laboratory *HY-8 Version 7.0.* McLean, Virginia, March 2007.

Michael Baker Jr. Inc *Hydrology Report for Rodger Creek Floodplain Delineation Study FCD 89-1,* prepared by for the Flood Control District of Maricopa County, dated December, 1989.

create: live, work, play

Technical Data Notebook
Appendix A
Data Collection

July 11, 2011

Rodger Creek Floodplain Delineation Study

FCDMC Contract # 2010C003
Assignment #2

Maricopa County, Arizona

Civil Engineering
Land Planning
Land Surveying
Landscape Architecture
LEED/Sustainability
Master Planning
Transportation
Water Resources

www.cardnowrg.com

Project #:
Cardno WRG 4109563000

Prepared for:
Flood Control District of Maricopa
2801 West Durango Street
Phoenix, AZ 85009
Phone: 602-506-1501

Prepared by:
Cardno WRG
9977 North 90th Street Ste 350
Scottsdale, AZ 85258
602-977-8000

Cardno WRG
Shaping the Future

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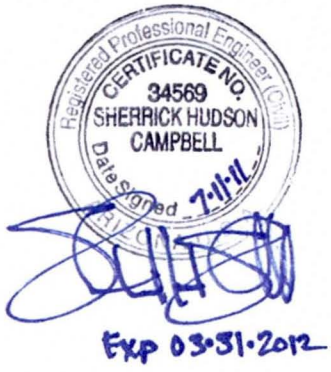
ATTACHMENTS

Gage Data

Roadway Culvert As-builts

FIRM/FIS



A.1 Flood Hazard Reports

A Floodplain Delineation Study was commissioned by the Flood Control District of Maricopa County (FCDMC) in 1989. The FCDMC hired Michael Baker Jr., Inc. to determine the 100-year (1% annual chance) peak discharges and associated floodplain and floodway limits under contract number FCD 89-15. The Rodger Creek Floodplain Delineation Study culminated in the following two reports:

- *Hydrology Report, Rodger Creek Floodplain Delineation Study, FCD 89-15*, prepared by Michael Baker Jr., Inc., dated December 1989.
- *Rodger Creek, Flood Delineation Study, FCD 89-15*, prepared by Michael Baker Jr., Inc., dated August 1990.

Copies of these reports are available in the FCDMC Library.

A.2 Hydrologic Models

As a part of the 1989 study, Michael Baker Jr., Inc. prepared hydrologic models of the Rodger Creek watershed for the 100-year, 2-hour, 6-hour, and 24-hour rainfall events using HEC-1 as a part of the Rodger Creek Floodplain Delineation Study. These hydrologic models utilized the SCS dimensionless unit hydrograph with initial and uniform loss rate methodology for sub-basin runoff. The Muskingum routing option was used to route the hydrographs downstream. This was documented in the *Hydrology Report, Rodger Creek Floodplain Delineation Study* and can be found as a part of that report in the appendix.

A.3 Hydraulic Models

As a part of the 1989 study, Michael Baker Jr., Inc. prepared a hydrologic model for a 6.35 mile reach of Rodger Creek from its confluence with Skunk Creek to approximately the 42nd Street alignment. The model was prepared using HEC-2

for the 100-year 24-hour flow event as a part of the Rodger Creek Floodplain Delineation Study. This hydraulic model was documented in the *Rodger Creek, Flood Delineation Study* and can be found as a part of that report in the appendix.

A.4 Historic Flooding Information

No information was available for historic flooding along Rodger Creek.

A.5 Gage Data

No flow or precipitation Gage Data is available along Rodger Creek or within the Rodger Creek watershed. However, there are six locations in the near vicinity of the watershed that had precipitation gages operated by the Flood Control District of Maricopa County. The identification names and numbers of the gages are Cline Creek (5580), Upper Cline Creek (5545), Cave Creek @ Spur Cross (4920), Skunk Tank Wash (4885), Desert Hills Wash (4895), and Cave Creek (4890). The locations and individual gage history for these precipitation gages are included in the appendix.

A.6 Storm Drain Data

There are no records available for storm drain data along the Rodger Creek. It is therefore a reasonable assumption that no significant storm drain systems exist in the watershed.

A.7 Roadway Culvert As-builts

Maricopa County Department of Transportation (MCDOT) was contacted for the As-Built plans of the culvert crossing of New River Road along Rodger Creek.

MCDOT did not have records or as-built drawings for this road crossing. A copy of the Letter from Maricopa County Public can be found in the Appendix.

A.8 FIRM/FIS

The Rodger Creek Floodplain Delineation Study is part of the FIS for Maricopa County, Arizona and Incorporated Areas. The Flood Insurance Study Number is 04013CV001A and its latest revision is marked September 30, 2005. A copy of the Rodger Creek information from the FIS can be found in the appendix.

A.9 LOMR/CLOMR

There are no LOMRs or CLOMRs on record per the FEMA website along Rodger Creek.

A.10 Repetitive Loss Claims

No Repetitive loss claims are on file with the Flood Control District of Maricopa County for the Rodger Creek Watershed.

A.11 Drainage Complaints

Drainage complaints were requested from the Flood Control District of Maricopa County and from the Maricopa County Planning and Development Department for the Rodger Creek watershed. No complaints were identified that are believed to have a significant impact on the floodplain delineation.

A.12 Floodplain Use Permits

Floodplain Use Permits are required to develop within the current regulatory FEMA designated Special Flood Hazard Area. Parcel specific inquiries can be made to the Flood Control District of Maricopa County for Floodplain Use Permits.

A.13 Floodplain Use Violations

Floodplain use violations were requested from the Flood Control District of Maricopa County for the existing Rodger Creek Floodplain. No floodplain use violations were identified that are believed to have a significant impact on the floodplain delineation.

A.14 Elevation Certificates

There are three parcels along Rodger Creek that are on record with the Flood Control District of Maricopa County for having an elevation certificate. The three parcels are 211-72-020B, 202-20-094M, and 211-70-011L. The elevation certificates for these three parcels are on file with and are available from the FCDMC.

A.15 GIS Data

GIS Data was obtained from the Flood Control District of Maricopa County. The District provided data for rivers, flood zones, land use features, topography, soils data, and aerial photos.

A.16 Zoning

Existing Land Use data was obtained for the Rodger Creek Watershed through the Maricopa County Planning and Development Website.

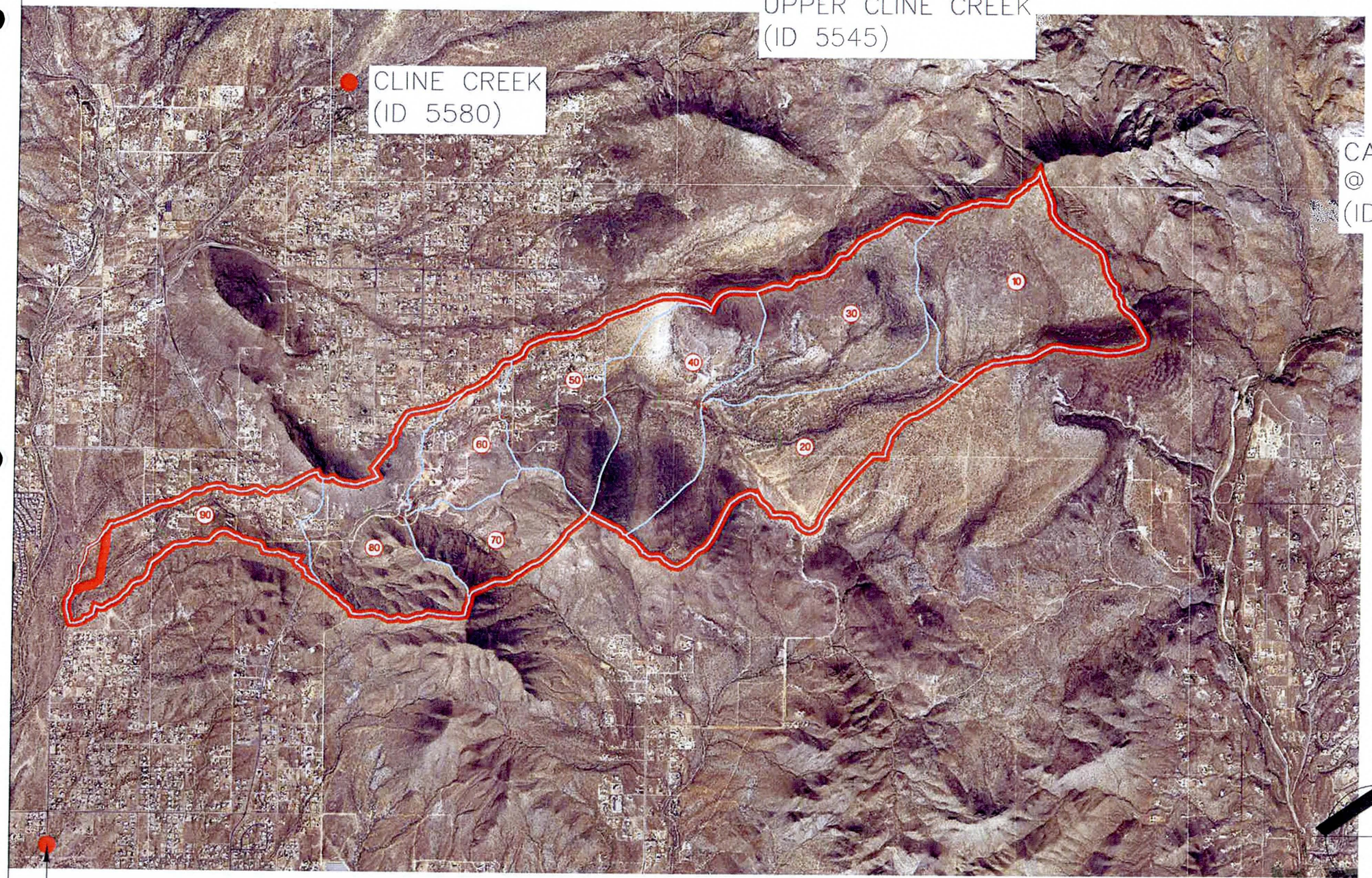
ATTACHMENTS

Gage Data

Roadway Culvert As-builts

FIRM/FIS

Gage Data



SKUNK TANK WASH
(ID 4885)

DESERT HILLS WASH
(ID 4895)

CAVE CREEK
(ID 4890)

SCALE: 1"=3000'

3000 1500 0 3000

FLOOD CONTROL PRECIPITATION STATIONS
RODGER CREEK

MICHAEL BAKER JR. INC
MARICOPA COUNTY, ARIZONA

PROJECT NO. 4109563
DATE: 2011-01-18
BY: TKJ
SHEET NO. 1

Cardno WRG
PHOENIX
9977 N 90TH ST, STE 350, SCOTTSDALE, AZ 85258
TEL: (602) 977-6000 FAX: (602) 977-2029
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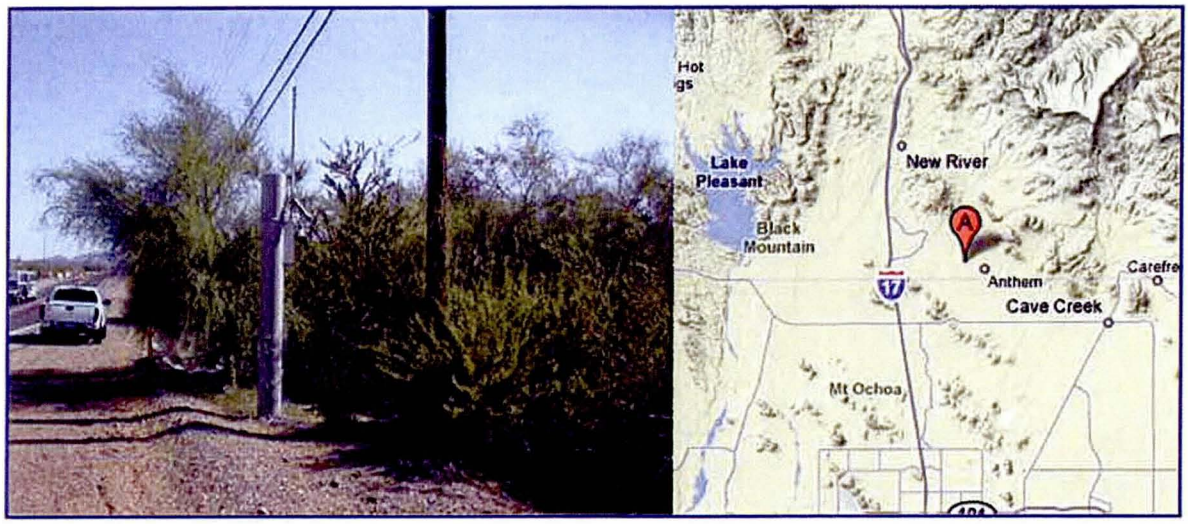
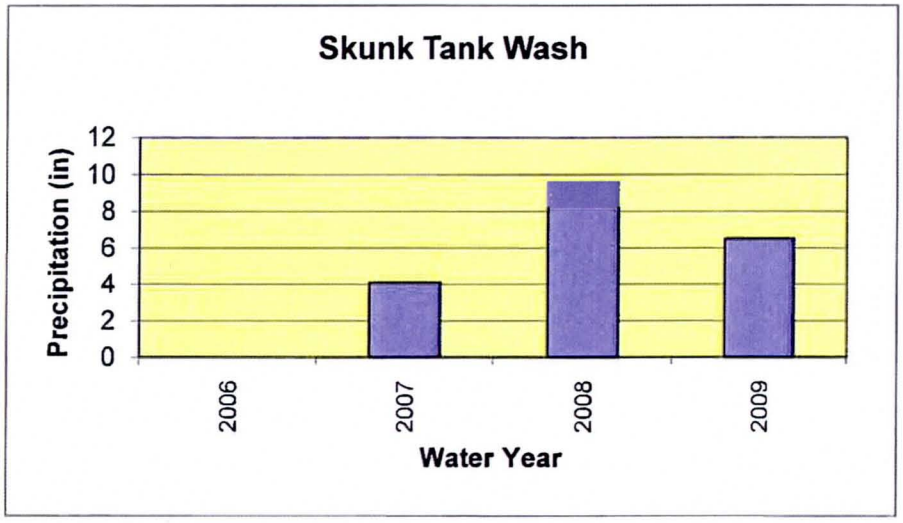


Station Name: Skunk Tank Wash

Station ID Number History:	**4885** since 03/02/06
Station Type:	Rain / Stream
Data Begins:	03/02/2006
Years of Record:	3.58 (as of 10/01/09)
Data Repeater:	White Tank Peak
TRS:	T6N-R3E-Section 29
Latitude:	33° 50' 24.5" (33.8401)
Longitude:	112° 04' 57.8" (112.0827)
Elevation:	1,865 ft. msl
Location:	0.2 mile S of 7th Ave. and Desert Hills Rd.
Data Record:	
Partial Months (>10 days missing):	None
Missing Months:	None
Remarks:	Records Good



Data Statistics for Period of Record:

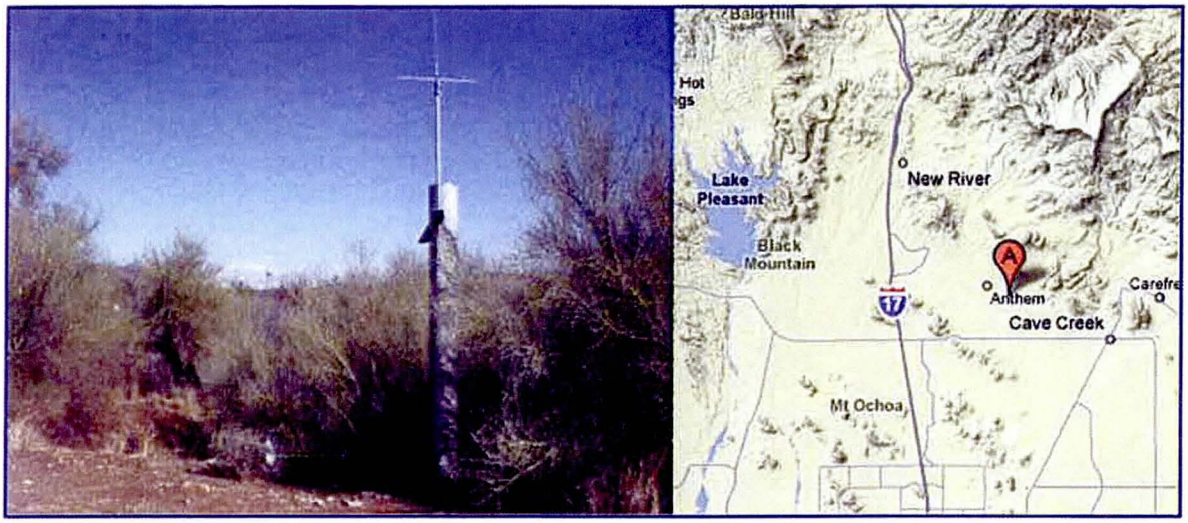
Number of storms greater than 1 inch in 24 hours:	7
Number of storms greater than 2 inches in 24 hours:	1
Number of storms greater than 3 inches in 24 hours:	0
Greatest 15 minute total:	0.59" on 09/07/06
Greatest 1 hour total:	0.98" on 09/07/06
Greatest 3 hour total:	1.06" on 08/24/06
Greatest 6 hour total:	1.42" on 11/30/07
Greatest 24 hour total:	2.95" on 11/30/07

Water Year Totals: (Mean of Complete Water Years [3] = 6.72 inches)

Water Year	Total	Water Year	Total
2020		2010	
2019		2009	6.50
2018		2008	9.57
2017		2007	4.09
2016		2006	M
2015		2005	
2014		2004	
2013		2003	
2012		2002	
2011		2001	

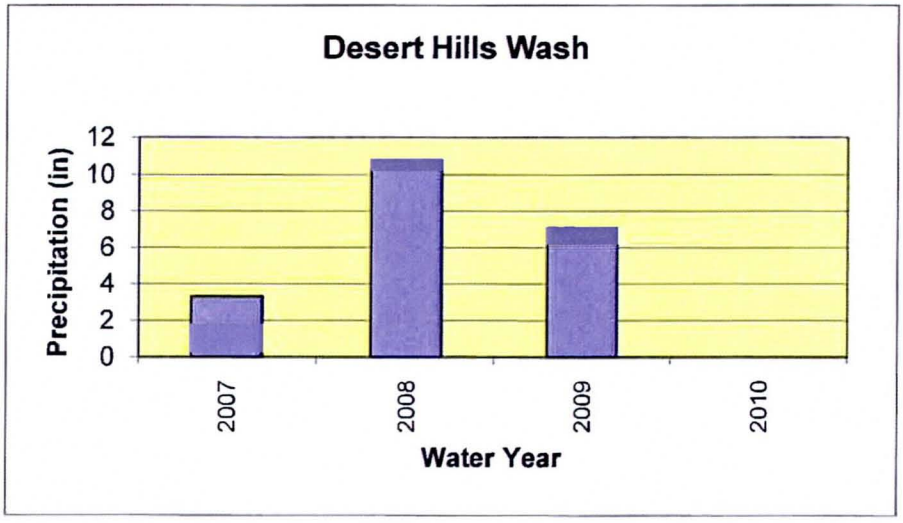
M: One or more months contain partial or missing data

Daily Precipitation Totals And Annual Statistics Are On The Following Pages



Station Name: Desert Hills Wash

Station ID Number History:	**4895** since 03/02/06
Station Type:	Rain / Stream
Data Begins:	03/02/2006
Years of Record:	3.58 (as of 10/01/09)
Data Repeater:	White Tank Peak
TRS:	T6N-R3E-Section 28
Latitude:	33° 49' 41.5" (33.8282)
Longitude:	112° 02' 54.0" (112.0483)
Elevation:	1,860 ft. msl
Location:	Joy Ranch Rd. at 16th St.
Data Record:	
Partial Months (>10 days missing):	None
Missing Months:	None
Remarks:	Records Good



Data Statistics for Period of Record:

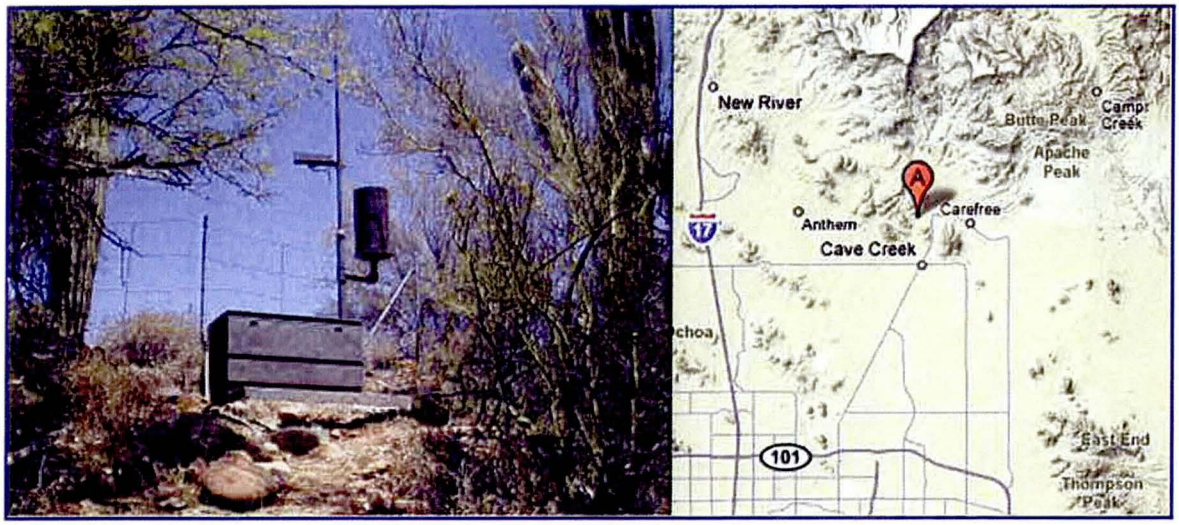
Number of storms greater than 1 inch in 24 hours:	5
Number of storms greater than 2 inches in 24 hours:	2
Number of storms greater than 3 inches in 24 hours:	0
Greatest 15 minute total:	0.28" on 09/09/08
Greatest 1 hour total:	0.63" on 08/25/08
Greatest 3 hour total:	1.10" on 11/30/07
Greatest 6 hour total:	1.42" on 11/30/07
Greatest 24 hour total:	2.99" on 11/30/07

Water Year Totals: (Mean of Complete Water Years [3] = 7.06 inches)

Water Year	Total	Water Year	Total
2020		2010	
2019		2009	7.09
2018		2008	10.79
2017		2007	3.31
2016		2006	M
2015		2005	
2014		2004	
2013		2003	
2012		2002	
2011		2001	

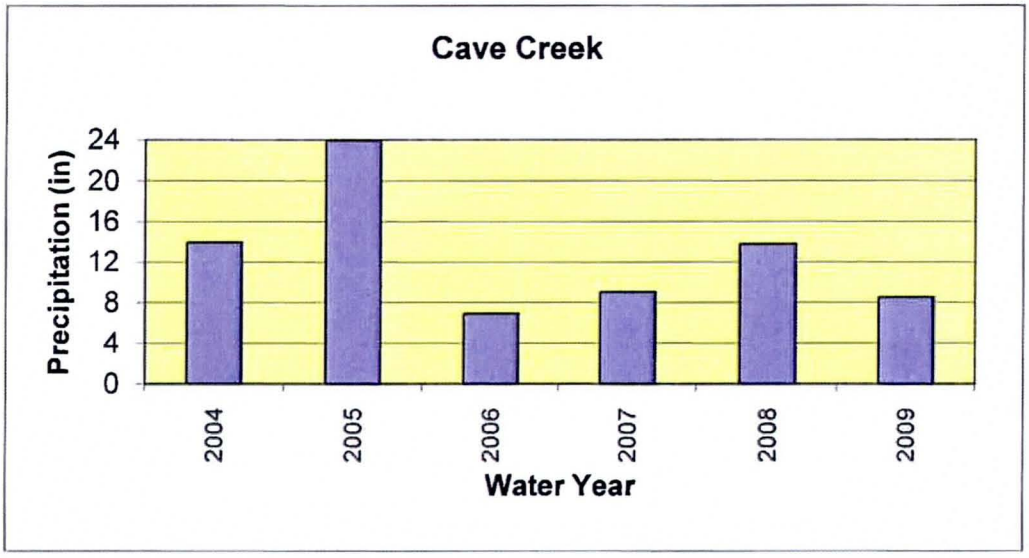
M: One or more months contain partial or missing data

Daily Precipitation Totals And Annual Statistics Are On The Following Pages



Station Name: Cave Creek

Station ID Number History:	**4890** since 05/29/03
Station Type:	Rain / Stream
Data Begins:	05/29/2003
Years of Record:	6.34 (as of 10/01/09)
Data Repeater:	Direct
TRS:	T6N-R4E-Section 29
Latitude:	33° 49' 49.4" (33.8304)
Longitude:	111° 58' 04.9" (111.9680)
Elevation:	1,995 ft. msl
Location:	1 mile west of Cave Creek Town Hall
Data Record:	
Partial Months (>10 days missing):	None
Missing Months:	None
Remarks:	Records Good



Data Statistics for Period of Record:

Number of storms greater than 1 inch in 24 hours:	22
Number of storms greater than 2 inches in 24 hours:	6
Number of storms greater than 3 inches in 24 hours:	1
Greatest 15 minute total:	0.71" on 08/09/05
Greatest 1 hour total:	1.97" on 08/02/05
Greatest 3 hour total:	2.05" on 08/02/05
Greatest 6 hour total:	2.24" on 08/02/05
Greatest 24 hour total:	3.50" on 11/30/07

Water Year Totals: (Mean of Complete Water Years [6] = 12.67 inches)

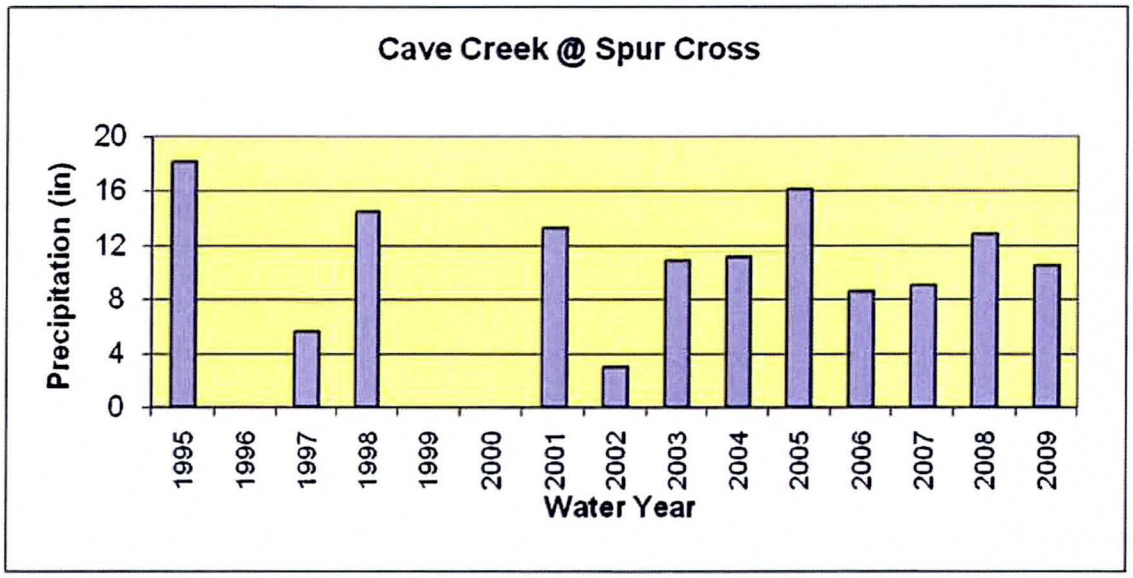
Water Year	Total	Water Year	Total
2020		2010	
2019		2009	8.50
2018		2008	13.78
2017		2007	9.02
2016		2006	6.89
2015		2005	23.90
2014		2004	13.94
2013		2003	M
2012		2002	
2011		2001	

M: One or more months contain partial or missing data

Daily Precipitation Totals And Annual Statistics Are On The Following Pages

Station Name: Cave Creek @ Spur Cross

Station ID Number History:	**4920** since 06/16/93
Data Begins:	06/16/1993
Years of Record:	16.29 (as of 10/01/09)
Data Repeater:	Direct
TRS:	T6N-R4E-Section 04
Latitude:	33° 53' 16.5" (33.8879)
Longitude:	111° 57' 12.8" (111.9536)
Elevation:	2,280 ft. msl
Location:	3.5 mi. North of the Town of Cave Creek on Cave Creek near Spur Cross Road
Data Record:	
Partial Months (>10 days missing):	03/00, 02/00, 04/99, 03/99, 04/99, 10/96, 07/94, 07/93
Missing Months:	None
Remarks:	Records **poor** prior to 2001 due to inconsistent radio path



2801 W. Durango St. Phoenix, AZ 85009 (602) 506-1501

Data Statistics for Period of Record:

Number of storms greater than 1 inch in 24 hours:	38	
Number of storms greater than 2 inches in 24 hours:	7	
Number of storms greater than 3 inches in 24 hours:	0	
		Approx. T_r
Greatest 15 minute total:	0.87" on 09/09/06	8 years
Greatest 1 hour total:	1.10" on 09/28/95	4 years
Greatest 3 hour total:	1.30" on 09/28/95	3 years
Greatest 6 hour total:	1.69" on 09/28/95	4 years
Greatest 24 hour total:	2.52" on 11/30/07	4 years

Water Year Totals: (Mean of Complete Water Years [12] = 11.16 inches)

Water Year	Total	Water Year	Total
2010		*2000*	M
2009	10.55	*1999*	M
2008	12.87	*1998*	14.53
2007	9.09	*1997*	5.63
2006	8.58	*1996*	M
2005	16.14	*1995*	18.19
2004	11.22	*1994*	M
2003	10.91	*1993*	M
2002	2.95	*1992*	
2001	13.31	*1991*	

M: One or more months contain partial or missing data

NOAA Atlas 14 Precipitation Frequency Estimates, Daily Precipitation Totals, And Annual Statistics Are On The Following Pages

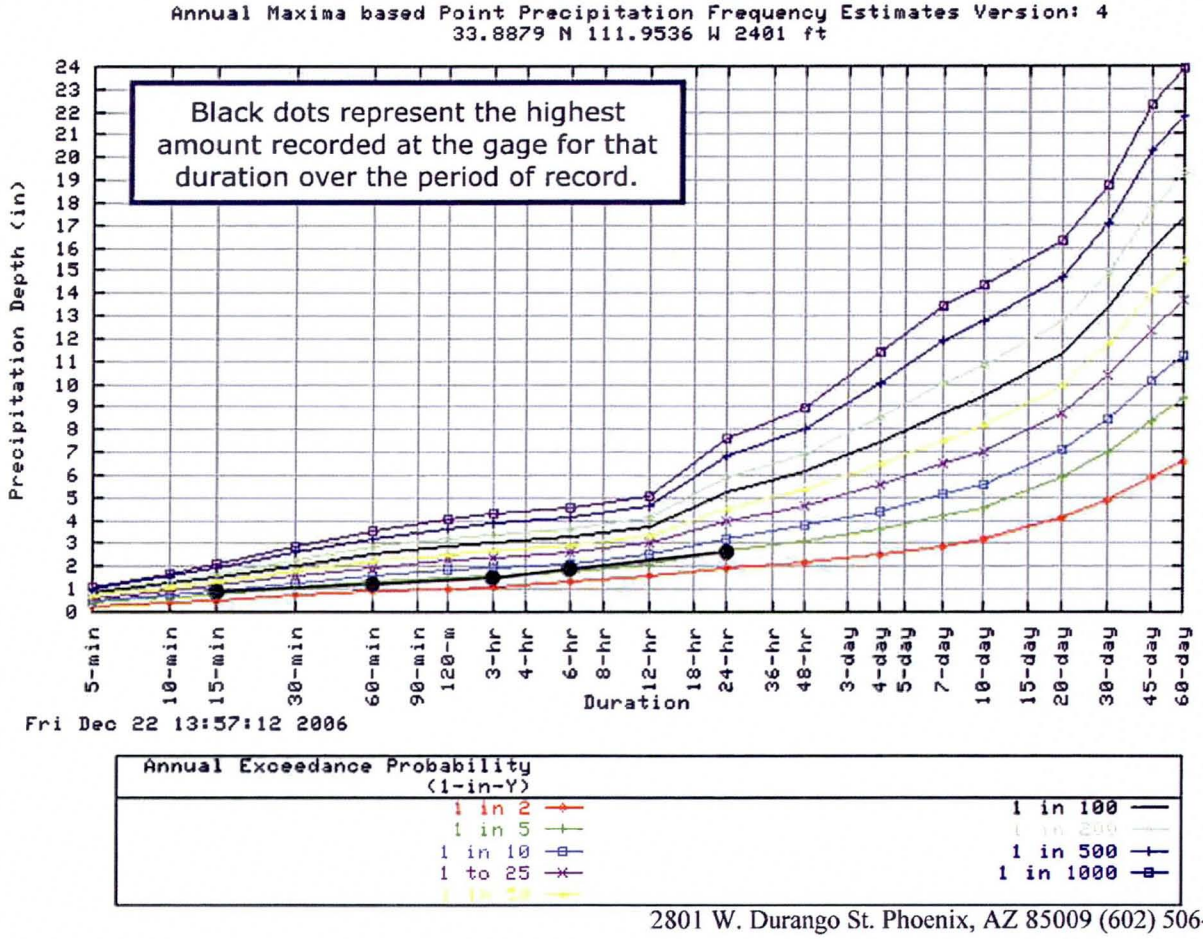
POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Arizona 33.8879 N 111.9536 W 2401 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006
Extracted: Fri Dec 22 2006

Precipitation Frequency Estimates (inches)

AEP* (1-in-Y)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
2	0.29	0.44	0.54	0.73	0.91	1.05	1.12	1.31	1.58	1.92	2.20	2.52	2.91	3.20	4.13	4.93	5.88	6.63
5	0.42	0.64	0.79	1.07	1.32	1.51	1.58	1.79	2.13	2.70	3.12	3.62	4.19	4.59	5.88	7.01	8.38	9.40
10	0.51	0.78	0.96	1.30	1.61	1.82	1.91	2.13	2.51	3.25	3.78	4.43	5.14	5.62	7.10	8.46	10.10	11.27
25	0.63	0.96	1.19	1.60	1.98	2.24	2.34	2.58	3.01	4.00	4.67	5.56	6.47	7.04	8.74	10.36	12.36	13.68
50	0.72	1.09	1.36	1.83	2.26	2.56	2.68	2.92	3.38	4.60	5.38	6.48	7.56	8.20	10.01	11.83	14.09	15.50
100	0.81	1.23	1.53	2.06	2.54	2.88	3.03	3.28	3.76	5.23	6.13	7.48	8.74	9.45	11.35	13.35	15.89	17.36
200	0.90	1.37	1.70	2.29	2.84	3.21	3.40	3.65	4.14	5.90	6.92	8.54	10.02	10.80	12.75	14.91	17.74	19.26
500	1.03	1.56	1.94	2.61	3.23	3.67	3.92	4.14	4.65	6.85	8.04	10.10	11.89	12.76	14.70	17.06	20.31	21.84
1000	1.13	1.72	2.13	2.87	3.55	4.03	4.33	4.54	5.05	7.62	8.94	11.38	13.46	14.40	16.28	18.77	22.35	23.88



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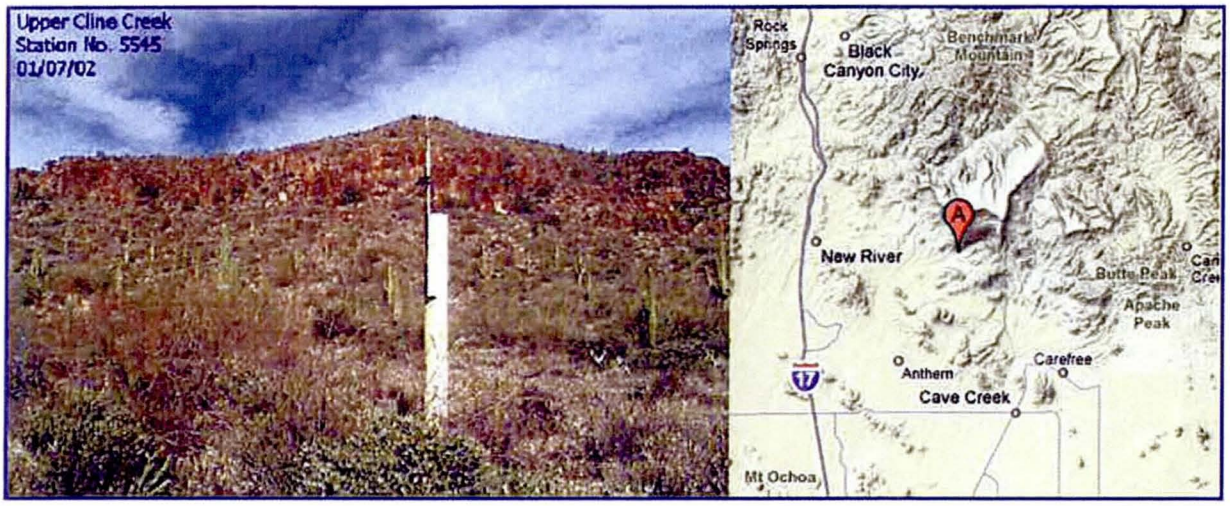
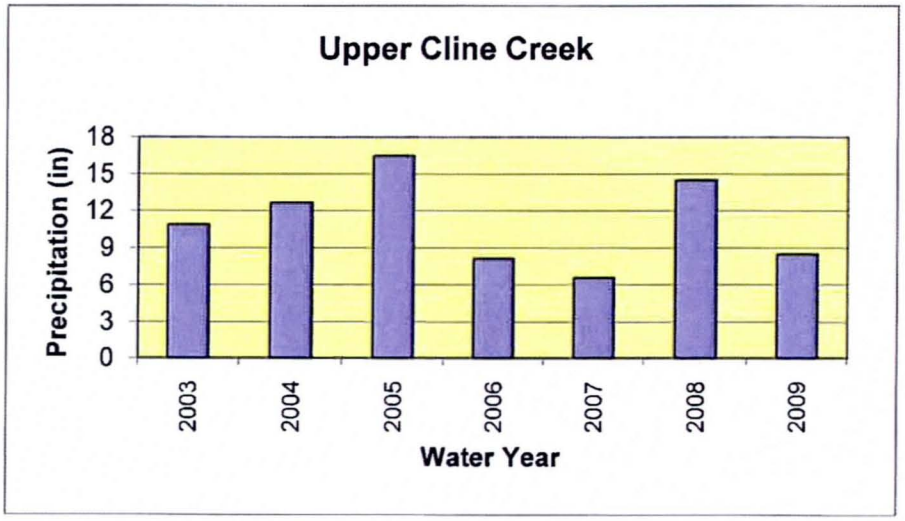


Station Name: Upper Cline Creek

Station ID Number History:	**5545** since installation
Station Type:	Rain
Data Begins:	11/21/2001
Years of Record:	7.86 (as of 10/01/09)
Data Repeater:	White Tank Peak
TRS:	T7N-R3E-Section 35
Latitude:	33° 54' 37.6" (33.9104)
Longitude:	112° 00' 56.6" (112.0157)
Elevation:	2,520 ft. msl
Location:	8 miles east of New River
Data Record:	
Partial Months (>10 days missing):	None
Missing Months:	None
Remarks:	Records Good



Data Statistics for Period of Record:

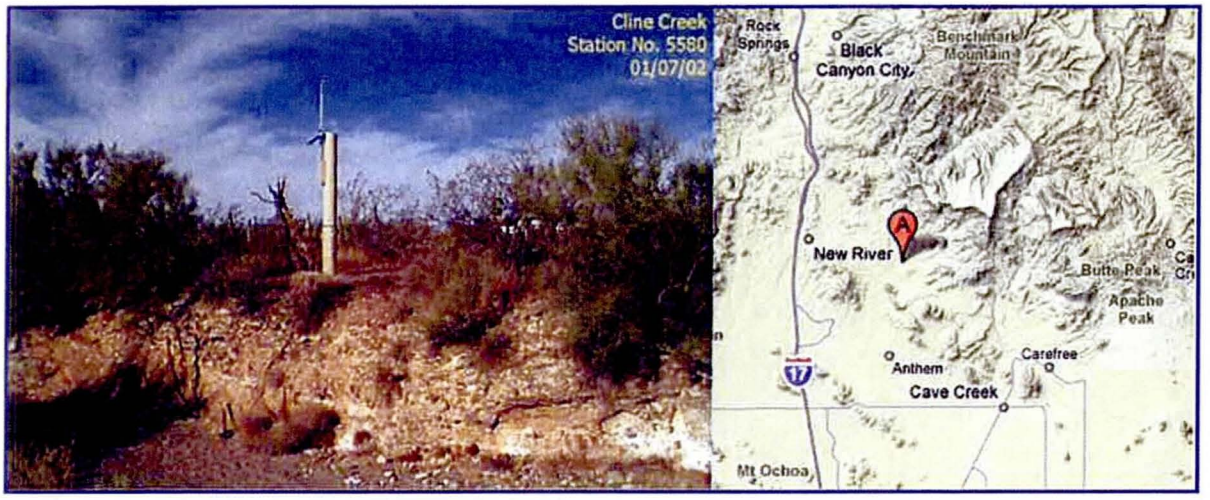
Number of storms greater than 1 inch in 24 hours:	20
Number of storms greater than 2 inches in 24 hours:	2
Number of storms greater than 3 inches in 24 hours:	1
Greatest 15 minute total:	0.55" on 09/09/06
Greatest 1 hour total:	1.18" on 08/25/08
Greatest 3 hour total:	1.46" on 08/25/08
Greatest 6 hour total:	1.50" on 08/25/08
Greatest 24 hour total:	4.49" on 11/30/07

Water Year Totals: (Mean of Complete Water Years [7] = 11.09 inches)

Water Year	Total	Water Year	Total
2020		2010	
2019		2009	8.46
2018		2008	14.49
2017		2007	6.57
2016		2006	8.11
2015		2005	16.46
2014		2004	12.64
2013		2003	10.87
2012		2002	M
2011		2001	

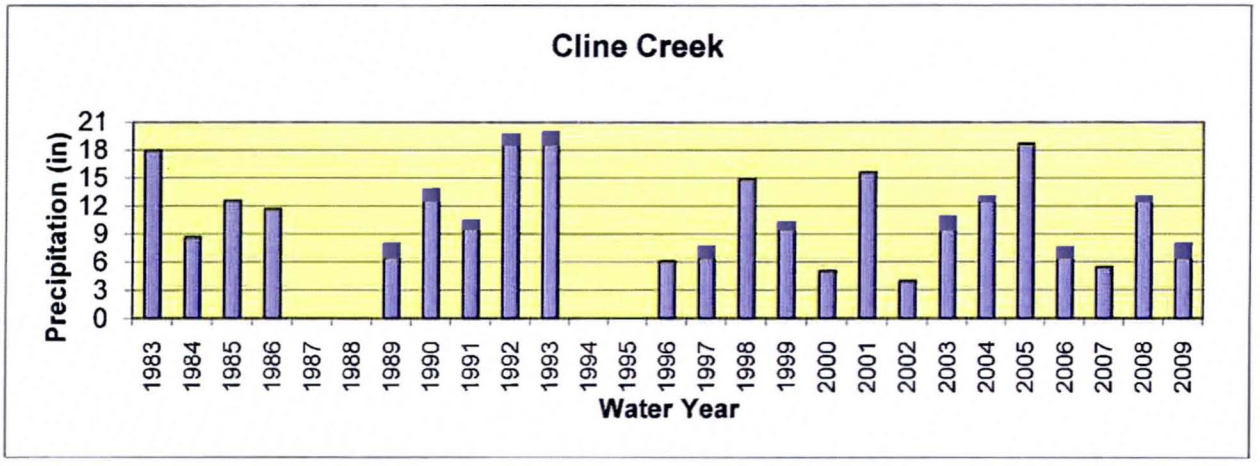
M: One or more months contain partial or missing data

Daily Precipitation Totals And Annual Statistics Are On The Following Pages



Station Name: Cline Creek

Station ID Number History:	**5580** since 10/16/92 **2630** from 10/01/87 - 10/16/92 **0019** from 08/01/81 - 10/01/87
Data Begins:	08/01/1981
Years of Record:	28.17 (as of 10/01/09)
Data Repeater:	Direct
TRS:	T7N-R3E-Section 33
Latitude:	33° 54' 03.5" (33.9010)
Longitude:	112° 03' 17.9" (112.0550)
Elevation:	2,170 ft. msl
Location:	4 miles east of New River
Data Record:	
Partial Months (>10 days missing):	11/87
Missing Months:	10/87, 05/87, 03/82, 12/81
Remarks:	Records Fair



Data Statistics for Period of Record:

Number of storms greater than 1 inch in 24 hours:	71	
Number of storms greater than 2 inches in 24 hours:	11	
Number of storms greater than 3 inches in 24 hours:	3	
		Approx. T_r
Greatest 15 minute total:	0.91" on 09/11/97	9 years
Greatest 1 hour total:	1.89" on 08/14/90	20 years
Greatest 3 hour total:	2.68" on 08/14/90	50 years
Greatest 6 hour total:	2.68" on 08/14/90	35 years
Greatest 24 hour total:	4.21" on 11/30/07	45 years

Water Year Totals: (Mean of Complete Water Years [23] = 11.41 inches)

Water Year	Total	Water Year	Total	Water Year	Total
2010		2000	5.00	1990	13.78
2009	7.95	1999	10.28	1989	7.95
2008	12.99	1998	14.88	1988	M
2007	5.43	1997	7.64	1987	M
2006	7.56	1996	6.06	1986	11.65
2005	18.66	1995	M	1985	12.56
2004	12.99	1994	M	1984	8.66
2003	10.91	1993	19.92	1983	17.95
2002	3.98	1992	19.69	1982	M
2001	15.59	1991	10.43	1981	M

M: One or more months contain partial or missing data

NOAA Atlas 14 Precipitation Frequency Estimates, Daily Precipitation Totals, And Annual Statistics Are On The Following Pages

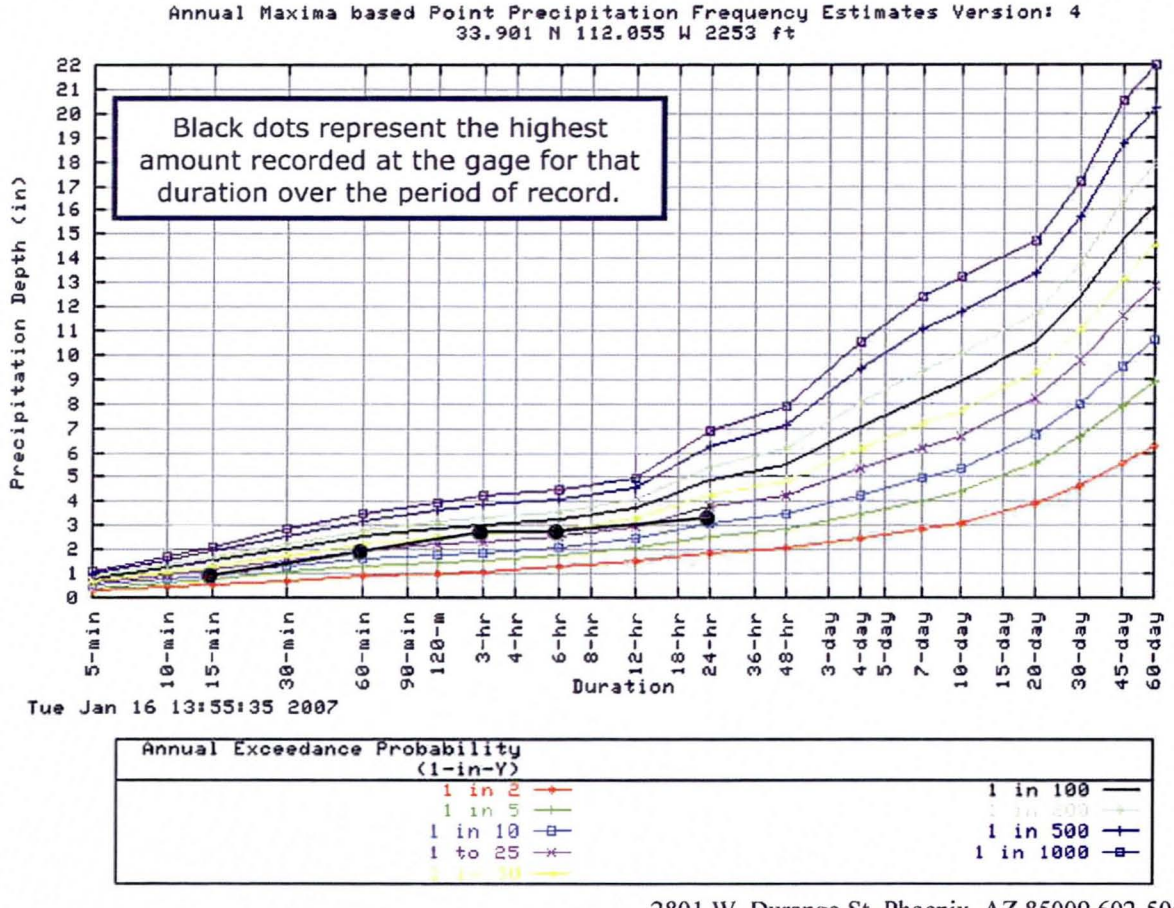
POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Arizona 33.901 N 112.055 W 2253 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006
Extracted: Tue Jan 16 2007

Precipitation Frequency Estimates (inches)

AEP* (1-in-Y)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
2	0.28	0.43	0.54	0.72	0.90	1.04	1.11	1.29	1.55	1.86	2.05	2.45	2.83	3.10	3.95	4.68	5.59	6.29
5	0.42	0.63	0.79	1.06	1.31	1.49	1.56	1.77	2.10	2.58	2.88	3.50	4.05	4.43	5.59	6.64	7.93	8.90
10	0.51	0.77	0.95	1.29	1.59	1.81	1.88	2.10	2.48	3.09	3.47	4.26	4.95	5.38	6.72	7.98	9.53	10.64
25	0.62	0.95	1.18	1.58	1.96	2.22	2.31	2.54	2.97	3.77	4.26	5.31	6.18	6.70	8.20	9.72	11.60	12.86
50	0.71	1.08	1.34	1.81	2.24	2.53	2.65	2.88	3.33	4.31	4.88	6.16	7.17	7.75	9.34	11.06	13.18	14.53
100	0.80	1.22	1.51	2.04	2.52	2.85	3.00	3.23	3.71	4.87	5.53	7.07	8.24	8.87	10.51	12.42	14.79	16.20
200	0.90	1.36	1.69	2.27	2.81	3.18	3.36	3.60	4.08	5.45	6.20	8.03	9.38	10.07	11.72	13.82	16.45	17.90
500	1.02	1.55	1.92	2.59	3.21	3.63	3.88	4.09	4.59	6.26	7.14	9.42	11.04	11.79	13.40	15.73	18.73	20.20
1000	1.12	1.70	2.11	2.84	3.52	3.99	4.29	4.48	4.98	6.91	7.89	10.56	12.41	13.21	14.73	17.23	20.52	21.99



2801 W. Durango St. Phoenix, AZ 85009 602-506-1501

Roadway Culvert As-builts

Maricopa County
Public Works

Cynthia Robinson
2901 W. Durango St
Phoenix, AZ 85009
Office: 602-506-8796
Cell: 602-722-5411
Fax: 602-506-4750
www.maricopa.gov

February 11, 2011

Mr. Matthew Pruitt
9977 North 90th Street, Suite 350
Scottsdale, AZ 85258

RE: AS-BUILT OF CULVERT CROSSING OF NEW RIVER ROAD AND RODGER CREEK NEW RIVER ROAD AND LINDA LANE.

Mr. Pruitt:

Pursuant to the provisions of A.R.S. 39-121.03 the disposition of your records request received on February 3, 2011 is as follows:

MCDOT does not have records for the area listed above.

Please feel free to contact me if you need further information.

Sincerely,

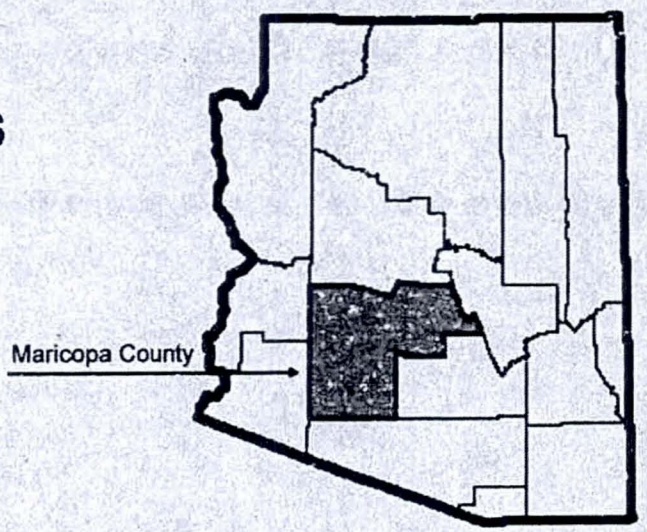
Cynthia Robinson MPA C.P.M.
Public Works Facilities Manager
Custodian of Records for
MCDOT & Solid Waste Management
on

FIRM/FIS

FLOOD INSURANCE STUDY

MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS
VOLUME 1 OF 17

COMMUNITY NAME	COMMUNITY NUMBER
AVONDALE, CITY OF	040038
BUCKEYE, TOWN OF	040039
CAREFREE, TOWN OF	040126
CAVE CREEK, TOWN OF	040129
CHANDLER, CITY OF	040040
EL MIRAGE, CITY OF	040041
FOUNTAIN HILLS, TOWN OF	040135
GILA BEND, TOWN OF	040043
GILBERT, TOWN OF	040044
GLENDALE, CITY OF	040045
GOODYEAR, CITY OF	040046
GUADALUPE, TOWN OF	040111
LITCHFIELD PARK, CITY O	040128
MARICOPA COUNTY (UNINCORPORATED AREAS)	040037
MESA, CITY OF	040048
PARADISE VALLEY, TOWN OF	040049
PEORIA, CITY OF	040050
PHOENIX, CITY OF	040051
QUEEN CREEK, TOWN OF	040132
SCOTTSDALE, CITY O	045012
SURPRISE, CITY OF	040053
TEMPE, CITY OF	040054
TOLLESON, CITY OF	040055
WICKENBURG, TOWN OF	040056
YOUNGTOWN, TOWN OF	040057



REVISED
September 30, 2005

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
04013CV001A

Table 1. Detailed Study Sources (Continued)

Flooding Source	Limits of Study
Unnamed Tributary of Jackrabbit Wash	From the mouth to Vulture Mine Road
Star Wash	From confluence with Jackrabbit Wash to 2.1 miles Upstream
Southern Pacific Railroad & Pacific Spur, Ponding Southern	From East Maricopa Floodway to Baseline Road along Southern Pacific Railroad, and from Hunt Highway north to Baseline Road along Southern Pacific Spur
Consolidated Canal, Ponding	From Hunt Highway (Maricopa County Line) to Superstition Freeway (SR 360)
Eastern Canal, Ponding	From Riggs Road north to Superstition Freeway (SR 360)
Cline Creek	From confluence with Skunk Creek to 2.6 miles upstream
Cline Creek, Tributary X5	From confluence with Cline Creek to 16th Street Alignment
Cline Creek, Tributary C-6	From confluence with Cline Creek to 600 feet west of 20th Street
Cline Creek, Tributary C-8	From confluence with Tributary C-6 to 2,200 feet east of 24th Street
Cline Creek, Tributary Xl of C-6	From 600 feet west of 20th Street to 1,400 feet east of 24th Street Alignment
Cline Creek, Tributary X2 of C-6	From confluence with Tributary C-6 to 24th Street Alignment
Cline Creek, Tributary X3 of C-6	From confluence with Tributary C-6 to 500 feet east of 20th Street
Cline Creek, Tributary X4A of C-6	From confluence with Tributary C-6 to confluence with Tributary X4B
Cline Creek, Tributary X4B of X4A	From confluence with Tributary X4A of C-6 to 600 feet west of 14th Street
Morgan City Wash	From confluence with Agua Fria River to approximately12 miles upstream at Maricopa County Line
Rodger Creek	From confluence with Skunk Creek to 6.4 miles upstream
Grass Wash	From confluence with Aguila Farm Channel to 5.685 miles upstream
Aguila Farm Channel	From confluence with Centennial Wash to 5.378 miles upstream
North Branch Centennial Wash	From confluence with Aguila Farm Channel to 2.416 miles upstream
Gila River	From north of Gila Bend to Gillespie Dam and from Gillespie Dam to confluence with Salt River at 115th Avenue

Table 3. Summary of Discharges (Continued)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
Tributary X2					
At confluence with Tributary C-6	0.43	--[1]	--[1]	390	--[1]
Tributary X1					
600 feet west of 20th Street	0.60	--[1]	--[1]	708	--[1]
Tributary X5					
At confluence with Cline Creek	0.38	--[1]	--[1]	301	--[1]
Tributary C-8					
At confluence with Tributary C-6	1.42	--[1]	--[1]	2,280	--[1]
Morgan City Wash					
At confluence with Agua Fria River	22.97	--[1]	--[1]	14,400	--[1]
At confluence with Tributary M-12	21.16	--[1]	--[1]	14,200	--[1]
At confluence with Tributary M-10	18.90	--[1]	--[1]	13,900	--[1]
At confluence with Tributary M-8	15.64	--[1]	--[1]	12,300	--[1]
At confluence with Tributary M-7	13.25	--[1]	--[1]	12,000	--[1]
At confluence with Tributary M-4	8.12	--[1]	--[1]	8,130	--[1]
At confluence with Tributary M-3	5.45	--[1]	--[1]	4,820	--[1]
Rodger Creek					
At confluence with Skunk Creek	--[2]	--[1]	--[1]	6,170	--[1]
At 18th Street	--[2]	--[1]	--[1]	5,450	--[1]
Upstream of 28th Street	--[2]	--[1]	--[1]	2,870	--[1]

--[1] Not Computed

--[2] Not Available

Table 4. Range of Hydraulic Roughness Coefficients (Manning's "n") (Continued)

Flooding Source	Channel	Overbanks
Osborn Road Wash	0.030 - 0.035	0.050 - 0.070
Paradise Wash	0.013 - 0.055	0.050 - 0.070
Paradise Wash - West Branch	0.050 - 0.055	0.053 - 0.065
Perryville Road Wash	0.022 - 0.045	0.035 - 0.080
Powder House Wash	0.030 - 0.060	0.040 - 0.060
Powerline Wash	0.040 - 0.045	0.050 - 0.055
Powerline Wash	0.040 - 0.041	0.043 - 0.055
Rainbow Wash	0.016 - 0.047	0.030 - 0.150
Rainbow Wash Tributary	0.013 - 0.040	0.040 - 0.050
Ranieri Wash	0.050	0.065
Rodeo Wash	0.025	0.035
Rodeo Wash Tributary	0.025	0.035
Rodger Creek	0.045 - 0.080	0.055 - 0.080
Rowe Wash	0.020 - 0.045	0.020 - 0.052
Rowe Wash Tributary 1	0.045	0.045 - 0.055
Rowe Wash Tributary 2	0.045	0.050 - 0.055
Salt River	0.030 - 0.035	0.040 - 0.050
Sand Tank Wash	0.025 - 0.030	0.035 - 0.060
Scatter Wash, North Branch	0.020 - 0.050	0.070 - 0.150
Scatter Wash, South Branch	0.035	0.045
Scott Avenue Wash	0.025	0.035
Scott Avenue Wash	0.035 - 0.080	0.035 - 0.040
Skunk Creek	0.035	0.045 - 0.050
Sols Wash	0.035 - 0.065	0.025 - 0.100
South Branch Casandro Wash	0.030 - 0.060	0.040 - 0.060
South Branch of Tank Wash	0.040 - 0.050	0.050 - 0.055
Southern Pacific Railroad	0.014 - 0.050	0.014 - 0.100

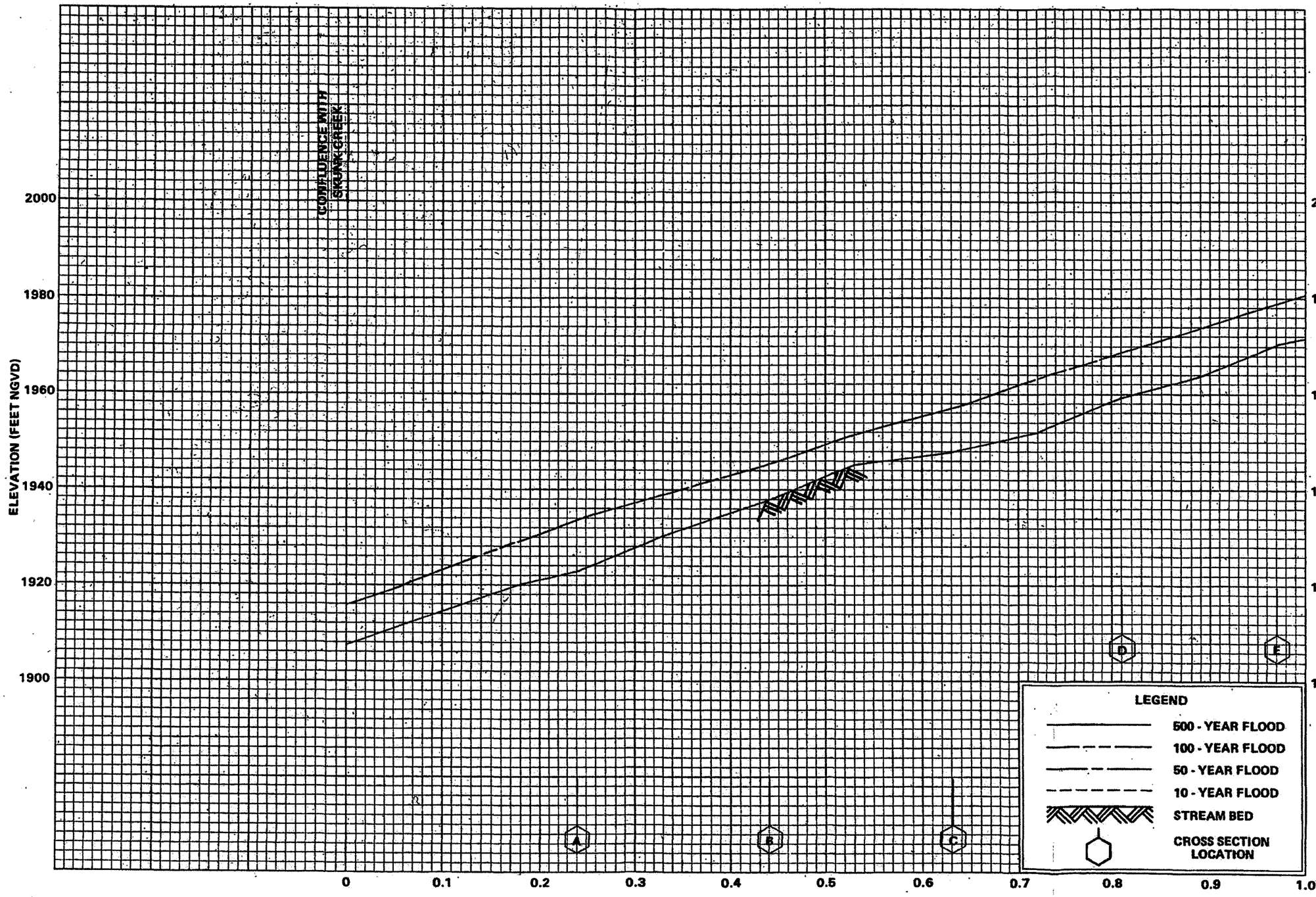
FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Rodger Creek								
A	0.243	244	860	7.2	1,933.3	1,933.3	1,933.3	0.0
B	0.435	222	903	6.8	1,945.2	1,945.2	1,945.5	0.3
C	0.628	166	767	8.0	1,956.8	1,956.8	1,956.9	0.1
D	0.812	198	889	6.9	1,968.5	1,968.5	1,968.6	0.1
E	0.971	328	1,265	4.9	1,978.8	1,978.8	1,978.9	0.1
F	1.156	271	921	6.7	1,990.6	1,990.6	1,990.7	0.1
G	1.344	173	757	8.2	2,005.4	2,005.4	2,005.6	0.2
H	1.526	276	1,057	5.8	2,019.0	2,019.0	2,019.1	0.1
I	1.674	188	792	7.8	2,029.1	2,029.1	2,029.4	0.3
J	1.831	140	865	7.1	2,038.0	2,038.0	2,038.0	0.0
K	2.081	225	782	7.9	2,062.9	2,062.9	2,062.9	0.0
L	2.265	182	697	8.9	2,077.1	2,077.1	2,077.1	0.0
M	2.458	172	630	8.7	2,093.8	2,093.8	2,093.8	0.0
N	2.654	186	585	9.3	2,112.7	2,112.7	2,112.7	0.0
O	2.841	203	651	8.4	2,128.5	2,128.5	2,128.5	0.0
P	3.036	286	800	6.8	2,146.2	2,146.2	2,146.2	0.0
Q	3.207	140	560	9.7	2,163.5	2,163.5	2,163.5	0.0
R	3.384	202	595	9.2	2,181.1	2,181.1	2,181.1	0.0
S	3.567	100	539	10.1	2,197.8	2,197.8	2,197.8	0.0
T	3.730	195	653	8.3	2,214.1	2,214.1	2,214.1	0.0
U	3.905	140	716	7.6	2,233.6	2,233.6	2,233.6	0.0
V	4.102	203	738	7.4	2,254.5	2,254.5	2,254.6	0.1
W	4.293	162	677	8.1	2,273.0	2,273.0	2,273.1	0.1
X	4.481	183	348	8.3	2,291.0	2,291.0	2,291.0	0.0
Y	4.661	147	352	8.2	2,313.4	2,313.4	2,313.5	0.1
Z	4.853	153	381	7.6	2,337.4	2,337.4	2,337.4	0.0

[1]Miles above confluence with Skunk Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Rodger Creek (Cont'd)								
AA	5.061	126	433	6.7	2,368.8	2,368.8	2,368.8	0.0
AB	5.239	86	350	8.3	2,392.5	2,392.5	2,392.6	0.1
AC	5.414	108	362	8.0	2,415.4	2,415.4	2,415.5	0.1
AD	5.591	204	424	6.8	2,440.1	2,440.1	2,440.1	0.0
AE	5.970	84	322	9.0	2,493.1	2,493.1	2,493.1	0.0
AF	6.153	89	368	7.9	2,520.2	2,520.2	2,520.2	0.0
AG	6.349	244	479	6.0	2,555.4	2,555.4	2,555.4	0.0

[1]Miles above confluence with Skunk Creek

FLOODING SOURCE | FLOODWAY | BASE FLOOD



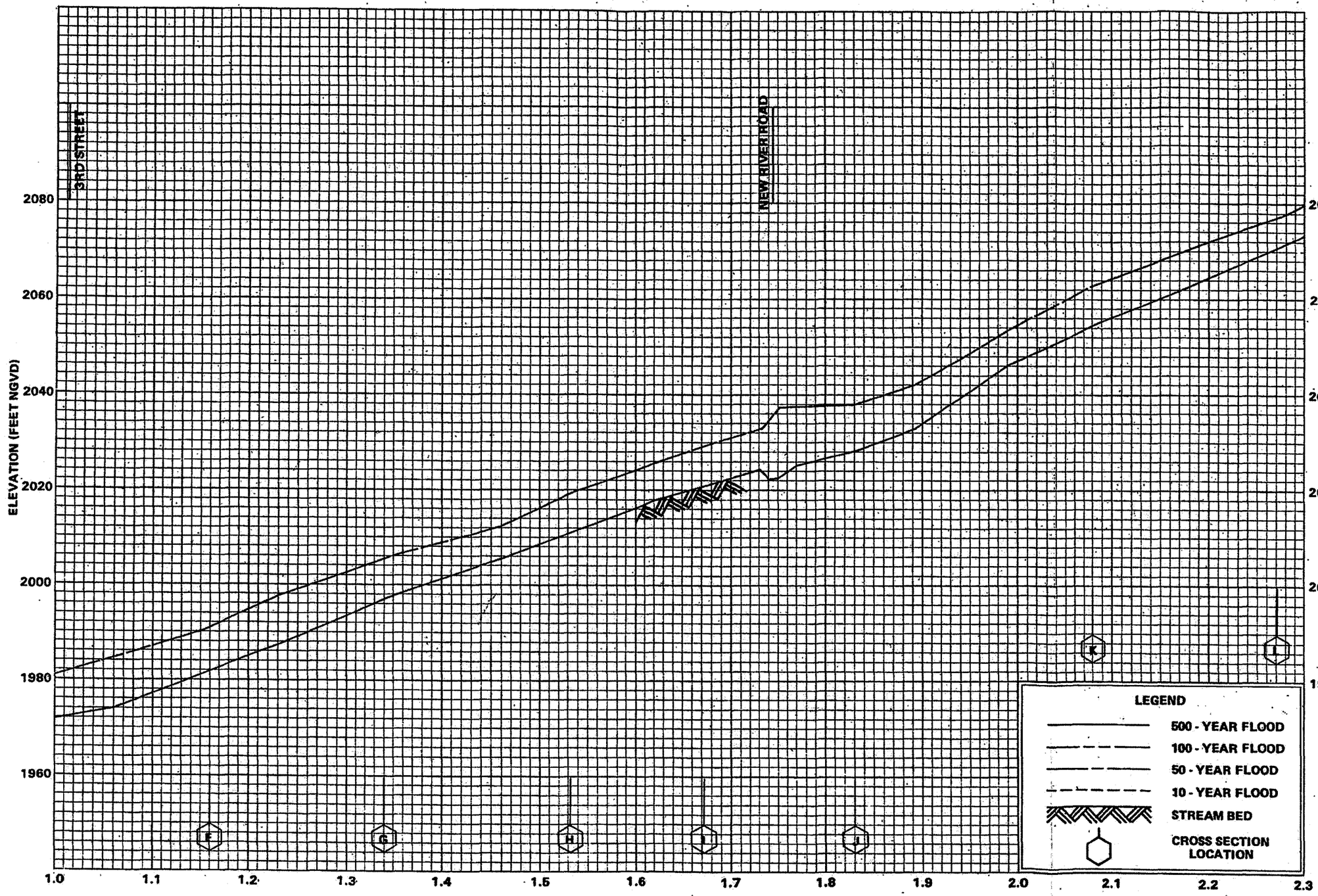
FLOOD PROFILES

RODGER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

513P



FLOOD PROFILES

RODGER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

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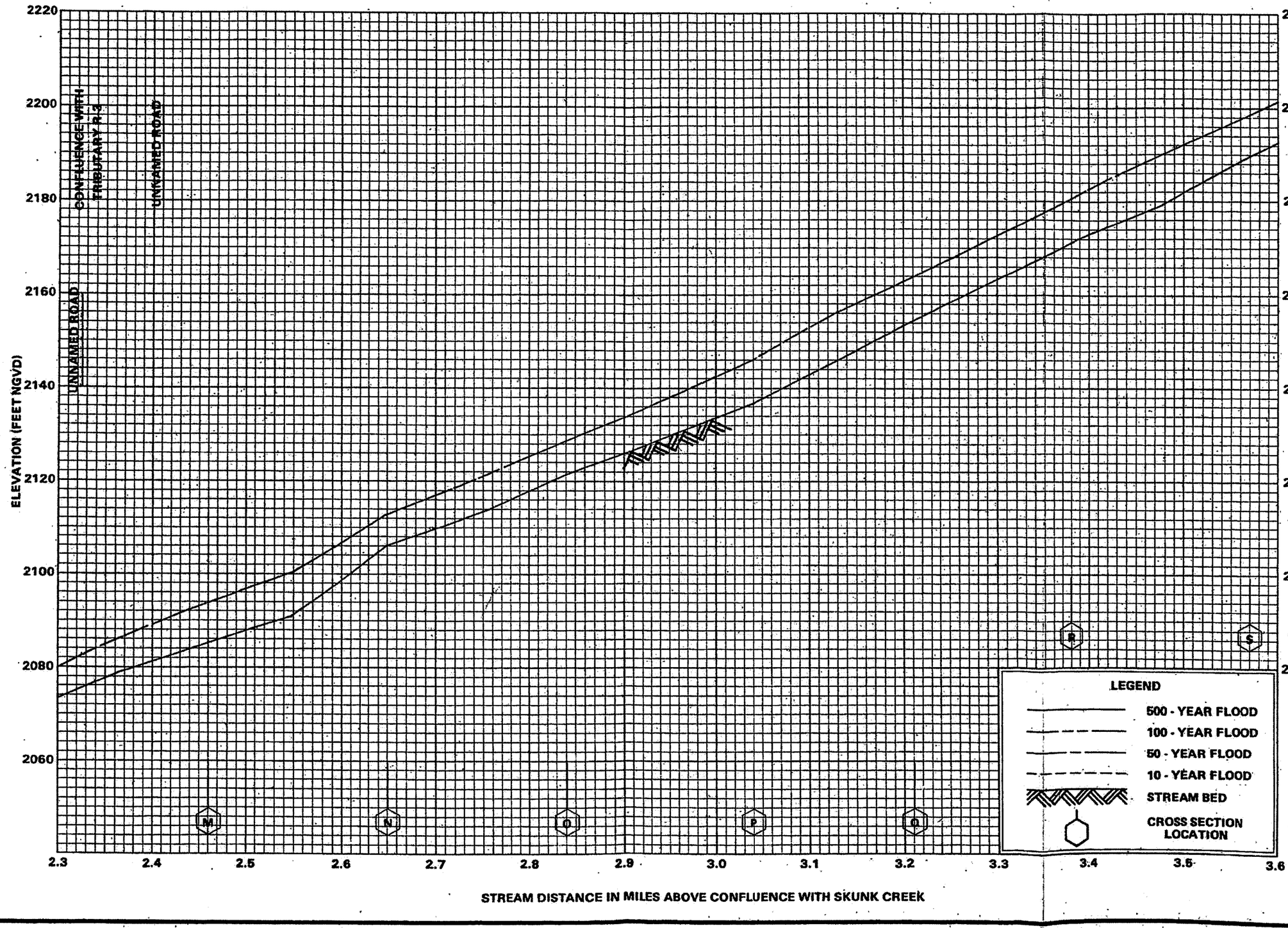


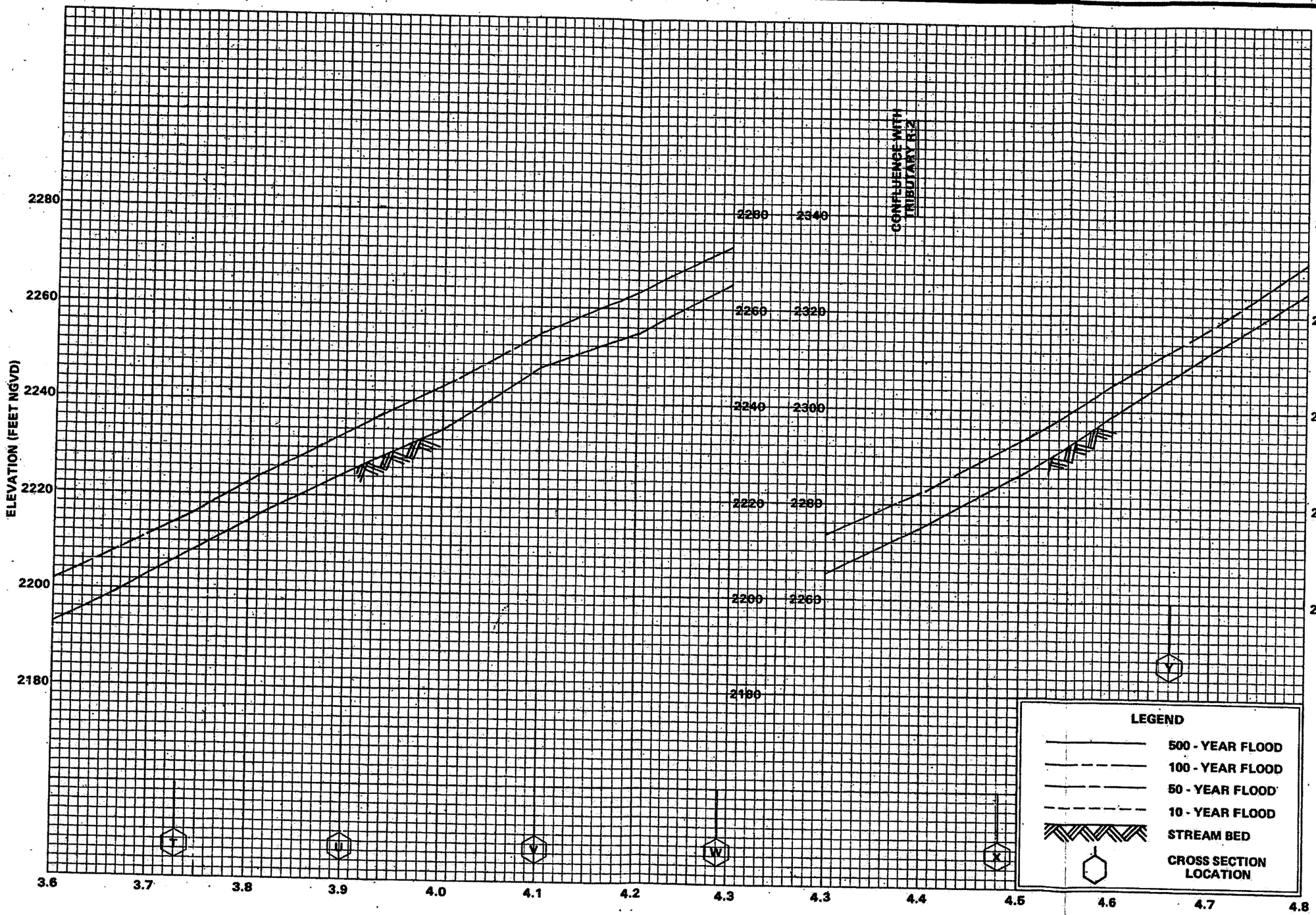
FLOOD PROFILES

RODGER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

515P

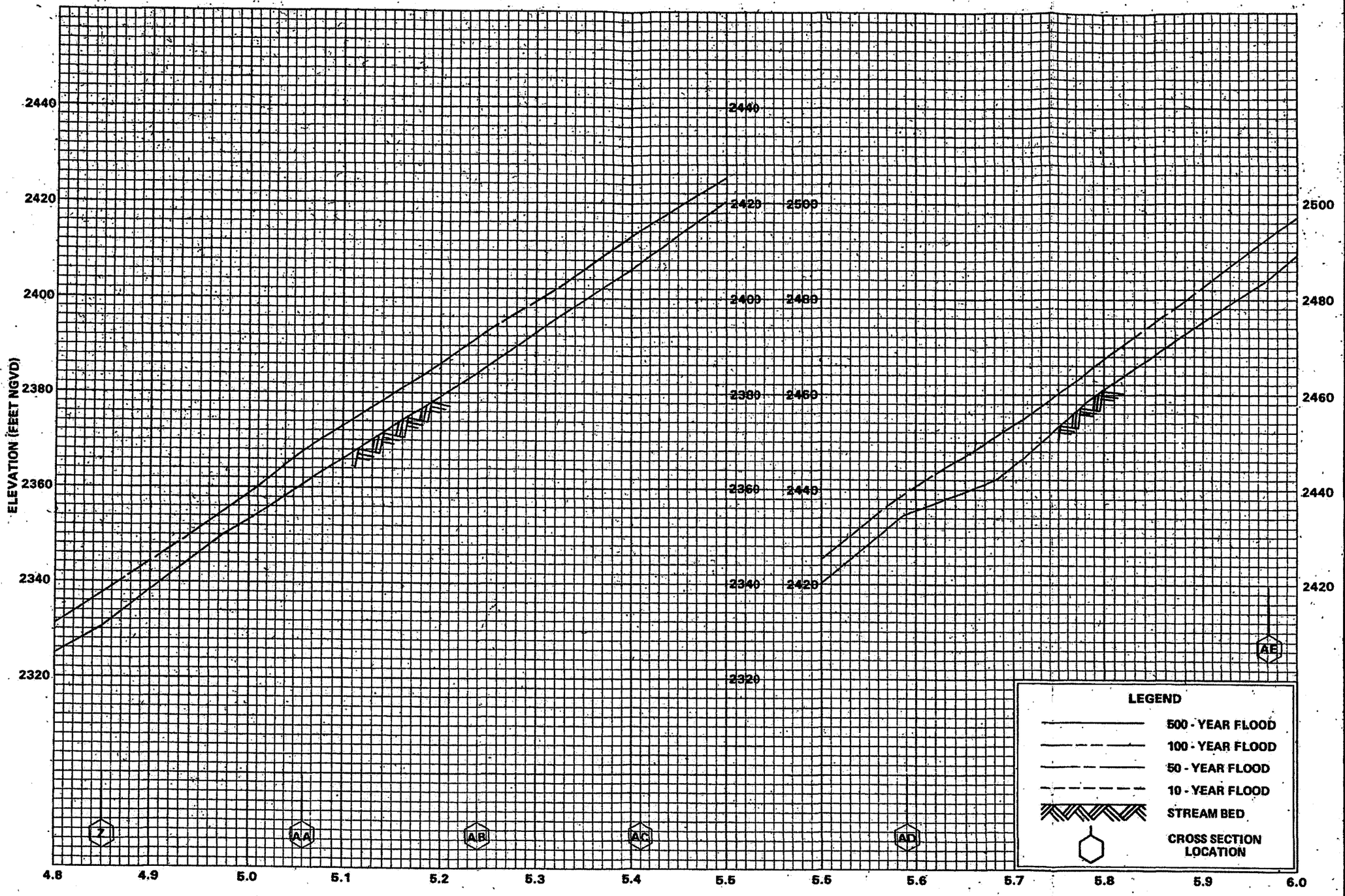


FLOOD PROFILES

RODGER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS



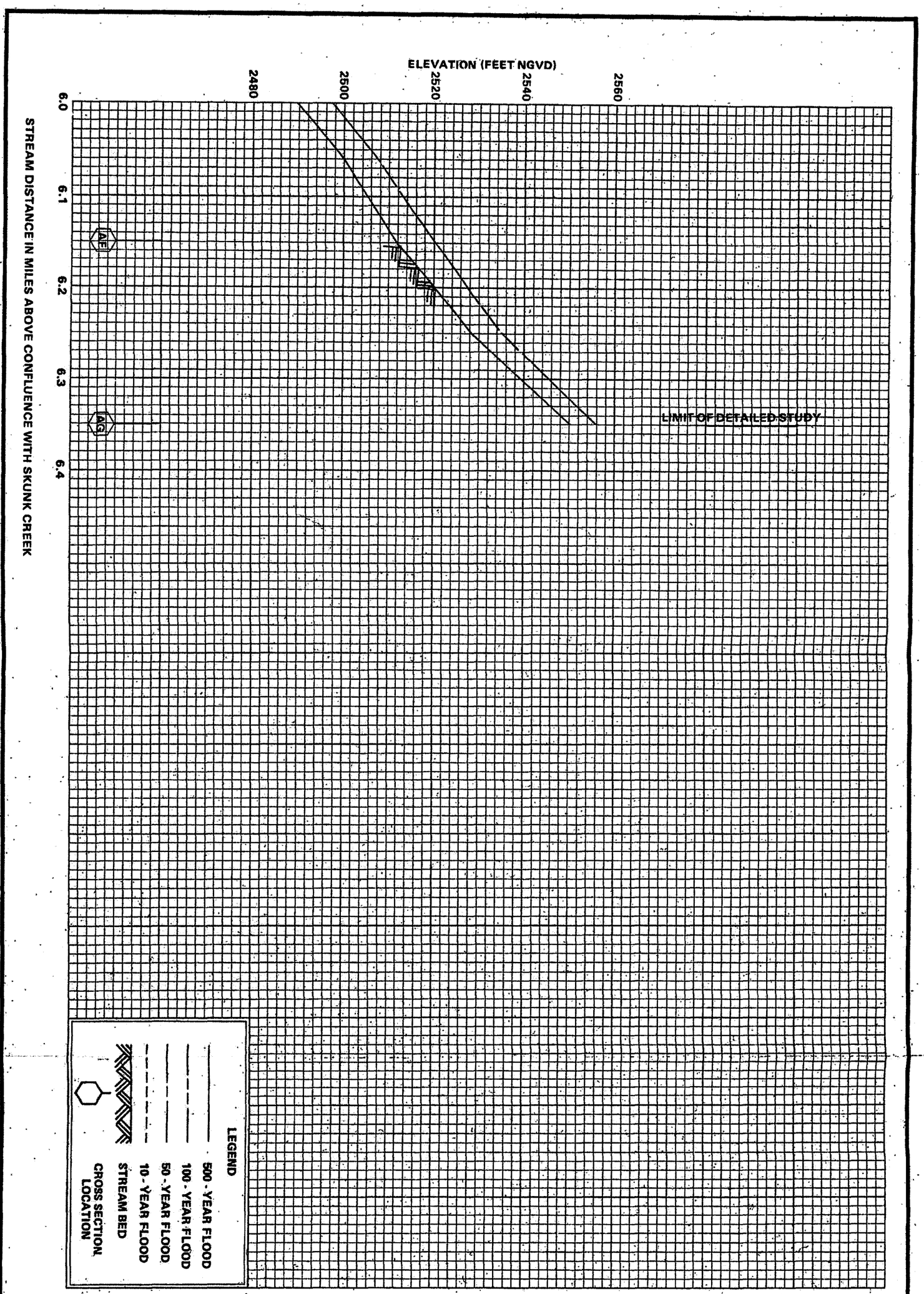
FLOOD PROFILES

RODGER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

517P


ELEVATION (FEET NGVD)
2480
2500
2520
2540
2560
6.0
6.1
6.2
6.3
6.4
STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH SKUNK CREEK
AF
AG
LIMIT OF DETAILED STUDY
LEGEND
500 - YEAR FLOOD
100 - YEAR FLOOD
50 - YEAR FLOOD
10 - YEAR FLOOD
STREAM BED
CROSS SECTION LOCATION

APPENDIX B
GENERAL DOCUMENTATION AND CORRESPONDENCE

APPENDIX B.1

MEETING MINUTES OR REPORTS

Baker

Meeting Minutes

Project:	Rodger Creek	**Date:**	September 9, 2010
Subject:	Scoping Meeting	**Time:**	9 am - 12 noon
By:	Padinare Unnikrishna	**Place:**	FCDMC McMicken Room

Attendees: Amir Motamedi, Richard Harris, Cathy Regester (FCDMC); Jack Moody (Cardno WRG); Cindy DePonti, Padinare Unnikrishna (Baker)

The meeting minutes from the scoping meeting for Rodger Creek are summarized below. Teri George, could not attend as she was not feeling well. I have updated Teri on the details of the meeting after getting back to the office.

A detailed spreadsheet on the main tasks and sub-tasks related to the Rodger Creek project that was prepared by Baker and WRG was distributed at the start of the meeting. Jack's sub-basin map from the Baker 1989/1990 study and an ArcGIS figure of the study area on screen were used for the discussion.

The meeting began with Amir asking for an overview and purpose of the project. Richard provided a description of the study area and the need for performing the study - older study with different standards, new development and for floodplain management. I explained how Cardno would complete the hydrology, Baker would review it, then Baker would complete the hydraulics and Cardno would review it. The District would be invovled throughout the process as detailed in the spreadsheet.

Task 1 - Coordination
A question came up on why the MIP had to be updated 4 times. Based on a brief phone discussion with Teri after the meeting, because this is a CTP, the MIP has to be updated monthly in the last four months. Baker will obtain additional information on this.

Task 2 - Data Collection
Cathy suggested adding 'Research floodplain violations' to the list. District will provide a list to Baker after NTP.

District suggested inviting people related to upcoming developments to the kick off meeting.

Cathy suggested that instead of using land use coverage, the aerial coverage may be used to determine land use, especially because the model will reflect existing condition. We decided that we can still obtain land use data as part of data collection.

Task 3 - Field Survey
Cathy corrected changing Establish Control to Verify Control. Amir said that the District will provide Baker with controls in digital format.
W:\Proj\FCDMC\01_PMR_On_Call\Project Management\Meeting notes\External\Meeting Minutes_Rodger_Ck_Sep0910draft.doc

Cathy will verify whether the District has the new 2' mapping. She will also verify if this is in the points format or a topographic surface is available.

There was a discussion on survey of finished floors. It was suggested that this data may be available from elevation certificates. But the quality of such data was uncertain. So it was decided to retain this item in the spreadsheet.

There was some discussion on whether dip sections need to be surveyed. The feeling was that the cross-section from the topographic data would be studied first before deciding on whether such a section was to be surveyed.

The District will perform cross-section check.

Regarding the cross-section check item, Richard said that Marta used to do this previously at the District. His understanding was that John Stock is not doing it now. Cathy will discuss this with John.

Jack explained that new topo augmentation means checking for site features such as rock outcrop that may need to be included in the hydraulic model.

Task 4 - Hydrology

Amir said that the NOAA 14 data within the latest version of DDMSW would be used. He suggested using point values at a few locations to determine if the rainfall values changed within the study area. DDMSW has the capability to calculated average rainfall within a basin.

Cathy said that the latest version of DDMSW will be used for the modeling. This would be the one that is available from the District web site.

Jack said that the previous study only analyzed the 100-year return period event. Cathy asked whether FEMA would ask for multiple return periods analysis. Baker will research this.

Amir said that typical sub-basin sizes are around 0.5 sq. mi. So, for the 5.13 sq. mi. area, approximately 10 sub-basins would be required.

Amir suggested using the 2' topo data as much as possible during the basin delineation. This data will be augmented with lower resolution data where the 2' data is not available.

There was a brief discussion on whether the basin delineation would be automated or manual. Automated methods work well when there is good ground relief and manual methods are required for flatter areas. However, manual checks are needed for all basin delineation. I pointed out Cindy's recent experience with this in one of her projects. Cathy recommended manual delineation because the drainage area is not too big.

Task 5 - Floodplain Delineation

To determine if coincident peak conditons exist between Skunk Creek and Rodger Creek in order to establish downstream boundary conditions, which may be backwater or normal depth.

Cathy asked if hydrologic and hydraulic modeling will proceed simulteneously. Jack and I mentioned that it would since the velocity information from the hydraulic modeling will be used in the routing NSTPS

data in hydrologic calculations. DDMSW has a feature for calculating the velocity, however, it should be verified that the velocities are reasonable compared to the hydraulic model estimates. The velocities from the effective hydraulic model should serve as a good starting point.

Delineate thalweg to be changed to Delineate baseline.

It was felt that no work is required with the duplicate effective model.

Bank stations will represent the physical banks of the main channel.

Based on a 400-500' spacing, less than 100 cross-sections would likely be required in the HEC-RAS model.

There was some detailed discussion on floodway and the potential for problems if floodways need to be changed, especially widened. Jack described his experiences on other projects. We have some buffer for Rodger Creek because effective study did not optimize the floodway to be close to 1' rise. So, it may be possible to accommodate some increase in discharge which keeping maintaining floodway limits. However, this is an issue that bears close monitoring.

Cathy said that good checks must be made between the HEC-RAS model, floodplain widths and actual field hydraulic impacts on properties.

To use the latest HEC-RAS model.

Task 6 - Digital Data

Cathy said that digital data can be submitted in either shape file or dxf format. Jack can also supply in either format. Baker plans to submit in shape file format.

GIS data will be submitted at intervals over the course of the project for District review. The purpose is to make sure that there is agreement between GIS data, hydrologic and hydraulic models and conditions on the field.

Task 7 - Deliverables

TDN copies required would be 1 for the District and 1 for FEMA review; 1 final for District, 1 for FEMA and 1 for Cathy. So, a total of 5 copies. The second copy to FEMA may not be required if the revisions are minor.

Miscellaneous:

Richard said he will provide land ownership data.

There was some discussion on the precise language that will be used to notify impacted property owners, if any. The MT-2 instructions file should have standard templates on this. The feeling was that the limits of floodplain width changes are specified and not details such as rise in water surface elevations.

Action Items:

Baker will provide an explanation on why the MIP has to be updated 4 times.

Baker will obtain information on whether multiple return periods need to be analyzed for the project.

District will provide the HEC-1 and HEC-2 digital models.

District will provide the new mapping data to Baker. Cathy will verify if this will be points data or DTM. Baker will give a copy to Cardno WRG.

District will research floodplain violations and provide data on this after NTP.

District will edit spreadsheet items and prepare scope of work.

The next meeting is tentatively scheduled for either September 27th or 28th.

Padinare Unnikrishna

APPENDIX B.2

CONTRACT DOCUMENTS

EXHIBIT A

GENERAL SCOPE OF WORK

CONTRACT FCD 2010C003
Assignment # 2

Rodger Creek Floodplain Delineation Study

EXHIBIT A

GENERAL SCOPE OF WORK

This study will be a detailed Zone AE floodplain, with floodway, delineation for Rodger Creek. The study will include the development of new hydrologic data and discharges for Rodger Creek based on current methodology. Rodger Creek is currently delineated as a detailed Zone AE with floodway. This project will re-delineate approximately 6.35 miles of Zone AE floodplain/floodway based on the new hydrologic study.

The western half of the study area is located in an unincorporated area of northern Maricopa County. The eastern half of the study area is located within the Town of Cave Creek. The general study area is bounded approximately on the north by Circle Mountain Rd, on the south by Rockaway Hills Rd alignment, on the east by Elephant Mountain, and on the west by Skunk Creek.

All work must meet the requirements of the DISTRICT's Consultant Guidelines most current edition. All work must also meet the latest versions of the Arizona Department of Water Resources (ADWR) State Standards and the Federal Emergency Management Agency (FEMA) Guidelines and Specifications for floodplain delineations. Prior to the finalization of this contract, FEMA and the DISTRICT must review and accept the results of this study, and all items called for in this Scope of Work must be delivered to the DISTRICT.

The study will consist of tasks up to and including submittal to FEMA and responding to FEMA review comments leading to FEMA approval.

All work must be completed within four hundred seventy-five (475) calendar days from the Notice to Proceed (NTP) which includes ninety-five (95) days for DISTRICT reviews and two hundred forty (240) days for FEMA reviews. The CONSULTANT shall have the final study results ready for submittal to FEMA within two hundred thirty-five (235) calendar days from the Notice to Proceed (NTP).

TASK 1 - COORDINATION

1.1 Within seven (7) days of the NTP the CONSULTANT will submit a project schedule to the DISTRICT's Project Manager showing coordination meetings and completion dates for each task identified in the Scope of Work (SOW). The schedule shall also show product submittal dates and DISTRICT product review periods. The CONSULTANT will update this project schedule when appropriate.

1.2 The CONSULTANT will participate in regular coordination meetings (at least monthly) with the DISTRICT's Project Manager and in milestone coordination meetings in the development of the hydrologic and hydraulic analyses. Coordination and milestone meetings should be combined whenever possible. The CONSULTANT is responsible for the minutes of any meetings. Draft

meeting minutes must be prepared and delivered to the DISTRICT within seven (7) calendar days of all meetings.

1.3 The CONSULTANT will submit an estimate of the monthly billing within seven (7) calendar days of the NTP. Thereafter, this estimate will be updated and submitted to the DISTRICT's Project Manager as necessary but at least ten (10) calendar days before the end of each quarter whereas the end of a quarter in any given calendar year is March 31, June 30, and September 30, and December 31.

1.4 The CONSULTANT will submit monthly progress reports at least five (5) days before submittal of monthly invoices. The report shall be brief and should be no longer than two (2) typed pages. At a minimum, the monthly progress report shall contain the following:

1.4.1 A short description of the work accomplished by task during the reporting month.
1.4.2 Percent (%) completed for the month and percent (%) cumulative completed for each task.
1.4.3 A brief description of the work to be accomplished in the following month.
1.4.4 A description of any problems encountered.

1.5 The CONSULTANT will be responsible for updating FEMA's Mapping Information Portal (MIP) on a periodic basis during this project that reflects existing standards for Grant activities. The performance measures for this project will thereby be integrated within the overall performance measures of the PMR/Map Maintenance Grant Mapping Activity Statement (MAS) for FEMA Grant EMF-2009-GR-0909.

1.6 The DISTRICT will be responsible for placing the legal advertising at the beginning of the study. The advertisement will be run once in a widely circulated newspaper. A display advertisement will also be run once in a local newspaper that serves the area being studied. After the ads run in the newspapers, the DISTRICT will provide the CONSULTANT with the original affidavits of publication for inclusion in the Technical Data Notebook (TDN). The DISTRICT also will be responsible for placing any legal advertisements for public open house meetings.

1.7 The DISTRICT has prepared a separate set of guidelines for the CONSULTANT on conducting public involvement and public information activities for the DISTRICT. A copy of these guidelines will be provided by the Public Information Office and shall be used by the CONSULTANT when preparing public information related materials.

1.8 The DISTRICT will create a critical path calendar for planning one (1) public open house meeting. The public meeting will be held at the end of the study, but prior to the submittal to FEMA, and will present the final results of the study. The meeting will be held at a location either within the study area or very near the study area based upon available accommodations. At least two (2) representatives from the CONSULTANT will attend the public meeting.

1.9 For the open house meetings, The DISTRICT will secure the public meeting venue and certificate(s) of insurance.

1.10 The DISTRICT will create a mailing list and notify property-owners in the vicinity of the existing and/or final floodplain of the study using a series of two (2) mailers. The first mailing will be to notify property-owners within the study area of the Intent of Study. The mailer will also include text for right-of-entry for survey notice. The second mailing will be to notify affected property owners of the study results and to provide invitations to the open house meeting.

1.11 The DISTRICT will prepare (design) two brochure mailings to include the text of the two mailings described in task 1.9. The Intent of Study brochure will be mailed out after the Notice to Proceed of the study has been sent to the CONSULTANT. The Notification of Study Results brochure will be mailed out after the DISTRICT has approved draft floodplains. The DISTRICT will be responsible for mailing out the brochures.

1.12 The DISTRICT will develop PDFs of the brochures for placement on the District's website.

1.13 The CONSULTANT shall also be responsible for providing images (PDF) of the study area for the District's website to be used as part of the project description within the Projects and Structures folder. The DISTRICT shall post the images and project information on the District's website.

1.14 The CONSULTANT shall be responsible for producing the display images for the public open house meeting. The display images will include the final (pre-FEMA submittal) work maps with topographic contours plotted at the work map scale; and, a display showing the floodplain/floodway delineation plotted with an aerial photo background. The aerial photo display(s) will be of a scale sufficient for home owners to reasonably interpret the proximity of their home to the floodplain/floodway. The CONSULTANT will provide the images to the DISTRICT per the critical schedule to allow for sufficient time for mounting.

1.15 The DISTRICT will be responsible for mounting the displays and providing sign-in sheets, comment sheets, name tags, etc., and any additional handouts regarding the study at the meetings.

1.16 Performance Evaluations will be performed by both the DISTRICT and the CONSULTANT at the completion of the project.

TASK 2 - DATA COLLECTION

2.1 The CONSULTANT will collect and review pertinent data from the DISTRICT, Maricopa County Planning and Development, and the county and state transportation departments, and other outside sources. Data to be collected, if available, will include previous flood hazard reports, hydrology and hydrologic modeling for the study area, hydraulic modeling, historical flooding information, relevant stream and rain gage data, relevant storm drain and roadway crossing infrastructure information, as-built drawings, FEMA Flood Hazard Boundary Maps and/or Flood Insurance Rate Maps (FIRMs), FEMA Letters of Map Amendment (LOMA)/Revision (LOMR), repetitive loss claims, drainage complaints, Floodplain Use Permits, floodplain use violations, Elevation Certificates, and other pertinent information. Prior to any public presentation or meeting to discuss preliminary study results, the CONSULTANT will obtain the most current aerial photography from the DISTRICT to use as background for the project study sheets at the presentation.

2.2 The DISTRICT will provide its GIS soils information, streets, effective DFIRMs, effective floodplain/floodway boundaries, latest aerial photography, and topographic mapping as described in Task 3.1.

2.3 A data collection summary will be submitted to the DISTRICT for information purposes. A preliminary draft is due within sixty (60) days of the NTP. The final will be included in Appendix A of the Technical Data Notebook.

TASK 3 - TOPOGRAPHIC MAPPING

3.1 Topographic mapping, with 2-foot and 10-foot contour intervals (CI), will be provided by the DISTRICT. This mapping is in the Arizona State Plane Coordinate System Central Zone, 1983 North American Datum (NAD 83 HARN) International Feet, horizontal datum; and the North American Vertical Datum 1988 (NAVD 88), vertical datum. 2-ft CI mapping (Adobe Dam and Cave Creek FDS mapping) will be provided for the majority of the watershed for the hydrologic study. For the hydraulic analyses the 2-ft CI mapping developed specifically for Rodger Creek will be used. Mapping will be provided by the DISTRICT in the following formats: DTMs, mass points and breaklines, and contour files.

TASK 4 - FIELD SURVEY

4.1 Field surveys and measurements of bridges, culverts, and hydraulic structures are to be obtained by the CONSULTANT when as-built plans are not available, or when conditions have changed that impact the Zone delineation. Geodetic Densification and Cadastral Survey GDACS control will be the basis of field survey, unless otherwise approved by the DISTRICT. This information should be reduced and compiled into an 11"x 17" (maximum size) sketch format approved by the DISTRICT, for inclusion in the TDN. The survey should meet the DISTRICT's Chief Surveyor's criteria for accuracy. The information presented in the sketch should be in a format appropriate for use in future HEC-RAS models. It may be necessary to field survey some structures since the as-built plans may not be on the same datum as the study.

4.2 CONSULTANT will survey the center line of New River Road, extending from 200 feet south of the Rodger Creek culvert to 200 feet north of the culvert. The survey will be used as a cross section check and topographic verification.

4.3 Additional field survey is to be performed as directed and approved by the DISTRICT. This survey data may include additional topographic detail, dip section survey, Finished Floor elevations, and flow split topographic data.

4.4 Copies of the sealed survey field notes and office calculations must be included in the Technical Data Notebook. The survey notes must be signed and sealed by an Arizona Registered Land Surveyor (RLS).

TASK 5 - Hydrology

A detailed HEC-1 modeling approach appropriate for the delineation of the Zone AE floodplains and floodways shall be used for developing new hydrology for the project. The modeling shall be based upon methodology within the DISTRICT'S Drainage Design Manual, Volume I, Hydrology, 4th Edition (2009), and will use NOAA 14 rainfall.

5.1 **Base Maps:** The CONSULTANT shall develop the hydrologic base maps using the 2-foot and 10-foot contour interval topographic mapping supplied by the DISTRICT. An overall drainage basin map with sheet index will be prepared at a scale of 1 inch = 2000 feet, or some other appropriate scale approved by the DISTRICT. Exhibits shall show contours.

5.2 **Watershed and Sub-basin Delineations:** Using appropriate hydrologic judgment, sub-basins are to be identified that provide reasonable depiction of the watershed conditions for the purpose of drainage area determinations. Sub-basin breakdowns will be done in sufficient detail to allow estimation of peak discharges at structures, major road crossings, and confluences. Sub-basin sizes will be selected that will provide sufficient detail regarding the natural drainage patterns, and that also serve to compliment the hydraulic analysis. Sub-basin sizes will not be smaller than 0.1 square miles. For the HEC-1 model that is developed, an appropriate time step and number of

ordinates is to be selected that allows for complete calculation of the flood hydrograph without sacrificing resolution on the flood peak. All calculations or assumptions used in developing sub-basin and routing parameters shall be documented and made a part of the appendix for the hydrology report.

5.2.1 Hydrologic Field Reconnaissance: The CONSULTANT shall research and give consideration to all existing hydrologic studies of the area and shall become familiar with the general hydrology of the area. Field reconnaissance shall be done to determine the following:

- Verify sub-basin boundaries
- Verify flow patterns
- Note any discrepancies in actual land uses within the watershed
- Identify flow diversion locations caused by natural obstructions, drainage structures, etc.

5.2.2 Field Survey of Split Flow Locations, if needed: Cross-sectional field survey is to be done to collect geometric data at major flow splits by the CONSULTANT as outlined in Section 4.3, if approved. Field Reconnaissance level analysis of minor flow splits relative to the Hydrology task may be performed by the CONSULTANT in lieu of survey given prior written authorization by the DISTRICT. Minor structure measurements may be limited to taped geometry.

5.2.3 Sub-basin Delineations: Automated or manual delineations are acceptable. If sub-basin delineations are performed using software which automates the process, the CONSULTANT will perform QA/QC processes to ensure that the delineations are accurate and reasonable based on the topographic contours.

5.2.3.1 Manual Delineations: Manual delineations will be used in areas where an automated process does not yield satisfactory results. This will include refinements that are shown to better reflect contour mapping with consideration for field conditions and aerial photo imagery.

5.3 HEC-1 Parameters

5.3.1 Rainfall Excess – The Green and Ampt methodology will be utilized for estimation of rainfall losses.

5.3.2 Unit Hydrograph – The S-graph method will be used for all sub-basins within the watershed.

5.3.3 Drainage Design Management System for Windows (DDMSW) version 4.6.0 or newer as directed by the DISTRICT shall be used to develop HEC-1 input data. Alternative methods may be acceptable given written authorization by the DISTRICT.

5.4 HEC-1 Modeling

The CONSULTANT shall use the U.S. Army Corps of Engineers computer program HEC-1 to develop an existing conditions hydrologic model for the study area.

5.4.1 HEC-1 models for the 100-year, 6-hour and 24-hour storm events will be developed for existing land use conditions to use in the development of a HEC-RAS hydraulic model. Prior to submitting modeling results to the DISTRICT, the CONSULTANT will provide a

graphic presentation to compare peak discharges and unit peak discharges against regional regression curves.

5.4.2 Channel Routing – The CONSULTANT will use the normal depth routing method. Average cross sections will be developed utilizing the 2-foot or 10-foot contour interval mapping or field survey. The resulting velocities and depths for all reaches must be assessed for realistic values and compared to the final HEC-RAS model where appropriate.

5.4.3 Split Flows, if applicable – At locations of stable split flows a rating curve will be developed to define the split using normal depth in both branches of the downstream cross sections. Alternative methods may be used.

5.5 Meetings and Field Visits

Meetings to discuss the hydrology will typically be included in the monthly coordination meetings.

5.5.1 One (1) field trip kick-off meeting will be performed at the start of the project to identify the critical points of the watershed and problem areas.

5.6 Review and Approval

The CONSULTANT shall obtain approval from the DISTRICT at each of the following steps:

5.6.1 Sub-basin boundary maps, soil maps, and land use maps
5.6.2 HEC-1 parameter estimation
5.6.3 HEC-1 flow diagram and input parameters
5.6.4 HEC-1 results graphed with indirect verification comparisons

5.7 The Hydrologic Report

5.7.1 The findings of the hydrologic study will be presented in Section 4 of the Technical Data Notebook and will be prepared in accordance with ADWR State Standards Attachment 1-97 (SSA 1-97). The report will be organized as specified by the DISTRICT, following SSA 1-97 format. Specific deviations from this hydrologic scope shall not be undertaken without the specific written authorization from the DISTRICT's Project Manager. The report will include a summary of "controlling" discharges derived by comparing results from the two primary models (24-hr vs. 6-hr).

5.7.2 Tables and Figures for the Appendices

5.7.2.1 (Schematic Map) Base topographic contour maps(s) showing the sub-basins, schematic map for the HEC-1, routing reaches, concentration points, diversions, major man-made structures such as pipes, levees, railroads, or culverts, and references (i.e., street names, Township, Range, Section, etc.) at a scale to be agreed upon with DISTRICT Staff.

5.7.2.2 (Watershed Map) Topographic base map showing the sub-basins, concentration points, lag flow paths, and routing reaches labeled at the same scale as the base map. Pertinent hydraulic data for each routing reach such as cross sections locations shall be included on the map.

5.7.2.3 (Soils Map) Soils map(s) at the same scale as the base map.

5.7.2.4 (Land Use Map) Existing condition land use map(s) at the same scale as the base map.

5.7.2.5 (Flow Map) Base map with aerial photo background showing the sub-basins, the results of the study (i.e. peak flows, peak volumes for impoundments, etc) at major concentration points.

5.8 Digital Deliverables

5.8.1 The CONSULTANT will submit digital files for each DISTRICT review. Acceptable formats are shape files, CADD (Microstation DGN and AutoCAD DWG), and DXF. Files shall be submitted for the sub-basins, flow paths and routing reaches (may be combined in one file), concentration points, and existing land use if automated input into the DDMSW was used. The files need not meet the DISTRICT's HIS/CADD Data Delivery Specifications at the various review stages.

5.8.2 Upon approval of the hydrology by the DISTRICT, digital data will be prepared in conformance with the DISTRICT's Data Delivery Specifications. This data will be checked by the CONSULTANT and then delivered to the DISTRICT. The data may then undergo an independent review by an outside consultant. The following themes are used for hydrologic data:

- DRNBSN: Drainage Basins (Watershed Sub-basins)
- PRJDAT: Project Identification
- DRNPTH: Drainage Flowpaths (Time-of Concentration, Routing, concentration points)

5.9 Specific deviations from this hydrologic scope shall not be undertaken without the specific written concurrence from the DISTRICT.

TASK 6 - FLOODPLAIN/FLOODWAY DELINEATION

6.1 Floodplain/Floodway delineations will be conducted using methodology as outlined by FEMA. The CONSULTANT will prepare the study using the guidelines established in FEMA's most current Guidelines and Specifications for Flood Hazard Mapping Partners, and FIA Document 12, Appeals, Revisions, and Amendments to Flood Insurance Maps, December 1993, and, if applicable, FEMA 265, *Managing Floodplain Development in Approximate Zone A Areas*, April 1995.

The CONSULTANT must obtain DISTRICT approval at each of the following steps:

6.1.1 Draft field reconnaissance section of the TDN and estimation of Manning's "n" values.
6.1.2 Proposed study reaches.
6.1.3 Methodology to be used for split-flow analyses.
6.1.4 Proposed location and alignment of the cross sections with draft floodplain delineations.
6.1.5 Floodplain and Draft Floodway delineations.
6.1.6 Final hydraulics section of the TDN.

6.2 The delineation work shall meet requirements for floodplain delineations as prescribed by FEMA and the Arizona Department of Water Resources. The mapping scale shall be as approved by the DISTRICT. The hydraulic modeling and delineation work maps shall be in the North American Vertical Datum of 1988 (NAVD 88). The delineations shall be based upon the final results of the hydrologic study as directed by the DISTRICT.

6.3 The CONSULTANT will delineate, based upon the final results of the hydrologic study, to the extents currently shown as effective detailed Zone AE floodplain and floodway boundary with the intent of superseding the effective study.

6.4 Hydraulics Field Reconnaissance

6.4.1 The CONSULTANT will conduct a field reconnaissance of the study area. This may include but is not limited to observation of channel and floodplain conditions for estimating Manning's "n" values; photographic documentation of floodplain characteristics; determination of channel bank characteristics; observation of possible overflow areas; observation of levees or other flood control structures; and measurement of bridge dimensions. The DISTRICT will be given notice and invited to this field trip.

6.4.2 Manning's "n" values are to be determined using the methodology in the USGS report, *Selection of Manning's Roughness Coefficient for Natural and Constructed Vegetated and Non-Vegetated Channels, and Vegetation Maintenance Plan Guidelines for Vegetated Channels in Central Arizona, 2006.* If approved by the DISTRICT, another report entitled *Estimated Manning's Roughness Coefficients for Stream Channels and Floodplains in Maricopa County, 1991*, may be substituted. Copies of these reports are available through the DISTRICT. Manning's Roughness Coefficients may be presented for typical reach types observed in the project area, rather than specific reaches of specific named watercourses. It is anticipated that between 5 and 10 typical reach types will be identified during the field reconnaissance.

6.4.3 Representative "n" values for each typical reach type will be selected. The reconnaissance data will present the determination of channel and over bank "n" values using captioned color photographs or color photocopies for each identified reach type in the project area, and the extents of the typical reach types shall be displayed on an aerial photo exhibit. The n-value section will also discuss floodplain conditions affecting the delineation, describe structures and obstructions, and provide color photos or photocopies of major hydraulic structures. Photo locations for channels, structures, and "n" value determinations will be displayed on reduced scale mapping and included in the Final Report.

6.5 Cross Sections

6.5.1 The location and alignment of cross sections and channel centerlines will be submitted for the DISTRICT's review and approval. Cross sections will be spaced approximately every five hundred (500) feet, unless geographic or structural constraints dictate otherwise, and will extend the full width of the area inundated by 100-year floodwaters. Cross section placement locations shall be selected with respect to existing structures such as roads, railways, drainage features and confluences, as well as at cadastral section lines. Cross section spacing should be done in such a way as to minimize computational head loss and where natural grade breaks occur. Cross section stationing will be from left to right looking downstream with the hydraulic baseline at station 10,000. Identification of cross sections will be in river miles, increasing upstream. The cross sections may need to be reoriented or altered after running the HEC-RAS model to ensure that they are perpendicular to flow per FEMA criteria. Cross sections developed by the HEC-RAS interpolation feature are not to be used. The CONSULTANT must coordinate and document the methodology for generating the cross section geometric data. Acceptable methods include using a computer program to develop the data from digital mapping files or from field surveys.

6.5.2 The HEC-RAS output for the Technical Data Notebook shall include fully labeled cross section plots in addition to summary tables and a full input/output report.

6.6 Bridges and culverts must be modeled according to HEC-RAS modeling requirements for the selected routine. Where multiple bridges occur, each bridge will be modeled separately. The HEC-RAS modeling results for bridges, culverts, and other hydraulic structures must be checked by using an independent method approved by the DISTRICT to analyze these structures. The hydraulic effects of bridges and culverts shall be incorporated into assessing the floodplain around such structures, especially in areas where ponding will occur. Minor conveyance structures such as small culverts (i.e., less than 30 inches in diameter), or, structures considered likely to become clogged during the 100-year peak discharge shall not be included in the hydraulic analyses.

6.7 For floodway encroachment modeling, the CONSULTANT shall first use HEC-RAS Method 4 (equal conveyance) where practical, or Method 5 (water surface and energy) as appropriate, then incorporate modifications and refinements, using HEC-RAS Method 1 (manual method). In order to classify locations where Method 5 may be more appropriate than Method 4, the CONSULTANT will provide the results of mixed flow regime runs for all models. Based upon the results, the CONSULTANT will make a recommendation which Method should be used for the final modeling. The final HEC-RAS files shall contain the final Method 1 information, and shall not contain the Method 4 or Method 5 information.

6.8 The main project description box of the HEC-RAS models should include the following:

- Project Name and FCD Contract Number
- Consultant(s) Name, phone number, address, website address, and Job Number
- Study Purpose
- File Name and latest run date/final date if completed
- Vertical Datum of the model, base map date, and base map contractor information
- Any notable features that are considered unique or unusual to the hydraulic modeling
- HEC-RAS program version.
- Source of Hydrology
- Wash Names
- Subsequent update information, if any.

In addition, minor descriptions should be added to the model for hydraulic sections located above and below drainage structures, at section lines, at highways and railway crossings, at canals, and at confluences. Model descriptions should be added at culverts and lateral structures, and at any other feature judged pertinent to the modeling.

6.9 The CONSULTANT will provide work maps using the DISTRICT's most recent aerial (contour) mapping. Photographic background in lieu of contour mapping may be acceptable at the DISTRICT's discretion. The work map drawings will be 24" X 36" in size. The work map scale will be 1 inch = 200 feet. A cover sheet will be part of the work-study drawings and shall include the project title, contract number, source and date of topographic mapping, and a location map showing geographic range covered by each specific mapping sheet. Each drawing will include the watercourse names and existing floodplain boundaries, proposed floodplain and floodway boundaries, a north arrow, map scale, section lines and corners, current streets and highway names, subdivision boundary names, Horizontal and Vertical Datum references (State Plane Coordinate System, NAD 83, and NAVD 88), any of the MCDOT's GDAC's and any other monument control as directed by the DISTRICT, monument labels located within individual sheet

boundaries, major drainage features, corporate boundaries, hydraulic cross section lines, sheet index map, peak discharges, and relative Township and Range.

6.10 Flood Zones must be determined according to FEMA criteria and be clearly labeled on the final drawings.

6.11 The CONSULTANT will review the final floodplain/floodway in relationship to existing structures and make a recommendation of which structures may require Elevation Certificates.

6.12 The findings of the floodplain delineation study will be presented in Section 5 of the Technical Data Notebook and will be prepared in accordance with ADWR State Standards Attachment 1-97 (SSA 1-97). The report will be organized as specified by the DISTRICT standards, following SSA 1-97 format.

6.13 The CONSULTANT shall prepare submittals for DISTRICT review and comment. These submittals shall include all the material and background information for the DISTRICT to review the draft floodplains/floodways. Each submittal shall include the paper work maps with the delineations, the digital draft TDN report (minus the HEC-RAS output), and the digital floodplain/floodway delineations, hydraulic baseline, and cross sections in shape file or CADD format. The files need not meet the DISTRICT's HIS/CADD Data Delivery Specifications at the various review stages.

6.14 The CONSULTANT shall fill out all the forms required by FEMA for the submittal of a Floodplain Delineation Study.

6.15 CONSULTANT shall prepare draft FIS Report data consisting of applicable tables, annotated FIRM panels, and RASPLOT used to generate flood profiles.

TASK 7 - DIGITAL DATA

Digital data shall be delivered in accordance with the Data Delivery Modified Shape File Specifications Version 1.2. Preliminary floodplains must be delivered to the DISTRICT at the time the study TDN is ready to be mailed to FEMA for review. After review, this preliminary data will be included on the pending floodplain layer in the DISTRICT's database. The following files are required at the time of FEMA submittal for placement on the pending layer:

- PRJ: Project Boundary
- PRJDAT: Project Identification
- DQ: Data Quality
- FPZNFCD: Floodplain Zones

The following themes, in addition to those listed under the Hydrology Task will be required for the final data delivery after FEMA approval:

- NDXPRJ: Map Sheet Index
- FPSRFFCD: Water Surface Elevation / Base Flood Elevation
- FPXFCD: Cross Sections
- FPBLN: Hydraulic Baseline

Listed below could be developed by the CONSULTANT for a Floodplain Delineation Study. Only those themes for which there is new data need to be delivered to the DISTRICT. If the CONSULTANT has

data that does not fit one of the themes listed, the DISTRICT's Project Manager shall be contacted to determine the appropriate theme for that data.

- CARTO: (Cartographic Features) (separate submittals for Mapping and Flood Delineation)
- CORNERS: (if any)
- CTRL: (Miscellaneous Control Survey Points)
- LNDUSECUR: (Current Land Use)
- STRCT: (Structure)
- FPCTLFCD: (FCD Reference Marks)
- CNL: (Canal System, if any)
- RR: (Railroad System, if any)
- STRTDTL: (Street Detail)
- ELV: (Elevation (Land))
- CULVERTS: (if any)
- LAKE: (if any)
- RIVER: (if any)

TASK 8 - DELIVERABLES

8.1 Both paper and digital deliverables will be provided for each review and at the completion of each task.

8.2 **FEMA Submittal:** The CONSULTANT will submit the following items to the DISTRICT for review by FEMA and any other appropriate governmental agency within two hundred thirty-five (235) calendar days from the Notice to Proceed (NTP).

All of the following products are considered deliverables for the FEMA submittal:

8.2.1 Two (2) complete sets of blackline paper topographic base maps with the floodplain delineations shown. All drawings will be signed and sealed by persons of appropriate professional registration(s). Each registrant will provide a specific statement as to what service they performed.

8.2.2 Two (2) complete copies of the Technical Data Notebook, including completed FEMA forms, annotated Flood Insurance Rate Maps showing the proposed delineation, HEC-1, and HEC-RAS input/output files on disks. The Technical Data Notebook will be prepared and organized in accordance with ADWR State Standards Attachment 1-97 (SSA 1-97).

8.3 Response to FEMA Comments: The CONSULTANT will respond to comments from FEMA and provide any additional/revised material necessary to address FEMA's comments.

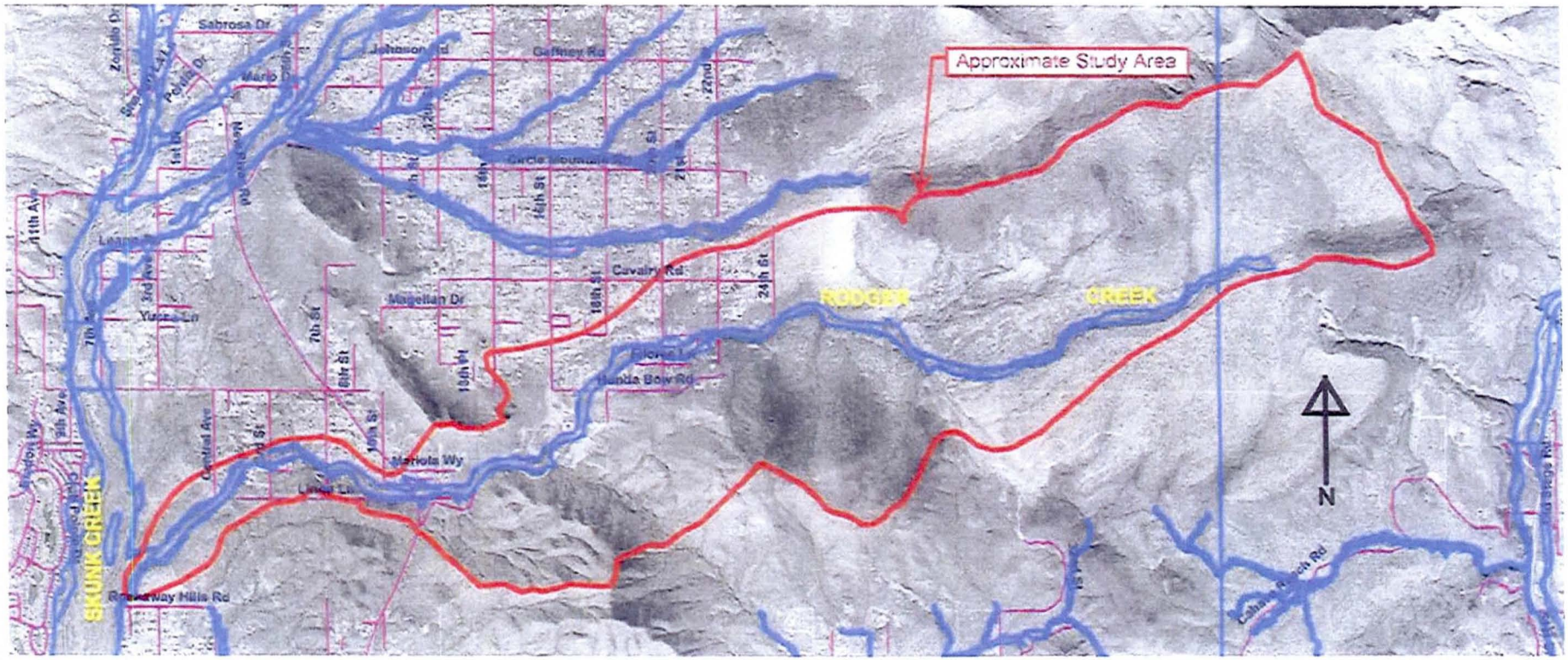
8.4 The following products are considered deliverables for the final submittal to the DISTRICT after FEMA approval is issued:

8.4.1 One (1) complete set of Mylars and two (2) complete sets of sealed blackline paper topographic maps with the floodplain/floodway delineations shown. All drawings will be signed and sealed by persons of appropriate professional registration(s). Each registrant will provide a specific statement as to what service they performed.

8.4.2 All remaining hydrologic and floodplain/floodway delineation data in conformance with the DISTRICT's CADD Data Delivery or modified Shape file Specifications.

8.4.3 Three (3) complete copies of the Technical Data Notebook including HEC-1 and HEC-RAS input/output files on disks. This submittal of the Technical Data Notebook shall include any correspondence and/or meeting minutes with the reviewing agencies and shall reflect any revisions required by those reviewing agencies. Revisions may include, but are not limited to, addressing FEMA's comments, modifications to the delineation maps, the HEC-1 models, the HEC-RAS models, and/or the Final Report.

Rodger Creek Study Area



APPENDIX B.3

AFFIDAVIT OF PUBLICATION

AFFIDAVIT OF PUBLICATION

RODGER CREEK

01

Arizona Business Gazette
The business resource

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

Announcement of Floodway Revision for Rodger Creek in Unincorporated Maricopa County and the Town of Cave Creek

The Flood Control District of Maricopa County and the Town of Cave Creek, in accordance with National Flood Insurance Program regulation 65.7(b)(1), hereby give notice of intent to revise the floodway, generally located within Township 6 North, Range 3 East, Sections 10, 11, 12, 15, 16, & 17 and Township 6 North, Range 4 East, Section 7. Specifically, the floodway shall be revised for Rodger Creek from the confluence with Skunk Creek to a point approximately 13,600 feet upstream of 24th Street. As a result of the floodway revision, the floodway for Rodger Creek shall both widen and narrow with a maximum widening of approximately 45 feet at a point approximately 150 feet downstream of New River Road and a maximum narrowing of approximately 230 feet at a point approximately 950 feet downstream of 20th Street.

Maps and detailed analysis of the floodway revision can be reviewed at the offices of the Flood Control District of Maricopa County, 2801 W. Durango St., Phoenix, AZ 85009. Interested persons may contact Catherine Regester at 602-506-4001 or cwr@mail.maricopa.gov for additional information.

Published: October 6, 2011

STATE OF ARIZONA
COUNTY OF MARICOPA } SS.

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

10/6/2011

Mark Gilmore

Sworn to before me this
6TH day of
OCTOBER 2011

MELISSA HOEKSTRA
Notary Public - Arizona
Maricopa County
My Comm. Expires Aug 1, 2014

Notary Public

AFFIDAVIT/PROOF OF PUBLICATION

STATE OF ARIZONA

}ss

County of Maricopa

John Alexander being duly sworn, deposes and says:

That he is the publisher of the Foothills Focus a newspaper published in New River, Maricopa County, Arizona; that the

advertisement announcing a Floodway revision for Rodger Creek a copy of which is

hereunto attached, was first published in said newspaper in its issue date the 12th day of Oct, 2011 and was published in each weekly issue of said newspaper for 1 consecutive issue the last publication being in the issue date the 12 day of Oct, 2011.

John Alexander

Subscribed and sworn to before me this

23 day of November, 2011

Phyllis Dean

Phyllis Dean

Notary Public

Phyllis Dean
Notary Public - Arizona
Maricopa County
My Commission Expires
November 25, 2012

My Commission expires November 25, 2012

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Maps and detailed analysis of the floodway revision can be reviewed at the offices of the Flood Control District of Maricopa County, 2801 W. Durango Street, Phoenix, AZ 85009. Interested persons may contact Catherine Regester at 602-506-4001 or cwr@mail.maricopa.gov for additional information.

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APPENDIX B.4

STUDY ANNOUNCEMENT & PUBLIC MEETING MATERIALS

Floodplain Management

The floodplain in this study is located within unincorporated Maricopa County and the Town of Cave Creek. The Flood Control District of Maricopa County manages the floodplains for both unincorporated Maricopa County and the Town.

Contact

More information can be found at the Flood Control District's Web site or by contacting:

Catherine Regester, P.E., CFM
Phone: (602) 506-4001
Fax: (602) 506-4601
cwr@mail.maricopa.gov

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

April 2011

Rodger Creek Floodplain/Floodway Delineation Study

Maricopa County Supervisor:
Andrew Kunasek, District 3

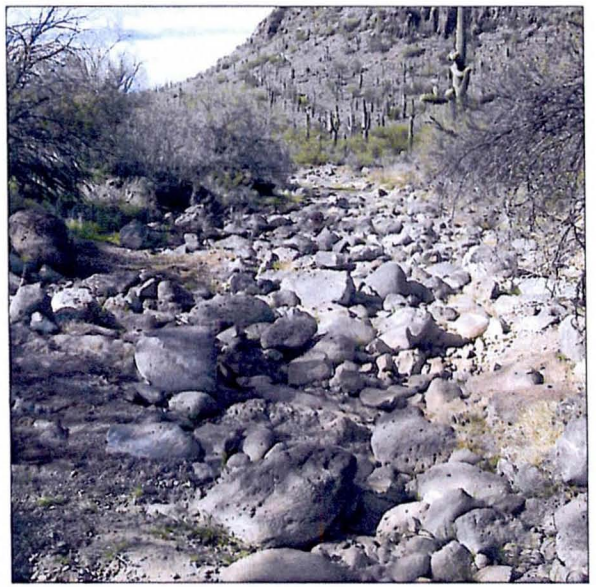
www.fcd.maricopa.gov

Rodger Creek Floodplain/Floodway Delineation Study

The Flood Control District of Maricopa County is conducting a detailed Floodplain/Floodway Delineation Study along Rodger Creek from the confluence with Skunk Creek to approximately 2.3 miles east of 24th Street.

The study will use detailed topographic mapping, hydrology, and hydraulic analyses to re-evaluate the extent of floodprone areas along Rodger Creek. The results will be a re-delineation of the existing floodplain/floodway along Rodger Creek.

You received this brochure because some portion of your property may be within or adjacent to the existing floodplain for Rodger Creek.



Project Schedule

Consultant Michael Baker Jr., Inc. began the study in November 2010. If you are affected by the results, you will be invited to a public meeting occurring in the summer of 2011, prior to the study being submitted to the Federal Emergency Management Agency (FEMA). The meeting will present the new floodplain/floodway delineation for Rodger Creek. Study team members will be available at the meeting to discuss the study and answer any questions.

When the study is completed, the final results will be sent to FEMA for approval and adoption, which takes approximately nine months. FEMA uses the studies to update the Flood Insurance Rate Maps for the National Flood Insurance Program.

About Floodplain/ Floodway Delineation

The District conducts Floodplain/Floodway Delineation Studies throughout unincorporated Maricopa County and within other jurisdictions, at their request, to determine where Special Flood Hazard Areas are located. Floodplain/Floodway Delineation Studies identify Special Flood Hazard Areas that are subject to flood inundation by a 100-year flood (one percent chance of occurring each year). The studies allow for sound floodplain management so that future development will not negatively impede, divert, or retard the movement of floodwaters.

Map not to scale.

Rodger Creek Floodplain Re-Delineation Study - Mailing List for Study Announcement - April 2011

APN	Owner Address	Owner Address 1	Owner City	Owner State	Owner Zip	Property Address	Property City	Property Zip	Property State	Tax Address	Tax Address 1	Tax City	Tax State	Tax Zip
21170002S	3010 E BLOOMFIELD RD		PHOENIX	AZ	85032	14815 N 12TH ST	PHOENIX	85086	AZ	3010 E BLOOMFIELD RD		PHOENIX	AZ	85032-7107
21170005D	42133 N 7TH ST		PHOENIX	AZ	85086	42133 N 7TH ST	PHOENIX	85086	AZ	42133 N 7TH ST		PHOENIX	AZ	85086-6592
21172018B	42014 N 7TH ST		NEW RIVER	AZ	85086	42014 N 7TH ST	NEW RIVER	85086	AZ	CINDY RANDEL 42014 N 7TH ST		NEW RIVER	AZ	85086-7324
20220091D	515 E CAREFREE HWY NO 701		PHOENIX	AZ	85085	1906 E FLOREE LN	NEW RIVER	85087	AZ	515 E CAREFREE HWY # 701		PHOENIX	AZ	85085-8839
20220091E	42 PAPAGO BLVD		WINSLOW	AZ	85041	1922 E FLOREE LN		85087	AZ	402 W ROOSEVELT DR STE E		PHOENIX	AZ	85003
20220294	239 WATER ST		EASTPORT	ME	04631	1740 E HONDA BOW RD		85087	AZ	9085 N LINNET RD		CASA GRANDE	AZ	85294-7167
20220085A	43024 N 24TH ST		PHOENIX	AZ	85087	43024 N 24TH ST	PHOENIX	85087	AZ	43024 N 24TH ST		PHOENIX	AZ	85087-8636
20220087	13602 N CAVE CREEK RD		PHOENIX	AZ	85022	43128 N 22ND ST	NEW RIVER	85087	AZ	13602 N CAVE CREEK RD		PHOENIX	AZ	85022-5138
20220093D	43024 N 24TH ST		PHOENIX	AZ	85087	42828 N 24TH ST		85087	AZ	43024 N 24TH ST		PHOENIX	AZ	85087-8636
2117202OE	42011 N 3RD ST		NEW RIVER	AZ	85086	42011 N 3RD ST		85086	AZ	42011 N 3RD ST		NEW RIVER	AZ	85086-7301
21170007C	41950 N 10TH ST		NEW RIVER	AZ	85086	41950 N 10TH ST		85086	AZ	41950 N 10TH ST		PHOENIX	AZ	85086-0902
21170011H	23035 N 21ST WAY		PHOENIX	AZ	85024	1131 E FALLING STAR DR		85086	AZ	1131 E FALLING STAR RD		PHOENIX	AZ	85086-7910
21170011L	1109 E FALLING STAR RD		PHOENIX	AZ	85086	1109 E FALLING STAR DR		85086	AZ	SHIMONOWSK 1109 E FALLING STAR DR		PHOENIX	AZ	85086-7910
21172028	42010 N 3RD ST		DESERT HILLS	AZ	85086	42010 N 3RD ST	NEW RIVER	85086	AZ	42010 N 3RD ST		DESERT HILLS	AZ	85086-7300
21170006H	PO BOX 39475		PHOENIX	AZ	85069	42016 N NEW RIVER RD	DESERT HILLS	85086	AZ	PO BOX 39475		PHOENIX	AZ	85069-9475
20220089K	42805 N 21ST ST		NEW RIVER	AZ	85087-6583	42805 N 21ST ST	NEW RIVER	85087	AZ	42805 N 21ST ST		NEW RIVER	AZ	85087-6583
21172017B	41910 N 7TH ST		PHOENIX	AZ	85086	41910 N 7TH ST		85086	AZ	41910 N 7TH ST		PHOENIX	AZ	85086-7309
20220089J	42805 N 21ST ST		NEW RIVER	AZ	85087-6583	42811 N 21ST ST	NEW RIVER	85087	AZ	42805 N 21ST ST		NEW RIVER	AZ	85087-6583
21170009B	41817 N 7TH ST		PHOENIX	AZ	85086	41817 N 7TH ST	PHOENIX	85086	AZ	41817 N 7TH ST		PHOENIX	AZ	85086-7323
21121006K	2614 ALIZIA CANYON		WOODLAND H	CA	91367	42316 N 18TH ST	NEW RIVER	85086	AZ	2614 ALIZIA CANYON		WOODLAND HILLS	CA	91367
21170005G	3761 W ANGELA DR		GLENDALE	AZ	85308	42011 N 7TH ST		85086	AZ	3761 W ANGELA DR		GLENDALE	AZ	85308-3108
21170007L	PO BOX 35697		PHOENIX	AZ	85069	41816 N 10TH ST		85086	AZ	C/O ACCOUNTI PO BOX 35697		PHOENIX	AZ	85069-5697
21172005B	42228 N 7TH ST		PHOENIX	AZ	85086	42228 N 7TH ST		85086	AZ	42228 N 7TH ST		PHOENIX	AZ	85086-7326
21172005C	42224 N 7TH ST		DESERT HILLS	AZ	85086	42224 N 7TH ST	PHOENIX	85086	AZ	42224 N 7TH ST		DESERT HILLS	AZ	85086-7326
21172011F	42116 N 3RD ST		DESERT HILLS	AZ	85086	42116 N 3RD ST		85086	AZ	42116 N 3RD ST		DESERT HILLS	AZ	85086-6585
21172011G	42123 N 3RD ST		PHOENIX	AZ	85086	42123 N 3RD ST		85086	AZ	42123 N 3RD ST		PHOENIX	AZ	85086-6586
21172018C	42018 N 7TH ST		NEW RIVER	AZ	85027	42018 N 7TH ST		85086	AZ	42018 N 7TH ST		PHOENIX	AZ	85086-7324
21172026A	PO BOX 420	515 E CAREFREE HWY	PHOENIX	AZ	85085	42035 N CENTRAL AVE		85086	AZ	PO BOX 420	515 E CAREFREE HWY	PHOENIX	AZ	85085
21121016	PO BOX 921		NORWOOD	CO	81423	1633 E ROLLING ROCK DR	PHOENIX	85086	AZ	3232 NEWMARK DR		MIAMISBURG	OH	45342-5421
21172027	515 E CAREFREE HWY		PHOENIX	AZ	85085	42005 N CENTRAL AVE			AZ	515 E CAREFREE HWY		PHOENIX	AZ	85085-8839
21170001T	11216 N 46TH DR		GLENDLAE	AZ	85302	1104 E FALLING STAR DR		85086	AZ	11216 N 46TH DR		GLENDLAE	AZ	85302
20220094L	42839 N 20TH ST		PHOENIX	AZ	85087	42839 N 20TH ST			AZ	42839 N 20TH ST		PHOENIX	AZ	85087-7987
20220094M	42845 N 20TH ST		PHOENIX	AZ	85087	42845 N 20TH ST			AZ	42845 N 20TH ST		PHOENIX	AZ	85087-7987
21170005T	42025 N 7TH ST		PHOENIX	AZ	85086	42025 N 7TH ST			AZ	21139 W CARAVAGGIO LN		WITTMANN	AZ	85361-8685
21170006J	42012 N NEW RIVER RD		PHOENIX	AZ	85086	42012 N NEW RIVER RD			AZ	42012 N NEW RIVER RD		PHOENIX	AZ	85086
21172019A	42036 N 7TH ST		PHOENIX	AZ	85027	42036 N 7TH ST			AZ	42036 N 7TH ST		PHOENIX	AZ	85086-7324
2117202OD	40708 N CENTRAL AVE		PHOENIX	AZ	85086	42027 N 3RD ST			AZ	FIRST AMERICA PO BOX 961253		FORT WORTH	TX	76161-0253
2117204O	3030 E CAMELBACK RD		PHOENIX	AZ	85016				AZ	3030 E CAMELBACK RD		PHOENIX	AZ	85016-4404
21172007F	42213 N 3RD ST		PHOENIX	AZ	85086				AZ	515 E CAREFREE HWY UNIT 143		PHOENIX	AZ	85085-8839
21170047	41806 N NEW RIVER RD		DESERT HILLS	AZ	85086				AZ	41806 N NEW RIVER RD		DESERT HILLS	AZ	85086-8632
21170005S	42025 N 7TH ST		PHOENIX	AZ	85086				AZ	42025 N 7TH ST		PHOENIX	AZ	85086-7325
21172011E	23960 N 75TH ST		SCOTTSDALE	AZ	85255				AZ	23960 N 75TH ST		SCOTTSDALE	AZ	85255-3458
21170014	7600 E REDFIELD RD STE 195		SCOTTSDALE	AZ	85260				AZ	9495 E SAN SALVADOR DR NO 100		SCOTTSDALE	AZ	85258-5553
21121006D	4620 AMBER VALLEY PKWY		FARGO	ND	58104				AZ	4265 45TH ST S STE 200		FARGO	ND	58104-4309
20220093K	43024 N 24TH ST		PHOENIX	AZ	85087				AZ	43024 N 24TH ST		PHOENIX	AZ	85087-8636
21172041	501 NW GRAND BLVD		OKLAHOMA CI	OK	73118				AZ	501 NW GRAND BLVD		OKLAHOMA CITY	OK	73118-6112
20220655A	32528 N 144TH ST		SCOTTSDALE	AZ	85262				AZ	32528 N 144TH ST		SCOTTSDALE	AZ	85262-5838
21170013	7600 E REDFIELD RD STE 195		SCOTTSDALE	AZ	85260				AZ	9495 E SAN SALVADOR DR NO 100		SCOTTSDALE	AZ	85258-5553
21172012D	41940 N 3RD ST		NEW RIVER	AZ	85087				AZ	41940 N 3RD ST		NEW RIVER	AZ	85087-8607
21170037	5946 W AUDREY LN		GLENDALE	AZ	85308				AZ	5946 W AUDREY LN		GLENDALE	AZ	85308
21170002L	7600 E REDFIELD RD STE 195		SCOTTSDALE	AZ	85260				AZ	9495 E SAN SALVADOR DR NO 100		SCOTTSDALE	AZ	85258-5553
20220089C	44431 N 20TH ST		NEW RIVER	AZ	85087				AZ	44431 N 20TH ST		NEW RIVER	AZ	85087-7523
21170007N	PO BOX 35697		PHOENIX	AZ	85069				AZ	C/O ACCOUNTI PO BOX 35697		PHOENIX	AZ	85069-5697
21170043	41806 N NEW RIVER RD		DESERT HILLS	AZ	85086				AZ	41806 N NEW RIVER RD		DESERT HILLS	AZ	85086-8632
21170045	41806 N NEW RIVER RD		DESERT HILLS	AZ	85086				AZ	41806 N NEW RIVER RD		DESERT HILLS	AZ	85086-8632
20220085D	43024 N 24TH ST		PHOENIX	AZ	85087				AZ	43024 N 24TH ST		PHOENIX	AZ	85087-8636
20220654Q	8533 E OVERLOOK DR		SCOTTSDALE	AZ	85255				AZ	C/O ALAN J FEF 8533 E OVERLOOK DR		SCOTTSDALE	AZ	85255-6495
21172034	48224 N LANTERN LIGHT CT		NEW RIVER	AZ	85087				AZ	48224 N LANTERN LIGHT CT		NEW RIVER	AZ	85087-8593
20220094H	13257 N 78TH ST		SCOTTSDALE	AZ	85260				AZ	13257 N 78TH ST		SCOTTSDALE	AZ	85260-4009

Rodger Creek Floodplain Re-Delineation Study - Mailing List for Study Announcement - April 2011

APN	Owner Address	Owner Address 1	Owner City	Owner State	Owner Zip	Property Address	Property City	Property Zip	Property State	Tax Address	Tax Address 1	Tax City	Tax State	Tax Zip
20220086A	43127 N 22ND ST		NEW RIVER	AZ	85087				AZ	43127 N 22ND ST		NEW RIVER	AZ	85087-6552
21170002V	7600 E REDFIELD RD STE 195		SCOTTSDALE	AZ	85260				AZ	9495 E SAN SALVADOR DR NO 100		SCOTTSDALE	AZ	85258-5553
21170001Q	41039 N 9TH ST		PHOENIX	AZ	85027				AZ	41039 N 9TH ST		PHOENIX	AZ	85086-7339
21170046	41806 N NEW RIVER RD		DESERT HILLS	AZ	85086				AZ	41806 N NEW RIVER RD		DESERT HILLS	AZ	85086-8632
21172029	42002 N 3RD ST		PHOENIX	AZ	85086				AZ	42002 N 3RD ST		PHOENIX	AZ	85086-7300
21172035	48224 N LANTERN LIGHT CT		NEW RIVER	AZ	85087				AZ	48224 N LANTERN LIGHT CT		NEW RIVER	AZ	85087-8593
21121022	100 E 2ND ST STE 200		CHASKA	MN	55318				AZ	100 E 2ND ST STE 200		CHASKA	MN	55318-4577
21170039	5946 W AUDREY LN		GLENDALE	AZ	85308				AZ	5946 W AUDREY LN		GLENDALE	AZ	85308
20220094K	13257 N 78TH ST		SCOTTSDALE	AZ	85260				AZ	13257 N 78TH ST		SCOTTSDALE	AZ	85260-4009
21170027	11509 N 77TH DR		PEORIA	AZ	85345				AZ	11509 N 77TH DR		PEORIA	AZ	85345-1361
20220089F	44431 N 20TH ST		PHOENIX	AZ	85087				AZ	44431 N 20TH ST		PHOENIX	AZ	85087-7523
21170007K	PO BOX 35697		PHOENIX	AZ	85069				AZ	C/O ACCOUNTI PO BOX 35697		PHOENIX	AZ	85069-5697
20220293	239 WATER ST		EASTPORT	ME	04631	1840 E QUAIL LN	PHOENIX	85086	AZ	9085 N LINNET RD		CASA GRANDE	AZ	85294-7167
20220361C	515 E CAREFREE HWY #144		PHOENIX	AZ	85085				AZ	515 E CAREFREE HWY # 144		PHOENIX	AZ	85085-8839
21172020B	42007 N 3RD ST		PHOENIX	AZ	85086	42007 N 3RD ST		85086	AZ	42007 N 3RD ST		PHOENIX	AZ	85086-7301
21172021A	41921 N CENTRAL AVE		PHOENIX	AZ	85086	41921 N CENTRAL AVE		85086	AZ	41921 N CENTRAL AVE		PHOENIX	AZ	85086-8610
21172011D	3500 E LINCOLN DR		PHOENIX	AZ	85018				AZ	3500 E LINCOLN DR		PHOENIX	AZ	85018-1023
21172033	41819 N CENTRAL AVE		PHOENIX	AZ	85029	41819 N CENTRAL AVE			AZ	29862 N TATUM BLVD		CAVE CREEK	AZ	85331-5860
21170011C	PO BOX 933		ST JOHNS	AZ	85936				AZ	PO BOX 933		SAINT JOHNS	AZ	85936-0933
21170011D	7600 E REDFIELD RD STE 195		SCOTTSDALE	AZ	85260				AZ	9495 E SAN SALVADOR DR STE 100		SCOTTSDALE	AZ	85258-5553
21121014C	PO BOX 1233		PALM HARBOR	FL	34682				AZ	PO BOX 1233		PALM HARBOR	FL	34682-1233
21121017A	39610 N 12TH ST		PHOENIX	AZ	85086				AZ					
21121015A	515 E CAREFREE HWY #429		PHOENIX	AZ	85085-8839				AZ					
21121015B	2326 W TALLGRASS TR		PHOENIX	AZ	85085				AZ					
20220086B	43127 N 22ND ST		NEW RIVER	AZ	85087	43127 N 22ND ST	NEW RIVER	85087	AZ	43127 N 22ND ST		NEW RIVER	AZ	85087-6552
20220085C	43024 N 24TH ST		PHOENIX	AZ	85087				AZ	43024 N 24TH ST		PHOENIX	AZ	85087-8636
20220091B	42806 N 20TH ST		NEW RIVER	AZ	85027-7986	42806 N 20TH ST	PHOENIX	85087	AZ	42806 N 20TH ST		NEW RIVER	AZ	85087-7986
20220329	18029 N 19TH DR #1		PHOENIX	AZ	85023	42849 N 18TH ST		85087	AZ	42849 N 18TH ST		NEW RIVER	AZ	85087-7509
20220094E	42849 N 20TH ST		NEW RIVER	AZ	85029	42849 N 20TH ST	PHOENIX	85087	AZ	42849 N 20TH ST		NEW RIVER	AZ	85029-7987
20220654P	42706 N 18TH WAY		NEW RIVER	AZ	85087	42706 N 18TH WY	NEW RIVER	85087	AZ	42706 N 18TH WAY		NEW RIVER	AZ	85087
20220089H	44431 N 20TH ST		PHOENIX	AZ	85087	42812 N 22ND ST	PHOENIX	85087	AZ	44431 N 20TH ST		PHOENIX	AZ	85087-7523
21172032	6610 S 66TH AVE		LAVEEN	AZ	85339				AZ	3120 W CAREFREE HWY STE 1		PHOENIX	AZ	85086-3202
21172020F	42015 N 3RD PL		PHOENIX	AZ	85086	42015 N 3RD ST		85086	AZ	42015 N 3RD PL		PHOENIX	AZ	85086-7301
21170038	5946 W AUDREY LN		GLENDALE	AZ	85308				AZ	5946 W AUDREY LN		GLENDALE	AZ	85308-0702
21170011K	1108 E FALLING STAR DR		PHOENIX	AZ	85086	1108 E FALLING STAR DR		85086	AZ	1108 E FALLING STAR DR		PHOENIX	AZ	85086
21170007H	41822 N 10TH ST		NEW RIVER	AZ	85086	41822 N 10TH ST		85086	AZ	41822 N 10TH ST		PHOENIX	AZ	85086-0949
21170044	41806 N NEW RIVER RD		DESERT HILLS	AZ	85086				AZ	41806 N NEW RIVER RD		DESERT HILLS	AZ	85086-8632
21170007G	515 E CAREFREE HWY PMB 590		PHOENIX	AZ	85085	41944 N 10TH ST		85086	AZ	515 E CAREFREE HWY PMB 590		PHOENIX	AZ	85085
21121006W	7133 W GLOBE AVE		PHOENIX	AZ	85043				AZ	7133 W GLOBE AVE		PHOENIX	AZ	85043-7838
21121006P	32528 N 144TH ST		SCOTTSDALE	AZ	85262				AZ	32528 N 144TH ST		SCOTTSDALE	AZ	85262-5838
21121021	9414 N JAGGED CIR		FOUNTAIN HILI	AZ	85258-6367				AZ	22638 N 54TH PL		PHOENIX	AZ	85054-7176
20220091C	515 E CAREFREE HWY NO 448		PHOENIX	AZ	85085	42844 N 20TH ST			AZ	515 E CAREFREE HWY # 448		PHOENIX	AZ	85085-8839
20220094G	13257 N 78TH ST		SCOTTSDALE	AZ	85260	2006 E FILOREE LN	PHOENIX	85087	AZ	13257 N 78TH ST		SCOTTSDALE	AZ	85260-4009
20220094J	13257 N 78TH ST		SCOTTSDALE	AZ	85260				AZ	13257 N 78TH ST		SCOTTSDALE	AZ	85260-4009
21170036	475 CROSSPOINT PKWY		GETZVILLE	NY	14068				AZ	475 CROSSPOINT PKWY		GETZVILLE	NY	14068-1609
21170005N	PO BOX 71037		PHOENIX	AZ	85050				AZ	PO BOX 71037		PHOENIX	AZ	85050-1001
21170005M	42017 N 7TH ST		NEW RIVER	AZ	85086	42017 N 7TH ST		85086	AZ	42017 N 7TH ST		NEW RIVER	AZ	85086-7325
21170009A	4757 E GREENWAY RD 107B-39		PHOENIX	AZ	85032				AZ	4757 E GREENWAY RD 107B-39		PHOENIX	AZ	85032-8513
21170007F	41908 N 10TH ST		NEW RIVER	AZ	85086				AZ	41908 N 10TH ST		NEW RIVER	AZ	85086-0902
21170001S	41840 N NEW RIVER RD		DESERT HILLS	AZ	85086	41840 N NEW RIVER RD		85086	AZ	41840 N NEW RIVER RD		DESERT HILLS	AZ	85086-8632
21170007M	PO BOX 35697		PHOENIX	AZ	85069				AZ	C/O ACCOUNTI PO BOX 35697		PHOENIX	AZ	85069-5697
21121015C	14610 N 10TH ST		PHOENIX	AZ	85022				AZ					
21121014B	11584 E DESERT WILLOW DR		SCOTTSDALE	AZ	85255	1625 E NIGHT BREEZE LN	NEW RIVER	85087	AZ	11584 E DESERT WILLOW DR		SCOTTSDALE	AZ	85255-8231

Note: Tax address used for mailing unless no tax address listed. When no tax address, Owner address was used.

Flood Control District
of Maricopa County

Board of Directors
Fulton Brock, District 1
Don Stapley, District 2
Andrew Kunasek, District 3
Max Wilson, District 4
Mary Rose Wilcox, District 5

ww.fcd.maricopa.gov

301 West Durango Street
ıoenix, Arizona 85009
ıone: 602-506-1501
ıx: 602-506-4601
: 602-505-5897

December 9, 2011

Ms. Lillian Moodey
Engineering Section Manager
Arizona State Land Department
1616 W Adams St
Phoenix, AZ 85007

RE: Rodger Creek Floodplain/Floodway Re-Delineation Study

Dear Ms. Moodey:

The Flood Control District of Maricopa County (District) is conducting a detailed Floodplain/Floodway Re-Delineation Study along Rodger Creek from the confluence with the Skunk Creek to approximately 13,600 feet upstream of 24th Street. The study is using current topographic mapping, and detailed hydrologic and hydraulic analyses to re-evaluate the extent of the floodprone areas along Rodger Creek. The study is nearing completion.

Upon completion of the study, the District will apply for a Letter of Map Revision (LOMR) from the Federal Emergency Management Agency (FEMA) to revise Flood Insurance Rate Map (FIRM) panels 04013C0395H, 04013C0415G, 04013C0780H, and 04013C0785J along Rodger Creek. The revision will reflect the results of the updated study.

This letter is to inform you of the proposed changes in the 1% annual chance water-surface elevations, floodway, and 100-year floodplain limits on Arizona State Trust Land property along Rodger Creek, between the confluence with Skunk Creek and Linda Lane; between the 10th Street Alignment and 700 feet east of 12th Street; and, from 24th Street to the upstream limit of study.

Between the confluence with Skunk Creek and Linda Lane, the 1% annual chance water-surface elevations for Rodger Creek decreased with a maximum decrease of approximately 4.0 feet at approximately the confluence with Skunk Creek. The floodway width decreased with a maximum decrease of approximately 80 feet at a point approximately 350 ft downstream of Linda Lane. The changes to the 100-year floodplain limits may be viewed on the attached annotated FIRM panels.

Between the 10th Street Alignment and 700 feet east of 12th Street, the 1% annual chance water-surface elevations for Rodger Creek decreased with a maximum decrease of approximately 3.0 feet at a point approximately 370 feet east of the 10th Street Alignment. The floodway does not fall on State Trust Land in this reach. The changes to the 100-year floodplain limits may be viewed on the attached annotated FIRM panels.

From 24th Street to the upstream limit of study, the 1% annual chance water-surface elevations for Rodger Creek both increased and decreased with a maximum increase of approximately 2.0 feet at a point approximately 10,800 feet upstream of 24th Street; and, decreased with a maximum decrease of approximately 2.0 feet at a point approximately 1,400 ft upstream of 24th Street. The floodway width decreased with a maximum decrease of approximately 190 feet at a point approximately 9,700 ft upstream of 24th Street. The changes to the 100-year floodplain limits may be viewed on the attached annotated FIRM panels.

If you have any questions or concerns about the project or its affect on State Trust Land, please contact me at 602-506-4001 or cwr@mail.maricopa.gov. Additional information can also be found on the District's website at: http://www.fcd.maricopa.gov/.

Sincerely,

Catherine W. Regester

Catherine W. Regester, P.E., CFM
Senior Civil Engineer

Enclosures: 5 Annotated FIRM Panels (listed above)

Copy to: Manny Patel, ASLD (with enclosures)

APPENDIX B.5

FEMA CORRESPONDENCES

NATIONAL FLOOD INSURANCE PROGRAM

FEMA PRODUCTION AND TECHNICAL SERVICES CONTRACTOR

March 14, 2012

Ms. Teri S. George, P.E.
Michael Baker Jr., Inc
2929 N. Central Ave.
Phoenix, AZ 85012

IN REPLY REFER TO:
Case No.: 12-09-1031P
Community: Maricopa County, AZ
Community No.: 040037

316-AD

Dear Ms. George:

This responds to your request dated January 23, 2012 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, AZ and Incorporated Areas. Pertinent information about the request is listed below.

Identifier:	Rodger Creek Floodplain Delineation Study
Flooding Source:	Rodger Creek
FIRM Panel(s) Affected:	04013C0780H, 785H, 395H, 4145H

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

If we do not receive the required data within 90 days, we will suspend our processing of your request. Any data submitted after 90 days will be treated as an original submittal and will be subject to all submittal/payment procedures, including the flat review and processing fee for requests of this type established by the current fee schedule. A copy of the notice summarizing the current fee schedule, which was published in the *Federal Register,* is enclosed for your information.

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

If you have general questions about your request, FEMA policy, or the National Flood Insurance Program, please call the FEMA Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627). If you have specific questions concerning your request, please contact your case reviewer, Mr. Dan Saltsman, CFM, by e-mail at dan.saltsman@starr-team.com or by telephone at (301) 982-2896, or the Revisions Coordinator for your request, Mr. Sudhanshu Mishra, P.E., CFM, at Sudhanshu.Mishra@starr-team.com or at (240) 542-3085.

Sincerely,

Alex Haptemariam, P.E., CFM
MT-2 Process Manager
STARR

Enclosure: Fee Schedule for Processing Requests for Map Changes

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

Ms. Catherine W. Regester, P.E., CFM
Flood Control District of Maricopa County
cwr@mail.maricopa.gov

Mr. Brian Cosson, CFM
State NFIP Coordinator
btcosson@azwater.gov

NATIONAL FLOOD INSURANCE PROGRAM

FEMA PRODUCTION AND TECHNICAL SERVICES CONTRACTOR

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

Case No.: 12-09-1031P

Requester: Ms. Teri S. George, P.E.

Community: Maricopa County, AZ

Community No.: 040037

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

1. Our review of the submitted revised conditions hydraulic model reveals changes to the New River Road culvert from the effective hydraulic model. Please provide a statement from a community official verifying that no manmade changes to the New River Road culvert have been made since the date of the effective hydraulic model (February 5, 1990). Otherwise, please provide the appropriate fee as detailed at the end of this summary.

2. Our review of the submitted topographic work maps, entitled "Rodger Creek Floodplain Delineation Study" and certified December 19, 2011, revealed multiple road crossings that were not modeled in the submitted revised conditions hydraulic model. Please provide a statement from a community official that verifies that the following road crossing were built prior to, or concurrent with, the effective HEC2 hydraulic model dated February 5, 1990: 3rd Street, 7th Street, Linda Lane/16th Street, 20th Street, 21st Street, 22nd Street, 24th Street, and East Calvary Rd. Otherwise, please provide as-built plans certified by a registered professional engineer and please update the submitted revised conditions hydraulic model to include these structures.

3. If manmade changes have occurred in the Rodger Creek floodplain since the date of the effective model (as detailed above), then please submit a corrected effective hydraulic model. The corrected effective model corrects any errors that occur in the duplicate effective model, adds any additional cross sections, and/or incorporates more topographic information than that used in the effective model. It must not reflect any manmade physical changes since the date of the effective model. If additional cross sections/more detailed topography are available, these sections should be added to the corrected effective model. The updated topography should reflect the physical conditions of the area at the time of the effective modeling. Please submit a corrected effective hydraulic model for Rodger Creek. Please provide digital copies this model.

Effective January 13, 2010, the Federal Emergency Management Agency revised the fee schedule for reviewing and processing requests for conditional and final modifications to published flood information and maps. A copy of the notice summarizing the current fee schedule, which was published in the *Federal Register*, is enclosed for your information. In accordance with this schedule, the fee for your request is $5,300 and must be submitted before we can continue processing your request. Payment of this fee must be made in the form of a check or money order, payable in U.S. funds to the National Flood Insurance Program, or a credit card payment (Visa or MasterCard only). For identification purposes, the case number referenced above must be included on the check or money order. We will not perform a detailed technical review of your request until we receive this payment.

Please send the required data and fee directly to us at the address shown at the bottom of the first page attention to Mr. Dan Saltsman, CFM, STARR. For identification purposes, please include the case number referenced above on all correspondence.

APPENDIX B.6

RESPONSE TO FEMA COMMENTS

George, Teri S

From: cwr@mail.maricopa.gov
Sent: Monday, June 11, 2012 2:29 PM
To: dan.saltsman@starr-team.com
Cc: George, Teri S
Subject: FEMA Case No. 12-09-1031P, Rodger Creek

Hi Dan,

Per our discussion last week, we have modified the HEC-RAS model for the subject study by deleting the cross sections upstream of cross section 5.21. Additionally, the delineation has been revised such that it now ties-in to the effective study between new cross section 5.21 and effective cross section AB. The revised HEC-RAS files, the revised shape files, and a copy of the letter that I am sending to the LOMC Clearinghouse today requesting the change in study limits are all included in the file for download.

Please let me know if you need any additional information or if you have any problems with retrieving the files.

Thank you,

Cathy

Catherine W. Regester, P.E., CFM
Flood Control District of Maricopa County
Engineering Division, Hydrology/Hydraulics Branch
2801 West Durango Street
Phoenix, AZ 85009
Phone: (602) 506-4001
Fax: (602) 506-4601
cwr@mail.maricopa.gov

Your credentials:

Username: HPCFOZMJMH
Password: fYeFb3Um

Download URL:
https://ftp2.maricopa.gov:443

The login above will expire on 6/18/2012 12:00:00 AM

Rodger Creek Floodplain Delineation Study
FEMA Case No.: 12-09-1031P

Response to FEMA Comments dated March 14, 2012

1. The existing New River Road culverts at Rodger Creek are maintained by the Maricopa County Department of Transportation (MCDOT). MCDOT was contacted regarding changes to the culverts since 1990. MCDOT responded that their records only showed some minor road work, i.e. chip seal and overlay, in the vicinity of Rodger Creek and no work on the culverts.

   The effective model for Rodger Creek is a HEC-2 hydraulic model. The New River Road culvert was modeled using the Special Bridge routine within HEC-2. The District has reviewed the effective HEC-2 model and compared it with the submitted HEC-RAS model and noted the following:

   Culvert Opening Area

   HEC-2: 100.50 ft^2 (BAREA on SB card)

   HEC-RAS: 100.53 ft^2 (πr^2 for 2 – 8 ft diam culverts in Culvert Data Editor)

   Culvert Height

   Inverts of culverts centered at stations 9992.5 and 9997 in HEC-2

   HEC-2: El. 2030.6 – El. 2022.6 ((ELLC on BT record at above stations) - (ELCHU on SB record and EL on GR record at above stations)) = 8 ft

   HEC-RAS: 8 ft diameter (Culvert Data Editor)

   Culvert Length

   HEC-2: 50 ft (XLCH on X1 record at cross section 1.754)

   HEC-RAS: 48.39 ft (Culvert Data Editor)

   Upstream Invert Elevation

   Conversion factor from NGVD 1929 to NAVD 1988 = +2.03 ft

   HEC-2: El. 2022.6 (ELCHU on SB record) + 2.03 ft = El. 2024.63

   HEC-RAS: EL. 2024.34 (Culvert Data Editor) (January submittal)
   HEC-RAS: EL. 2024.66 (Culvert Data Editor) (April submittal)

   Downstream Invert Elevation

   Conversion factor from NGVD 1929 to NAVD 1988 = +2.03 ft

   HEC-2: El. 2022.1 (ELCHD on SB record) + 2.03 ft = El. 2024.13

   HEC-RAS: EL. 2023.72 (Culvert Data Editor) (January submittal)
   HEC-RAS: EL. 2023.86 (Culvert Data Editor) (April submittal)

   There appears to be a reasonable match between the effective model and the April HEC-RAS model.

2. All road crossings within the study reach are at-grade (no culverts) dirt road crossings with the exception of the New River Road crossing which is modeled in the HEC-RAS.
3. The New River Road culverts and roadway have not been modified and no additional crossings have been constructed since the date of the effective model.

Appendix C – Survey Supporting Documentation

ID	NORTHING	EASTING	ELEV	DESCRIPTION
1	7434.798	20838.108	2056.693	CP NAIL BASE
2	10000	20000	1993.6	FD MC BC NW 16
1000	7688.432	22234.033	2036.513	GS @ WALL
1001	7616.786	22253.692	2035.327	GS
1002	7554.385	22270.347	2034.786	GS
1003	7527.784	22277.493	2033.593	TOP
1004	7510.321	22284.337	2030.618	GS GB
1005	7497.738	22288.178	2029.676	GS GB
1006	7495.977	22288.823	2028.769	TOE
1007	7489.123	22290.348	2028.578	FL
1008	7478.053	22294.092	2029.177	TOE
1009	7475.22	22294.977	2030.008	GS GB
1010	7471.122	22295.986	2030.142	GS GB
1011	7453.384	22297.08	2033.258	TOP
1012	7429.512	22306.995	2036.398	GS
1013	7381.698	22325.693	2038.354	GS @ EDGE DIRT RD
1014	7262.769	22242.922	2036.16	GS
1015	7325.898	22220.368	2034.907	GS
1016	7361.808	22202.389	2032.058	IE 24"CMP
1017	7363.115	22201.368	2034.078	GS @ EDGE DIRT RD
1018	7377.895	22193.915	2033.958	GS @ EDGE DIRT RD
1019	7379.442	22191.476	2031.713	IE 24"CMP
1020	7419.043	22186.077	2032.919	GS
1021	7442.614	22178.269	2032.42	TOP
1022	7453.667	22172.481	2028.925	GS GB
1023	7456.204	22171.962	2027.51	TOE
1024	7465.208	22168	2027.531	FL
1025	7476.087	22165.058	2027.989	TOE
1026	7478.811	22164.344	2028.683	GS GB
1027	7487.398	22162.134	2030.107	TOP
1028	7528.378	22151.348	2032.62	GS
1029	7567.306	22139.793	2032.128	GS
1030	7631.103	22111.336	2034.122	GS
1031	7690.082	22094.73	2035.334	GS @ FENCELINE
1032	7935.198	21784.962	2037.48	TP CL
1033	7856.218	21845.325	2036.769	TP CL
1034	7772.887	21899.094	2035.616	TP CL
1035	7683.555	21949.113	2034.254	TP CL
1036	7590.802	21995.549	2033.334	TP CL
1037	7507.647	22033.094	2033.786	TP CL
1038	7453.663	22054.853	2034.611	TP CL
1039	7365.219	22086.01	2036.738	TP CL
1040	7273.088	22113.52	2039.632	TP CL
1041	7353.659	21992.332	2037.234	GS @ EDGE DIRT RD
1042	7356.696	21902.613	2033.634	GS @ EDGE DIRT RD
1043	7436.779	21957.62	2030.818	TOP

ID	NORTHING	EASTING	ELEV	DESCRIPTION
1044	7446.867	21957.351	2026.714	GS GB
1045	7448.89	21957.729	2025.193	TOE
1046	7457.742	21959.645	2023.931	FL
1047	7466.167	21960.534	2024.448	TOE
1048	7467.983	21961.183	2026.222	TOP
1049	7482.446	21961.179	2027.711	GS
1050	7519.118	21960.24	2029.786	GS
1051	7574.31	21945.453	2030.819	GS
1052	7638.864	21926.679	2032.519	GS
1053	7692.297	21891.22	2032.177	GS @ FENCELINE
1054	7692.133	21816.919	2030.655	GS @ FENCELINE
1055	7625.099	21837.451	2030.608	GS
1056	7583.356	21851.229	2030.518	GS
1057	7556.534	21859.123	2028.768	GS
1058	7514.197	21865.512	2027.611	GS
1059	7496.116	21867.303	2025.621	GS
1060	7486.081	21871.317	2025.106	TOP
1061	7482.508	21873.477	2022.875	TOE
1062	7478.461	21874.01	2022.91	FL
1063	7455.538	21876.762	2025.242	TOE
1064	7448.572	21876.554	2028.501	TOP
1065	7424.248	21888.093	2030.043	GS
1066	7442.149	21977.868	2024.698	TOE CONC
1067	7441.614	21998.856	2024.269	TOE CONC
1068	7435.979	22016.293	2025.453	TOE CONC
1069	7439.706	22035.258	2025.565	TOE CONC
1070	7427.245	22039.464	2033.284	TOP CONC
1071	7427.433	22017.688	2031.202	TOP CONC
1072	7421.199	22017.691	2033.106	GS
1073	7424.398	21991.417	2031.748	GS @ EDGE CONC
1074	7434.469	21995.388	2030.396	TOP CONC
1075	7440.664	21987.102	2028.991	TOP CONC
1076	7429.512	21979.244	2031.9	GS @ EDGE CONC
1077	7417.422	22044.976	2034.171	EA N S
1078	7437.377	22038.289	2033.641	EA N S
1079	7435.98	22036.655	2033.246	TOP ROCK WALL
1080	7448.113	22033.445	2032.92	TOP ROCK WALL
1081	7448.601	22034.402	2033.66	EA N S
1082	7460.325	22026.559	2033.463	EA N S
1083	7459.329	22025.029	2032.946	TOP ROCK WALL
1084	7469.256	22015.875	2033.04	EA N S
1085	7466.874	22010.316	2030.405	TOE ASPHALT SLOUGH
1086	7457.774	22017.517	2028.454	TOE ASPHALT SLOUGH
1087	7452.375	22020.793	2026.254	TOE ASPHALT SLOUGH
1088	7450.731	22027.154	2025.733	TOE ASPHALT SLOUGH
1089	7452.786	22029.989	2025.641	TOE ASPHALT SLOUGH

ID	NORTHING	EASTING	ELEV	DESCRIPTION
1090	7451.669	22030.623	2023.855	IE 96"CMP
1091	7444.034	22034.245	2024.05	IE 96"CMP
1092	7455.752	22028.772	2027.304	TOE ROCK WALL
1093	7458.71	22024.56	2030.304	TOE ROCK WALL
1094	7440.205	22035.362	2025.965	TOE ROCK WALL
1095	7435.318	22036.229	2028.862	TOE ROCK WALL
1096	7443.352	22024.257	2024.532	FL
1097	7453.888	22028.199	2027.639	TOP ASPHALT SLOUGH
1098	7559.968	22034.472	2035.592	TOP GUARD RAIL END
1099	7559.95	22035.478	2033.417	8"X6" WOOD POST
1100	7554.567	22038.36	2033.431	8"X6" WOOD POST
1101	7548.558	22040.822	2033.363	8"X6" WOOD POST
1102	7542.937	22043.145	2033.391	8"X6" WOOD POST
1103	7537.107	22045.546	2033.467	8"X6" WOOD POST
1104	7531.106	22047.984	2033.438	8"X6" WOOD POST
1105	7525.463	22050.205	2033.446	8"X6" WOOD POST
1106	7519.736	22052.505	2033.421	8"X6" WOOD POST
1107	7513.772	22055.011	2033.461	8"X6" WOOD POST
1108	7508.215	22057.231	2033.381	8"X6" WOOD POST
1109	7502.455	22059.674	2033.39	8"X6" WOOD POST
1110	7496.544	22062.046	2033.564	8"X6" WOOD POST
1111	7490.926	22064.279	2033.626	8"X6" WOOD POST
1112	7485.146	22066.627	2033.571	8"X6" WOOD POST
1113	7479.244	22069.046	2033.713	8"X6" WOOD POST
1114	7473.361	22071.265	2033.69	8"X6" WOOD POST
1115	7472.805	22070.018	2036.225	TOP GUARD RAIL
1116	7467.195	22073.661	2033.878	8"X6" WOOD POST
1117	7461.659	22075.672	2033.934	8"X6" WOOD POST
1118	7455.883	22077.944	2033.814	8"X6" WOOD POST
1119	7449.795	22080.286	2034.515	8"X6" WOOD POST
1120	7444.241	22082.466	2034.742	8"X6" WOOD POST
1121	7438.451	22084.642	2034.933	8"X6" WOOD POST
1122	7432.726	22086.873	2035.254	8"X6" WOOD POST
1123	7426.726	22089.009	2035.303	8"X6" WOOD POST
1124	7420.732	22091.232	2035.503	8"X6" WOOD POST
1125	7414.714	22093.49	2035.702	8"X6" WOOD POST
1126	7408.98	22095.713	2035.895	8"X6" WOOD POST
1127	7403.237	22097.752	2036.016	8"X6" WOOD POST
1128	7397.423	22099.956	2036.162	8"X6" WOOD POST
1129	7391.508	22102.091	2036.282	8"X6" WOOD POST
1130	7385.439	22103.601	2036.498	8"X6" WOOD POST
1131	7384.662	22102.873	2038.817	TOP GUARD RAIL END
1132	7381.698	22103.654	2036.729	EA N S
1133	7426.201	22087.447	2035.387	EA N S
1134	7472.537	22069.638	2034.098	EA N S
1135	7522.066	22049.809	2033.399	EA N S

ID	NORTHING	EASTING	ELEV	DESCRIPTION
1136	7564.314	22032.366	2033.531	EA N S
1137	7492.811	22081.312	2031.204	TOP GABION BASKET
1138	7492.585	22082.325	2029.102	TOE GABION BASKET
1139	7480.116	22075.309	2032.135	TOP GABION BASKET
1140	7478.704	22076.393	2033.571	TOP ROCK WALL
1141	7472.644	22074.142	2033.792	TOP ROCK WALL
1142	7455.117	22081.124	2033.783	TOP ROCK WALL
1143	7452.802	22087.797	2033.511	TOP ROCK WALL
1144	7451.574	22087.644	2032.372	TOP GABION BASKET
1145	7441.678	22099.331	2031.559	TOP GABION BASKET
1146	7443.265	22099.519	2030.372	TOE GABION BASKET
1147	7450.178	22094.012	2026.467	TOE GABION BASKET
1148	7453.09	22089.284	2025.227	TOE GABION BASKET
1149	7453.328	22088.88	2025.198	TOE ROCK WALL
1150	7456.766	22081.418	2024.727	TOE ROCK WALL
1151	7459.605	22080.07	2024.665	IE 96"CMP
1152	7469.061	22076.102	2024.749	IE 96"CMP
1153	7471.987	22075.027	2025.635	TOE ROCK WALL
1154	7479.096	22077.256	2028.155	TOE ROCK WALL
1155	7479.95	22076.583	2028.891	TOE GABION BASKET
1156	7455.489	22098.634	2025.509	FL
3	7562.518	22036.263	2033.507	SET P-K TBM
4	7359.628	19997.922	2030.497	FD MC AC
5	10003.714	22672.22	2239.812	FD GLO BC
6	7361.413	22653.986	2049.459	FD 1"OD PIPE

Elevation Reference Marks

Rodger Creek Floodplain Delineation Study
Elevation Reference Marks

ERM ID	State Plane Coordinates X_NAD83	Y_NAD83	Elevation NAVD88	Description
5126	649,598.70	1,039,468.81	1,912.43	Aluminum cap, stamped FCD 5126, approximately 25 feet northeast of the northeast corner of Section 19, T6N, R3E.
5134	654,833.07	1,044,785.72	1,992.16	Aluminum cap, stamped FCD 5134, approximately 100 feet northwest of the intersection of 7th Street and Honda Bow Road.
5142	660,176.97	1,044,709.55	2,142.42	Aluminum cap stamped FCD 5142 at end of 16th St. Approximately 0.5 miles south of Calvary Rd., on the west side of the 16th St. right of way on south side of wire fence.
5149	665,307.33	1,045,527.11	2,280.19	Aluminum cap, stamped FCD 5149, in desert area. No intersections nearby.
5159	676,014.90	1,044,709.27	2,462.62	Aluminum cap, stamped FCD 5159, in desert area. No intersections nearby.
5154	670,742.55	1,044,665.75	2,363.78	Aluminum cap, stamped FCD 5154, in desert area. No intersections nearby.
6	670,813.28	1,046,452.84	2,383.14	Aluminum cap, stamped FCD 6, in desert area. No intersections nearby.
46058-1	657,551.53	1,044,719.22	2,239.62	2 1/2" GLO BC 1.75'UP STAMPED "1/4 S9 S16 1922"
46057-1M	654,879.81	1,044,719.45	1,993.60	5/8" ROUND SS ROD 0.1'DN w/3" MC BC STAMPED "T6N R3E S8 S9 S17 S16 LS 33307 2004"

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Land Survey Section: Report

UPLSS Corners

The information here on was gathered by the Maricopa County Department of Transportation (MCDOT) and is deemed reliable but is not guaranteed and should always be verified by the user. MCDOT is currently in the process of quality control checks. The elevations contained here are derived by GPS static procedures with a rigorous vertical adjustment. It is entirely the responsibility of any other user to determine its suitability and errors and/or omissions before using it for themselves and/or for another purpose.

Unofficial Document

Unique ID:	847
Point Name:	46058-1
Alias:	4605801
Import Date:	10/17/2005
Modified Date:	
Classification:	USPLSS Monument
Township:	T06N
Range:	R03E
Section:	16
UPLSS Corner Name:	North 1/4
USPLSS Corner Type:	
Determination Status:	Accepted
Latitude NAD83(1992):	33.521804013N (DD.MMSSssss)
Longitude NAD83(1992):	112.032346682W (DDD.MMSSssss)
Ellipsoid Height (Int. Feet):	2145.315
SPC AZ C Northing (Int Feet):	1044719.224
SPC AZ C Easting (Int Feet):	657551.530
NAVD88 Elev. (Int feet):	2239.623
Combination Grid Factor:	1.000200370
Convergence:	- 0.04410
Last Date Visited:	5/1/2003
FIRM/Agency:	ENTRANCO
MCR Number:	2005-0617876
MCR Book:	747
MCR Page:	38
Project Number:	69012
Project Name:	GDACS
Monument Status:	Good
Description:	FD 2 1/2" GLO BC 1.75'UP STAMPED "1/4 S9 S16 1922"
Comments:	

Photos of Survey Point

There are no photos available for this survey point.

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Land Survey Section: Report

UPLSS Corners

The information here on was gathered by the Maricopa County Department of Transportation (MCDOT) and is deemed reliable but is not guaranteed and should always be verified by the user. MCDOT is currently in the process of quality control checks. The elevations contained here are derived by GPS static procedures with a rigorous vertical adjustment. It is entirely the responsibility of any other user to determine its suitability and errors and/or omissions before using it for themselves and/or for another purpose.

Unofficial Document

Unique ID:	3467
Point Name:	46057-1M
Alias:	4605721
Import Date:	10/17/2005
Modified Date:	
Classification:	USPLSS Monument
Township:	T06N
Range:	R03E
Section:	17
UPLSS Corner Name:	Northeast
USPLSS Corner Type:	
Determination Status:	Accepted
Latitude NAD83(1992):	33.521800529N (DD.MMSSssss)
Longitude NAD83(1992):	112.035515506W (DDD.MMSSssss)
Ellipsoid Height (Int. Feet):	1899.222
SPC AZ C Northing (Int Feet):	1044719.451
SPC AZ C Easting (Int Feet):	654879.812
NAVD88 Elev. (Int feet):	1993.603
Combination Grid Factor:	1.000188355
Convergence:	- 0.04580
Last Date Visited:	9/13/2004
FIRM/Agency:	ENTRANCO
MCR Number:	2005-0617876
MCR Book:	747
MCR Page:	38
Project Number:	69012
Project Name:	GDACS
Monument Status:	Good
Description:	FD 1/2" RB NO ID 0.4'DN, REPLACED w/ 5/8" ROUND SS ROD 0.1'DN w/ 3" MC BC STAMPED "T6N R3E S8 S9 S17 S16 LS 33307 2004"
Comments:	

Photos of Survey Point

There are no photos available for this survey point.

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Close

Structure Survey

Registered Professional Engineer (Civil)
CERTIFICATE NO.
22208
JACK K.
MOODY
Date Signed 3-29-12
ARIZONA, U.S.A.

EXPIRES 9-30-12

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
49231
TEX J.
BROOKS
DATE SIGNED 3-30-12
ARIZONA U.S.A.
Expires 3/31/2012

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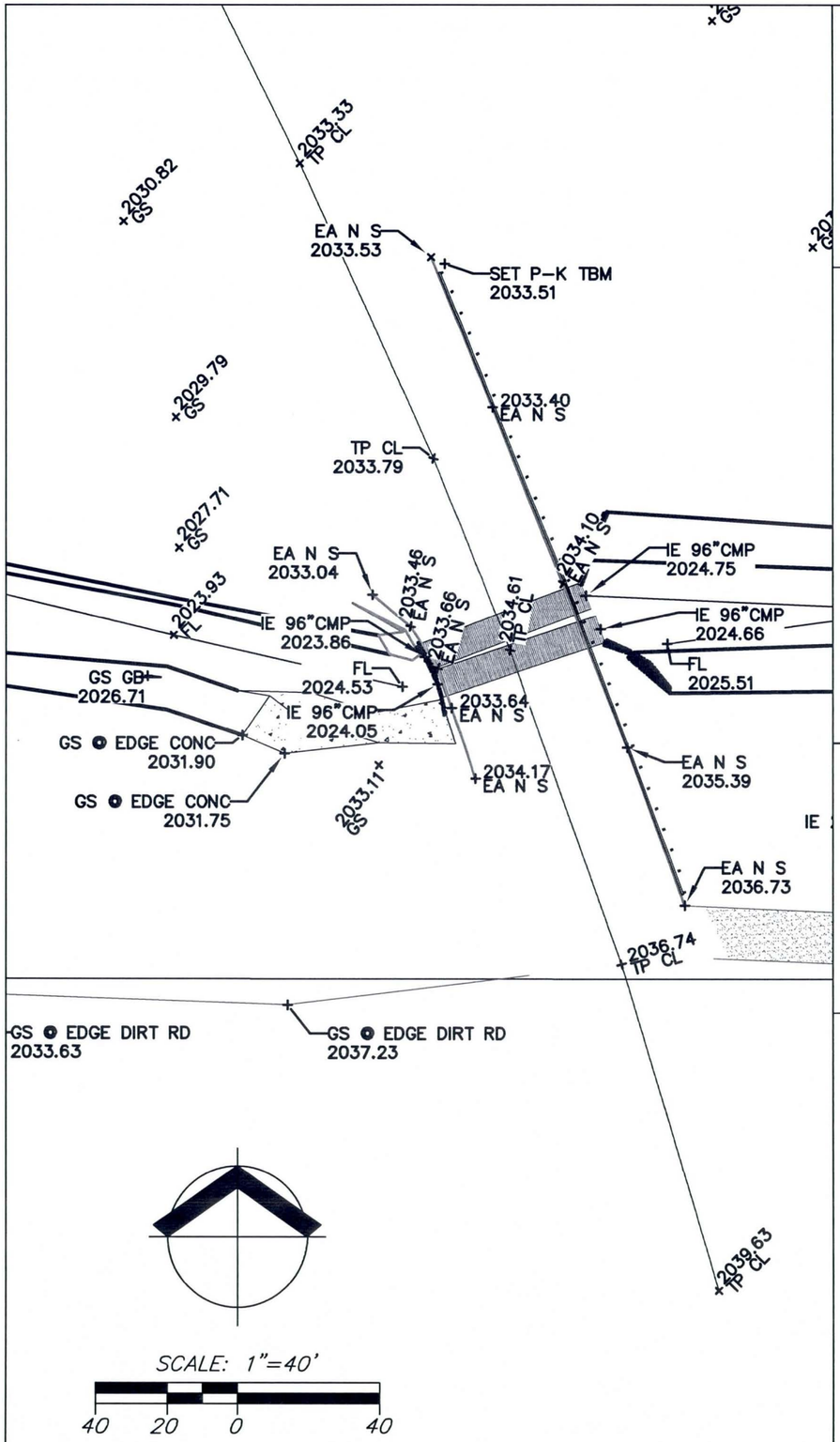
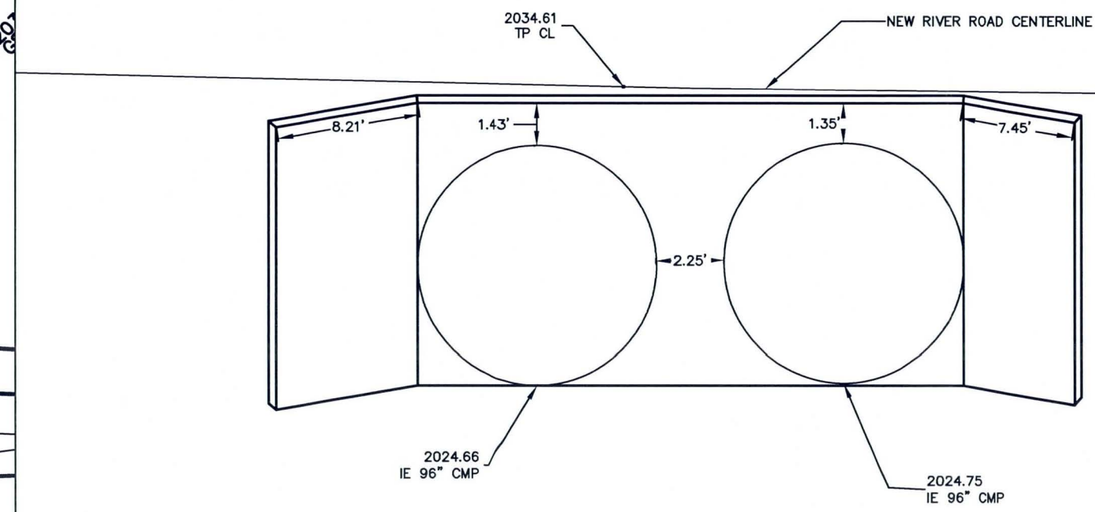
STRUCTURE SURVEY
RODGER CREEK FLOODPLAIN DELINEATION

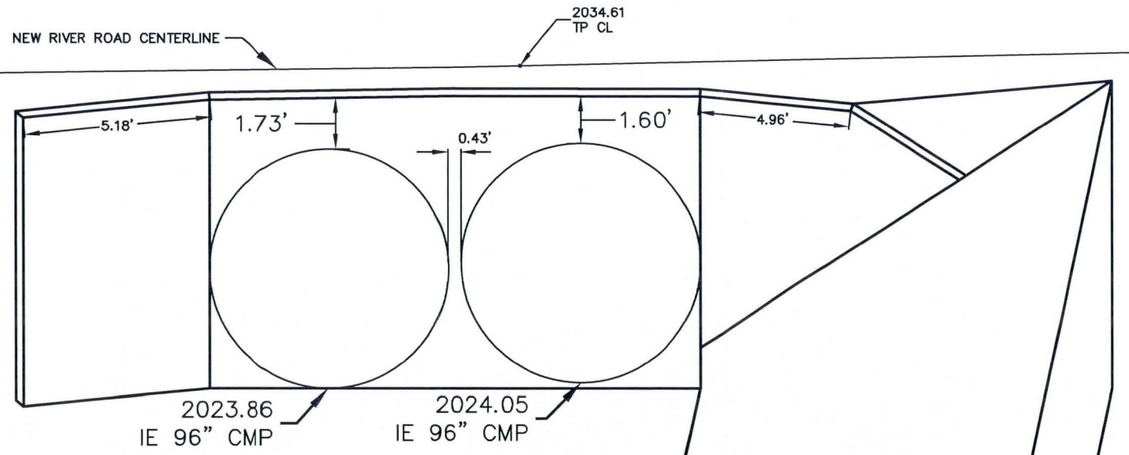
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
MARICOPA COUNTY, ARIZONA

PROJECT NO. 4109563000
DATE: 03-29-2012
BY: MRP
SHEET NO. 1





UPSTREAM HEADWALL



DOWNSTREAM HEADWALL

CULVERT HEADWALL
RODGER CREEK FLOODPLAIN DELINEATION STUDY
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
MARICOPA COUNTY, ARIZONA

PROJECT NO. 4109563000
DATE: 03-29-2012
BY: MRP
SHEET NO. 1

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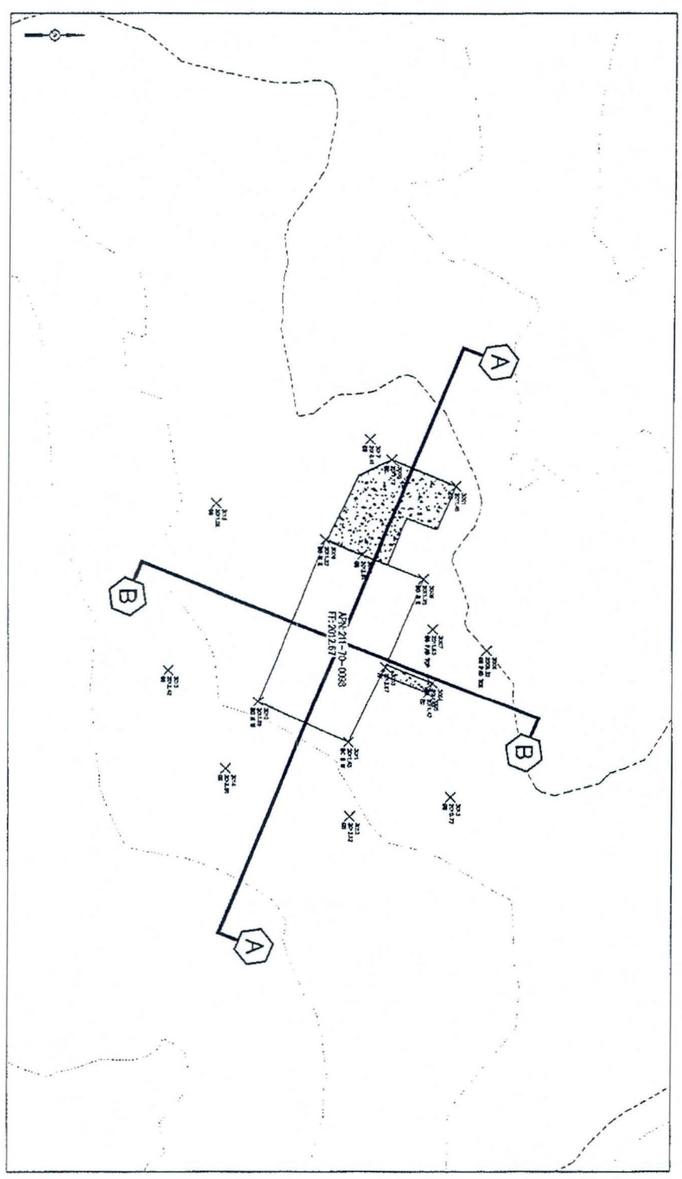
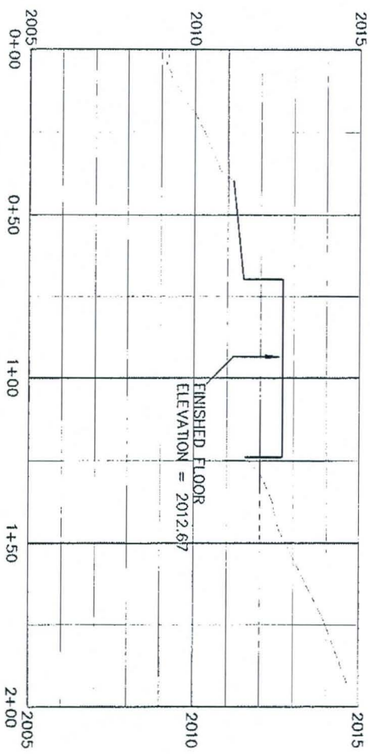
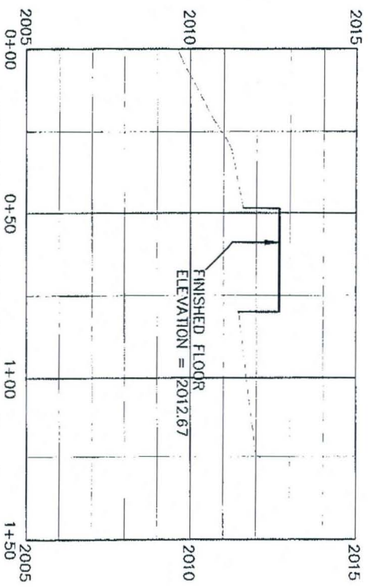
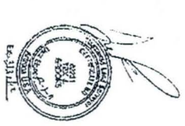


CROSS SECTION A–A



CROSS SECTION B–B





PROJECT NO.	410956300
DATE:	2011-11-11
BY:	TKJ
SHEET NO.	01

FINISHED FLOOR ELEVATION FOR PARCEL 211-70-009B
RODGER CREEK WASH

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
MARICOPA COUNTY, ARIZONA

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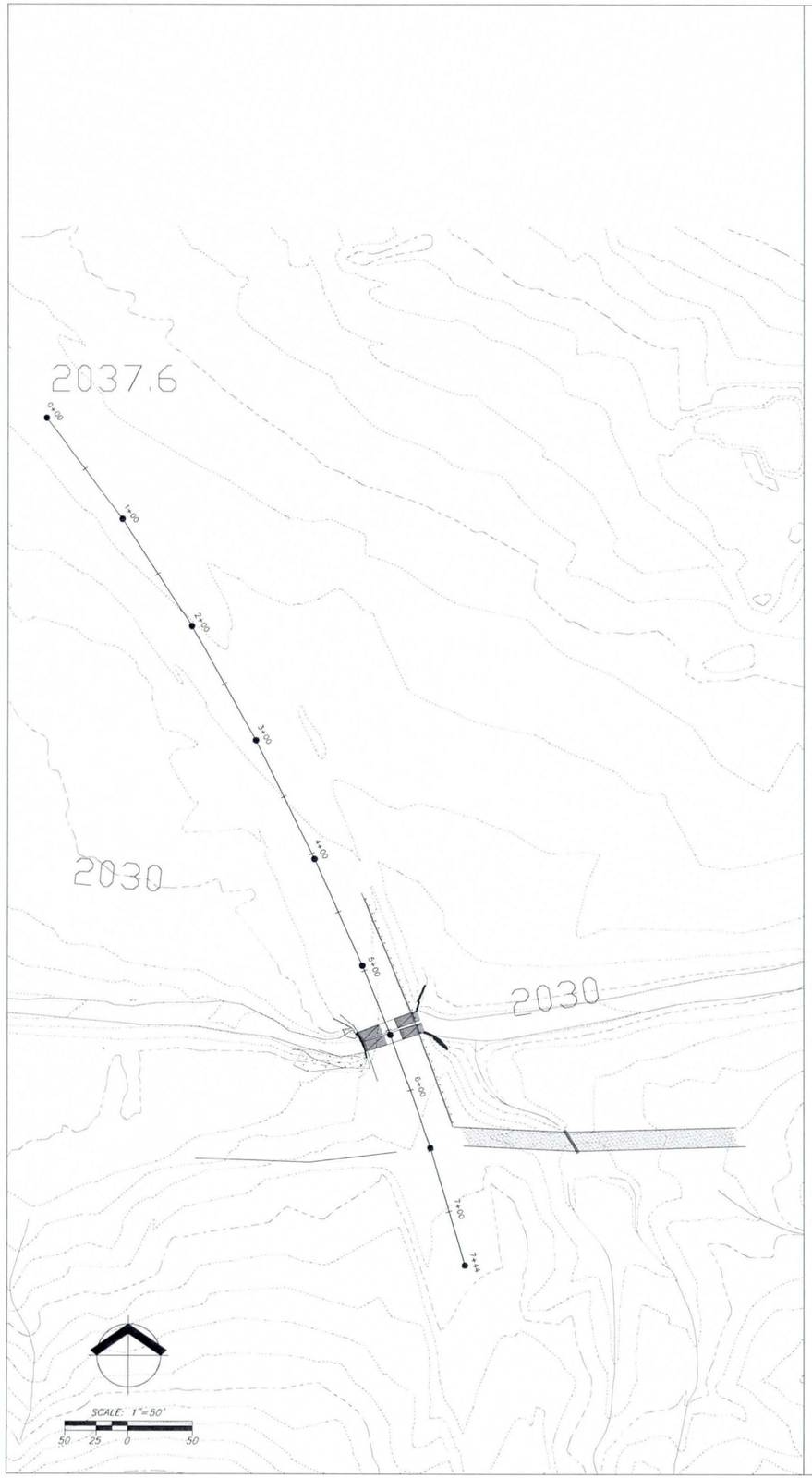
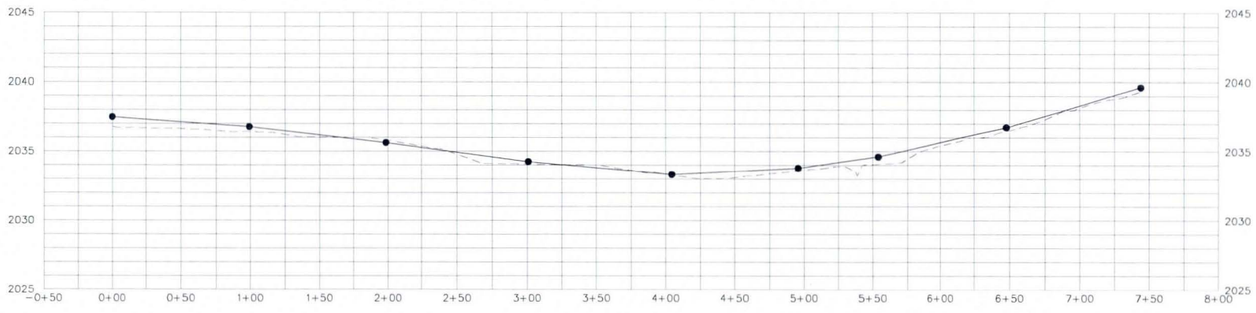
Topographic Verification





Road Centerline PROFILE

LEGEND

SURVEYED CROSS-SECTION

TOPO CROSS-SECTION

TOPOGRAPHY VERIFICATION EXHIBIT

RODGER CREEK FLOODPLAIN DELINEATION

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

MARICOPA COUNTY, ARIZONA

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#	DATE	DESCRIPTION	BY

PRELIMINARY NOT FOR CONSTRUCTION

DATE	2012-03-29
DRAWN	MRP
DESIGNED	TKJ
CHECKED	JKM
PROJECT #	4109563000

SHEET TITLE
TOPO VERIFICATION

SHEET NUMBER
1

LAND USE # NA

PROJECT NO.	410956300
DATE:	2011-11-11
BY:	CARDNO
SHEET NO.	01

SUPPLEMENTAL TOPOGRAPHY AT BREAKOUT
RODGER CREEK WASH

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
MARICOPA COUNTY, ARIZONA

Cardno WRG
PHOENIX
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NGS Data Sheet

The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

DATABASE = ,PROGRAM = datasheet, VERSION = 7.86

1 National Geodetic Survey, Retrieval Date = APRIL 29, 2011

AE4806 **********

AE4806 HT_MOD - This is a Height Modernization Survey Station.
AE4806 DESIGNATION - NR15
AE4806 PID - AE4806
AE4806 STATE/COUNTY- AZ/MARICOPA
AE4806 USGS QUAD - DAISY MOUNTAIN (1964)
AE4806
AE4806 *CURRENT SURVEY CONTROL
AE4806
AE4806* NAD 83(2007)- 33 53 10.52258(N) 112 02 03.67726(W) ADJUSTED
AE4806* NAVD 88 - 708.28 (meters) 2323.7 (feet) GPS OBS
AE4806
AE4806 EPOCH DATE - 2007.00
AE4806 X - -1,988,686.446 (meters) COMP
AE4806 Y - -4,913,686.984 (meters) COMP
AE4806 Z - 3,536,358.841 (meters) COMP
AE4806 LAPLACE CORR- 4.14 (seconds) DEFLEC09
AE4806 ELLIP HEIGHT- 679.615 (meters) (02/10/07) ADJUSTED
AE4806 GEOID HEIGHT- -28.66 (meters) GEOID09
AE4806

AE4806 ------- Accuracy Estimates (at 95% Confidence Level in cm) --------

	Type	PID	Designation	North	East	Ellip
AE4806	NETWORK	AE4806	NR15	0.55	0.45	0.92

AE4806
AE4806.The horizontal coordinates were established by GPS observations
AE4806.and adjusted by the National Geodetic Survey in February 2007.
AE4806
AE4806.The datum tag of NAD 83(2007) is equivalent to NAD 83(NSRS2007).
AE4806.See National Readjustment for more information.
AE4806.The horizontal coordinates are valid at the epoch date displayed above.
AE4806.The epoch date for horizontal control is a decimal equivalence
AE4806.of Year/Month/Day.
AE4806
AE4806.The orthometric height was determined by GPS observations and a
AE4806.high-resolution geoid model using precise GPS observation and
AE4806.processing techniques.
AE4806
AE4806.The X, Y, and Z were computed from the position and the ellipsoidal ht.
AE4806
AE4806.The Laplace correction was computed from DEFLEC09 derived deflections.
AE4806
AE4806.The ellipsoidal height was determined by GPS observations
AE4806.and is referenced to NAD 83.
AE4806
AE4806.The geoid height was determined by GEOID09.
AE4806

AE4806;		North	East	Units	Scale Factor	Converg.
AE4806;SPC AZ C	-	320,044.736	202,474.023	MT	0.99990146	-0 03 56.2
AE4806;SPC AZ C	-	1,050,015.54	664,284.85	iFT	0.99990146	-0 03 56.2

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AE4806;UTM  12       - 3,750,025.818   404,350.468   MT  0.99971278   -0 34 36.3
AE4806
AE4806!              -  Elev Factor  x  Scale Factor =   Combined Factor
AE4806!SPC AZ C      -   0.99989332  x   0.99990146  =   0.99979479
AE4806!UTM  12       -   0.99989332  x   0.99971278  =   0.99960613
AE4806
AE4806                          SUPERSEDED SURVEY CONTROL
AE4806
AE4806  NAD 83(1992)-  33 53 10.52194(N)     112 02 03.67684(W) AD(       ) B
AE4806  ELLIP H (04/12/01)  679.629  (m)                        GP(       ) 3 2
AE4806  NAD 83(1992)-  33 53 10.52206(N)     112 02 03.67718(W) AD(       ) 1
AE4806  NGVD 29 (11/28/97)  707.6    (m)          2322.     (f) GPS OBS
AE4806
AE4806.Superseded values are not recommended for survey control.
AE4806.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AE4806.See file dsdata.txt to determine how the superseded data were derived.
AE4806
AE4806_U.S. NATIONAL GRID SPATIAL ADDRESS: 12SVC0435050025(NAD 83)
AE4806_MARKER: I = METAL ROD
AE4806_SETTING: 59 = STAINLESS STEEL ROD IN SLEEVE (10 FT.+)
AE4806_STAMPING: NR-15
AE4806_MARK LOGO: MCDOT
AE4806_PROJECTION: PROJECTING 10 CENTIMETERS
AE4806_MAGNETIC: I = MARKER IS A STEEL ROD
AE4806_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
AE4806+STABILITY: POSITION/ELEVATION WELL
AE4806_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AE4806+SATELLITE: SATELLITE OBSERVATIONS - January 15, 2007
AE4806_ROD/PIPE-DEPTH: .9   meters
AE4806_SLEEVE-DEPTH  : .3 meters
AE4806
AE4806  HISTORY      - Date     Condition        Report By
AE4806  HISTORY      - 1996     MONUMENTED       ATEAM
AE4806  HISTORY      - 20000427 GOOD             MCDOT
AE4806  HISTORY      - 20060319 GOOD             USPSQD
AE4806  HISTORY      - 20070115 GOOD             USPSQD
AE4806
AE4806                          STATION DESCRIPTION
AE4806
AE4806'DESCRIBED BY A TEAM PA INC 1996 (JJR)
AE4806'TO REACH STATION FROM EXIT 232 (NEW RIVER ROAD) OF INTERSTATE 17,
AE4806'TRAVEL EAST ON NEW RIVER ROAD 0.25 MI (0.40 KM) TO T INTERSECTION WITH
AE4806'FRONTAGE ROAD. TURN LEFT (NORTH) AND TRAVEL 0.3 MI (0.48 KM) TO
AE4806'INTERSECTION WITH NEW RIVER ROAD(EAST). TURN RIGHT (EAST) AND TRAVEL
AE4806'5.1 MI (8.21 KM) TO CIRCLE MOUNTAIN ROAD. TURN LEFT AND TRAVEL EAST
AE4806'FOR 2.3 MI (3.70 KM) TO THE END OF CIRCLE MOUNTAIN ROAD AT 22ND STREET
AE4806'AND THE STATION (NORTHEAST). STATION MARK IS A 9/16 STAINLESS STEEL
AE4806'ROD IN A HANDWELL INCASED IN CONCRETE STAMPED NR-15 ON HANDWELL RIM.
AE4806'STATION IS APPROX. 70 FT (21.34 M) FROM THE EAST EDGE OF PAVEMENT OF
AE4806'22ND STREET ALONG THE NORTH R/W LINE ALIGNMENT OF CIRCLE MOUNTAIN ROAD
AE4806'AND 3.5 FT (1.07 M) WEST OF A WITNESS POST.
AE4806
AE4806                          STATION RECOVERY (2000)
AE4806
AE4806'RECOVERY NOTE BY MARICOPA CO DOT 2000 (KH)
AE4806'RECOVERED AS DESCRIBED.
AE4806
AE4806                          STATION RECOVERY (2006)
AE4806
AE4806'RECOVERY NOTE BY US POWER SQUADRON 2006 (RW)
```

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AE4806'RECOVERED AS DESCRIBED.
AE4806
AE4806                          STATION RECOVERY (2007)
AE4806
AE4806'RECOVERY NOTE BY US POWER SQUADRON 2007 (RW)
AE4806'RECOVERED AS DESCRIBED.

*** retrieval complete.
Elapsed Time = 00:00:00
```

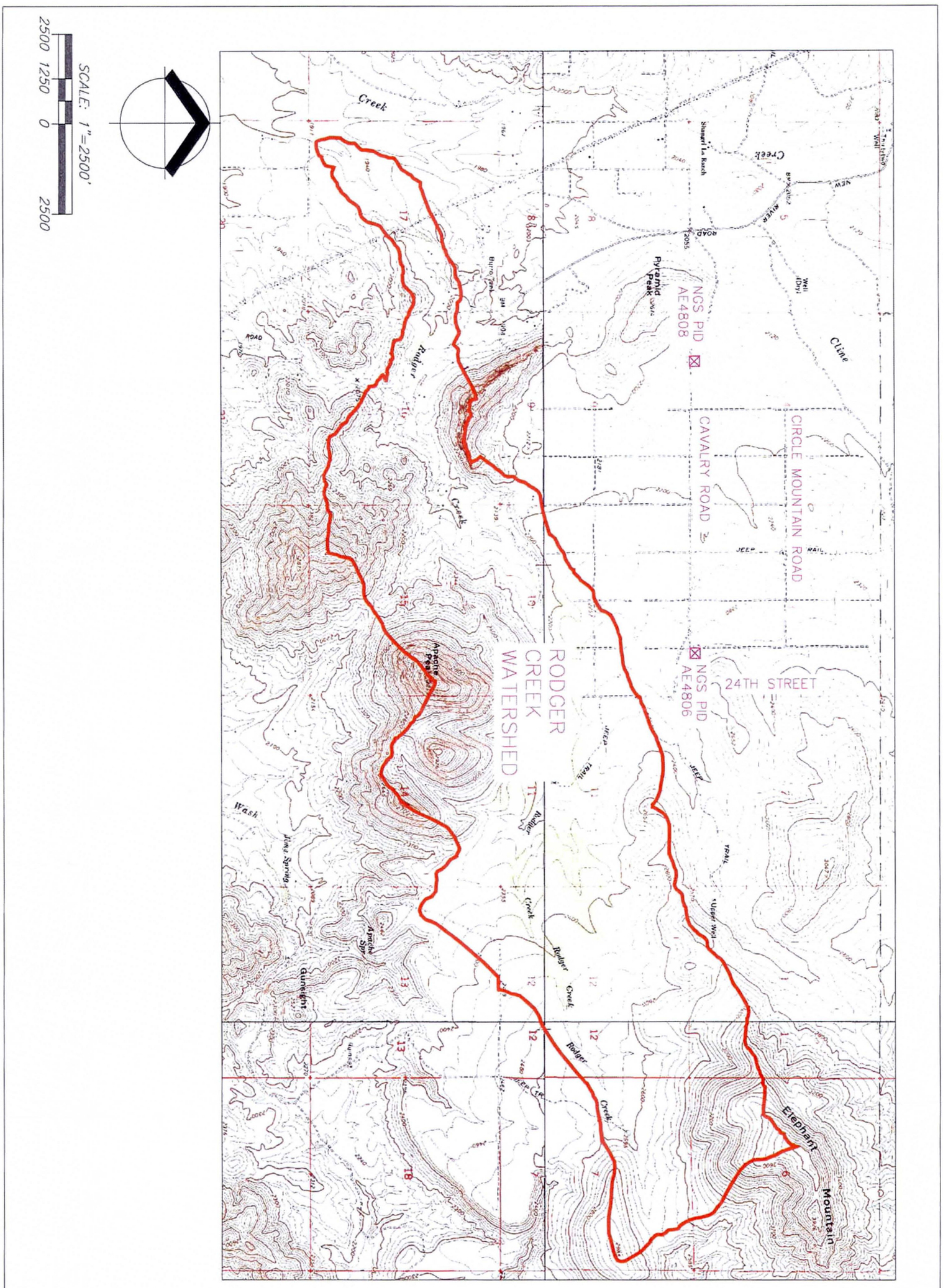

PROJECT NO. 4109563000
DATE: 2011-04-29
BY: SHC

NGS PID LOCATION
RODGER CREEK FLOODPLAIN DELINEATION STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
MARICOPA COUNTY, ARIZONA

Cardno WRG
PHOENIX
9977 N 90TH ST, STE 350, SCOTTSDALE, AZ 85258
TEL: (602) 977-8000 FAX: (602) 977-8099
www.cardnowrg.com
PLANNERS • ENGINEERS • LANDSCAPE ARCHITECTS • SURVEYORS

Appendix D – Hydrologic Analysis Supporting Documentation

100-Year 6-Hour

ID	Type	Area (sq mi)	Discharge cfs 2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Major Basin 01								
10	Hydrograph	0.860						1,523
RT10	Routed	0.860						1,261
20	Hydrograph	0.850						1,468
CP20	Combined	1.700						1,996
30	Hydrograph	0.660						1,093
CP30	Combined	2.360						2,622
RTCP30	Routed	2.360						2,591
40	Hydrograph	0.670						1,338
CP40	Combined	3.030						3,134
RTCP40	Routed	3.030						3,082
50	Hydrograph	0.510						1,176
CP50	Combined	3.540						3,462
RTCP50	Routed	3.540						3,412
60	Hydrograph	0.280						637
CP60	Combined	3.820						3,609
70	Hydrograph	0.380						861
CP70	Combined	4.200						3,877
RTCP70	Routed	4.200						3,786
80	Hydrograph	0.530						1,062
CP80	Combined	4.730						4,140
RTCP80	Routed	4.730						3,944
90	Hydrograph	0.440						741
CP90	Combined	5.170						4,082

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN   1998              *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   16FEB11  TIME  13:45:03   *
*                                       *
*****************************************
```

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

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

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.

THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION

NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,

DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION

KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


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

```
1         ID      Flood Control District of Maricopa County
2         ID      RODGER CREEK 06-HR - Rodger Creek Floodplain Delineation Study
3         ID      100 YEAR
4         ID      6 Hour  Storm
5         ID      Unit Hydrograph: S-Graph
6         ID      02/16/2011
7         ID
8         ID      ************************************************************************
9         ID
10        ID      Rodger Creek Floodplain Delineation Study
11        ID
12        ID      Contract FCD 2010C003
13        ID      Assignment # 2
14        ID
15        ID      Prepared by:
16        ID      Cardno WRG, Inc.
17        ID      9977 North 90th Street, Suite 350
18        ID      Scottsdale, AZ 85258
19        ID      Phone: 602-977-8000
20        ID      www.cardnowrg.com
21        ID
22        ID      Contact:
23        ID      Jack Moody, P.E.
24        ID      jack.moody@cardno.com
25        ID
26        ID      ************************************************************************
27        ID
28        IT       5       0       0    2000
29        IN      15
30        IO       3
          *DIAGRAM
          *
31        JD   3.181  0.0001
32        PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
33        PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
34        PC   0.962   0.972   0.983   0.991   1.000
35        JD   3.162  0.5000
36        PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
```

```
  37          PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
  38          PC   0.962   0.972   0.983   0.991   1.000
  39          JD   3.101     2.8
  40          PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.068   0.077
  41          PC   0.088   0.101   0.121   0.164   0.253   0.451   0.694   0.836   0.900   0.938
  42          PC   0.950   0.963   0.975   0.988   1.000
  43          JD   2.933    16.0
  44          PC   0.000   0.015   0.020   0.030   0.048   0.063   0.076   0.090   0.105   0.119
  45          PC   0.135   0.152   0.175   0.222   0.304   0.472   0.670   0.796   0.868   0.912
  46          PC   0.946   0.960   0.973   0.987   1.000
              *
1                                      HEC-1 INPUT                                      PAGE  2

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

  47          KK      10   BASIN
  48          KM        Sub-Basin 10
  49          BA   0.855
  50          LG   0.10    0.15    8.80    0.07     14
  51          UI      0     119     393     765    1070    1092     698     569     454     330
  52          UI    271     207     148     123      91      67      58      42      23      23
  53          UI     23      23      23       0       0       0       0       0       0       0
  54          UI      0       0       0       0       0       0       0       0       0       0
  55          UI      0       0       0       0       0       0       0       0       0       0
              *

  56          KK    RT10   ROUTE
  57          KM        Routes Sub-Basin 10 Through Sub-Basin 20
  58          RS       5    FLOW
  59          RC   0.055   0.075   0.055    8281  0.0244    0.00
  60          RX    0.00   83.00  163.00  180.00  254.00  343.00  425.00  486.00
  61          RY  2360.0 2356.00 2350.00 2348.00 2348.00 2350.00 2356.00 2360.00
              *

  62          KK      20   BASIN
  63          KM        Sub-Basin 20
  64          BA   0.849
```

```
 65          LG   0.10    0.13   10.10    0.04       5
 66          UI      0     107     303     626     848    1148     716     581     479     384
 67          UI    287     243     190     138     118      86      73      53      53      27
 68          UI     21      21      21      21      21       0       0       0       0       0
 69          UI      0       0       0       0       0       0       0       0       0       0
 70          UI      0       0       0       0       0       0       0       0       0       0
             *


 71          KK   CP20 COMBINE
 72          KM        Combines Routed Flow From Sub-Basin 10 with Sub-Basin 20
 73          HC       2
             *


 74          KK      30   BASIN
 75          KM        Sub-Basin 30
 76          BA   0.657
 77          LG   0.10    0.15    8.80    0.07      10
 78          UI      0      74     171     376     526     707     700     457     387     326
 79          UI    268     205     175     144     108      89      77      57      49      36
 80          UI     36      24      14      14      14      14      14      14       0       0
 81          UI      0       0       0       0       0       0       0       0       0       0
 82          UI      0       0       0       0       0       0       0       0       0       0
             *


 83          KK   CP30 COMBINE
 84          KM        Combines Hydrographs from CP20 and Sub-Basin 30
 85          HC       2
             *
```



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


 86          KK  RTCP30   ROUTE
 87          KM        Route CP30 through Sub-Basin 40
 88          RS       1    FLOW
 89          RC   0.050   0.065   0.050    3127  0.0205    0.00
 90          RX    0.00   73.00  156.00  184.00  200.00  233.00  297.00  324.00
```

```
RY  2270.0 2264.00 2258.00 2254.00 2254.00 2258.00 2266.00 2270.00
*

KK      40   BASIN
KM        Sub-Basin 40
BA   0.670
LG    0.10    0.15    7.30    0.13       9
UI       0     133     510     869    1114     671     520     381     275     205
UI     139     106      77      56      40      22      22      22      22       0
UI       0       0       0       0       0       0       0       0       0       0
UI       0       0       0       0       0       0       0       0       0       0
UI       0       0       0       0       0       0       0       0       0       0
*

KK    CP40 COMBINE
KM        Combine Hydrograph from Sub-Basin 40 and CP30
HC       2
*

KK  RTCP40   ROUTE
KM        Route CP40 Through Sub-Basin 50
RS       1    FLOW
RC   0.050   0.055   0.050    3387  0.0195    0.00
RX    0.00   33.00  162.00  263.00  297.00  353.00  390.00  435.00
RY  2200.0 2194.00 2192.00 2184.00 2184.00 2188.00 2194.00 2200.00
*

KK      50   BASIN
KM        Sub-Basin 50
BA   0.507
LG    0.19    0.15    8.00    0.09       9
UI       0     140     530     937     715     492     350     239     165     116
UI      79      51      40      19      19      19       0       0       0       0
UI       0       0       0       0       0       0       0       0       0       0
UI       0       0       0       0       0       0       0       0       0       0
UI       0       0       0       0       0       0       0       0       0       0
*
```

```
119          KK    CP50 COMBINE
120          KM        Combine Hydrographs from Sub-Basin 50 and CP40
121          HC       2
             *


122          KK  RTCP50   ROUTE
123          KM        Routes CP50 Through Sub-Basin 60
124          RS       2    FLOW
125          RC   0.050   0.060   0.050    4427  0.0158    0.00
126          RX    0.00  115.00  180.00  216.00  233.00  338.00  378.00  500.00
127          RY  2140.0 2134.00 2130.00 2124.00 2124.00 2128.00 2134.00 2140.00
             *
```



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


128          KK      60   BASIN
129          KM        Sub-Basin 60
130          BA   0.284
131          LG    0.19    0.15    9.70    0.05      10
132          UI       0      62     236     402     466     282     216     151     114      76
133          UI      58      40      28      25      10      10      10      10       0       0
134          UI       0       0       0       0       0       0       0       0       0       0
135          UI       0       0       0       0       0       0       0       0       0       0
136          UI       0       0       0       0       0       0       0       0       0       0
             *


137          KK    CP60 COMBINE
138          KM        Combines Hydrographs from Sub-Basin 60 and Routed Flow from CP50
139          HC       2
             *


140          KK      70   BASIN
141          KM        Sub-Basin 70
142          BA   0.380
143          LG    0.10    0.15    7.30    0.13      17
144          UI       0      97     368     642     574     373     273     184     137      88
```

```
145          UI      64      44      35      16      14      14      14       0       0       0
146          UI       0       0       0       0       0       0       0       0       0       0
147          UI       0       0       0       0       0       0       0       0       0       0
148          UI       0       0       0       0       0       0       0       0       0       0
             *

149          KK    CP70 COMBINE
150          KM         Combines Sub-Basins  70 with CP60
151          HC       2
             *

152          KK  RTCP70   ROUTE
153          KM         Routes CP70 Through Sub-Basin 80
154          RS       1    FLOW
155          RC   0.050   0.060   0.050    3365  0.0155    0.00
156          RX    0.00   70.00  188.00  209.00  223.00  271.00  326.00  370.00
157          RY  2080.0 2070.00 2066.00 2062.00 2062.00 2072.00 2076.00 2080.00
             *

158          KK      80   BASIN
159          KM         Sub-Basin 80
160          BA   0.529
161          LG    0.12    0.15    7.30    0.12      15
162          UI       0      80     306     548     819     568     427     340     250     191
163          UI     148     103      83      61      43      39      21      15      15      15
164          UI      15       0       0       0       0       0       0       0       0       0
165          UI       0       0       0       0       0       0       0       0       0       0
166          UI       0       0       0       0       0       0       0       0       0       0
             *
```



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


167          KK    CP80 COMBINE
168          KM         Combines Sub-Basin 80 and CP70
169          HC       2
             *
```

```
170          KK  RTCP80   ROUTE
171          KM        Routes CP80 Through Sub-Basin 90
172          RS       3    FLOW
173          RC   0.055   0.060   0.055    9218  0.0117    0.00
174          RX    0.00   72.00  105.00  126.00  232.00  277.00  351.00  460.00
175          RY  1980.0 1970.00 1962.00 1960.00 1960.00 1964.00 1968.00 1980.00
             *


176          KK      90   BASIN
177          KM        Sub-Basin 90
178          BA   0.442
179          LG    0.16    0.23    6.20    0.19       6
180          UI       0      57     165     336     456     598     370     301     248     196
181          UI     146     125      93      70      60      44      35      28      26      11
182          UI      11      11      11      11      11       0       0       0       0       0
183          UI       0       0       0       0       0       0       0       0       0       0
184          UI       0       0       0       0       0       0       0       0       0       0
             *


185          KK    CP90 COMBINE
186          KM        Combines Hydrographs from Sub-Basin 90 and CP80
187          HC       2
             *
188          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    47          10
                 V
                 V
    56        RT10
                 .
                 .
```

```
62          .          20
            .           .
            .           .
71        CP20.....
            .
            .
74          .          30
            .           .
            .           .
83        CP30.....
            V
            V
86       RTCP30
            .
            .
92          .          40
            .           .
            .           .
101       CP40.....
            V
            V
104      RTCP40
            .
            .
110         .          50
            .           .
            .           .
119       CP50.....
            V
            V
122      RTCP50
            .
            .
128         .          60
            .           .
            .           .
137       CP60.....
            .
```

```
                .
  140           .          70
                .           .
                .           .
  149        CP70.....
                V
                V
  152       RTCP70
                .
                .
  158           .          80
                .           .
                .           .
  167        CP80.....
                V
                V
  170       RTCP80
                .
                .
  176           .          90
                .           .
                .           .
  185        CP90.....

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *              JUN   1998               *
 *           VERSION 4.1                 *
 *                                       *
 * RUN DATE   16FEB11  TIME  13:45:03    *
 *                                       *
 *****************************************

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

Flood Control District of Maricopa County

RODGER CREEK 06-HR - Rodger Creek Floodplain Delineation Study

100 YEAR

6 Hour Storm

Unit Hydrograph: S-Graph

02/16/2011

****

Rodger Creek Floodplain Delineation Study

Contract FCD 2010C003

Assignment # 2

Prepared by:

Cardno WRG, Inc.

9977 North 90th Street, Suite 350

Scottsdale, AZ 85258

Phone: 602-977-8000

www.cardnowrg.com

Contact:

Jack Moody, P.E.

jack.moody@cardno.com

****

30 IO OUTPUT CONTROL VARIABLES

IPRNT	3	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

29 IN TIME DATA FOR INPUT TIME SERIES

JXMIN		15	TIME INTERVAL IN MINUTES
JXDATE	1	0	STARTING DATE
JXTIME		0	STARTING TIME

IT HYDROGRAPH TIME DATA

NMIN		5	MINUTES IN COMPUTATION INTERVAL
IDATE	1	0	STARTING DATE
ITIME		0000	STARTING TIME
NQ		2000	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	7	0	ENDING DATE
NDTIME		2235	ENDING TIME
ICENT		19	CENTURY MARK

COMPUTATION INTERVAL 0.08 HOURS

TOTAL TIME BASE 166.58 HOURS

ENGLISH UNITS

DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND
STORAGE VOLUME	ACRE-FEET
SURFACE AREA	ACRES
TEMPERATURE	DEGREES FAHRENHEIT

31 JD INDEX STORM NO. 1

STRM	3.18	PRECIPITATION DEPTH
TRDA	0.00	TRANSPOSITION DRAINAGE AREA

32 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.03
0.03	0.03	0.05	0.05	0.05	0.15	0.15	0.15	0.03	0.03
0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00								

35 JD INDEX STORM NO. 2

STRM	3.16	PRECIPITATION DEPTH

TRDA 0.50 TRANSPOSITION DRAINAGE AREA

36 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.03
0.03	0.03	0.05	0.05	0.05	0.15	0.15	0.15	0.03	0.03
0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00								

39 JD INDEX STORM NO. 3

STRM 3.10 PRECIPITATION DEPTH

TRDA 2.80 TRANSPOSITION DRAINAGE AREA

40 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.03
0.03	0.03	0.07	0.07	0.07	0.08	0.08	0.08	0.05	0.05
0.05	0.02	0.02	0.02	0.01	0.01	0.01	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00								

43 JD INDEX STORM NO. 4

STRM 2.93 PRECIPITATION DEPTH

TRDA 16.00 TRANSPOSITION DRAINAGE AREA

44 PI PRECIPITATION PATTERN

0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.03
0.03	0.03	0.06	0.06	0.06	0.07	0.07	0.07	0.04	0.04
0.04	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

0.00 0.00

*** ***

****
* *
47 KK * 10 * BASIN
* *
****

Sub-Basin 10

SUBBASIN RUNOFF DATA

49 BA SUBBASIN CHARACTERISTICS

TAREA 0.86 SUBBASIN AREA

50 LG GREEN AND AMPT LOSS RATE

STRTL 0.10 STARTING LOSS

DTH 0.15 MOISTURE DEFICIT

PSIF 8.80 WETTING FRONT SUCTION

XKSAT 0.07 HYDRAULIC CONDUCTIVITY

RTIMP 14.00 PERCENT IMPERVIOUS AREA

48 UI INPUT UNITGRAPH, 23 ORDINATES, VOLUME = 1.00

0.0 119.0 393.0 765.0 1070.0 1092.0 698.0 569.0 454.0 330.0

271.0 207.0 148.0 123.0 91.0 67.0 58.0 42.0 23.0 23.0

23.0 23.0 23.0

***

*** *** *** *** ***

HYDROGRAPH AT STATION 10

TRANSPOSITION AREA 0.0 SQ MI

TOTAL RAINFALL = 3.18, TOTAL LOSS = 0.83, TOTAL EXCESS = 2.35

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
		(CFS)				
+	1710.	4.25	215.	54.	18.	8.
		(INCHES)	2.340	2.343	2.343	2.343
		(AC-FT)	107.	107.	107.	107.

CUMULATIVE AREA = 0.86 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 10

TRANSPOSITION AREA 0.5 SQ MI

TOTAL RAINFALL = 3.16, TOTAL LOSS = 0.83, TOTAL EXCESS = 2.33

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
		(CFS)				
+	1699.	4.25	214.	53.	18.	8.
		(INCHES)	2.323	2.327	2.327	2.327
		(AC-FT)	106.	106.	106.	106.

CUMULATIVE AREA = 0.86 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 10

TRANSPOSITION AREA 2.8 SQ MI

TOTAL RAINFALL = 3.10, TOTAL LOSS = 0.88, TOTAL EXCESS = 2.22

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	1137.	4.33		204.	51.	17.	7.
			(INCHES)	2.217	2.222	2.222	2.222
			(AC-FT)	101.	101.	101.	101.

CUMULATIVE AREA = 0.86 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 10

TRANSPOSITION AREA 16.0 SQ MI

TOTAL RAINFALL = 2.93, TOTAL LOSS = 0.95, TOTAL EXCESS = 1.98

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	895.	4.33		181.	45.	15.	7.
			(INCHES)	1.972	1.977	1.977	1.977
			(AC-FT)	90.	90.	90.	90.

CUMULATIVE AREA = 0.86 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT 10

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				

```
+    1523.      4.25                  211.         53.         18.          8.
                              (INCHES)     2.290       2.294       2.294       2.294
                              (AC-FT)      104.        105.        105.        105.

                              CUMULATIVE AREA =     0.86 SQ MI
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              **************
              *            *
56 KK         *      RT10  *        ROUTE
              *            *
              **************
```

Routes Sub-Basin 10 Through Sub-Basin 20

HYDROGRAPH ROUTING DATA

```
58 RS          STORAGE ROUTING
                     NSTPS           5  NUMBER OF SUBREACHES
                      ITYP        FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC        0.00  INITIAL CONDITION
                         X        0.00 WORKING R AND D COEFFICIENT

59 RC          NORMAL DEPTH CHANNEL
                       ANL       0.055  LEFT OVERBANK N-VALUE
                      ANCH       0.075  MAIN CHANNEL N-VALUE
                       ANR       0.055  RIGHT OVERBANK N-VALUE
                     RLNTH       8281.  REACH LENGTH
                       SEL      0.0244  ENERGY SLOPE
                     ELMAX         0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION
```

CROSS-SECTION DATA

```
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
61 RY        ELEVATION   2360.00   2356.00   2350.00   2348.00   2348.00   2350.00   2356.00   2360.00
```

60 RX DISTANCE 0.00 83.00 163.00 180.00 254.00 343.00 425.00 486.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	10.89	25.81	44.74	67.01	91.35	117.74	146.18	176.67	209.20
OUTFLOW	0.00	116.91	410.72	891.38	1687.60	2743.58	4050.49	5619.21	7460.91	9586.93
ELEVATION	2348.00	2348.63	2349.26	2349.89	2350.53	2351.16	2351.79	2352.42	2353.05	2353.68
STORAGE	243.78	280.41	319.08	359.84	403.18	449.25	498.05	549.58	603.84	660.83
OUTFLOW	12008.68	14737.57	17784.94	21130.37	24771.96	28796.68	33220.31	38058.83	43328.19	49044.48
ELEVATION	2354.32	2354.95	2355.58	2356.21	2356.84	2357.47	2358.11	2358.74	2359.37	2360.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 5619. TO 49044.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** *** *** *** ***

HYDROGRAPH AT STATION RT10

TRANSPOSITION AREA 0.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1385.	4.67		215.	54.	18.	8.
		(INCHES)	2.334	2.343	2.343	2.343
		(AC-FT)	106.	107.	107.	107.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
12.	4.67	2.	1.	0.	0.

PEAK STAGE TIME MAXIMUM AVERAGE STAGE

			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
2350.29	4.67		2348.56	2348.14	2348.05	2348.02

CUMULATIVE AREA = 0.86 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RT10

TRANSPOSITION AREA 0.5 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1375.	4.67		213.	53.	18.	8.
		(INCHES)	2.317	2.327	2.327	2.327
		(AC-FT)	106.	106.	106.	106.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
12.	4.67	2.	1.	0.	0.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
2350.28	4.67		2348.55	2348.14	2348.05	2348.02

CUMULATIVE AREA = 0.86 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RT10

TRANSPOSITION AREA 2.8 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1011.	4.67		203.	51.	17.	7.
		(INCHES)	2.210	2.222	2.222	2.222
		(AC-FT)	101.	101.	101.	101.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
10.	4.67	2.	1.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2349.99	4.67	2348.57	2348.14	2348.05	2348.02

CUMULATIVE AREA = 0.86 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RT10

TRANSPOSITION AREA 16.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 788.	4.83		181.	45.	15.	7.
		(INCHES)	1.963	1.977	1.977	1.977
		(AC-FT)	90.	90.	90.	90.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
8.	4.83	2.	1.	0.	0.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
2349.76	4.83		2348.56	2348.14	2348.05	2348.02

CUMULATIVE AREA = 0.86 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT RT10

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1261.	4.67		210.	53.	18.	8.
		(INCHES)	2.284	2.294	2.294	2.294
		(AC-FT)	104.	105.	105.	105.

CUMULATIVE AREA = 0.86 SQ MI

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              **************
              *            *
  62 KK       *     20     *       BASIN
              *            *
              **************
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Sub-Basin 20

SUBBASIN RUNOFF DATA

64 BA SUBBASIN CHARACTERISTICS

TAREA 0.85 SUBBASIN AREA

65 LG GREEN AND AMPT LOSS RATE

STRTL 0.10 STARTING LOSS

DTH 0.13 MOISTURE DEFICIT

PSIF 10.10 WETTING FRONT SUCTION

XKSAT 0.04 HYDRAULIC CONDUCTIVITY

RTIMP 5.00 PERCENT IMPERVIOUS AREA

63 UI INPUT UNITGRAPH, 25 ORDINATES, VOLUME = 1.00

0.0	107.0	303.0	626.0	848.0	1148.0	716.0	581.0	479.0	384.0
287.0	243.0	190.0	138.0	118.0	86.0	73.0	53.0	53.0	27.0
21.0	21.0	21.0	21.0	21.0					

***

*** *** *** *** ***

HYDROGRAPH AT STATION 20

TRANSPOSITION AREA 0.0 SQ MI

TOTAL RAINFALL = 3.18, TOTAL LOSS = 0.77, TOTAL EXCESS = 2.41

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
		(CFS)				
+	1630.	4.33	219.	55.	18.	8.
		(INCHES)	2.402	2.404	2.404	2.404
		(AC-FT)	109.	109.	109.	109.

CUMULATIVE AREA = 0.85 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 20

TRANSPOSITION AREA 0.5 SQ MI

TOTAL RAINFALL = 3.16, TOTAL LOSS = 0.77, TOTAL EXCESS = 2.39

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	1619.	4.33	218.	54.	18.	8.
			(INCHES) 2.385	2.386	2.386	2.386
			(AC-FT) 108.	108.	108.	108.

CUMULATIVE AREA = 0.85 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 20

TRANSPOSITION AREA 2.8 SQ MI

TOTAL RAINFALL = 3.10, TOTAL LOSS = 0.78, TOTAL EXCESS = 2.32

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	1128.	4.33	212.	53.	18.	8.
			(INCHES) 2.317	2.321	2.321	2.321
			(AC-FT) 105.	105.	105.	105.

CUMULATIVE AREA = 0.85 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 20

TRANSPOSITION AREA 16.0 SQ MI

TOTAL RAINFALL = 2.93, TOTAL LOSS = 0.84, TOTAL EXCESS = 2.09

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	894.	4.33		191.	48.	16.	7.
			(INCHES)	2.087	2.091	2.091	2.091
			(AC-FT)	94.	95.	95.	95.

CUMULATIVE AREA = 0.85 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT 20

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	1468.	4.33		216.	54.	18.	8.
			(INCHES)	2.364	2.366	2.366	2.366
			(AC-FT)	107.	107.	107.	107.

CUMULATIVE AREA = 0.85 SQ MI

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          **************
          *            *
71 KK     *    CP20    *     COMBINE
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*           *
***************
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Combines Routed Flow From Sub-Basin 10 with Sub-Basin 20

```
 73 HC          HYDROGRAPH COMBINATION
                      ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                                  ***
      ***            ***            ***            ***            ***
                        HYDROGRAPH AT STATION     CP20
                      TRANSPOSITION AREA      0.0 SQ MI
  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    2352.      4.58                434.        109.         36.          16.
                        (INCHES)    2.365       2.374       2.374        2.374
                        (AC-FT)     215.        216.        216.         216.
                      CUMULATIVE AREA =     1.70 SQ MI
      ***            ***            ***            ***            ***
                        HYDROGRAPH AT STATION     CP20
                      TRANSPOSITION AREA      0.5 SQ MI
  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    2334.      4.58                430.        108.         36.          16.
                        (INCHES)    2.348       2.356       2.356        2.356
                        (AC-FT)     213.        214.        214.         214.
```

CUMULATIVE AREA = 1.70 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP20

TRANSPOSITION AREA 2.8 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	1859.	4.58		415.	104.	35.	15.
			(INCHES)	2.262	2.271	2.271	2.271
			(AC-FT)	206.	206.	206.	206.

CUMULATIVE AREA = 1.70 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP20

TRANSPOSITION AREA 16.0 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	1457.	4.67		371.	93.	31.	13.
			(INCHES)	2.022	2.034	2.034	2.034
			(AC-FT)	184.	185.	185.	185.

CUMULATIVE AREA = 1.70 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT CP20

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	1996.	4.58		419.	105.	35.	15.
			(INCHES)	2.287	2.296	2.296	2.296
			(AC-FT)	208.	209.	209.	209.

CUMULATIVE AREA = 1.70 SQ MI

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          ***************
          *             *
 74 KK    *        30   *        BASIN
          *             *
          ***************
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Sub-Basin 30

SUBBASIN RUNOFF DATA

76 BA	SUBBASIN CHARACTERISTICS		
	TAREA	0.66	SUBBASIN AREA
77 LG	GREEN AND AMPT LOSS RATE		
	STRTL	0.10	STARTING LOSS
	DTH	0.15	MOISTURE DEFICIT
	PSIF	8.80	WETTING FRONT SUCTION
	XKSAT	0.07	HYDRAULIC CONDUCTIVITY
	RTIMP	10.00	PERCENT IMPERVIOUS AREA

75 UI INPUT UNITGRAPH, 28 ORDINATES, VOLUME = 1.00

0.0	74.0	171.0	376.0	526.0	707.0	700.0	457.0	387.0	326.0
268.0	205.0	175.0	144.0	108.0	89.0	77.0	57.0	49.0	36.0
36.0	24.0	14.0	14.0	14.0	14.0	14.0	14.0		

***

*** *** *** *** ***

HYDROGRAPH AT STATION 30

TRANSPOSITION AREA 0.0 SQ MI

TOTAL RAINFALL = 3.18, TOTAL LOSS = 0.87, TOTAL EXCESS = 2.31

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	1156.	4.33	162.	41.	14.	6.
			(INCHES) 2.299	2.302	2.302	2.302
			(AC-FT) 81.	81.	81.	81.

CUMULATIVE AREA = 0.66 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 30

TRANSPOSITION AREA 0.5 SQ MI

TOTAL RAINFALL = 3.16, TOTAL LOSS = 0.87, TOTAL EXCESS = 2.29

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	1148.	4.33	161.	40.	13.	6.
			(INCHES) 2.283	2.286	2.286	2.286
			(AC-FT) 80.	80.	80.	80.

CUMULATIVE AREA = 0.66 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 30

TRANSPOSITION AREA 2.8 SQ MI

TOTAL RAINFALL = 3.10, TOTAL LOSS = 0.92, TOTAL EXCESS = 2.18

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	801.	4.42	154.	38.	13.	6.
			(INCHES) 2.175	2.179	2.179	2.179
			(AC-FT) 76.	76.	76.	76.

CUMULATIVE AREA = 0.66 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 30

TRANSPOSITION AREA 16.0 SQ MI

TOTAL RAINFALL = 2.93, TOTAL LOSS = 1.00, TOTAL EXCESS = 1.94

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	634.	4.42	136.	34.	11.	5.
			(INCHES) 1.925	1.931	1.931	1.931
			(AC-FT) 67.	68.	68.	68.

CUMULATIVE AREA = 0.66 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT 30

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	1093.	4.33		160.	40.	13.	6.
			(INCHES)	2.265	2.269	2.269	2.269
			(AC-FT)	79.	79.	79.	79.

CUMULATIVE AREA = 0.66 SQ MI

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          **************
          *            *
83 KK     *    CP30    *     COMBINE
          *            *
          **************
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Combines Hydrographs from CP20 and Sub-Basin 30

85 HC HYDROGRAPH COMBINATION

ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

***

*** *** *** *** ***

HYDROGRAPH AT STATION CP30

TRANSPOSITION AREA 0.0 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	3321.	4.42	595.	149.	50.	22.
			(INCHES) 2.345	2.354	2.354	2.354
			(AC-FT) 295.	296.	296.	296.

CUMULATIVE AREA = 2.36 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP30

TRANSPOSITION AREA 0.5 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	3294.	4.42	591.	148.	49.	21.
			(INCHES) 2.328	2.337	2.337	2.337
			(AC-FT) 293.	294.	294.	294.

CUMULATIVE AREA = 2.36 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP30

TRANSPOSITION AREA 2.8 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			

+	2561.	4.58		568.	143.	48.	21.
			(INCHES)	2.235	2.245	2.245	2.245
			(AC-FT)	281.	283.	283.	283.

CUMULATIVE AREA = 2.36 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP30

TRANSPOSITION AREA 16.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2028.	4.58		506.	127.	42.	18.
		(INCHES)	1.992	2.005	2.005	2.005
		(AC-FT)	251.	253.	253.	253.

CUMULATIVE AREA = 2.36 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT CP30

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2622.	4.50		570.	143.	48.	21.
		(INCHES)	2.244	2.254	2.254	2.254
		(AC-FT)	283.	284.	284.	284.

CUMULATIVE AREA = 2.36 SQ MI

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          **************
          *            *
86 KK     *    RTCP30  *        ROUTE
          *            *
          **************
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Route CP30 through Sub-Basin 40

HYDROGRAPH ROUTING DATA

```
88 RS          STORAGE ROUTING
                    NSTPS           1  NUMBER OF SUBREACHES
                     ITYP        FLOW  TYPE OF INITIAL CONDITION
                   RSVRIC        0.00  INITIAL CONDITION
                        X        0.00 WORKING R AND D COEFFICIENT

89 RC          NORMAL DEPTH CHANNEL
                      ANL       0.050  LEFT OVERBANK N-VALUE
                     ANCH       0.065  MAIN CHANNEL N-VALUE
                      ANR       0.050  RIGHT OVERBANK N-VALUE
                    RLNTH       3127.  REACH LENGTH
                      SEL      0.0205  ENERGY SLOPE
                    ELMAX         0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION
```

CROSS-SECTION DATA

```
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
91 RY        ELEVATION   2270.00   2264.00   2258.00   2254.00   2254.00   2258.00   2266.00   2270.00
90 RX        DISTANCE       0.00     73.00    156.00    184.00    200.00    233.00    297.00    324.00
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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	1.36	3.49	6.39	10.08	14.55	20.04	26.63	34.35	43.17
OUTFLOW	0.00	46.59	175.90	403.89	748.53	1257.75	2032.30	3032.23	4294.73	5852.13
ELEVATION	2254.00	2254.84	2255.68	2256.53	2257.37	2258.21	2259.05	2259.89	2260.74	2261.58

STORAGE	53.10	64.14	76.30	89.51	103.75	119.00	135.21	152.39	170.53	189.63
OUTFLOW	7734.18	9968.86	12585.85	15625.38	19085.58	23008.04	27393.81	32253.27	37604.15	43463.96
ELEVATION	2262.42	2263.26	2264.10	2264.95	2265.79	2266.63	2267.47	2268.31	2269.16	2270.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 32253. TO 43464.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP30

TRANSPOSITION AREA 0.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3229.	4.50		595.	149.	50.	22.
		(INCHES)	2.343	2.354	2.354	2.354
		(AC-FT)	295.	296.	296.	296.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
28.	4.50	7.	2.	1.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2260.03	4.50	2255.99	2254.51	2254.17	2254.07

CUMULATIVE AREA = 2.36 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP30

TRANSPOSITION AREA 0.5 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	3202.	4.50		591.	148.	49.	21.
			(INCHES)	2.326	2.337	2.337	2.337
			(AC-FT)	293.	294.	294.	294.

	PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+	(AC-FT)	(HR)				
	28.	4.50	7.	2.	1.	0.

	PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+	(FEET)	(HR)				
	2260.01	4.50	2255.98	2254.51	2254.17	2254.07

CUMULATIVE AREA = 2.36 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP30

TRANSPOSITION AREA 2.8 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	2527.	4.67		567.	143.	48.	21.
			(INCHES)	2.234	2.245	2.245	2.245

		(AC-FT)	281.	283.	283.	283.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
23.	4.67	7.	2.	1.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2259.47	4.67	2256.07	2254.53	2254.18	2254.08

CUMULATIVE AREA = 2.36 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP30

TRANSPOSITION AREA 16.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2003.	4.67		505.	127.	42.	18.
		(INCHES)	1.990	2.005	2.005	2.005
		(AC-FT)	251.	253.	253.	253.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
20.	4.67	6.	2.	1.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2259.02	4.67	2256.08	2254.54	2254.18	2254.08

CUMULATIVE AREA = 2.36 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT RTCP30

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	2591.	4.58		570.	143.	48.	21.
			(INCHES)	2.243	2.254	2.254	2.254
			(AC-FT)	282.	284.	284.	284.

CUMULATIVE AREA = 2.36 SQ MI

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          ***************
          *             *
92 KK     *        40   *        BASIN
          *             *
          ***************
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Sub-Basin 40

SUBBASIN RUNOFF DATA

94 BA SUBBASIN CHARACTERISTICS

TAREA 0.67 SUBBASIN AREA

95 LG GREEN AND AMPT LOSS RATE

STRTL 0.10 STARTING LOSS

```
                    DTH        0.15  MOISTURE DEFICIT
                    PSIF       7.30  WETTING FRONT SUCTION
                    XKSAT      0.13  HYDRAULIC CONDUCTIVITY
                    RTIMP      9.00  PERCENT IMPERVIOUS AREA

 93 UI        INPUT UNITGRAPH,  19 ORDINATES,  VOLUME = 1.00
                0.0     133.0     510.0     869.0    1114.0     671.0     520.0     381.0     275.0     205.0
              139.0     106.0      77.0      56.0      40.0      22.0      22.0      22.0      22.0

                                                        ***

    ***           ***           ***           ***           ***

                    HYDROGRAPH AT STATION       40
                   TRANSPOSITION AREA      0.0 SQ MI

   TOTAL RAINFALL =    3.18, TOTAL LOSS =    1.02, TOTAL EXCESS =    2.16

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    1435.      4.25                155.        39.         13.           6.
                        (INCHES)    2.158       2.159       2.159       2.159
                        (AC-FT)      77.         77.         77.         77.

                   CUMULATIVE AREA =    0.67 SQ MI

    ***           ***           ***           ***           ***

                    HYDROGRAPH AT STATION       40
                   TRANSPOSITION AREA      0.5 SQ MI

   TOTAL RAINFALL =    3.16, TOTAL LOSS =    1.02, TOTAL EXCESS =    2.15

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR    166.58-HR
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```
+   (CFS)        (HR)

                                (CFS)

+    1425.       4.25                154.          39.          13.           6.

                              (INCHES)     2.142        2.143        2.143        2.143

                              (AC-FT)       77.          77.          77.          77.

                           CUMULATIVE AREA =     0.67 SQ MI


          ***             ***             ***             ***             ***

                            HYDROGRAPH AT STATION        40

                          TRANSPOSITION AREA       2.8 SQ MI

       TOTAL RAINFALL =     3.10, TOTAL LOSS =     1.11, TOTAL EXCESS =     1.99

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW

                                        6-HR         24-HR         72-HR     166.58-HR
+   (CFS)        (HR)

                                (CFS)

+     910.       4.25                143.          36.          12.           5.

                              (INCHES)     1.987        1.989        1.989        1.989

                              (AC-FT)       71.          71.          71.          71.

                           CUMULATIVE AREA =     0.67 SQ MI


          ***             ***             ***             ***             ***

                            HYDROGRAPH AT STATION        40

                          TRANSPOSITION AREA      16.0 SQ MI

       TOTAL RAINFALL =     2.93, TOTAL LOSS =     1.21, TOTAL EXCESS =     1.73

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW

                                        6-HR         24-HR         72-HR     166.58-HR
+   (CFS)        (HR)

                                (CFS)
```

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+     702.      4.25                124.         31.         10.          4.
                          (INCHES)    1.722       1.724       1.724       1.724
                          (AC-FT)      62.         62.         62.         62.

                          CUMULATIVE AREA =    0.67 SQ MI

        ***             ***             ***             ***             ***


                          INTERPOLATED HYDROGRAPH AT       40

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW

                                          6-HR        24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                            (CFS)
+     1338.     4.25                152.         38.         13.          5.
                          (INCHES)    2.115       2.117       2.117       2.117
                          (AC-FT)      76.         76.         76.         76.

                          CUMULATIVE AREA =    0.67 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            ***************
            *             *
101 KK      *      CP40   *      COMBINE
            *             *
            ***************

                          Combine Hydrograph from Sub-Basin 40 and CP30

103 HC            HYDROGRAPH COMBINATION
                          ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE
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*** *** *** *** ***

HYDROGRAPH AT STATION CP40

TRANSPOSITION AREA 0.0 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
		(CFS)				
+	4045.	4.42	750.	188.	63.	27.
		(INCHES)	2.299	2.311	2.311	2.311
		(AC-FT)	372.	374.	374.	374.

CUMULATIVE AREA = 3.03 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP40

TRANSPOSITION AREA 0.5 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
		(CFS)				
+	4013.	4.42	744.	187.	62.	27.
		(INCHES)	2.283	2.294	2.294	2.294
		(AC-FT)	369.	371.	371.	371.

CUMULATIVE AREA = 3.03 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP40

TRANSPOSITION AREA 2.8 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	3165.	4.50	709.	178.	59.	26.
			(INCHES) 2.176	2.189	2.189	2.189
			(AC-FT) 352.	354.	354.	354.

CUMULATIVE AREA = 3.03 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP40

TRANSPOSITION AREA 16.0 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	2497.	4.50	628.	158.	53.	23.
			(INCHES) 1.927	1.943	1.943	1.943
			(AC-FT) 312.	314.	314.	314.

CUMULATIVE AREA = 3.03 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT CP40

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	3134.	4.50	706.	177.	59.	26.

(INCHES)	2.165	2.178	2.178	2.178
(AC-FT)	350.	352.	352.	352.

CUMULATIVE AREA = 3.03 SQ MI

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*            *
104 KK  *  RTCP40  *       ROUTE
*            *
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Route CP40 Through Sub-Basin 50

HYDROGRAPH ROUTING DATA

106 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	0.00	INITIAL CONDITION
X	0.00	WORKING R AND D COEFFICIENT

107 RC NORMAL DEPTH CHANNEL

ANL	0.050	LEFT OVERBANK N-VALUE
ANCH	0.055	MAIN CHANNEL N-VALUE
ANR	0.050	RIGHT OVERBANK N-VALUE
RLNTH	3387.	REACH LENGTH
SEL	0.0195	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL -------		+ --- RIGHT OVERBANK ---		
109 RY	ELEVATION	2200.00	2194.00	2192.00	2184.00	2184.00	2188.00	2194.00	2200.00
108 RX	DISTANCE	0.00	33.00	162.00	263.00	297.00	353.00	390.00	435.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	2.96	7.39	13.28	20.65	29.47	39.44	50.45	62.50	75.58
OUTFLOW	0.00	110.71	406.63	914.80	1669.59	2737.84	4207.36	5991.84	8107.52	10570.80
ELEVATION	2184.00	2184.84	2185.68	2186.53	2187.37	2188.21	2189.05	2189.89	2190.74	2191.58
STORAGE	90.06	108.07	129.96	153.78	178.32	203.57	229.54	256.23	283.63	311.76
OUTFLOW	13623.60	17416.35	21912.36	27277.54	33369.50	40157.84	47625.66	55763.18	64564.91	74028.27
ELEVATION	2192.42	2193.26	2194.10	2194.95	2195.79	2196.63	2197.47	2198.31	2199.16	2200.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 47626. TO 74028.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP40

TRANSPOSITION AREA 0.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3967.	4.50		749.	188.	63.	27.
		(INCHES)	2.298	2.311	2.311	2.311
		(AC-FT)	372.	374.	374.	374.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
38.	4.50	9.	2.	1.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR

+ (FEET)	(HR)				
2188.91	4.50	2185.52	2184.39	2184.13	2184.06

CUMULATIVE AREA = 3.03 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP40

TRANSPOSITION AREA 0.5 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3936.	4.50		744.	187.	62.	27.
		(INCHES)	2.282	2.294	2.294	2.294
		(AC-FT)	369.	371.	371.	371.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
38.	4.50	9.	2.	1.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2188.90	4.50	2185.52	2184.39	2184.13	2184.06

CUMULATIVE AREA = 3.03 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP40

TRANSPOSITION AREA 2.8 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW

			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3113.	4.58		709.	178.	59.	26.
		(INCHES)	2.175	2.189	2.189	2.189
		(AC-FT)	352.	354.	354.	354.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)					
32.	4.58		9.	2.	1.	0.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
2188.43	4.58		2185.57	2184.40	2184.13	2184.06

CUMULATIVE AREA = 3.03 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP40

TRANSPOSITION AREA 16.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2454.	4.67		628.	158.	53.	23.
		(INCHES)	1.925	1.943	1.943	1.943
		(AC-FT)	311.	314.	314.	314.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)					
27.	4.67		8.	2.	1.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2187.99	4.67	2185.55	2184.40	2184.13	2184.06

CUMULATIVE AREA = 3.03 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT RTCP40

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3082.	4.58		705.	177.	59.	26.
		(INCHES)	2.164	2.178	2.178	2.178
		(AC-FT)	350.	352.	352.	352.

CUMULATIVE AREA = 3.03 SQ MI

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          ***************
          *             *
110 KK    *        50   *        BASIN
          *             *
          ***************
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Sub-Basin 50

SUBBASIN RUNOFF DATA

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112 BA          SUBBASIN CHARACTERISTICS
                      TAREA        0.51  SUBBASIN AREA

113 LG          GREEN AND AMPT LOSS RATE
                     STRTL        0.19  STARTING LOSS
                       DTH        0.15  MOISTURE DEFICIT
                      PSIF        8.00  WETTING FRONT SUCTION
                     XKSAT        0.09  HYDRAULIC CONDUCTIVITY
                     RTIMP        9.00  PERCENT IMPERVIOUS AREA

111 UI          INPUT UNITGRAPH,  16 ORDINATES,  VOLUME = 1.00
                    0.0     140.0     530.0     937.0     715.0     492.0     350.0     239.0     165.0     116.0
                   79.0      51.0      40.0      19.0      19.0      19.0

                                                                    ***

     ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION       50
                      TRANSPOSITION AREA      0.0 SQ MI

    TOTAL RAINFALL =    3.18, TOTAL LOSS =    0.97, TOTAL EXCESS =    2.21

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    1188.      4.17                  120.         30.         10.          4.
                       (INCHES)      2.196       2.198       2.198       2.198
                       (AC-FT)         59.         59.         59.         59.

                      CUMULATIVE AREA =    0.51 SQ MI

     ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION       50
                      TRANSPOSITION AREA      0.5 SQ MI
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TOTAL RAINFALL = 3.16, TOTAL LOSS = 0.97, TOTAL EXCESS = 2.19

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	1180.	4.17	119.	30.	10.	4.
			(INCHES) 2.180	2.182	2.182	2.182
			(AC-FT) 59.	59.	59.	59.

CUMULATIVE AREA = 0.51 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 50

TRANSPOSITION AREA 2.8 SQ MI

TOTAL RAINFALL = 3.10, TOTAL LOSS = 1.04, TOTAL EXCESS = 2.07

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	735.	4.17	112.	28.	9.	4.
			(INCHES) 2.056	2.058	2.058	2.058
			(AC-FT) 56.	56.	56.	56.

CUMULATIVE AREA = 0.51 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 50

TRANSPOSITION AREA 16.0 SQ MI

TOTAL RAINFALL = 2.93, TOTAL LOSS = 1.11, TOTAL EXCESS = 1.82

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 568.	4.17		99.	25.	8.	4.
		(INCHES)	1.812	1.814	1.814	1.814
		(AC-FT)	49.	49.	49.	49.

CUMULATIVE AREA = 0.51 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT 50

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1176.	4.17		119.	30.	10.	4.
		(INCHES)	2.179	2.181	2.181	2.181
		(AC-FT)	59.	59.	59.	59.

CUMULATIVE AREA = 0.51 SQ MI

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              **************
              *            *
119 KK        *    CP50    *     COMBINE
              *            *
              **************
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Combine Hydrographs from Sub-Basin 50 and CP40

121 HC HYDROGRAPH COMBINATION

ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

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HYDROGRAPH AT STATION CP50

TRANSPOSITION AREA 0.0 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	4553.	4.42		868.	218.	73.	31.
			(INCHES)	2.281	2.295	2.295	2.295
			(AC-FT)	430.	433.	433.	433.

CUMULATIVE AREA = 3.54 SQ MI

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HYDROGRAPH AT STATION CP50

TRANSPOSITION AREA 0.5 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	4519.	4.42		862.	217.	72.	31.
			(INCHES)	2.265	2.278	2.278	2.278
			(AC-FT)	427.	430.	430.	430.

CUMULATIVE AREA = 3.54 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP50

TRANSPOSITION AREA 2.8 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	3564.	4.50		820.	206.	69.	30.
			(INCHES)	2.156	2.170	2.170	2.170
			(AC-FT)	407.	409.	409.	409.

CUMULATIVE AREA = 3.54 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP50

TRANSPOSITION AREA 16.0 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	2808.	4.58		725.	183.	61.	26.
			(INCHES)	1.906	1.925	1.925	1.925
			(AC-FT)	360.	363.	363.	363.

CUMULATIVE AREA = 3.54 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT CP50

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	3462.	4.50		807.	203.	68.	29.
			(INCHES)	2.122	2.137	2.137	2.137
			(AC-FT)	400.	403.	403.	403.

CUMULATIVE AREA = 3.54 SQ MI

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          *             *
122 KK    *    RTCP50   *        ROUTE
          *             *
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Routes CP50 Through Sub-Basin 60

HYDROGRAPH ROUTING DATA

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124 RS          STORAGE ROUTING
                     NSTPS           2  NUMBER OF SUBREACHES
                      ITYP        FLOW  TYPE OF INITIAL CONDITION
                     RSVRIC        0.00  INITIAL CONDITION
                         X         0.00 WORKING R AND D COEFFICIENT

125 RC          NORMAL DEPTH CHANNEL
                       ANL       0.050  LEFT OVERBANK N-VALUE
                      ANCH       0.060  MAIN CHANNEL N-VALUE
                       ANR       0.050  RIGHT OVERBANK N-VALUE
                     RLNTH        4427.  REACH LENGTH
                       SEL      0.0158  ENERGY SLOPE
                     ELMAX         0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION
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CROSS-SECTION DATA

		--- LEFT OVERBANK ---	+	------ MAIN CHANNEL -------	+	--- RIGHT OVERBANK ---		
127 RY	ELEVATION	2140.00	2134.00	2130.00	2124.00	2124.00	2128.00	2134.00	2140.00
126 RX	DISTANCE	0.00	115.00	180.00	216.00	233.00	338.00	378.00	500.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	2.62	7.56	14.82	24.41	36.28	49.46	63.55	78.83	95.77
OUTFLOW	0.00	56.02	238.31	590.50	1152.88	2005.63	3255.60	4773.09	6665.76	8898.73
ELEVATION	2124.00	2124.84	2125.68	2126.53	2127.37	2128.21	2129.05	2129.89	2130.74	2131.58
STORAGE	114.35	134.58	156.48	180.76	207.89	237.87	270.69	306.36	344.87	386.23
OUTFLOW	11489.47	14463.79	17822.28	21511.08	25756.29	30587.02	36040.82	42156.90	48974.29	56531.21
ELEVATION	2132.42	2133.26	2134.10	2134.95	2135.79	2136.63	2137.47	2138.31	2139.16	2140.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 11489. TO 56531.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP50

TRANSPOSITION AREA 0.0 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	4447.	4.58		868.	218.	73.	31.
			(INCHES)	2.280	2.295	2.295	2.295
			(AC-FT)	430.	433.	433.	433.

	PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR

+ (AC-FT)	(HR)					
30.	4.58		8.	2.	1.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2129.71	4.58	2126.07	2124.54	2124.18	2124.08

CUMULATIVE AREA = 3.54 SQ MI

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HYDROGRAPH AT STATION RTCP50

TRANSPOSITION AREA 0.5 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 4412.	4.58		861.	217.	72.	31.
		(INCHES)	2.263	2.278	2.278	2.278
		(AC-FT)	427.	430.	430.	430.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
30.	4.58	8.	2.	1.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2129.69	4.58	2126.06	2124.54	2124.18	2124.08

CUMULATIVE AREA = 3.54 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP50

TRANSPOSITION AREA 2.8 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3512.	4.67		820.	206.	69.	30.
		(INCHES)	2.154	2.170	2.170	2.170
		(AC-FT)	406.	409.	409.	409.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
26.	4.67	8.	2.	1.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2129.19	4.67	2126.12	2124.55	2124.18	2124.08

CUMULATIVE AREA = 3.54 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP50

TRANSPOSITION AREA 16.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2773.	4.67		725.	183.	61.	26.
		(INCHES)	1.904	1.925	1.925	1.925
		(AC-FT)	359.	363.	363.	363.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)					
22.	4.67		7.	2.	1.	0.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
2128.73	4.67		2126.10	2124.56	2124.19	2124.08

CUMULATIVE AREA = 3.54 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT RTCP50

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3412.	4.67		807.	203.	68.	29.
		(INCHES)	2.121	2.137	2.137	2.137
		(AC-FT)	400.	403.	403.	403.

CUMULATIVE AREA = 3.54 SQ MI

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              *            *
128 KK        *       60   *        BASIN
              *            *
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Sub-Basin 60

SUBBASIN RUNOFF DATA

130 BA SUBBASIN CHARACTERISTICS

TAREA	0.28	SUBBASIN AREA

131 LG GREEN AND AMPT LOSS RATE

STRTL	0.19	STARTING LOSS
DTH	0.15	MOISTURE DEFICIT
PSIF	9.70	WETTING FRONT SUCTION
XKSAT	0.05	HYDRAULIC CONDUCTIVITY
RTIMP	10.00	PERCENT IMPERVIOUS AREA

129 UI INPUT UNITGRAPH, 18 ORDINATES, VOLUME = 1.00

0.0	62.0	236.0	402.0	466.0	282.0	216.0	151.0	114.0	76.0
58.0	40.0	28.0	25.0	10.0	10.0	10.0	10.0		

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*** *** *** *** ***

HYDROGRAPH AT STATION 60

TRANSPOSITION AREA 0.0 SQ MI

TOTAL RAINFALL = 3.18, TOTAL LOSS = 0.84, TOTAL EXCESS = 2.34

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	641.	4.25		71.	18.	6.	3.
			(INCHES)	2.332	2.334	2.334	2.334
			(AC-FT)	35.	35.	35.	35.

CUMULATIVE AREA = 0.28 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 60

TRANSPOSITION AREA 0.5 SQ MI

TOTAL RAINFALL = 3.16, TOTAL LOSS = 0.84, TOTAL EXCESS = 2.32

+	PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW 6-HR (CFS)	24-HR	72-HR	166.58-HR
+	637.	4.25	71.	18.	6.	3.
		(INCHES)	2.315	2.317	2.317	2.317
		(AC-FT)	35.	35.	35.	35.

CUMULATIVE AREA = 0.28 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 60

TRANSPOSITION AREA 2.8 SQ MI

TOTAL RAINFALL = 3.10, TOTAL LOSS = 0.88, TOTAL EXCESS = 2.22

+	PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW 6-HR (CFS)	24-HR	72-HR	166.58-HR
+	413.	4.25	68.	17.	6.	2.
		(INCHES)	2.213	2.215	2.215	2.215
		(AC-FT)	34.	34.	34.	34.

CUMULATIVE AREA = 0.28 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 60

TRANSPOSITION AREA 16.0 SQ MI

TOTAL RAINFALL = 2.93, TOTAL LOSS = 0.94, TOTAL EXCESS = 2.00

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	323.	4.25		61.	15.	5.	2.
			(INCHES)	1.988	1.992	1.992	1.992
			(AC-FT)	30.	30.	30.	30.

CUMULATIVE AREA = 0.28 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT 60

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	637.	4.25		71.	18.	6.	3.
			(INCHES)	2.316	2.318	2.318	2.318
			(AC-FT)	35.	35.	35.	35.

CUMULATIVE AREA = 0.28 SQ MI

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          *            *
137 KK    *     CP60   *     COMBINE
          *            *
          **************

                        Combines Hydrographs from Sub-Basin 60 and Routed Flow from CP50

139 HC          HYDROGRAPH COMBINATION
                     ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***

     ***             ***             ***             ***             ***

                       HYDROGRAPH AT STATION     CP60
                      TRANSPOSITION AREA      0.0 SQ MI

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    4749.      4.50                  938.        236.         79.          34.
                       (INCHES)      2.282       2.298       2.298        2.298
                       (AC-FT)       465.        468.        468.         468.

                       CUMULATIVE AREA =    3.82 SQ MI

     ***             ***             ***             ***             ***

                       HYDROGRAPH AT STATION     CP60
                      TRANSPOSITION AREA      0.5 SQ MI

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    4713.      4.50                  931.        234.         78.          34.
```

	(INCHES)	2.265	2.281	2.281	2.281
	(AC-FT)	462.	465.	465.	465.

CUMULATIVE AREA = 3.82 SQ MI

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HYDROGRAPH AT STATION CP60

TRANSPOSITION AREA 2.8 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
	(CFS)				
+ 3752.	4.58	887.	223.	74.	32.
	(INCHES)	2.157	2.173	2.173	2.173
	(AC-FT)	440.	443.	443.	443.

CUMULATIVE AREA = 3.82 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP60

TRANSPOSITION AREA 16.0 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
	(CFS)				
+ 2971.	4.67	784.	198.	66.	29.
	(INCHES)	1.908	1.930	1.930	1.930
	(AC-FT)	389.	393.	393.	393.

CUMULATIVE AREA = 3.82 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT CP60

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	3609.	4.58		868.	219.	73.	32.
			(INCHES)	2.112	2.130	2.130	2.130
			(AC-FT)	431.	434.	434.	434.

CUMULATIVE AREA = 3.82 SQ MI

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              **************
              *            *
140 KK        *        70  *        BASIN
              *            *
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Sub-Basin 70

SUBBASIN RUNOFF DATA

142 BA	SUBBASIN CHARACTERISTICS		
	TAREA	0.38	SUBBASIN AREA
143 LG	GREEN AND AMPT LOSS RATE		
	STRTL	0.10	STARTING LOSS
	DTH	0.15	MOISTURE DEFICIT
	PSIF	7.30	WETTING FRONT SUCTION
	XKSAT	0.13	HYDRAULIC CONDUCTIVITY

RTIMP 17.00 PERCENT IMPERVIOUS AREA

141 UI INPUT UNITGRAPH, 17 ORDINATES, VOLUME = 1.00

0.0 97.0 368.0 642.0 574.0 373.0 273.0 184.0 137.0 88.0

64.0 44.0 35.0 16.0 14.0 14.0 14.0

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*** *** *** *** ***

HYDROGRAPH AT STATION 70

TRANSPOSITION AREA 0.0 SQ MI

TOTAL RAINFALL = 3.18, TOTAL LOSS = 0.93, TOTAL EXCESS = 2.25

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	866.	4.17	92.	23.	8.	3.
		(INCHES)	2.243	2.247	2.247	2.247
		(AC-FT)	45.	46.	46.	46.

CUMULATIVE AREA = 0.38 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 70

TRANSPOSITION AREA 0.5 SQ MI

TOTAL RAINFALL = 3.16, TOTAL LOSS = 0.93, TOTAL EXCESS = 2.23

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	861.	4.17	91.	23.	8.	3.

(INCHES)	2.227	2.230	2.230	2.230
(AC-FT)	45.	45.	45.	45.

CUMULATIVE AREA = 0.38 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 70

TRANSPOSITION AREA 2.8 SQ MI

TOTAL RAINFALL = 3.10, TOTAL LOSS = 1.01, TOTAL EXCESS = 2.09

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	539.	4.17	85.	21.	7.	3.
		(INCHES)	2.081	2.085	2.085	2.085
		(AC-FT)	42.	42.	42.	42.

CUMULATIVE AREA = 0.38 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 70

TRANSPOSITION AREA 16.0 SQ MI

TOTAL RAINFALL = 2.93, TOTAL LOSS = 1.10, TOTAL EXCESS = 1.83

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	415.	4.17	75.	19.	6.	3.
		(INCHES)	1.824	1.828	1.828	1.828
		(AC-FT)	37.	37.	37.	37.

CUMULATIVE AREA = 0.38 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT 70

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
		(CFS)				
+	861.	4.17	91.	23.	8.	3.
		(INCHES)	2.228	2.231	2.231	2.231
		(AC-FT)	45.	45.	45.	45.

CUMULATIVE AREA = 0.38 SQ MI

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* *
149 KK * CP70 * COMBINE
* *
****

Combines Sub-Basins 70 with CP60

151 HC HYDROGRAPH COMBINATION

ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

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*** *** *** *** ***

HYDROGRAPH AT STATION CP70

TRANSPOSITION AREA 0.0 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	5149.	4.50		1028.	259.	86.	37.
			(INCHES)	2.275	2.293	2.293	2.293
			(AC-FT)	510.	514.	514.	514.

CUMULATIVE AREA = 4.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP70

TRANSPOSITION AREA 0.5 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	5109.	4.50		1021.	257.	86.	37.
			(INCHES)	2.258	2.276	2.276	2.276
			(AC-FT)	506.	510.	510.	510.

CUMULATIVE AREA = 4.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP70

TRANSPOSITION AREA 2.8 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR

+	(CFS)	(HR)					
			(CFS)				
+	4075.	4.58		970.	245.	82.	35.
			(INCHES)	2.146	2.165	2.165	2.165
			(AC-FT)	481.	485.	485.	485.

CUMULATIVE AREA = 4.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP70

TRANSPOSITION AREA 16.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3224.	4.58		857.	217.	72.	31.
		(INCHES)	1.895	1.921	1.921	1.921
		(AC-FT)	425.	430.	430.	430.

CUMULATIVE AREA = 4.20 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT CP70

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3877.	4.58		944.	238.	79.	34.
		(INCHES)	2.088	2.108	2.108	2.108
		(AC-FT)	468.	472.	472.	472.

CUMULATIVE AREA = 4.20 SQ MI

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* *
152 KK * RTCP70 * ROUTE
* *
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Routes CP70 Through Sub-Basin 80

HYDROGRAPH ROUTING DATA

154 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	0.00	INITIAL CONDITION
X	0.00	WORKING R AND D COEFFICIENT

155 RC NORMAL DEPTH CHANNEL

ANL	0.050	LEFT OVERBANK N-VALUE
ANCH	0.060	MAIN CHANNEL N-VALUE
ANR	0.050	RIGHT OVERBANK N-VALUE
RLNTH	3365.	REACH LENGTH
SEL	0.0155	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL -------		+ --- RIGHT OVERBANK ---		
157 RY	ELEVATION	2080.00	2070.00	2066.00	2062.00	2062.00	2072.00	2076.00	2080.00
156 RX	DISTANCE	0.00	70.00	188.00	209.00	223.00	271.00	326.00	370.00

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COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	1.37	3.44	6.21	9.67	14.34	21.34	30.72	42.48	56.38
OUTFLOW	0.00	45.34	166.91	376.30	687.98	1165.28	1874.49	2891.53	4286.58	6210.01
ELEVATION	2062.00	2062.95	2063.89	2064.84	2065.79	2066.74	2067.68	2068.63	2069.58	2070.53
STORAGE	71.24	86.99	104.08	122.61	142.58	163.98	186.68	210.63	235.84	262.28
OUTFLOW	8647.96	11611.84	15154.87	19193.61	23756.48	28873.92	34575.42	40860.63	47747.00	55252.24
ELEVATION	2071.47	2072.42	2073.37	2074.31	2075.26	2076.21	2077.16	2078.10	2079.05	2080.00

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HYDROGRAPH AT STATION RTCP70

TRANSPOSITION AREA 0.0 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
	(CFS)				
+ 4996.	4.58	1028.	259.	86.	37.
	(INCHES)	2.274	2.293	2.293	2.293
	(AC-FT)	510.	514.	514.	514.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
48.	4.58	12.	3.	1.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2069.93	4.58	2065.13	2062.83	2062.28	2062.12

CUMULATIVE AREA = 4.20 SQ MI

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HYDROGRAPH AT STATION RTCP70

TRANSPOSITION AREA 0.5 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 4956.	4.58		1020.	257.	86.	37.
		(INCHES)	2.257	2.276	2.276	2.276
		(AC-FT)	506.	510.	510.	510.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
47.	4.58	12.	3.	1.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2069.91	4.58	2065.12	2062.82	2062.27	2062.12

CUMULATIVE AREA = 4.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP70

TRANSPOSITION AREA 2.8 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3980.	4.67		969.	245.	82.	35.
		(INCHES)	2.145	2.165	2.165	2.165
		(AC-FT)	481.	485.	485.	485.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
40.	4.67	11.	3.	1.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2069.37	4.67	2065.21	2062.85	2062.28	2062.12

CUMULATIVE AREA = 4.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP70

TRANSPOSITION AREA 16.0 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
	(CFS)				
+ 3158.	4.75	856.	217.	72.	31.
	(INCHES)	1.894	1.921	1.921	1.921
	(AC-FT)	425.	430.	430.	430.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
33.	4.75	10.	3.	1.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2068.81	4.75	2065.18	2062.86	2062.29	2062.12

CUMULATIVE AREA = 4.20 SQ MI

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INTERPOLATED HYDROGRAPH AT RTCP70

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3786.	4.67		943.	238.	79.	34.
		(INCHES)	2.087	2.108	2.108	2.108
		(AC-FT)	468.	472.	472.	472.

CUMULATIVE AREA = 4.20 SQ MI

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          *            *
158 KK    *      80    *      BASIN
          *            *
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Sub-Basin 80

SUBBASIN RUNOFF DATA

160 BA SUBBASIN CHARACTERISTICS

TAREA 0.53 SUBBASIN AREA

161 LG GREEN AND AMPT LOSS RATE

STRTL 0.12 STARTING LOSS

DTH 0.15 MOISTURE DEFICIT

PSIF 7.30 WETTING FRONT SUCTION

XKSAT 0.12 HYDRAULIC CONDUCTIVITY

RTIMP 15.00 PERCENT IMPERVIOUS AREA

159 UI INPUT UNITGRAPH, 21 ORDINATES, VOLUME = 1.00

0.0 80.0 306.0 548.0 819.0 568.0 427.0 340.0 250.0 191.0

148.0 103.0 83.0 61.0 43.0 39.0 21.0 15.0 15.0 15.0

15.0

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HYDROGRAPH AT STATION 80

TRANSPOSITION AREA 0.0 SQ MI

TOTAL RAINFALL = 3.18, TOTAL LOSS = 0.94, TOTAL EXCESS = 2.24

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
		(CFS)				
+	1081.	4.25	127.	32.	11.	5.
		(INCHES)	2.234	2.238	2.238	2.238
		(AC-FT)	63.	63.	63.	63.

CUMULATIVE AREA = 0.53 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 80

TRANSPOSITION AREA 0.5 SQ MI

TOTAL RAINFALL = 3.16, TOTAL LOSS = 0.94, TOTAL EXCESS = 2.23

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				

			(CFS)			
+	1074.	4.25		126.	32.	11.	5.
			(INCHES)	2.218	2.221	2.221	2.221
			(AC-FT)	63.	63.	63.	63.

CUMULATIVE AREA = 0.53 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 80

TRANSPOSITION AREA 2.8 SQ MI

TOTAL RAINFALL = 3.10, TOTAL LOSS = 1.01, TOTAL EXCESS = 2.09

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	700.	4.25		118.	30.	10.	4.
			(INCHES)	2.077	2.082	2.082	2.082
			(AC-FT)	59.	59.	59.	59.

CUMULATIVE AREA = 0.53 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 80

TRANSPOSITION AREA 16.0 SQ MI

TOTAL RAINFALL = 2.93, TOTAL LOSS = 1.10, TOTAL EXCESS = 1.83

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	543.	4.25		104.	26.	9.	4.

	(INCHES)	1.823	1.828	1.828	1.828
	(AC-FT)	51.	52.	52.	52.

CUMULATIVE AREA = 0.53 SQ MI

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INTERPOLATED HYDROGRAPH AT 80

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
		(CFS)			
+ 1062.	4.25	126.	32.	11.	5.
	(INCHES)	2.213	2.217	2.217	2.217
	(AC-FT)	62.	63.	63.	63.

CUMULATIVE AREA = 0.53 SQ MI

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          *            *
167 KK    *      CP80  *      COMBINE
          *            *
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Combines Sub-Basin 80 and CP70

169 HC HYDROGRAPH COMBINATION

ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

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*** *** *** *** ***

HYDROGRAPH AT STATION CP80

TRANSPOSITION AREA 0.0 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	5525.	4.50	1153.	291.	97.	42.
			(INCHES) 2.266	2.287	2.287	2.287
			(AC-FT) 572.	577.	577.	577.

CUMULATIVE AREA = 4.73 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP80

TRANSPOSITION AREA 0.5 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	5480.	4.50	1144.	289.	96.	42.
			(INCHES) 2.249	2.270	2.270	2.270
			(AC-FT) 567.	573.	573.	573.

CUMULATIVE AREA = 4.73 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP80

TRANSPOSITION AREA 2.8 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	4420.	4.58		1086.	274.	91.	40.
			(INCHES)	2.133	2.156	2.156	2.156
			(AC-FT)	538.	544.	544.	544.

CUMULATIVE AREA = 4.73 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP80

TRANSPOSITION AREA 16.0 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	3514.	4.67		957.	243.	81.	35.
			(INCHES)	1.881	1.910	1.910	1.910
			(AC-FT)	475.	482.	482.	482.

CUMULATIVE AREA = 4.73 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT CP80

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	4140.	4.67		1047.	265.	88.	38.
			(INCHES)	2.057	2.082	2.082	2.082

(AC-FT) 519. 525. 525. 525.

CUMULATIVE AREA = 4.73 SQ MI

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          *            *
170 KK    *    RTCP80  *        ROUTE
          *            *
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Routes CP80 Through Sub-Basin 90

HYDROGRAPH ROUTING DATA

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172 RS          STORAGE ROUTING
                     NSTPS           3  NUMBER OF SUBREACHES
                      ITYP        FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC        0.00  INITIAL CONDITION
                         X        0.00 WORKING R AND D COEFFICIENT

173 RC          NORMAL DEPTH CHANNEL
                       ANL       0.055  LEFT OVERBANK N-VALUE
                      ANCH       0.060  MAIN CHANNEL N-VALUE
                       ANR       0.055  RIGHT OVERBANK N-VALUE
                     RLNTH        9218.  REACH LENGTH
                       SEL      0.0117  ENERGY SLOPE
                     ELMAX         0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION
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CROSS-SECTION DATA

		--- LEFT OVERBANK ---			+ ------ MAIN CHANNEL -------			+ --- RIGHT OVERBANK ---	
175 RY	ELEVATION	1980.00	1970.00	1962.00	1960.00	1960.00	1964.00	1968.00	1980.00
174 RX	DISTANCE	0.00	72.00	105.00	126.00	232.00	277.00	351.00	460.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	26.16	57.41	92.88	131.98	175.85	225.01	279.49	339.09	402.19
OUTFLOW	0.00	322.80	1077.60	2265.65	3871.12	6029.15	8666.22	11817.51	15537.86	19845.59
ELEVATION	1960.00	1961.05	1962.11	1963.16	1964.21	1965.26	1966.32	1967.37	1968.42	1969.47
STORAGE	468.47	538.48	612.31	689.96	771.42	856.70	945.80	1038.72	1135.46	1236.01
OUTFLOW	24676.11	30053.10	36019.90	42589.78	49777.35	57597.95	66067.27	75201.12	85015.42	95526.09
ELEVATION	1970.53	1971.58	1972.63	1973.68	1974.74	1975.79	1976.84	1977.89	1978.95	1980.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 66067. TO 95526.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

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HYDROGRAPH AT STATION RTCP80

TRANSPOSITION AREA 0.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 5165.	4.83		1151.	291.	97.	42.
		(INCHES)	2.263	2.287	2.287	2.287
		(AC-FT)	571.	577.	577.	577.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
53.	4.83	16.	4.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				

1964.84	4.83	1961.62	1960.42	1960.14	1960.06

CUMULATIVE AREA = 4.73 SQ MI

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HYDROGRAPH AT STATION RTCP80

TRANSPOSITION AREA 0.5 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 5121.	4.83		1143.	289.	96.	42.
		(INCHES)	2.246	2.270	2.270	2.270
		(AC-FT)	567.	573.	573.	573.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
52.	4.83	16.	4.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
1964.82	4.83	1961.62	1960.41	1960.14	1960.06

CUMULATIVE AREA = 4.73 SQ MI

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HYDROGRAPH AT STATION RTCP80

TRANSPOSITION AREA 2.8 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR

+ (CFS)	(HR)					
		(CFS)				
+ 4216.	4.92		1084.	274.	91.	40.
		(INCHES)	2.130	2.156	2.156	2.156
		(AC-FT)	537.	544.	544.	544.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
46.	4.92	16.	4.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
1964.38	4.92	1961.63	1960.42	1960.14	1960.06

CUMULATIVE AREA = 4.73 SQ MI

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HYDROGRAPH AT STATION RTCP80

TRANSPOSITION AREA 16.0 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
		(CFS)			
+ 3343.	5.00	955.	243.	81.	35.
	(INCHES)	1.877	1.910	1.910	1.910
	(AC-FT)	474.	482.	482.	482.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
40.	5.00	15.	4.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE

			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
1963.86	5.00		1961.55	1960.40	1960.13	1960.06

CUMULATIVE AREA = 4.73 SQ MI

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INTERPOLATED HYDROGRAPH AT RTCP80

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3944.	4.92		1045.	265.	88.	38.
		(INCHES)	2.054	2.082	2.082	2.082
		(AC-FT)	518.	525.	525.	525.

CUMULATIVE AREA = 4.73 SQ MI

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          *            *
176 KK    *     90     *      BASIN
          *            *
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Sub-Basin 90

SUBBASIN RUNOFF DATA

178 BA SUBBASIN CHARACTERISTICS

TAREA 0.44 SUBBASIN AREA

179 LG GREEN AND AMPT LOSS RATE

STRTL 0.16 STARTING LOSS

DTH 0.23 MOISTURE DEFICIT

PSIF 6.20 WETTING FRONT SUCTION

XKSAT 0.19 HYDRAULIC CONDUCTIVITY

RTIMP 6.00 PERCENT IMPERVIOUS AREA

177 UI INPUT UNITGRAPH, 25 ORDINATES, VOLUME = 1.00

0.0	57.0	165.0	336.0	456.0	598.0	370.0	301.0	248.0	196.0
146.0	125.0	93.0	70.0	60.0	44.0	35.0	28.0	26.0	11.0
11.0	11.0	11.0	11.0	11.0					

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HYDROGRAPH AT STATION 90

TRANSPOSITION AREA 0.0 SQ MI

TOTAL RAINFALL = 3.18, TOTAL LOSS = 1.29, TOTAL EXCESS = 1.89

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	746.	4.33		90.	22.	7.	3.
			(INCHES)	1.889	1.890	1.890	1.890
			(AC-FT)	45.	45.	45.	45.

CUMULATIVE AREA = 0.44 SQ MI

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HYDROGRAPH AT STATION 90

TRANSPOSITION AREA 0.5 SQ MI

TOTAL RAINFALL = 3.16, TOTAL LOSS = 1.29, TOTAL EXCESS = 1.88

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
	(CFS)				
+ 740.	4.33	89.	22.	7.	3.
	(INCHES)	1.873	1.874	1.874	1.874
	(AC-FT)	44.	44.	44.	44.

CUMULATIVE AREA = 0.44 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 90

TRANSPOSITION AREA 2.8 SQ MI

TOTAL RAINFALL = 3.10, TOTAL LOSS = 1.44, TOTAL EXCESS = 1.66

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
	(CFS)				
+ 486.	4.33	79.	20.	7.	3.
	(INCHES)	1.654	1.656	1.656	1.656
	(AC-FT)	39.	39.	39.	39.

CUMULATIVE AREA = 0.44 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 90

TRANSPOSITION AREA 16.0 SQ MI

TOTAL RAINFALL = 2.93, TOTAL LOSS = 1.57, TOTAL EXCESS = 1.36

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
		(CFS)				
+	368.	4.33	65.	16.	5.	2.
		(INCHES)	1.358	1.361	1.361	1.361
		(AC-FT)	32.	32.	32.	32.

CUMULATIVE AREA = 0.44 SQ MI

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INTERPOLATED HYDROGRAPH AT 90

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
		(CFS)				
+	741.	4.33	89.	22.	7.	3.
		(INCHES)	1.873	1.874	1.874	1.874
		(AC-FT)	44.	44.	44.	44.

CUMULATIVE AREA = 0.44 SQ MI

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          ***************
          *             *
185 KK    *      CP90   *      COMBINE
          *             *
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Combines Hydrographs from Sub-Basin 90 and CP80

187 HC HYDROGRAPH COMBINATION

ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

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*** *** *** *** ***

HYDROGRAPH AT STATION CP90

TRANSPOSITION AREA 0.0 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
		(CFS)				
+	5382.	4.83	1240.	313.	104.	45.
		(INCHES)	2.228	2.253	2.253	2.253
		(AC-FT)	615.	622.	622.	622.

CUMULATIVE AREA = 5.17 SQ MI

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HYDROGRAPH AT STATION CP90

TRANSPOSITION AREA 0.5 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
		(CFS)				
+	5336.	4.83	1231.	311.	104.	45.
		(INCHES)	2.212	2.236	2.236	2.236
		(AC-FT)	610.	617.	617.	617.

CUMULATIVE AREA = 5.17 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP90

TRANSPOSITION AREA 2.8 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	4408.	4.92	1161.	294.	98.	42.
			(INCHES) 2.086	2.113	2.113	2.113
			(AC-FT) 576.	583.	583.	583.

CUMULATIVE AREA = 5.17 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP90

TRANSPOSITION AREA 16.0 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	3482.	4.92	1018.	259.	86.	37.
			(INCHES) 1.830	1.863	1.863	1.863
			(AC-FT) 505.	514.	514.	514.

CUMULATIVE AREA = 5.17 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT CP90

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	4082.	4.92		1110.	282.	94.	41.
			(INCHES)	1.996	2.025	2.025	2.025
			(AC-FT)	551.	559.	559.	559.

CUMULATIVE AREA = 5.17 SQ MI

1

RUNOFF SUMMARY

FLOW IN CUBIC FEET PER SECOND

TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+					6-HOUR	24-HOUR	72-HOUR			
	HYDROGRAPH AT									
+		10	1523.	4.25	211.	53.	18.	0.86		
	ROUTED TO									
+		RT10	1261.	4.67	210.	53.	18.	0.86		
	HYDROGRAPH AT									
+		20	1468.	4.33	216.	54.	18.	0.85		
	2 COMBINED AT									
+		CP20	1996.	4.58	419.	105.	35.	1.70		
	HYDROGRAPH AT									
+		30	1093.	4.33	160.	40.	13.	0.66		
	2 COMBINED AT									
+		CP30	2622.	4.50	570.	143.	48.	2.36		
	ROUTED TO									

+	RTCP30	2591.	4.58	570.	143.	48.	2.36
HYDROGRAPH AT							
+	40	1338.	4.25	152.	38.	13.	0.67
2 COMBINED AT							
+	CP40	3134.	4.50	706.	177.	59.	3.03
ROUTED TO							
+	RTCP40	3082.	4.58	705.	177.	59.	3.03
HYDROGRAPH AT							
+	50	1176.	4.17	119.	30.	10.	0.51
2 COMBINED AT							
+	CP50	3462.	4.50	807.	203.	68.	3.54
ROUTED TO							
+	RTCP50	3412.	4.67	807.	203.	68.	3.54
HYDROGRAPH AT							
+	60	637.	4.25	71.	18.	6.	0.28
2 COMBINED AT							
+	CP60	3609.	4.58	868.	219.	73.	3.82
HYDROGRAPH AT							
+	70	861.	4.17	91.	23.	8.	0.38
2 COMBINED AT							
+	CP70	3877.	4.58	944.	238.	79.	4.20
ROUTED TO							
+	RTCP70	3786.	4.67	943.	238.	79.	4.20
HYDROGRAPH AT							
+	80	1062.	4.25	126.	32.	11.	0.53

	2 COMBINED AT						
+	CP80	4140.	4.67	1047.	265.	88.	4.73
	ROUTED TO						
+	RTCP80	3944.	4.92	1045.	265.	88.	4.73
	HYDROGRAPH AT						
+	90	741.	4.33	89.	22.	7.	0.44
	2 COMBINED AT						
+	CP90	4082.	4.92	1110.	282.	94.	5.17

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

Area ID	Sub Basin Parameters								Rainfall Losses				
	Area (sq mi)	Length (mi)	Slope (ft/mi)	S-Graph	Lca (mi)	Lag (min)	Velocity (f/s)	Kn	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)
Major Basin ID: 01													
10	0.855	1.64	823.5	MOUNTAIN	0.99	24.20	5.96	0.050	0.10	0.15	8.80	0.07	14
20	0.849	1.89	226.3	MOUNTAIN	0.58	26.60	6.25	0.050	0.10	0.13	10.10	0.04	5
30	0.657	2.02	469.0	MOUNTAIN	1.06	29.90	5.94	0.050	0.10	0.15	8.80	0.07	10
40	0.670	1.39	300.4	MOUNTAIN	0.42	19.80	6.15	0.050	0.10	0.15	7.30	0.13	9
50	0.507	1.45	344.6	MOUNTAIN	0.49	17.10	7.45	0.041	0.19	0.15	8.00	0.09	9
60	0.284	1.15	165.8	MOUNTAIN	0.57	19.00	5.30	0.041	0.19	0.15	9.70	0.05	10
70	0.380	1.29	883.1	MOUNTAIN	0.57	17.70	6.44	0.050	0.10	0.15	7.30	0.13	17
80	0.529	1.43	139.5	MOUNTAIN	0.42	22.30	5.66	0.048	0.12	0.15	7.30	0.12	15
90	0.442	1.87	343.5	MOUNTAIN	0.97	26.20	6.27	0.044	0.16	0.23	6.20	0.19	6

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)
Major Basin ID: 01								
10	645	26	64526	0.211	24.60	0.01	-	100
	645	72	64572	0.645	75.40	0.09	30.00	60
20	645	26	64526	0.398	46.80	0.01	-	100
	645	66	64566	0.027	3.20	0.23	-	100
	645	72	64572	0.220	25.90	0.09	30.00	60
	645	95	64595	0.182	21.40	0.04	-	100
	645	96	64596	0.023	2.70	0.07	-	100
30	645	26	64526	0.210	32.00	0.01	-	100
	645	66	64566	0.068	10.30	0.23	-	100
	645	72	64572	0.377	57.40	0.09	30.00	60
	645	96	64596	0.002	0.30	0.07	-	100
40	645	26	64526	0.078	11.60	0.01	-	100
	645	66	64566	0.213	31.80	0.23	-	100
	645	72	64572	0.339	50.60	0.09	30.00	60
	645	95	64595	0.032	4.80	0.04	-	100
	645	96	64596	0.008	1.10	0.07	-	100
50	645	26	64526	0.085	16.80	0.01	-	100
	645	66	64566	0.141	27.80	0.23	-	100
	645	72	64572	0.198	39.10	0.09	30.00	60
	645	95	64595	0.083	16.30	0.04	-	100
60	645	26	64526	0.084	29.40	0.01	-	100
	645	72	64572	0.130	45.60	0.09	30.00	60
	645	93	64593	0.007	2.40	0.33	-	100
	645	95	64595	0.040	14.00	0.04	-	100
	645	96	64596	0.025	8.60	0.07	-	100
70	645	72	64572	0.363	95.50	0.09	30.00	60
	645	96	64596	0.017	4.50	0.07	-	100
80	645	26	64526	0.016	3.00	0.01	-	100
	645	66	64566	0.008	1.60	0.23	-	100
	645	72	64572	0.437	82.60	0.09	30.00	60
	645	93	64593	0.008	1.60	0.33	-	100
	645	95	64595	0.013	2.40	0.04	-	100
	645	96	64596	0.039	7.30	0.07	-	100
	645	98	64598	0.008	1.60	0.37	-	100
90	645	3	6453	0.000	0.10	0.58	-	100
	645	12	64512	0.009	2.00	0.01	-	100
	645	44	64544	0.045	10.20	0.03	-	100
	645	52	64552	0.026	5.90	0.16	20.00	60
	645	68	64568	0.000	0.00	0.63	-	100
	645	72	64572	0.104	23.50	0.09	30.00	60
	645	98	64598	0.133	30.10	0.37	-	100
	645	110	645110	0.125	28.20	0.13	-	100

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kn
Major Basin ID: 01								
10	730	0.855	100.0	0.10	0	45.0 *	NORMAL	0.050
		0.855	**100.0**					
20	730	0.850	100.0	0.10	0	45.0 *	NORMAL	0.050
		0.850	**100.0**					
30	730	0.657	100.0	0.10	0	45.0 *	NORMAL	0.050
		0.657	**100.0**					
40	120	0.000		0.30	5	30.0	NORMAL	0.030 *
	730	0.670	100.0	0.10	0	45.0 *	NORMAL	0.050
		0.670	**100.0**					
50	120	0.225	44.3	0.30	5	30.0	NORMAL	0.030 *
	730	0.282	55.7	0.10	0	45.0 *	NORMAL	0.050
		0.507	**100.0**					
60	120	0.122	43.1	0.30	5	30.0	NORMAL	0.030 *
	730	0.162	56.9	0.10	0	45.0 *	NORMAL	0.050
		0.284	**100.0**					
70	730	0.380	100.0	0.10	0	45.0 *	NORMAL	0.050
		0.380	**100.0**					
80	120	0.054	10.3	0.30	5	30.0	NORMAL	0.030 *
	730	0.474	89.7	0.10	0	45.0 *	NORMAL	0.050
		0.529	**100.0**					
90	120	0.123	27.8	0.30	5	30.0	NORMAL	0.030 *
	730	0.319	72.2	0.10	0	45.0 *	NORMAL	0.050
		0.442	**100.0**					

ID	Method	Duration	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
DEFAULT	NOAA14	5 MIN	0.312	0.421	0.503	0.615	0.701	0.788
	NOAA14	10 MIN	0.474	0.640	0.766	0.936	1.067	1.200
	NOAA14	15 MIN	0.588	0.794	0.950	1.161	1.322	1.487
	NOAA14	30 MIN	0.792	1.069	1.279	1.563	1.781	2.003
	NOAA14	1 HOUR	0.980	1.323	1.583	1.934	2.204	2.479
	NOAA14	2 HOUR	1.135	1.507	1.797	2.189	2.491	2.804
	NOAA14	3 HOUR	1.211	1.579	1.873	2.282	2.608	2.948
	NOAA14	6 HOUR	1.406	1.784	2.087	2.508	2.838	3.181
	NOAA14	12 HOUR	1.677	2.104	2.443	2.903	3.257	3.621
	NOAA14	24 HOUR	2.003	2.588	3.058	3.719	4.253	4.815

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)
Major Basin ID: 01								
10	645	26	64526	0.211	24.60	0.01	-	100
	645	72	64572	0.645	75.40	0.09	30.00	60
20	645	26	64526	0.398	46.80	0.01	-	100
	645	66	64566	0.027	3.20	0.23	-	100
	645	72	64572	0.220	25.90	0.09	30.00	60
	645	95	64595	0.182	21.40	0.04	-	100
	645	96	64596	0.023	2.70	0.07	-	100
30	645	26	64526	0.210	32.00	0.01	-	100
	645	66	64566	0.068	10.30	0.23	-	100
	645	72	64572	0.377	57.40	0.09	30.00	60
	645	96	64596	0.002	0.30	0.07	-	100
40	645	26	64526	0.078	11.60	0.01	-	100
	645	66	64566	0.213	31.80	0.23	-	100
	645	72	64572	0.339	50.60	0.09	30.00	60
	645	95	64595	0.032	4.80	0.04	-	100
	645	96	64596	0.008	1.10	0.07	-	100
50	645	26	64526	0.085	16.80	0.01	-	100
	645	66	64566	0.141	27.80	0.23	-	100
	645	72	64572	0.198	39.10	0.09	30.00	60
	645	95	64595	0.083	16.30	0.04	-	100
60	645	26	64526	0.084	29.40	0.01	-	100
	645	72	64572	0.130	45.60	0.09	30.00	60
	645	93	64593	0.007	2.40	0.33	-	100
	645	95	64595	0.040	14.00	0.04	-	100
	645	96	64596	0.025	8.60	0.07	-	100
70	645	72	64572	0.363	95.50	0.09	30.00	60
	645	96	64596	0.017	4.50	0.07	-	100
80	645	26	64526	0.016	3.00	0.01	-	100
	645	66	64566	0.008	1.60	0.23	-	100
	645	72	64572	0.437	82.60	0.09	30.00	60
	645	93	64593	0.008	1.60	0.33	-	100
	645	95	64595	0.013	2.40	0.04	-	100
	645	96	64596	0.039	7.30	0.07	-	100
	645	98	64598	0.008	1.60	0.37	-	100
90	645	3	6453	0.000	0.10	0.58	-	100
	645	12	64512	0.009	2.00	0.01	-	100
	645	44	64544	0.045	10.20	0.03	-	100
	645	52	64552	0.026	5.90	0.16	20.00	60
	645	68	64568	0.000	0.00	0.63	-	100
	645	72	64572	0.104	23.50	0.09	30.00	60
	645	98	64598	0.133	30.10	0.37	-	100
	645	110	645110	0.125	28.20	0.13	-	100

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kn
Major Basin ID: 01								
10	730	0.855	100.0	0.10	0	45.0 *	NORMAL	0.050
		0.855	**100.0**					
20	730	0.850	100.0	0.10	0	45.0 *	NORMAL	0.050
		0.850	**100.0**					
30	730	0.657	100.0	0.10	0	45.0 *	NORMAL	0.050
		0.657	**100.0**					
40	120	0.000		0.30	5	30.0	NORMAL	0.030 *
	730	0.670	100.0	0.10	0	45.0 *	NORMAL	0.050
		0.670	**100.0**					
50	120	0.225	44.3	0.30	5	30.0	NORMAL	0.030 *
	730	0.282	55.7	0.10	0	45.0 *	NORMAL	0.050
		0.507	**100.0**					
60	120	0.122	43.1	0.30	5	30.0	NORMAL	0.030 *
	730	0.162	56.9	0.10	0	45.0 *	NORMAL	0.050
		0.284	**100.0**					
70	730	0.380	100.0	0.10	0	45.0 *	NORMAL	0.050
		0.380	**100.0**					
80	120	0.054	10.3	0.30	5	30.0	NORMAL	0.030 *
	730	0.474	89.7	0.10	0	45.0 *	NORMAL	0.050
		0.529	**100.0**					
90	120	0.123	27.8	0.30	5	30.0	NORMAL	0.030 *
	730	0.319	72.2	0.10	0	45.0 *	NORMAL	0.050
		0.442	**100.0**					

ID	Method	Duration	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
DEFAULT	NOAA14	5 MIN	0.312	0.421	0.503	0.615	0.701	0.788
	NOAA14	10 MIN	0.474	0.640	0.766	0.936	1.067	1.200
	NOAA14	15 MIN	0.588	0.794	0.950	1.161	1.322	1.487
	NOAA14	30 MIN	0.792	1.069	1.279	1.563	1.781	2.003
	NOAA14	1 HOUR	0.980	1.323	1.583	1.934	2.204	2.479
	NOAA14	2 HOUR	1.135	1.507	1.797	2.189	2.491	2.804
	NOAA14	3 HOUR	1.211	1.579	1.873	2.282	2.608	2.948
	NOAA14	6 HOUR	1.406	1.784	2.087	2.508	2.838	3.181
	NOAA14	12 HOUR	1.677	2.104	2.443	2.903	3.257	3.621
	NOAA14	24 HOUR	2.003	2.588	3.058	3.719	4.253	4.815

Major Basin	Area (sq mi)	Storm	Duration	Tab Interval	Ordinates	Output	Description
01	5.1730	Multiple	6 Hour	5	2,000	3	RODGER CREEK WATERSHED

100-Year 24-Hour

ID	Type	Area (sq mi)	Discharge cfs 2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Major Basin 01								
10	Hydrograph	0.860						1,532
RT10	Routed	0.860						1,235
20	Hydrograph	0.850						1,452
CP20	Combined	1.700						2,097
30	Hydrograph	0.660						1,038
CP30	Combined	2.360						2,948
RTCP30	Routed	2.360						2,857
40	Hydrograph	0.670						1,290
CP40	Combined	3.030						3,626
RTCP40	Routed	3.030						3,602
50	Hydrograph	0.510						1,075
CP50	Combined	3.540						4,163
RTCP50	Routed	3.540						4,048
60	Hydrograph	0.280						578
CP60	Combined	3.820						4,320
70	Hydrograph	0.380						781
CP70	Combined	4.200						4,681
RTCP70	Routed	4.200						4,523
80	Hydrograph	0.530						973
CP80	Combined	4.730						5,006
RTCP80	Routed	4.730						4,691
90	Hydrograph	0.440						683
CP90	Combined	5.170						4,904

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1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN   1998              *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   16FEB11  TIME  11:40:56   *
*                                       *
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*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*          (916) 756-1104               *
*                                       *
*****************************************
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.

THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION

NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,

DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION

KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
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1         ID      Flood Control District of Maricopa County
2         ID      RODGER CREEK 24-HR - Rodger Creek Floodplain Delineation Study
3         ID      100 YEAR
4         ID      24 Hour Storm
5         ID      Unit Hydrograph: S-Graph
6         ID      02/16/2011
7         ID
8         ID      ************************************************************************
9         ID
10        ID      Rodger Creek Floodplain Delineation Study
11        ID
12        ID      Contract FCD 2010C003
13        ID      Assignment # 2
14        ID
15        ID      Prepared by:
16        ID      Cardno WRG, Inc.
17        ID      9977 North 90th Street, Suite 350
18        ID      Scottsdale, AZ 85258
19        ID      Phone: 602-977-8000
20        ID      www.cardnowrg.com
21        ID
22        ID      Contact:
23        ID      Jack Moody, P.E.
24        ID      jack.moody@cardno.com
25        ID
26        ID      ************************************************************************
27        ID
28        IT       5       0       0    2000
29        IN      15
30        IO       3
          *DIAGRAM
          *
31        JD   4.815  0.0001
32        PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
33        PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
34        PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
35        PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
36        PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
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 37          PC  0.735  0.758  0.776  0.791  0.804  0.815  0.825  0.834  0.842  0.849
 38          PC  0.856  0.863  0.869  0.875  0.881  0.887  0.893  0.898  0.903  0.908
 39          PC  0.913  0.918  0.922  0.926  0.930  0.934  0.938  0.942  0.946  0.950
 40          PC  0.953  0.956  0.959  0.962  0.965  0.968  0.971  0.974  0.977  0.980
 41          PC  0.983  0.986  0.989  0.992  0.995  0.998  1.000
 42          JD  4.574   10.0
             *

 43          KK     10  BASIN
 44          KM        Sub-Basin 10
 45          BA  0.855
 46          LG   0.10   0.15   8.80   0.07     14
 47          UI      0    119    393    765   1070   1092    698    569    454    330
 48          UI    271    207    148    123     91     67     58     42     23     23
 49          UI     23     23     23      0      0      0      0      0      0      0
 50          UI      0      0      0      0      0      0      0      0      0      0
 51          UI      0      0      0      0      0      0      0      0      0      0
             *
```



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

 52          KK    RT10  ROUTE
 53          KM        Routes Sub-Basin 10 Through Sub-Basin 20
 54          RS       5   FLOW
 55          RC   0.055   0.075   0.055    8281  0.0244    0.00
 56          RX    0.00   83.00  163.00  180.00  254.00  343.00  425.00  486.00
 57          RY  2360.0 2356.00 2350.00 2348.00 2348.00 2350.00 2356.00 2360.00
             *

 58          KK     20  BASIN
 59          KM        Sub-Basin 20
 60          BA  0.849
 61          LG   0.10   0.13  10.10   0.04      5
 62          UI      0    107    303    626    848   1148    716    581    479    384
 63          UI    287    243    190    138    118     86     73     53     53     27
 64          UI     21     21     21     21     21      0      0      0      0      0
```

```
65          UI      0       0       0       0       0       0       0       0       0       0
66          UI      0       0       0       0       0       0       0       0       0       0
            *

67          KK    CP20 COMBINE
68          KM        Combines Routed Flow From Sub-Basin 10 with Sub-Basin 20
69          HC       2
            *

70          KK      30   BASIN
71          KM        Sub-Basin 30
72          BA   0.657
73          LG    0.10    0.15    8.80    0.07      10
74          UI       0      74     171     376     526     707     700     457     387     326
75          UI     268     205     175     144     108      89      77      57      49      36
76          UI      36      24      14      14      14      14      14      14       0       0
77          UI       0       0       0       0       0       0       0       0       0       0
78          UI       0       0       0       0       0       0       0       0       0       0
            *

79          KK    CP30 COMBINE
80          KM        Combines Hydrographs from CP20 and Sub-Basin 30
81          HC       2
            *

82          KK  RTCP30   ROUTE
83          KM        Route CP30 through Sub-Basin 40
84          RS       1    FLOW
85          RC   0.050   0.065   0.050    3127  0.0205    0.00
86          RX    0.00   73.00  156.00  184.00  200.00  233.00  297.00  324.00
87          RY  2270.0 2264.00 2258.00 2254.00 2254.00 2258.00 2266.00 2270.00
            *

88          KK      40   BASIN
89          KM        Sub-Basin 40
90          BA   0.670
91          LG    0.10    0.15    7.30    0.13       9
92          UI       0     133     510     869    1114     671     520     381     275     205
```

```
 93          UI     139     106      77      56      40      22      22      22      22       0

1                                      HEC-1 INPUT                                        PAGE  3

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

 94          UI       0       0       0       0       0       0       0       0       0       0
 95          UI       0       0       0       0       0       0       0       0       0       0
 96          UI       0       0       0       0       0       0       0       0       0       0
             *

 97          KK    CP40 COMBINE
 98          KM         Combine Hydrograph from Sub-Basin 40 and CP30
 99          HC       2
             *

100          KK  RTCP40   ROUTE
101          KM         Route CP40 Through Sub-Basin 50
102          RS       2    FLOW
103          RC   0.050   0.055   0.050    3387  0.0195    0.00
104          RX    0.00   33.00  162.00  263.00  297.00  353.00  390.00  435.00
105          RY  2200.0 2194.00 2192.00 2184.00 2184.00 2188.00 2194.00 2200.00
             *

106          KK      50   BASIN
107          KM         Sub-Basin 50
108          BA   0.507
109          LG    0.19    0.15    8.00    0.09       9
110          UI       0     140     530     937     715     492     350     239     165     116
111          UI      79      51      40      19      19      19       0       0       0       0
112          UI       0       0       0       0       0       0       0       0       0       0
113          UI       0       0       0       0       0       0       0       0       0       0
114          UI       0       0       0       0       0       0       0       0       0       0
             *

115          KK    CP50 COMBINE
116          KM         Combine Hydrographs from Sub-Basin 50 and CP40
117          HC       2
             *
```

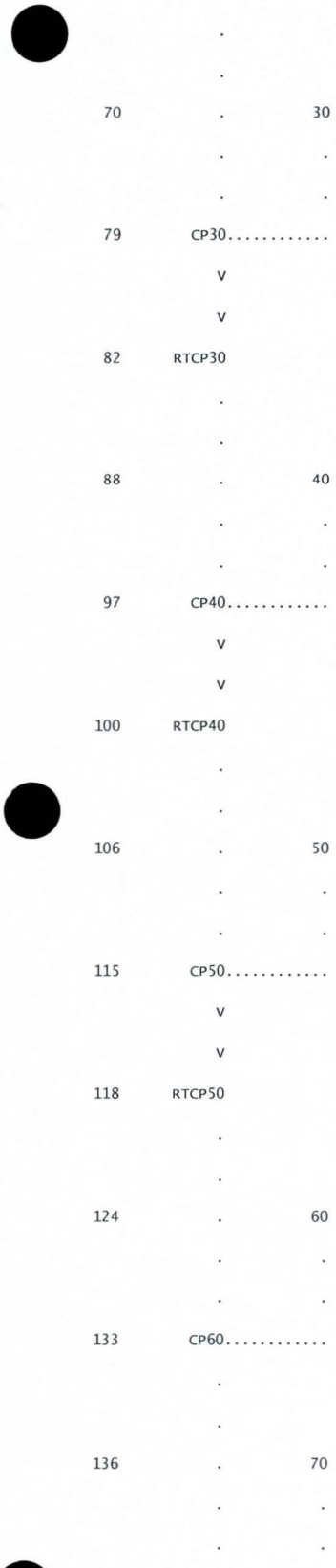
```
118          KK  RTCP50   ROUTE
119          KM        Routes CP50 Through Sub-Basin 60
120          RS       2    FLOW
121          RC   0.050   0.060   0.050    4427  0.0158    0.00
122          RX    0.00  115.00  180.00  216.00  233.00  338.00  378.00  500.00
123          RY  2140.0 2134.00 2130.00 2124.00 2124.00 2128.00 2134.00 2140.00
             *

124          KK      60   BASIN
125          KM        Sub-Basin 60
126          BA   0.284
127          LG    0.19    0.15    9.70    0.05      10
128          UI       0      62     236     402     466     282     216     151     114      76
129          UI      58      40      28      25      10      10      10      10       0       0
130          UI       0       0       0       0       0       0       0       0       0       0
131          UI       0       0       0       0       0       0       0       0       0       0
132          UI       0       0       0       0       0       0       0       0       0       0
             *
```

1 HEC-1 INPUT PAGE 4

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

133          KK    CP60 COMBINE
134          KM        Combines Hydrographs from Sub-Basin 60 and Routed Flow from CP50
135          HC       2
             *

136          KK      70   BASIN
137          KM        Sub-Basin 70
138          BA   0.380
139          LG    0.10    0.15    7.30    0.13      17
140          UI       0      97     368     642     574     373     273     184     137      88
141          UI      64      44      35      16      14      14      14       0       0       0
142          UI       0       0       0       0       0       0       0       0       0       0
143          UI       0       0       0       0       0       0       0       0       0       0
144          UI       0       0       0       0       0       0       0       0       0       0
```

```
*

KK    CP70 COMBINE
KM        Combines Sub-Basins  70 with CP60
HC       2
*

KK  RTCP70   ROUTE
KM        Routes CP70 Through Sub-Basin 80
RS       1    FLOW
RC   0.050   0.060   0.050    3365  0.0155    0.00
RX    0.00   70.00  188.00  209.00  223.00  271.00  326.00  370.00
RY  2080.0 2070.00 2066.00 2062.00 2062.00 2072.00 2076.00 2080.00
*

KK      80   BASIN
KM        Sub-Basin 80
BA   0.529
LG    0.12    0.15    7.30    0.12      15
UI       0      80     306     548     819     568     427     340     250     191
UI     148     103      83      61      43      39      21      15      15      15
UI      15       0       0       0       0       0       0       0       0       0
UI       0       0       0       0       0       0       0       0       0       0
UI       0       0       0       0       0       0       0       0       0       0
*

KK    CP80 COMBINE
KM        Combines Sub-Basin 80 and CP70
HC       2
*

KK  RTCP80   ROUTE
KM        Routes CP80 Through Sub-Basin 90
RS       3    FLOW
RC   0.055   0.060   0.055    9218  0.0117    0.00
RX    0.00   72.00  105.00  126.00  232.00  277.00  351.00  460.00
RY  1980.0 1970.00 1962.00 1960.00 1960.00 1964.00 1968.00 1980.00
*
```

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

  172         KK      90   BASIN
  173         KM        Sub-Basin 90
  174         BA   0.442
  175         LG    0.16    0.23    6.20    0.19       6
  176         UI       0      57     165     336     456     598     370     301     248     196
  177         UI     146     125      93      70      60      44      35      28      26      11
  178         UI      11      11      11      11      11       0       0       0       0       0
  179         UI       0       0       0       0       0       0       0       0       0       0
  180         UI       0       0       0       0       0       0       0       0       0       0
              *

  181         KK    CP90 COMBINE
  182         KM        Combines Hydrographs from Sub-Basin 90 and CP80
  183         HC       2
              *
  184         ZZ
1

              SCHEMATIC DIAGRAM OF STREAM NETWORK

 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    43          10
                 V
                 V
    52        RT10
                 .
                 .
    58           .          20
                 .           .
                 .           .
    67        CP20.............
```


70 30
79 CP30
82 RTCP30
88 40
97 CP40
100 RTCP40
106 50
115 CP50
118 RTCP50
124 60
133 CP60
136 70

```
145        CP70.....
               V
               V
148       RTCP70
               .
               .
154            .          80
               .           .
               .           .
163        CP80.....
               V
               V
166       RTCP80
               .
               .
172            .          90
               .           .
               .           .
181        CP90.....
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN  1998               *
*            VERSION 4.1                *
*                                       *
* RUN DATE   16FEB11  TIME  11:40:56    *
*                                       *
*****************************************
```

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

Flood Control District of Maricopa County

RODGER CREEK 24-HR - Rodger Creek Floodplain Delineation Study

100 YEAR

24 Hour Storm

Unit Hydrograph: S-Graph

02/16/2011

****

Rodger Creek Floodplain Delineation Study

Contract FCD 2010C003

Assignment # 2

Prepared by:

Cardno WRG, Inc.

9977 North 90th Street, Suite 350

Scottsdale, AZ 85258

Phone: 602-977-8000

www.cardnowrg.com

Contact:

Jack Moody, P.E.

jack.moody@cardno.com

****

30 IO OUTPUT CONTROL VARIABLES

IPRNT		3	PRINT CONTROL
IPLOT		0	PLOT CONTROL
QSCAL		0.	HYDROGRAPH PLOT SCALE

29 IN TIME DATA FOR INPUT TIME SERIES

JXMIN		15	TIME INTERVAL IN MINUTES
JXDATE	1	0	STARTING DATE
JXTIME		0	STARTING TIME

IT HYDROGRAPH TIME DATA

NMIN		5	MINUTES IN COMPUTATION INTERVAL
IDATE	1	0	STARTING DATE

ITIME		0000	STARTING TIME
NQ		2000	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	7	0	ENDING DATE
NDTIME		2235	ENDING TIME
ICENT		19	CENTURY MARK

COMPUTATION INTERVAL 0.08 HOURS

TOTAL TIME BASE 166.58 HOURS

ENGLISH UNITS

DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND
STORAGE VOLUME	ACRE-FEET
SURFACE AREA	ACRES
TEMPERATURE	DEGREES FAHRENHEIT

31 JD INDEX STORM NO. 1

STRM	4.82	PRECIPITATION DEPTH
TRDA	0.00	TRANSPOSITION DRAINAGE AREA

32 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03
0.03	0.09	0.09	0.09	0.01	0.01	0.01	0.01	0.01	0.01

0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

42 JD INDEX STORM NO. 2

STRM 4.57 PRECIPITATION DEPTH

TRDA 10.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03
0.03	0.09	0.09	0.09	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

*** ***

```
          ***************
          *             *
43 KK     *        10   *        BASIN
          *             *
          ***************

                        Sub-Basin 10


            SUBBASIN RUNOFF DATA


45 BA          SUBBASIN CHARACTERISTICS
                     TAREA         0.86  SUBBASIN AREA


46 LG          GREEN AND AMPT LOSS RATE
                     STRTL         0.10  STARTING LOSS
                       DTH         0.15  MOISTURE DEFICIT
                      PSIF         8.80  WETTING FRONT SUCTION
                     XKSAT         0.07  HYDRAULIC CONDUCTIVITY
                     RTIMP        14.00  PERCENT IMPERVIOUS AREA


44 UI          INPUT UNITGRAPH,  23 ORDINATES,  VOLUME = 1.00
                     0.0     119.0     393.0     765.0    1070.0    1092.0     698.0     569.0     454.0     330.0
```

271.0 207.0 148.0 123.0 91.0 67.0 58.0 42.0 23.0 23.0

23.0 23.0 23.0

***

*** *** *** *** ***

HYDROGRAPH AT STATION 10

TRANSPOSITION AREA 0.0 SQ MI

TOTAL RAINFALL = 4.82, TOTAL LOSS = 2.00, TOTAL EXCESS = 2.82

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1599.	12.25		241.	65.	22.	9.
		(INCHES)	2.617	2.813	2.814	2.814
		(AC-FT)	119.	128.	128.	128.

CUMULATIVE AREA = 0.86 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 10

TRANSPOSITION AREA 10.0 SQ MI

TOTAL RAINFALL = 4.57, TOTAL LOSS = 1.94, TOTAL EXCESS = 2.63

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1513.	12.25		225.	60.	20.	9.
		(INCHES)	2.444	2.630	2.631	2.631
		(AC-FT)	111.	120.	120.	120.

CUMULATIVE AREA = 0.86 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT 10

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1532.	12.25		228.	61.	20.	9.
		(INCHES)	2.481	2.669	2.670	2.670
		(AC-FT)	113.	122.	122.	122.

CUMULATIVE AREA = 0.86 SQ MI

*** ***

```
          **************
          *            *
52 KK     *    RT10    *        ROUTE
          *            *
          **************
```

Routes Sub-Basin 10 Through Sub-Basin 20

HYDROGRAPH ROUTING DATA

54 RS STORAGE ROUTING

NSTPS	5	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	0.00	INITIAL CONDITION
X	0.00	WORKING R AND D COEFFICIENT

55 RC NORMAL DEPTH CHANNEL

ANL	0.055	LEFT OVERBANK N-VALUE
ANCH	0.075	MAIN CHANNEL N-VALUE
ANR	0.055	RIGHT OVERBANK N-VALUE
RLNTH	8281.	REACH LENGTH
SEL	0.0244	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL -------			+ --- RIGHT OVERBANK ---		
57 RY	ELEVATION	2360.00	2356.00	2350.00	2348.00	2348.00	2350.00	2356.00	2360.00
56 RX	DISTANCE	0.00	83.00	163.00	180.00	254.00	343.00	425.00	486.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	10.89	25.81	44.74	67.01	91.35	117.74	146.18	176.67	209.20
OUTFLOW	0.00	116.91	410.72	891.38	1687.60	2743.58	4050.49	5619.21	7460.91	9586.93
ELEVATION	2348.00	2348.63	2349.26	2349.89	2350.53	2351.16	2351.79	2352.42	2353.05	2353.68
STORAGE	243.78	280.41	319.08	359.84	403.18	449.25	498.05	549.58	603.84	660.83
OUTFLOW	12008.68	14737.57	17784.94	21130.37	24771.96	28796.68	33220.31	38058.83	43328.19	49044.48
ELEVATION	2354.32	2354.95	2355.58	2356.21	2356.84	2357.47	2358.11	2358.74	2359.37	2360.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 5619. TO 49044.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** *** *** *** ***

HYDROGRAPH AT STATION RT10

TRANSPOSITION AREA 0.0 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR

+ (CFS)	(HR)					
		(CFS)				
+ 1296.	12.67		240.	65.	22.	9.
		(INCHES)	2.614	2.811	2.814	2.814
		(AC-FT)	119.	128.	128.	128.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
11.	12.67	3.	1.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2350.22	12.67	2348.67	2348.19	2348.06	2348.03

CUMULATIVE AREA = 0.86 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RT10

TRANSPOSITION AREA 10.0 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
		(CFS)			
+ 1218.	12.67	225.	60.	20.	9.
		(INCHES)	2.442	2.628	2.631	2.631
		(AC-FT)	111.	120.	120.	120.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
11.	12.67	3.	1.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE

			6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)					
2350.15	12.67		2348.64	2348.18	2348.06	2348.03

CUMULATIVE AREA = 0.86 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT RT10

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1235.	12.67		228.	61.	20.	9.
		(INCHES)	2.478	2.667	2.670	2.670
		(AC-FT)	113.	122.	122.	122.

CUMULATIVE AREA = 0.86 SQ MI

*** ***

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           **************
           *            *
58 KK      *      20    *     BASIN
           *            *
           **************
                         Sub-Basin 20
```

SUBBASIN RUNOFF DATA

60 BA SUBBASIN CHARACTERISTICS

TAREA 0.85 SUBBASIN AREA

61 LG GREEN AND AMPT LOSS RATE

STRTL 0.10 STARTING LOSS

DTH 0.13 MOISTURE DEFICIT

PSIF 10.10 WETTING FRONT SUCTION

XKSAT 0.04 HYDRAULIC CONDUCTIVITY

RTIMP 5.00 PERCENT IMPERVIOUS AREA

59 UI INPUT UNITGRAPH, 25 ORDINATES, VOLUME = 1.00

0.0	107.0	303.0	626.0	848.0	1148.0	716.0	581.0	479.0	384.0
287.0	243.0	190.0	138.0	118.0	86.0	73.0	53.0	53.0	27.0
21.0	21.0	21.0	21.0	21.0					

***

*** *** *** *** ***

HYDROGRAPH AT STATION 20

TRANSPOSITION AREA 0.0 SQ MI

TOTAL RAINFALL = 4.82, TOTAL LOSS = 1.82, TOTAL EXCESS = 3.00

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
		(CFS)				
+	1514.	12.33	260.	68.	23.	10.
		(INCHES)	2.845	2.994	2.995	2.995
		(AC-FT)	129.	136.	136.	136.

CUMULATIVE AREA = 0.85 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 20

TRANSPOSITION AREA 10.0 SQ MI

TOTAL RAINFALL = 4.57, TOTAL LOSS = 1.78, TOTAL EXCESS = 2.79

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1435.	12.33		243.	64.	21.	9.
		(INCHES)	2.666	2.788	2.788	2.788
		(AC-FT)	121.	126.	126.	126.

CUMULATIVE AREA = 0.85 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT 20

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1452.	12.33		247.	65.	22.	9.
		(INCHES)	2.704	2.832	2.832	2.832
		(AC-FT)	122.	128.	128.	128.

CUMULATIVE AREA = 0.85 SQ MI

*** ***

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              **************
              *            *
 67 KK        *    CP20    *     COMBINE
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*           *
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Combines Routed Flow From Sub-Basin 10 with Sub-Basin 20

```
 69 HC          HYDROGRAPH COMBINATION
                      ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                    ***

      ***            ***            ***            ***            ***
```

HYDROGRAPH AT STATION CP20

TRANSPOSITION AREA 0.0 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	2216.	12.58	499.	133.	44.	19.
		(INCHES)	2.724	2.901	2.904	2.904
		(AC-FT)	248.	264.	264.	264.

CUMULATIVE AREA = 1.70 SQ MI

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      ***            ***            ***            ***            ***
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HYDROGRAPH AT STATION CP20

TRANSPOSITION AREA 10.0 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	2075.	12.58	467.	124.	41.	18.
		(INCHES)	2.550	2.707	2.709	2.709
		(AC-FT)	232.	246.	246.	246.

CUMULATIVE AREA = 1.70 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT CP20

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2097.	12.58		472.	125.	42.	18.
		(INCHES)	2.577	2.737	2.739	2.739
		(AC-FT)	234.	249.	249.	249.

CUMULATIVE AREA = 1.70 SQ MI

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              **************
              *            *
  70 KK       *      30    *      BASIN
              *            *
              **************
```

Sub-Basin 30

SUBBASIN RUNOFF DATA

72 BA SUBBASIN CHARACTERISTICS

TAREA 0.66 SUBBASIN AREA

73 LG GREEN AND AMPT LOSS RATE

STRTL 0.10 STARTING LOSS

DTH 0.15 MOISTURE DEFICIT

PSIF 8.80 WETTING FRONT SUCTION

XKSAT 0.07 HYDRAULIC CONDUCTIVITY

RTIMP 10.00 PERCENT IMPERVIOUS AREA

71 UI INPUT UNITGRAPH, 28 ORDINATES, VOLUME = 1.00

0.0	74.0	171.0	376.0	526.0	707.0	700.0	457.0	387.0	326.0
268.0	205.0	175.0	144.0	108.0	89.0	77.0	57.0	49.0	36.0
36.0	24.0	14.0	14.0	14.0	14.0	14.0	14.0		

***

*** *** *** *** ***

HYDROGRAPH AT STATION 30

TRANSPOSITION AREA 0.0 SQ MI

TOTAL RAINFALL = 4.82, TOTAL LOSS = 2.09, TOTAL EXCESS = 2.73

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
		(CFS)				
+	1083.	12.33	182.	48.	16.	7.
		(INCHES)	2.577	2.718	2.719	2.719
		(AC-FT)	90.	95.	95.	95.

CUMULATIVE AREA = 0.66 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 30

TRANSPOSITION AREA 10.0 SQ MI

TOTAL RAINFALL = 4.57, TOTAL LOSS = 2.03, TOTAL EXCESS = 2.54

PEAK FLOW TIME MAXIMUM AVERAGE FLOW

			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1024.	12.33		170.	45.	15.	6.
		(INCHES)	2.405	2.538	2.539	2.539
		(AC-FT)	84.	89.	89.	89.

CUMULATIVE AREA = 0.66 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT 30

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1038.	12.33		173.	46.	15.	7.
		(INCHES)	2.446	2.580	2.581	2.581
		(AC-FT)	86.	90.	90.	90.

CUMULATIVE AREA = 0.66 SQ MI

*** ***

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* *

79 KK * CP30 * COMBINE

* *

****

Combines Hydrographs from CP20 and Sub-Basin 30

81 HC HYDROGRAPH COMBINATION

ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

***

*** *** *** *** ***

HYDROGRAPH AT STATION CP30

TRANSPOSITION AREA 0.0 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	3133.	12.42	681.	181.	60.	26.
			(INCHES) 2.683	2.850	2.853	2.853
			(AC-FT) 338.	359.	359.	359.

CUMULATIVE AREA = 2.36 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP30

TRANSPOSITION AREA 10.0 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	2922.	12.42	637.	169.	56.	24.
			(INCHES) 2.509	2.659	2.662	2.662
			(AC-FT) 316.	335.	335.	335.

CUMULATIVE AREA = 2.36 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT CP30

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	2948.	12.42		643.	170.	57.	25.
			(INCHES)	2.531	2.683	2.686	2.686
			(AC-FT)	319.	338.	338.	338.

CUMULATIVE AREA = 2.36 SQ MI

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          **************
          *            *
82 KK     *    RTCP30  *        ROUTE
          *            *
          **************
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Route CP30 through Sub-Basin 40

HYDROGRAPH ROUTING DATA

```
84 RS          STORAGE ROUTING
                    NSTPS           1  NUMBER OF SUBREACHES
                    ITYP        FLOW  TYPE OF INITIAL CONDITION
                   RSVRIC        0.00  INITIAL CONDITION
                        X        0.00 WORKING R AND D COEFFICIENT

85 RC          NORMAL DEPTH CHANNEL
                     ANL       0.050  LEFT OVERBANK N-VALUE
                    ANCH       0.065  MAIN CHANNEL N-VALUE
```

ANR	0.050	RIGHT OVERBANK N-VALUE
RLNTH	3127.	REACH LENGTH
SEL	0.0205	ENERGY SLOPE
ELMAX	0.0	MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL -------			+ --- RIGHT OVERBANK ---		
87 RY	ELEVATION	2270.00	2264.00	2258.00	2254.00	2254.00	2258.00	2266.00	2270.00
86 RX	DISTANCE	0.00	73.00	156.00	184.00	200.00	233.00	297.00	324.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	1.36	3.49	6.39	10.08	14.55	20.04	26.63	34.35	43.17
OUTFLOW	0.00	46.59	175.90	403.89	748.53	1257.75	2032.30	3032.23	4294.73	5852.13
ELEVATION	2254.00	2254.84	2255.68	2256.53	2257.37	2258.21	2259.05	2259.89	2260.74	2261.58
STORAGE	53.10	64.14	76.30	89.51	103.75	119.00	135.21	152.39	170.53	189.63
OUTFLOW	7734.18	9968.86	12585.85	15625.38	19085.58	23008.04	27393.81	32253.27	37604.15	43463.96
ELEVATION	2262.42	2263.26	2264.10	2264.95	2265.79	2266.63	2267.47	2268.31	2269.16	2270.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 32253. TO 43464.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP30

TRANSPOSITION AREA 0.0 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	3039.	12.50	681.	181.	60.	26.
			(INCHES) 2.681	2.849	2.853	2.853

	(AC-FT)	338.	359.	359.	359.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
27.	12.50	8.	2.	1.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2259.90	12.50	2256.53	2254.82	2254.28	2254.12

CUMULATIVE AREA = 2.36 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP30

TRANSPOSITION AREA 10.0 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
	(CFS)				
+ 2831.	12.50	637.	169.	56.	24.
	(INCHES)	2.507	2.659	2.662	2.662
	(AC-FT)	316.	335.	335.	335.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
25.	12.50	8.	2.	1.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2259.72	12.50	2256.44	2254.78	2254.26	2254.11

CUMULATIVE AREA = 2.36 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT RTCP30

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	2857.	12.50		642.	170.	57.	25.
			(INCHES)	2.529	2.683	2.686	2.686
			(AC-FT)	318.	338.	338.	338.

CUMULATIVE AREA = 2.36 SQ MI

*** ***

88 KK * 40 * BASIN

Sub-Basin 40

SUBBASIN RUNOFF DATA

90 BA SUBBASIN CHARACTERISTICS

TAREA 0.67 SUBBASIN AREA

91 LG GREEN AND AMPT LOSS RATE

STRTL 0.10 STARTING LOSS

```
                    DTH        0.15  MOISTURE DEFICIT
                    PSIF       7.30  WETTING FRONT SUCTION
                    XKSAT      0.13  HYDRAULIC CONDUCTIVITY
                    RTIMP      9.00  PERCENT IMPERVIOUS AREA

 89 UI          INPUT UNITGRAPH,  19 ORDINATES,  VOLUME = 1.00
                   0.0     133.0     510.0     869.0    1114.0     671.0     520.0     381.0     275.0     205.0
                 139.0     106.0      77.0      56.0      40.0      22.0      22.0      22.0      22.0

                                                  ***

     ***             ***             ***             ***             ***

                     HYDROGRAPH AT STATION        40
                    TRANSPOSITION AREA       0.0 SQ MI

   TOTAL RAINFALL =    4.82, TOTAL LOSS =    2.42, TOTAL EXCESS =    2.40

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    1347.     12.25                163.         43.         14.          6.
                         (INCHES)    2.267       2.392       2.393       2.393
                         (AC-FT)      81.         85.         86.         86.

                    CUMULATIVE AREA =    0.67 SQ MI

     ***             ***             ***             ***             ***

                     HYDROGRAPH AT STATION        40
                    TRANSPOSITION AREA      10.0 SQ MI

   TOTAL RAINFALL =    4.57, TOTAL LOSS =    2.34, TOTAL EXCESS =    2.23

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    166.58-HR
```

```
+   (CFS)        (HR)
                                (CFS)
+     1273.      12.25                 152.          40.          13.           6.
                              (INCHES)  2.112        2.231        2.232         2.232
                              (AC-FT)    75.          80.          80.           80.

                            CUMULATIVE AREA =    0.67 SQ MI

          ***              ***              ***              ***              ***


                            INTERPOLATED HYDROGRAPH AT       40

  PEAK FLOW      TIME                            MAXIMUM AVERAGE FLOW
                                                 6-HR         24-HR        72-HR    166.58-HR
+   (CFS)        (HR)
                                (CFS)
+     1290.      12.25                 155.          41.          14.           6.
                              (INCHES)  2.148        2.269        2.269         2.269
                              (AC-FT)    77.          81.          81.           81.

                            CUMULATIVE AREA =    0.67 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            ***************
            *             *
 97 KK      *      CP40   *      COMBINE
            *             *
            ***************
                                Combine Hydrograph from Sub-Basin 40 and CP30

 99 HC              HYDROGRAPH COMBINATION
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ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

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*** *** *** *** ***

HYDROGRAPH AT STATION CP40

TRANSPOSITION AREA 0.0 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	3838.	12.33		844.	224.	75.	32.
			(INCHES)	2.589	2.748	2.751	2.751
			(AC-FT)	418.	444.	445.	445.

CUMULATIVE AREA = 3.03 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP40

TRANSPOSITION AREA 10.0 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	3601.	12.33		789.	209.	70.	30.
			(INCHES)	2.419	2.564	2.567	2.567
			(AC-FT)	391.	414.	415.	415.

CUMULATIVE AREA = 3.03 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT CP40

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	3626.	12.33		794.	210.	70.	30.
			(INCHES)	2.437	2.583	2.586	2.586
			(AC-FT)	394.	418.	418.	418.

CUMULATIVE AREA = 3.03 SQ MI

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          **************
          *            *
100 KK    *    RTCP40  *        ROUTE
          *            *
          **************
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Route CP40 Through Sub-Basin 50

HYDROGRAPH ROUTING DATA

102 RS	STORAGE ROUTING		
	NSTPS	2	NUMBER OF SUBREACHES
	ITYP	FLOW	TYPE OF INITIAL CONDITION
	RSVRIC	0.00	INITIAL CONDITION
	X	0.00	WORKING R AND D COEFFICIENT
103 RC	NORMAL DEPTH CHANNEL		
	ANL	0.050	LEFT OVERBANK N-VALUE
	ANCH	0.055	MAIN CHANNEL N-VALUE
	ANR	0.050	RIGHT OVERBANK N-VALUE

RLNTH 3387. REACH LENGTH

SEL 0.0195 ENERGY SLOPE

ELMAX 0.0 MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL -------			+ --- RIGHT OVERBANK ---		
105 RY	ELEVATION	2200.00	2194.00	2192.00	2184.00	2184.00	2188.00	2194.00	2200.00
104 RX	DISTANCE	0.00	33.00	162.00	263.00	297.00	353.00	390.00	435.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	2.96	7.39	13.28	20.65	29.47	39.44	50.45	62.50	75.58
OUTFLOW	0.00	110.71	406.63	914.80	1669.59	2737.84	4207.36	5991.84	8107.52	10570.80
ELEVATION	2184.00	2184.84	2185.68	2186.53	2187.37	2188.21	2189.05	2189.89	2190.74	2191.58
STORAGE	90.06	108.07	129.96	153.78	178.32	203.57	229.54	256.23	283.63	311.76
OUTFLOW	13623.60	17416.35	21912.36	27277.54	33369.50	40157.84	47625.66	55763.18	64564.91	74028.27
ELEVATION	2192.42	2193.26	2194.10	2194.95	2195.79	2196.63	2197.47	2198.31	2199.16	2200.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 2738. TO 74028.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP40

TRANSPOSITION AREA 0.0 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
		(CFS)				
+	3819.	12.50	844.	224.	75.	32.
		(INCHES)	2.588	2.748	2.751	2.751
		(AC-FT)	418.	444.	445.	445.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
18.	12.50	5.	2.	1.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2188.83	12.50	2185.88	2184.57	2184.19	2184.08

CUMULATIVE AREA = 3.03 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP40

TRANSPOSITION AREA 10.0 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
	(CFS)				
+ 3576.	12.50	788.	209.	70.	30.
	(INCHES)	2.418	2.564	2.567	2.567
	(AC-FT)	391.	414.	415.	415.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
18.	12.50	5.	1.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2188.69	12.50	2185.81	2184.54	2184.18	2184.08

CUMULATIVE AREA = 3.03 SQ MI

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    ***         ***         ***         ***         ***

                INTERPOLATED HYDROGRAPH AT   RTCP40

  PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW

                                     6-HR       24-HR       72-HR     166.58-HR

+   (CFS)       (HR)

                          (CFS)

+    3602.     12.50                 794.       210.         70.          30.

                        (INCHES)    2.436      2.583       2.586        2.586

                         (AC-FT)     394.       417.        418.         418.

                CUMULATIVE AREA =     3.03 SQ MI

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
  106 KK    *      50    *      BASIN
            *            *
            **************

                         Sub-Basin 50

              SUBBASIN RUNOFF DATA

  108 BA       SUBBASIN CHARACTERISTICS
                    TAREA       0.51  SUBBASIN AREA

  109 LG       GREEN AND AMPT LOSS RATE
                    STRTL       0.19  STARTING LOSS
                      DTH       0.15  MOISTURE DEFICIT
```

PSIF 8.00 WETTING FRONT SUCTION

XKSAT 0.09 HYDRAULIC CONDUCTIVITY

RTIMP 9.00 PERCENT IMPERVIOUS AREA

107 UI INPUT UNITGRAPH, 16 ORDINATES, VOLUME = 1.00

0.0	140.0	530.0	937.0	715.0	492.0	350.0	239.0	165.0	116.0
79.0	51.0	40.0	19.0	19.0	19.0				

***

*** *** *** *** ***

HYDROGRAPH AT STATION 50

TRANSPOSITION AREA 0.0 SQ MI

TOTAL RAINFALL = 4.82, TOTAL LOSS = 2.25, TOTAL EXCESS = 2.56

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1119.	12.17		132.	35.	12.	5.
		(INCHES)	2.426	2.551	2.552	2.552
		(AC-FT)	66.	69.	69.	69.

CUMULATIVE AREA = 0.51 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 50

TRANSPOSITION AREA 10.0 SQ MI

TOTAL RAINFALL = 4.57, TOTAL LOSS = 2.19, TOTAL EXCESS = 2.39

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				

```
                    (CFS)
+    1059.     12.17                123.         32.         11.          5.
                  (INCHES)       2.260       2.379       2.380       2.380
                  (AC-FT)          61.         64.         64.         64.

                  CUMULATIVE AREA =    0.51 SQ MI

     ***           ***           ***           ***           ***


                  INTERPOLATED HYDROGRAPH AT       50

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR       72-HR    166.58-HR
+   (CFS)        (HR)
                    (CFS)
+    1075.     12.17                126.         33.         11.          5.
                  (INCHES)       2.303       2.424       2.424       2.424
                  (AC-FT)          62.         66.         66.         66.

                  CUMULATIVE AREA =    0.51 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
115 KK    *      CP50  *      COMBINE
          *            *
          **************

                    Combine Hydrographs from Sub-Basin 50 and CP40

117 HC          HYDROGRAPH COMBINATION
                  ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE
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*** *** *** *** ***

HYDROGRAPH AT STATION CP50

TRANSPOSITION AREA 0.0 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	4409.	12.42		975.	259.	86.	37.
			(INCHES)	2.563	2.719	2.722	2.722
			(AC-FT)	484.	513.	514.	514.

CUMULATIVE AREA = 3.54 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP50

TRANSPOSITION AREA 10.0 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)					
			(CFS)				
+	4139.	12.42		911.	241.	81.	35.
			(INCHES)	2.394	2.537	2.540	2.540
			(AC-FT)	452.	479.	479.	479.

CUMULATIVE AREA = 3.54 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT CP50

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	4163.	12.42	917.	243.	81.	35.
			(INCHES) 2.410	2.553	2.556	2.556
			(AC-FT) 455.	482.	482.	482.

CUMULATIVE AREA = 3.54 SQ MI

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*            *
118 KK  *  RTCP50  *       ROUTE
*            *
**************
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Routes CP50 Through Sub-Basin 60

HYDROGRAPH ROUTING DATA

120 RS STORAGE ROUTING

NSTPS	2	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	0.00	INITIAL CONDITION
X	0.00	WORKING R AND D COEFFICIENT

121 RC NORMAL DEPTH CHANNEL

ANL	0.050	LEFT OVERBANK N-VALUE
ANCH	0.060	MAIN CHANNEL N-VALUE
ANR	0.050	RIGHT OVERBANK N-VALUE
RLNTH	4427.	REACH LENGTH

SEL 0.0158 ENERGY SLOPE

ELMAX 0.0 MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

--- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---

123 RY	ELEVATION	2140.00	2134.00	2130.00	2124.00	2124.00	2128.00	2134.00	2140.00
122 RX	DISTANCE	0.00	115.00	180.00	216.00	233.00	338.00	378.00	500.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	2.62	7.56	14.82	24.41	36.28	49.46	63.55	78.83	95.77
OUTFLOW	0.00	56.02	238.31	590.50	1152.88	2005.63	3255.60	4773.09	6665.76	8898.73
ELEVATION	2124.00	2124.84	2125.68	2126.53	2127.37	2128.21	2129.05	2129.89	2130.74	2131.58
STORAGE	114.35	134.58	156.48	180.76	207.89	237.87	270.69	306.36	344.87	386.23
OUTFLOW	11489.47	14463.79	17822.28	21511.08	25756.29	30587.02	36040.82	42156.90	48974.29	56531.21
ELEVATION	2132.42	2133.26	2134.10	2134.95	2135.79	2136.63	2137.47	2138.31	2139.16	2140.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 11489. TO 56531.

THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.

THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP50

TRANSPOSITION AREA 0.0 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	4295.	12.58	975.	259.	86.	37.
			(INCHES) 2.561	2.718	2.722	2.722
			(AC-FT) 483.	513.	514.	514.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
30.	12.58	9.	3.	1.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2129.63	12.58	2126.47	2124.84	2124.28	2124.12

CUMULATIVE AREA = 3.54 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP50

TRANSPOSITION AREA 10.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 4023.	12.58		910.	241.	81.	35.
		(INCHES)	2.392	2.536	2.540	2.540
		(AC-FT)	451.	479.	479.	479.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
28.	12.58	9.	2.	1.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2129.48	12.58	2126.39	2124.80	2124.27	2124.12

CUMULATIVE AREA = 3.54 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT RTCP50

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 4048.	12.58		916.	243.	81.	35.
		(INCHES)	2.407	2.553	2.556	2.556
		(AC-FT)	454.	482.	482.	482.

CUMULATIVE AREA = 3.54 SQ MI

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          **************
          *            *
124 KK    *        60  *        BASIN
          *            *
          **************
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Sub-Basin 60

SUBBASIN RUNOFF DATA

126 BA	SUBBASIN CHARACTERISTICS		
	TAREA	0.28	SUBBASIN AREA
127 LG	GREEN AND AMPT LOSS RATE		
	STRTL	0.19	STARTING LOSS
	DTH	0.15	MOISTURE DEFICIT
	PSIF	9.70	WETTING FRONT SUCTION

```
                    XKSAT        0.05  HYDRAULIC CONDUCTIVITY
                    RTIMP       10.00  PERCENT IMPERVIOUS AREA

125 UI          INPUT UNITGRAPH,  18 ORDINATES,  VOLUME = 1.00
                     0.0      62.0     236.0     402.0     466.0     282.0     216.0     151.0     114.0      76.0
                    58.0      40.0      28.0      25.0      10.0      10.0      10.0      10.0

                                                  ***

     ***             ***             ***             ***             ***

                      HYDROGRAPH AT STATION        60
                     TRANSPOSITION AREA       0.0 SQ MI

   TOTAL RAINFALL =    4.82, TOTAL LOSS =    1.94, TOTAL EXCESS =    2.87

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                        (CFS)
+     600.     12.25                  83.         22.          7.           3.
                      (INCHES)     2.713       2.866       2.867        2.867
                      (AC-FT)       41.         43.         43.          43.

                     CUMULATIVE AREA =    0.28 SQ MI

     ***             ***             ***             ***             ***

                      HYDROGRAPH AT STATION        60
                     TRANSPOSITION AREA      10.0 SQ MI

   TOTAL RAINFALL =    4.57, TOTAL LOSS =    1.90, TOTAL EXCESS =    2.68

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR    166.58-HR
+   (CFS)       (HR)
                        (CFS)
```

+	568.	12.25		77.	20.	7.	3.
			(INCHES)	2.531	2.671	2.672	2.672
			(AC-FT)	38.	40.	40.	40.

CUMULATIVE AREA = 0.28 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT 60

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 578.	12.25		79.	21.	7.	3.
		(INCHES)	2.587	2.731	2.732	2.732
		(AC-FT)	39.	41.	41.	41.

CUMULATIVE AREA = 0.28 SQ MI

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* *

133 KK * CP60 * COMBINE

* *

****

Combines Hydrographs from Sub-Basin 60 and Routed Flow from CP50

135 HC HYDROGRAPH COMBINATION

ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

***

*** *** *** *** ***

HYDROGRAPH AT STATION CP60

TRANSPOSITION AREA 0.0 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	4591.	12.50	1056.	280.	94.	40.
			(INCHES) 2.570	2.729	2.733	2.733
			(AC-FT) 524.	556.	557.	557.

CUMULATIVE AREA = 3.82 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP60

TRANSPOSITION AREA 10.0 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	4296.	12.50	986.	262.	87.	38.
			(INCHES) 2.400	2.546	2.550	2.550
			(AC-FT) 489.	519.	520.	520.

CUMULATIVE AREA = 3.82 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT CP60

```
  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR    166.58-HR
+   (CFS)       (HR)
                          (CFS)
+    4320.     12.50                992.         263.          88.          38.
                        (INCHES)    2.414        2.561        2.565        2.565
                        (AC-FT)     492.         522.         523.         523.

                        CUMULATIVE AREA =    3.82 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
136 KK      *        70  *        BASIN
            *            *
            **************
                              Sub-Basin 70


                SUBBASIN RUNOFF DATA


138 BA            SUBBASIN CHARACTERISTICS
                        TAREA        0.38  SUBBASIN AREA


139 LG            GREEN AND AMPT LOSS RATE
                        STRTL        0.10  STARTING LOSS
                          DTH        0.15  MOISTURE DEFICIT
                         PSIF        7.30  WETTING FRONT SUCTION
                        XKSAT        0.13  HYDRAULIC CONDUCTIVITY
                        RTIMP       17.00  PERCENT IMPERVIOUS AREA


137 UI            INPUT UNITGRAPH,  17 ORDINATES,  VOLUME = 1.00
                        0.0       97.0      368.0     642.0     574.0     373.0     273.0     184.0     137.0      88.0
```

64.0 44.0 35.0 16.0 14.0 14.0 14.0

***

*** *** *** *** ***

HYDROGRAPH AT STATION 70

TRANSPOSITION AREA 0.0 SQ MI

TOTAL RAINFALL = 4.82, TOTAL LOSS = 2.21, TOTAL EXCESS = 2.61

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
		(CFS)			
+ 813.	12.17	97.	27.	9.	4.
		(INCHES) 2.365	2.602	2.603	2.603
		(AC-FT) 48.	53.	53.	53.

CUMULATIVE AREA = 0.38 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 70

TRANSPOSITION AREA 10.0 SQ MI

TOTAL RAINFALL = 4.57, TOTAL LOSS = 2.13, TOTAL EXCESS = 2.44

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
		(CFS)			
+ 769.	12.17	90.	25.	8.	4.
		(INCHES) 2.209	2.433	2.434	2.434
		(AC-FT) 45.	49.	49.	49.

CUMULATIVE AREA = 0.38 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT 70

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	781.	12.17	92.	25.	8.	4.
			(INCHES) 2.253	2.481	2.482	2.482
			(AC-FT) 46.	50.	50.	50.

CUMULATIVE AREA = 0.38 SQ MI

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          **************
          *            *
145 KK    *      CP70  *      COMBINE
          *            *
          **************
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Combines Sub-Basins 70 with CP60

147 HC HYDROGRAPH COMBINATION

ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

***

*** *** *** *** ***

HYDROGRAPH AT STATION CP70

TRANSPOSITION AREA 0.0 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	4975.	12.50	1152.	307.	102.	44.
			(INCHES) 2.550	2.717	2.721	2.721
			(AC-FT) 571.	609.	610.	610.

CUMULATIVE AREA = 4.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP70

TRANSPOSITION AREA 10.0 SQ MI

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			
+	4657.	12.50	1076.	286.	96.	41.
			(INCHES) 2.381	2.535	2.539	2.539
			(AC-FT) 534.	568.	569.	569.

CUMULATIVE AREA = 4.20 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT CP70

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+	(CFS)	(HR)				
			(CFS)			

```
+    4681.     12.50                1082.        288.         96.         42.
                          (INCHES)    2.394        2.548       2.553       2.553
                          (AC-FT)      536.         571.        572.        572.

                          CUMULATIVE AREA =    4.20 SQ MI
```

*** ***

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          **************
          *            *
148 KK    *    RTCP70  *        ROUTE
          *            *
          **************
```

Routes CP70 Through Sub-Basin 80

HYDROGRAPH ROUTING DATA

```
150 RS          STORAGE ROUTING
                     NSTPS           1  NUMBER OF SUBREACHES
                      ITYP        FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC        0.00  INITIAL CONDITION
                         X        0.00 WORKING R AND D COEFFICIENT

151 RC          NORMAL DEPTH CHANNEL
                       ANL       0.050  LEFT OVERBANK N-VALUE
                      ANCH       0.060  MAIN CHANNEL N-VALUE
                       ANR       0.050  RIGHT OVERBANK N-VALUE
                     RLNTH       3365.  REACH LENGTH
                       SEL      0.0155  ENERGY SLOPE
                     ELMAX         0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION
```

CROSS-SECTION DATA

```
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
153 RY        ELEVATION   2080.00   2070.00   2066.00   2062.00   2062.00   2072.00   2076.00   2080.00
```

152 RX DISTANCE 0.00 70.00 188.00 209.00 223.00 271.00 326.00 370.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	1.37	3.44	6.21	9.67	14.34	21.34	30.72	42.48	56.38
OUTFLOW	0.00	45.34	166.91	376.30	687.98	1165.28	1874.49	2891.53	4286.58	6210.01
ELEVATION	2062.00	2062.95	2063.89	2064.84	2065.79	2066.74	2067.68	2068.63	2069.58	2070.53
STORAGE	71.24	86.99	104.08	122.61	142.58	163.98	186.68	210.63	235.84	262.28
OUTFLOW	8647.96	11611.84	15154.87	19193.61	23756.48	28873.92	34575.42	40860.63	47747.00	55252.24
ELEVATION	2071.47	2072.42	2073.37	2074.31	2075.26	2076.21	2077.16	2078.10	2079.05	2080.00

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP70

TRANSPOSITION AREA 0.0 SQ MI

PEAK FLOW + (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	166.58-HR
		(CFS)				
+ 4825.	12.58		1152.	307.	102.	44.
		(INCHES)	2.548	2.716	2.721	2.721
		(AC-FT)	571.	609.	610.	610.

PEAK STORAGE + (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	166.58-HR
46.	12.58	13.	4.	1.	1.

PEAK STAGE + (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	166.58-HR
2069.84	12.58	2065.67	2063.30	2062.44	2062.19

CUMULATIVE AREA = 4.20 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP70

TRANSPOSITION AREA 10.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 4498.	12.58		1076.	286.	96.	41.
		(INCHES)	2.380	2.534	2.539	2.539
		(AC-FT)	533.	568.	569.	569.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
44.	12.58	13.	4.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
2069.68	12.58	2065.55	2063.24	2062.42	2062.18

CUMULATIVE AREA = 4.20 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT RTCP70

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				

```
+    4523.     12.58                1081.        288.         96.          42.
                          (INCHES)     2.393        2.548        2.553        2.553
                          (AC-FT)       536.         571.         572.         572.

                          CUMULATIVE AREA =     4.20 SQ MI
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*** ***

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              **************
              *             *
154 KK        *         80  *         BASIN
              *             *
              **************
                                Sub-Basin 80

              SUBBASIN RUNOFF DATA

156 BA            SUBBASIN CHARACTERISTICS
                        TAREA         0.53  SUBBASIN AREA

157 LG            GREEN AND AMPT LOSS RATE
                        STRTL         0.12  STARTING LOSS
                          DTH         0.15  MOISTURE DEFICIT
                         PSIF         7.30  WETTING FRONT SUCTION
                        XKSAT         0.12  HYDRAULIC CONDUCTIVITY
                        RTIMP        15.00  PERCENT IMPERVIOUS AREA

155 UI            INPUT UNITGRAPH,  21 ORDINATES,  VOLUME = 1.00
                          0.0       80.0      306.0      548.0      819.0      568.0      427.0      340.0      250.0      191.0
                        148.0      103.0       83.0       61.0       43.0       39.0       21.0       15.0       15.0       15.0
                         15.0
```

***

*** *** *** *** ***

HYDROGRAPH AT STATION 80

TRANSPOSITION AREA 0.0 SQ MI

TOTAL RAINFALL = 4.82, TOTAL LOSS = 2.22, TOTAL EXCESS = 2.60

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
		(CFS)			
+ 1015.	12.25	135.	37.	12.	5.
		(INCHES) 2.379	2.588	2.589	2.589
		(AC-FT) 67.	73.	73.	73.

CUMULATIVE AREA = 0.53 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 80

TRANSPOSITION AREA 10.0 SQ MI

TOTAL RAINFALL = 4.57, TOTAL LOSS = 2.15, TOTAL EXCESS = 2.42

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
		(CFS)			
+ 959.	12.25	126.	34.	11.	5.
		(INCHES) 2.219	2.417	2.418	2.418
		(AC-FT) 63.	68.	68.	68.

CUMULATIVE AREA = 0.53 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT 80

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 973.	12.25		129.	35.	12.	5.
		(INCHES)	2.260	2.461	2.462	2.462
		(AC-FT)	64.	69.	69.	69.

CUMULATIVE AREA = 0.53 SQ MI

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          **************
          *            *
163 KK    *      CP80  *      COMBINE
          *            *
          **************
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Combines Sub-Basin 80 and CP70

165 HC HYDROGRAPH COMBINATION

ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

***

*** *** *** *** ***

HYDROGRAPH AT STATION CP80

TRANSPOSITION AREA 0.0 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR

+	(CFS)	(HR)					
			(CFS)				
+	5340.	12.58		1286.	344.	115.	50.
			(INCHES)	2.528	2.701	2.707	2.707
			(AC-FT)	638.	682.	683.	683.

CUMULATIVE AREA = 4.73 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP80

TRANSPOSITION AREA 10.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 4983.	12.58		1201.	321.	107.	46.
		(INCHES)	2.360	2.520	2.526	2.526
		(AC-FT)	596.	636.	637.	637.

CUMULATIVE AREA = 4.73 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT CP80

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 5006.	12.58		1206.	322.	108.	47.
		(INCHES)	2.371	2.532	2.538	2.538
		(AC-FT)	598.	639.	640.	640.

CUMULATIVE AREA = 4.73 SQ MI

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          **************
          *            *
166 KK    *    RTCP80  *        ROUTE
          *            *
          **************
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Routes CP80 Through Sub-Basin 90

HYDROGRAPH ROUTING DATA

```
168 RS          STORAGE ROUTING
                     NSTPS            3  NUMBER OF SUBREACHES
                      ITYP         FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC         0.00  INITIAL CONDITION
                         X         0.00 WORKING R AND D COEFFICIENT

169 RC          NORMAL DEPTH CHANNEL
                       ANL        0.055  LEFT OVERBANK N-VALUE
                      ANCH        0.060  MAIN CHANNEL N-VALUE
                       ANR        0.055  RIGHT OVERBANK N-VALUE
                     RLNTH        9218.  REACH LENGTH
                       SEL       0.0117  ENERGY SLOPE
                     ELMAX          0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION
```

CROSS-SECTION DATA

		--- LEFT OVERBANK ---			+ ------ MAIN CHANNEL -------		+ --- RIGHT OVERBANK ---		
171 RY	ELEVATION	1980.00	1970.00	1962.00	1960.00	1960.00	1964.00	1968.00	1980.00
170 RX	DISTANCE	0.00	72.00	105.00	126.00	232.00	277.00	351.00	460.00

***

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	26.16	57.41	92.88	131.98	175.85	225.01	279.49	339.09	402.19
OUTFLOW	0.00	322.80	1077.60	2265.65	3871.12	6029.15	8666.22	11817.51	15537.86	19845.59
ELEVATION	1960.00	1961.05	1962.11	1963.16	1964.21	1965.26	1966.32	1967.37	1968.42	1969.47
STORAGE	468.47	538.48	612.31	689.96	771.42	856.70	945.80	1038.72	1135.46	1236.01
OUTFLOW	24676.11	30053.10	36019.90	42589.78	49777.35	57597.95	66067.27	75201.12	85015.42	95526.09
ELEVATION	1970.53	1971.58	1972.63	1973.68	1974.74	1975.79	1976.84	1977.89	1978.95	1980.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 66067. TO 95526.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP80

TRANSPOSITION AREA 0.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 5023.	12.83		1282.	344.	115.	50.
		(INCHES)	2.518	2.700	2.707	2.707
		(AC-FT)	635.	681.	683.	683.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
52.	12.83	18.	5.	2.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
1964.77	12.83	1961.86	1960.54	1960.18	1960.08

CUMULATIVE AREA = 4.73 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION RTCP80

TRANSPOSITION AREA 10.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 4668.	12.83		1197.	321.	107.	46.
		(INCHES)	2.352	2.520	2.526	2.526
		(AC-FT)	593.	636.	637.	637.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (AC-FT)	(HR)				
49.	12.83	17.	5.	2.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	166.58-HR
+ (FEET)	(HR)				
1964.60	12.83	1961.79	1960.52	1960.17	1960.07

CUMULATIVE AREA = 4.73 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT RTCP80

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				

+	4691.	12.83		1202.	322.	108.	47.
			(INCHES)	2.363	2.532	2.538	2.538
			(AC-FT)	596.	639.	640.	640.

CUMULATIVE AREA = 4.73 SQ MI

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          **************
          *            *
172 KK    *        90  *        BASIN
          *            *
          **************
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Sub-Basin 90

SUBBASIN RUNOFF DATA

174 BA SUBBASIN CHARACTERISTICS

TAREA	0.44	SUBBASIN AREA

175 LG GREEN AND AMPT LOSS RATE

STRTL	0.16	STARTING LOSS
DTH	0.23	MOISTURE DEFICIT
PSIF	6.20	WETTING FRONT SUCTION
XKSAT	0.19	HYDRAULIC CONDUCTIVITY
RTIMP	6.00	PERCENT IMPERVIOUS AREA

173 UI INPUT UNITGRAPH, 25 ORDINATES, VOLUME = 1.00

0.0	57.0	165.0	336.0	456.0	598.0	370.0	301.0	248.0	196.0
146.0	125.0	93.0	70.0	60.0	44.0	35.0	28.0	26.0	11.0
11.0	11.0	11.0	11.0	11.0					

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*** *** *** *** ***

HYDROGRAPH AT STATION 90

TRANSPOSITION AREA 0.0 SQ MI

TOTAL RAINFALL = 4.82, TOTAL LOSS = 2.81, TOTAL EXCESS = 2.01

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
		(CFS)			
+ 714.	12.33	91.	24.	8.	3.
	(INCHES)	1.922	2.005	2.006	2.006
	(AC-FT)	45.	47.	47.	47.

CUMULATIVE AREA = 0.44 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION 90

TRANSPOSITION AREA 10.0 SQ MI

TOTAL RAINFALL = 4.57, TOTAL LOSS = 2.71, TOTAL EXCESS = 1.87

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
		(CFS)			
+ 671.	12.33	85.	22.	7.	3.
	(INCHES)	1.786	1.865	1.866	1.866
	(AC-FT)	42.	44.	44.	44.

CUMULATIVE AREA = 0.44 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT 90

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)				
		(CFS)			
+ 683.	12.33	87.	23.	8.	3.
		(INCHES) 1.823	1.903	1.904	1.904
		(AC-FT) 43.	45.	45.	45.

CUMULATIVE AREA = 0.44 SQ MI

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          **************
          *            *
181 KK    *      CP90  *      COMBINE
          *            *
          **************
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Combines Hydrographs from Sub-Basin 90 and CP80

183 HC HYDROGRAPH COMBINATION

ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

***

*** *** *** *** ***

HYDROGRAPH AT STATION CP90

TRANSPOSITION AREA 0.0 SQ MI

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	166.58-HR

+	(CFS)	(HR)					
			(CFS)				
+	5256.	12.83		1372.	367.	123.	53.
			(INCHES)	2.465	2.641	2.647	2.647
			(AC-FT)	680.	728.	730.	730.

CUMULATIVE AREA = 5.17 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION CP90

TRANSPOSITION AREA 10.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 4883.	12.83		1281.	343.	114.	49.
		(INCHES)	2.302	2.463	2.469	2.469
		(AC-FT)	635.	680.	681.	681.

CUMULATIVE AREA = 5.17 SQ MI

*** *** *** *** ***

INTERPOLATED HYDROGRAPH AT CP90

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	166.58-HR
+ (CFS)	(HR)					
		(CFS)				
+ 4904.	12.83		1286.	344.	115.	50.
		(INCHES)	2.311	2.474	2.480	2.480
		(AC-FT)	638.	682.	684.	684.

CUMULATIVE AREA = 5.17 SQ MI

1

RUNOFF SUMMARY

FLOW IN CUBIC FEET PER SECOND

TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	10	1532.	12.25	228.	61.	20.	0.86		
+	ROUTED TO	RT10	1235.	12.67	228.	61.	20.	0.86		
+	HYDROGRAPH AT	20	1452.	12.33	247.	65.	22.	0.85		
+	2 COMBINED AT	CP20	2097.	12.58	472.	125.	42.	1.70		
+	HYDROGRAPH AT	30	1038.	12.33	173.	46.	15.	0.66		
+	2 COMBINED AT	CP30	2948.	12.42	643.	170.	57.	2.36		
+	ROUTED TO	RTCP30	2857.	12.50	642.	170.	57.	2.36		
+	HYDROGRAPH AT	40	1290.	12.25	155.	41.	14.	0.67		
+	2 COMBINED AT	CP40	3626.	12.33	794.	210.	70.	3.03		

	ROUTED TO						
+		RTCP40	3602.	12.50	794.	210.	70.	3.03
	HYDROGRAPH AT						
+		50	1075.	12.17	126.	33.	11.	0.51
	2 COMBINED AT						
+		CP50	4163.	12.42	917.	243.	81.	3.54
	ROUTED TO						
+		RTCP50	4048.	12.58	916.	243.	81.	3.54
	HYDROGRAPH AT						
+		60	578.	12.25	79.	21.	7.	0.28
	2 COMBINED AT						
+		CP60	4320.	12.50	992.	263.	88.	3.82
	HYDROGRAPH AT						
+		70	781.	12.17	92.	25.	8.	0.38
	2 COMBINED AT						
+		CP70	4681.	12.50	1082.	288.	96.	4.20
	ROUTED TO						
+		RTCP70	4523.	12.58	1081.	288.	96.	4.20
	HYDROGRAPH AT						
+		80	973.	12.25	129.	35.	12.	0.53
	2 COMBINED AT						
+		CP80	5006.	12.58	1206.	322.	108.	4.73
	ROUTED TO						
+		RTCP80	4691.	12.83	1202.	322.	108.	4.73
	HYDROGRAPH AT						
+		90	683.	12.33	87.	23.	8.	0.44

2 COMBINED AT

+	CP90	4904.	12.83	1286.	344.	115.	5.17

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

Area ID	Sub Basin Parameters								Rainfall Losses				
	Area (sq mi)	Length (mi)	Slope (ft/mi)	S-Graph	Lca (mi)	Lag (min)	Velocity (f/s)	Kn	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)
Major Basin ID: 01													
10	0.855	1.64	823.5	MOUNTAIN	0.99	24.20	5.96	0.050	0.10	0.15	8.80	0.07	14
20	0.849	1.89	226.3	MOUNTAIN	0.58	26.60	6.25	0.050	0.10	0.13	10.10	0.04	5
30	0.657	2.02	469.0	MOUNTAIN	1.06	29.90	5.94	0.050	0.10	0.15	8.80	0.07	10
40	0.670	1.39	300.4	MOUNTAIN	0.42	19.80	6.15	0.050	0.10	0.15	7.30	0.13	9
50	0.507	1.45	344.6	MOUNTAIN	0.49	17.10	7.45	0.041	0.19	0.15	8.00	0.09	9
60	0.284	1.15	165.8	MOUNTAIN	0.57	19.00	5.30	0.041	0.19	0.15	9.70	0.05	10
70	0.380	1.29	883.1	MOUNTAIN	0.57	17.70	6.44	0.050	0.10	0.15	7.30	0.13	17
80	0.529	1.43	139.5	MOUNTAIN	0.42	22.30	5.66	0.048	0.12	0.15	7.30	0.12	15
90	0.442	1.87	343.5	MOUNTAIN	0.97	26.20	6.27	0.044	0.16	0.23	6.20	0.19	6

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)
Major Basin ID: 01								
10	645	26	64526	0.211	24.60	0.01	-	100
	645	72	64572	0.645	75.40	0.09	30.00	60
20	645	26	64526	0.398	46.80	0.01	-	100
	645	66	64566	0.027	3.20	0.23	-	100
	645	72	64572	0.220	25.90	0.09	30.00	60
	645	95	64595	0.182	21.40	0.04	-	100
	645	96	64596	0.023	2.70	0.07	-	100
30	645	26	64526	0.210	32.00	0.01	-	100
	645	66	64566	0.068	10.30	0.23	-	100
	645	72	64572	0.377	57.40	0.09	30.00	60
	645	96	64596	0.002	0.30	0.07	-	100
40	645	26	64526	0.078	11.60	0.01	-	100
	645	66	64566	0.213	31.80	0.23	-	100
	645	72	64572	0.339	50.60	0.09	30.00	60
	645	95	64595	0.032	4.80	0.04	-	100
	645	96	64596	0.008	1.10	0.07	-	100
50	645	26	64526	0.085	16.80	0.01	-	100
	645	66	64566	0.141	27.80	0.23	-	100
	645	72	64572	0.198	39.10	0.09	30.00	60
	645	95	64595	0.083	16.30	0.04	-	100
60	645	26	64526	0.084	29.40	0.01	-	100
	645	72	64572	0.130	45.60	0.09	30.00	60
	645	93	64593	0.007	2.40	0.33	-	100
	645	95	64595	0.040	14.00	0.04	-	100
	645	96	64596	0.025	8.60	0.07	-	100
70	645	72	64572	0.363	95.50	0.09	30.00	60
	645	96	64596	0.017	4.50	0.07	-	100
80	645	26	64526	0.016	3.00	0.01	-	100
	645	66	64566	0.008	1.60	0.23	-	100
	645	72	64572	0.437	82.60	0.09	30.00	60
	645	93	64593	0.008	1.60	0.33	-	100
	645	95	64595	0.013	2.40	0.04	-	100
	645	96	64596	0.039	7.30	0.07	-	100
	645	98	64598	0.008	1.60	0.37	-	100
90	645	3	6453	0.000	0.10	0.58	-	100
	645	12	64512	0.009	2.00	0.01	-	100
	645	44	64544	0.045	10.20	0.03	-	100
	645	52	64552	0.026	5.90	0.16	20.00	60
	645	68	64568	0.000	0.00	0.63	-	100
	645	72	64572	0.104	23.50	0.09	30.00	60
	645	98	64598	0.133	30.10	0.37	-	100
	645	110	645110	0.125	28.20	0.13	-	100

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kn
Major Basin ID: 01								
10	730	0.855	100.0	0.10	0	45.0 *	NORMAL	0.050
		0.855	**100.0**					
20	730	0.850	100.0	0.10	0	45.0 *	NORMAL	0.050
		0.850	**100.0**					
30	730	0.657	100.0	0.10	0	45.0 *	NORMAL	0.050
		0.657	**100.0**					
40	120	0.000		0.30	5	30.0	NORMAL	0.030 *
	730	0.670	100.0	0.10	0	45.0 *	NORMAL	0.050
		0.670	**100.0**					
50	120	0.225	44.3	0.30	5	30.0	NORMAL	0.030 *
	730	0.282	55.7	0.10	0	45.0 *	NORMAL	0.050
		0.507	**100.0**					
60	120	0.122	43.1	0.30	5	30.0	NORMAL	0.030 *
	730	0.162	56.9	0.10	0	45.0 *	NORMAL	0.050
		0.284	**100.0**					
70	730	0.380	100.0	0.10	0	45.0 *	NORMAL	0.050
		0.380	**100.0**					
80	120	0.054	10.3	0.30	5	30.0	NORMAL	0.030 *
	730	0.474	89.7	0.10	0	45.0 *	NORMAL	0.050
		0.529	**100.0**					
90	120	0.123	27.8	0.30	5	30.0	NORMAL	0.030 *
	730	0.319	72.2	0.10	0	45.0 *	NORMAL	0.050
		0.442	**100.0**					

ID	Method	Duration	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
DEFAULT	NOAA14	5 MIN	0.312	0.421	0.503	0.615	0.701	0.788
	NOAA14	10 MIN	0.474	0.640	0.766	0.936	1.067	1.200
	NOAA14	15 MIN	0.588	0.794	0.950	1.161	1.322	1.487
	NOAA14	30 MIN	0.792	1.069	1.279	1.563	1.781	2.003
	NOAA14	1 HOUR	0.980	1.323	1.583	1.934	2.204	2.479
	NOAA14	2 HOUR	1.135	1.507	1.797	2.189	2.491	2.804
	NOAA14	3 HOUR	1.211	1.579	1.873	2.282	2.608	2.948
	NOAA14	6 HOUR	1.406	1.784	2.087	2.508	2.838	3.181
	NOAA14	12 HOUR	1.677	2.104	2.443	2.903	3.257	3.621
	NOAA14	24 HOUR	2.003	2.588	3.058	3.719	4.253	4.815

Major Basin	Area (sq mi)	Storm	Duration	Tab Interval	Ordinates	Output	Description
01	5.1730	Multiple	24 Hour	5	2,000	3	RODGER CREEK WATERSHED

Route ID	LOB N	Chan N	ROB N	Length (ft)	Slope (ft/ft)	Max Elev (ft)		1.	2.	3.	4.	5.	6.	7.	8.
NORMAL DEPTH															
Major Basin 01															
RT10	0.055	0.075	0.055	8,281.00	0.0244	-	X:	-	83.00	163.00	180.00	254.00	343.00	425.00	486.00
							Y:	2,360.00	2,356.00	2,350.00	2,348.00	2,348.00	2,350.00	2,356.00	2,360.00
RTCP30	0.050	0.065	0.050	3,127.00	0.0205	-	X:	-	73.00	156.00	184.00	200.00	233.00	297.00	324.00
							Y:	2,270.00	2,264.00	2,258.00	2,254.00	2,254.00	2,258.00	2,266.00	2,270.00
RTCP40	0.050	0.055	0.050	3,387.00	0.0195	-	X:	-	33.00	162.00	263.00	297.00	353.00	390.00	435.00
							Y:	2,200.00	2,194.00	2,192.00	2,184.00	2,184.00	2,188.00	2,194.00	2,200.00
RTCP50	0.050	0.060	0.050	4,427.00	0.0158	-	X:	-	115.00	180.00	216.00	233.00	338.00	378.00	500.00
							Y:	2,140.00	2,134.00	2,130.00	2,124.00	2,124.00	2,128.00	2,134.00	2,140.00
RTCP70	0.050	0.060	0.050	3,365.00	0.0155	-	X:	-	70.00	188.00	209.00	223.00	271.00	326.00	370.00
							Y:	2,080.00	2,070.00	2,066.00	2,062.00	2,062.00	2,072.00	2,076.00	2,080.00
RTCP80	0.055	0.060	0.055	9,218.00	0.0117	-	X:	-	72.00	105.00	126.00	232.00	277.00	351.00	460.00
							Y:	1,980.00	1,970.00	1,962.00	1,960.00	1,960.00	1,964.00	1,968.00	1,980.00

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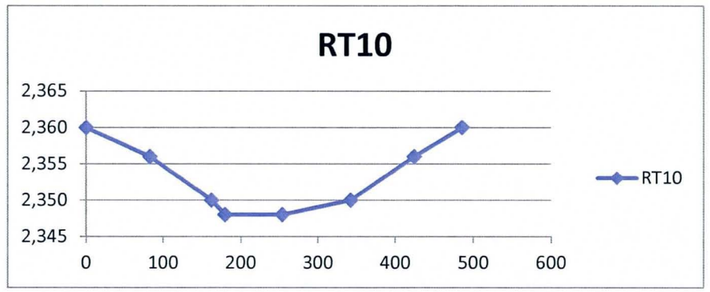
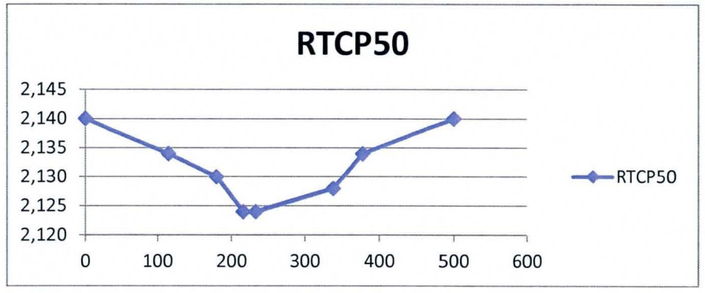
HEC-1 ROUTING REACH CROSS-SECTIONS

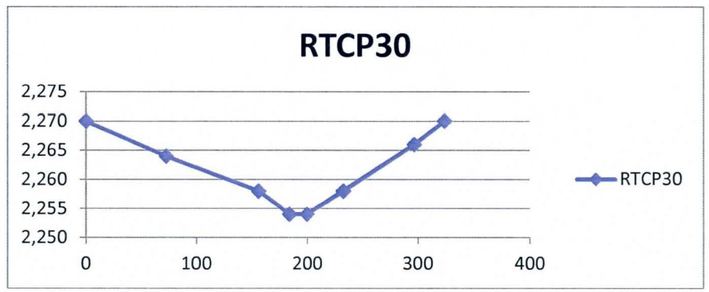
	RT10	
	X	Y
1	0	2,360
2	83	2,356
3	163	2,350
4	180	2,348
5	254	2,348
6	343	2,350
7	425	2,356
8	486	2,360



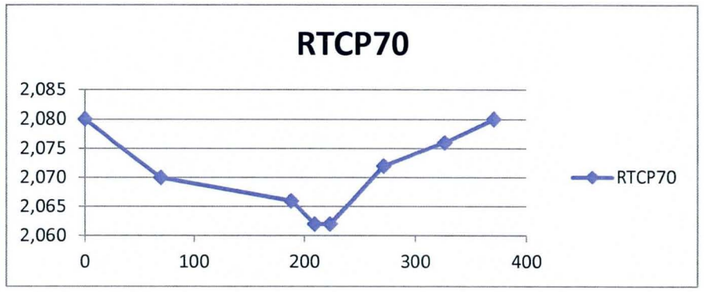
	RTCP50	
	X	Y
1	0	2,140
2	115	2,134
3	180	2,130
4	216	2,124
5	233	2,124
6	338	2,128
7	378	2,134
8	500	2,140



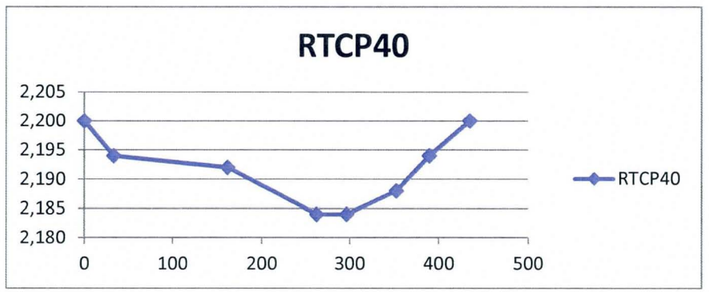
	RTCP30	
	X	Y
1	0	2,270
2	73	2,264
3	156	2,258
4	184	2,254
5	200	2,254
6	233	2,258
7	297	2,266
8	324	2,270



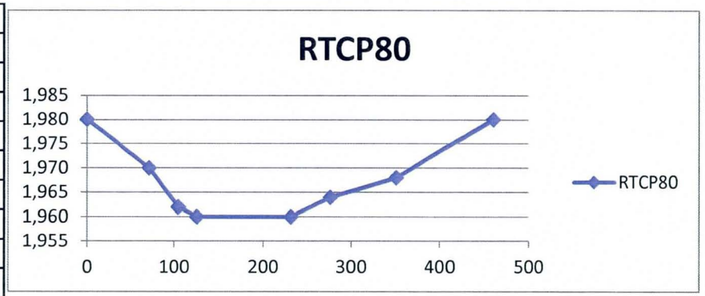
	RTCP70	
	X	Y
1	0	2,080
2	70	2,070
3	188	2,066
4	209	2,062
5	223	2,062
6	271	2,072
7	326	2,076
8	370	2,080



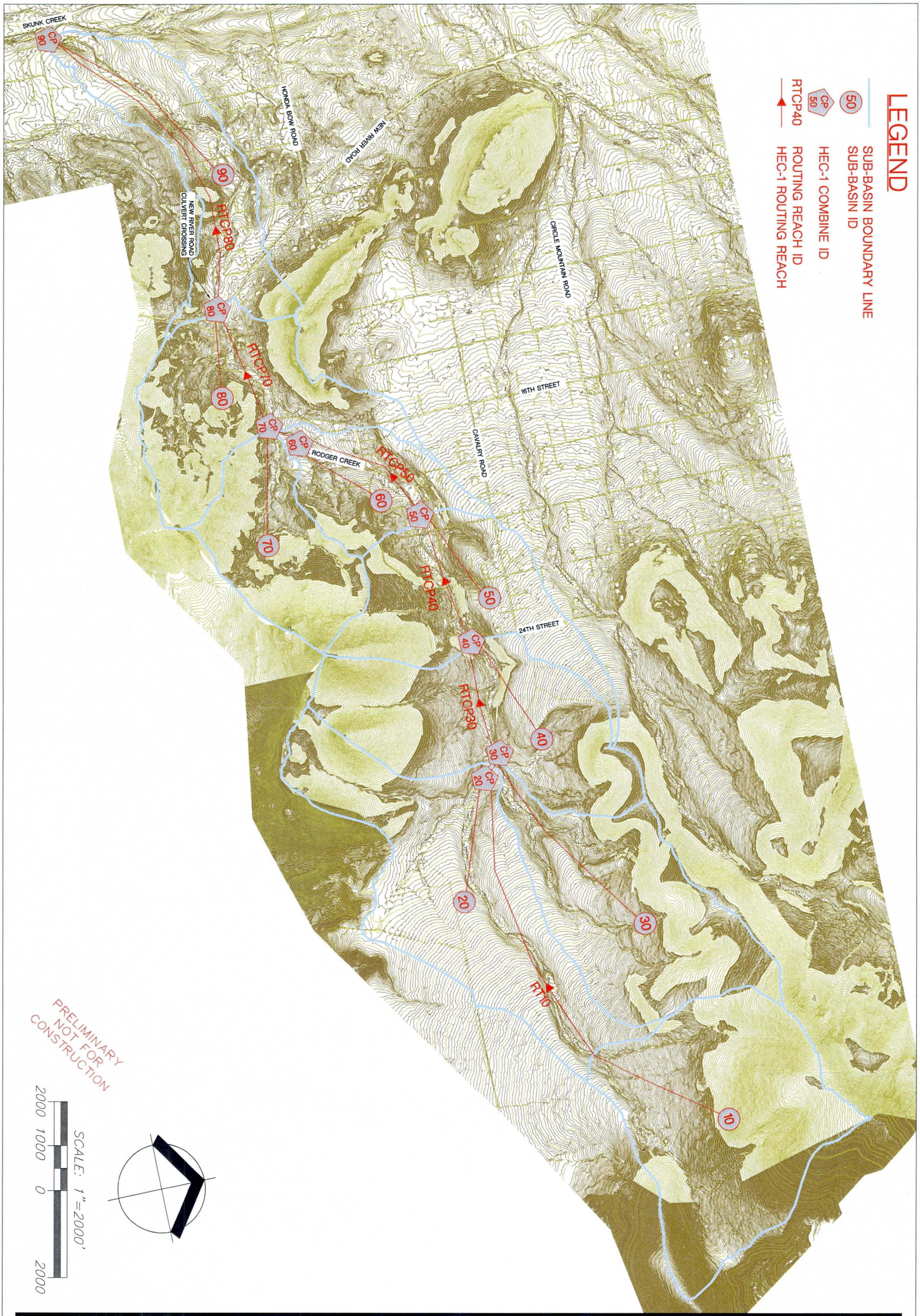
	RTCP40	
	X	Y
1	0	2,200
2	33	2,194
3	162	2,192
4	263	2,184
5	297	2,184
6	353	2,188
7	390	2,194
8	435	2,200



	RTCP80	
	X	Y
1	0	1,980
2	72	1,970
3	105	1,962
4	126	1,960
5	232	1,960
6	277	1,964
7	351	1,968
8	460	1,980



Exhibits



PROJECT NO.	4109563000
DATE:	2010-02-02
BY:	MRP
EXHIBIT NO.	4.2.1

HEC-1 SCHEMATIC
RODGER CREEK FLOODPLAIN DELINEATION STUDY

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MARICOPA COUNTY, ARIZONA

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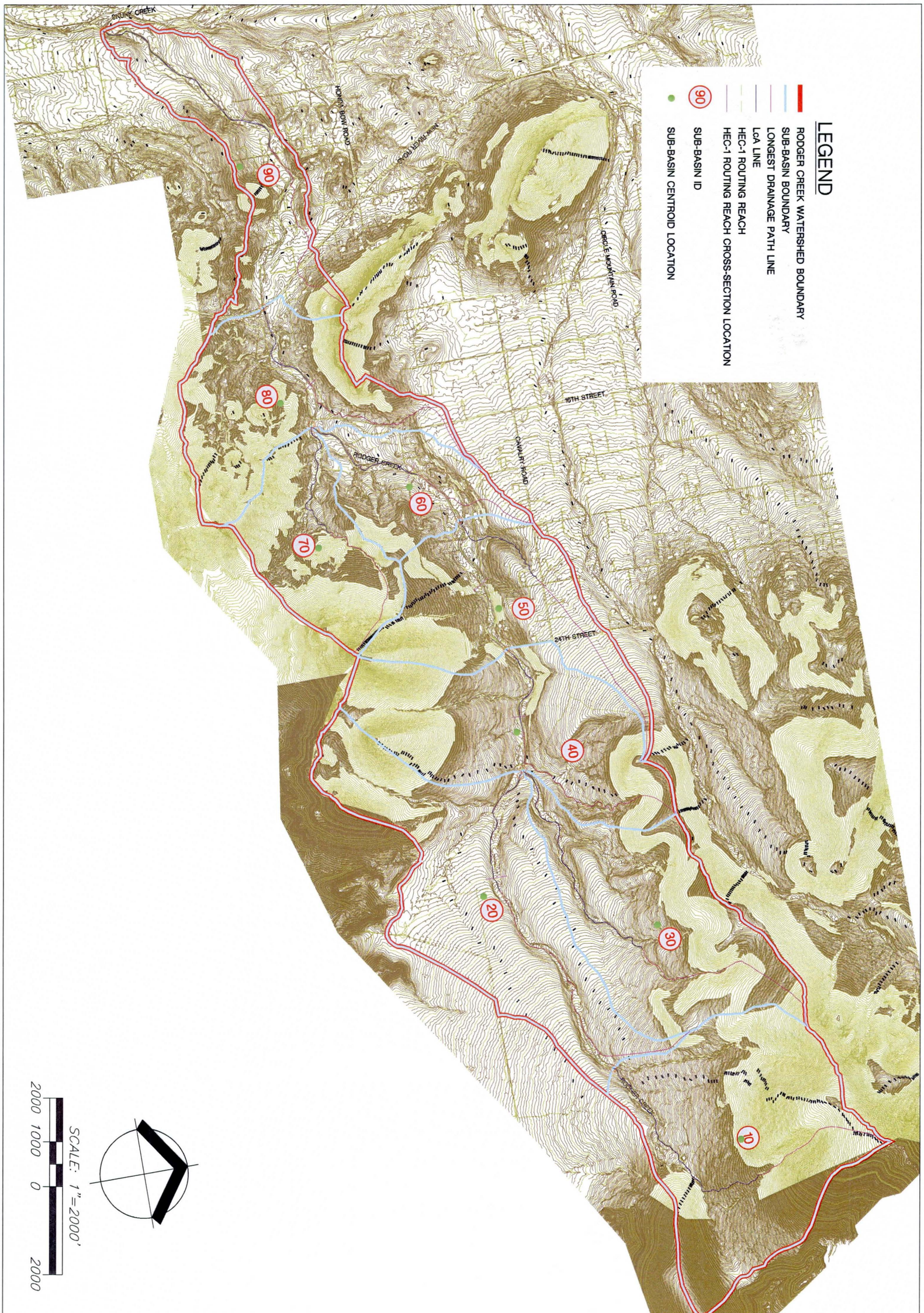

PROJECT NO.	4109563000
DATE:	04-29-2011
BY:	MRP
EXHIBIT NO.	4.2.2

WATERSHED MAP
RODGER CREEK FLOODPLAIN DELINEATION STUDY

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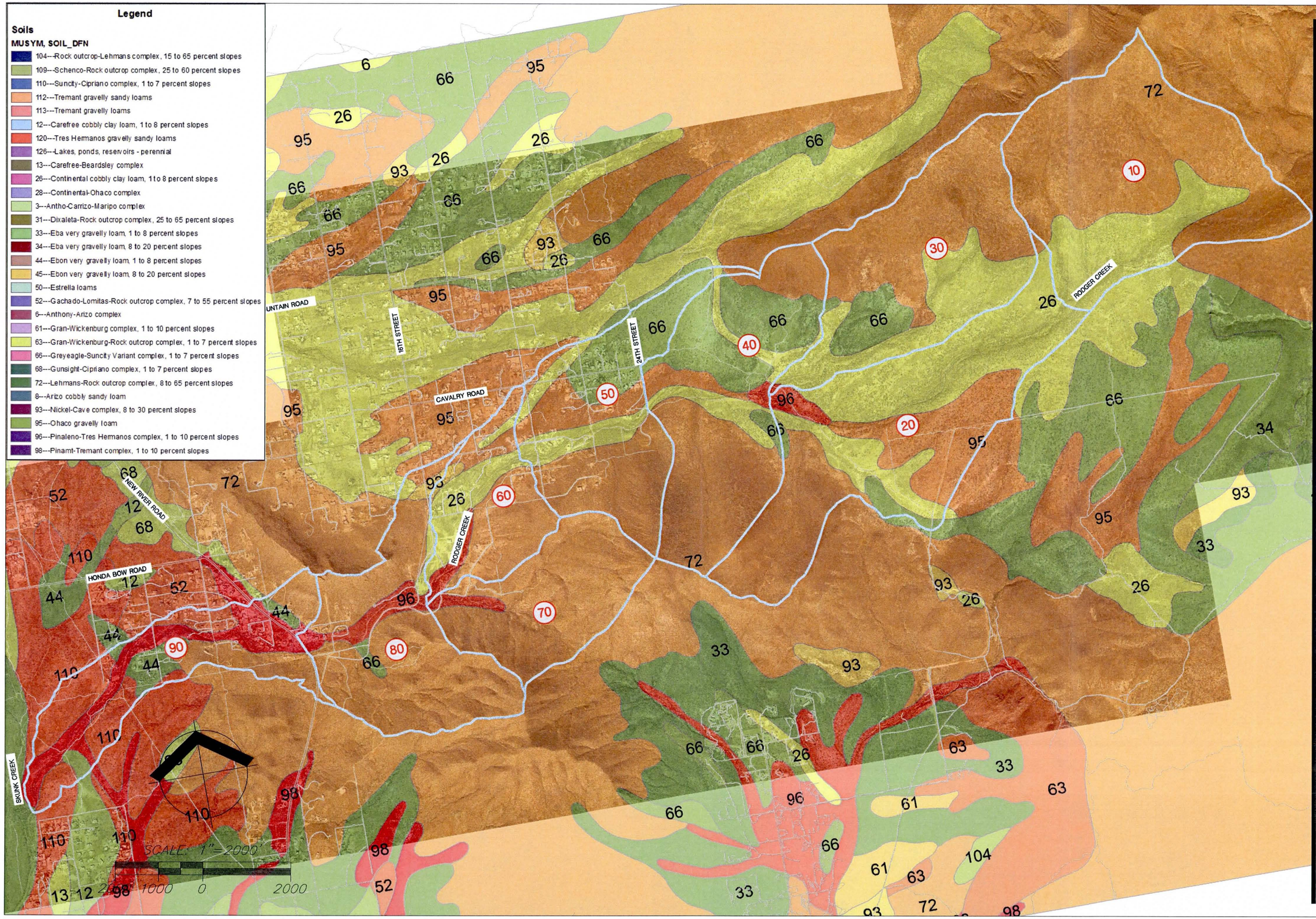
Legend

Soils

MUSYM, SOIL_DFN

- 104---Rock outcrop-Lehmans complex, 15 to 65 percent slopes
- 109---Schenco-Rock outcrop complex, 25 to 60 percent slopes
- 110---Suncity-Cipriano complex, 1 to 7 percent slopes
- 112---Tremant gravelly sandy loams
- 113---Tremant gravelly loams
- 12---Carefree cobbly clay loam, 1 to 8 percent slopes
- 120---Tres Hermanos gravelly sandy loams
- 126---Lakes, ponds, reservoirs - perennial
- 13---Carefree-Beardsley complex
- 26---Continental cobbly clay loam, 1 to 8 percent slopes
- 28---Continental-Ohaco complex
- 3---Antho-Carrizo-Maripo complex
- 31---Dixaleta-Rock outcrop complex, 25 to 65 percent slopes
- 33---Eba very gravelly loam, 1 to 8 percent slopes
- 34---Eba very gravelly loam, 8 to 20 percent slopes
- 44---Ebon very gravelly loam, 1 to 8 percent slopes
- 45---Ebon very gravelly loam, 8 to 20 percent slopes
- 50---Estrella loams
- 52---Gachado-Lomitas-Rock outcrop complex, 7 to 55 percent slopes
- 6---Anthony-Arizo complex
- 61---Gran-Wickenburg complex, 1 to 10 percent slopes
- 63---Gran-Wickenburg-Rock outcrop complex, 1 to 7 percent slopes
- 66---Greyeagle-Suncity Variant complex, 1 to 7 percent slopes
- 68---Gunsight-Cipriano complex, 1 to 7 percent slopes
- 72---Lehmans-Rock outcrop complex, 8 to 65 percent slopes
- 8---Arizo cobbly sandy loam
- 93---Nickel-Cave complex, 8 to 30 percent slopes
- 95---Ohaco gravelly loam
- 96---Pinaleno-Tres Hermanos complex, 1 to 10 percent slopes
- 98---Pinamt-Tremant complex, 1 to 10 percent slopes



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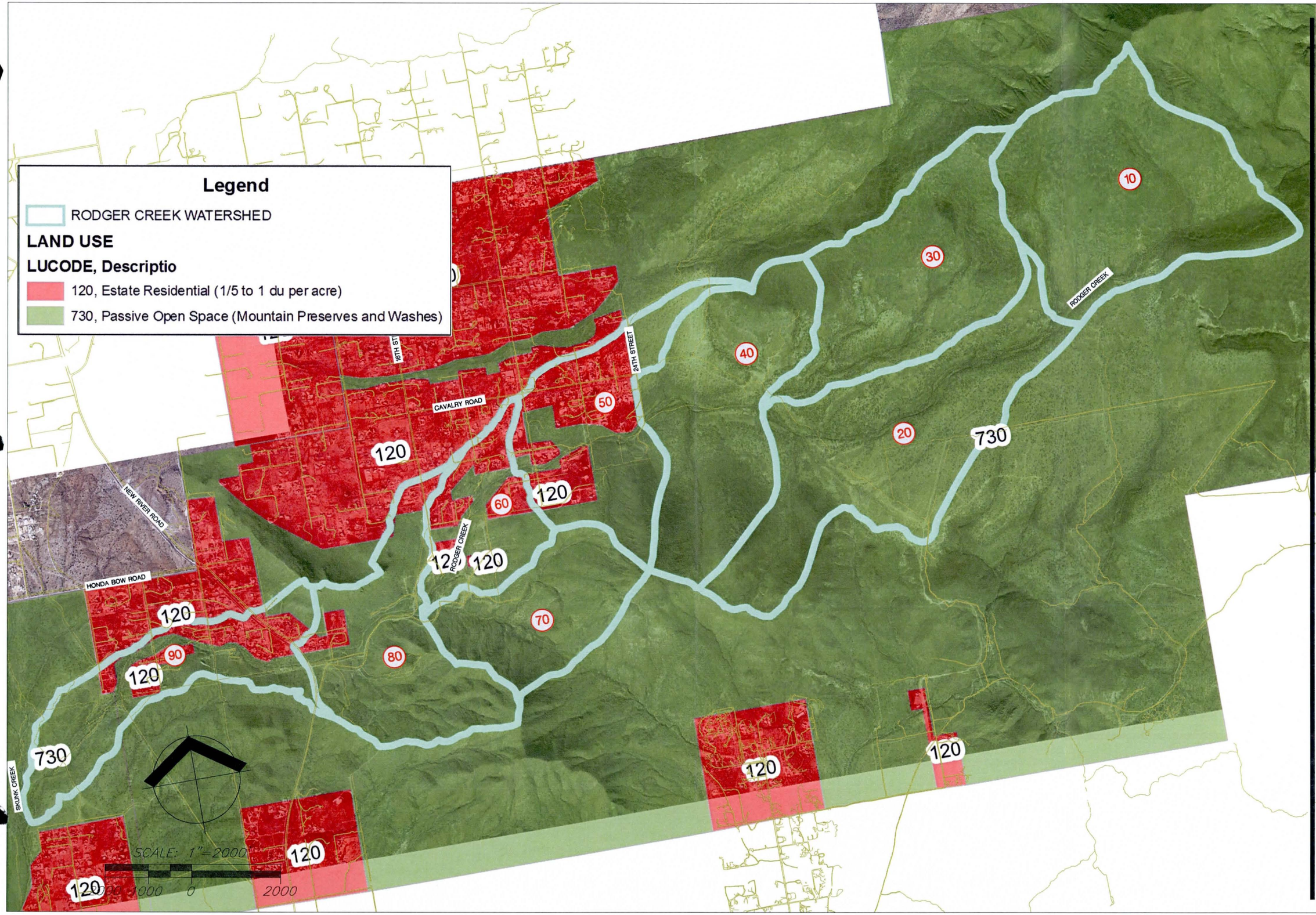
SOILS MAP
RODGER CREEK FLOODPLAIN DELINEATION STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
MARICOPA COUNTY, ARIZONA

PROJECT NO.	4109563000
DATE:	04-29-2011
BY:	MRP
FIGURE NO:	4.2.6.1



LAND USE MAP
RODGER CREEK FLOODPLAIN DELINEATION STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
MARICOPA COUNTY, ARIZONA

PROJECT NO. 410956300
DATE: 04-29-2011
BY: MRP
EXHIBIT NO: 4.2.6.2

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LEGEND

- RODGER CREEK WATERSHED BOUNDARY
- (90) SUB-BASIN ID
- Q_{100} =4681cfs — 100-Year 24-Hour Peak Flows
- CONCENTRATION POINT LOCATION

CIRCLE MOUNTAIN ROAD
16TH STREET
24TH STREET
CAVALRY ROAD
NEW RIVER ROAD
HONDA BOW ROAD
RODGER CREEK
SKUNK CREEK

10
20
30
40
50
60
70
80
90

Q_{100} =1532cfs
Q_{100} =2948cfs
Q_{100} =3626cfs
Q_{100} =4163cfs
Q_{100} =4681cfs
Q_{100} =5006cfs
Q_{100} =4904cfs

SCALE: 1" = 2000'
2000 1000 0 2000

FLOW MAP
RODGER CREEK FLOODPLAIN DELINEATION STUDY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
MARICOPA COUNTY, ARIZONA

PROJECT NO.	4109563000
DATE:	04-29-2011
BY:	MRP
EXHIBIT NO:	4.5.1

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APPENDIX E
HYDRAULIC ANALYSIS SUPPORTING DOCUMENTATION

APPENDIX E.1

MANNING'S N VALUE DETERMINATIONS

MANNING'S n VALUE DETERMINATIONS

I. INTRODUCTION

The Manning's *n* values chosen for the channel and the overbanks of Rodger Creek are based on the methodology outlined in the *Selection of Manning's Roughness Coefficient for Natural and Constructed Vegetated and Non-Vegetated Channels, and Vegetation Maintenance Plan Guidelines for Vegetated Channels in Central Arizona* (the *Manning's Manual*) prepared by the United States Geological Survey (USGS) for the Flood Control District of Maricopa County (FCDMC) dated 2006.

Baker and FCDMC conducted a field visit on January 19, 2011 in order to determine the values used for this Floodplain Delineation Study. Contained within this section is a sampling of some of the photos that were used to finalize the Manning's *n* values.

II. METHODOLOGY

The Manning's *n* values were based on inspection of the field conditions, aerial imagery and field photographs. Eight areas were identified as having consistent yet differentiable characteristics representing the study reach. Overall, the changes in characteristics between areas are the result of the presence or absence of large cobbles and boulders and variations in vegetation. The extents of each area are depicted by color, along with the locations (1 through 8) of the selected photographs that represent typical cross-sections of each of the eight areas, are shown on Figure 1.

Figure 1: Locations along Rodger Creek where Manning's *n* Values Were Computed

As specified in the *Manning's Manual*, the Manning's coefficient is composed of coefficients that describe the bed material (n_0), irregularity of the channel (n_1), the variation in channel

cross-section (n_2), the effect of obstructions (n_3), the amount of vegetation (n_4), and the degree of meandering (m). The degree of meandering ranges from 1 to 1.3 and is multiplied to the sum of the rest of the coefficients to compute the final n-value for the section. This determination is made once for the channel and once for the overbanks with some variations. The equation for the composite n value is:

$$n = (n_0 + n_1 + n_2 + n_3 + n_4)\, m$$

Table 2 of the *Manning's Manual* was used to select base n-value (n_0) coefficients as a function of bed material for stable channels. Along the channel bed, the grain sizes ranged from large boulders upstream to cobbles and gravel downstream; and in area 6 a large rock outcrop dominated the area with little loose material. Typically fine gravels and small cobbles were located within the channel banks and the overbanks. Overall, n_0 values ranged between 0.033 and 0.060.

Adjustment factors for channel n values from Table 3 from the *Manning's Manual* were selected as follows. For the channels, mostly smooth bank conditions were met and therefore n_1 was set to 0.001 all reaches. The variation in the cross-section shapes within the reaches also altered minimally. These n_2 values were chosen to range between 0.001 and 0.003, 0.001 being most downstream and indicative of a fairly consistent channel section. The most upstream area, Location 8, appeared to have the most channel variation therefore 0.003 was assigned here. Downstream of location 8 is location 7, and this area was assigned a value of 0.002 to account for the channel cross-section variation that occurs occasionally in the area. Very few obstructions were located within the channel sections of the reaches and therefore n_3 varies between 0.001 and 0.002. At areas 2, 3, and 7, 0.002 was chosen to account for debris piles and small structures located in the channel. Vegetation within the wash bottoms was negligible but along the channel banks many trees and tall brush were present yet sparsely spaced. To account for this variation, the n_4 value was determined at the bottom and along the banks separately and then weighted linearly to determine a total value. The n_4 value ranged between 0.002 at area 6 where little vegetation was located within the channel banks to 0.021 at area 5; where the channel bottom was grassy. The degree of meandering was fairly minor for half of the reach and an m factor of 1.0 was adopted. At areas 2, 3, 7, and 8, some meandering occurs and therefore an m factor of 1.1 was used.

Overbank n_0 values were determined from Table 2 of the *Manning's Manual*. This value ranged from 0.024 to 0.035. Similar to the channel value for irregularity, the overbanks value for n_1 was set to 0.001, and per the *Manning's Manual*, n_2 was not used as it represents variation in channel cross-section. For n_3, because some obstructions were located within the overbanks, an n_3-value of 0.005 was used for all reaches. Table 4 of the *Manning's Manual* was used to determine the n_4-value in the overbanks. The amount of vegetation was fairly consistent within the overbanks, with some areas slightly denser in vegetation than other areas. For this minor change in vegetation, the n_4-value was set to either 0.030 or 0.040. Area 6 had drastic changes in vegetation at the overbanks. The left overbank is composed of smooth bedrock with minimal vegetation similar to the channel, and the right overbank was loose rock material with more vegetation, similar to the overbanks typically seen throughout the rest of the study area. The degree of meandering was minor and the m factor was kept to 1 for the overbanks, not affecting the computed n-values.

The Manning's n values calculated for each area are listed in Table 1.

Table 1: Channel and Overbank Manning's n Values

Area	Channel n	Overbank n
1	0.045	0.060
2	0.051	0.070
3	0.058	0.065
4	0.065	0.066
5	0.059	0.071
6	0.038 (and Left Overbank)	0.071 (Right Overbank)
7	0.066	0.066
8	0.079	0.076

III. PHOTOGRAPHS AND N VALUE ASSIGNMENTS

The remainder of this document describes in further detail the eight areas for which the above Manning's n values were determined along with representative photographs of the channels and the overbanks.

The Manning's n values that were determined in this section will be applied to the HEC-RAS modeling for the revision of the floodplain delineation of Rodger Creek.

Area 1 extends from the Skunk Creek Confluence to north of the intersection of Rodger Creek with Linda Lane; just east of the Central Avenue alignment. This area is typical of a few boulders of about 1-foot in diameter and rounded, but mostly the channel bed is composed of cobbles and gravels as seen in Photo 1, with mesquite trees along the banks. No obstructions are present in the channel of this area so n_3 is kept low and the study reach in this area is fairly straight.

The overbanks are fine, firm soil with tall grasses and trees but with adequate spacing that can be seen in Photo 2. Some clearing has occurred in the area and therefore this value is set at 0.030. For reference, the multi-colored rod depicted in many of the photographs is five feet long, and each color segment of the rod is 1-foot.

Table 2: Channel and Overbank Assignments for Area 1

Area 1	n_0	n_1	n_2	n_3	n_4	m	Composite n-Value
Channel	0.035	0.001	0.001	0.001	0.007	1	0.045
Overbanks	0.024	0.001	0	0.005	0.030	1	0.060

Photo 1 at Location 1: Looking upstream from channel bottom

Photo 2 at location 1: Looking downstream at overbank area

Area 2 extends from the intersection of Rodger Creek with Linda Lane; just east of the Central Avenue alignment to mid-way between the 3rd Street and 7th Street alignments. This area is typical of a few rounded boulders of around 1-foot in diameter, and the rest are cobbles and gravels as seen in Photo 3 with no vegetation in the wash. Some small structures are present along this area of the study, so the n_3 value is set at 0.002. The channel banks are composed of finer materials with some vegetation consisting of grasses and mesquite trees. Some minor channel meandering also occurs within this segment.

The overbanks are composed of fine, firm soil with tall grasses and trees as seen in Photo 4. Some clearing has occurred in this area, and therefore the n_4 value is set at 0.040.

Table 3: Channel and Overbank Assignments for Area 2

Area 2	n_0	n_1	n_2	n_3	n_4	m	Composite n-Value
Channel	0.035	0.001	0.001	0.002	0.007	1.1	0.051
Overbanks	0.024	0.001	0	0.005	0.040	1	0.070

Photo 3 at Location 2: Looking downstream from channel bottom

Photo 4 at Location 2: Looking north at right overbank area

Area 3 extends from mid-way between the 3rd Street and 7th Street alignments to the intersection of Rodger Creek and the Mariola Way alignment. This area is typical of having slightly more boulders than areas 1 and 2, and has many cobbles and gravels as seen in Photo 5. For this reason, the n_0 value is set slightly higher than what was used for the previous 2 areas at 0.040. Some small structures and debris piles were found along the wash bottom and therefore the n_3 value was set to 0.002. Slightly more vegetation is present in this area than was seen in the previous two areas and therefore the coefficient is set to 0.009. The channel banks are composed of cobbles and large gravels with fairly dense vegetation of grasses and mesquite trees. Some meandering occurs in this segment of the reach.

The overbanks in this area are composed of finer-grained material and firm soil and therefore the n_0 is set to 0.024. The overbanks are composed of fine, firm soil with tall grasses and trees as seen in Photo 6. Clearing in this area is on the higher end, and therefore the n_4 value is kept at 0.035 with a higher density than area 1, but less dense than area 2.

Table 4: Channel and Overbank Assignments for Area 3

Area 3	n_0	n_1	n_2	n_3	n_4	m	Composite n-Value
Channel	0.040	0.001	0.001	0.002	0.009	1.1	0.058
Overbanks	0.024	0.001	0	0.005	0.035	1	0.065

Photo 5 at Location 3: Looking downstream from channel bottom

Photo 6 at Location 3: Looking downstream at channel overbank

Area 4 extends from the Mariola Way alignment to the next major dirt road crossing. This area is typical of about 40% rounded boulders a few larger than 1-foot in diameter, about 60% cobbles and gravels as seen in Photo 7 with no vegetation in the wash. The n_0 value is set much higher than the downstream segments because of the large boulders present, which is what sets this small area apart from the other areas. The channel banks are also composed of large boulders, and bedrock is present as well. No large obstructions are located within the channel or the banks. Dense vegetation is located along the channel banks as consistent with previous washes. No meandering occurs within this segment.

The overbanks in this location are composed of a higher amount of boulders and larger cobbles than seen in areas 1 through 3. The vegetation in the overbanks appears similar to area 1 as seen in Photo 8.

Table 5: Channel and Overbank Assignments for Area 4

Area 4	n_0	n_1	n_2	n_3	n_4	m	Composite n-Value
Channel	0.055	0.001	0.001	0.001	0.007	1	0.065
Overbanks	0.030	0.001	0	0.005	0.030	1	0.066

Photo 7 at Location 4: Looking downstream from channel bottom

Photo 8 at Location 4: Looking downstream at right overbank

Area 5 extends from the major dirt road crossing to the rock-outcrop of area 6. The bed material in area 5 is composed of gravels and cobbles along the channel bottom and large, angular basaltic rock outcrops along the banks as can be seen in Photo 9. Overall, the n_0 value assigned considering this juxtaposition is 0.035. Thick grass in isolated areas along the bottom and the banks are likely due to the presence of shallow ground water in the area. Because of the consistency of the grasses and trees present, a higher n_4 value was used at this location than at others. This segment has minimal meandering.

Similar to area 4, the overbanks in this location are composed of a higher amount of boulders and larger cobbles than seen in areas 1 through 3. The vegetation in the overbanks is also similar to those of area 3 as can be seen in Photo 10.

Table 6: Channel and Overbank Assignments for Area 5

Area 5	n_0	n_1	n_2	n_3	n_4	m	Composite n-Value
Channel	0.035	0.001	0.001	0.001	0.021	1	0.059
Overbanks	0.030	0.001	0	0.005	0.035	1	0.071

Photo 9 at Location 5: Looking upstream at channel bottom and left overbank

Photo 10 at Location 5: Looking downstream at right overbank

Area 6 encompasses a large rock outcropping within Rodger Creek. This location has very little loose material with the exception of a few random boulders and piles of sand within the bedrock depressions. Ponds of water were present at the time of our field visit, several weeks after the most recent storm event. Some grass and weeds are present, but also located sporadically. The overall condition of the bedrock is smooth and rounded, but the surface itself is rough. See Photo 11.

The left overbank is of similar material as the channel bottom, but the right overbank has some medium and sparsely vegetated areas. See Photo 12.

Table 7: Channel and Overbank Assignments for Location 6

Location 6	n_0	n_1	n_2	n_3	n_4	m	Composite n-Value
Channel and LOB	0.033	0.001	0.001	0.001	0.002	1	0.038
ROB	0.030	0.001	0	0.005	0.035	1	0.071

Photo 11 at Location 6: Looking upstream from the channel bottom within area 6

Photo 12 at Location 6: Looking downstream at the left overbank, the channel, and the right overbank within area 6

Area 7 extends from the large rock outcropping to 22nd Street. This area is typical of about 20% rounded boulders a few larger than 1-foot in diameter, about 80% cobbles and gravels as seen in Photo 13. Because of the large amount of boulders present in the channel and in the banks, the n_0 value is set higher than the values used in previous area except for area 4 (which was assigned a value of 0.055). The channel moves from side to side in this area, and therefore a slightly higher n_2 value is assigned and there are some structures present within this area adjacent to the wash. More grass is present at this location than at previous locations except for at area 5, so the corresponding n_4 value has been set to 0.010. Grass is located within the channel bottoms in some locations, and some channel meandering occurs throughout the length.

The overbanks in this area consist of larger course material than seen in previous sections and therefore a higher n_0 value is set than used previously and the vegetation n_4 value is set to 0.025. See Photo 14.

Table 8: Channel and Overbank Assignments for Area 7

Area 7	n_0	n_1	n_2	n_3	n_4	m	Composite n-Value
Channel	0.045	0.001	0.002	0.002	0.010	1.1	0.066
Overbank	0.035	0.001	0	0.005	0.025	1	0.066

Photo 13 at Location 7: Looking upstream from the channel bottom

Photo 14 at Location 7: Looking at upstream at island area and left overbank

Area 8 extends from the 22nd Street alignment to the upstream end of Rodger Creek. This area is composed of about half large boulders, an amount not seen in previous areas. Many of the boulders are rounded and larger than 1-foot in diameter. Also present are large cobbles and gravels. See Photo 15. Grass is located within the channel bottoms in some locations, and some channel meandering occurs throughout the length.

The overbanks in this area are classified similarly as the previous area in that larger cobbles are present. The amount of vegetation is similar to the vegetation seen in areas 3, 5, and 6 and therefore the n_4 value is set to 0.035. See Photo 16.

This location generates a higher composite value in the channel than the overbanks due to the number of large boulders within the channel and the absence of them within the floodplain.

Table 9: Channel and Overbank Assignments for Location 8

Location 8	n_0	n_1	n_2	n_3	n_4	m	Composite n-Value
Channel	0.060	0.001	0.003	0.001	0.007	1.1	0.079
Overbank	0.035	0.001	0	0.005	0.035	1	0.076

Photo 15 at Location 8: Looking upstream from channel bottom

Photo 16 at Location 8: Looking upstream at right overbank

Selection of Manning's Roughness Coefficient for Natural and Constructed Vegetated and Non-Vegetated Channels, and Vegetation Maintenance Plan Guidelines for Vegetated Channels in Central Arizona

By Jeff V. Phillips and Saeid Tadayon

Prepared in cooperation with the
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Scientic Investigations Report 2006–5108

U.S. Department of the Interior
U.S. Geological Survey

Table 2. Base values of Manning's *n* for channels considered stable.

[—, not available; >, greater than; Modified from Aldridge and Garrett (1973)]

Channel type	Median size of bed material		Base *n* value	
	Millimeters	Inches	Benson and Dalrymple (1967)	Chow (1959)
Firm earth	—	—	0.025–0.032	0.020
Coarse sand	1–2	—	.026–.035	—
Fine gravel	—	—	—	.024
Gravel	2–64	0.08–2.5	.028–.035	—
Coarse gravel	—	—	—	.028
Cobble	64–256	2.5–10.5	.030–.050	—
Boulder	> 256	> 10	.040–.070	—

Equations for selection of base *n* values for stable channels

Base *n* values for stable channels also can be assigned through the use of equations developed from verified channel reaches that relate Manning's *n* to easily measured hydraulic and channel parameters (eqs. 3 and 4). Several investigators have presented data that indicate trends exist among depth or hydraulic radius, median grain-size diameter, and verified base values of *n*. For example, Limerinos (1970) examined verified values of *n* for 11 streams in California (fig. 6). Limerinos developed an equation to assign base *n* values for stable channels that is expressed as

$$n = \frac{0.0926R^{1/6}}{1.16} + 2.0\log\left(\frac{R}{d_{84}}\right), \quad (3)$$

where

R = hydraulic radius, in feet, and

d_{84} = intermediate diameter of bed material, in feet, that equals or exceeds that of 84 percent of the particles.

Figure 5. Typical cobble-bed channel in central Arizona for which Manning's *n* was verified; and used for development of equation 4.

A similar equation was developed for generally lower-gradient stable channels in central Arizona for which the base *n* value was the only perceivable factor that contributed to total roughness (fig. 5; Phillips and Ingersoll, 1998). That equation is in the form of

$$n = \frac{0.0926R^{1/6}}{1.46} + 2.23\log\left(\frac{R}{d_{50}}\right), \quad (4)$$

where

d_{50} = intermediate diameter of bed material, in feet, that equals or exceeds that of 50 percent of the particles.

The equation was developed by utilizing channels with a median diameter of bed material that ranged from 0.28 to 0.36 foot. These equations have their limitations, but can be utilized as a check or reference for assigning base values of *n*.

Figure 6. Typical high-gradient cobble-bed channel in California for which Manning's *n* was verified and utilized for development of equation 3.

Flow Depth and Channel Gradient

Previous investigations indicate there is a relation between depth of flow and *n* values (Jarrett, 1985; Phillips and Ingersoll, 1998). In the absence of bank vegetation and other obstructions, the roughness coefficient for flows in a uniform stable streambed generally decreases with increasing depth of flow (eqs. 3 and 4). With increased flow depth, the energy losses associated with the channel-bed roughness elements generally become less significant. As flow approaches bank-full stage, the roughness coefficient may approach a constant

Table 3. Adjustment factors or component ranges for various channel conditions used to determine Manning's *n* values.

[Adjustment to degree of meandering values apply to flow confined in the channel and does not apply where flow crosses meanders; Modified from Cowen, 1956; and Chow, 1959]

Channel conditions	Manning's *n* adjustment	Example
		Degree of irregularity
Smooth	0.000	Smoothest channel attainable in a given bed material.
Minor	.001–.005	Channels with slightly scoured or eroded side slopes.
Moderate	.006–.010	Channels with moderately sloughed or eroded side slopes.
Severe	.011–.020	Channels with badly sloughed banks; unshaped, jagged, and irregular surfaces of channels in rock.
		Variation in channel cross section
Gradual	.000	Size and shape of channel cross sections change gradually.
Alternating occasionally	.001–.005	Large and small cross sections alternate occasionally, or the main flow occasionally shifts from side to side owing to changes in cross-section shape.
Alternating frequently	.010–.015	Large and small cross sections alternate frequently, or the main flow frequently shifts from side to side owing to changes in cross-section shape.
		Effect of obstructions
Negligible	.000–.004	A few scattered obstructions, which include debris deposits, stumps, exposed roots, logs, piers, or isolated boulders, which occupy less than 5 percent of the channel.
Minor	.005–.015	Obstructions occupy from 5 to 15 percent of the cross-section area and spacing between obstructions is such that the sphere of influence around one obstruction does not extend to the sphere of influence around another obstruction. Smaller adjustments are used for curved, smooth-surfaced objects than are used for sharp-edged, angular objects.
Appreciable	.020–.030	Obstructions occupy from 15 to 50 percent of the cross-section area, or the space between obstructions is small enough to cause the effects of severe obstructions to be additive, thereby blocking an equivalent part of a cross section.
Severe	.040–.060	Obstructions occupy more than 50 percent of the cross-section area, or the space between obstructions is small enough to cause turbulence across most of the cross section.
		Amount of vegetation
Negligible	.000–.002	Grass, shrubs, or weeds were permanently laid over during flow.
Small	.002–.010	Dense growths of flexible turf grass, such as Bermuda, or weeds growing where the average depth of flow is at least two times the height of the vegetation where the vegetation is not laid over. Trees, such as willow, cottonwood, or saltcedar, growing where the average depth of flow is at least three times the height of the vegetation. Flow depth is about two times the tree height, and the trees are laid over.
Medium	.010–.025	Moderately dense grass, weeds, or tree seedlings growing where the average depth of flow is from two to three times the height of vegetation; brushy, moderately dense vegetation, similar to 1- to 2-year-old willow trees growing along the banks. A few 8 to 10-year old willow, cottonwood, mesquite, or palo verde, which blocks flow by approximately 1 to 10 percent, and spheres of influence or turbulence do not overlap.
Large	.025–.050	8- to 10-year-old willow, cottonwood, mesquite or palo verde trees (block flow by approximately 10 to 30 percent where the sphere's of influence overlap) intergrown with some weeds and brush where the hydraulic radius exceeds 2 feet.
Very large	.050–.100	Bushy willow trees about 1-year old intergrown with weeds alongside slopes or dense cattails growing along the channel bottom; trees intergrown with weeds and brush. Moderately dense (blocks flow by approximately 30 to 50 percent and the sphere's of influence overlap) 8- to 10-year old trees spaced randomly throughout channel where depth of flow approximates height of vegetation.
Extremely large	.100–.200	Mature (greater than 10 years old) willow trees and tamarisk intergrown with brush and blocking flow by more than 70 percent of the flow area, causing turbulence across most of the section. Depth of flow is less than average height of the vegetation. Dense stands of palo verde or mesquite that block flow by 70 percent or more and hydraulic radius is about equal to or greater than average height of vegetation.
		Degree of meandering
Minor	1.00	Ratio of the channel length to valley length is 1.0 to 1.2.
Appreciable	1.15	Ratio of the channel length to valley length is 1.2 to 1.5.
Severe	1.30	Ratio of the channel length to valley length is greater than 1.5.

Values of Manning's *n* For Agriculture or Overbank Areas

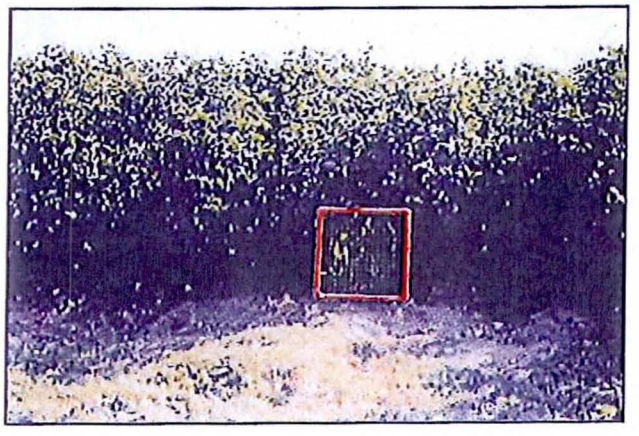
Values of *n* for fields with crops, as well as for natural vegetation in overbank areas, can be selected on the basis of the work of Chow (1959; table 4). Mature cotton plants are comparable to dense brush in the summer, and defoliated cotton is comparable to medium to dense brush in the winter (fig. 25*A* and *B*). For overbank areas, the value of *n* generally varies with the stage of submergence of the vegetation (Thomsen and Hjalmarson, 1991). In general, higher stages should result in lower Manning's *n* values.

Table 4. Values of Manning's *n* for agriculture or overbank areas.

[Modified from Chow (1959) and Thomsen and Hjalmarson (1991)]

Description	Manning's *n*		
	Minimum	Normal	Maximum
Pasture, no brush			
Short grass	0.025	0.030	0.035
High grass	.030	.035	.050
Cultivated areas			
No crop	.020	.030	.040
Mature row crops	.025	.035	.045
Mature field crops	.030	.040	.050
Shrubs			
Scattered shrubs, heavy weeds	.035	.050	.070
Light shrubs and trees, in winter	.035	.050	.060
Light shrubs and trees, in summer	.040	.060	.080
Medium to dense shrubs, in winter	.045	.070	.110
Medium to dense shrubs, in summer	.070	.100	.160
Trees			
Dense willows, mesquite, saltcedar	.110	.150	.200
Cleared land with tree stumps, no sprouts	.030	.040	.050
Same as above, but heavy growth of sprouts	.050	.060	.080
Heavy stand of timber, a few down trees, little undergrowth, flood stage below branches	.080	.100	.120
Same as above, but with flood stage reaching branches	.100	.120	.160

A. Mature cotton



B. Defoliated cotton

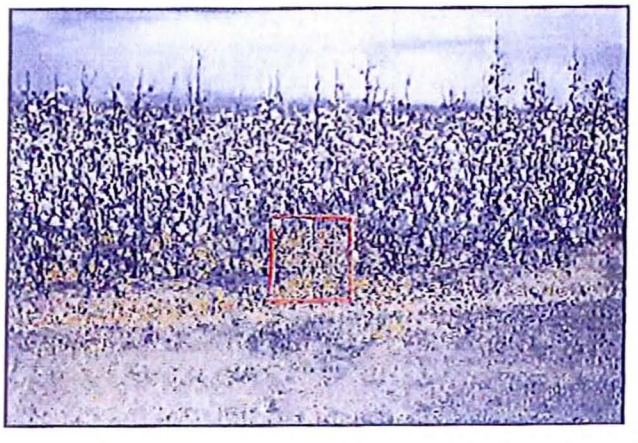


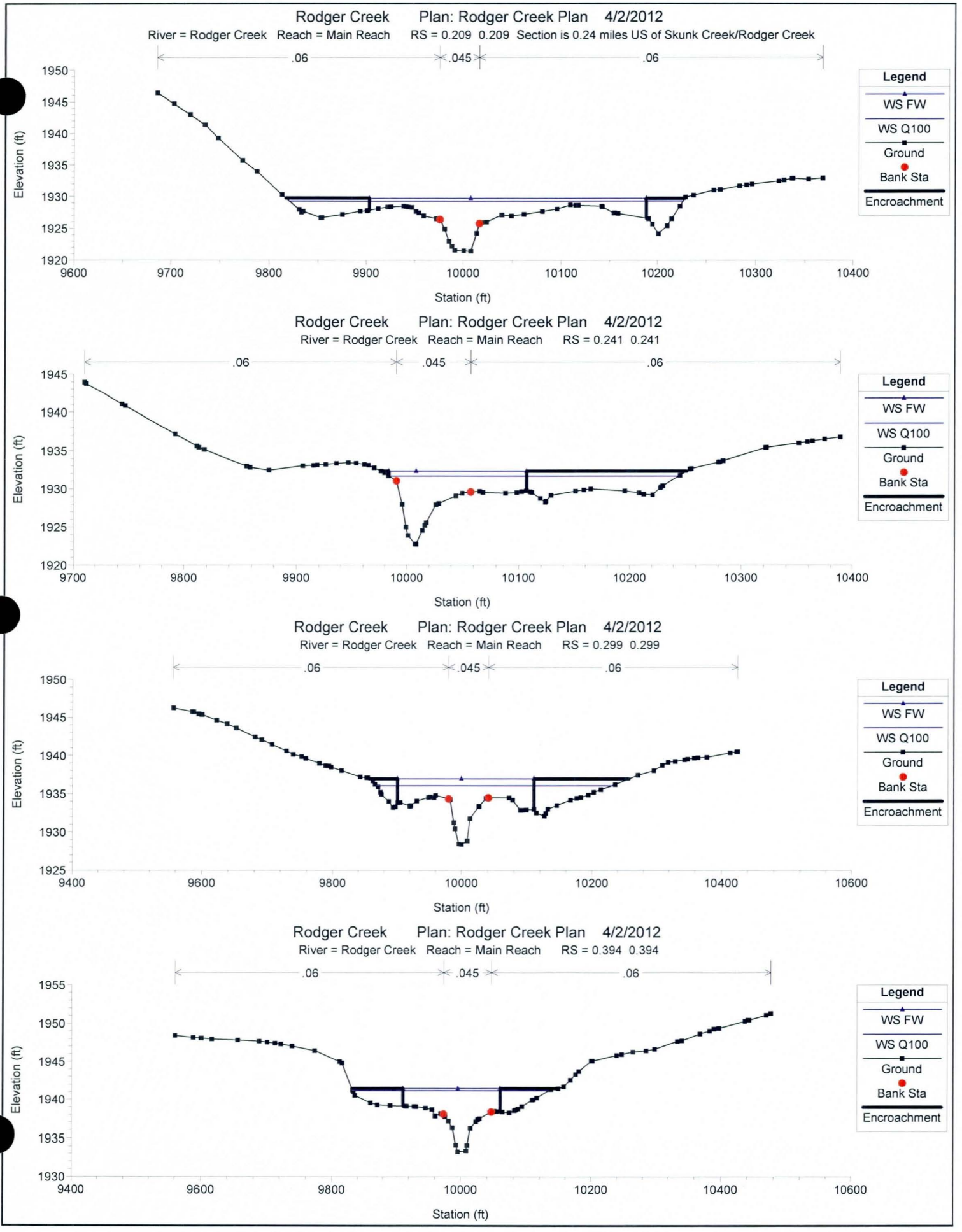
Figure 25. Fields of *A*, Mature cotton in the summer and *B*, defoliated cotton in the fall.

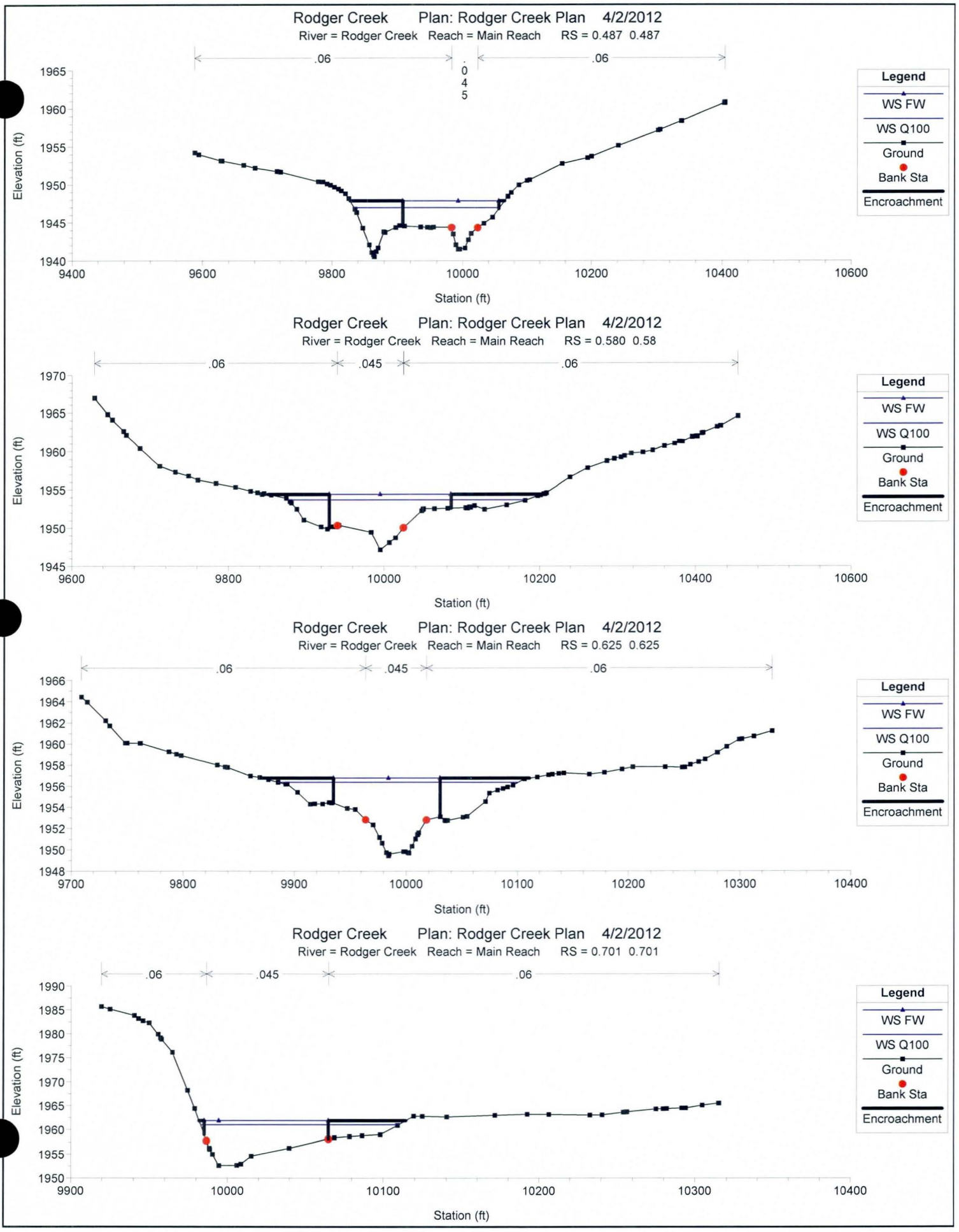
Composite Values of *n* For Constructed Channels

Composite values of *n* are presented in table 5 for various types of stable constructed channels. The degree of the *n* value for a selected channel type is related to the newness of the channel and degree of subsequent maintenance (fig. 26*A* and *B*). For example, minimum values correspond to new construction, normal values correspond to good maintenance, and the maximum *n* value corresponds to deteriorated or poor maintenance.

APPENDIX E.2

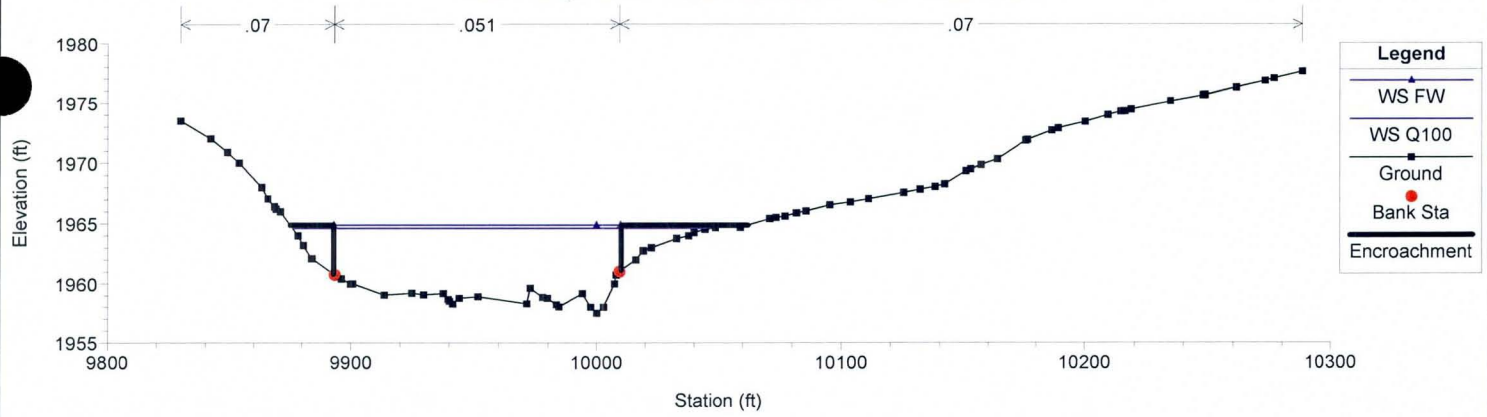
CROSS SECTION PLOTS


Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 0.209 0.209 Section is 0.24 miles US of Skunk Creek/Rodger Creek
.06
.045
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 0.241 0.241
.06
.045
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 0.299 0.299
.06
.045
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 0.394 0.394
.06
.045
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment


Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 0.487 0.487
.06
.045
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 0.580 0.58
.06
.045
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 0.625 0.625
.06
.045
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 0.701 0.701
.06
.045
.06
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment

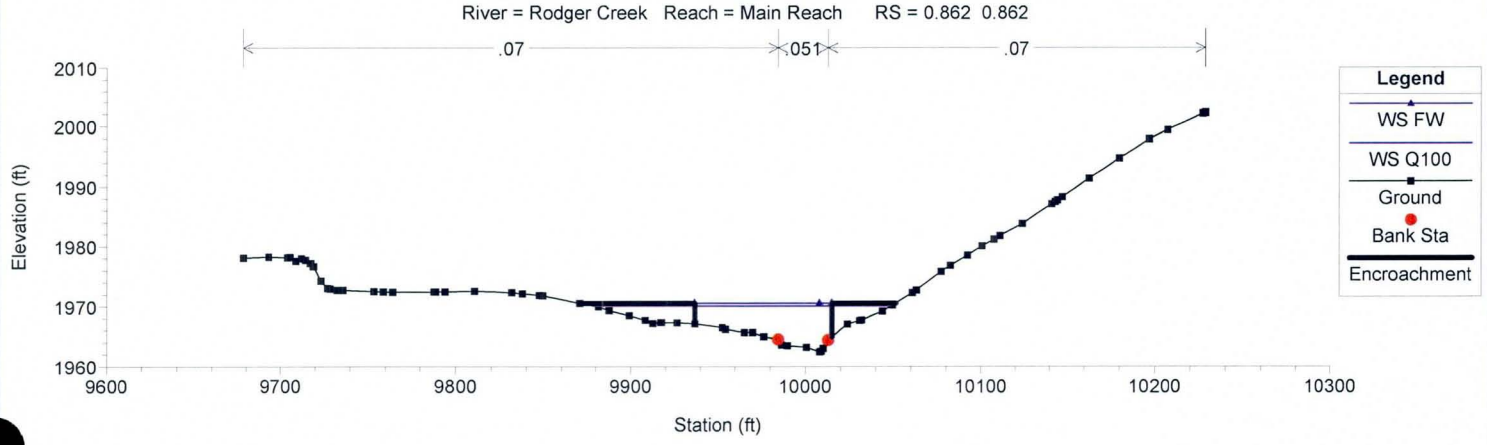
Rodger Creek Plan: Rodger Creek Plan 4/2/2012

River = Rodger Creek Reach = Main Reach RS = 0.769 0.769



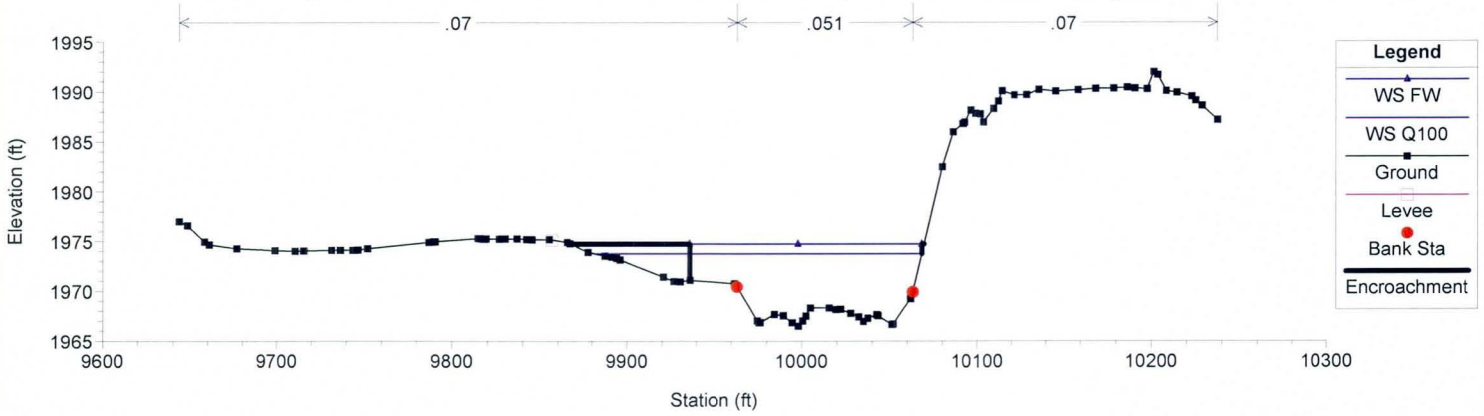
Rodger Creek Plan: Rodger Creek Plan 4/2/2012

River = Rodger Creek Reach = Main Reach RS = 0.862 0.862



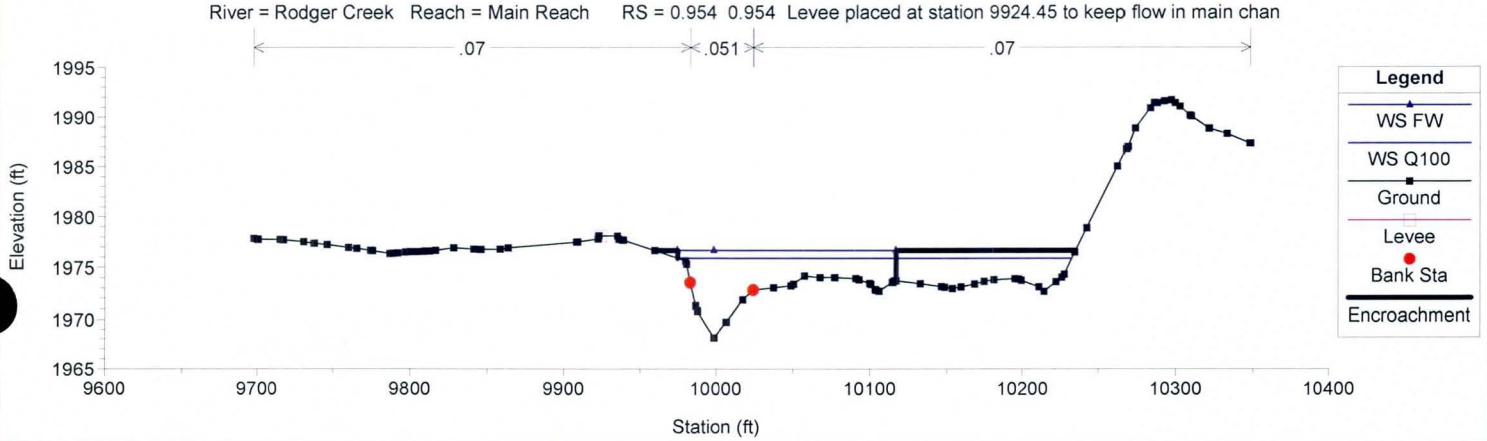
Rodger Creek Plan: Rodger Creek Plan 4/2/2012

River = Rodger Creek Reach = Main Reach RS = 0.913 0.913 Levee placed at station 9856.72 to keep flow in main chan



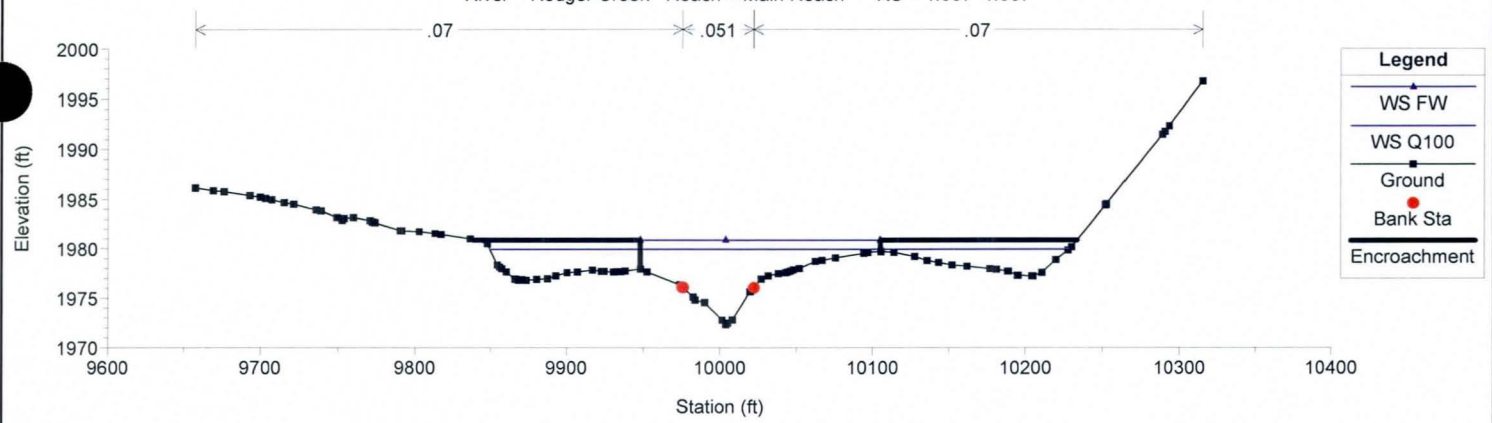
Rodger Creek Plan: Rodger Creek Plan 4/2/2012

River = Rodger Creek Reach = Main Reach RS = 0.954 0.954 Levee placed at station 9924.45 to keep flow in main chan



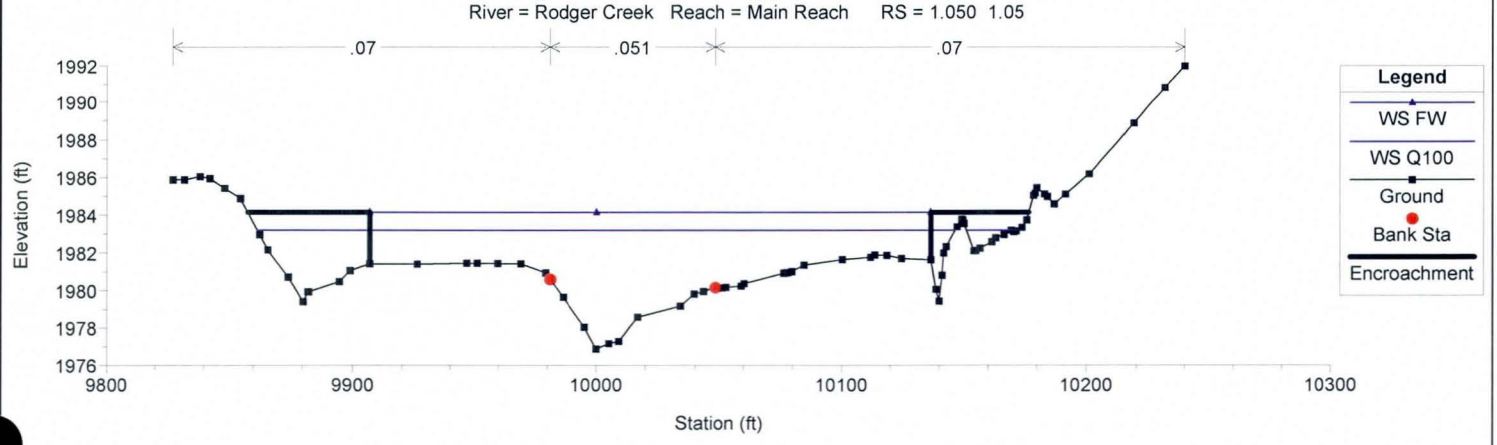
Rodger Creek Plan: Rodger Creek Plan 4/2/2012

River = Rodger Creek Reach = Main Reach RS = 1.007 1.007



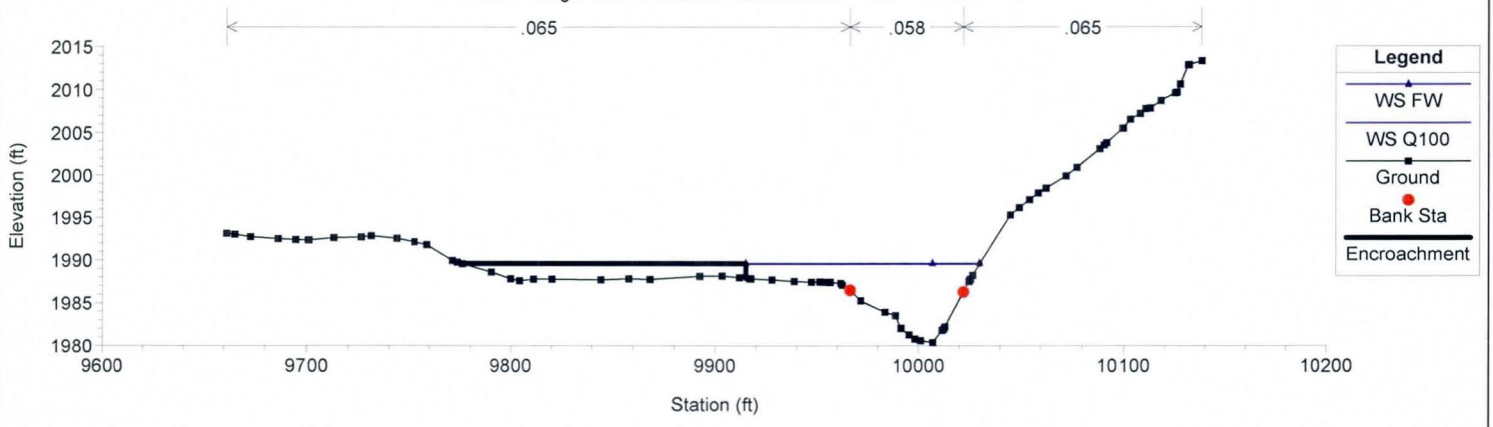
Rodger Creek Plan: Rodger Creek Plan 4/2/2012

River = Rodger Creek Reach = Main Reach RS = 1.050 1.05



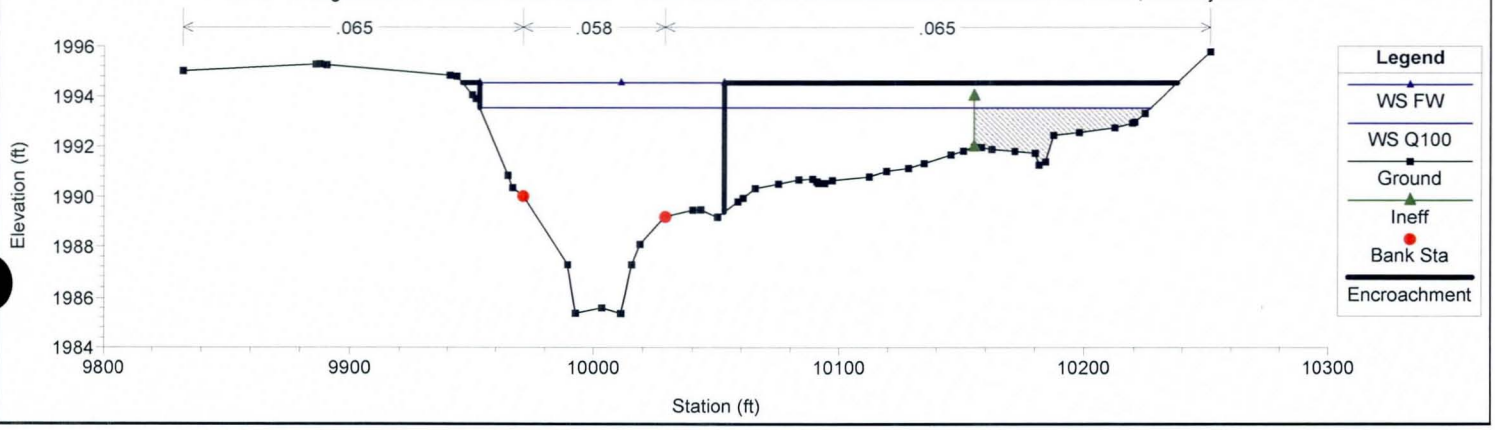
Rodger Creek Plan: Rodger Creek Plan 4/2/2012

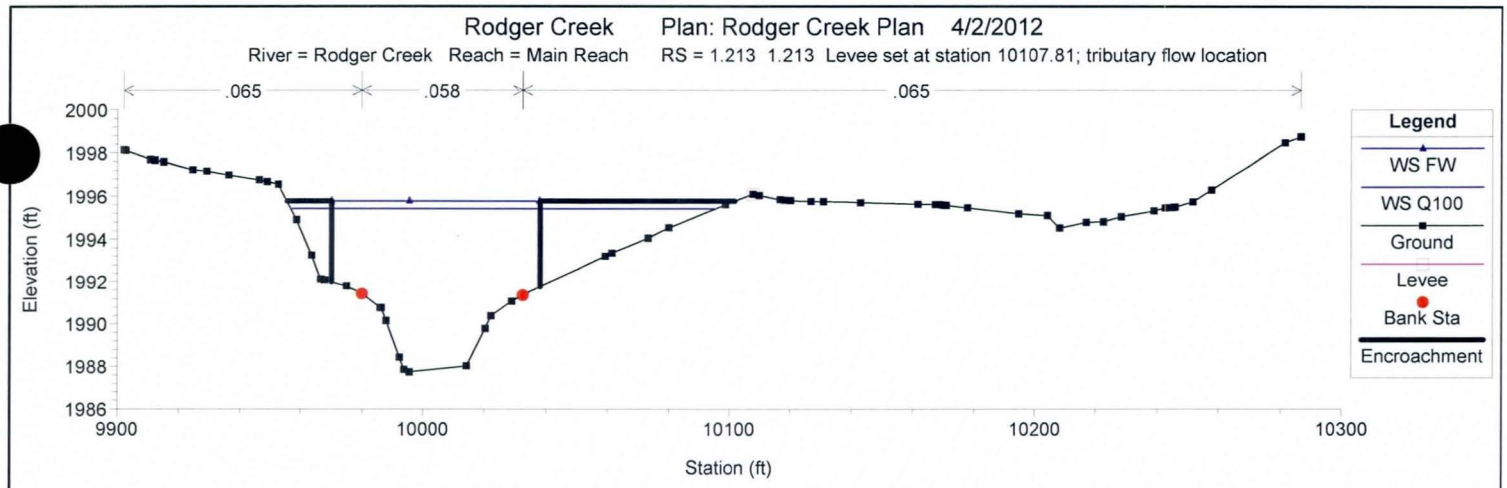
River = Rodger Creek Reach = Main Reach RS = 1.128 1.128

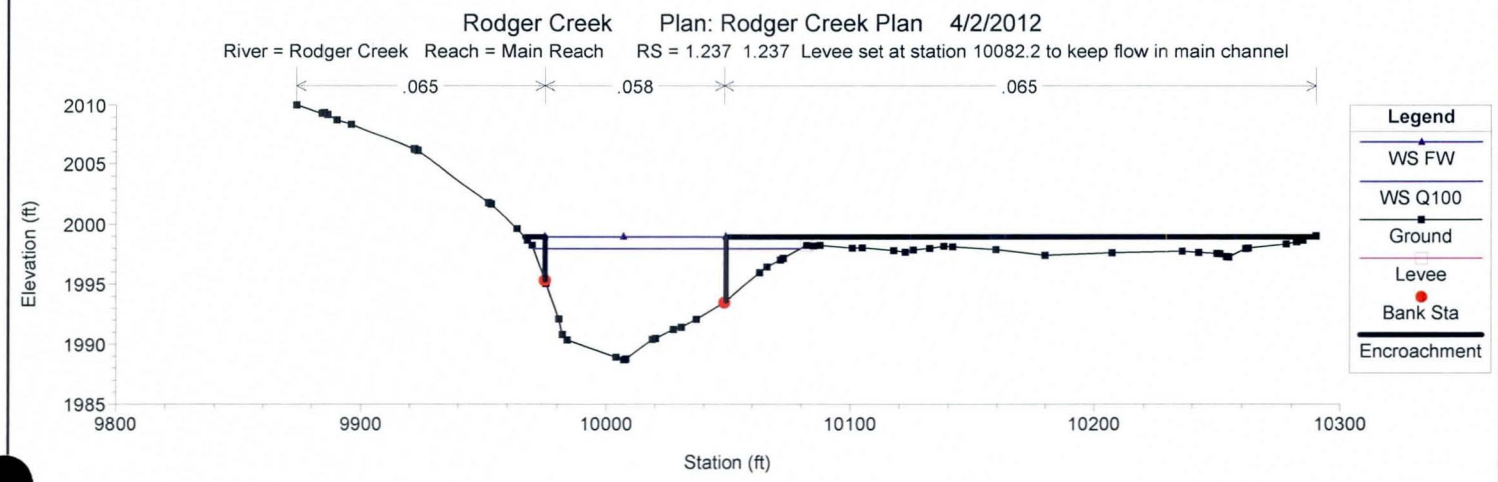


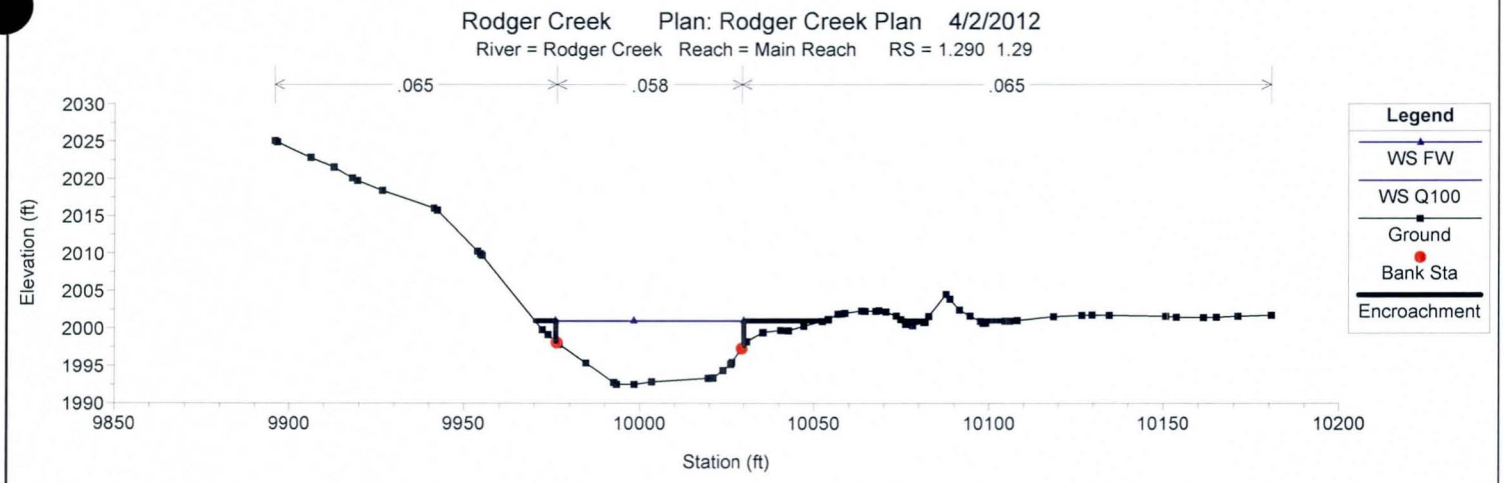
Rodger Creek Plan: Rodger Creek Plan 4/2/2012

River = Rodger Creek Reach = Main Reach RS = 1.184 1.184 Ineffective area set at station 10155.37; tributary flow




Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 1.213 1.213 Levee set at station 10107.81; tributary flow location
.065
.058
.065
Elevation (ft)
2000
1998
1996
1994
1992
1990
1988
1986
9900
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Levee
Bank Sta
Encroachment


Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 1.237 1.237 Levee set at station 10082.2 to keep flow in main channel
.065
.058
.065
Elevation (ft)
2010
2005
2000
1995
1990
1985
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Levee
Bank Sta
Encroachment


Rodger Creek Plan: Rodger Creek Plan 4/2/2012
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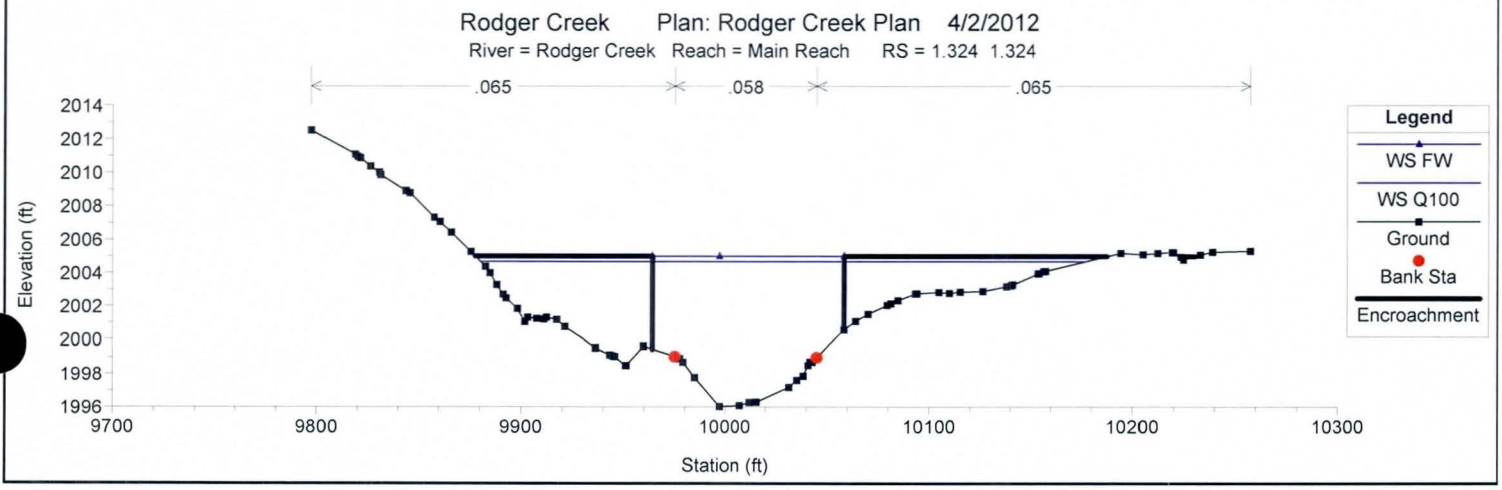
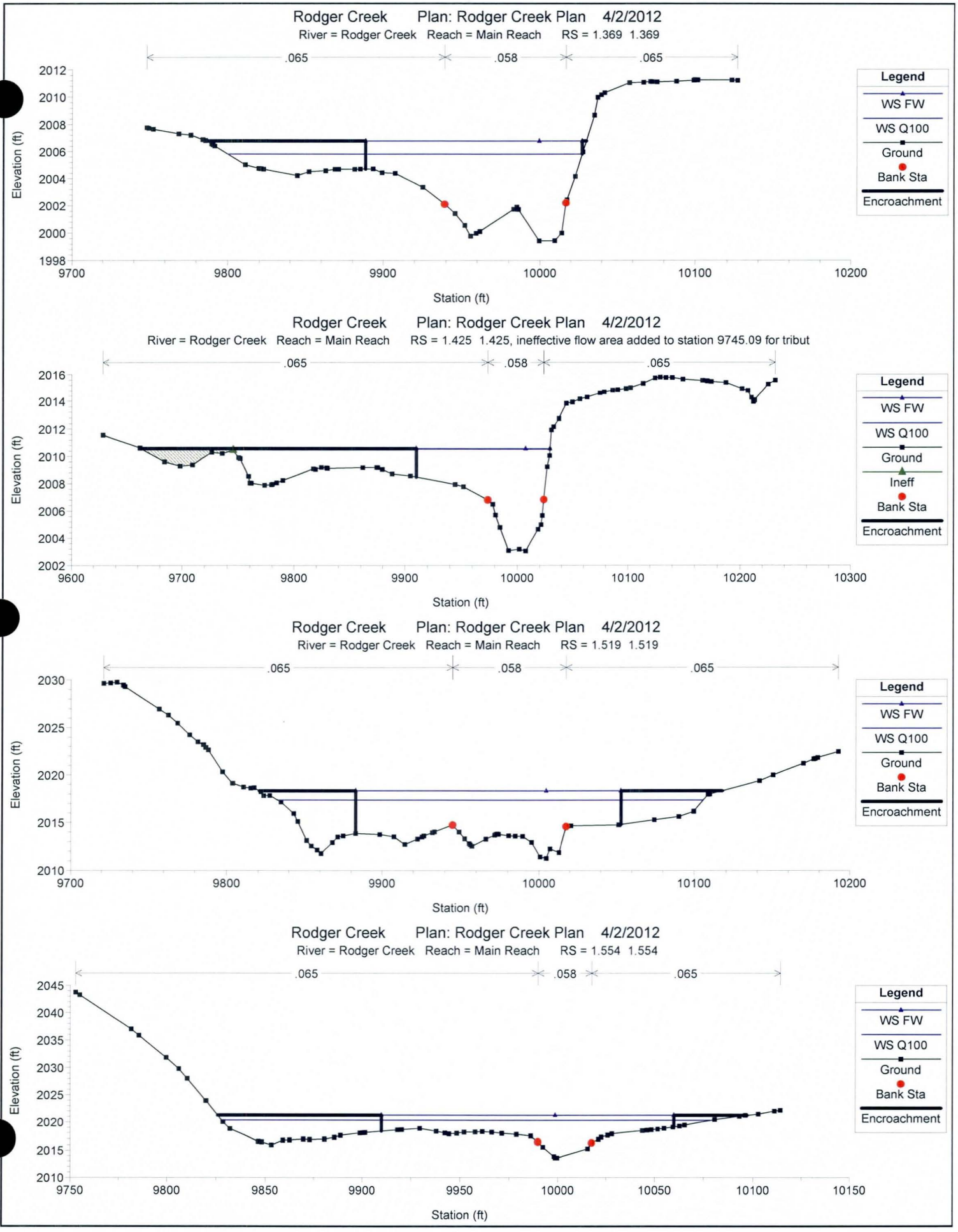
.065
.058
.065
Elevation (ft)
2030
2025
2020
2015
2010
2005
2000
1995
1990
9850
9900
9950
10000
10050
10100
10150
10200
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment


Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 1.324 1.324
.065
.058
.065
Elevation (ft)
2014
2012
2010
2008
2006
2004
2002
2000
1998
1996
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment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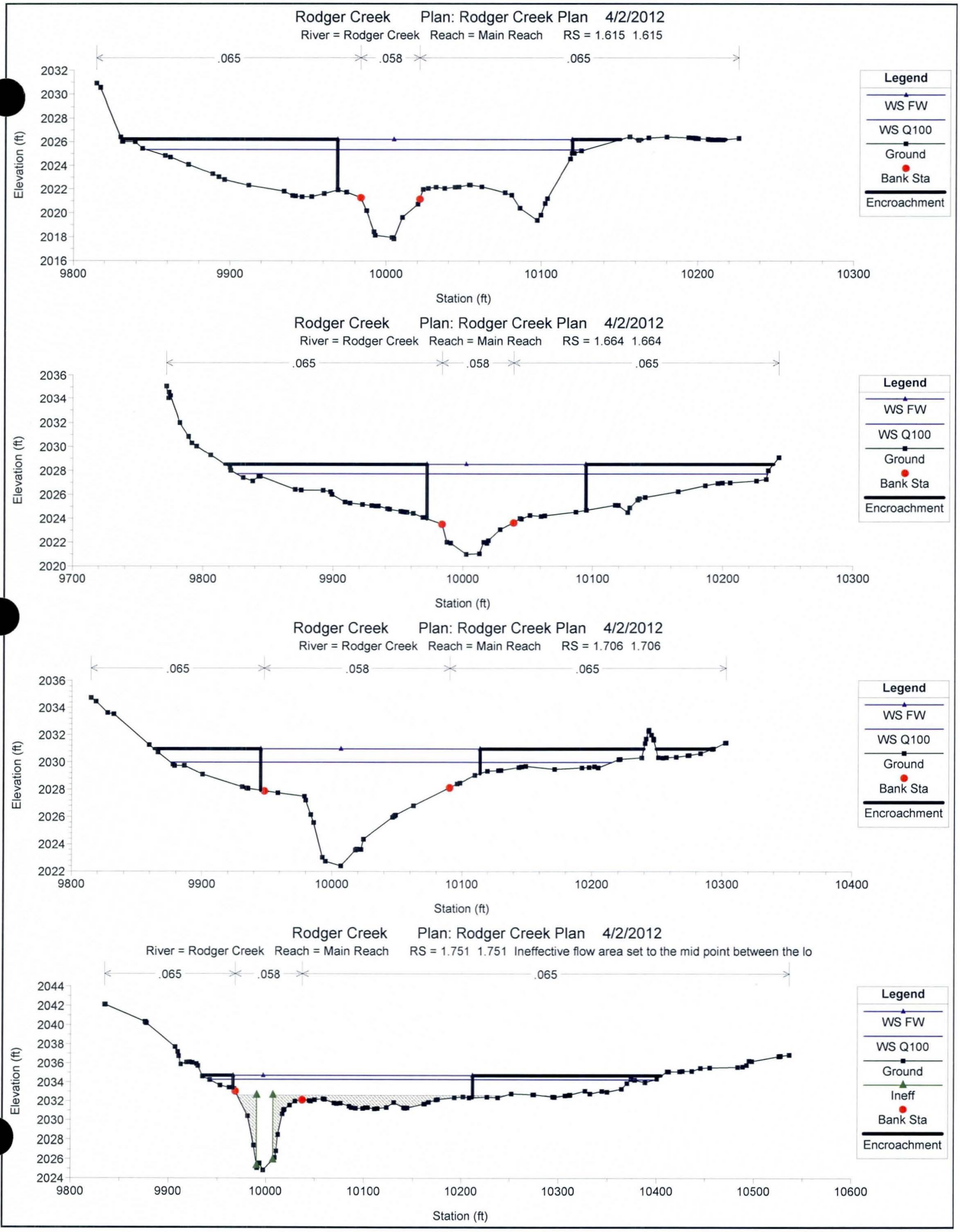
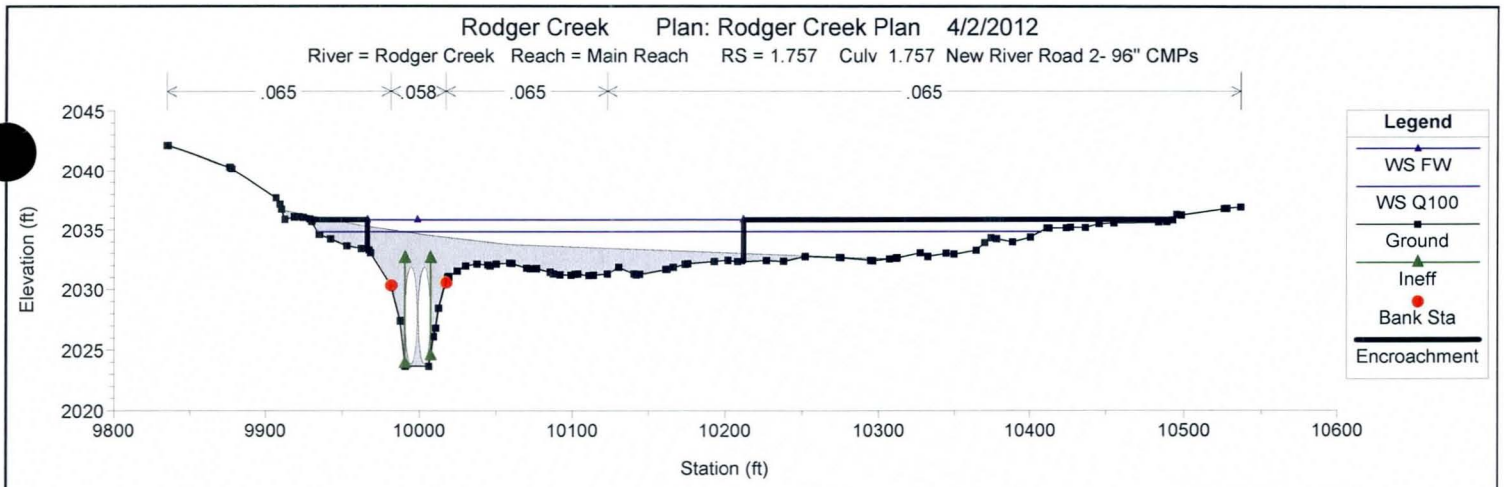
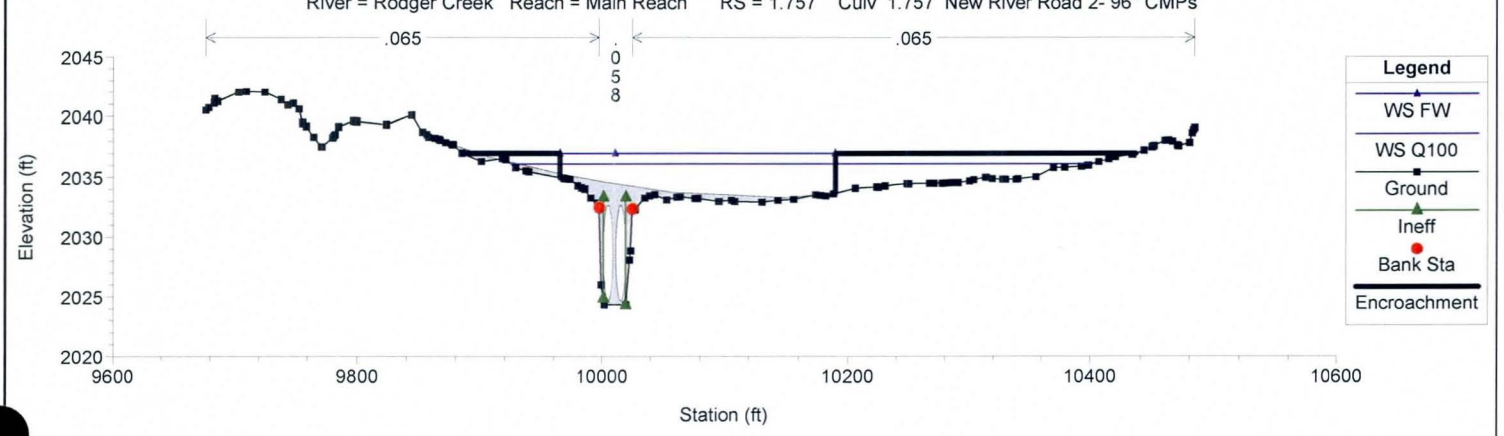
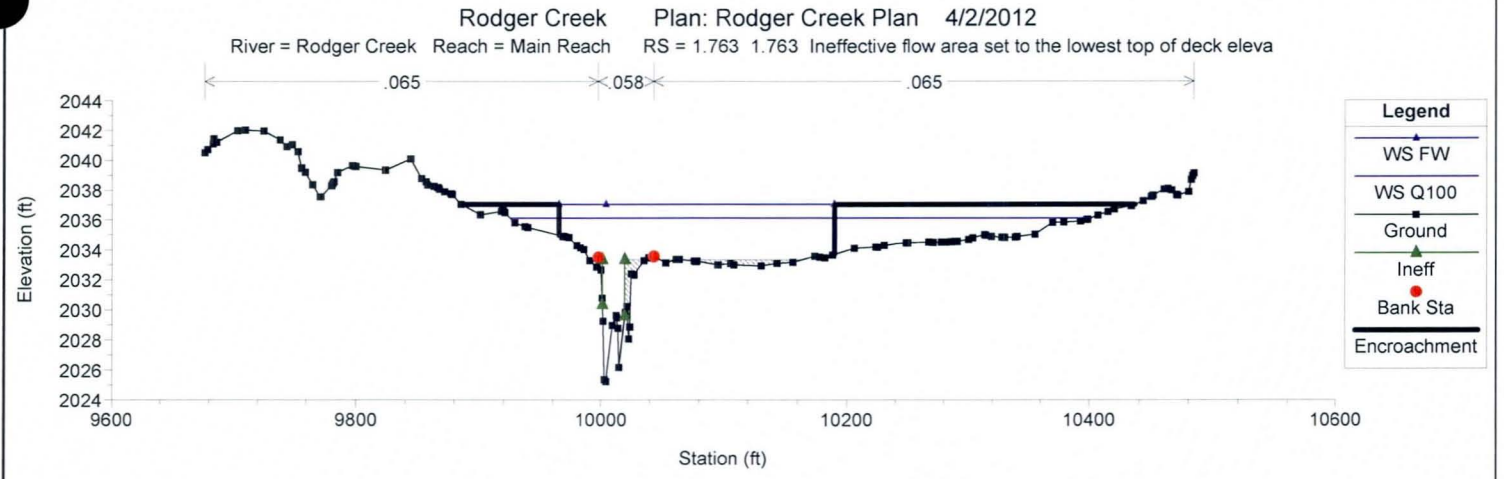
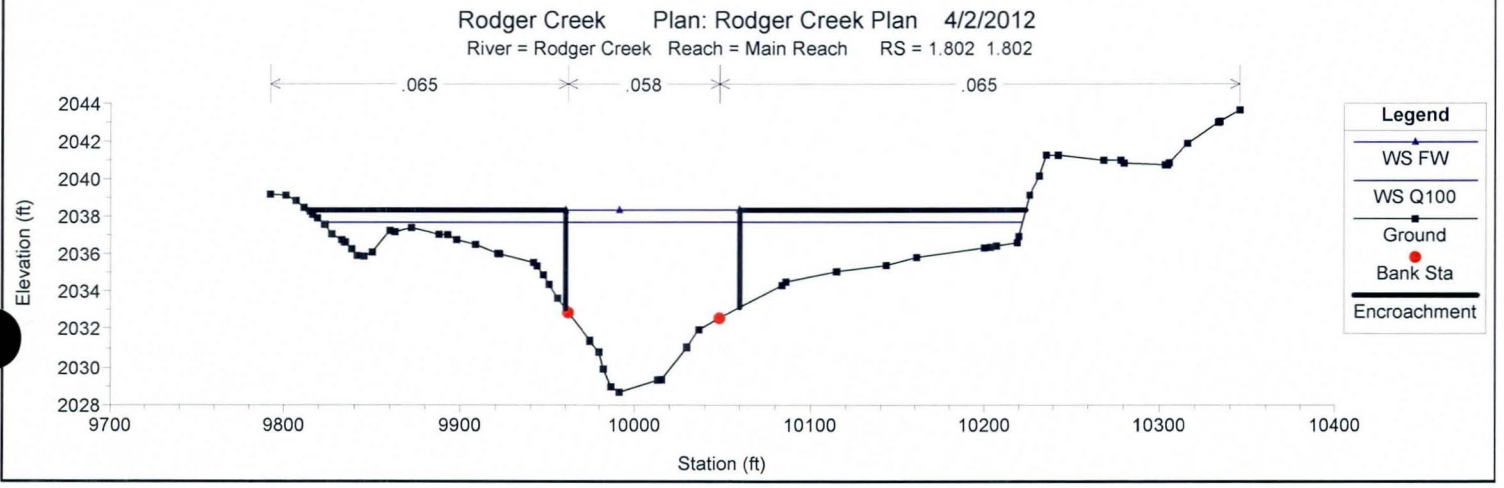
River = Rodger Creek Reach = Main Reach RS = 1.369 1.369
.065
.058
.065
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 1.425 1.425, ineffective flow area added to station 9745.09 for tribut
.065
.058
.065
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Ineff
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 1.519 1.519
.065
.058
.065
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 1.554 1.554
.065
.058
.065
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment

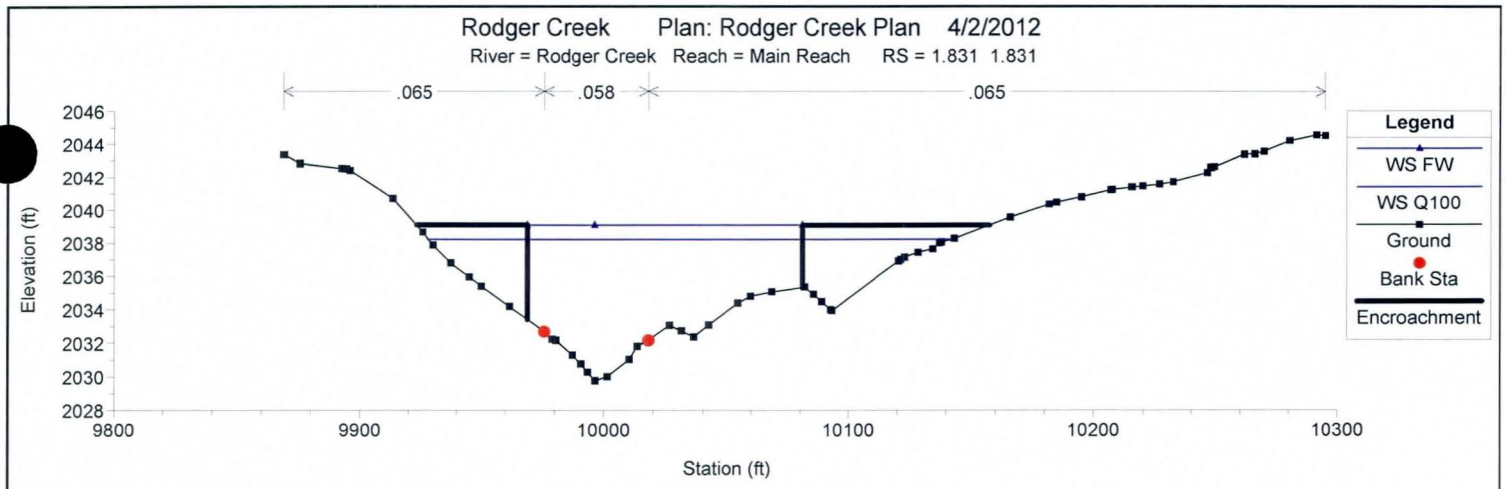

Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 1.615 1.615
.065
.058
.065
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 1.664 1.664
.065
.058
.065
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 1.706 1.706
.065
.058
.065
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 1.751 1.751 Ineffective flow area set to the mid point between the lo
.065
.058
.065
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Ineff
Bank Sta
Encroachment

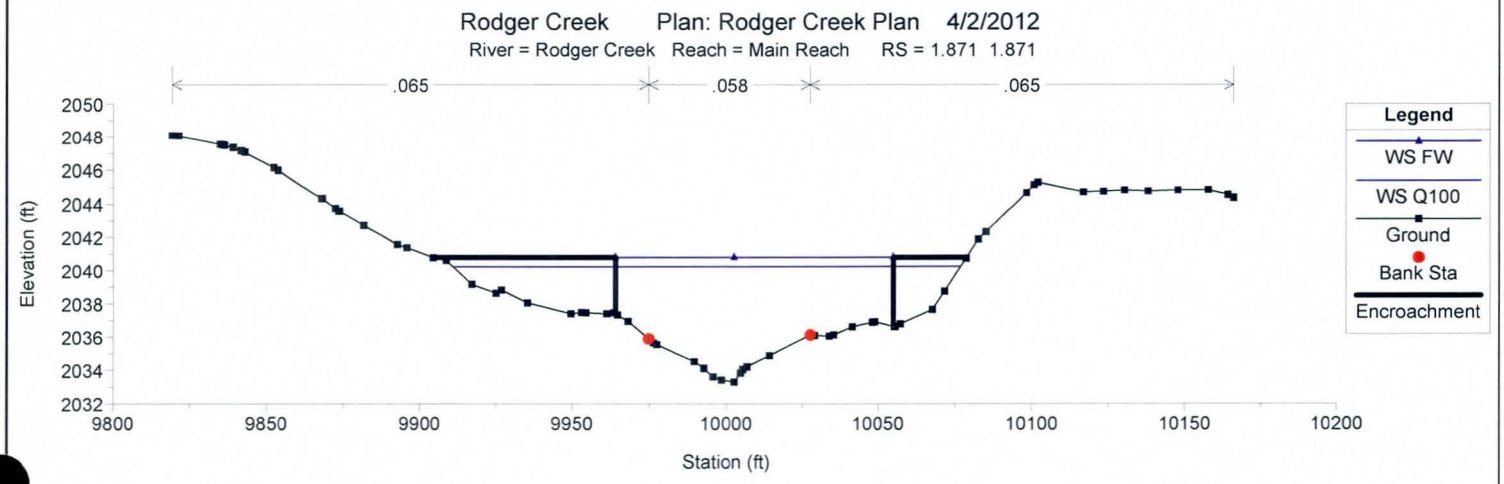

Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 1.757 Culv 1.757 New River Road 2- 96" CMPs
.065
.058
.065
.065
Elevation (ft)
2045
2040
2035
2030
2025
2020
9800
9900
10000
10100
10200
10300
10400
10500
10600
Station (ft)
Legend
WS FW
WS Q100
Ground
Ineff
Bank Sta
Encroachment

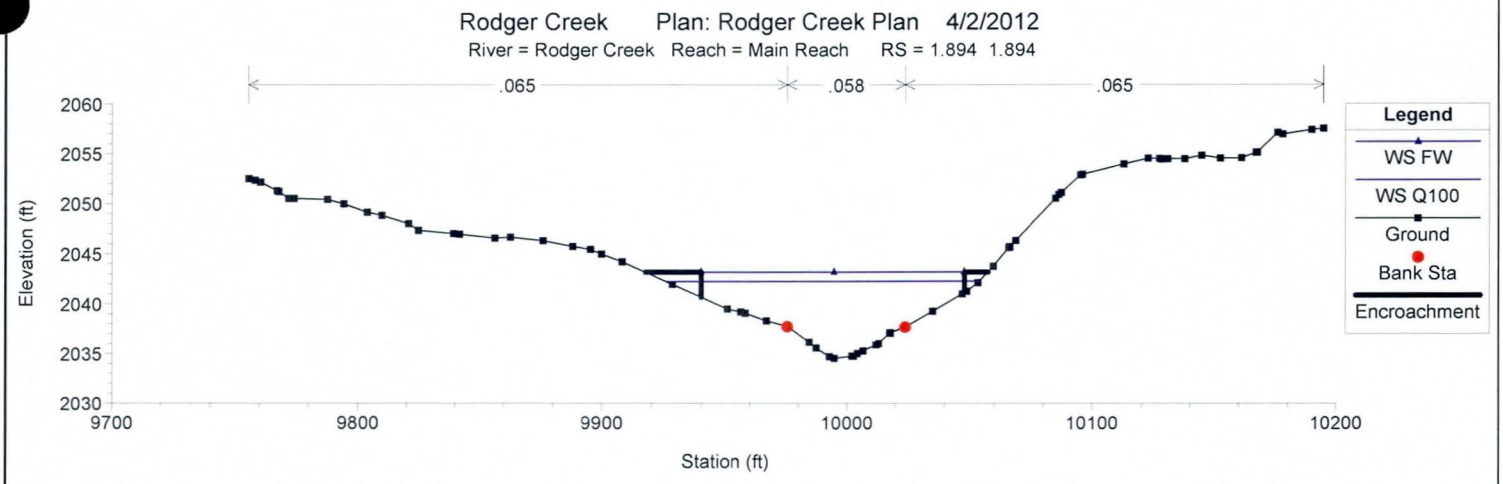

Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 1.757 Culv 1.757 New River Road 2- 96" CMPs
.065
.058
.065
Elevation (ft)
2045
2040
2035
2030
2025
2020
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS FW
WS Q100
Ground
Ineff
Bank Sta
Encroachment

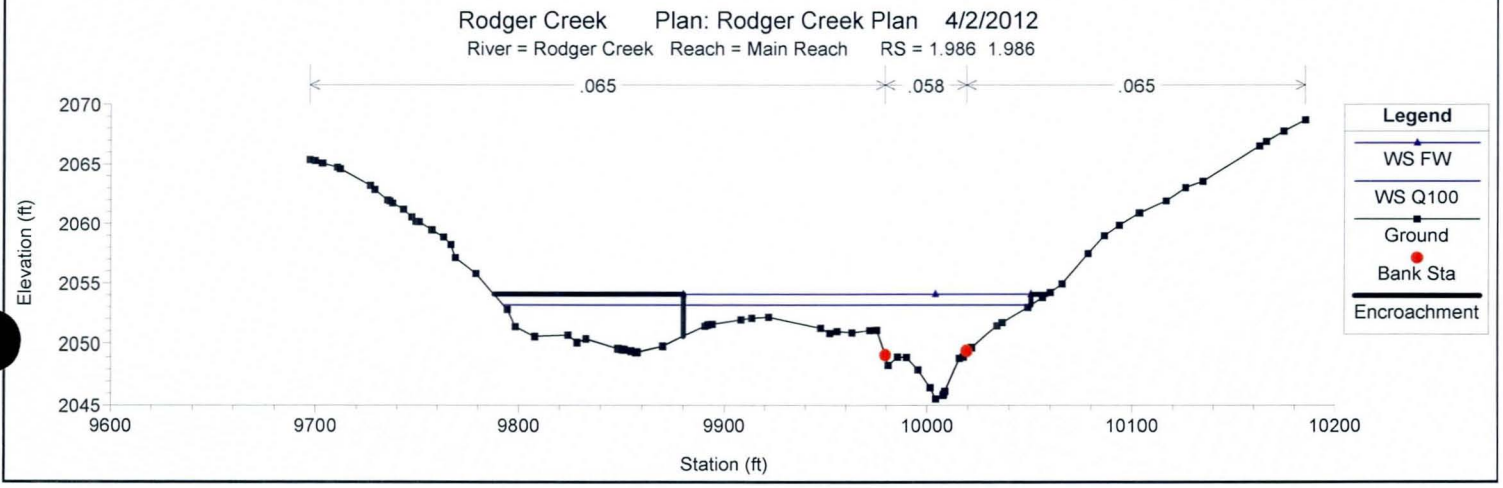

Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 1.763 1.763 Ineffective flow area set to the lowest top of deck eleva
.065
.058
.065
Elevation (ft)
2044
2042
2040
2038
2036
2034
2032
2030
2028
2026
2024
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS FW
WS Q100
Ground
Ineff
Bank Sta
Encroachment

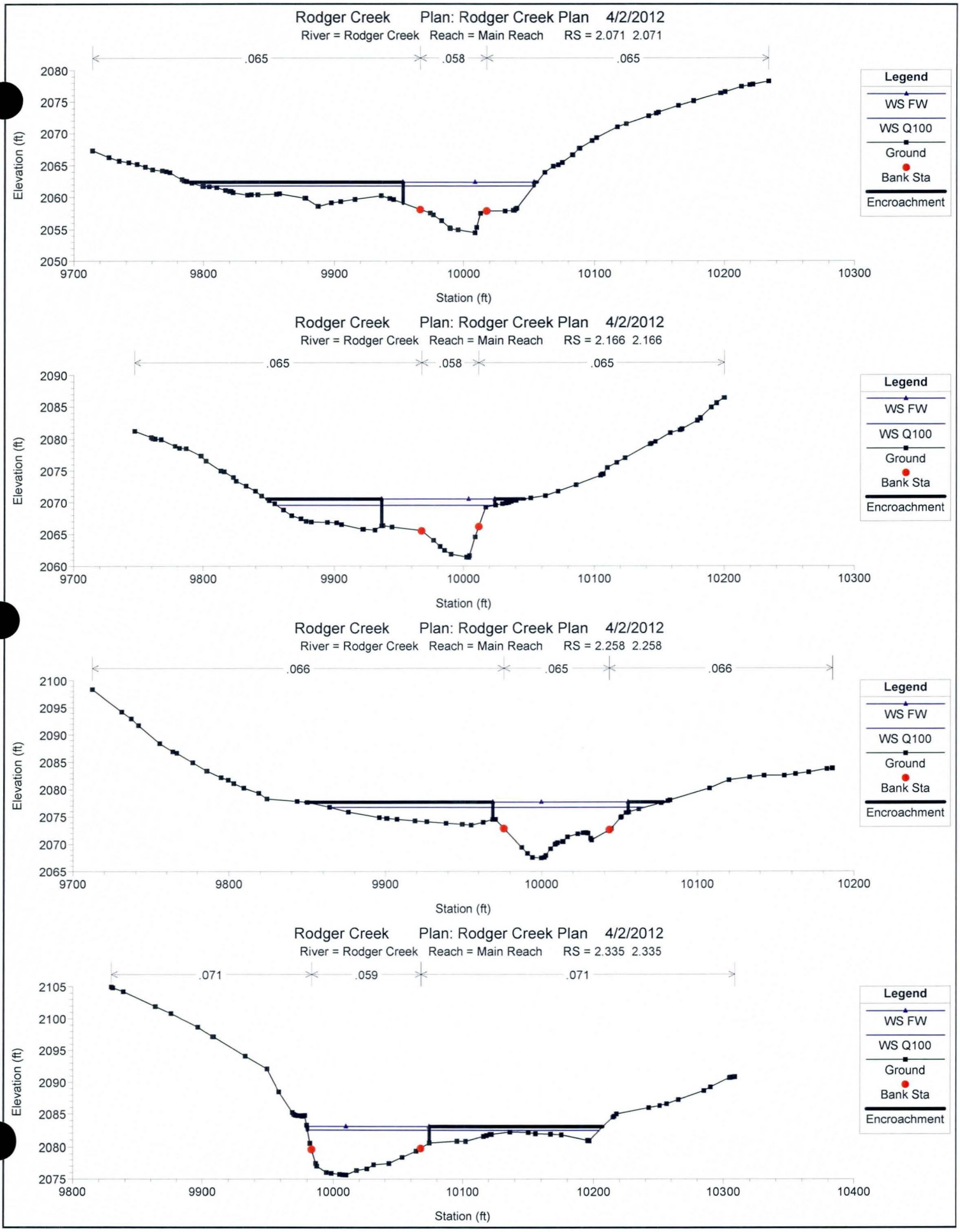

Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 1.802 1.802
.065
.058
.065
Elevation (ft)
2044
2042
2040
2038
2036
2034
2032
2030
2028
9700
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment

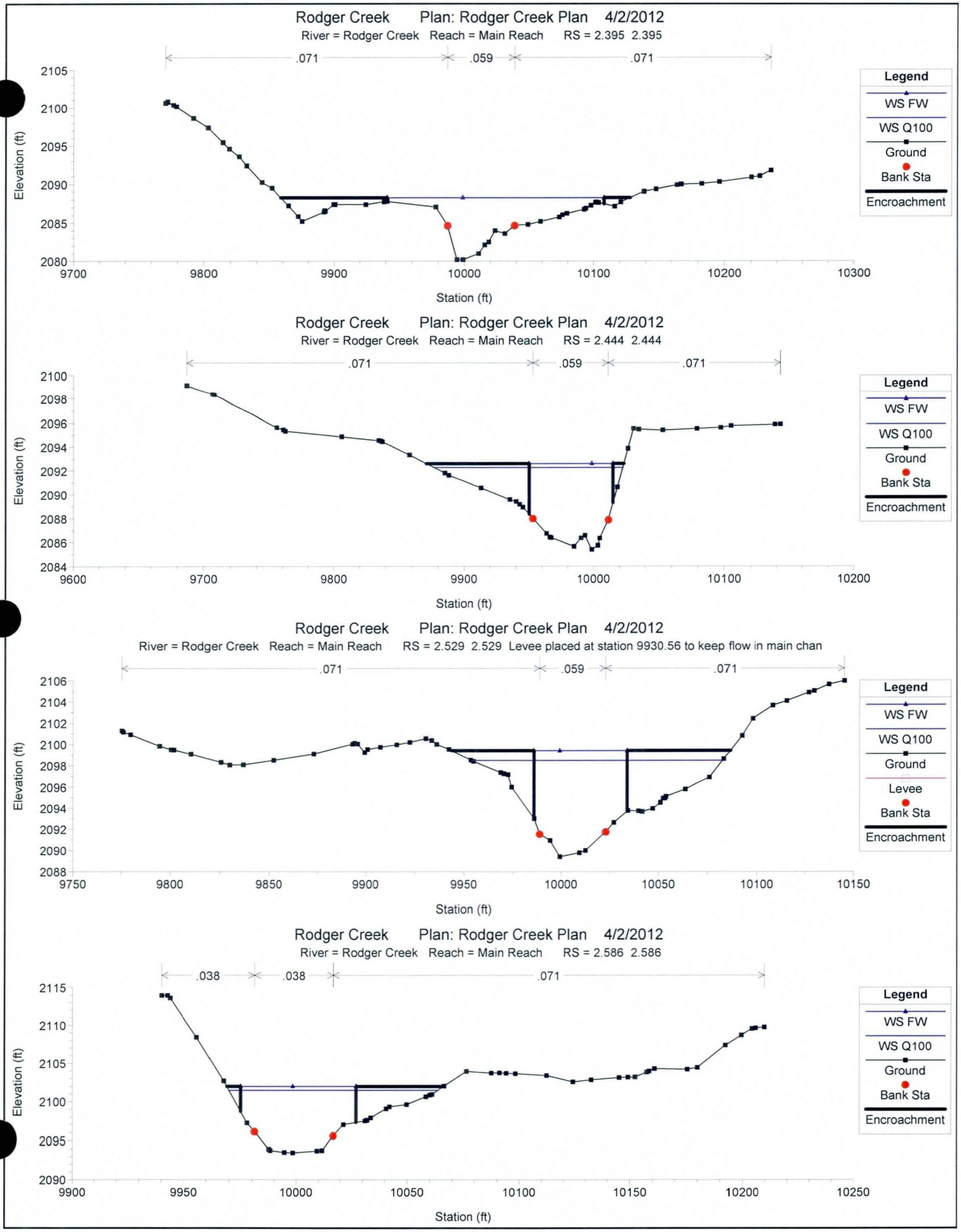

Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 1.831 1.831
.065
.058
.065
Elevation (ft)
2046
2044
2042
2040
2038
2036
2034
2032
2030
2028
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment

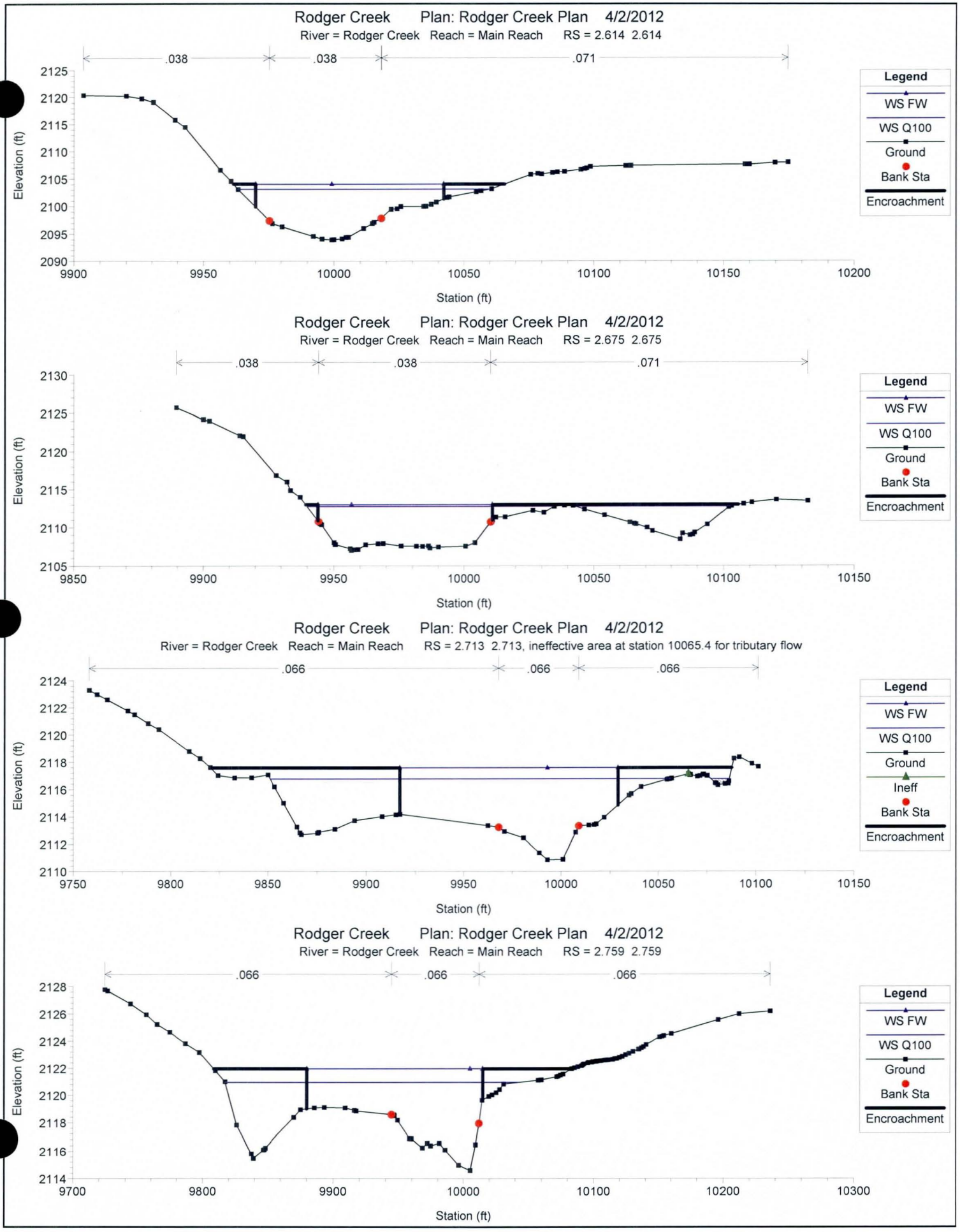

Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 1.871 1.871
.065
.058
.065
Elevation (ft)
2050
2048
2046
2044
2042
2040
2038
2036
2034
2032
9800
9850
9900
9950
10000
10050
10100
10150
10200
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment

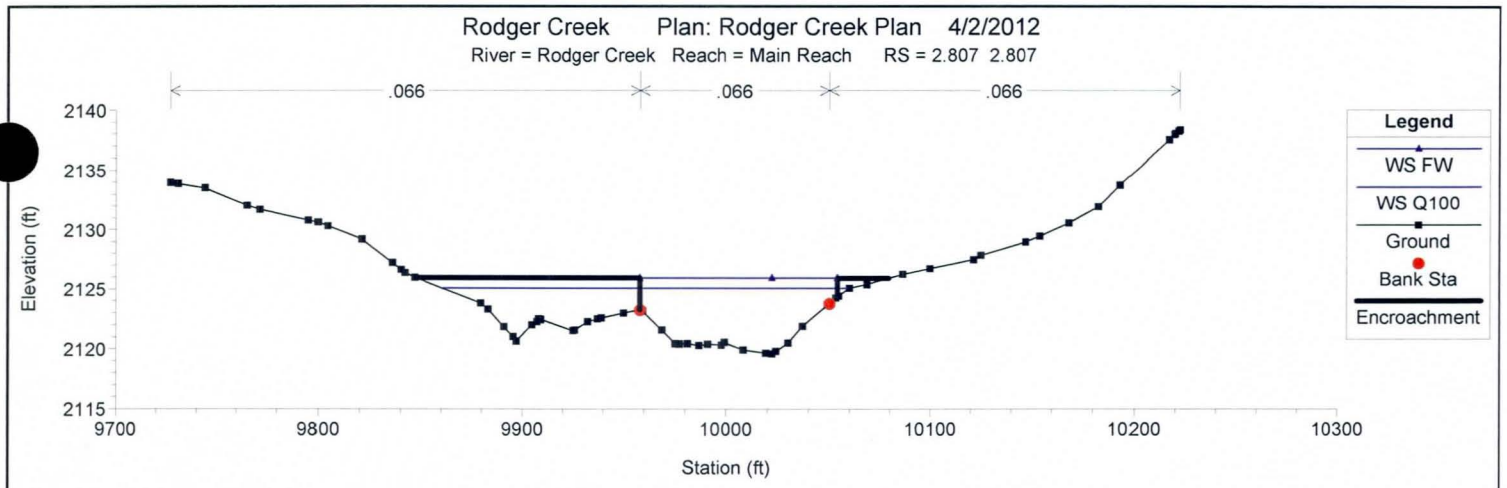

Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 1.894 1.894
.065
.058
.065
Elevation (ft)
2060
2055
2050
2045
2040
2035
2030
9700
9800
9900
10000
10100
10200
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment

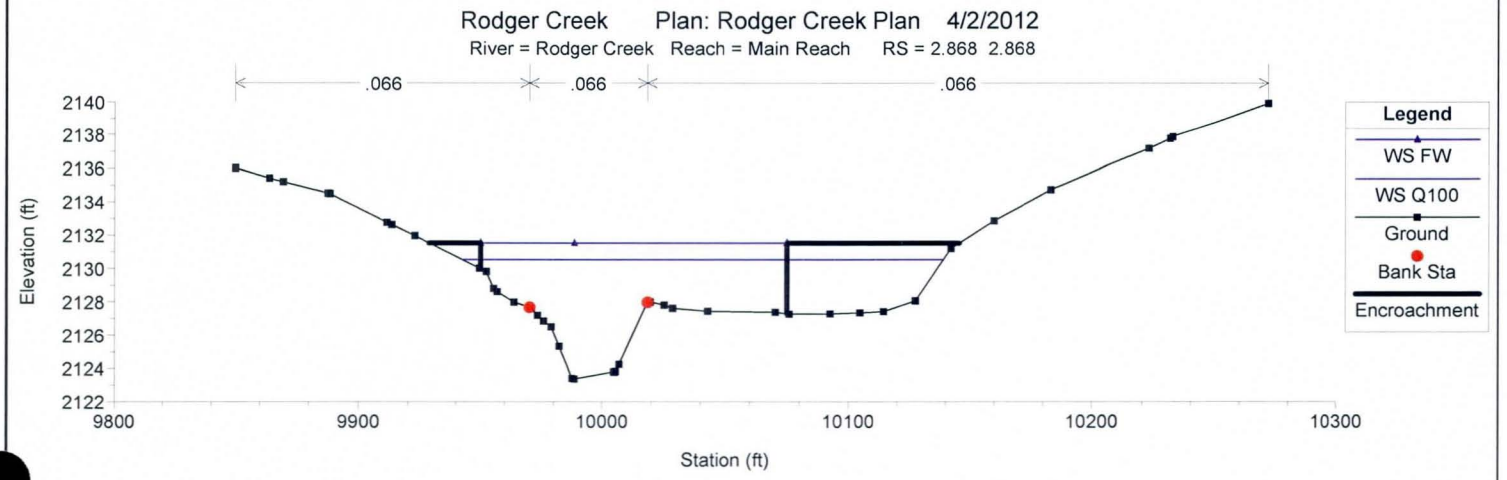

Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 1.986 1.986
.065
.058
.065
Elevation (ft)
2070
2065
2060
2055
2050
2045
9600
9700
9800
9900
10000
10100
10200
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment

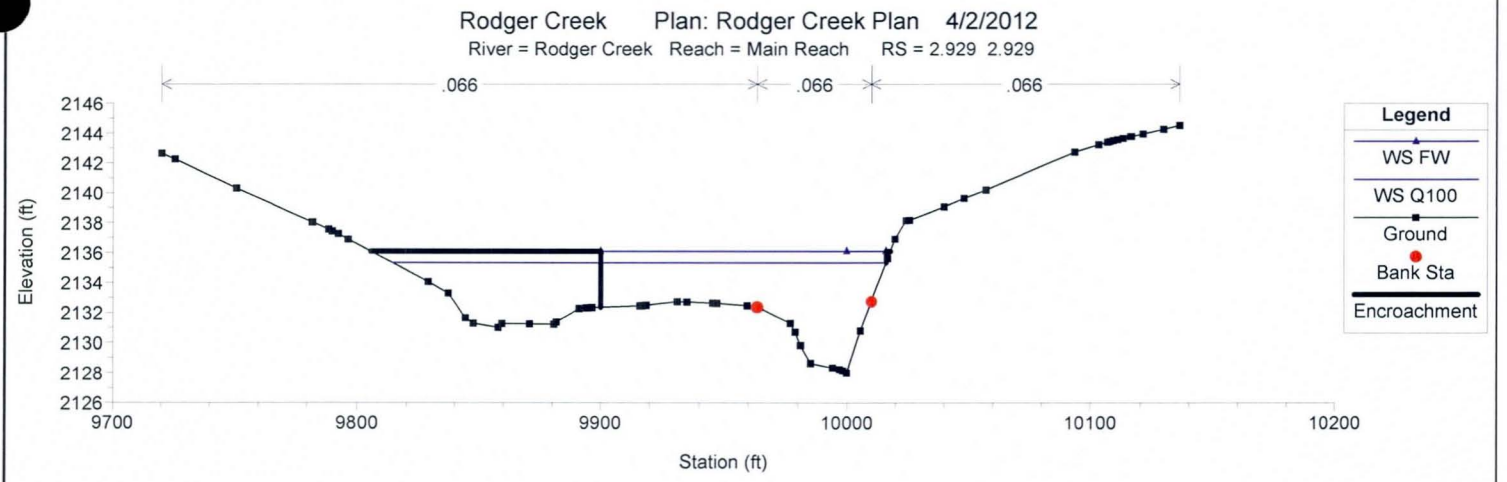

Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 2.071 2.071
.065
.058
.065
Elevation (ft)
2080
2075
2070
2065
2060
2055
2050
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 2.166 2.166
.065
.058
.065
Elevation (ft)
2090
2085
2080
2075
2070
2065
2060
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 2.258 2.258
.066
.065
.066
Elevation (ft)
2100
2095
2090
2085
2080
2075
2070
2065
9700
9800
9900
10000
10100
10200
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 2.335 2.335
.071
.059
.071
Elevation (ft)
2105
2100
2095
2090
2085
2080
2075
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment

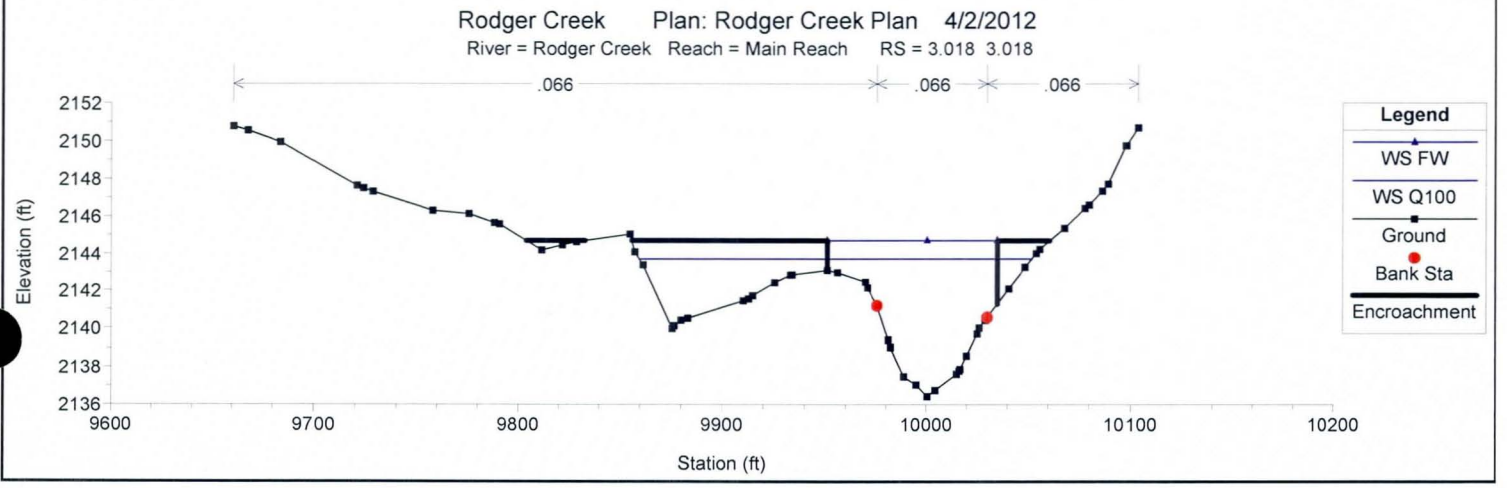

Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 2.395 2.395
.071
.059
.071
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 2.444 2.444
.071
.059
.071
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 2.529 2.529 Levee placed at station 9930.56 to keep flow in main chan
.071
.059
.071
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Levee
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 2.586 2.586
.038
.038
.071
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment

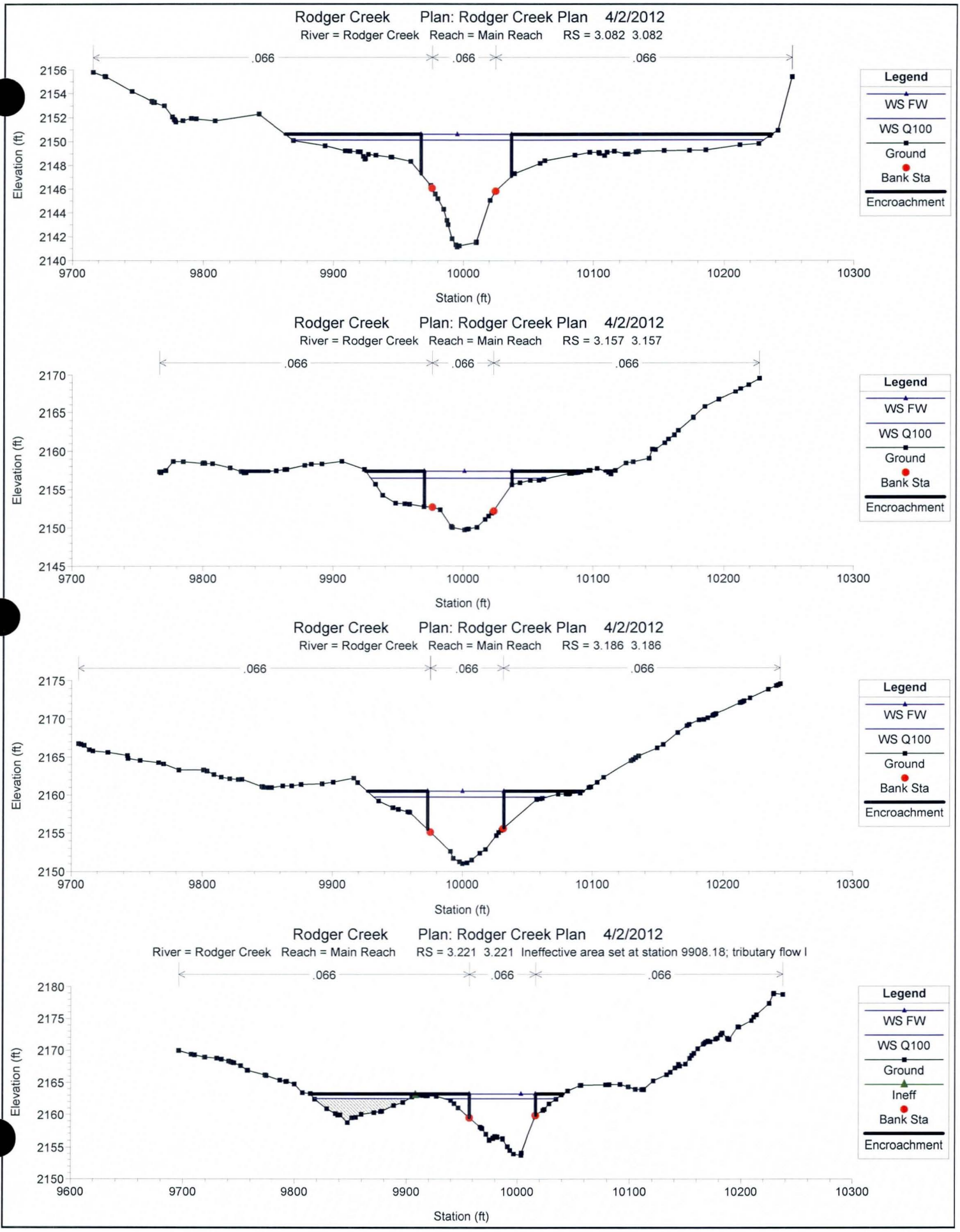

Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 2.614 2.614
.038
.038
.071
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 2.675 2.675
.038
.038
.071
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 2.713 2.713, ineffective area at station 10065.4 for tributary flow
.066
.066
.066
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Ineff
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 2.759 2.759
.066
.066
.066
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment

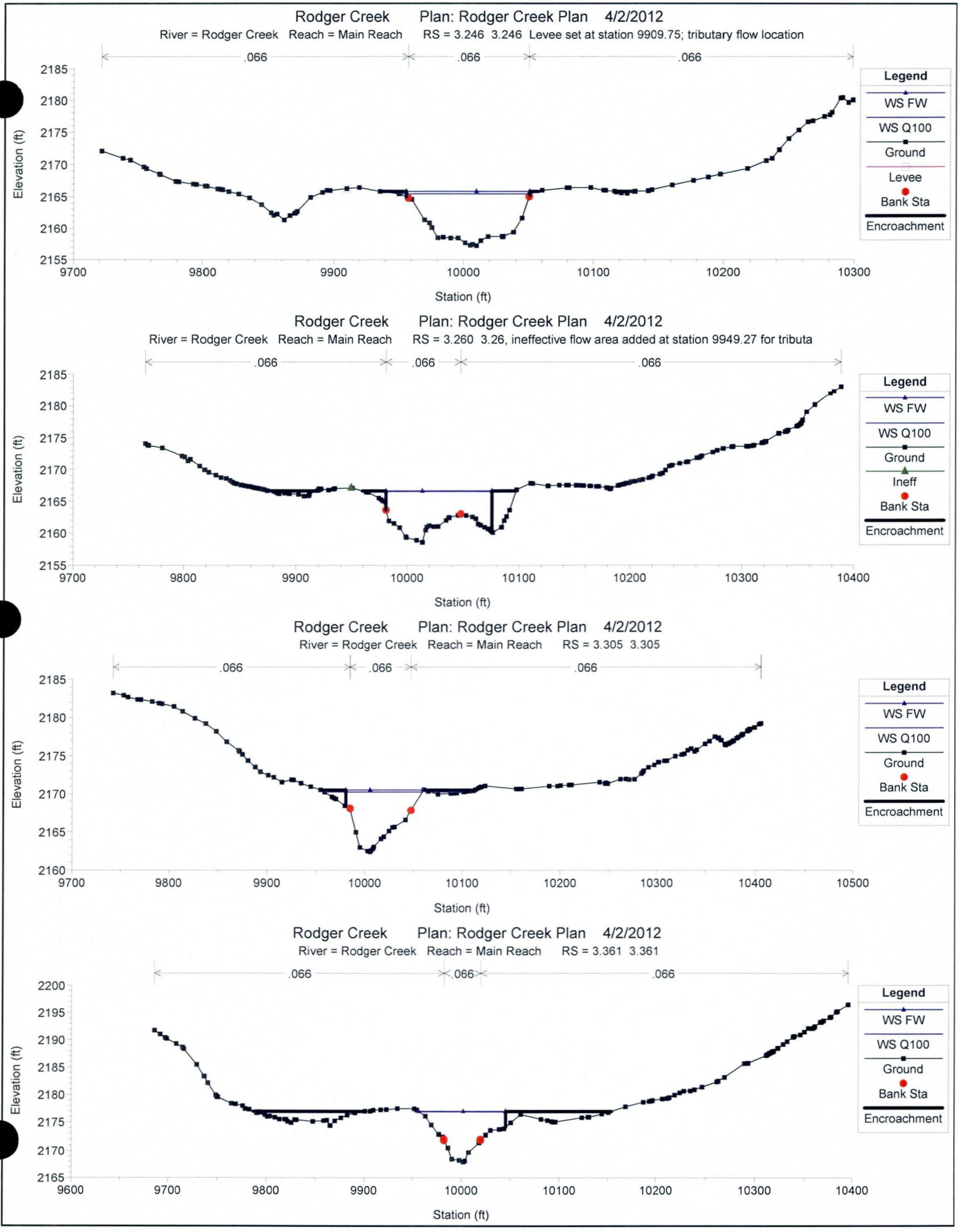

Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 2.807 2.807
.066
.066
.066
Elevation (ft)
2140
2135
2130
2125
2120
2115
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment


Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 2.868 2.868
.066
.066
.066
Elevation (ft)
2140
2138
2136
2134
2132
2130
2128
2126
2124
2122
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment


Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 2.929 2.929
.066
.066
.066
Elevation (ft)
2146
2144
2142
2140
2138
2136
2134
2132
2130
2128
2126
9700
9800
9900
10000
10100
10200
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment

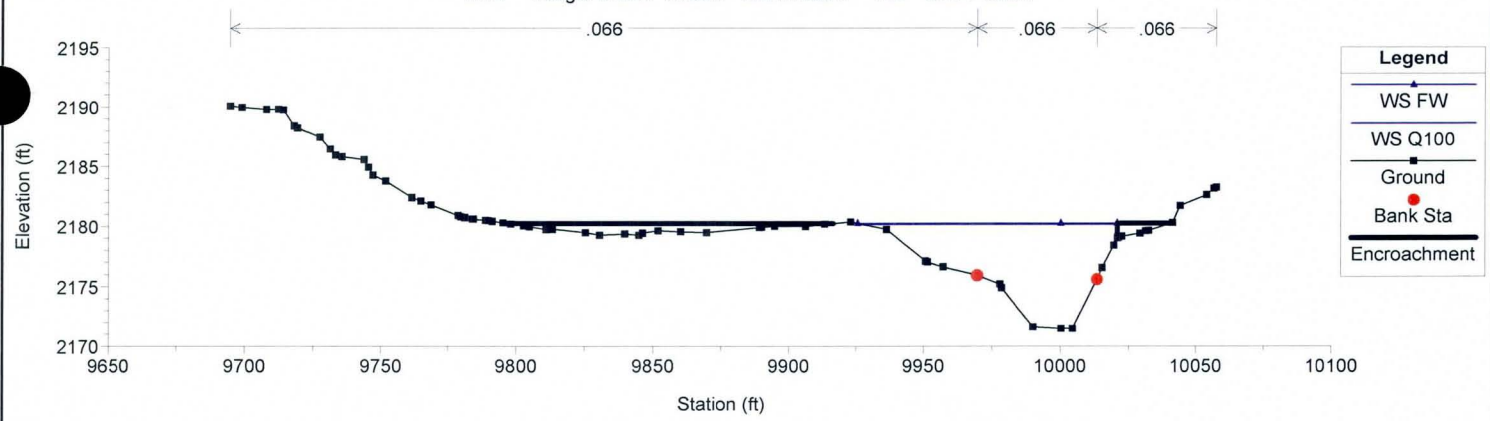

Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 3.018 3.018
.066
.066
.066
Elevation (ft)
2152
2150
2148
2146
2144
2142
2140
2138
2136
9600
9700
9800
9900
10000
10100
10200
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment


Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 3.082 3.082
.066
.066
.066
Elevation (ft)
2156
2154
2152
2150
2148
2146
2144
2142
2140
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 3.157 3.157
.066
.066
.066
Elevation (ft)
2170
2165
2160
2155
2150
2145
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 3.186 3.186
.066
.066
.066
Elevation (ft)
2175
2170
2165
2160
2155
2150
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 3.221 3.221 Ineffective area set at station 9908.18; tributary flow l
.066
.066
.066
Elevation (ft)
2180
2175
2170
2165
2160
2155
2150
9600
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Ineff
Bank Sta
Encroachment


Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 3.246 3.246 Levee set at station 9909.75; tributary flow location
.066
.066
.066
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Levee
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 3.260 3.26, ineffective flow area added at station 9949.27 for tributa
.066
.066
.066
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Ineff
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 3.305 3.305
.066
.066
.066
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 3.361 3.361
.066
.066
.066
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment

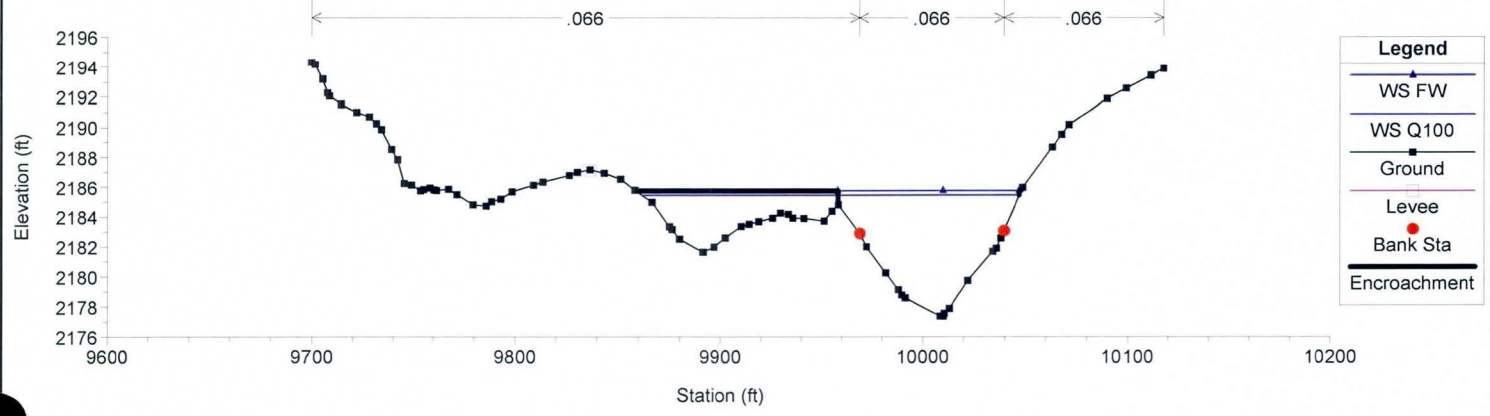
Rodger Creek Plan: Rodger Creek Plan 4/2/2012

River = Rodger Creek Reach = Main Reach RS = 3.394 3.394



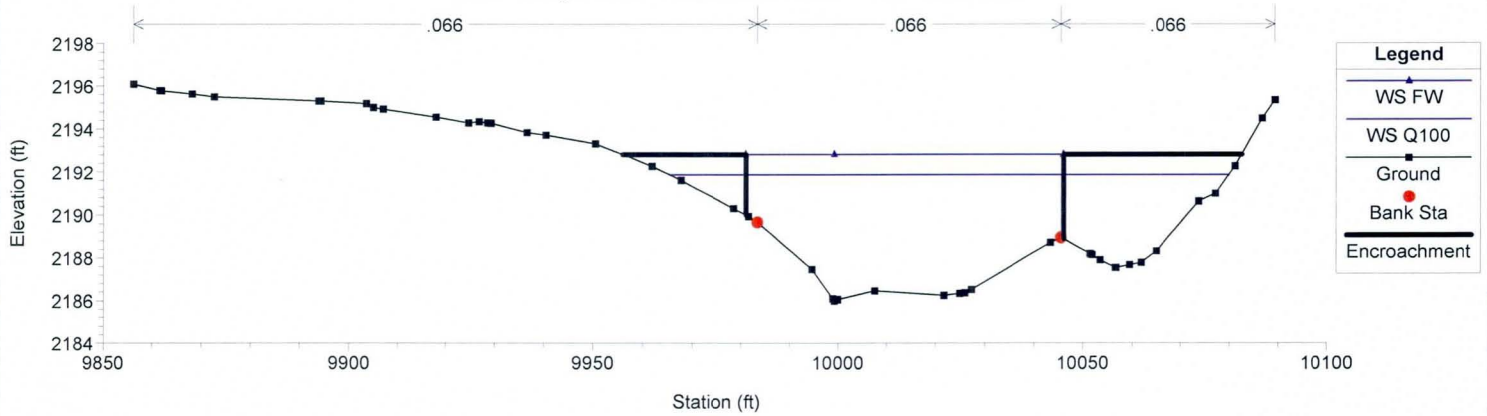
Rodger Creek Plan: Rodger Creek Plan 4/2/2012

River = Rodger Creek Reach = Main Reach RS = 3.449 3.449 Levee placed at station 9836.46 to keep flow in main chan



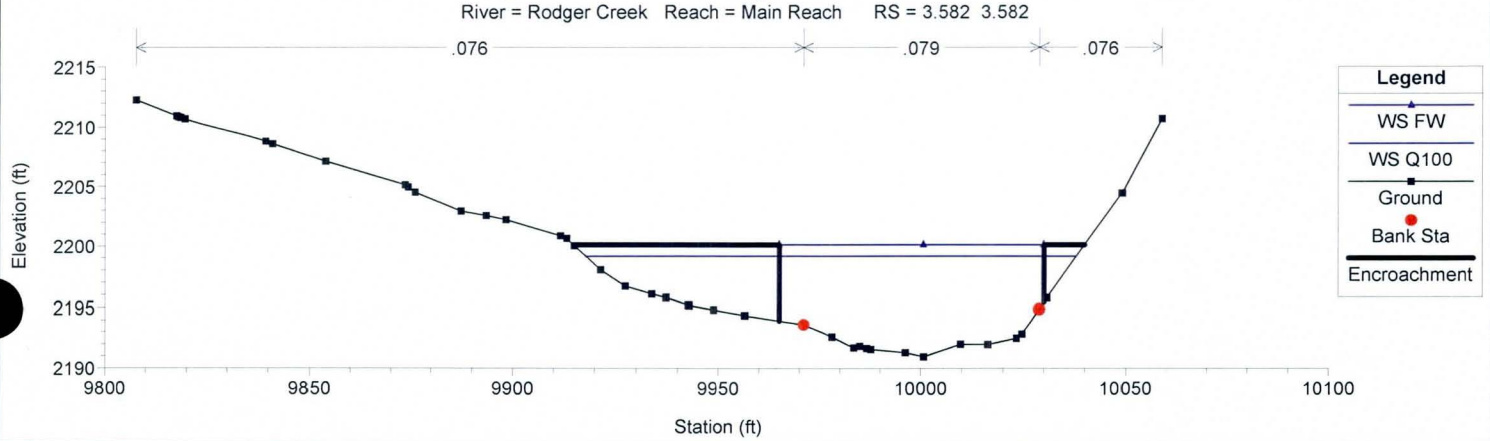
Rodger Creek Plan: Rodger Creek Plan 4/2/2012

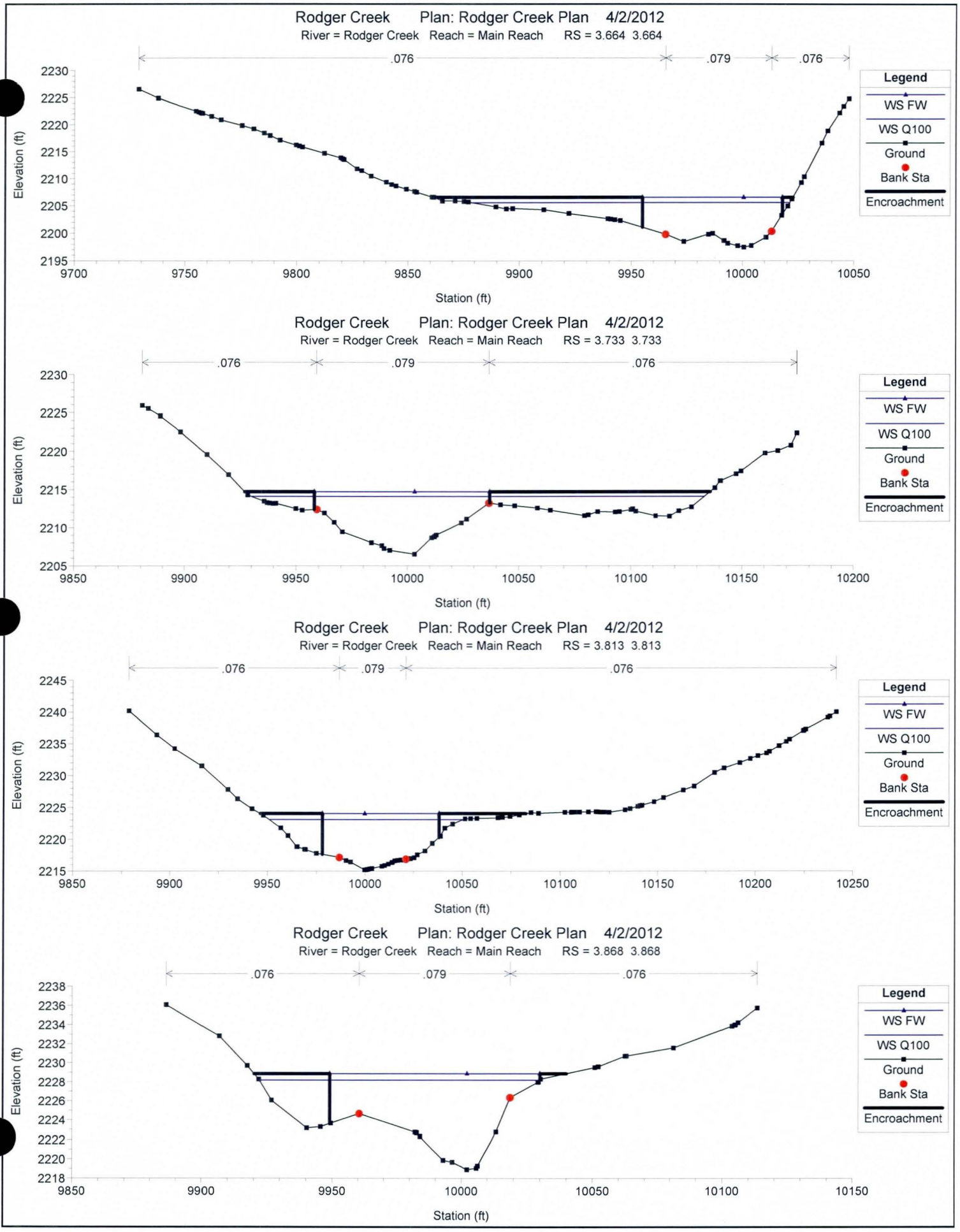
River = Rodger Creek Reach = Main Reach RS = 3.518 3.518

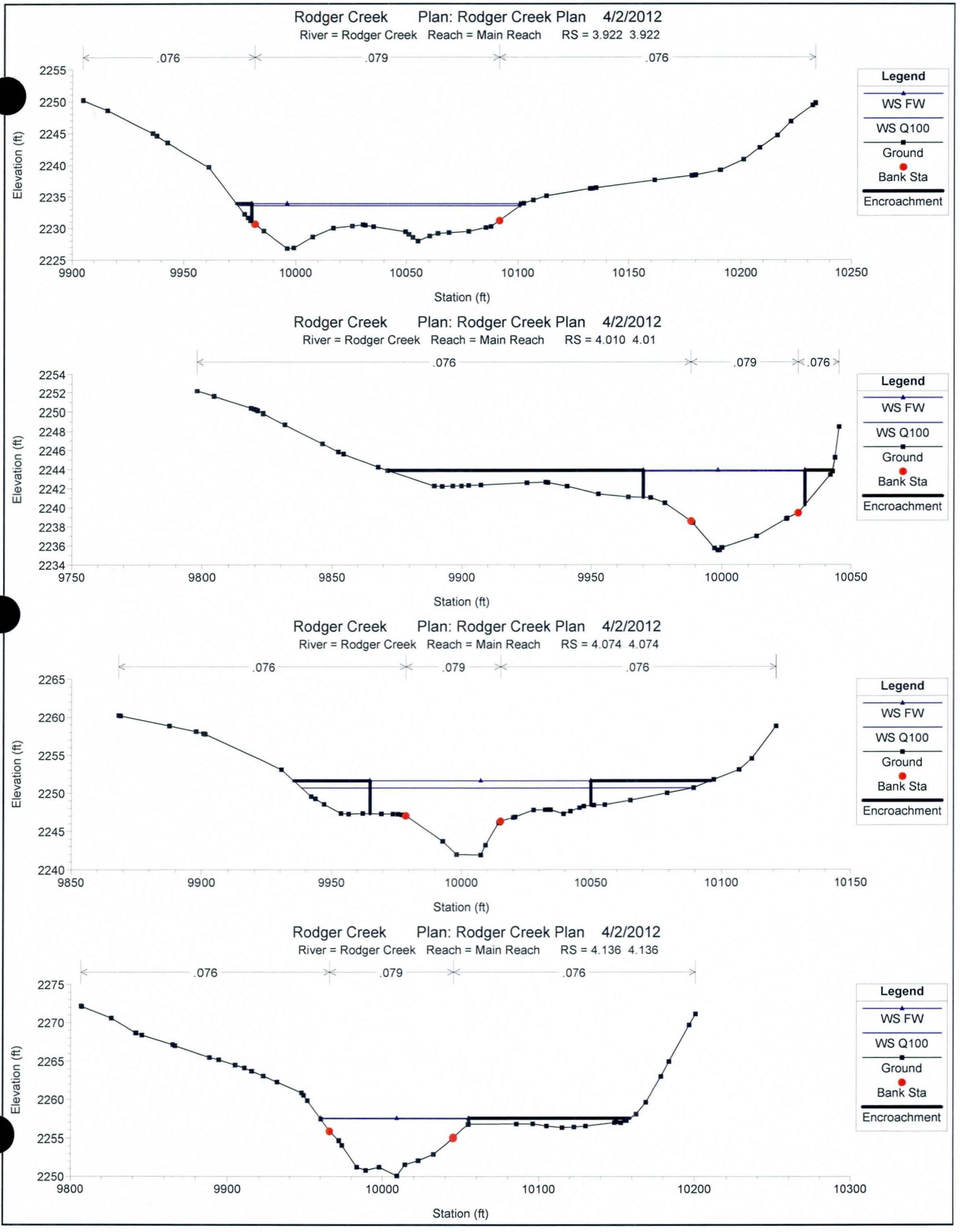


Rodger Creek Plan: Rodger Creek Plan 4/2/2012

River = Rodger Creek Reach = Main Reach RS = 3.582 3.582




Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 3.664 3.664
.076
.079
.076
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 3.733 3.733
.076
.079
.076
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 3.813 3.813
.076
.079
.076
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 3.868 3.868
.076
.079
.076
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment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Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
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Station (ft)
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WS Q100
Ground
Bank Sta
Encroachment
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Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
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River = Rodger Creek Reach = Main Reach RS = 4.136 4.136
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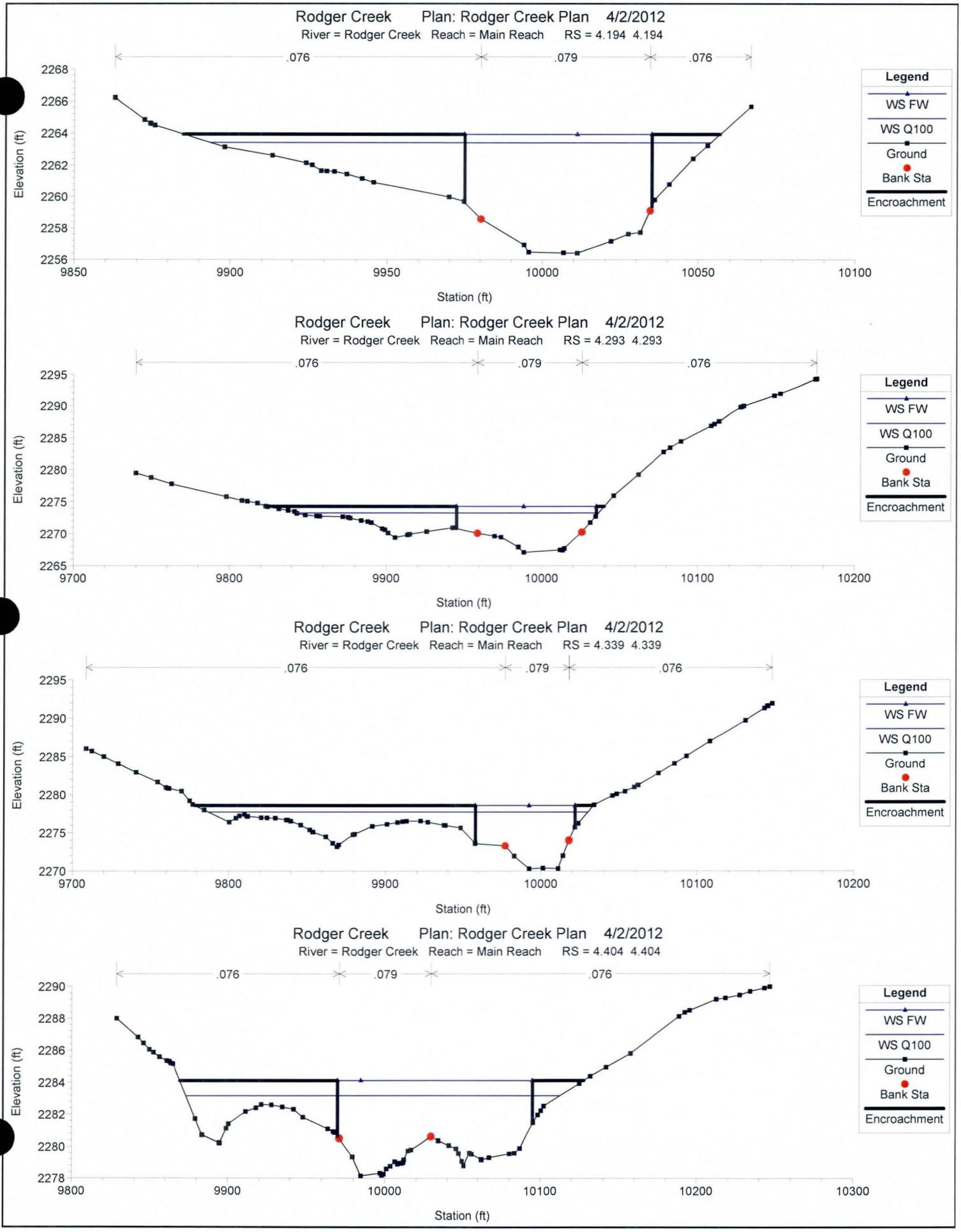
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment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Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
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.079
.076
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
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Elevation (ft)
Station (ft)
Legend
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WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
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Station (ft)
Legend
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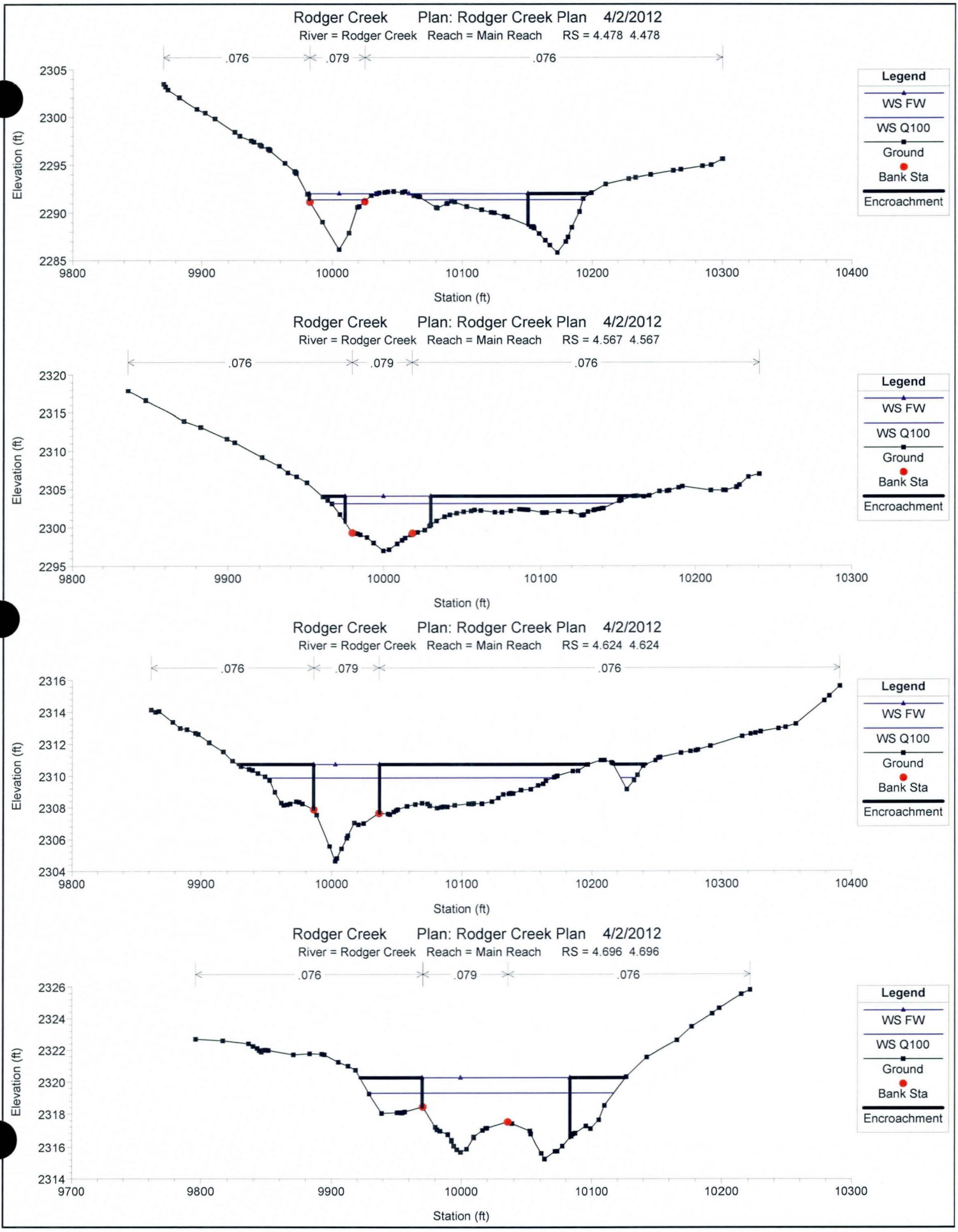
Bank Sta
Encroachment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Elevation (ft)
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2295
2290
2285
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 4.567 4.567
.076
.079
.076
Elevation (ft)
2320
2315
2310
2305
2300
2295
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
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.076
.079
.076
Elevation (ft)
2316
2314
2312
2310
2308
2306
2304
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 4.696 4.696
.076
.079
.076
Elevation (ft)
2326
2324
2322
2320
2318
2316
2314
9700
9800
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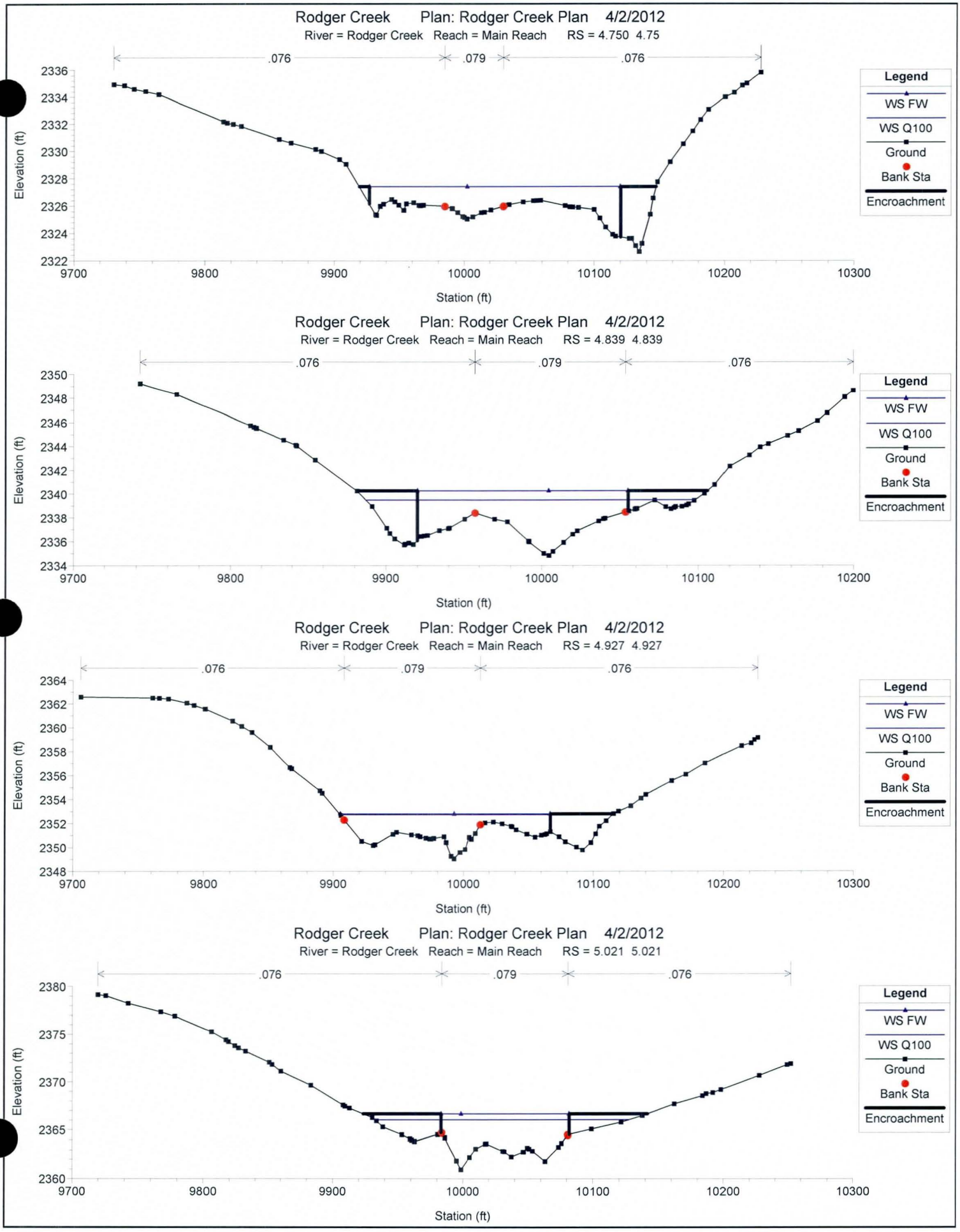
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment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2332
2330
2328
2326
2324
2322
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 4.839 4.839
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.079
.076
Elevation (ft)
2350
2348
2346
2344
2342
2340
2338
2336
2334
9700
9800
9900
10000
10100
10200
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 4.927 4.927
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.079
.076
Elevation (ft)
2364
2362
2360
2358
2356
2354
2352
2350
2348
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 5.021 5.021
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.076
Elevation (ft)
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2375
2370
2365
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10000
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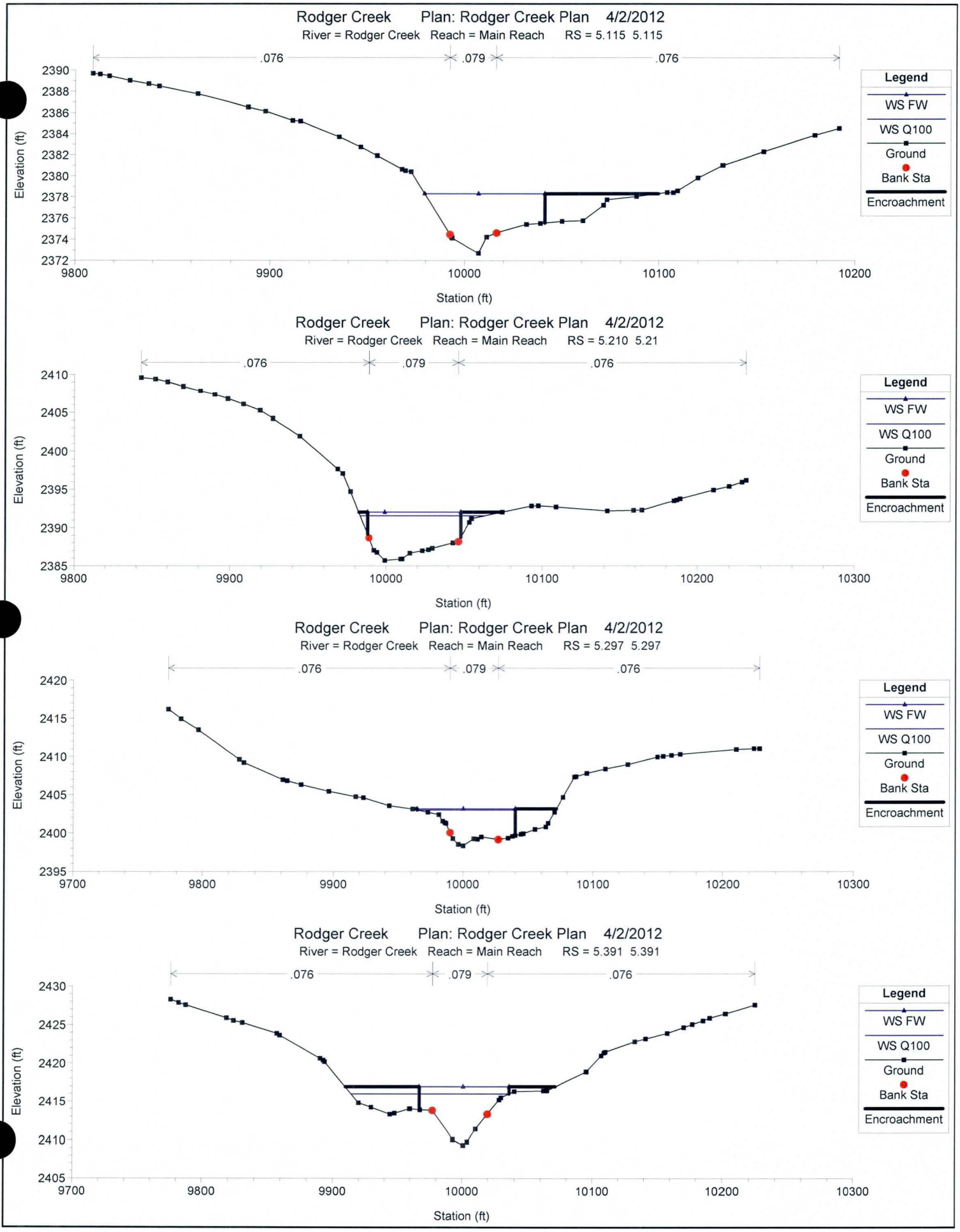
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment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Elevation (ft)
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2386
2384
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2380
2378
2376
2374
2372
9800
9900
10000
10100
10200
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 5.210 5.21
.076
.079
.076
Elevation (ft)
2410
2405
2400
2395
2390
2385
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 5.297 5.297
.076
.079
.076
Elevation (ft)
2420
2415
2410
2405
2400
2395
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 5.391 5.391
.076
.079
.076
Elevation (ft)
2430
2425
2420
2415
2410
2405
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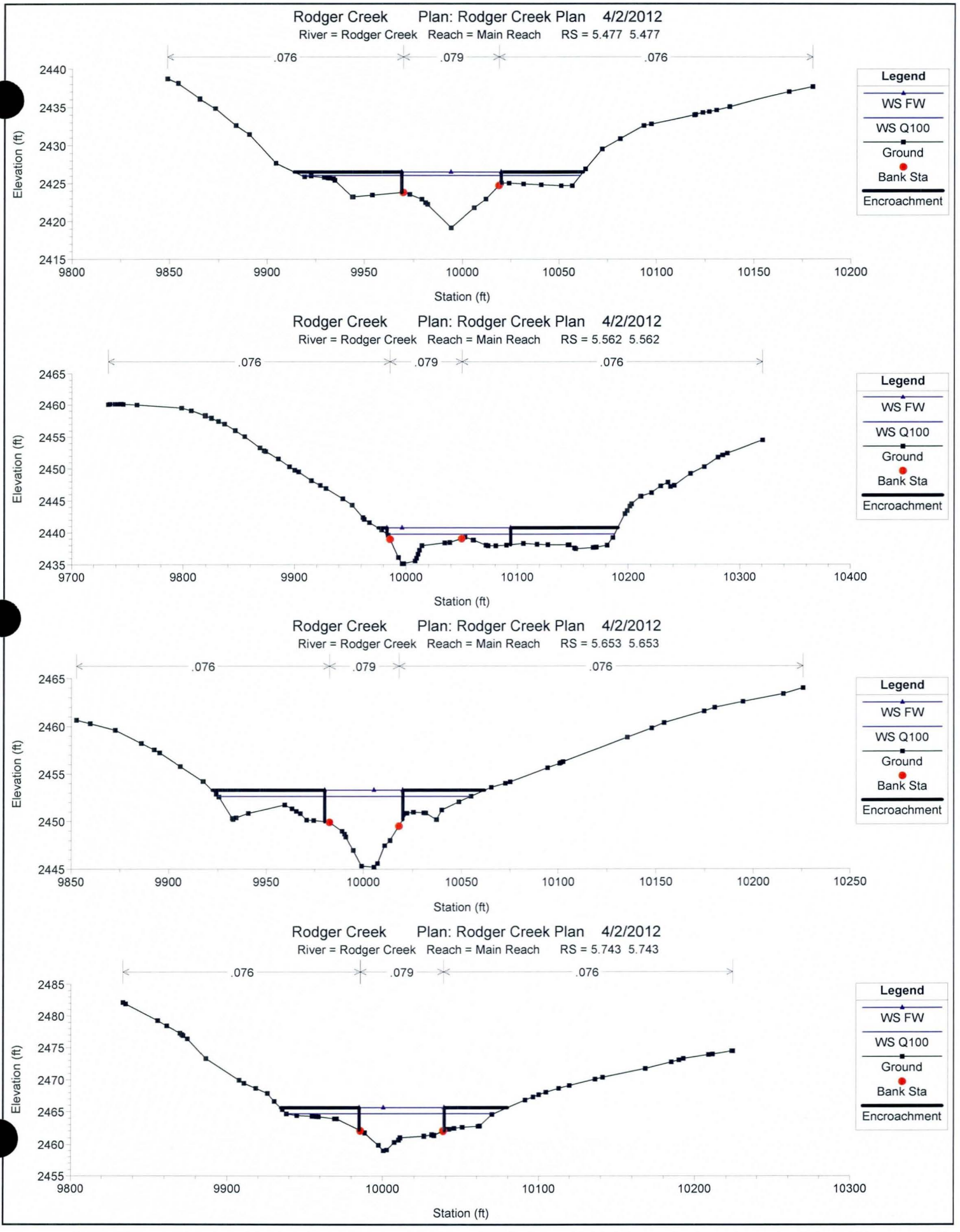
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment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River = Rodger Creek Reach = Main Reach RS = 5.477 5.477
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.076
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 5.562 5.562
.076
.079
.076
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 5.653 5.653
.076
.079
.076
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 5.743 5.743
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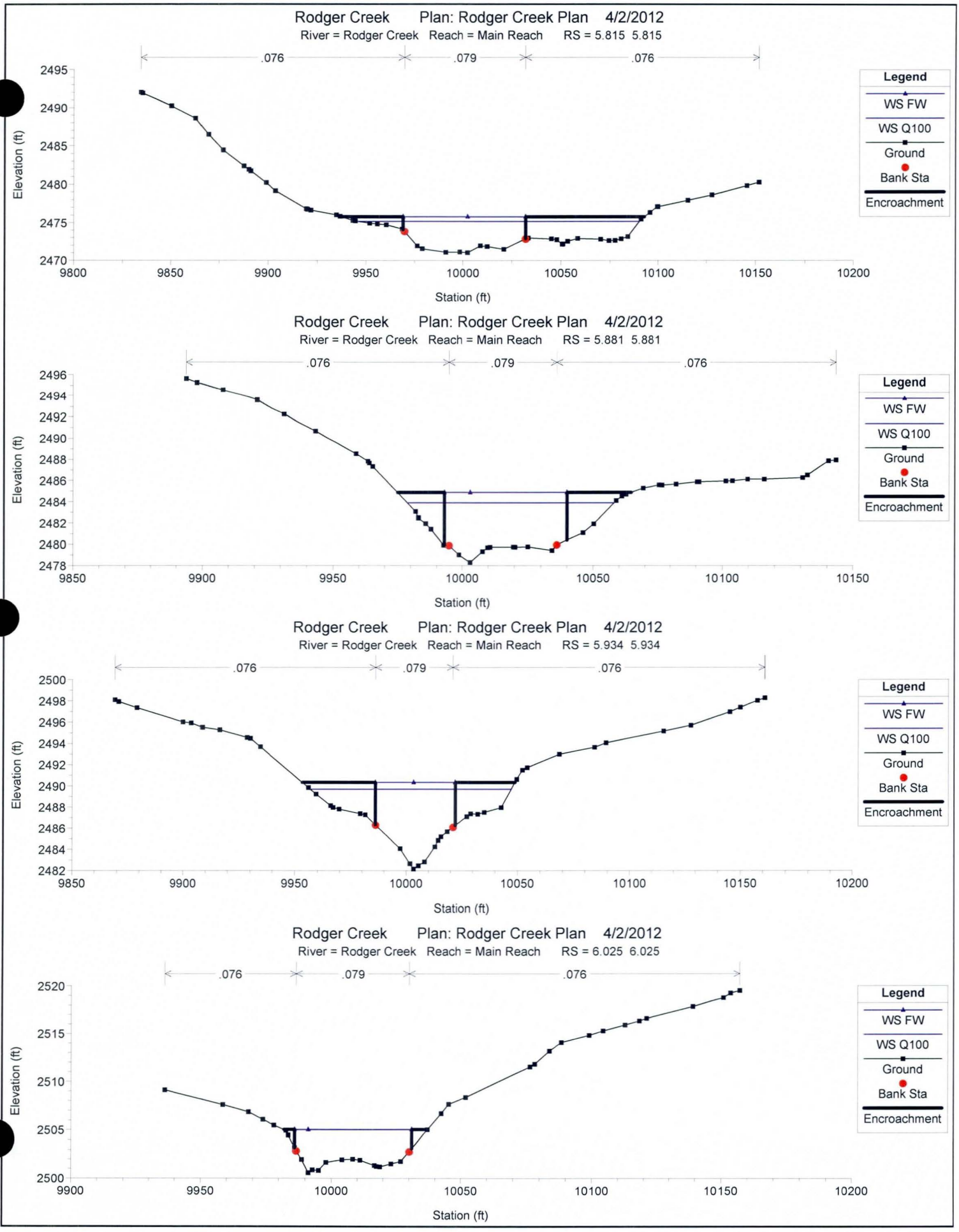
.079
.076
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment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River = Rodger Creek Reach = Main Reach RS = 5.815 5.815
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.079
.076
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
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River = Rodger Creek Reach = Main Reach RS = 5.881 5.881
.076
.079
.076
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 5.934 5.934
.076
.079
.076
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 6.025 6.025
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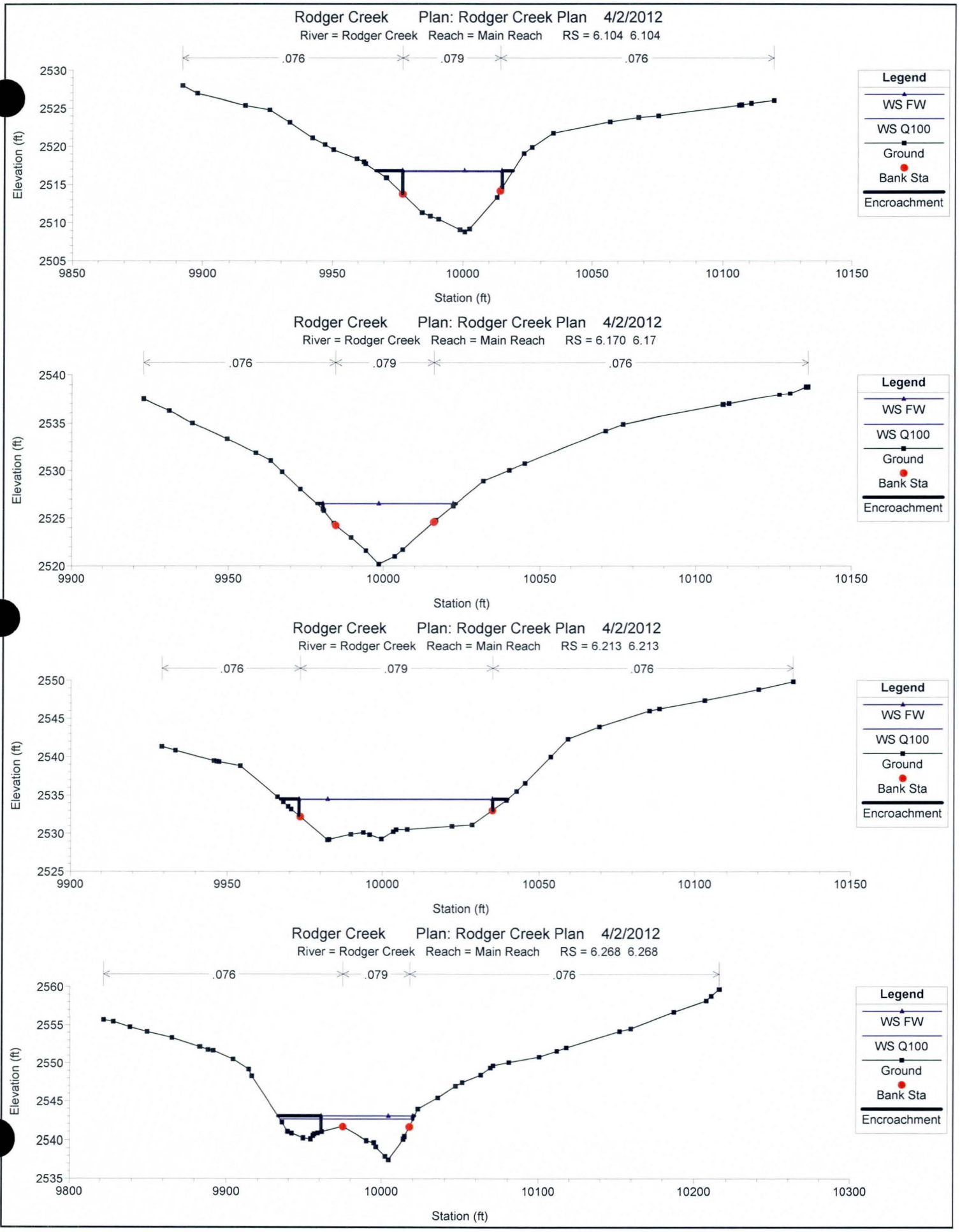
.079
.076
Elevation (ft)
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment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.076
Elevation (ft)
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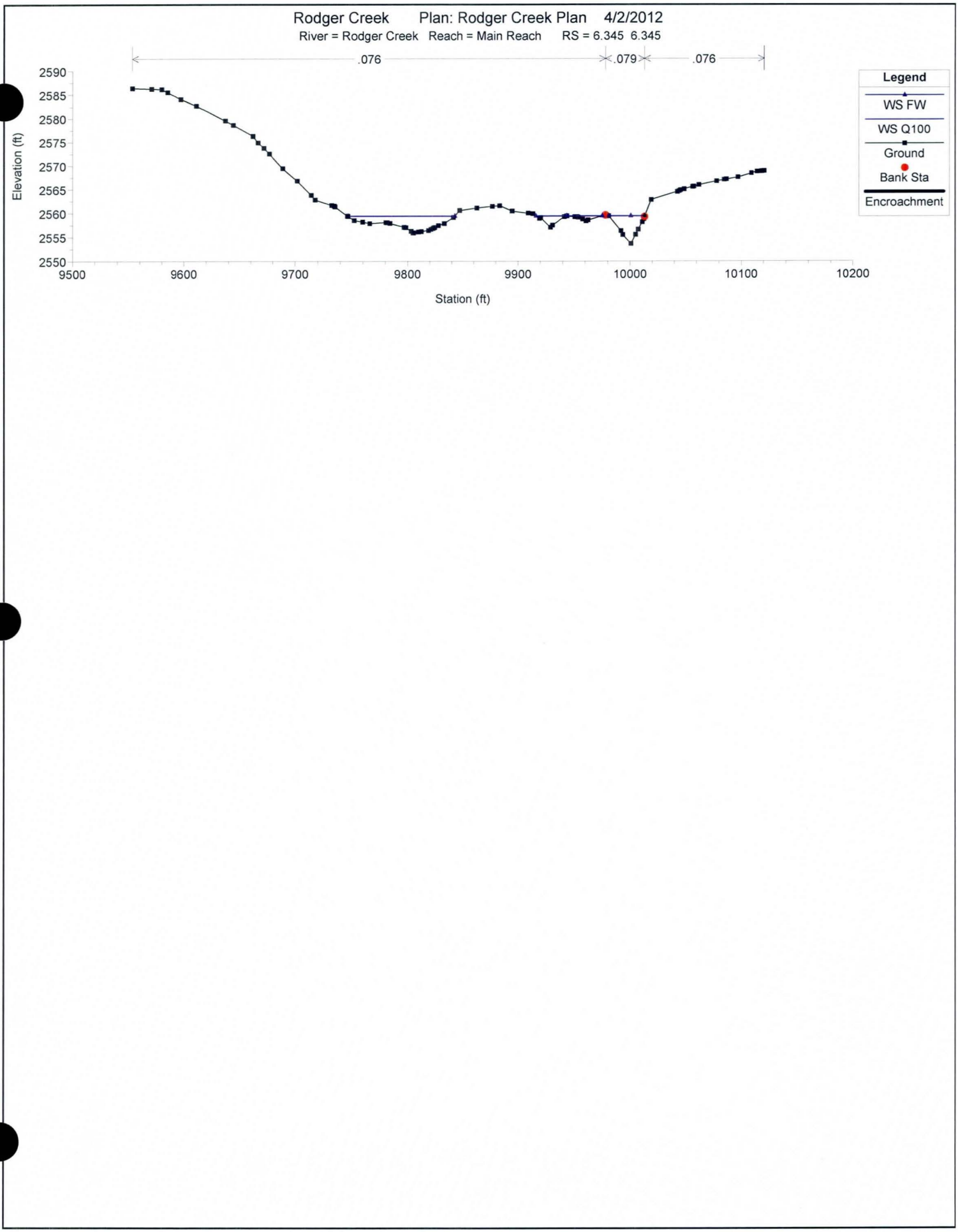
2525
2520
2515
2510
2505
9850
9900
9950
10000
10050
10100
10150
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 6.170 6.17
.076
.079
.076
Elevation (ft)
2540
2535
2530
2525
2520
9900
9950
10000
10050
10100
10150
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 6.213 6.213
.076
.079
.076
Elevation (ft)
2550
2545
2540
2535
2530
2525
9900
9950
10000
10050
10100
10150
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment
Rodger Creek Plan: Rodger Creek Plan 4/2/2012
River = Rodger Creek Reach = Main Reach RS = 6.268 6.268
.076
.079
.076
Elevation (ft)
2560
2555
2550
2545
2540
2535
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment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.079
.076
Elevation (ft)
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2580
2575
2570
2565
2560
2555
2550
9500
9600
9700
9800
9900
10000
10100
10200
Station (ft)
Legend
WS FW
WS Q100
Ground
Bank Sta
Encroachment

APPENDIX E.3

EXPANSION AND CONTRACTION COEFFICIENTS

EXPANSION AND CONTRACTION COEFFICIENTS

The expansion and contraction coefficients selected for this project are typical and were not calculated specifically at any one location.

APPENDIX E.4

ANALYSIS OF STRUCTURES

ANALYSIS OF STRUCTURES

Analysis of Structures

The following section includes the required summary table, Annotated FIRM panels, and flood profiles required to be integrated into the County's Flood Insurance Study Report.

One double-barrel 96-inch culvert is located at New River Road. This structure was analyzed using HEC-RAS and the results were verified using Federal Highway Administration's HY-8 version 7.0 Software.

The tailwater elevation was set at a constant elevation that corresponded to the resulting water surface elevation in HEC-RAS. The slope, Manning's *n* value, and culvert geometry were maintained.

Results indicate the modeling procedures employed between the two softwares are consistent, and no fatal or questionable errors were found.

HY-8 Culvert Analysis Report

Crossing - New River Road, Design Discharge - 799.9 cfs

Culvert - SetTWD, Culvert Discharge - 158.0 cfs

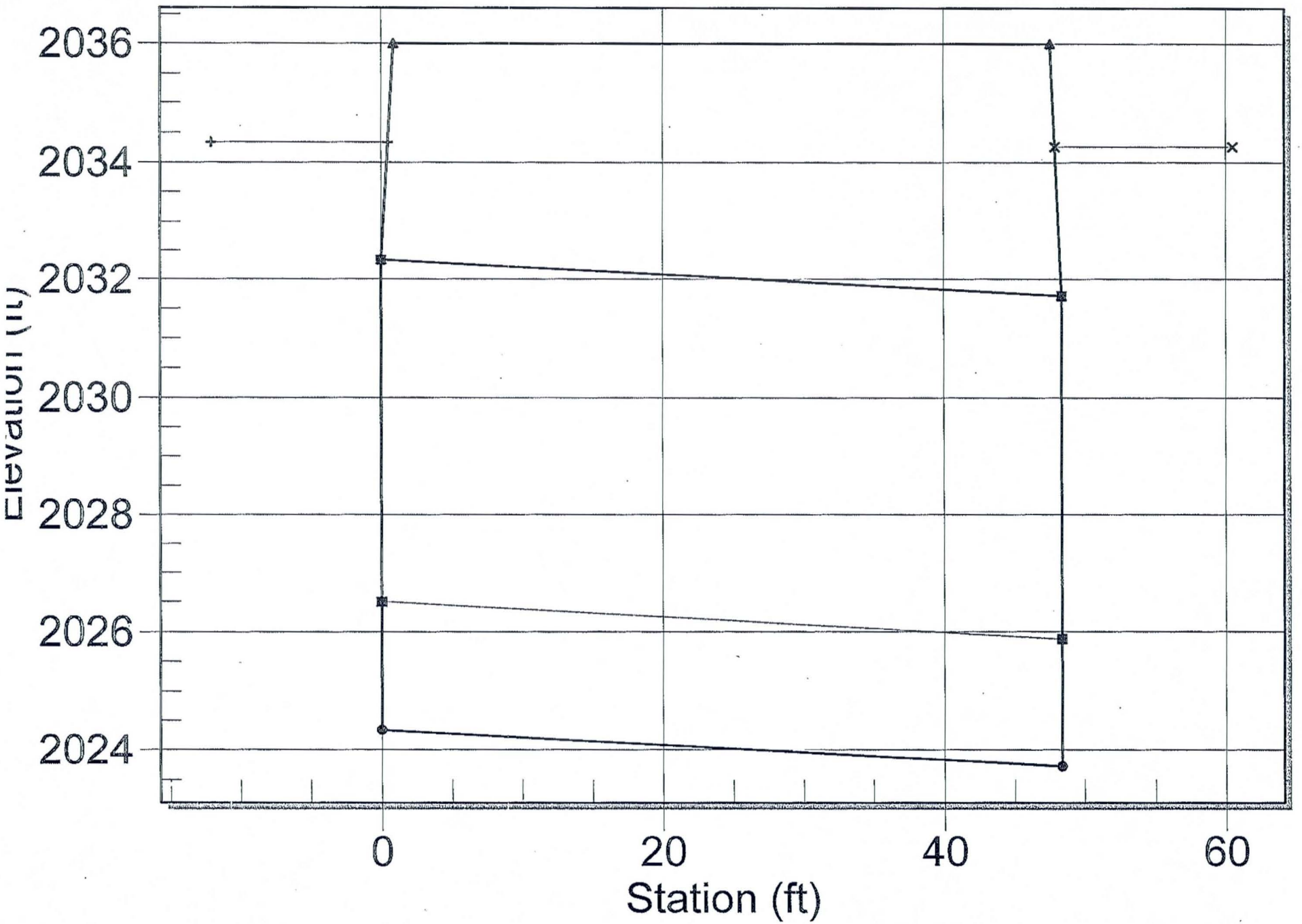


Table 1 - Summary of Culvert Flows at Crossing: New River Road

Headwater Elevation (ft)	Total Discharge (cfs)	SetTWD Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2034.27	100.00	26.29	26.29	7
2034.34	590.60	152.56	152.56	8
2034.41	799.85	217.30	217.30	4
2034.80	1571.80	424.81	424.81	3
2035.06	2062.40	520.36	520.36	3
2035.32	2553.00	599.53	599.53	4
2035.57	3043.60	666.12	666.12	4
2035.80	3534.20	723.87	723.87	4
2036.03	4024.80	774.97	774.97	4
2036.24	4515.40	820.78	820.78	4
2036.45	5006.00	862.60	862.60	4

Rating Curve Plot for Crossing: New River Road

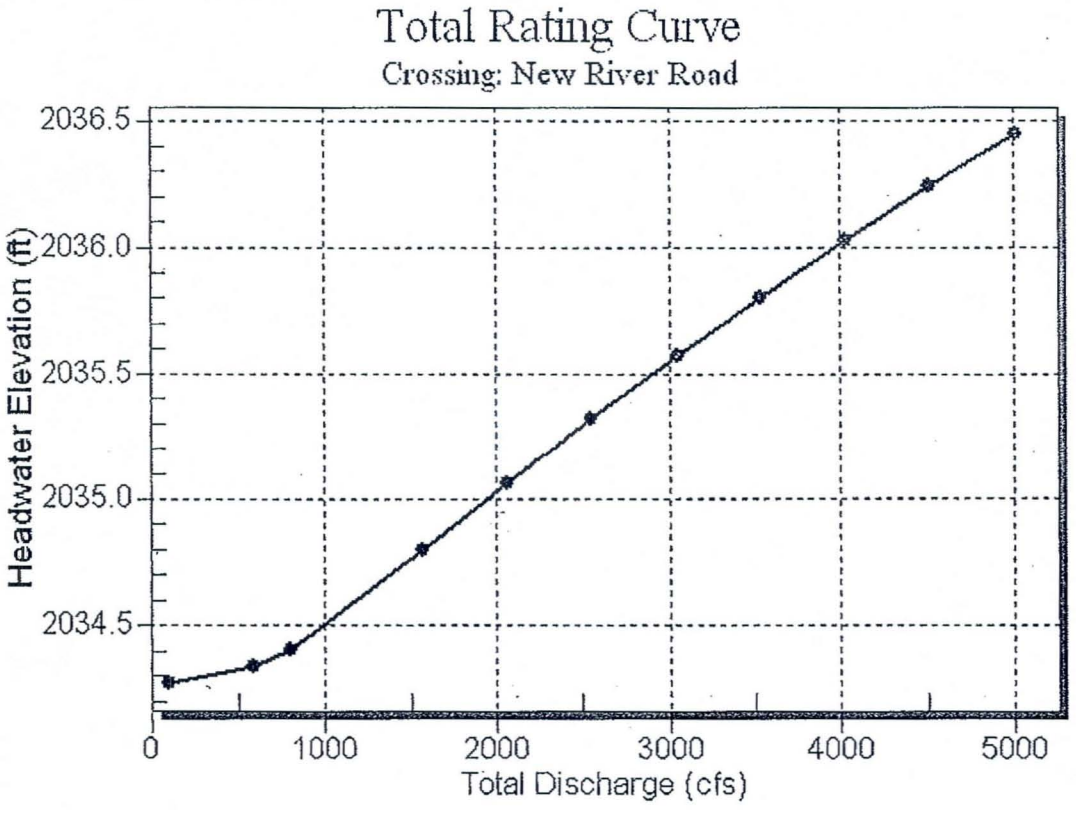


Table 2 - Culvert Summary Table: SetTWD

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
100.00	26.29	2034.27	1.169	9.612	4-FFf	0.828	0.855	8.000	10.460	0.262	0.000
590.60	152.56	2034.34	2.905	9.678	4-FFf	1.949	2.116	8.000	10.460	1.518	0.000
799.85	217.30	2034.41	3.512	9.748	4-FFf	2.372	2.559	8.000	10.460	2.162	0.000
1571.80	424.81	2034.80	5.140	10.138	4-FFf	3.389	3.632	8.000	10.460	4.226	0.000
2062.40	520.36	2035.06	5.816	10.403	4-FFf	3.803	4.056	8.000	10.460	5.176	0.000
2553.00	599.53	2035.32	6.359	10.663	4-FFf	4.139	4.357	8.000	10.460	5.964	0.000
3043.60	666.12	2035.57	6.811	10.909	4-FFf	4.413	4.609	8.000	10.460	6.626	0.000
3534.20	723.87	2035.80	7.205	11.144	4-FFf	4.651	4.824	8.000	10.460	7.200	0.000
4024.80	774.97	2036.03	7.557	11.369	4-FFf	4.863	4.988	8.000	10.460	7.709	0.000
4515.40	820.78	2036.24	7.878	11.583	4-FFf	5.059	5.135	8.000	10.460	8.164	0.000
5006.00	862.60	2036.45	8.177	11.789	4-FFf	5.238	5.269	8.000	10.460	8.580	0.000

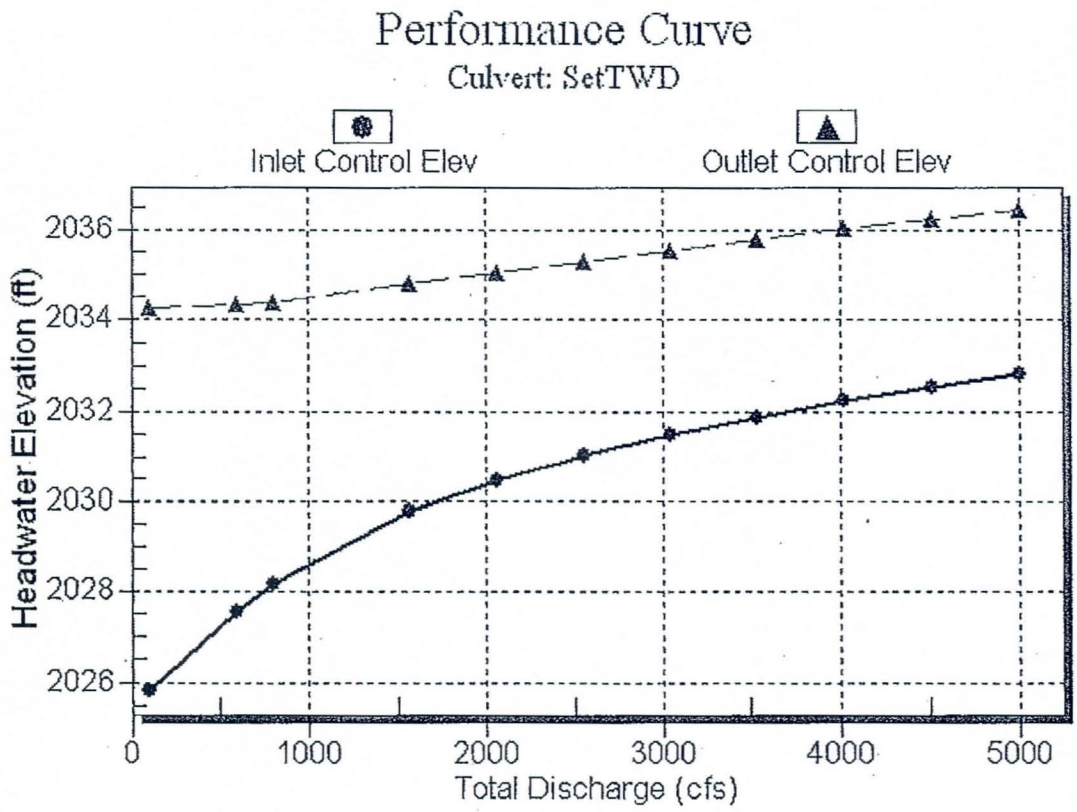
****

Inlet Elevation (invert): 2024.66 ft, Outlet Elevation (invert): 2023.86 ft

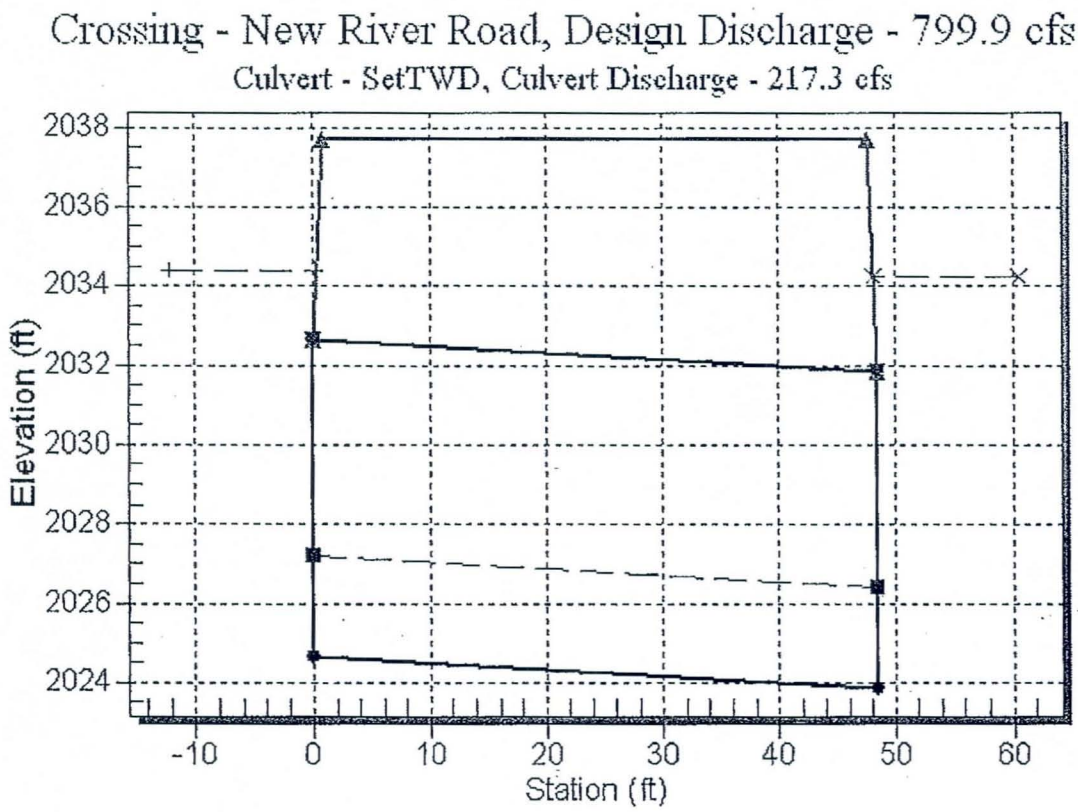
Culvert Length: 48.41 ft, Culvert Slope: 0.0165

****

Culvert Performance Curve Plot: SetTWD



Water Surface Profile Plot for Culvert: SetTWD



Site Data - SetTWD

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2024.66 ft

Outlet Station: 48.40 ft

Outlet Elevation: 2023.86 ft

Number of Barrels: 2

Culvert Data Summary - SetTWD

Barrel Shape: Circular

Barrel Diameter: 8.00 ft

Barrel Material:

Barrel Manning's n: 0.0270

Inlet Type:

Inlet Edge Condition:

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: New River Road)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
100.00	2034.27	10.46
590.60	2034.27	10.46
799.85	2034.27	10.46
1571.80	2034.27	10.46
2062.40	2034.27	10.46
2553.00	2034.27	10.46
3043.60	2034.27	10.46
3534.20	2034.27	10.46
4024.80	2034.27	10.46
4515.40	2034.27	10.46
5006.00	2034.27	10.46

Tailwater Channel Data - New River Road

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 2034.27 ft

Roadway Data for Crossing: New River Road

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Irregular Roadway Cross-Section:

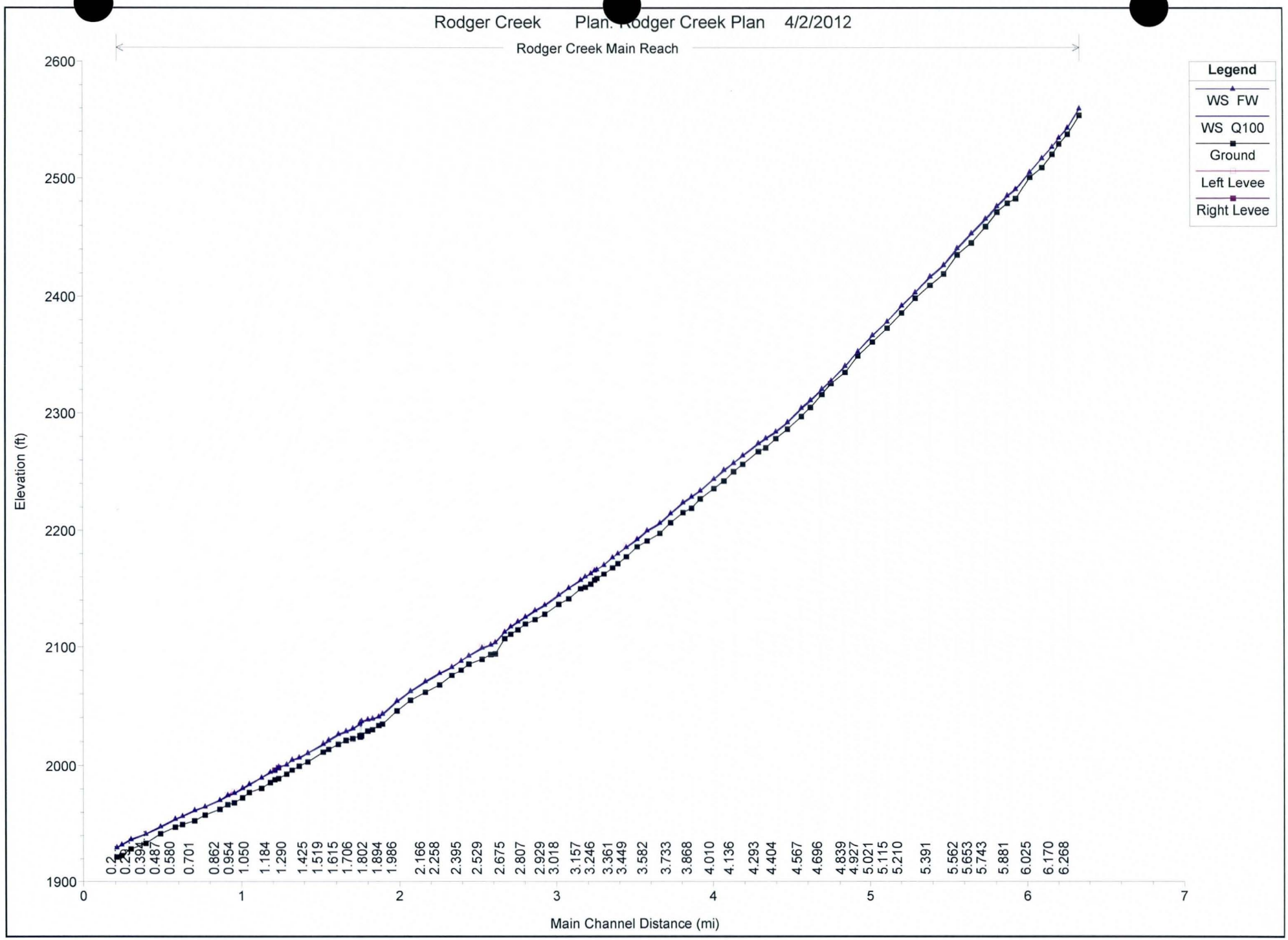
Coord No.	Station (ft)	Elevation (ft)
1	9878.09	2037.69
2	9907.08	2036.74
3	9962.08	2035.39
4	10002.08	2034.61
5	10058.08	2033.79
6	10112.08	2033.53
7	10150.08	2033.33
8	10173.98	2033.58
9	10178.03	2033.51
10	10182.19	2033.46
11	10188.33	2033.65
12	10206.13	2034.10
13	10223.67	2034.20
14	10225.46	2034.17
15	10230.88	2034.29

Roadway Surface: Paved

Roadway Top Width: 46.71 ft

APPENDIX E.5

HYDRAULIC CALCULATIONS


Rodger Creek Plan: Rodger Creek Plan 4/2/2012
Rodger Creek Main Reach
Legend
WS FW
WS Q100
Ground
Left Levee
Right Levee
Elevation (ft)
2600
2500
2400
2300
2200
2100
2000
1900
0
1
2
3
4
5
6
7
Main Channel Distance (mi)
0.2
0.294
0.394
0.487
0.580
0.701
0.862
0.954
1.050
1.184
1.290
1.425
1.519
1.615
1.706
1.802
1.894
1.986
2.166
2.258
2.395
2.529
2.675
2.807
2.929
3.018
3.157
3.246
3.361
3.449
3.582
3.733
3.868
4.010
4.136
4.293
4.404
4.567
4.696
4.839
4.927
5.021
5.115
5.210
5.391
5.562
5.653
5.743
5.881
6.025
6.170
6.268

HEC-RAS Plan: Rodger River: Rodger Creek Reach: Main Reach

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Main Reach	0.209	Q100	5006.00	1921.39	1929.26	1929.26	1930.21	0.008386	10.19	940.80	405.32	0.71
Main Reach	0.209	FW	5006.00	1921.39	1929.74	1929.74	1930.92	0.008534	10.78	805.48	284.86	0.72
Main Reach	0.241	Q100	5006.00	1922.72	1931.68	1931.68	1932.92	0.014586	10.58	682.31	260.98	0.88
Main Reach	0.241	FW	5006.00	1922.72	1932.33	1932.33	1934.29	0.015729	12.01	491.45	123.44	0.93
Main Reach	0.299	Q100	5006.00	1928.38	1936.03		1936.88	0.011870	9.46	854.05	362.00	0.79
Main Reach	0.299	FW	5006.00	1928.38	1936.94		1937.86	0.008767	9.20	760.65	209.00	0.70
Main Reach	0.394	Q100	5006.00	1933.25	1941.16		1942.10	0.009090	9.13	814.03	301.87	0.72
Main Reach	0.394	FW	5006.00	1933.25	1941.45		1942.82	0.010515	10.20	602.41	149.00	0.78
Main Reach	0.487	Q100	5006.00	1941.50	1946.97	1946.75	1948.11	0.016771	11.14	661.30	223.16	0.95
Main Reach	0.487	FW	5006.00	1941.50	1947.88	1947.88	1949.60	0.017136	12.81	548.05	148.00	0.99
Main Reach	0.580	Q100	5006.00	1947.15	1953.69	1953.57	1954.81	0.011487	9.62	725.09	305.79	0.80
Main Reach	0.580	FW	5006.00	1947.15	1954.42		1955.64	0.009164	9.50	629.48	155.00	0.73
Main Reach	0.625	Q100	5006.00	1949.43	1956.37	1956.37	1957.98	0.013175	11.77	625.33	216.17	0.88
Main Reach	0.625	FW	5006.00	1949.43	1956.76	1956.76	1959.12	0.015086	13.17	451.35	95.00	0.95
Main Reach	0.701	Q100	5006.00	1952.59	1961.02		1962.55	0.009772	10.28	547.96	127.06	0.76
Main Reach	0.701	FW	5006.00	1952.59	1961.85		1963.30	0.007241	9.68	520.62	80.08	0.67
Main Reach	0.769	Q100	5006.00	1957.50	1964.61		1965.41	0.006453	7.32	743.39	170.44	0.54
Main Reach	0.769	FW	5006.00	1957.50	1964.89		1965.71	0.006022	7.30	688.75	117.00	0.53
Main Reach	0.862	Q100	5006.00	1962.45	1970.09	1970.09	1971.90	0.017848	13.77	601.14	169.49	0.93
Main Reach	0.862	FW	5006.00	1962.45	1970.55	1970.55	1973.22	0.020266	15.34	441.80	78.33	1.00
Main Reach	0.913	Q100	5006.00	1966.50	1973.75	1972.19	1974.58	0.006422	7.63	766.35	186.44	0.55
Main Reach	0.913	FW	5006.00	1966.50	1974.75	1972.13	1975.40	0.003995	6.67	818.02	132.26	0.44
Main Reach	0.954	Q100	5006.00	1968.11	1975.88	1975.88	1977.08	0.016614	11.34	729.47	258.17	0.86
Main Reach	0.954	FW	5006.00	1968.11	1976.65	1976.65	1978.45	0.017282	12.63	581.30	142.44	0.89
Main Reach	1.007	Q100	5006.00	1972.33	1979.93	1979.93	1980.92	0.012346	10.23	884.25	378.75	0.76
Main Reach	1.007	FW	5006.00	1972.33	1980.88	1980.71	1982.46	0.012845	11.56	613.99	157.00	0.79
Main Reach	1.050	Q100	5006.00	1976.87	1983.20	1983.20	1984.33	0.017130	10.32	743.33	305.69	0.86
Main Reach	1.050	FW	5006.00	1976.87	1984.15		1984.97	0.009191	8.59	830.04	229.86	0.65
Main Reach	1.128	Q100	5006.00	1980.38	1989.52	1989.49	1990.83	0.014523	10.42	687.86	253.60	0.73
Main Reach	1.128	FW	5006.00	1980.38	1989.59	1989.59	1991.66	0.019436	12.15	482.78	114.95	0.84
Main Reach	1.184	Q100	5006.00	1985.35	1993.54		1994.36	0.009819	8.50	778.91	273.80	0.60
Main Reach	1.184	FW	5006.00	1985.35	1994.53		1995.76	0.010100	9.52	599.66	99.96	0.62
Main Reach	1.213	Q100	5006.00	1987.74	1995.42	1995.42	1997.38	0.020804	12.27	509.98	138.62	0.87
Main Reach	1.213	FW	5006.00	1987.74	1995.78	1995.48	1998.38	0.022855	13.35	406.14	68.00	0.92
Main Reach	1.237	Q100	5006.00	1988.66	1997.97	1996.17	1999.21	0.009534	9.12	591.95	109.14	0.60
Main Reach	1.237	FW	5006.00	1988.66	1998.97	1996.10	2000.06	0.007207	8.39	599.68	74.00	0.52
Main Reach	1.290	Q100	5006.00	1992.49	2000.90	2000.90	2003.55	0.021380	13.25	408.37	96.29	0.89
Main Reach	1.290	FW	5006.00	1992.49	2000.96	2000.51	2003.81	0.022185	13.57	371.43	54.00	0.91
Main Reach	1.324	Q100	5006.00	1996.01	2004.67		2005.05	0.003476	5.81	1189.90	296.11	0.37
Main Reach	1.324	FW	5006.00	1996.01	2005.00		2005.91	0.006190	7.97	687.22	94.36	0.50
Main Reach	1.369	Q100	5006.00	1999.43	2005.80	2005.80	2007.19	0.018133	10.24	623.04	227.41	0.79
Main Reach	1.369	FW	5006.00	1999.43	2006.79		2007.82	0.010318	8.67	661.94	138.95	0.61
Main Reach	1.425	Q100	5006.00	2003.06	2010.53	2010.37	2011.73	0.014984	10.49	785.22	365.98	0.74
Main Reach	1.425	FW	5006.00	2003.06	2010.57	2010.57	2012.54	0.020522	12.32	498.20	119.42	0.87
Main Reach	1.519	Q100	5006.00	2011.27	2017.35		2017.89	0.010426	6.82	898.74	272.84	0.58
Main Reach	1.519	FW	5006.00	2011.27	2018.34		2018.99	0.008732	7.16	802.13	170.28	0.55
Main Reach	1.554	Q100	5006.00	2013.58	2020.33	2020.33	2021.53	0.022455	11.93	672.87	250.53	0.88
Main Reach	1.554	FW	5006.00	2013.58	2021.28	2021.28	2022.90	0.021394	12.92	563.90	150.00	0.89
Main Reach	1.615	Q100	5006.00	2017.84	2025.36		2025.91	0.008930	7.97	945.17	282.08	0.57
Main Reach	1.615	FW	5006.00	2017.84	2026.21		2026.98	0.008542	8.51	765.45	151.00	0.57
Main Reach	1.664	Q100	5006.00	2020.99	2027.73		2028.27	0.008998	7.67	1048.74	408.96	0.57
Main Reach	1.664	FW	5006.00	2020.99	2028.53		2029.57	0.010783	9.17	651.73	123.00	0.64

HEC-RAS Plan: Rodger River: Rodger Creek Reach: Main Reach (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Main Reach	1.706	Q100	5006.00	2022.40	2029.97	2029.30	2030.86	0.014272	7.83	747.42	339.84	0.68
Main Reach	1.706	FW	5006.00	2022.40	2030.95		2031.61	0.007641	6.60	790.19	169.00	0.52
Main Reach	1.751	Q100	5006.00	2024.83	2034.27	2034.22	2035.11	0.028011	9.44	783.29	453.32	0.90
Main Reach	1.751	FW	5006.00	2024.83	2034.70	2034.70	2035.85	0.027980	10.21	635.92	246.00	0.92
Main Reach	1.757		Culvert									
Main Reach	1.763	Q100	5006.00	2025.24	2036.12	2035.63	2036.62	0.015018	7.67	1004.99	476.42	0.61
Main Reach	1.763	FW	5006.00	2025.24	2037.03	2035.75	2037.55	0.009404	6.79	898.71	225.00	0.49
Main Reach	1.802	Q100	5006.00	2028.68	2037.67		2038.05	0.003547	5.66	1266.67	400.23	0.37
Main Reach	1.802	FW	5006.00	2028.68	2038.32		2039.05	0.004769	6.96	754.03	100.00	0.44
Main Reach	1.831	Q100	5006.00	2029.78	2038.23		2038.95	0.008124	8.51	848.92	213.59	0.56
Main Reach	1.831	FW	5006.00	2029.78	2039.10		2040.00	0.007351	8.74	709.10	112.00	0.54
Main Reach	1.871	Q100	5006.00	2033.30	2040.24	2039.98	2041.63	0.018702	10.92	592.29	166.00	0.82
Main Reach	1.871	FW	5006.00	2033.30	2040.79		2042.65	0.019356	11.84	483.47	91.00	0.85
Main Reach	1.894	Q100	5006.00	2034.52	2042.21	2042.21	2044.21	0.020734	12.52	501.94	128.15	0.88
Main Reach	1.894	FW	5006.00	2034.52	2043.15	2042.12	2044.49	0.011582	10.27	588.88	108.00	0.67
Main Reach	1.986	Q100	5006.00	2045.53	2053.17	2053.14	2054.32	0.020436	11.03	693.05	257.97	0.84
Main Reach	1.986	FW	5006.00	2045.53	2054.08	2054.08	2055.57	0.018968	11.78	598.75	170.47	0.83
Main Reach	2.071	Q100	5006.00	2054.53	2061.81	2061.61	2062.97	0.016836	10.39	699.88	255.36	0.77
Main Reach	2.071	FW	5006.00	2054.53	2062.42	2061.92	2064.16	0.018187	11.56	505.27	100.80	0.81
Main Reach	2.166	Q100	5006.00	2061.36	2069.55		2070.86	0.015159	10.75	625.19	167.50	0.74
Main Reach	2.166	FW	5006.00	2061.36	2070.55		2072.38	0.014979	11.74	497.78	87.33	0.75
Main Reach	2.258	Q100	5006.00	2067.49	2076.74	2076.05	2077.77	0.013701	9.00	700.55	201.30	0.63
Main Reach	2.258	FW	5006.00	2067.49	2077.73		2079.07	0.012696	9.54	557.16	86.00	0.62
Main Reach	2.335	Q100	4681.00	2075.63	2082.48	2081.92	2083.81	0.015907	9.60	590.34	224.04	0.73
Main Reach	2.335	FW	4681.00	2075.63	2083.01		2084.34	0.013210	9.32	517.37	93.81	0.68
Main Reach	2.395	Q100	4320.00	2080.18	2088.29	2088.29	2089.49	0.015224	10.07	646.47	269.71	0.72
Main Reach	2.395	FW	4320.00	2080.18	2088.29	2088.29	2089.80	0.017717	10.87	524.32	167.00	0.78
Main Reach	2.444	Q100	4320.00	2085.39	2092.28	2091.92	2093.79	0.016861	10.58	508.91	145.49	0.77
Main Reach	2.444	FW	4320.00	2085.39	2092.62		2094.64	0.018672	11.56	390.92	65.00	0.82
Main Reach	2.529	Q100	4320.00	2089.42	2098.50	2097.17	2099.80	0.010947	10.58	571.05	128.59	0.65
Main Reach	2.529	FW	4320.00	2089.42	2099.42	2097.63	2101.53	0.012748	12.25	402.27	48.00	0.72
Main Reach	2.586	Q100	4320.00	2093.48	2101.46	2101.46	2103.94	0.008636	13.66	424.84	93.67	0.88
Main Reach	2.586	FW	4320.00	2093.48	2101.97	2101.30	2104.66	0.007973	13.72	365.27	52.00	0.86
Main Reach	2.614	Q100	4320.00	2093.96	2103.12	2102.29	2105.09	0.006141	11.79	453.77	96.61	0.75
Main Reach	2.614	FW	4320.00	2093.96	2104.07		2105.61	0.004131	10.45	496.91	72.00	0.63
Main Reach	2.675	Q100	4320.00	2107.03	2112.78	2112.78	2114.66	0.011149	11.69	479.99	164.16	0.93
Main Reach	2.675	FW	4320.00	2107.03	2113.01	2113.01	2115.55	0.012523	12.78	339.68	67.00	1.00
Main Reach	2.713	Q100	4320.00	2110.84	2116.77		2117.59	0.018694	8.73	628.25	214.35	0.70
Main Reach	2.713	FW	4320.00	2110.84	2117.57	2116.81	2118.80	0.020081	10.02	502.50	112.00	0.74
Main Reach	2.759	Q100	4320.00	2114.59	2120.95		2121.68	0.015338	7.64	680.40	225.15	0.63
Main Reach	2.759	FW	4320.00	2114.59	2121.95		2122.90	0.014464	8.46	583.95	135.00	0.63
Main Reach	2.807	Q100	4320.00	2119.60	2125.09		2125.91	0.018787	7.93	621.02	199.58	0.69
Main Reach	2.807	FW	4320.00	2119.60	2125.94		2127.29	0.020332	9.34	466.97	96.00	0.74
Main Reach	2.868	Q100	4320.00	2123.36	2130.55		2131.33	0.014866	8.37	657.10	196.70	0.63
Main Reach	2.868	FW	4320.00	2123.36	2131.53		2132.43	0.012308	8.51	599.79	125.00	0.59
Main Reach	2.929	Q100	4320.00	2127.99	2135.32		2136.02	0.014380	7.94	682.76	201.67	0.61
Main Reach	2.929	FW	4320.00	2127.99	2136.09		2137.29	0.018220	9.80	516.56	116.04	0.71
Main Reach	3.018	Q100	4320.00	2136.43	2143.70	2143.70	2145.03	0.022203	10.43	542.77	192.36	0.78
Main Reach	3.018	FW	4320.00	2136.43	2144.69		2146.46	0.020084	11.06	428.69	84.00	0.76
Main Reach	3.082	Q100	4320.00	2141.14	2150.15	2150.15	2151.13	0.012431	9.10	740.99	362.25	0.60
Main Reach	3.082	FW	4320.00	2141.14	2150.63		2152.15	0.014617	10.30	456.62	70.00	0.66
Main Reach	3.157	Q100	4163.00	2149.75	2156.48	2156.17	2158.10	0.025085	11.23	450.34	136.93	0.83

HEC-RAS Plan: Rodger River: Rodger Creek Reach: Main Reach (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Main Reach	3.157	FW	4163.00	2149.75	2157.40		2159.34	0.022123	11.66	389.36	67.73	0.80
Main Reach	3.186	Q100	4163.00	2151.01	2159.74		2160.93	0.013496	9.30	530.84	133.68	0.63
Main Reach	3.186	FW	4163.00	2151.01	2160.50		2161.93	0.012588	9.64	440.49	59.00	0.62
Main Reach	3.221	Q100	4163.00	2153.71	2162.47	2162.00	2164.27	0.022899	11.01	412.78	185.91	0.79
Main Reach	3.221	FW	4163.00	2153.71	2163.22	2161.82	2164.88	0.020066	10.36	401.85	59.45	0.70
Main Reach	3.246	Q100	4163.00	2157.25	2165.50	2163.45	2166.43	0.011807	7.75	539.61	101.22	0.57
Main Reach	3.246	FW	4163.00	2157.25	2165.88	2163.48	2166.70	0.009517	7.26	574.68	94.50	0.51
Main Reach	3.260	Q100	4163.00	2158.54	2166.56		2167.29	0.010664	7.25	617.78	174.44	0.54
Main Reach	3.260	FW	4163.00	2158.54	2166.64		2167.66	0.015017	8.44	518.96	95.18	0.62
Main Reach	3.305	Q100	4163.00	2162.40	2170.24	2170.24	2172.22	0.028108	11.54	392.58	132.38	0.87
Main Reach	3.305	FW	4163.00	2162.40	2170.51		2172.39	0.024639	11.15	389.86	80.62	0.82
Main Reach	3.361	Q100	4163.00	2167.91	2176.88	2176.78	2177.92	0.013896	9.81	682.74	306.62	0.64
Main Reach	3.361	FW	4163.00	2167.91	2176.95	2176.23	2178.66	0.018768	11.47	433.57	88.87	0.74
Main Reach	3.394	Q100	4163.00	2171.49	2180.18	2180.18	2181.81	0.019383	11.18	489.11	225.15	0.75
Main Reach	3.394	FW	4163.00	2171.49	2180.27	2179.54	2182.00	0.019427	11.29	432.24	95.29	0.75
Main Reach	3.449	Q100	4163.00	2177.35	2185.48	2184.71	2186.33	0.012607	8.07	629.85	185.39	0.59
Main Reach	3.449	FW	4163.00	2177.35	2185.77	2184.57	2187.11	0.016033	9.40	481.43	89.07	0.67
Main Reach	3.518	Q100	4163.00	2185.99	2191.85	2191.76	2193.60	0.032415	11.26	409.28	114.44	0.92
Main Reach	3.518	FW	4163.00	2185.99	2192.80	2192.33	2194.95	0.027843	11.80	358.52	65.00	0.88
Main Reach	3.582	Q100	4163.00	2190.96	2199.15		2199.91	0.012050	7.55	626.07	120.11	0.50
Main Reach	3.582	FW	4163.00	2190.96	2200.10		2201.20	0.013041	8.54	508.50	65.00	0.53
Main Reach	3.664	Q100	4163.00	2197.44	2205.59		2206.74	0.020643	9.57	543.35	142.37	0.65
Main Reach	3.664	FW	4163.00	2197.44	2206.55		2207.94	0.018246	9.83	455.54	63.00	0.62
Main Reach	3.733	Q100	4163.00	2206.51	2214.12	2213.76	2215.07	0.025366	8.52	589.15	203.50	0.68
Main Reach	3.733	FW	4163.00	2206.51	2214.73		2216.21	0.028388	9.75	429.11	79.00	0.73
Main Reach	3.813	Q100	3626.00	2215.19	2223.08		2224.10	0.017920	9.16	474.69	99.55	0.61
Main Reach	3.813	FW	3626.00	2215.19	2224.04		2225.23	0.016128	9.47	429.92	60.00	0.59
Main Reach	3.868	Q100	3626.00	2218.90	2228.15		2228.99	0.015877	7.74	511.24	107.85	0.55
Main Reach	3.868	FW	3626.00	2218.90	2228.84		2229.82	0.015557	8.22	471.14	80.94	0.55
Main Reach	3.922	Q100	3626.00	2226.82	2233.59		2234.46	0.023636	7.54	492.50	126.91	0.64
Main Reach	3.922	FW	3626.00	2226.82	2233.93		2234.69	0.018505	7.03	525.89	120.90	0.58
Main Reach	4.010	Q100	3626.00	2235.50	2243.79	2243.50	2244.85	0.021097	9.45	517.18	170.19	0.65
Main Reach	4.010	FW	3626.00	2235.50	2243.89	2243.13	2245.68	0.029334	11.25	352.44	62.00	0.77
Main Reach	4.074	Q100	3626.00	2241.92	2250.68		2251.66	0.020025	9.22	519.06	150.47	0.62
Main Reach	4.074	FW	3626.00	2241.92	2251.65		2252.62	0.015139	8.76	485.76	65.00	0.55
Main Reach	4.136	Q100	3626.00	2250.06	2257.45	2256.35	2258.44	0.021903	8.24	508.57	198.21	0.64
Main Reach	4.136	FW	3626.00	2250.06	2257.53		2258.64	0.023018	8.53	437.37	95.00	0.66
Main Reach	4.194	Q100	3626.00	2256.41	2263.42		2264.28	0.016733	8.21	550.23	160.37	0.58
Main Reach	4.194	FW	3626.00	2256.41	2263.94		2265.30	0.020089	9.49	395.41	60.00	0.64
Main Reach	4.293	Q100	3626.00	2267.10	2273.26		2274.01	0.021131	7.82	570.57	193.50	0.62
Main Reach	4.293	FW	3626.00	2267.10	2274.26		2275.23	0.018094	8.19	470.85	90.00	0.60
Main Reach	4.339	Q100	3626.00	2270.28	2277.69		2278.35	0.015094	7.92	666.65	242.89	0.55
Main Reach	4.339	FW	3626.00	2270.28	2278.55		2279.83	0.018689	9.58	414.94	64.00	0.62
Main Reach	4.404	Q100	2948.00	2278.14	2283.12		2283.54	0.015917	5.90	605.74	239.29	0.52
Main Reach	4.404	FW	2948.00	2278.14	2284.08		2284.49	0.009753	5.34	574.07	125.00	0.42
Main Reach	4.478	Q100	2097.00	2286.15	2291.39	2290.81	2291.95	0.034156	6.48	353.64	166.03	0.70
Main Reach	4.478	FW	2097.00	2286.15	2292.05	2292.05	2293.02	0.050109	9.11	285.16	143.07	0.89
Main Reach	4.567	Q100	2097.00	2296.97	2303.12	2302.85	2303.79	0.019669	7.59	383.51	180.49	0.60
Main Reach	4.567	FW	2097.00	2296.97	2304.10		2304.91	0.015346	7.57	299.97	55.00	0.55
Main Reach	4.624	Q100	2097.00	2304.63	2309.88		2310.36	0.025202	6.67	416.88	231.52	0.64
Main Reach	4.624	FW	2097.00	2304.63	2310.71		2312.22	0.041032	9.86	213.96	51.00	0.85
Main Reach	4.696	Q100	2097.00	2315.66	2319.28		2319.73	0.025817	5.44	396.40	188.36	0.62

HEC-RAS Plan: Rodger River: Rodger Creek Reach: Main Reach (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Main Reach	4.696	FW	2097.00	2315.66	2320.24		2320.68	0.013956	5.00	405.09	113.00	0.48
Main Reach	4.750	Q100	2097.00	2325.05	2327.42	2327.02	2327.84	0.031827	5.06	406.60	228.17	0.65
Main Reach	4.750	FW	2097.00	2325.05	2327.42	2327.35	2328.13	0.064812	7.22	312.42	193.00	0.93
Main Reach	4.839	Q100	2097.00	2334.83	2339.51		2339.90	0.021124	5.02	430.11	210.87	0.56
Main Reach	4.839	FW	2097.00	2334.83	2340.28		2340.65	0.014351	4.95	432.61	135.00	0.48
Main Reach	4.927	Q100	2097.00	2349.04	2352.74		2353.25	0.040935	6.09	367.33	209.04	0.75
Main Reach	4.927	FW	2097.00	2349.04	2352.80	2352.80	2353.65	0.063574	7.75	289.62	161.60	0.94
Main Reach	5.021	Q100	2097.00	2360.94	2366.02		2366.45	0.018909	5.60	425.07	195.32	0.55
Main Reach	5.021	FW	2097.00	2360.94	2366.63		2367.12	0.015036	5.60	376.38	99.00	0.50
Main Reach	5.115	Q100	2097.00	2372.69	2378.31	2377.70	2379.30	0.035267	9.71	293.13	119.89	0.79
Main Reach	5.115	FW	2097.00	2372.69	2378.32	2378.29	2379.97	0.048977	11.46	212.92	61.48	0.94
Main Reach	5.210	Q100	2097.00	2385.72	2391.58		2392.43	0.020494	7.49	295.74	80.47	0.61
Main Reach	5.210	FW	2097.00	2385.72	2392.06		2392.81	0.015718	6.99	305.40	60.00	0.54
Main Reach	5.297	Q100	2097.00	2398.35	2403.03		2403.94	0.032110	8.36	285.69	106.12	0.74
Main Reach	5.297	FW	2097.00	2398.35	2403.17	2403.17	2404.69	0.047164	10.39	223.75	75.13	0.91
Main Reach	5.391	Q100	2097.00	2409.31	2415.95		2416.66	0.020495	7.52	341.28	121.72	0.61
Main Reach	5.391	FW	2097.00	2409.31	2416.90		2417.71	0.016293	7.57	306.54	68.90	0.56
Main Reach	5.477	Q100	2097.00	2419.16	2426.11		2426.85	0.025075	7.60	340.18	143.49	0.66
Main Reach	5.477	FW	2097.00	2419.16	2426.57		2427.87	0.031810	9.18	231.40	51.00	0.75
Main Reach	5.562	Q100	2097.00	2435.12	2439.77	2439.43	2440.27	0.036654	6.23	375.07	204.96	0.72
Main Reach	5.562	FW	2097.00	2435.12	2440.76		2441.44	0.028626	6.98	321.73	110.97	0.68
Main Reach	5.653	Q100	2097.00	2445.21	2452.63	2452.20	2453.41	0.020991	8.03	339.33	129.22	0.62
Main Reach	5.653	FW	2097.00	2445.21	2453.30		2454.71	0.025794	9.64	226.49	40.00	0.70
Main Reach	5.743	Q100	2097.00	2458.96	2464.66	2464.25	2465.55	0.031852	8.17	303.20	132.99	0.73
Main Reach	5.743	FW	2097.00	2458.96	2465.59		2466.65	0.024504	8.28	256.31	54.00	0.67
Main Reach	5.815	Q100	2097.00	2471.02	2475.20		2475.77	0.023025	6.52	358.69	144.46	0.62
Main Reach	5.815	FW	2097.00	2471.02	2475.82		2476.86	0.029435	8.22	256.31	63.00	0.72
Main Reach	5.881	Q100	2097.00	2478.28	2483.90		2484.90	0.029013	8.64	272.28	79.31	0.72
Main Reach	5.881	FW	2097.00	2478.28	2484.87		2486.01	0.023018	8.77	252.10	47.00	0.66
Main Reach	5.934	Q100	1532.00	2482.15	2489.70		2490.19	0.011701	6.17	299.12	90.39	0.47
Main Reach	5.934	FW	1532.00	2482.15	2490.34		2491.14	0.013705	7.19	216.55	38.00	0.51
Main Reach	6.025	Q100	1532.00	2500.58	2504.98	2504.98	2506.53	0.059422	10.13	157.51	54.79	0.98
Main Reach	6.025	FW	1532.00	2500.58	2505.00	2505.00	2506.66	0.061686	10.37	149.84	45.00	0.99
Main Reach	6.104	Q100	1532.00	2508.84	2516.70	2514.77	2517.44	0.014421	6.99	230.65	51.64	0.52
Main Reach	6.104	FW	1532.00	2508.84	2516.84		2517.61	0.014213	7.05	218.82	38.00	0.51
Main Reach	6.170	Q100	1532.00	2520.19	2526.53	2526.53	2528.33	0.050845	10.93	148.15	44.58	0.93
Main Reach	6.170	FW	1532.00	2520.19	2526.54	2526.54	2528.33	0.050344	10.90	147.87	41.74	0.93
Main Reach	6.213	Q100	1532.00	2529.16	2534.43		2535.03	0.018451	6.26	250.90	72.64	0.56
Main Reach	6.213	FW	1532.00	2529.16	2534.48		2535.09	0.018853	6.29	244.35	62.00	0.56
Main Reach	6.268	Q100	1532.00	2537.44	2542.63	2542.58	2543.67	0.054556	8.79	193.55	85.79	0.91
Main Reach	6.268	FW	1532.00	2537.44	2543.02	2543.02	2544.41	0.056846	9.77	167.09	58.94	0.95
Main Reach	6.345	Q100	1532.00	2553.65	2559.42	2558.97	2559.83	0.027535	6.15	307.88	183.10	0.63
Main Reach	6.345	FW	1532.00	2553.65	2559.47		2559.86	0.025126	5.92	318.39	186.72	0.60

CheckRAS Comments

Rodger Creek Floodplain Delineation Study

FCD Contract 2010-C003

April 2012

CHECK-RAS Comments

The HEC-RAS hydraulic model was checked with the CHECK-RAS software. CHECK-RAS outputs are included in this section and also with the digital HEC-RAS model files. Baker addressed relevant CHECK-RAS comments. However, there were several comments that did not warrant any changes to the modeling. An explanation of the remaining CHECK-RAS comments in the hydraulic model and why these comments may be safely ignored is provided below.

BR Comments

None

Floodway Check

RS: 1.757 This is Culvert

ST FW 01 Encroachment Method was not specified at this river station.

For flood insurance studies Encroachment Methods 4 and 1

should be used.

HEC-RAS does not allow the user to specify encroachment information at a culvert cross-section, so error may be ignored.

NT Comments

CHECK-RAS comments related to the Manning's 'n' values were for floodplain values being smaller than channel values in some areas. Roughness coefficients for the modeling were adopted from the Manning's 'n' value report prepared based on field visits. Justifications for cases where channel 'n' values were higher than floodplain values are provided in TDN section 5.3.1.

FW Comments

FLOODWAY WIDTH CHECK

RS: 6.345

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

RS: 6.268

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

RS: 6.17

FW FW 03 The Left channel bank station may not be at the proper Location.

Comments of this nature provide a flag suggesting that bank stations may not be in the proper location. Bank stations with these comments were checked and it was verified that they have been placed at reasonable locations.

RS: 3.26

FW FW 04 The left station effective of 9960.86 for 1% annual chance floodplain

is less than the left channel bank station 9980.82

The 1% annual chance floodplain is outside the channel.

However, the left encroachment station (9919) is outside of 1% annual chance floodplain.

The left encroachment station should be adjusted.

The floodway has been mapped at the floodplain extent in these cases.

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

Project File: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.prj
Plan File: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.p01
Geometry File: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.g02
Flow File: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.f01
Report File: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.nt
Selected profiles: Q100;FW
Date: 4/2/2012
Time: 11:26:13 AM

SECNO	STRUCTURE	NLOB	NCHL	NROB	CNTR	EXP
Rodger Creek,Main Reach						
6.345		0.076	0.079	0.076	0.1	0.3
6.268		0.076	0.079	0.076	0.1	0.3
6.213		0.076	0.079	0.076	0.1	0.3
6.17		0.076	0.079	0.076	0.1	0.3
6.104		0.076	0.079	0.076	0.1	0.3
6.025		0.076	0.079	0.076	0.1	0.3
5.934		0.076	0.079	0.076	0.1	0.3
5.881		0.076	0.079	0.076	0.1	0.3
5.815		0.076	0.079	0.076	0.1	0.3
5.743		0.076	0.079	0.076	0.1	0.3
5.653		0.076	0.079	0.076	0.1	0.3
5.562		0.076	0.079	0.076	0.1	0.3
5.477		0.076	0.079	0.076	0.1	0.3
5.391		0.076	0.079	0.076	0.1	0.3
5.297		0.076	0.079	0.076	0.1	0.3
5.21		0.076	0.079	0.076	0.1	0.3
5.115		0.076	0.079	0.076	0.1	0.3
5.021		0.076	0.079	0.076	0.1	0.3
4.927		0.076	0.079	0.076	0.1	0.3
4.839		0.076	0.079	0.076	0.1	0.3
4.75		0.076	0.079	0.076	0.1	0.3
4.696		0.076	0.079	0.076	0.1	0.3
4.624		0.076	0.079	0.076	0.1	0.3
4.567		0.076	0.079	0.076	0.1	0.3
4.478		0.076	0.079	0.076	0.1	0.3
4.404		0.076	0.079	0.076	0.1	0.3
4.339		0.076	0.079	0.076	0.1	0.3
4.293		0.076	0.079	0.076	0.1	0.3
[redacted]		0.076	0.079	0.076	0.1	0.3
		0.076	0.079	0.076	0.1	0.3
4.		0.076	0.079	0.076	0.1	0.3
4.01		0.076	0.079	0.076	0.1	0.3
3.922		0.076	0.079	0.076	0.1	0.3
3.868		0.076	0.079	0.076	0.1	0.3
3.813		0.076	0.079	0.076	0.1	0.3
3.733		0.076	0.079	0.076	0.1	0.3
3.664		0.076	0.079	0.076	0.1	0.3
3.582		0.076	0.079	0.076	0.1	0.3
3.518		0.066	0.066	0.066	0.1	0.3
3.449		0.066	0.066	0.066	0.1	0.3
3.394		0.066	0.066	0.066	0.1	0.3
3.361		0.066	0.066	0.066	0.1	0.3
3.305		0.066	0.066	0.066	0.1	0.3
3.26		0.066	0.066	0.066	0.1	0.3
3.246		0.066	0.066	0.066	0.1	0.3
3.221		0.066	0.066	0.066	0.1	0.3
3.186		0.066	0.066	0.066	0.1	0.3
3.157		0.066	0.066	0.066	0.1	0.3
3.082		0.066	0.066	0.066	0.1	0.3
3.018		0.066	0.066	0.066	0.1	0.3
2.929		0.066	0.066	0.066	0.1	0.3
2.868		0.066	0.066	0.066	0.1	0.3
2.807		0.066	0.066	0.066	0.1	0.3
2.759		0.066	0.066	0.066	0.1	0.3
2.713		0.066	0.066	0.066	0.1	0.3
2.675		0.038	0.038	0.071	0.1	0.3
2.614		0.038	0.038	0.071	0.1	0.3
2.586		0.038	0.038	0.071	0.1	0.3
2.529		0.071	0.059	0.071	0.1	0.3
2.444		0.071	0.059	0.071	0.1	0.3
2.395		0.071	0.059	0.071	0.1	0.3
2.335		0.071	0.059	0.071	0.1	0.3
2.258		0.066	0.065	0.066	0.1	0.3
2.166		0.065	0.058	0.065	0.1	0.3
2.071		0.065	0.058	0.065	0.1	0.3
1.986		0.065	0.058	0.065	0.1	0.3
1.894		0.065	0.058	0.065	0.1	0.3
1.871		0.065	0.058	0.065	0.1	0.3
1.831		0.065	0.058	0.065	0.1	0.3
[redacted]		0.065	0.058	0.065	0.3	0.5
		0.065	0.058	0.065	0.3	0.5
	Culvert-Up	0.065	0.058	0.065	0.3	0.5
1.757	Culvert-Dn	0.065	0.058	0.065	0.3	0.5
		-----	-----	0.065		
1.751		0.065	0.058	0.065	0.3	0.5
1.706		0.065	0.058	0.065	0.1	0.3
1.664		0.065	0.058	0.065	0.1	0.3
1.615		0.065	0.058	0.065	0.1	0.3
1.554		0.065	0.058	0.065	0.1	0.3
1.519		0.065	0.058	0.065	0.1	0.3

1.425	0.065	0.058	0.065	0.1	0.3
1.369	0.065	0.058	0.065	0.1	0.3
1.324	0.065	0.058	0.065	0.1	0.3
[redacted]	0.065	0.058	0.065	0.1	0.3
	0.065	0.058	0.065	0.1	0.3
1.	0.065	0.058	0.065	0.1	0.3
1.184	0.065	0.058	0.065	0.1	0.3
1.128	0.065	0.058	0.065	0.1	0.3
1.05	0.07	0.051	0.07	0.1	0.3
1.007	0.07	0.051	0.07	0.1	0.3
.954	0.07	0.051	0.07	0.1	0.3
.913	0.07	0.051	0.07	0.1	0.3
.862	0.07	0.051	0.07	0.1	0.3
.769	0.07	0.051	0.07	0.1	0.3
.701	0.06	0.045	0.06	0.1	0.3
.625	0.06	0.045	0.06	0.1	0.3
.58	0.06	0.045	0.06	0.1	0.3
.487	0.06	0.045	0.06	0.1	0.3
.394	0.06	0.045	0.06	0.1	0.3
.299	0.06	0.045	0.06	0.1	0.3
.241	0.06	0.045	0.06	0.1	0.3
.209	0.06	0.045	0.06	0.1	0.3

---Summary of Statistics---

	Minimum	Maximum
Left Overbank n Value:	0.038	0.076
Right Overbank n Value:	0.06	0.076
Channel n Value:	0.038	0.079
Contraction Coefficient:	0.1	0.3
Expansion Coefficient:	0.3	0.5

ROUGHNESS COEFFICIENT CHECK

RS: 6.345
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 6.268
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 6.213
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 6.17
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 6.104
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 6.025
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 5.934
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 5.881
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 5.815
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 5.743
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

[redacted] 5.653
NT [redacted] 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 5.562
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 5.477
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 5.391
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 5.297
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 5.21
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 5.115
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 5.021
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 4.927
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 4.839
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 4.75
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 4.696
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 4.624
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 4.567
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 4.478
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 4.404
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 4.339
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 4.293
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 4.194
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

4.136
05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 4.074
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 4.01
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 3.922
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 3.868
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 3.813
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 3.733
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 3.664
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 3.582
NT RC 05 The left overbank n value of 0.076 and the right overbank n value of 0.076 are less than or equal to the channel n value of 0.079 The overbank n values should be reevaluated.

RS: 3.518
NT RC 05 The left overbank n value of 0.066 and the right overbank n value of 0.066 are less than or equal to the channel n value of 0.066 The overbank n values should be reevaluated.

RS: 3.449
NT RC 05 The left overbank n value of 0.066 and the right overbank n value of 0.066 are less than or equal to the channel n value of 0.066 The overbank n values should be reevaluated.

RS: 3.394
NT RC 05 The left overbank n value of 0.066 and the right overbank n value of 0.066 are less than or equal to the channel n value of 0.066 The overbank n values should be reevaluated.

RS: 3.361
NT RC 05 The left overbank n value of 0.066 and the right overbank n value of 0.066 are less than or equal to the channel n value of 0.066 The overbank n values should be reevaluated.

RS: 3.305
NT RC 05 The left overbank n value of 0.066 and the right overbank n value of 0.066 are less than or equal to the channel n value of 0.066 The overbank n values should be reevaluated.

RS: 3.26
NT RC 05 The left overbank n value of 0.066 and the right overbank n value of 0.066 are less than or equal to the channel n value of 0.066 The overbank n values should be reevaluated.

RS: 3.246
NT RC 05 The left overbank n value of 0.066 and the right overbank n value of 0.066 are less than or equal to the channel n value of 0.066 The overbank n values should be reevaluated.

RS: 3.221
NT RC 05 The left overbank n value of 0.066 and the right overbank n value of 0.066 are less than or equal to the channel n value of 0.066 The overbank n values should be reevaluated.

RS: 3.186
NT RC 05 The left overbank n value of 0.066 and the right overbank n value of 0.066 are less than or equal to the channel n value of 0.066 The overbank n values should be reevaluated.

RS: 3.157
NT RC 05 The left overbank n value of 0.066 and the right overbank n value of 0.066 are less than or equal to the channel n value of 0.066 The overbank n values should be reevaluated.

RS: 3.082
NT RC 05 The left overbank n value of 0.066 and the right overbank n value of 0.066 are less than or equal to the channel n value of 0.066 The overbank n values should be reevaluated.

RS: 3.018
NT RC 05 The left overbank n value of 0.066 and the right overbank n value of 0.066 are less than or equal to the channel n value of 0.066 The overbank n values should be reevaluated.

RS: 2.929

NT RC 05 The left overbank n value of 0.066 and the right overbank n value
of 0.066 are less than or equal to the channel n value of 0.066
The overbank n values should be reevaluated.

RS: 2.868
NT RC 05 The left overbank n value of 0.066 and the right overbank n value
of 0.066 are less than or equal to the channel n value of 0.066
The overbank n values should be reevaluated.

RS: 2.807
NT RC 05 The left overbank n value of 0.066 and the right overbank n value
of 0.066 are less than or equal to the channel n value of 0.066
The overbank n values should be reevaluated.

RS: 2.759
NT RC 05 The left overbank n value of 0.066 and the right overbank n value
of 0.066 are less than or equal to the channel n value of 0.066
The overbank n values should be reevaluated.

RS: 2.713
NT RC 05 The left overbank n value of 0.066 and the right overbank n value
of 0.066 are less than or equal to the channel n value of 0.066
The overbank n values should be reevaluated.

TRANSITION LOSS COEFFICIENT CHECK

ROUGHNESS COEFFICIENT AT STRUCTURES

---END---

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

[redacted] File: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.prj
Pla[redacted]ile: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.p01
Geometry File: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.g02
Flow File: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.f01
Report File: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.xs
Selected profiles: Q100;FW
Date: 4/2/2012
Time: 11:27:26 AM

SECNO	Len Lob	Len Chl	Len Rob	TopWdthAct	Q Total	Flow Code
Rodger Creek,Main Reach						
6.345	453.91	406.25	394.49	183.1	1532	D
6.268	283.03	289.37	307.23	85.79	1532	
6.213	224.86	229.16	234.19	72.64	1532	
6.17	348.8	344.75	335.2	44.58	1532	C
6.104	423.63	418.14	414.87	51.64	1532	
6.025	469.34	478.28	504.97	54.79	1532	C
5.934	280.19	280.62	268.06	90.39	1532	
5.881	362.75	352.04	338.98	79.31	2097	
5.815	384.22	380.96	370.04	144.46	2097	
5.743	474.27	473.93	472.98	132.99	2097	
5.653	483.26	481.46	476.11	129.22	2097	
5.562	435.15	448.41	445.29	204.96	2097	
5.477	441.23	452.53	459.5	143.49	2097	
5.391	477.68	497.93	527.94	121.72	2097	
5.297	477.05	457.75	436.12	106.12	2097	
5.21	502.9	498.93	487.96	80.47	2097	
5.115	493.77	500.02	515.44	119.89	2097	
5.021	515.64	494.84	476.48	195.32	2097	
4.927	470.83	465.41	460.32	209.04	2097	
4.839	477.34	470.81	462.36	210.87	2097	
4.75	285.76	283.86	282.83	228.17	2097	
4.696	382.67	381.79	349.26	188.36	2097	
4.624	309.87	301.6	280.44	231.52	2097	D
4.567	472.25	469.25	458.84	180.49	2097	
4.478	370.22	391.11	405.22	166.03	2097	D
4.404	322.74	338.69	338.89	239.29	2948	
4.339	242.98	245.4	245.26	242.89	3626	
[redacted]	516.88	519.91	516.84	193.5	3626	
[redacted]	311.32	306.48	290.21	160.37	3626	
[redacted]	339.56	327.98	289.17	198.21	3626	
4.074	297.55	337.56	352.24	150.47	3626	
4.01	443.93	465.86	486.23	170.19	3626	
3.922	273.06	286.5	288.34	126.91	3626	
3.868	284.36	289.38	289.81	107.85	3626	
3.813	433.3	421.36	410.53	99.55	3626	
3.733	389.59	366.31	318.91	203.5	4163	
3.664	431.13	434.49	435.41	142.37	4163	
3.582	322.17	334.64	340.34	120.11	4163	
3.518	360.26	366.39	370.84	114.44	4163	
3.449	277.13	289.06	293.04	185.39	4163	
3.394	180.73	174.53	168.53	225.15	4163	D,C
3.361	304.23	294.48	261.7	306.62	4163	D
3.305	243.91	237.54	222.3	132.38	4163	D,C
3.26	65.59	76.91	69.22	136.47	4163	
3.246	110.89	129.81	118.31	101.22	4163	
3.221	173.91	183.87	178.18	101.21	4163	
3.186	153.76	155.34	157.76	133.66	4163	
3.157	383.63	397.75	419.63	136.93	4163	
3.082	305.51	333.56	353.18	362.25	4320	C
3.018	471.53	469.84	466.27	192.36	4320	C
2.929	316.38	325.29	316.01	201.67	4320	
2.868	290.13	323.25	354.66	196.7	4320	
2.807	245.08	251.85	248.16	199.58	4320	
2.759	236.22	242.05	243.81	225.15	4320	
2.713	197.96	201.17	187.64	204.99	4320	
2.675	342.81	320.13	277.54	154.16	4320	D,C
2.614	155.6	151.17	142.28	96.61	4320	
2.586	295.96	297.19	302.11	93.67	4320	C
2.529	390.01	448.64	471.99	128.59	4320	
2.444	308.47	260.45	219.29	145.49	4320	
2.395	338.91	317.17	267.97	269.71	4320	C
2.335	377.96	407.29	409.74	224.04	4681	
2.258	464.57	484.81	486.42	201.3	5006	
2.166	468.12	500.41	515.9	167.5	5006	
2.071	499.45	451.2	434.5	255.36	5006	
1.986	487.7	486.64	488.01	257.97	5006	
1.894	115.15	120.57	126.81	128.15	5006	C
1.871	217.16	212.34	202.44	166	5006	
[redacted]	150.92	153.13	160.08	213.59	5006	
[redacted]	197.47	204.22	238.16	400.23	5006	
[redacted]	65.79	64.46	68.26	476.42	5006	
1.757	Culvert #1-Up					
1.757	Culvert #1-Dn					
1.751	243.01	234.37	176.68	453.32	5006	D
1.706	225.94	222.56	217.61	339.84	5006	
1.664	260.09	261.13	264.73	408.96	5006	
1.615	348.67	319.49	275.36	282.08	5006	
1.554	186.38	184.64	177.52	250.53	5006	C
1.519	478.98	499.06	501.73	272.84	5006	

1.425	213.43	294.1	310.95	365.98	5006	
1.369	239.27	239.8	219.34	227.41	5006	C
1.2[redacted]	197.12	179.74	148.13	296.11	5006	
1[redacted]	276.82	275.39	270.55	96.29	5006	D,C
1[redacted]	130.65	129.75	127.89	109.14	5006	
1.2[redacted]	150.15	151.03	156.08	138.62	5006	C
1.184	233.26	297.19	325.83	202.33	5006	
1.128	392.74	413.7	415.27	253.6	5006	
1.05	259.63	227.18	190.58	305.69	5006	D,C
1.007	274.62	275.37	252.36	378.75	5006	C
.954	186.9	218.1	251.71	258.17	5006	C
.913	221.22	268.06	280.4	186.44	5006	
.862	480.95	493.11	499.81	169.49	5006	C
.769	359.05	356.5	318.7	170.44	5006	
.701	407.46	405.66	393.74	127.06	5006	
.625	235.83	235.89	237.92	216.17	5006	C
.58	477.5	492.31	498.33	305.79	5006	
.487	499.86	490.83	480.36	223.16	5006	
.394	520.3	501.07	488.64	301.87	5006	
.299	321.3	304.33	283.97	362	5006	
.241	181.32	169.91	166.9	260.98	5006	C
.209	0	0	0	405.32	5006	C

B=blocked obstruction
C=critial depth
D=divided flow
E=cross section extended
K=known water-surface

XS SC 05
XS SC 03
XS SC 01
XS SC 02
XS SC 04

DISTANCE CHECK

SPACING CHECK

INEFFECTIVE FLOW CHECK

RS: 3.449
XS IF 01 Left Levee option is used at this river station
Please investigate whether the NFIP requirements
for levees are met.

RS: 3.246
XS IF 01 Left Levee option is used at this river station
Please investigate whether the NFIP requirements
for levees are met.

RS: 2.529
XS IF 01 Left Levee option is used at this river station
Please investigate whether the NFIP requirements
for levees are met.

RS: 1.237
XS IF 01 Right Levee option is used at this river station
Please investigate whether the NFIP requirements
for levees are met.

RS: 1.213
XS IF 01 Right Levee option is used at this river station
Please investigate whether the NFIP requirements
for levees are met.

RS: 0.954
XS IF 01 Left Levee option is used at this river station
Please investigate whether the NFIP requirements
for levees are met.

RS: 0.913
XS IF 01 Left Levee option is used at this river station
Please investigate whether the NFIP requirements
for levees are met.

DISCHARGE CHECK

LOCATION CHECK

[redacted] 3.361
1 Lenchl Up/TopwdthAct Dn = 2.22
MaxChlDpth Up/MaxChlDpth Dn = 1.14
TopwdthAct Up/TopwdthAct Dn = 2.32
This cross section is located too far upstream from the
critical depth cross section.

RS: 3.082
XS LC 01 Lenchl Up/TopwdthAct Dn = 1.73
MaxChlDpth Up/MaxChlDpth Dn = 1.24
TopwdthAct Up/TopwdthAct Dn = 1.88

This cross section is located too far upstream from the
critical depth cross section.

RS: 1.615
XS 1 Lenchl Up/TopwdthAct Dn = 1.28
MaxChlDpth Up/MaxChlDpth Dn = 1.11
TopwdthAct Up/TopwdthAct Dn = 1.13
This cross section is located too far upstream from the
critical depth cross section.

RS: 1.425
XS LC 01 Lenchl Up/TopwdthAct Dn = 1.29
MaxChlDpth Up/MaxChlDpth Dn = 1.17
TopwdthAct Up/TopwdthAct Dn = 1.61
This cross section is located too far upstream from the
critical depth cross section.

BOUNDARY CONDITION CHECK

XS BC 02 The name of the stream is Rodger Creek,Main Reach
Normal S = 0.012 is specified as the downstream boundary
for profile Q100

XS BC 02 The name of the stream is Rodger Creek,Main Reach
Normal S = 0.012 is specified as the downstream boundary
for profile FW

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

LATERAL WEIRS CHECK

---END---

CHECK-RAS Program: Structure Check

Project File: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.prj
Plan File: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.p01
Geometry File: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.g02
Flow File: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.f01
Report File: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.br
Selected profiles: Q100;FW
Date: 4/2/2012
Time: 11:28:34 AM

RS	MaxLoChord	MnTpRd	EGEL	WSEL	MinChEl	Structure
Rodger Creek,Main Reach						
6.345			2559.83	2559.42	2553.65	
6.268			2543.67	2542.63	2537.44	
6.213			2535.03	2534.43	2529.16	
6.17			2528.33	2526.53	2520.19	
6.104			2517.44	2516.7	2508.84	
6.025			2506.53	2504.98	2500.58	
5.934			2490.19	2489.7	2482.15	
5.881			2484.9	2483.9	2478.28	
5.815			2475.77	2475.2	2471.02	
5.743			2465.55	2464.66	2458.96	
5.653			2453.41	2452.63	2445.21	
5.562			2440.27	2439.77	2435.12	
5.477			2426.85	2426.11	2419.16	
5.391			2416.66	2415.95	2409.31	
5.297			2403.94	2403.03	2398.35	
5.21			2392.43	2391.58	2385.72	
5.115			2379.3	2378.31	2372.69	
5.021			2366.45	2366.02	2360.94	
4.927			2353.25	2352.74	2349.04	
4.839			2339.9	2339.51	2334.83	
4.75			2327.84	2327.42	2325.05	
4.696			2319.73	2319.28	2315.66	
4.624			2310.36	2309.88	2304.63	
4.567			2303.79	2303.12	2296.97	
4.478			2291.95	2291.39	2286.15	
4.404			2283.54	2283.12	2278.14	
4.339			2278.35	2277.69	2270.28	
4.293			2274.01	2273.26	2267.1	
4.194			2264.28	2263.42	2256.41	
[illegible]			2258.44	2257.45	2250.06	
[illegible]			2251.66	2250.68	2241.92	
4			2244.85	2243.79	2235.5	
3.922			2234.46	2233.59	2226.82	
3.868			2228.99	2228.15	2218.9	
3.813			2224.1	2223.08	2215.19	
3.733			2215.07	2214.12	2206.51	
3.664			2206.74	2205.59	2197.44	
3.582			2199.91	2199.15	2190.96	
3.518			2193.6	2191.85	2185.99	
3.449			2186.33	2185.48	2177.35	
3.394			2181.81	2180.18	2171.49	
3.361			2177.92	2176.88	2167.91	
3.305			2172.22	2170.24	2162.4	
3.26			2167.29	2166.56	2158.54	
3.246			2166.43	2165.5	2157.25	
3.221			2164.27	2162.47	2153.71	
3.186			2160.93	2159.74	2151.01	
3.157			2158.1	2156.48	2149.75	
3.082			2151.13	2150.15	2141.14	
3.018			2145.03	2143.7	2136.43	
2.929			2136.02	2135.32	2127.99	
2.868			2131.33	2130.55	2123.36	
2.807			2125.91	2125.09	2119.6	
2.759			2121.66	2120.95	2114.59	
2.713			2117.59	2116.77	2110.84	
2.675			2114.66	2112.78	2107.03	
2.614			2105.09	2103.12	2093.96	
2.586			2103.94	2101.46	2093.48	
2.529			2099.8	2098.5	2089.42	
2.444			2093.79	2092.28	2085.39	
2.395			2089.49	2088.29	2080.18	
2.335			2083.81	2082.48	2075.63	
2.258			2077.77	2076.74	2067.49	
2.166			2070.86	2069.55	2061.36	
2.071			2062.97	2061.81	2054.53	
1.986			2054.32	2053.17	2045.53	
1.894			2044.21	2042.21	2034.52	
1.871			2041.63	2040.24	2033.3	
1.831			2038.95	2038.23	2029.78	
1.802			2038.05	2037.67	2028.68	
[illegible]			2036.62	2036.12	2025.24	
	2032.66	2033.33	0	2032.66	2024.66	Culvert #1-Up
	2031.86	2032.56	0	2031.86	2023.86	Culvert #1-Dn
1.751			2035.11	2034.27	2024.83	
1.706			2030.86	2029.97	2022.4	
1.664			2028.27	2027.73	2020.99	
1.615			2025.91	2025.36	2017.84	
1.554			2021.53	2020.33	2013.58	
1.519			2017.89	2017.35	2011.27	
1.425			2011.73	2010.53	2003.06	
1.369			2007.19	2005.8	1999.43	

1.324	2005.05	2004.67	1996.01
1.29	2003.55	2000.9	1992.49
[illegible]	1999.21	1997.97	1988.66
[illegible]	1997.38	1995.42	1987.74
[illegible]	1994.36	1993.54	1985.35
1..	1990.83	1989.52	1980.38
1.05	1984.33	1983.2	1976.87
1.007	1980.92	1979.93	1972.33
0.954	1977.08	1975.88	1968.11
0.913	1974.58	1973.75	1966.5
0.862	1971.9	1970.09	1962.45
0.769	1965.41	1964.61	1957.5
0.701	1962.55	1961.02	1952.59
0.625	1957.98	1956.37	1949.43
0.58	1954.81	1953.69	1947.15
0.487	1948.11	1946.97	1941.5
0.394	1942.1	1941.16	1933.25
0.299	1936.88	1936.03	1928.38
0.241	1932.92	1931.68	1922.72
0.209	1930.21	1929.26	1921.39

RIVER/REACH: Rodger Creek, Main Reach
RIVER STATION: 1.757
TYPE OF STRUCTURE: Culvert

Description:	1.757 New River Road 2- 96" CMPs
Distance from Upstream XS:	8
Deck/Roadway Width:	43
Weir Coefficient:	2.6
Maximum allowable submergence for weir flow:	0.98
Elevation at which weir flow begins:	0
Weir crest shape:	Broad Crested

Sec	River Station	Length Channel	WSEL	Surch.	EGEL	TopWidth Actual	
4	1.802	204.22	2037.67	0	2038.05	400.23	
4	1.802	204.22	2038.32	0.65	2039.05	100	
[illegible]	1.763	64.46	2036.12	0	2036.62	476.42	
[illegible]	1.763	64.46	2037.03	0.91	2037.55	225	
	757	48.39	2032.66	0	0	0	Culvert #1-Up
	.757	8.07	2031.86	0	0	0	Culvert #1-Dn
	1.757	48.39	2032.66	0	0	0	Culvert #1-Up
	1.757	8.07	2031.86	0	0	0	Culvert #1-Dn
2	1.751	234.37	2034.27	0	2035.11	453.32	
2	1.751	234.37	2034.7	0.43	2035.85	246	
1	1.706	222.56	2029.97	0	2030.86	339.84	
1	1.706	222.56	2030.95	0.98	2031.61	169	

	Ineffective Flow, Section 3 Sta L	Sta R	Elev	Ineffective Flow, Section 2 Sta L	Sta R	Elev
1	9676.34	10001.11	2033.33	9834.94	9990.43	2032.6
2	10019.54	10484.15	2033.33	10007.13	10536.58	2032.6

Opening Type	StagStaL	StagStaR	EncStaL	EncStaR	LIfStaS	RIfStaS	
Culvert Group					10001.11	10019.54	
							U
					9990.43	10007.13	
							D
			0	0			U
			0	0			D

CULVERT:
Culvert Name: Culvert #1
Shape: Circular Rise: 8 Span: 0 Barrels: 2
FHWA Chart #: # 2 - Corrugated Metal Pipe C
FHWA Scale #: # 1 - Headwall
Solution Crit:Highest U.S. EG

UpstrmDist:	8	Length:	48.39	n-Value:	0.027		
EntLossCoef:	0.5	ExtLossCoef:	1	CulvInvElU	2024.66	CulvInvElD	2023.86
LCntStaU:	10005.12	RCntStaU:	10015.53	LCntStaD	9994.439	RCntStaD	10003.13

Culvert Depth Blocked: 0

Culv Area:	100.53	CulvQ:	896.29	MinTopRd:	2033.34	
	100.53		985.84		2033.34	

	LAbutSt	RAbutSt	LMnTpRd	RMnTpRd	MnTpRd	MxLoCd	
Culvert #1	10001.12	10019.53	2034.61	2033.33	2033.33	2032.66	U
	9990.44	10007.13	2034.55	2032.56	2032.56	2031.86	D

	10001.12	10019.53	2034.61	2033.33	2033.33	2032.66 U
	9990.44	10007.13	2034.55	2032.56	2032.56	2031.86 D

Name	Q Total.	Q Struc	Q Weir	Selected Method	Flow Type
Culvert #1		896.29	4109.71	Highest U.S. EG	Pressure and Weir Flow
		985.84	4020.16	Highest U.S. EG	Pressure and Weir Flow

GEOMETRIC CHECK

TYPE OF FLOW CHECK

RS: 1.757 This is Culvert #1
CV PW 01 Type of flow is pressure and weir flow because,
1. EGEL 3 of 2036.62 is greater than MinTopRd of 2033.34.
2. CulvWSIn of 2032.66 is greater than or equal to MxLoCdU of 2032.66.
3. CulvWSOut of 2031.86 is greater than or equal to MxLoCdD of 2031.86.

RS: 1.757 This is Culvert #1
CV PW 01 Type of flow is pressure and weir flow because,
1. EGEL 3 of 2037.55 is greater than MinTopRd of 2033.34.
2. CulvWSIn of 2032.66 is greater than or equal to MxLoCdU of 2032.66.
3. CulvWSOut of 2031.86 is greater than or equal to MxLoCdD of 2031.86.

DISTANCE CHECK

CULVERT COEFFICIENT CHECK

CULVERT CRITERIA CHECK

INEFFECTIVE FLOW CHECK

FLOODWAY CHECK

1.757 This is Culvert
'1 Encroachment Method was not specified at this river station.
For flood insurance studies Encroachment Methods 4 and 1
should be used.

---END

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

[redacted] File: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.prj
[redacted] le: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.p01
Geo[redacted]y File: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.g02
Flow File: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.f01
Report File: W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.fw
Selected profiles: Q100;FW
Date: 4/2/2012
Time: 11:28:12 AM

SECNO	Method	Surcharge	EncStaL	EncStaR	LStaEff	RStaEff	Structure
Rodger Creek,Main Reach							
6.345					9746.33	10013.18	
6.345	1	0.06	9747	10013.18	9747	10013.18	
6.268					9934.26	10020.05	
6.268	1	0.39	9961	10019.94	9961	10019.94	
6.213					9967.05	10039.69	
6.213	1	0.05	9973	10035	9973	10035	
6.17					9978.44	10023.02	
6.17	19	0.01	9980.41	10022.15	9980.41	10022.15	
6.104					9967.32	10018.96	
6.104	1	0.13	9977	10015	9977	10015	
6.025					9982.19	10036.99	
6.025	1	0.02	9986	10031	9986	10031	
5.934					9956.87	10047.26	
5.934	1	0.64	9986	10022	9986	10022	
5.881					9978.69	10057.99	
5.881	1	0.97	9993	10040	9993	10040	
5.815					9945.59	10090.05	
5.815	1	0.62	9969	10032	9969	10032	
5.743					9938.11	10071.09	
5.743	1	0.93	9985	10039	9985	10039	
5.653					9925.2	10054.42	
5.653	1	0.67	9980	10020	9980	10020	
5.562					9983.03	10187.99	
5.562	19	0.99	9983.03	10094	9983.03	10094	
5.477					9917.67	10061.16	
5.477	1	0.46	9969	10020	9969	10020	
5.391					9914.18	10035.9	
[redacted]391	1	0.95	9967	10035.9	9967	10035.9	
[redacted]					9964.87	10071	
[redacted]	19	0.15	9964.87	10040	9964.87	10040	
[redacted]					9983.2	10063.67	
5.21	1	0.47	9988	10048	9988	10048	
5.115					9979.52	10099.41	
5.115	19	0.01	9979.52	10041	9979.52	10041	
5.021					9932.23	10127.55	
5.021	1	0.61	9983	10082	9983	10082	
4.927					9905.4	10114.44	
4.927	1	0.06	9905.4	10067	9905.4	10067	
4.839					9887.09	10097.96	
4.839	1	0.77	9920	10055	9920	10055	
4.75					9919.13	10147.31	
4.75	1	0	9927	10120	9927	10120	
4.696					9928.78	10117.14	
4.696	1	0.96	9970	10083	9970	10083	
4.624					9949.59	10233.9	
4.624	1	0.83	9986	10037	9986	10037	
4.567					9966.54	10147.03	
4.567	1	0.99	9975	10030	9975	10030	
4.478					9982.19	10192.55	
4.478	19	0.65	9982.19	10150	9982.19	10150	
4.404					9873.27	10112.56	
4.404	1	0.95	9970	10095	9970	10095	
4.339					9787.13	10030.02	
4.339	1	0.86	9958	10022	9958	10022	
4.293					9842.9	10036.4	
4.293	1	1	9945	10035	9945	10035	
4.194					9893.59	10053.96	
4.194	1	0.52	9975	10035	9975	10035	
4.136					9959.96	10158.17	
4.136	1	0.08	9960	10055	9960	10055	
4.074					9938.44	10088.91	
4.074	1	0.97	9965	10050	9965	10050	
4.01					9872.53	10042.73	
4.01	1	0.1	9970	10032	9970	10032	
3.922					9973.99	10100.9	
3.922	1	0.34	9980	10100.9	9980	10100.9	
3.868					9922.09	10029.94	
3.868	1	0.68	9949	10029.94	9949	10029.94	
3.813					9950.94	10050.49	
[redacted]813	1	0.95	9978	10038	9978	10038	
[redacted]					9929.88	10133.39	
[redacted]	1	0.61	9958	10037	9958	10037	
3.664					9878.88	10021.25	
3.664	1	0.96	9955	10018	9955	10018	
3.582					9917.78	10037.89	
3.582	1	0.95	9965	10030	9965	10030	
3.518					9965.47	10079.91	
3.518	1	0.95	9981	10046	9981	10046	
3.449					9861.68	10047.07	
3.449	1	0.3	9958	10047.07	9958	10047.07	

3.394					9799.3	10039.67	
3.394	1	0.09	9923	10021	9925.71	10021	
3.361					9787.8	10153.05	
[redacted]	1	0.07	9950	10045	9956.13	10045	
					9958.48	10099.57	
3.[redacted]	1	0.27	9980	10061	9980	10060.62	
3.26					9960.86	10097.33	
3.26	19	0.08	9980.82	10076	9980.82	10076	
3.246					9949.74	10050.97	
3.246	1	0.39	9956	10050.5	9956	10050.5	
3.221					9934.06	10035.28	
3.221	19	0.74	9956.94	10016.39	9956.94	10016.39	
3.186					9931.65	10065.3	
3.186	1	0.76	9973	10032	9973	10032	
3.157					9928.98	10065.91	
3.157	1	0.92	9970	10037.73	9970	10037.73	
3.082					9868.47	10230.72	
3.082	1	0.48	9967	10037	9967	10037	
3.018					9859.58	10051.95	
3.018	1	0.99	9951	10035	9951	10035	
2.929					9814.38	10016.04	
2.929	1	0.77	9900	10016.04	9900	10016.04	
2.868					9942.45	10139.14	
2.868	1	0.99	9950	10075	9950	10075	
2.807					9860.33	10059.9	
2.807	1	0.85	9958	10054	9958	10054	
2.759					9817.18	10042.33	
2.759	1	1	9880	10015	9880	10015	
2.713					9851.17	10056.15	
2.713	1	0.8	9917	10029	9917	10029	
2.675					9939.93	10102.61	
2.675	1	0.23	9944	10011	9944	10011	
2.614					9963.19	10059.8	
2.614	1	0.95	9970	10042	9970	10042	
2.586					9969.85	10063.52	
2.586	1	0.52	9975	10027	9975	10027	
2.529					9953.97	10082.56	
2.529	1	0.92	9986	10034	9986	10034	
2.444					9877.04	10022.53	
2.444	1	0.34	9950	10015	9950	10015	
2.395					9858.53	10128.24	
2.395	1	0	9941	10108	9941	10108	
2.335					9980.28	10204.33	
2.335	19	0.53	9980.28	10074.09	9980.28	10074.09	
[redacted]					9864.42	10065.72	
[redacted]	1	0.98	9969	10055	9969	10055	
[redacted]					9856.51	10024.01	
2.166	19	0.99	9936.68	10024.01	9936.68	10024.01	
2.071					9798.45	10053.8	
2.071	1	0.61	9953	10053.8	9953	10053.8	
1.986					9792.5	10050.47	
1.986	1	0.91	9880	10050.47	9880	10050.47	
1.894					9925.85	10054	
1.894	1	0.94	9940	10048	9940	10048	
1.871					9910.98	10076.98	
1.871	1	0.55	9964	10055	9964	10055	
1.831					9928.4	10141.99	
1.831	1	0.88	9969	10081	9969	10081	
1.802					9821.83	10222.06	
1.802	1	0.65	9960	10060	9960	10060	
1.763					9924.89	10401.31	
1.763	1	0.91	9965	10190	9965	10190	
1.757					0	0	Culvert #1-Up
1.757					0	0	Culvert #1-Dn
1.757	0	0	0	0	0	0	Culvert #1-Up
1.757	0	0	0	0	0	0	Culvert #1-Dn
1.751					9941.4	10397.26	
1.751	1	0.43	9966	10212	9966	10212	
1.706					9875.42	10215.25	
1.706	1	0.98	9945	10114	9945	10114	
1.664					9825.57	10234.53	
1.664	1	0.8	9972	10095	9972	10095	
1.615					9846.03	10128.11	
1.615	1	0.86	9969	10120	9969	10120	
1.554					9827.89	10078.41	
1.554	1	0.95	9910	10060	9910	10060	
1.519					9832.85	10105.69	
1.519	19	0.99	9882.72	10053	9882.72	10053	
1.425					9663.44	10029.42	
1.425	1	0.04	9910	10029.42	9910	10029.42	
1.369					9800.04	10027.45	
1.369	1	0.99	9888.5	10027.45	9888.5	10027.45	
1.324					9880.33	10176.44	
1.324	1	0.33	9964	10058.36	9964	10058.36	
1.29					9970.22	10105.99	
[redacted]	1	0.05	9976	10030	9976	10030	
[redacted]					9970.37	10079.51	
[redacted]	1	1	9975	10049	9975	10049	
1.213					9956.72	10095.34	
1.213	1	0.36	9970	10038	9970	10038	
1.184					9953.04	10155.37	
1.184	19	1	9953.04	10053	9953.04	10053	
1.128					9776.35	10029.95	
1.128	1	0.08	9915	10029.95	9915	10029.95	
1.05					9861.62	10171.89	
1.05	19	0.95	9906.84	10136.7	9906.84	10136.7	

1.007					9849.52	10228.27
1.007	1	0.95	9948	10105	9948	10105
0.954					9974.56	10232.73
[redacted]	19	0.77	9974.56	10117	9974.56	10117
					9881.82	10068.26
0.[redacted]	1	1	9936	10068.26	9936	10068.26
0.862					9879.33	10048.81
0.862	19	0.46	9936.67	10015	9936.67	10015
0.769					9876.22	10046.66
0.769	1	0.27	9893	10010	9893	10010
0.701					9982.81	10109.87
0.701	1	0.83	9985	10065.08	9985	10065.08
0.625					9884.79	10100.95
0.625	1	0.39	9935	10030	9935	10030
0.58					9877.13	10182.92
0.58	1	0.73	9930	10085	9930	10085
0.487					9833.83	10057
0.487	1	0.91	9908	10056	9908	10056
0.394					9832.23	10134.1
0.394	1	0.3	9911	10060	9911	10060
0.299					9868.45	10230.45
0.299	1	0.91	9901	10110	9901	10110
0.241					9983.56	10244.53
0.241	19	0.65	9983.56	10107	9983.56	10107
0.209					9820.91	10226.23
0.209	1	0.48	9903.3	10188.16	9903.3	10188.16

ENCROACHMENT METHOD CHECK

RS: 1.757
FW EM 01 Floodway encroachment method is not selected at this section.

FLOODWAY WIDTH CHECK

RS: 6.345
FW FW 03 The right channel bank station may not be at the proper location.

RS: 6.268
[redacted] 03 The right channel bank station may not be at the proper location.

RS: 6.17
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 6.17
FW FW 03 The right channel bank station may not be at the proper location.

RS: 6.104
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 6.025
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 6.025
FW FW 03 The right channel bank station may not be at the proper location.

RS: 5.934
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 5.934
FW FW 03 The right channel bank station may not be at the proper location.

RS: 5.815
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 5.815
FW FW 03 The right channel bank station may not be at the proper location.

RS: 5.653
FW FW 03 The right channel bank station may not be at the proper location.

[redacted]

5.562
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 5.562
FW FW 03 The right channel bank station may not be at the proper location.

RS: 5.477

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

R 5.297
F 3 The right channel bank station may not be at the proper location.

RS: 5.21
FW FW 03 The right channel bank station may not be at the proper location.

RS: 5.115
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 4.927
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 4.839
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 4.75
FW FW 03 The right channel bank station may not be at the proper location.

RS: 4.696
FW FW 03 The right channel bank station may not be at the proper location.

RS: 4.567
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 4.478
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 4.293
FW FW 03 The Left channel bank station may not be at the proper location.

RS 4.293
03 The right channel bank station may not be at the proper location.

RS: 4.194
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 4.136
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 4.136
FW FW 03 The right channel bank station may not be at the proper location.

RS: 4.01
FW FW 03 The right channel bank station may not be at the proper location.

RS: 3.868
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 3.664
FW FW 03 The right channel bank station may not be at the proper location.

RS: 3.518
FW FW 03 The right channel bank station may not be at the proper location.

RS: 3.449
FW FW 03 The right channel bank station may not be at the proper location.

RS: 3.394
FW FW 03 The right channel bank station may not be at the proper location.

RS: 3.246
FW FW 03 The Left channel bank station may not be at the proper location.

3.186
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 3.157
FW FW 03 The right channel bank station may not be at the proper location.

RS: 3.082

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

RS: 2.929
FW FW 03 The right channel bank station may not be at the proper location.

RS: 2.807
FW FW 03 The right channel bank station may not be at the proper location.

RS: 2.759
FW FW 03 The right channel bank station may not be at the proper location.

RS: 2.675
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 2.614
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 2.614
FW FW 03 The right channel bank station may not be at the proper location.

RS: 2.529
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 2.529
FW FW 03 The right channel bank station may not be at the proper location.

RS: 2.444
FW FW 03 The right channel bank station may not be at the proper location.

RS: 2.335
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 2.335
FW FW 03 The right channel bank station may not be at the proper location.

RS: 2.258
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 2.166
FW FW 03 The right channel bank station may not be at the proper location.

RS: 2.071
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 1.894
FW FW 03 The right channel bank station may not be at the proper location.

RS: 1.831
FW FW 03 The right channel bank station may not be at the proper location.

RS: 1.802
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 1.763
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 1.763
FW FW 03 The right channel bank station may not be at the proper location.

RS: 1.751
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 1.706
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 1.706
FW FW 03 The right channel bank station may not be at the proper location.

RS: 1.664
FW FW 03 The right channel bank station may not be at the proper location.

RS: 1.615

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

RS 1.29
F 3 The Left channel bank station may not be at the proper location.

RS: 1.29
FW FW 03 The right channel bank station may not be at the proper location.

RS: 1.237
FW FW 03 The right channel bank station may not be at the proper location.

RS: 1.128
FW FW 03 The right channel bank station may not be at the proper location.

RS: 1.007
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 0.913
FW FW 03 The right channel bank station may not be at the proper location.

RS: 0.769
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 0.701
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 0.625
FW FW 03 The Left channel bank station may not be at the proper location.

SURCHARGE CHECK

DISCHARGE CHECK

STARTING WATER-SURFACE ELEVATION CHECK

---END---

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: Rodger Creek
Project File : RodgerCreek.prj
Run Date and Time: 4/2/2012 11:25:48 AM

Project in English units

Project Description:
Rodger Creek Floodplain Delineation Study
Contract FCD 2010C003 Assignment
#2
This model is not for public release until final approval provided by
FEMA

Consultant: Michael Baker Jr. Incorporated
Cynthia M. S. DePonti, PE,
CFM
2929 North Central Avenue #800
Phoenix, AZ
85012
http://www.mbakercorp.com/
Internal Job number 122522
HEC-RAS model
name: RodgerCreek.prj, July 11, 2011

This is a re-delineation of Rodger
using updated methods and data, including rainfall from NOAA 14

Mod
Geometry based upon 2' contour interval mapping

Vertical Datum in
NAVD88

Aerial mapping provided by the Flood Control District of Maricopa
County for Rodger Creek Mapping, Contract No. FCD 08-20, Flight Date April 7,
2010

In conjunction with FEMA Grant No. EMF-2009-GR-0909

HEC-RAS Version
4.1.0
Rodger Creek is tributary to Skunk Creek

Last Run date April 2, 2012

****

PLAN DATA

Plan Title: Rodger Creek Plan
Plan File : W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.p01

Geometry Title: Rodger Creek Geometry
Geometry File : W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.g02

Flow Title : Rodger Creek Flow Rates
Flow File : W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.f01

Plan Summary Information:
Number of: Cross Sections = 99 Multiple Openings = 0
Culverts = 1 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

Encroachment Data
Equal Conveyance = True
Left Offset = 0

Ri[redacted] = Rodger Creek Reach = Main Reach

R[redacted]	Profile	Method	Value1	Value2
6.[redacted]	FW	1	974710013.18	
6.268	FW	1	996110019.94	
6.213	FW	1	9973	10035
6.170	FW	1	9980.4110022.15	
6.104	FW	1	9977	10015
6.025	FW	1	9986	10031
5.934	FW	1	9986	10022
5.881	FW	1	9993	10040
5.815	FW	1	9969	10032
5.743	FW	1	9985	10039
5.653	FW	1	9980	10020
5.562	FW	1	9983.03	10094
5.477	FW	1	9969	10020
5.391	FW	1	9967	10035.9
5.297	FW	1	9964.87	10040
5.210	FW	1	9988	10048
5.115	FW	1	9979.52	10041
5.021	FW	1	9983	10082
4.927	FW	1	9905.4	10067
4.839	FW	1	9920	10055
4.750	FW	1	9927	10120
4.696	FW	1	9970	10083
4.624	FW	1	9986	10037
4.567	FW	1	9975	10030
4.478	FW	1	9982.19	10150
4.404	FW	1	9970	10095
4.339	FW	1	9958	10022
4.293	FW	1	9945	10035
4.194	FW	1	9975	10035
4.136	FW	1	9960	10055
4.074	FW	1	9965	10050
4.010	FW	1	9970	10032
3.922	FW	1	9980	10100.9
3.868	FW	1	994910029.94	
3.813	FW	1	9978	10038
3.733	FW	1	9958	10037
3.664	FW	1	9955	10018
3.582	FW	1	9965	10030
3.518	FW	1	9981	10046
3.449	FW	1	995810047.07	
3.394	FW	1	9923	10021
3.361	FW	1	9950	10045
3[redacted]	FW	1	9980	10061
[redacted]	FW	1	9980.82	10076
3.[redacted]	FW	1	9956	10050.5
3.221	FW	1	9956.9410016.39	
3.186	FW	1	9973	10032
3.157	FW	1	997010037.73	
3.082	FW	1	9967	10037
3.018	FW	1	9951	10035
2.929	FW	1	990010016.04	
2.868	FW	1	9950	10075
2.807	FW	1	9958	10054
2.759	FW	1	9880	10015
2.713	FW	1	9917	10029
2.675	FW	1	9944	10011
2.614	FW	1	9970	10042
2.586	FW	1	9975	10027
2.529	FW	1	9986	10034
2.444	FW	1	9950	10015
2.395	FW	1	9941	10108
2.335	FW	1	9980.2810074.09	
2.258	FW	1	9969	10055
2.166	FW	1	9936.6810024.01	
2.071	FW	1	9953	10053.8
1.986	FW	1	988010050.47	
1.894	FW	1	9940	10048
1.871	FW	1	9964	10055
1.831	FW	1	9969	10081
1.802	FW	1	9960	10060
1.763	FW	1	9965	10190
1.751	FW	1	9966	10212
1.706	FW	1	9945	10114
1.664	FW	1	9972	10095
1.615	FW	1	9969	10120
1.554	FW	1	9910	10060
1.519	FW	1	9882.72	10053
1.425	FW	1	991010029.42	
1.369	FW	1	9888.510027.45	
1.324	FW	1	996410058.36	
1.290	FW	1	9976	10030
1.237	FW	1	9975	10049
1.213	FW	1	9970	10038
1.184	FW	1	9953.04	10053
1.128	FW	1	991510029.95	
1.050	FW	1	9906.84	10136.7
[redacted]	FW	1	9948	10105
[redacted]	FW	1	9974.56	10117
[redacted]	FW	1	993610068.26	
0.862	FW	1	9936.67	10015
0.769	FW	1	9893	10010
0.701	FW	1	998510065.08	
0.625	FW	1	9935	10030
0.580	FW	1	9930	10085
0.487	FW	1	9908	10056
0.394	FW	1	9911	10060
0.299	FW	1	9901	10110
0.241	FW	1	9983.56	10107

0.209 FW 1 9903.310188.16

[redacted] **********

FLOW DATA

Flow Title: Rodger Creek Flow Rates
Flow File : W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.f01

Flow Data (cfs)

River	Reach	RS	Q100	FW
Rodger Creek	Main Reach	6.345	1532	1532
Rodger Creek	Main Reach	5.881	2097	2097
Rodger Creek	Main Reach	4.404	2948	2948
Rodger Creek	Main Reach	4.339	3626	3626
Rodger Creek	Main Reach	3.733	4163	4163
Rodger Creek	Main Reach	3.082	4320	4320
Rodger Creek	Main Reach	2.335	4681	4681
Rodger Creek	Main Reach	2.258	5006	5006

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Rodger Creek	Main Reach	Q100		Normal S = 0.012
Rodger Creek	Main Reach	FW		Normal S = 0.012

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GEOMETRY DATA

Geometry Title: Rodger Creek Geometry
Geometry File : W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Hydraulic Models\HEC-RAS Current Model\RodgerCreek.g02

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 6.345

INPUT
Description: 6.345
Station Elevation Data num= 92

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9553.39	2586.4	9570.59	2586.27	9579.75	2586.19	9585	2585.52	9597.29	2584.1
9611.43	2582.76	9637.04	2579.59	9644.1	2578.67	9661.83	2576.31	9666.45	2574.91
9671.72	2573.76	9676.61	2572.56	9688.98	2569.47	9701.87	2566.83	9714.22	2563.83
9717.76	2562.82	9732.27	2561.7	9734.57	2561.54	9735.29	2561.4	9746.12	2559.45
9746.43	2559.4	9746.47	2559.39	9752.23	2558.54	9759.66	2558.22	9766.05	2557.9
9780.57	2558.1	9781.19	2558.08	9781.74	2558.05	9784.16	2557.91	9796.65	2557.11
9798.42	2557.03	9803.04	2556.25	9804.82	2555.93	9805.1	2555.97	9805.26	2555.96
9809.73	2556.14	9812.28	2556.23	9818.8	2556.45	9821.07	2556.68	9822.8	2556.87
9823.78	2556.98	9824.43	2557.06	9827.72	2557.47	9833.11	2557.89	9841.51	2559.18
9847.04	2560.61	9862.88	2561.13	9877.04	2561.48	9883.6	2561.6	9894.72	2560.5
9894.79	2560.49	9894.84	2560.48	9909.18	2560.04	9913.39	2559.92	9919.12	2558.95
9920.27	2559.14	9928.97	2557.06	9930.83	2557.53	9941.58	2559.31	9943.75	2559.48
9950.97	2559.27	9952.82	2559.28	9953.97	2559.17	9957.9	2558.78	9960.7	2558.38
9962.66	2558.59	9978.07	2559.68	9980.9	2559.47	9991.72	2556.34	9993.4	2555.54
10000.67	2553.6510004.86		2555.5710007.22		2556.6610010.99		2558.1910012.22		2558.85
100132559.31110018.99			2562.8510042.85		2564.5310044.49		2564.7110045.63		2564.86
10048.97	2565.0810056.53		2565.610057.66		2565.6610062.21		2565.98	10078.1	2566.77
10084.69	2567.0910086.41		2567.1710096.81		2567.5910109.15		2568.46	10114.4	2568.81
10118.37	2568.8910120.67		2568.92						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9553.39	.076	9978.07	.079	10013	.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9978.07 10013 453.91 406.25 394.49 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2559.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.41	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2559.42	Reach Len. (ft)	453.91	406.25	394.49
Crit W.S. (ft)	2558.97	Flow Area (sq ft)	213.85	94.02	0.01
E.G. Slope (ft/ft)	0.027535	Area (sq ft)	213.85	94.02	0.01
Q Total (cfs)	1532.00	Flow (cfs)	954.04	577.96	0.00
Top Width (ft)	183.10	Top Width (ft)	151.01	31.91	0.18
Vel Total (ft/s)	4.98	Avg. Vel. (ft/s)	4.46	6.15	0.41
Max Chl Dpth (ft)	5.77	Hydr. Depth (ft)	1.42	2.95	0.05
Conv. Total (cfs)	9232.4	Conv. (cfs)	5749.4	3483.0	0.0
[redacted]th Wtd. (ft)	427.87	Wetted Per. (ft)	152.04	34.02	0.21
[redacted]h El (ft)	2553.65	Shear (lb/sq ft)	2.42	4.75	0.08
[redacted]	1.08	Stream Power (lb/ft s)	10120.67	0.00	0.00
Frctn Loss (ft)	16.11	Cum Volume (acre-ft)	106.21	214.56	85.24
C & E Loss (ft)	0.06	Cum SA (acres)	51.97	42.64	46.23

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the

need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2559.86	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.39	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* W.S. Elev (ft)	* 2559.47	* Reach Len. (ft)	* 453.91	* 406.25	* 394.49 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 222.52	* 95.85	* 0.02 *
* E.G. Slope (ft/ft)	*0.025126	* Area (sq ft)	* 222.52	* 95.85	* 0.02 *
* Q Total (cfs)	* 1532.00	* Flow (cfs)	* 964.46	* 567.53	* 0.01 *
* Top Width (ft)	* 186.72	* Top Width (ft)	* 154.40	* 32.14	* 0.18 *
* Vel Total (ft/s)	* 4.81	* Avg. Vel. (ft/s)	* 4.33	* 5.92	* 0.55 *
* Max Chl Dpth (ft)	* 5.82	* Hydr. Depth (ft)	* 1.44	* 2.98	* 0.11 *
* Conv. Total (cfs)	* 9665.0	* Conv. (cfs)	* 6084.5	* 3580.4	* 0.1 *
* Length Wtd. (ft)	* 423.51	* Wetted Per. (ft)	* 155.60	* 34.25	* 0.26 *
* Min Ch El (ft)	* 2553.65	* Shear (lb/sq ft)	* 2.24	* 4.39	* 0.12 *
* Alpha	* 1.07	* Stream Power (lb/ft s)	*10120.67	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 15.36	* Cum Volume (acre-ft)	* 44.64	* 240.70	* 47.77 *
* C & E Loss (ft)	* 0.10	* Cum SA (acres)	* 14.81	* 42.64	* 15.89 *

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 6.268

INPUT
Description: 6.268
Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9821.75	2555.69	9828.07	2555.44	9838.73	2554.73	9849.68	2554.12	9865.64	2553.3
9883.15	2552.14	9888.25	2551.75	9891.55	2551.64	9904.16	2550.49	9914.04	2549.16
9916.03	2548.26	9935.67	2542.19	9939.17	2541.02	9939.46	2540.98	9941.98	2540.79
9949.39	2540.22	9954.25	2540.11	9955.72	2540.51	9956.5	2540.71	9958.78	2540.81
9961.5	2540.96	9974.94	2541.65	9990.29	2539.91	9995.07	2539.67	9996.35	2539.16
10002.29	2537.8910004.37		2537.4410013.78		2540.0810014.57		2540.3810017.77		2541.61
[redacted]99	2543.9410035.49		2545.4	10046.7	2546.9410051.01		2547.4310062.86		2548.42
[redacted]9	2549.3510070.66		2549.6310080.86		2550.05	10100.5	2550.7910111.92		2551.55
10[redacted]8	2552.0110152.29		2554.1410159.52		2554.4810187.12		2556.6710207.52		2558.15
10210.63	2558.7610215.61		2559.64						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9821.75	.076	9974.94	.07910017.77		.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9974.9410017.77 283.03 289.37 307.23 .1 .3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2543.67	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.04	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* W.S. Elev (ft)	* 2542.63	* Reach Len. (ft)	* 283.03	* 289.37	* 307.23 *
* Crit W.S. (ft)	* 2542.58	* Flow Area (sq ft)	* 68.18	* 124.22	* 1.16 *
* E.G. Slope (ft/ft)	*0.054556	* Area (sq ft)	* 68.18	* 124.22	* 1.16 *
* Q Total (cfs)	* 1532.00	* Flow (cfs)	* 436.47	* 1092.36	* 3.17 *
* Top Width (ft)	* 85.79	* Top Width (ft)	* 40.68	* 42.83	* 2.28 *
* Vel Total (ft/s)	* 7.92	* Avg. Vel. (ft/s)	* 6.40	* 8.79	* 2.74 *
* Max Chl Dpth (ft)	* 5.19	* Hydr. Depth (ft)	* 1.68	* 2.90	* 0.51 *
* Conv. Total (cfs)	* 6559.0	* Conv. (cfs)	* 1868.7	* 4676.7	* 13.6 *
* Length Wtd. (ft)	* 288.48	* Wetted Per. (ft)	* 41.08	* 43.86	* 2.49 *
* Min Ch El (ft)	* 2537.44	* Shear (lb/sq ft)	* 5.65	* 9.65	* 1.58 *
* Alpha	* 1.07	* Stream Power (lb/ft s)	*10215.61	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 8.51	* Cum Volume (acre-ft)	* 104.74	* 213.54	* 85.23 *
* C & E Loss (ft)	* 0.13	* Cum SA (acres)	* 50.98	* 42.29	* 46.22 *

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2544.41	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.39	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* W.S. Elev (ft)	* 2543.02	* Reach Len. (ft)	* 283.03	* 289.37	* 307.23 *
* Crit W.S. (ft)	* 2543.02	* Flow Area (sq ft)	* 24.07	* 141.01	* 2.01 *
* [redacted]G. Slope (ft/ft)	*0.056846	* Area (sq ft)	* 24.07	* 141.01	* 2.01 *
[redacted]Total (cfs)	* 1532.00	* Flow (cfs)	* 147.09	* 1377.45	* 7.46 *
[redacted]idth (ft)	* 58.94	* Top Width (ft)	* 13.94	* 42.83	* 2.17 *
[redacted]otal (ft/s)	* 9.17	* Avg. Vel. (ft/s)	* 6.11	* 9.77	* 3.72 *
* Max Chl Dpth (ft)	* 5.58	* Hydr. Depth (ft)	* 1.73	* 3.29	* 0.92 *
* Conv. Total (cfs)	* 6425.5	* Conv. (cfs)	* 616.9	* 5777.3	* 31.3 *
* Length Wtd. (ft)	* 289.11	* Wetted Per. (ft)	* 16.05	* 43.86	* 2.82 *
* Min Ch El (ft)	* 2537.44	* Shear (lb/sq ft)	* 5.32	* 11.41	* 2.53 *
* Alpha	* 1.06	* Stream Power (lb/ft s)	*10215.61	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 8.78	* Cum Volume (acre-ft)	* 43.36	* 239.59	* 47.76 *
* C & E Loss (ft)	* 0.23	* Cum SA (acres)	* 13.93	* 42.29	* 15.87 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 6.213

INPUT
Description: 6.213
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9929.2	2541.34	9933.57	2540.84	9945.69	2539.48	9946.62	2539.4	9947.28	2539.33
9954.03	2538.81	9966.05	2534.79	9967.92	2534.11	9969.51	2533.53	9970.48	2533.17
9973.38	2532.23	9982.28	2529.16	9982.8	2529.21	9989.83	2529.86	9993.88	2530.11
9995.91	2529.83	9999.68	2529.251	0003.43	2530.231	0004.36	2530.51	0007.87	2530.51
10021.99	2530.931	0028.46	2531.13	100352	533.037	10039.4	2534.321	0042.65	2535.49
10045.4	2536.561	0053.69	2539.97	10059.3	2542.29	10069.4	2543.891	0085.48	2545.98
10088.73	2546.241	0103.05	2547.351	0120.16	2548.791	0131.25	2549.82		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9929.2	.076	9973.38	.079	10035	.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9973.38 10035 224.86 229.16 234.19 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2535.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.60	Wt. n-Val.	0.076	0.079	0.076
[redacted] Elev (ft)	2534.43	Reach Len. (ft)	224.86	229.16	234.19
[redacted] W.S. (ft)		Flow Area (sq ft)	7.15	240.46	3.30
[redacted] Slope (ft/ft)	0.018451	Area (sq ft)	7.15	240.46	3.30
Q Total (cfs)	1532.00	Flow (cfs)	19.81	1505.45	6.74
Top Width (ft)	72.64	Top Width (ft)	6.33	61.62	4.69
Vel Total (ft/s)	6.11	Avg. Vel. (ft/s)	2.77	6.26	2.04
Max Chl Dpth (ft)	5.27	Hydr. Depth (ft)	1.13	3.90	0.70
Conv. Total (cfs)	11278.4	Conv. (cfs)	145.8	11082.9	49.6
Length Wtd. (ft)	229.15	Wetted Per. (ft)	6.70	62.68	4.89
Min Ch El (ft)	2529.16	Shear (lb/sq ft)	1.23	4.42	0.78
Alpha	1.04	Stream Power (lb/ft s)	10131.25	0.00	0.00
Frctn Loss (ft)	6.59	Cum Volume (acre-ft)	104.49	212.33	85.22
C & E Loss (ft)	0.12	Cum SA (acres)	50.82	41.95	46.19

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2535.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.61	Wt. n-Val.	0.076	0.079	
W.S. Elev (ft)	2534.48	Reach Len. (ft)	224.86	229.16	234.19
Crit W.S. (ft)		Flow Area (sq ft)	0.83	243.53	
E.G. Slope (ft/ft)	0.018853	Area (sq ft)	0.83	243.53	
Q Total (cfs)	1532.00	Flow (cfs)	1.06	1530.94	
Top Width (ft)	62.00	Top Width (ft)	0.38	61.62	
Vel Total (ft/s)	6.27	Avg. Vel. (ft/s)	1.28	6.29	
Max Chl Dpth (ft)	5.32	Hydr. Depth (ft)	2.18	3.95	
Conv. Total (cfs)	11157.6	Conv. (cfs)	7.7	11149.8	
Length Wtd. (ft)	229.17	Wetted Per. (ft)	2.52	64.12	
Min Ch El (ft)	2529.16	Shear (lb/sq ft)	0.39	4.47	
Alpha	1.00	Stream Power (lb/ft s)	10131.25	0.00	0.00
Frctn Loss (ft)	6.65	Cum Volume (acre-ft)	43.28	238.31	47.75
C & E Loss (ft)	0.12	Cum SA (acres)	13.89	41.95	15.87

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

[redacted] SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 6.170

INPUT
Description: 6.17
Station Elevation Data num= 31

```
**********************************************************************************
[redacted]06 2537.47 9931.25 2536.22 9938.67 2535.02 9949.54 2533.35 9958.65 2531.87
[redacted]1 2531.06 9967.18 2529.87 9973.11 2528.05 9980.41 2525.97 9980.73  2525.8
9[redacted]4 2524.47 9984.56 2524.26  9989.6 2522.96 9994.45 2521.59 9998.53 2520.19
10003.64    252110006.17  2521.710015.99 2524.6110016.59 2524.7910022.15 2526.29
10031.69 2528.9210040.05 2530.0510044.98 2530.7710071.13 2534.1810076.75 2534.88
10108.55 2536.8910110.34 2536.9810126.56 2537.9210130.05 2538.0610135.22 2538.76
10135.86 2538.77

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
 9923.06    .076 9984.56    .07910015.99    .076

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9984.5610015.99             348.8  344.75   335.2             .1       .3

CROSS SECTION OUTPUT  Profile #Q100
**********************************************************************************************
* E.G. Elev (ft)          * 2528.33  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)           *    1.80  * Wt. n-Val.            *   0.076  *   0.079  *   0.076  *
* W.S. Elev (ft)          * 2526.53  * Reach Len. (ft)       *  348.80  *  344.75  *  335.20  *
* Crit W.S. (ft)          * 2526.53  * Flow Area (sq ft)     *    6.50  *  134.94  *    6.71  *
* E.G. Slope (ft/ft)      *0.050845  * Area (sq ft)          *    6.50  *  134.94  *    6.71  *
* Q Total (cfs)           * 1532.00  * Flow (cfs)            *   28.55  * 1475.48  *   27.97  *
* Top Width (ft)          *   44.58  * Top Width (ft)       *    6.12  *   31.43  *    7.03  *
* Vel Total (ft/s)        *   10.34  * Avg. Vel. (ft/s)     *    4.39  *   10.93  *    4.17  *
* Max Chl Dpth (ft)       *    6.34  * Hydr. Depth (ft)     *    1.06  *    4.29  *    0.95  *
* Conv. Total (cfs)       *  6794.1  * Conv. (cfs)          *  126.6   *  6543.5  *  124.1   *
* Length Wtd. (ft)        *  344.71  * Wetted Per. (ft)     *    6.53  *   32.60  *    7.29  *
* Min Ch El (ft)          * 2520.19  * Shear (lb/sq ft)     *    3.16  *   13.14  *    2.92  *
* Alpha                   *    1.08  * Stream Power (lb/ft s) *10135.86  *    0.00  *    0.00  *
* Frctn Loss (ft)         *    8.47  * Cum Volume (acre-ft) *  104.46  *  211.34  *   85.19  *
* C & E Loss (ft)         *    0.32  * Cum SA (acres)       *   50.79  *   41.70  *   46.16  *
**********************************************************************************************

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

CR[redacted]ECTION OUTPUT  Profile #FW
**********************************************************************************************
* E.G. Elev (ft)          * 2528.33  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)           *    1.79  * Wt. n-Val.            *   0.076  *   0.079  *   0.076  *
* W.S. Elev (ft)          * 2526.54  * Reach Len. (ft)       *  348.80  *  344.75  *  335.20  *
* Crit W.S. (ft)          * 2526.54  * Flow Area (sq ft)     *    5.99  *  135.23  *    6.66  *
* E.G. Slope (ft/ft)      *0.050344  * Area (sq ft)          *    5.99  *  135.23  *    6.66  *
* Q Total (cfs)           * 1532.00  * Flow (cfs)            *   29.38  * 1473.35  *   29.28  *
* Top Width (ft)          *   41.74  * Top Width (ft)       *    4.15  *   31.43  *    6.16  *
* Vel Total (ft/s)        *   10.36  * Avg. Vel. (ft/s)     *    4.91  *   10.90  *    4.40  *
* Max Chl Dpth (ft)       *    6.35  * Hydr. Depth (ft)     *    1.44  *    4.30  *    1.08  *
* Conv. Total (cfs)       *  6827.8  * Conv. (cfs)          *  130.9   *  6566.4  *  130.5   *
* Length Wtd. (ft)        *  344.69  * Wetted Per. (ft)     *    5.06  *   32.60  *    6.63  *
* Min Ch El (ft)          * 2520.19  * Shear (lb/sq ft)     *    3.72  *   13.04  *    3.15  *
* Alpha                   *    1.07  * Stream Power (lb/ft s) *10135.86  *    0.00  *    0.00  *
* Frctn Loss (ft)         *    8.36  * Cum Volume (acre-ft) *   43.26  *  237.32  *   47.73  *
* C & E Loss (ft)         *    0.30  * Cum SA (acres)       *   13.88  *   41.70  *   15.85  *
**********************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
         for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
         water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The program
         defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth.  The program will try the cross section slice/secant
         method to find critical depth.

CROSS SECTION


RIVER: Rodger Creek
REACH: Main Reach         RS: 6.104

INPUT
Description: 6.104
S[redacted]tion Elevation Data    num=      34
[redacted]Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      **********************************************************************
9[redacted]9 2527.98 9897.92 2526.94 9916.01 2525.38  9925.4 2524.79 9933.28 2523.15
 9942.11 2521.12 9946.99 2520.25 9950.35 2519.57 9959.44 2518.38 9962.14 2517.99
 9962.78 2517.75 9970.66 2515.93 9970.77  2515.9 9970.94 2515.86 9977.07 2513.81
 9984.44 2511.35 9987.58 2510.89 9990.72 2510.49 9998.81 2509.1110000.68 2508.84
10002.57 2509.2210013.03 2513.3510014.36 2514.22 10014.9 2514.5710023.47 2519.07
10026.55 2519.88 10034.8 2521.7510056.86 2523.2110067.85 2523.7910075.62 2523.97
10106.18 2525.3910107.06 2525.4410110.84 2525.6210119.65 2525.98

Manning's n Values        num=       3
[redacted]Sta   n Val     Sta   n Val     Sta   n Val
```

```
**********************************************
[redacted]29    .076 9977.07    .07910014.36    .076

Ba[redacted].a: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9977.0710014.36            423.63  418.14  414.87             .1       .3

CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************
* E.G. Elev (ft)        * 2517.44  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    0.74  * Wt. n-Val.           *    0.076 *    0.079 *    0.076 *
* W.S. Elev (ft)        * 2516.70  * Reach Len. (ft)       *  423.63  *  418.14  *  414.87  *
* Crit W.S. (ft)        * 2514.77  * Flow Area (sq ft)     *   12.96  *  212.12  *    5.57  *
* E.G. Slope (ft/ft)    *0.014421  * Area (sq ft)          *   12.96  *  212.12  *    5.57  *
* Q Total (cfs)         * 1532.00  * Flow (cfs)            *   35.74  * 1482.60  *   13.66  *
* Top Width (ft)        *   51.64  * Top Width (ft)        *    9.75  *   37.29  *    4.60  *
* Vel Total (ft/s)      *    6.64  * Avg. Vel. (ft/s)      *    2.76  *    6.99  *    2.45  *
* Max Chl Dpth (ft)     *    7.86  * Hydr. Depth (ft)      *    1.33  *    5.69  *    1.21  *
* Conv. Total (cfs)     * 12757.4  * Conv. (cfs)           *   297.7  * 12346.0  *   113.7  *
* Length Wtd. (ft)      *  418.18  * Wetted Per. (ft)      *   10.18  *   38.97  *    5.23  *
* Min Ch El (ft)        * 2508.84  * Shear (lb/sq ft)      *    1.15  *    4.90  *    0.96  *
* Alpha                 *    1.08  * Stream Power (lb/ft s) *10119.65  *    0.00  *    0.00  *
* Frctn Loss (ft)       *   10.83  * Cum Volume (acre-ft)  *  104.38  *  209.97  *   85.14  *
* C & E Loss (ft)       *    0.08  * Cum SA (acres)        *   50.73  *   41.43  *   46.12  *
*****************************************************************************************

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
         This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION OUTPUT  Profile #FW
*****************************************************************************************
* E.G. Elev (ft)        * 2517.61  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    0.77  * Wt. n-Val.           *    0.076 *    0.079 *    0.076 *
* W.S. Elev (ft)        * 2516.84  * Reach Len. (ft)       *  423.63  *  418.14  *  414.87  *
* Crit W.S. (ft)        *          * Flow Area (sq ft)     *    0.21  *  217.07  *    1.54  *
* E.G. Slope (ft/ft)    *0.014213  * Area (sq ft)          *    0.21  *  217.07  *    1.54  *
* Q Total (cfs)         * 1532.00  * Flow (cfs)            *    0.08  * 1529.60  *    2.32  *
* Top Width (ft)        *   38.00  * Top Width (ft)        *    0.07  *   37.29  *    0.64  *
* Vel Total (ft/s)      *    7.00  * Avg. Vel. (ft/s)      *    0.39  *    7.05  *    1.51  *
* Max Chl Dpth (ft)     *    7.99  * Hydr. Depth (ft)      *    3.01  *    5.82  *    2.41  *
* Conv. Total (cfs)     * 12850.3  * Conv. (cfs)           *     0.7  * 12830.2  *    19.5  *
* Length Wtd. (ft)      *  418.14  * Wetted Per. (ft)      *    3.08  *   38.97  *    2.97  *
* Min Ch El (ft)        * 2508.84  * Shear (lb/sq ft)      *    0.06  *    4.94  *    0.46  *
* [redacted]a           *    1.01  * Stream Power (lb/ft s) *10119.65  *    0.00  *    0.00  *
* [redacted]. Loss (ft) *   10.85  * Cum Volume (acre-ft)  *   43.24  *  235.92  *   47.70  *
* [redacted]. Loss (ft) *    0.09  * Cum SA (acres)        *   13.86  *   41.43  *   15.82  *
*****************************************************************************************

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
         This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION


RIVER: Rodger Creek
REACH: Main Reach         RS: 6.025

INPUT
Description: 6.025
Station Elevation Data    num=      40
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**************************************************************************
 9936.09  2509.1 9958.48 2507.57  9968.3 2506.82 9973.81 2506.06 9978.16 2505.45
 9982.77 2504.91 9983.64 2504.44    99862503.184 9986.57 2502.88 9988.71 2501.96
  9991.2 2500.58 9992.78 2500.86 9995.14 2500.81 9997.96 2501.65   10004 2501.93
10008.16 2502.0110010.97 2501.8910016.62 2501.3310017.38 2501.2410018.75  2501.2
10023.03 2501.5110026.75 2501.77   100302502.788   100372504.98210042.32 2506.65
10045.24  2507.610051.88 2508.3210076.42 2511.4910078.22 2511.7610083.79 2513.13
10088.42 2514.0410098.95 2514.7810104.25 2515.2510112.68 2515.8710118.23  2516.3
10121.05 2516.58 10139.2 2517.8210150.82 2518.7510153.57 2519.2410157.07 2519.49

Manning's n Values        num=      3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
 9936.09    .076 9986.57    .079   10030    .076

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9986.57   10030            469.34  478.28  504.97             .1       .3

CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************
* E.G. Elev (ft)        * 2506.53  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    1.55  * Wt. n-Val.           *    0.076 *    0.079 *    0.076 *
* W.S. Elev (ft)        * 2504.98  * Reach Len. (ft)       *  469.34  *  478.28  *  504.97  *
* [redacted] W.S. (ft)  * 2504.98  * Flow Area (sq ft)     *    4.14  *  145.72  *    7.65  *
* [redacted] Slope (ft/ft) *0.059422 * Area (sq ft)        *    4.14  *  145.72  *    7.65  *
* [redacted].al (cfs)   * 1532.00  * Flow (cfs)            *   17.68  * 1476.79  *   37.53  *
* Top Width (ft)        *   54.79  * Top Width (ft)        *    4.38  *   43.43  *    6.99  *
* Vel Total (ft/s)      *    9.73  * Avg. Vel. (ft/s)      *    4.27  *   10.13  *    4.91  *
* Max Chl Dpth (ft)     *    4.40  * Hydr. Depth (ft)      *    0.95  *    3.36  *    1.09  *
* Conv. Total (cfs)     *  6284.7  * Conv. (cfs)           *    72.5  *  6058.2  *   153.9  *
* Length Wtd. (ft)      *  479.81  * Wetted Per. (ft)      *    4.89  *   44.34  *    7.32  *
* Min Ch El (ft)        * 2500.58  * Shear (lb/sq ft)      *    3.14  *   12.19  *    3.88  *
* Alpha                 *    1.06  * Stream Power (lb/ft s) *10157.07  *    0.00  *    0.00  *
* Frctn Loss (ft)       *   10.77  * Cum Volume (acre-ft)  *  104.30  *  208.25  *   85.08  *
* C & E Loss (ft)       *    0.22  * Cum SA (acres)        *   50.66  *   41.04  *   46.06  *
```

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

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2506.66	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.66	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2505.00	Reach Len. (ft)	469.34	478.28	504.97
Crit W.S. (ft)	2505.00	Flow Area (sq ft)	1.12	146.66	2.05
E.G. Slope (ft/ft)	*0.061686	Area (sq ft)	1.12	146.66	2.05
Q Total (cfs)	1532.00	Flow (cfs)	3.23	1520.93	7.85
Top Width (ft)	45.00	Top Width (ft)	0.57	43.43	1.00
Vel Total (ft/s)	10.22	Avg. Vel. (ft/s)	2.88	10.37	3.82
Max Chl Dpth (ft)	4.42	Hydr. Depth (ft)	1.97	3.38	2.05
Conv. Total (cfs)	6168.3	Conv. (cfs)	13.0	6123.7	31.6
Length Wtd. (ft)	478.41	Wetted Per. (ft)	2.46	44.34	2.95
Min Ch El (ft)	2500.58	Shear (lb/sq ft)	1.76	12.74	2.69
Alpha	1.02	Stream Power (lb/ft s)	*10157.07	0.00	0.00
Frctn Loss (ft)	12.11	Cum Volume (acre-ft)	43.23	234.18	47.69
C & E Loss (ft)	0.26	Cum SA (acres)	13.86	41.04	15.82

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

[redacted]ECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 5.934

INPUT
Description: 5.934
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9869.1	2498.11	9870.71	2497.93	9878.94	2497.36	9899.91	2496.01	9903.66	2495.92
9908.64	2495.52	9916.46	2495.28	9928.63	2494.55	9930.12	2494.47	9934.55	2493.69
9956.03	2489.85	9959.43	2489.24	9965.9	2488.13	9966.94	2487.96	9969.63	2487.82
9979.13	2487.38	9981.44	2487.27	9986.15	2486.31	9997.28	2484.0710001.66		2482.65
10003.3	2482.1510005.48		2482.4510008.22		2482.8310012.83		2484.2410014.33		2484.85
10015.63	2485.2110018.44		2485.69	100212486.09510027.34			2487.110029.11		2487.38
10032.31	2487.3310035.24		2487.5110042.81		2487.9710049.67		2490.6410052.15		2491.49
10054.28	2491.7310068.65		2492.9910084.25		2493.6510089.35		2494.0810115.54		2495.16
10127.89	2495.710145.26		2496.9710149.91		2497.410157.66		2498.0210160.94		2498.28

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9869.1	.076	9986.15	.079	10021	.076

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9986.15	10021	280.19	280.62 268.06	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2490.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.49	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2489.70	Reach Len. (ft)	280.19	280.62	268.06
Crit W.S. (ft)		Flow Area (sq ft)	52.90	189.33	56.89
E.G. Slope (ft/ft)	*0.011701	Area (sq ft)	52.90	189.33	56.89
Q Total (cfs)	1532.00	Flow (cfs)	164.94	1167.81	199.25
Top Width (ft)	90.39	Top Width (ft)	29.29	34.85	26.26
Vel Total (ft/s)	5.12	Avg. Vel. (ft/s)	3.12	6.17	3.50
Max Chl Dpth (ft)	7.55	Hydr. Depth (ft)	1.81	5.43	2.17
Conv. Total (cfs)	14162.5	Conv. (cfs)	1524.8	10795.7	1841.9
Length Wtd. (ft)	278.86	Wetted Per. (ft)	29.55	35.87	26.70
[redacted]in Ch El (ft)	2482.15	Shear (lb/sq ft)	1.31	3.86	1.56
[redacted]cha	1.21	Stream Power (lb/ft s)	*10160.94	0.00	0.00
[redacted] Loss (ft)	5.24	Cum Volume (acre-ft)	103.99	206.41	84.71
[redacted] Loss (ft)	0.05	Cum SA (acres)	50.48	40.61	45.87

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.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2491.14	Element	Left OB	Channel	Right OB

* Vel Head (ft)	* 0.80	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* [redacted] Elev (ft)	* 2490.34	* Reach Len. (ft)	* 280.19	* 280.62	* 268.06 *
* [redacted] W.S. (ft)	*	* Flow Area (sq ft)	* 0.60	* 211.78	* 4.17 *
* [redacted] Slope (ft/ft)	*0.013705	* Area (sq ft)	* 0.60	* 211.78	* 4.17 *
* Q Total (cfs)	* 1532.00	* Flow (cfs)	* 0.38	* 1523.28	* 8.34 *
* Top Width (ft)	* 36.00	* Top Width (ft)	* 0.15	* 34.85	* 1.00 *
* Vel Total (ft/s)	* 7.07	* Avg. Vel. (ft/s)	* 0.63	* 7.19	* 2.00 *
* Max Chl Dpth (ft)	* 8.19	* Hydr. Depth (ft)	* 4.02	* 6.08	* 4.17 *
* Conv. Total (cfs)	* 13086.5	* Conv. (cfs)	* 3.3	* 13012.0	* 71.3 *
* Length Wtd. (ft)	* 280.27	* Wetted Per. (ft)	* 4.16	* 35.87	* 5.10 *
* Min Ch El (ft)	* 2482.15	* Shear (lb/sq ft)	* 0.12	* 5.05	* 0.70 *
* Alpha	* 1.03	* Stream Power (lb/ft s)	*10160.94	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 5.10	* Cum Volume (acre-ft)	* 43.22	* 232.21	* 47.65 *
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 13.85	* 40.61	* 15.80 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 5.881

INPUT
Description: 5.881
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9893.81	2495.63	9897.94	2495.25	9907.92	2494.61	9920.96	2493.57	9931.34	2492.22
9943.22	2490.67	9958.75	2488.53	9963.39	2487.82	9963.98	2487.66	9965.28	2487.32
9981.88	2483.08	9982.92	2482.5	9982.99	2482.45	9985.78	2481.93	9987.77	2481.41
9992.66	2479.9	9994.74	2479.87	9994.86	2479.86	9998.69	247910003.04		2478.28
10007.79	2479.3110009.78		2479.6710010.71		2479.7110019.62		2479.7210020.29		2479.71
10025.07	2479.7410025.122479.73810034.25				2479.3910036.12		2479.9310046.16		2481.09
10050.17	2481.9210058.84		2484.11	10061	2484.5310062.67		2484.6910069.25		2485.27
10075.51	2485.5710076.73		2485.5610082.19		2485.6510090.37		2485.8710091.09		2485.86
10101.28	2485.9510103.79		2485.9610109.62		2486.1110116.01		2486.1210130.59		2486.27
10132.41	2486.5210140.45		2487.8610143.35		2487.95				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
[redacted]	.076	9994.74	.07910036.12		.076

[redacted] a: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9994.7410036.12 362.75 352.04 338.98 .1 .3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2484.90	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.00	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* W.S. Elev (ft)	* 2483.90	* Reach Len. (ft)	* 362.75	* 352.04	* 338.98 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 35.94	* 185.03	* 51.31 *
* E.G. Slope (ft/ft)	*0.029013	* Area (sq ft)	* 35.94	* 185.03	* 51.31 *
* Q Total (cfs)	* 2097.00	* Flow (cfs)	* 199.73	* 1599.17	* 298.10 *
* Top Width (ft)	* 79.31	* Top Width (ft)	* 16.05	* 41.38	* 21.87 *
* Vel Total (ft/s)	* 7.70	* Avg. Vel. (ft/s)	* 5.56	* 8.64	* 5.81 *
* Max Chl Dpth (ft)	* 5.62	* Hydr. Depth (ft)	* 2.24	* 4.47	* 2.35 *
* Conv. Total (cfs)	* 12311.2	* Conv. (cfs)	* 1172.6	* 9388.5	* 1750.1 *
* Length Wtd. (ft)	* 349.60	* Wetted Per. (ft)	* 16.67	* 41.76	* 22.27 *
* Min Ch El (ft)	* 2478.28	* Shear (lb/sq ft)	* 3.91	* 8.03	* 4.17 *
* Alpha	* 1.09	* Stream Power (lb/ft s)	*10143.35	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 9.01	* Cum Volume (acre-ft)	* 103.70	* 205.21	* 84.37 *
* C & E Loss (ft)	* 0.13	* Cum SA (acres)	* 50.33	* 40.37	* 45.72 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2486.01	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.15	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* W.S. Elev (ft)	* 2484.87	* Reach Len. (ft)	* 362.75	* 352.04	* 338.98 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 8.67	* 225.15	* 18.28 *
* E.G. Slope (ft/ft)	*0.023016	* Area (sq ft)	* 8.67	* 225.15	* 18.28 *
* Q Total (cfs)	* 2097.00	* Flow (cfs)	* 30.51	* 1975.38	* 91.10 *
* Top Width (ft)	* 47.00	* Top Width (ft)	* 1.74	* 41.38	* 3.88 *
* Vel Total (ft/s)	* 8.32	* Avg. Vel. (ft/s)	* 3.52	* 8.77	* 4.98 *
* Max Chl Dpth (ft)	* 6.59	* Hydr. Depth (ft)	* 4.98	* 5.44	* 4.71 *
* Conv. Total (cfs)	* 13822.4	* Conv. (cfs)	* 201.1	* 13020.7	* 600.5 *
* Length Wtd. (ft)	* 351.84	* Wetted Per. (ft)	* 6.71	* 41.76	* 8.39 *
* Min Ch El (ft)	* 2478.28	* Shear (lb/sq ft)	* 1.86	* 7.75	* 3.13 *
* Alpha	* 1.07	* Stream Power (lb/ft s)	*10143.35	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 9.12	* Cum Volume (acre-ft)	* 43.19	* 230.80	* 47.58 *
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 13.85	* 40.37	* 15.79 *

[redacted] : The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 5.815

INPUT
Description: 5.815

Station Elevation Data num= 59

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
98	.2 2491.99	9835.31	2491.88	9850.13	2490.27	9850.31	2490.25	9850.33	2490.24
9862.7	2488.59	9869.43	2486.48	9876.98	2484.45	9887.6	2482.4	9890.1	2481.94
9891.04	2481.75	9898.97	2480.23	9903.77	2479.17	9919.42	2476.85	9919.9	2476.8
9920.05	2476.77	9921.75	2476.67	9934.63	2476.04	9936.48	2475.87	9943.08	2475.31
9943.32	2475.29	9944.28	2475.25	9951.8	2474.96	9955.78	2474.85	9960.38	2474.75
9968.63	2474.19	9969.76	2473.86	9976.32	2471.95	9978.99	2471.56	9991.05	2471.08
9998.28	2471.1410002.35		2471.0210008.94		2471.9610012.41		2471.87	10021	2471.49
10031.93	2472.8810032.32		2472.9610033.36		2472.9810045.05		2472.87	10047.9	2472.76
10050.72	2472.1610050.97		2472.210053.36		2472.5610058.48		2472.9210070.19		2472.82
10074.41	2472.6310077.53		2472.6610080.67		2472.87	10084.1	2473.1810090.88		2475.48
10091.03	2475.5110095.63		2476.3810099.59		2477.1210099.65		2477.13	10099.9	2477.14
10115.4	2477.95	10127.8	2478.6310145.55		2479.8410151.77		2480.29		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9834.42	.076	9969.76	.07910031.93		.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9969.7610031.93 384.22 380.96 370.04 .1 .3

CROSS SECTION OUTPUT Profile #Q100

			Left OB	Channel	Right OB
E.G. Elev (ft)	2475.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.57	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2475.20	Reach Len. (ft)	384.22	380.96	370.04
Crit W.S. (ft)		Flow Area (sq ft)	11.10	216.39	131.21
E.G. Slope (ft/ft)	*0.023025	Area (sq ft)	11.10	216.39	131.21
Q Total (cfs)	2097.00	Flow (cfs)	19.56	1411.23	666.22
Top Width (ft)	144.46	Top Width (ft)	24.17	62.17	58.12
Vel Total (ft/s)	5.85	Avg. Vel. (ft/s)	1.76	6.52	5.08
Max Chl Dpth (ft)	4.18	Hydr. Depth (ft)	0.46	3.48	2.26
Conv. Total (cfs)	13819.7	Conv. (cfs)	128.9	9300.3	4390.5
Length Wtd. (ft)	378.52	Wetted Per. (ft)	24.24	62.65	58.60
Min Ch El (ft)	2471.02	Shear (lb/sq ft)	0.66	4.97	3.22
Alpha	1.08	Stream Power (lb/ft s)	*10151.77	0.00	0.00
Frctn Loss (ft)	10.18	Cum Volume (acre-ft)	103.51	203.59	83.66
C & E Loss (ft)	0.03	Cum SA (acres)	50.16	39.95	45.41

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #EW

			Left OB	Channel	Right OB
E.G. Elev (ft)	2476.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.05	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2475.82	Reach Len. (ft)	384.22	380.96	370.04
Crit W.S. (ft)		Flow Area (sq ft)	1.40	254.70	0.21
E.G. Slope (ft/ft)	*0.029435	Area (sq ft)	1.40	254.70	0.21
Q Total (cfs)	2097.00	Flow (cfs)	3.18	2093.71	0.12
Top Width (ft)	63.00	Top Width (ft)	0.76	62.17	0.07
Vel Total (ft/s)	8.18	Avg. Vel. (ft/s)	2.27	8.22	0.56
Max Chl Dpth (ft)	4.80	Hydr. Depth (ft)	1.84	4.10	2.93
Conv. Total (cfs)	12222.6	Conv. (cfs)	18.5	12203.4	0.7
Length Wtd. (ft)	380.96	Wetted Per. (ft)	2.53	62.65	2.99
Min Ch El (ft)	2471.02	Shear (lb/sq ft)	1.02	7.47	0.13
Alpha	1.01	Stream Power (lb/ft s)	*10151.77	0.00	0.00
Frctn Loss (ft)	10.21	Cum Volume (acre-ft)	43.15	228.86	47.51
C & E Loss (ft)	0.00	Cum SA (acres)	13.84	39.95	15.77

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 5.743

INPUT
Description: 5.743
Station Elevation Data num= 59

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9833.59	2482.1	9835.27	2481.87	9855.62	2479.25	9861.35	2478.42	9870.07	2477.26
9871.22	2477.04	9871.91	2476.87	9874.67	2476.37	9886.25	2473.27	9907.62	2469.9
9910.84	2469.42	9918.31	2468.64	9925.95	2467.82	9930.46	2466.56	9935.74	2465.3
9938.3	2464.61	9945	2464.36	9954.68	2464.25	9957.55	2464.21	9958.87	2464.19
9969.2	2463.87	9970.56	2463.84	9985.68	2462.03	9988.56	2461.68	9997.33	2459.86
10000.54	2458.9610002.53		2459.0910007.43		2460.310010.08		2460.6510011.01		2460.98
10026.13	2461.210031.08		2461.3810032.56		2461.2810038.53		2461.9810041.33		2462.19
10042.13	2462.2410045.28		2462.3410050.33		2462.5110050.79		2462.5210060.76		2462.67
10061.53	2462.6810061.82		2462.7410069.75		2464.5210091.12		2466.7810096.37		2467.25
10	0.05 2467.610104.63		2467.9710113.08		2468.610120.02		2469.0510136.35		2470.03
	.2 2470.3110168.39		2471.6710184.97		2472.6910189.79		2473.0110192.71		2473.24
	7 2473.8510211.53		2473.9210223.65		2474.4110224.21		2474.43		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9833.59	.076	9985.68	.07910038.53		.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9985.6810038.53 474.27 473.93 472.98 .1 .3

CROSS SECTION OUTPUT Profile #Q100

[redacted] Elev (ft)	* 2465.55	* Element	* Left OB	* Channel	* Right OB
[redacted] ead (ft)	* 0.89	* Wt. n-Val.	* 0.076	* 0.079	* 0.076
h Elev (ft)	* 2464.66	* Reach Len. (ft)	* 474.27	* 473.93	* 472.98
Crit W.S. (ft)	* 2464.25	* Flow Area (sq ft)	* 40.24	* 203.05	* 59.92
E.G. Slope (ft/ft)	*0.031852	* Area (sq ft)	* 40.24	* 203.05	* 59.92
Q Total (cfs)	* 2097.00	* Flow (cfs)	* 125.35	* 1659.17	* 312.48
Top Width (ft)	* 132.99	* Top Width (ft)	* 47.57	* 52.85	* 32.56
Vel Total (ft/s)	* 6.92	* Avg. Vel. (ft/s)	* 3.12	* 8.17	* 5.22
Max Chl Dpth (ft)	* 5.70	* Hydr. Depth (ft)	* 0.85	* 3.84	* 1.84
Conv. Total (cfs)	* 11749.8	* Conv. (cfs)	* 702.4	* 9296.6	* 1750.9
Length Wtd. (ft)	* 473.86	* Wetted Per. (ft)	* 47.70	* 53.46	* 32.79
Min Ch El (ft)	* 2458.96	* Shear (lb/sq ft)	* 1.68	* 7.55	* 3.63
Alpha	* 1.20	* Stream Power (lb/ft s)	*10224.21	* 0.00	* 0.00
Frctn Loss (ft)	* 12.12	* Cum Volume (acre-ft)	* 103.28	* 201.75	* 82.85
C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 49.85	* 39.44	* 45.02

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	* 2466.65	* Element	* Left OB	* Channel	* Right OB
Vel Head (ft)	* 1.06	* Wt. n-Val.	* 0.076	* 0.079	* 0.076
W.S. Elev (ft)	* 2465.59	* Reach Len. (ft)	* 474.27	* 473.93	* 472.98
Crit W.S. (ft)	*	* Flow Area (sq ft)	* 2.39	* 252.23	* 1.69
E.G. Slope (ft/ft)	*0.024504	* Area (sq ft)	* 2.39	* 252.23	* 1.69
Q Total (cfs)	* 2097.00	* Flow (cfs)	* 5.06	* 2089.05	* 2.89
Top Width (ft)	* 54.00	* Top Width (ft)	* 0.68	* 52.85	* 0.47
Vel Total (ft/s)	* 8.18	* Avg. Vel. (ft/s)	* 2.12	* 8.28	* 1.71
Max Chl Dpth (ft)	* 6.63	* Hydr. Depth (ft)	* 3.52	* 4.77	* 3.60
Conv. Total (cfs)	* 13396.2	* Conv. (cfs)	* 32.4	* 13345.4	* 18.4
Length Wtd. (ft)	* 473.93	* Wetted Per. (ft)	* 4.17	* 53.46	* 4.05
Min Ch El (ft)	* 2458.96	* Shear (lb/sq ft)	* 0.88	* 7.22	* 0.64
Alpha	* 1.02	* Stream Power (lb/ft s)	*10224.21	* 0.00	* 0.00
Frctn Loss (ft)	* 11.91	* Cum Volume (acre-ft)	* 43.13	* 226.65	* 47.50
C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 13.83	* 39.44	* 15.77

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

[redacted] Rodger Creek
REA Main Reach RS: 5.653

INPUT
Description: 5.653
Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9852.63	2460.66	9859.78	2460.3	9872.63	2459.6	9885.96	2458.23	9892.54	2457.53
9895.24	2457.22	9905.87	2455.79	9917.46	2454.21	9924.1	2452.86	9925.5	2452.56
9932.43	2450.31	9932.82	2450.2	9934.33	2450.36	9940.66	2450.84	9959.54	2451.73
9963.29	2451.32	9965.4	2451.06	9967.54	2450.81	9970.8	2450.13	9974.39	2450.09
9982.44	2449.92	9988.98	2448.96	9990.28	2448.67	9990.9	2448.37	9994.72	2446.96
9999.05	2445.32	10005.33	2445.21	10007.14	2445.61	10010.82	2447.48	10013.56	2448.01
100182	449.51	110022.02	2450.87	10025.32	2450.97	10030.57	2450.91	10031.57	2450.89
10036.97	2450.17	10037.11	2450.18	10039.71	2451.21	10048.43	2452.06	10054.8	2452.66
10065.18	2453.61	10072.55	2454.02	10075.06	2454.17	10094.44	2455.63	10100.65	2456.11
10101.42	2456.19	10102.55	2456.27	10135.41	2458.84	10147.75	2459.79	10154.16	2460.35
10174.71	2461.55	10180.14	2461.93	10194.46	2462.56	10215.5	2463.36	10225.63	2463.99

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9852.63	.076	9982.44	.079	10018	.076

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9982.44	10018	483.26	481.45 476.11	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	* 2453.41	* Element	* Left OB	* Channel	* Right OB
Vel Head (ft)	* 0.79	* Wt. n-Val.	* 0.076	* 0.079	* 0.076
W.S. Elev (ft)	* 2452.63	* Reach Len. (ft)	* 483.26	* 481.45	* 476.11
Crit W.S. (ft)	* 2452.20	* Flow Area (sq ft)	* 98.73	* 187.55	* 53.06
E.G. Slope (ft/ft)	*0.020991	* Area (sq ft)	* 98.73	* 187.55	* 53.06
Q Total (cfs)	* 2097.00	* Flow (cfs)	* 399.64	* 1506.10	* 191.25
Top Width (ft)	* 129.22	* Top Width (ft)	* 57.24	* 35.56	* 36.42
Vel Total (ft/s)	* 6.18	* Avg. Vel. (ft/s)	* 4.05	* 8.03	* 3.60
Max Chl Dpth (ft)	* 7.41	* Hydr. Depth (ft)	* 1.72	* 5.27	* 1.46
Conv. Total (cfs)	* 14473.6	* Conv. (cfs)	* 2758.4	* 10395.2	* 1320.1
Length Wtd. (ft)	* 479.89	* Wetted Per. (ft)	* 57.79	* 37.07	* 36.96
Min Ch El (ft)	* 2445.21	* Shear (lb/sq ft)	* 2.24	* 6.63	* 1.88
[redacted] pha	* 1.33	* Stream Power (lb/ft s)	*10225.63	* 0.00	* 0.00
[redacted] rn Loss (ft)	* 13.06	* Cum Volume (acre-ft)	* 102.52	* 199.63	* 82.24
Loss (ft)	* 0.09	* Cum SA (acres)	* 49.28	* 38.96	* 44.65

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	* 2454.71	* Element	* Left OB	* Channel	* Right OB
Vel Head (ft)	* 1.41	* Wt. n-Val.	* 0.076	* 0.079	* 0.076

* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 8.18	* 211.42	* 6.89	*
* [redacted] Slope (ft/ft)	*0.025794	* Area (sq ft)	* 8.18	* 211.42	* 6.89	*
* [redacted]al (cfs)	* 2097.00	* Flow (cfs)	* 32.41	* 2038.54	* 26.06	*
* [redacted].idth (ft)	* 40.00	* Top Width (ft)	* 2.44	* 35.56	* 2.00	*
* Vel Total (ft/s)	* 9.26	* Avg. Vel. (ft/s)	* 3.96	* 9.64	* 3.78	*
* Max Chl Dpth (ft)	* 8.09	* Hydr. Depth (ft)	* 3.35	* 5.95	* 3.45	*
* Conv. Total (cfs)	* 13057.0	* Conv. (cfs)	* 201.8	* 12693.0	* 162.2	*
* Length Wtd. (ft)	* 480.66	* Wetted Per. (ft)	* 5.77	* 37.07	* 5.22	*
* Min Ch El (ft)	* 2445.21	* Shear (lb/sq ft)	* 2.28	* 9.18	* 2.13	*
* Alpha	* 1.06	* Stream Power (lb/ft s)	*10225.63	* 0.00	* 0.00	*
* Frctn Loss (ft)	* 13.05	* Cum Volume (acre-ft)	* 43.07	* 224.12	* 47.45	*
* C & E Loss (ft)	* 0.22	* Cum SA (acres)	* 13.81	* 38.96	* 15.76	*

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.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 5.562

INPUT
Description: 5.562
Station Elevation Data num= 80

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9732.99	2460.06	9734.55	2460.11	9739.16	2460.12	9741.38	2460.11	9744.32	2460.14
9746.13	2460.09	9758.61	2459.99	9798.66	2459.47	9807.21	2459.03	9819.56	2458.29
9824.86	2457.94	9831.23	2457.47	9836.67	2457.04	9846.46	2456.01	9854.8	2455.1
9868.72	2453.3	9872.27	2452.85	9873.73	2452.71	9885.34	2451.58	9895.41	2450.32
9900.22	2449.76	9903.74	2449.51	9915.12	2448.16	9923.27	2447.41	9928.36	2446.94
9943.5	2445.34	9951.9	2444.35	9961.43	2442.37	9962.61	2442.11	9967.26	2441.57
9978.29	2440.42	9984.17	2439.61	9985.77	2438.99	9993.22	2436.12	9996.58	2435.12
9997.79	2435.16	10008.05	2435.58	10009.33	2436.03	10010.65	2436.64	10011.92	2437.26
10014.04	2437.98	10034.33	2438.37	10038.96	2438.45	10049.77	2439.07	10052.66	2439.29
10059.89	2438.82	10060.33	2438.79	10071.53	2438.04	10073.52	2437.94	10080.41	2437.95
10090.23	2438.03	10105.4	2438.29	10117.9	2438.15	10127.64	2438.11	10146.16	2438.06
10147.24	2438.05	10151.99	2437.58	10153.06	2437.47	10168.51	2437.65	10170.25	2437.67
10171.43	2437.71	10181.25	2438.01	10186.28	2439.17	10197.13	2442.96	10199.07	2443.43
10201.36	2444.16	10202.9	2444.51	10210.96	2445.64	10211.31	2445.67	10220.56	2446.22
10229.02	2447.28	10235.45	2447.84	10237.79	2447.19	10240.95	2447.37	10255.68	2449.23
10268.04	2450.31	10280.46	2451.81	10284.52	2452.16	10288.53	2452.43	10320.57	2454.51

[redacted]'s n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9732.99	.076	9985.77	.07	9910049.77	.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9985.77 10049.77 435.15 448.41 445.29 .1 .3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2440.27	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.50	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* W.S. Elev (ft)	* 2439.77	* Reach Len. (ft)	* 435.15	* 448.41	* 445.29 *
* Crit W.S. (ft)	* 2439.43	* Flow Area (sq ft)	* 0.84	* 148.36	* 225.87 *
* E.G. Slope (ft/ft)	*0.036654	* Area (sq ft)	* 0.84	* 148.36	* 225.87 *
* Q Total (cfs)	* 2097.00	* Flow (cfs)	* 1.38	* 924.44	* 1171.18 *
* Top Width (ft)	* 204.96	* Top Width (ft)	* 2.74	* 64.00	* 138.22 *
* Vel Total (ft/s)	* 5.59	* Avg. Vel. (ft/s)	* 1.65	* 6.23	* 5.19 *
* Max Chl Dpth (ft)	* 4.65	* Hydr. Depth (ft)	* 0.31	* 2.32	* 1.63 *
* Conv. Total (cfs)	* 10953.1	* Conv. (cfs)	* 7.2	* 4828.5	* 6117.3 *
* Length Wtd. (ft)	* 446.24	* Wetted Per. (ft)	* 2.87	* 65.18	* 138.55 *
* Min Ch El (ft)	* 2435.12	* Shear (lb/sq ft)	* 0.67	* 5.21	* 3.73 *
* Alpha	* 1.03	* Stream Power (lb/ft s)	*10320.57	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 13.41	* Cum Volume (acre-ft)	* 101.97	* 197.77	* 80.71 *
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 48.94	* 38.41	* 43.70 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2441.44	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.68	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* W.S. Elev (ft)	* 2440.76	* Reach Len. (ft)	* 435.15	* 448.41	* 445.29 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 3.56	* 211.88	* 106.30 *
* E.G. Slope (ft/ft)	*0.028626	* Area (sq ft)	* 3.56	* 211.88	* 106.30 *
* Q Total (cfs)	* 2097.00	* Flow (cfs)	* 11.14	* 1479.56	* 606.29 *
* Top Width (ft)	* 110.97	* Top Width (ft)	* 2.74	* 64.00	* 44.23 *
* Vel Total (ft/s)	* 6.52	* Avg. Vel. (ft/s)	* 3.13	* 6.98	* 5.70 *
* Max Chl Dpth (ft)	* 5.64	* Hydr. Depth (ft)	* 1.30	* 3.31	* 2.40 *
* Conv. Total (cfs)	* 12394.1	* Conv. (cfs)	* 65.8	* 8744.8	* 3583.5 *
* [redacted]ength Wtd. (ft)	* 447.90	* Wetted Per. (ft)	* 3.86	* 65.18	* 46.95 *
* [redacted] Ch El (ft)	* 2435.12	* Shear (lb/sq ft)	* 1.65	* 5.81	* 4.05 *
[redacted]	* 1.03	* Stream Power (lb/ft s)	*10320.57	* 0.00	* 0.00 *
* [redacted] Loss (ft)	* 13.51	* Cum Volume (acre-ft)	* 43.01	* 221.79	* 46.84 *
* C [redacted] E Loss (ft)	* 0.06	* Cum SA (acres)	* 13.78	* 38.41	* 15.51 *

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.

CROSS SECTION

RI [redacted] Rodger Creek
RE [redacted] Main Reach RS: 5.477

INPUT
Description: 5.477
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9848.86	2438.71	9854.39	2436.13	9865.32	2436.08	9873.21	2434.85	9883.83	2432.63
9890.73	2431.45	9904.46	2427.72	9919.25	2425.92	9922.64	2426.03	9929.39	2425.84
9931.33	2425.77	9931.99	2425.75	9934.07	2425.7	9934.82	2425.47	9943.82	2423.24
9944.18	2423.26	9954.13	2423.49	9969.86	2423.86	9973.09	2423.57	9979.22	2422.95
9981.1	2422.48	9982.17	2422.26	9994.12	2419.1610006.01		2421.8310012.13		2422.96
10018.94	2424.7810020.17		2425.11	10024.1	2425.0710031.64		2424.9810040.77		2424.87
10051.15	2424.7410056.94		2424.7210063.73		2426.9610072.28		2429.5610081.38		2430.89
10093.46	2432.6210097.13		2432.8210119.33		2434.0110119.92		2434.0510123.67		2434.32
10126.97	2434.4410130.79		2434.6610137.33		2435.110168.12		2437.0210180.23		2437.69

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9848.86	.076	9969.86	.07910018.94		.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9969.8610018.94 441.23 452.53 459.5 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2426.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.73	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2426.11	Reach Len. (ft)	441.23	452.53	459.50
Crit W.S. (ft)		Flow Area (sq ft)	86.24	204.96	48.98
E.G. Slope (ft/ft)	*0.025075	Area (sq ft)	86.24	204.96	48.98
Q Total (cfs)	2097.00	Flow (cfs)	371.61	1558.66	166.73
Top Width (ft)	143.49	Top Width (ft)	52.19	49.08	42.22
Vel Total (ft/s)	6.16	Avg. Vel. (ft/s)	4.31	7.60	3.40
Max Chl Dpth (ft)	6.95	Hydr. Depth (ft)	1.65	4.18	1.16
Conv. Total (cfs)	13242.8	Conv. (cfs)	2346.8	9843.1	1052.9
Length Wtd. (ft)	450.47	Wetted Per. (ft)	52.52	50.24	42.49
Min Ch El (ft)	2419.16	Shear (lb/sq ft)	2.57	6.39	1.80
Alpha	1.24	Stream Power (lb/ft s)	*10180.23	0.00	0.00
Frctn Loss (ft)	10.19	Cum Volume (acre-ft)	101.54	195.95	79.31
C & E Loss (ft)	0.01	Cum SA (acres)	48.67	37.83	42.77

[redacted] : The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2427.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.30	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2426.57	Reach Len. (ft)	441.23	452.53	459.50
Crit W.S. (ft)		Flow Area (sq ft)	2.34	227.32	1.74
E.G. Slope (ft/ft)	*0.031810	Area (sq ft)	2.34	227.32	1.74
Q Total (cfs)	2097.00	Flow (cfs)	6.13	2086.22	4.66
Top Width (ft)	51.00	Top Width (ft)	0.86	49.08	1.06
Vel Total (ft/s)	9.06	Avg. Vel. (ft/s)	2.62	9.18	2.67
Max Chl Dpth (ft)	7.41	Hydr. Depth (ft)	2.72	4.63	1.65
Conv. Total (cfs)	11757.5	Conv. (cfs)	34.4	11697.1	26.1
Length Wtd. (ft)	452.36	Wetted Per. (ft)	3.59	50.24	2.60
Min Ch El (ft)	2419.16	Shear (lb/sq ft)	1.29	8.99	1.33
Alpha	1.02	Stream Power (lb/ft s)	*10180.23	0.00	0.00
Frctn Loss (ft)	10.02	Cum Volume (acre-ft)	42.98	219.52	46.28
C & E Loss (ft)	0.15	Cum SA (acres)	13.77	37.83	15.27

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 5.391

INPUT
Description: 5.391
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9775.75	2428.27	9781.96	2427.85	9787.62	2427.55	9818.8	2425.88	9824.02	2425.53
9830.84	2425.27	9857.15	2423.87	9859.39	2423.63	9890.19	2420.63	9892.55	2420.39
9893.66	2420.17	9919.82	2414.79	9929.64	2414.2	9944.23	2413.29	9947.75	2413.42
9959.3	2413.99	9959.81	2414.01	9967.46	2413.84	9977.06	2413.78	9992.61	2410.07
9992.71	2410.0410000.62		2409.3110003.81		2409.7310010.39		2411.3310019.38		2413.29
10028.26	2415.1510029.71		2415.4610039.83		2416.2610062.11		2416.3510064.16		2416.34
[redacted]64.85	2416.39	10095.1	2418.8410095.33		2418.8510106.81		2420.9510108.81		2421.31
[redacted] 99	2421.4310132.81		2422.7910141.01		2423.1510157.88		2423.8710170.55		2424.62
[redacted] 9	2425.0310185.41		2425.4810190.52		2425.8310202.27		2426.3910224.61		2427.52

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9775.75	.076	9977.06	.07910019.38		.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9977.0610019.38 477.68 497.93 527.94 .1 .3

CROSS SECTION OUTPUT Profile #Q100

[redacted] Elev (ft)	2416.66	Element	Left OB	Channel	Right OB
[redacted]ead (ft)	0.71	Wt. n-Val.	0.076	0.079	0.076
[redacted] Elev (ft)	2415.95	Reach Len. (ft)	477.68	497.93	527.94
Crit W.S. (ft)		Flow Area (sq ft)	121.79	201.69	17.81
E.G. Slope (ft/ft)	*0.020495	Area (sq ft)	121.79	201.69	17.81
Q Total (cfs)	2097.00	Flow (cfs)	528.66	1516.45	51.89
Top Width (ft)	121.72	Top Width (ft)	62.88	42.32	16.52
Vel Total (ft/s)	6.14	Avg. Vel. (ft/s)	4.34	7.52	2.91
Max Chl Dpth (ft)	6.64	Hydr. Depth (ft)	1.94	4.77	1.08
Conv. Total (cfs)	14648.0	Conv. (cfs)	3692.8	10592.7	362.4
Length Wtd. (ft)	501.35	Wetted Per. (ft)	63.06	43.23	16.77
Min Ch El (ft)	2409.31	Shear (lb/sq ft)	2.47	5.97	1.36
Alpha	1.21	Stream Power (lb/ft s)	*10224.61	0.00	0.00
Frctn Loss (ft)	12.70	Cum Volume (acre-ft)	100.48	193.84	78.96
C & E Loss (ft)	0.02	Cum SA (acres)	48.09	37.36	42.46

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2417.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.81	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2416.90	Reach Len. (ft)	477.68	497.93	527.94
Crit W.S. (ft)		Flow Area (sq ft)	31.07	241.94	33.52
E.G. Slope (ft/ft)	*0.016293	Area (sq ft)	31.07	241.94	33.52
Q Total (cfs)	2097.00	Flow (cfs)	137.86	1831.16	127.98
Top Width (ft)	68.90	Top Width (ft)	10.06	42.32	16.52
Vel Total (ft/s)	6.84	Avg. Vel. (ft/s)	4.44	7.57	3.82
Max Chl Dpth (ft)	7.59	Hydr. Depth (ft)	3.09	5.72	2.03
Conv. Total (cfs)	16428.5	Conv. (cfs)	1080.0	14345.9	1002.6
Length Wtd. (ft)	500.84	Wetted Per. (ft)	13.11	43.23	17.72
Min Ch El (ft)	2409.31	Shear (lb/sq ft)	2.41	5.69	1.92
Alpha	1.12	Stream Power (lb/ft s)	*10224.61	0.00	0.00
Frctn Loss (ft)	12.95	Cum Volume (acre-ft)	42.81	217.09	46.10
C & E Loss (ft)	0.07	Cum SA (acres)	13.71	37.36	15.18

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

[redacted]ECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 5.297

INPUT
Description: 5.297
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9773.35	2416.2	9783.37	2414.94	9796.78	2413.49	9796.9	2413.48	9827.93	2409.6
9831.36	2409.17	9861.3	2406.96	9864.61	2406.83	9875.21	2406.33	9896.37	2405.46
9917.03	2404.76	9922.87	2404.62	9943.09	2403.59	9961.14	2403.16	9973.01	2402.73
9981.36	2402.42	9984.37	2401.54	99862	401.356	9986.85	2401.26	99902	400.085
9992.13	2399.29	9996.34	2398.55	10000.1	2398.35	10008.41	2399.25	10011.25	2399.2
10014.18	2399.49	10026.55	2399.18	100272	399.18	10034.56	2399.35	10037.85	2399.59
10040	2399.68	10044.49	2399.85	10046.18	2399.92	10055.08	2400.49	10063.35	2400.81
100652	401.288	100702	402.73	10076.68	2404.67	10085.51	2407.32	10086.83	2407.37
10095.07	2407.78	10109.49	2408.35	10126.9	2408.95	10149.75	2409.92	10154.29	2410
10160.71	2410.13	10167.43	2410.26	10209.94	2410.92	10223.34	2411.03	10227.67	2411.02

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9773.35	.076	9990	.079	10027	.076

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9990	10027	477.05	457.75	436.12	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2403.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.92	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2403.03	Reach Len. (ft)	477.05	457.75	436.12
Crit W.S. (ft)		Flow Area (sq ft)	19.54	145.64	120.51
E.G. Slope (ft/ft)	*0.032110	Area (sq ft)	19.54	145.64	120.51
Q Total (cfs)	2097.00	Flow (cfs)	57.32	1217.55	822.13
Top Width (ft)	106.12	Top Width (ft)	25.13	37.00	44.00
Vel Total (ft/s)	7.34	Avg. Vel. (ft/s)	2.93	8.36	6.82
Max Chl Dpth (ft)	4.67	Hydr. Depth (ft)	0.78	3.94	2.74
Conv. Total (cfs)	11702.6	Conv. (cfs)	319.9	6794.7	4588.0
[redacted]ngth Wtd. (ft)	453.64	Wetted Per. (ft)	25.49	37.28	44.35
[redacted] Ch El (ft)	2398.35	Shear (lb/sq ft)	1.54	7.83	5.45
	1.10	Stream Power (lb/ft s)	*10227.67	0.00	0.00
[redacted] Loss (ft)	11.49	Cum Volume (acre-ft)	99.71	191.85	78.12
C & E Loss (ft)	0.02	Cum SA (acres)	47.60	36.90	42.10

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

[redacted] Elev (ft)	2404.69	Element	Left OB	Channel	Right OB

* [illegible] Head (ft)	* 1.51	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* [illegible] Elev (ft)	* 2403.17	* Reach Len. (ft)	* 477.05	* 457.75	* 436.12 *
* [illegible] W.S. (ft)	* 2403.17	* Flow Area (sq ft)	* 23.29	* 151.16	* 49.31 *
* E[illegible] Slope (ft/ft)	*0.047164	* Area (sq ft)	* 23.29	* 151.16	* 49.31 *
* Q Total (cfs)	* 2097.00	* Flow (cfs)	* 92.71	* 1570.00	* 434.29 *
* Top Width (ft)	* 75.13	* Top Width (ft)	* 25.13	* 37.00	* 13.00 *
* Vel Total (ft/s)	* 9.37	* Avg. Vel. (ft/s)	* 3.98	* 10.39	* 8.81 *
* Max Chl Dpth (ft)	* 4.82	* Hydr. Depth (ft)	* 0.93	* 4.09	* 3.79 *
* Conv. Total (cfs)	* 9655.9	* Conv. (cfs)	* 426.9	* 7229.3	* 1999.8 *
* Length Wtd. (ft)	* 455.89	* Wetted Per. (ft)	* 25.64	* 37.28	* 16.51 *
* Min Ch El (ft)	* 2398.35	* Shear (lb/sq ft)	* 2.67	* 11.94	* 8.80 *
* Alpha	* 1.11	* Stream Power (lb/ft s)	*10227.67	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 11.52	* Cum Volume (acre-ft)	* 42.51	* 214.84	* 45.60 *
* C & E Loss (ft)	* 0.23	* Cum SA (acres)	* 13.52	* 36.90	* 15.00 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 5.210

INPUT
Description: 5.21
Station Elevation Data num= 42

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9843.05	2409.57	9852.17	2409.39	9860.04	2409.02	9870.25	2408.45	9881.26	2407.84
9890.38	2407.35	9898.65	2406.78	9908.56	2406.09	9919.21	2405.25	9927.41	2404.22
9944.61	2401.98	9968.7	2397.68	9971.99	2397.09	9976.95	2394.73	9988.94	2388.69
[illegible].19	2387.05	9994.03	2386.77	9999.18	2385.72	10009.5	2385.89	10010.42	2385.92
[illegible]38	2386.68	10023.47	2386.99	10027.32	2387.13	10029.86	2387.32	10042.91	2388
[illegible]4	2388.19	10053.66	2390.73	10055	2391.21	10074.69	2392.07	10093.16	2392.85
10[illegible]8	2392.88	10108.77	2392.73	10142.02	2392.23	10158.9	2392.31	10164.33	2392.33
10185.13	2393.53	10186.99	2393.64	10189.12	2393.78	10210.29	2394.94	10219.97	2395.41
10228.07	2395.99	10230.65	2396.22						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9843.05	.076	9988.94	.07	10046.44	.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9988.94 10046.44 502.9 498.93 487.96 .1 .3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2392.43	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.84	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* W.S. Elev (ft)	* 2391.58	* Reach Len. (ft)	* 502.90	* 498.93	* 487.96 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 8.31	* 269.62	* 17.82 *
* E.G. Slope (ft/ft)	*0.020494	* Area (sq ft)	* 8.31	* 269.62	* 17.82 *
* Q Total (cfs)	* 2097.00	* Flow (cfs)	* 27.58	* 2019.43	* 49.99 *
* Top Width (ft)	* 80.47	* Top Width (ft)	* 5.74	* 57.50	* 17.23 *
* Vel Total (ft/s)	* 7.09	* Avg. Vel. (ft/s)	* 3.32	* 7.49	* 2.81 *
* Max Chl Dpth (ft)	* 5.86	* Hydr. Depth (ft)	* 1.45	* 4.69	* 1.03 *
* Conv. Total (cfs)	* 14648.3	* Conv. (cfs)	* 192.7	* 14106.4	* 349.2 *
* Length Wtd. (ft)	* 496.63	* Wetted Per. (ft)	* 6.43	* 58.12	* 17.75 *
* Min Ch El (ft)	* 2385.72	* Shear (lb/sq ft)	* 1.65	* 5.94	* 1.28 *
* Alpha	* 1.08	* Stream Power (lb/ft s)	*10230.65	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 13.11	* Cum Volume (acre-ft)	* 99.56	* 189.67	* 77.43 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 47.44	* 36.41	* 41.79 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2392.81	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.75	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* W.S. Elev (ft)	* 2392.06	* Reach Len. (ft)	* 502.90	* 498.93	* 487.96 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 2.94	* 296.85	* 5.60 *
* E.G. Slope (ft/ft)	*0.015718	* Area (sq ft)	* 2.94	* 296.85	* 5.60 *
* [illegible] Total (cfs)	* 2097.00	* Flow (cfs)	* 5.93	* 2076.19	* 14.87 *
* [illegible] Width (ft)	* 60.00	* Top Width (ft)	* 0.94	* 57.50	* 1.56 *
* [illegible] otal (ft/s)	* 6.87	* Avg. Vel. (ft/s)	* 2.02	* 6.99	* 2.65 *
* [illegible] hl Dpth (ft)	* 6.34	* Hydr. Depth (ft)	* 3.13	* 5.16	* 3.59 *
* Conv. Total (cfs)	* 16726.2	* Conv. (cfs)	* 47.3	* 16560.3	* 118.6 *
* Length Wtd. (ft)	* 497.31	* Wetted Per. (ft)	* 3.95	* 58.12	* 4.97 *
* Min Ch El (ft)	* 2385.72	* Shear (lb/sq ft)	* 0.73	* 5.01	* 1.11 *
* Alpha	* 1.03	* Stream Power (lb/ft s)	*10230.65	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 12.74	* Cum Volume (acre-ft)	* 42.37	* 212.49	* 45.32 *
* C & E Loss (ft)	* 0.09	* Cum SA (acres)	* 13.37	* 36.41	* 14.93 *

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

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.
W[redacted]: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 5.115

INPUT
Description: 5.115
Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9809.07	2389.68	9812.76	2389.61	9817.58	2389.43	9828.06	2389.01	9837.76	2388.69
9843.14	2388.47	9863.32	2387.75	9888.9	2386.52	9897.59	2386.14	9911.63	2385.27
9915.54	2385.21	9935.26	2383.7	9946.31	2382.74	9955	2381.94	9967.82	2380.64
9969.55	2380.51	9972.44	2380.41	9992.46	2374.48	9993.15	2374.28	9993.47	2374.18
9993.69	2374.1	10007.18	2372.69	10011.37	2374.23	10016.28	2374.63	10031.56	2375.41
10038.64	2375.51	10049.88	2375.71	10060.73	2375.75	10071.35	2377.21	10073.12	2377.73
10088.29	2378.04	10104.23	2378.43	10107.44	2378.41	10109.55	2378.59	10119.99	2379.8
10132.53		10153.11	2382.29	10179.06	2383.87	10191.59	2384.53		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9809.07	.076	9992.46	.07	10016.28	.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9992.46 10016.28 493.77 500.02 515.44 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2379.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.99	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2378.31	Reach Len. (ft)	493.77	500.02	515.44
Crit W.S. (ft)	2377.70	Flow Area (sq ft)	24.79	110.52	157.82
E.G. Slope (ft/ft)	*0.035267	Area (sq ft)	24.79	110.52	157.82
Q Total (cfs)	2097.00	Flow (cfs)	136.53	1073.50	886.97
Top Width (ft)	119.89	Top Width (ft)	12.94	23.82	83.13
Vel Total (ft/s)	7.15	Avg. Vel. (ft/s)	5.51	9.71	5.62
Max Chl Dpth (ft)	5.62	Hydr. Depth (ft)	1.92	4.64	1.90
Conv. Total (cfs)	11166.5	Conv. (cfs)	727.0	5716.4	4723.1
[redacted]rth Wtd. (ft)	503.01	Wetted Per. (ft)	13.49	24.24	83.33
[redacted]h El (ft)	2372.69	Shear (lb/sq ft)	4.05	10.04	4.17
[redacted]	1.24	Stream Power (lb/ft s)	*10191.59	0.00	0.00
Frctn Loss (ft)	12.68	Cum Volume (acre-ft)	99.37	187.50	76.44
C & E Loss (ft)	0.17	Cum SA (acres)	47.33	35.94	41.23

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.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2379.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.65	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2378.32	Reach Len. (ft)	493.77	500.02	515.44
Crit W.S. (ft)	2378.29	Flow Area (sq ft)	24.90	110.74	77.28
E.G. Slope (ft/ft)	*0.048977	Area (sq ft)	24.90	110.74	77.28
Q Total (cfs)	2097.00	Flow (cfs)	162.06	1269.19	665.75
Top Width (ft)	61.48	Top Width (ft)	12.94	23.82	24.72
Vel Total (ft/s)	9.85	Avg. Vel. (ft/s)	6.51	11.46	8.61
Max Chl Dpth (ft)	5.63	Hydr. Depth (ft)	1.92	4.65	3.13
Conv. Total (cfs)	9475.5	Conv. (cfs)	732.3	5734.9	3008.3
Length Wtd. (ft)	502.24	Wetted Per. (ft)	13.50	24.24	27.51
Min Ch El (ft)	2372.69	Shear (lb/sq ft)	5.64	13.97	8.59
Alpha	1.10	Stream Power (lb/ft s)	*10191.59	0.00	0.00
Frctn Loss (ft)	12.51	Cum Volume (acre-ft)	42.21	210.15	44.86
C & E Loss (ft)	0.35	Cum SA (acres)	13.29	35.94	14.78

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 5.021

INPUT
Description: 5.021
[redacted]on Elevation Data num= 57

[redacted]a	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9719.69	2379.15	9725.7	2379.05	9742.66	2378.23	9767.51	2377.34	9778.12	2376.87
9806.06	2375.25	9817.25	2374.4	9819	2374.2	9824.04	2373.77	9826.94	2373.54
9832.29	2373.2	9850.76	2372.03	9852.94	2371.79	9860.02	2371.08	9883.13	2369.61
9907.86	2367.54	9909.33	2367.41	9912.81	2367.23	9930.2	2366.23	9933.56	2365.88
9938.41	2365.27	9952.94	2364.47	9959.13	2364.06	9960.49	2363.97	9962.57	2363.84
9980.34	2364.49	9983.5	2364.69	9985.92	2364.17	9995.02	2361.82	9998.48	2360.94
10005.18	2362.21	10010.06	2363.09	10017.39	2363.61	10018.17	2363.63	10030.76	2362.86
10031.89	2362.82	10037.41	2362.25	10046.49	2362.76	10046.93	2362.78	10049.72	2363.19
10050.94	2363.09	10053.7	2362.88	10063.32	2361.79	10073.67	2363.27	10076.05	2363.66

```
10091.04 2364.4810098.83 2365.0510121.38 2365.7610137.65 2366.44 10162.2 2367.65
10[redacted]2 2368.5110186.76 2368.7310191.97 2368.8310198.11 2369.14 10227.8 2370.61
10[redacted]2 2371.7410252.18 2371.86

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 9719.69    .076  9983.5    .07910081.04    .076

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9983.510081.04           515.64  494.84  476.48             .1       .3

CROSS SECTION OUTPUT  Profile #Q100
*************************************************************************************************
* E.G. Elev (ft)          * 2366.45  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)           *    0.43  * Wt. n-Val.             *   0.076 *   0.079 *   0.076 *
* W.S. Elev (ft)          * 2366.02  * Reach Len. (ft)        *  515.64 *  494.84 *  476.48 *
* Crit W.S. (ft)          *         * Flow Area (sq ft)       *   74.33 *  313.82 *   36.91 *
* E.G. Slope (ft/ft)      *0.018909  * Area (sq ft)           *   74.33 *  313.82 *   36.91 *
* Q Total (cfs)           * 2097.00  * Flow (cfs)             *  255.66 * 1756.31 *   85.03 *
* Top Width (ft)          *  195.32  * Top Width (ft)         *   51.27 *   97.54 *   46.51 *
* Vel Total (ft/s)        *    4.93  * Avg. Vel. (ft/s)       *    3.44 *    5.60 *    2.30 *
* Max Chl Dpth (ft)       *    5.08  * Hydr. Depth (ft)       *    1.45 *    3.22 *    0.79 *
* Conv. Total (cfs)       * 15250.0  * Conv. (cfs)           *  1859.2 * 12772.3 *   618.4 *
* Length Wtd. (ft)        *  492.26  * Wetted Per. (ft)       *   51.37 *   98.60 *   46.54 *
* Min Ch El (ft)          * 2360.94  * Shear (lb/sq ft)      *    1.71 *    3.76 *    0.94 *
* Alpha                   *    1.15  * Stream Power (lb/ft s) *10252.18 *    0.00 *    0.00 *
* Frctn Loss (ft)         *   13.20  * Cum Volume (acre-ft)   *   98.80 *  185.06 *   75.29 *
* C & E Loss (ft)         *    0.01  * Cum SA (acres)         *   46.96 *   35.24 *   40.46 *
*************************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
         This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION OUTPUT  Profile #FW
*************************************************************************************************
* E.G. Elev (ft)          * 2367.12  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)           *    0.49  * Wt. n-Val.             *   0.076 *   0.079 *   0.076 *
* W.S. Elev (ft)          * 2366.63  * Reach Len. (ft)        *  515.64 *  494.84 *  476.48 *
* Crit W.S. (ft)          *         * Flow Area (sq ft)       *    0.98 *  373.36 *    2.05 *
* E.G. Slope (ft/ft)      *0.015036  * Area (sq ft)           *    0.98 *  373.36 *    2.05 *
* Q Total (cfs)           * 2097.00  * Flow (cfs)             *    1.26 * 2092.00 *    3.74 *
* [redacted] Width (ft)   *   99.00  * Top Width (ft)         *    0.50 *   97.54 *    0.96 *
* [redacted] Total (ft/s) *    5.57  * Avg. Vel. (ft/s)       *    1.29 *    5.60 *    1.83 *
* [redacted] hl Dpth (ft) *    5.69  * Hydr. Depth (ft)       *    1.95 *    3.83 *    2.13 *
* C[redacted] Total (cfs) * 17101.7  * Conv. (cfs)           *    10.3 * 17060.9 *    30.5 *
* Length Wtd. (ft)        *  493.14  * Wetted Per. (ft)       *    2.47 *   98.60 *    3.08 *
* Min Ch El (ft)          * 2360.94  * Shear (lb/sq ft)      *    0.37 *    3.55 *    0.62 *
* Alpha                   *    1.01  * Stream Power (lb/ft s) *10252.18 *    0.00 *    0.00 *
* Frctn Loss (ft)         *   13.43  * Cum Volume (acre-ft)   *   42.06 *  207.37 *   44.39 *
* C & E Loss (ft)         *    0.04  * Cum SA (acres)         *   13.22 *   35.24 *   14.63 *
*************************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
         This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION


RIVER: Rodger Creek
REACH: Main Reach         RS: 4.927

INPUT
Description: 4.927
Station Elevation Data     num=      73
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*********************************************************************************************
 9706.06 2362.58 9760.92 2362.51 9765.84 2362.49 9772.83 2362.42 9786.99 2362.08
 9792.44 2361.87  9800.9 2361.57 9821.85 2360.56 9828.85 2360.12 9836.83  2359.6
 9851.14 2358.36 9866.59 2356.67 9868.04 2356.56 9889.81 2354.72  9891.4 2354.52
 9905.84 2352.68 9908.16 2352.31 9921.71  2350.5 9930.62 2350.16 9932.03 2350.23
 9945.73 2351.08 9948.41 2351.25 9959.77 2351.04 9964.58 2350.97 9966.58 2350.88
  9970.9 2350.76 9973.84 2350.69  9974.7  2350.7 9977.07 2350.74 9984.82 2350.88
 9986.46  2350.4 9990.31 2349.24 9992.68 2349.04 9997.23 2349.5710001.19 2349.82
 10004.5 2350.8310006.21 2350.6710009.27 2351.1510013.09 2351.92 10016.8 2352.05
10023.17 2352.1210029.89 2351.9810036.75 2351.7610037.59 2351.7210040.73 2351.46
10048.77 2351.1110048.99  2351.110055.17 2350.8510060.02 2351.0110062.84 2351.06
10064.19 2351.1310066.89  2351.310073.65 2350.88 10078.6 2350.4710087.16 2350.02
10091.69 2349.7710098.08 2350.4110101.63 2351.1210104.54 2351.7610109.56 2352.22
10115.33 2352.8310119.07 2353.0310128.38 2353.4810136.26  2354.110139.78 2354.41
10159.81 2355.5610170.66 2356.0810185.48 2357.0310213.57 2358.4710221.01  2358.7
10221.22 2358.7210223.68 2358.9810226.53 2359.16

Manning's n Values        num=       3
[redacted]Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
    6    .076 9908.16    .07910013.09    .076

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9908.1610013.09          470.83  465.41  460.32             .1       .3

CROSS SECTION OUTPUT  Profile #Q100
*************************************************************************************************
* E.G. Elev (ft)          * 2353.25  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)           *    0.52  * Wt. n-Val.             *   0.076 *   0.079 *   0.076 *
* W.S. Elev (ft)          * 2352.74  * Reach Len. (ft)        *  470.83 *  465.41 *  460.32 *
* Crit W.S. (ft)          *         * Flow Area (sq ft)       *    0.57 *  313.85 *  153.91 *
```

* E.G. Slope (ft/ft)	*0.040935	* Area (sq ft)	* 0.57	* 213.85	* 152.91	*
* [illegible]tal (cfs)	* 2097.00	* Flow (cfs)	* 0.79	* 1302.13	* 794.08	*
* [illegible]idth (ft)	* 209.04	* Top Width (ft)	* 2.76	* 104.93	* 101.35	*
* [illegible]otal (ft/s)	* 5.71	* Avg. Vel. (ft/s)	* 1.37	* 6.09	* 5.19	*
* Max Chl Dpth (ft)	* 3.70	* Hydr. Depth (ft)	* 0.21	* 2.04	* 1.51	*
* Conv. Total (cfs)	* 10364.6	* Conv. (cfs)	* 3.9	* 6435.9	* 3924.8	*
* Length Wtd. (ft)	* 465.50	* Wetted Per. (ft)	* 2.79	* 105.66	* 101.66	*
* Min Ch El (ft)	* 2349.04	* Shear (lb/sq ft)	* 0.52	* 5.17	* 3.84	*
* Alpha	* 1.02	* Stream Power (lb/ft s)	*10226.53	* 0.00	* 0.00	*
* Frctn Loss (ft)	* 13.32	* Cum Volume (acre-ft)	* 98.36	* 182.06	* 74.25	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 46.64	* 34.09	* 39.65	*

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2353.65	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.85	* Wt. n-Val.	* 0.076	* 0.079	* 0.076	*
* W.S. Elev (ft)	* 2352.80	* Reach Len. (ft)	* 470.83	* 465.41	* 460.32	*
* Crit W.S. (ft)	* 2352.80	* Flow Area (sq ft)	* 0.75	* 220.56	* 68.31	*
* E.G. Slope (ft/ft)	*0.063574	* Area (sq ft)	* 0.75	* 220.56	* 68.31	*
* Q Total (cfs)	* 2097.00	* Flow (cfs)	* 1.51	* 1708.51	* 386.98	*
* Top Width (ft)	* 161.60	* Top Width (ft)	* 2.76	* 104.93	* 53.91	*
* Vel Total (ft/s)	* 7.24	* Avg. Vel. (ft/s)	* 2.02	* 7.75	* 5.66	*
* Max Chl Dpth (ft)	* 3.76	* Hydr. Depth (ft)	* 0.27	* 2.10	* 1.27	*
* Conv. Total (cfs)	* 8316.8	* Conv. (cfs)	* 6.0	* 6776.1	* 1534.8	*
* Length Wtd. (ft)	* 465.63	* Wetted Per. (ft)	* 2.86	* 105.66	* 55.46	*
* Min Ch El (ft)	* 2349.04	* Shear (lb/sq ft)	* 1.04	* 8.29	* 4.89	*
* Alpha	* 1.05	* Stream Power (lb/ft s)	*10226.53	* 0.00	* 0.00	*
* Frctn Loss (ft)	* 12.28	* Cum Volume (acre-ft)	* 42.05	* 204.00	* 44.00	*
* C & E Loss (ft)	* 0.15	* Cum SA (acres)	* 13.20	* 34.09	* 14.33	*

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 conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

C[illegible]ECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 4.839

INPUT
Description: 4.839
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9742.4	2349.22	9765.54	2348.3	9812.81	2345.74	9814.93	2345.62	9816.29	2345.55
9816.74	2345.52	9834.4	2344.54	9842.19	2344.11	9842.86	2344.05	9854.75	2342.87
9881.43	2340.26	9891.12	2338.97	9900.52	2337.12	9902.47	2336.68	9905.61	2336.22
9911.63	2335.72	9912.18	2335.78	9914.53	2335.88	9917.45	2335.76	9922.66	2336.42
9924.29	2336.47	9926.47	2336.51	9934.04	2336.91	9939.88	2337.08	9940.67	2337.14
9950.53	2337.88	9957.18	2338.43	9969.76	2337.88	9978.01	2337.66	9991.61	2336.03
9991.82	2336.01	9991.92	2335.9810001.32		233510004.63		2334.8310007.15		2335.18
10014.06	2335.9210019.99		2336.6110022.84		2336.8910036.47		2337.7310039.34		2337.92
10040.48	2337.9710053.45		2338.510055.42		2338.5710059.34		2338.7310059.65		2338.75
10059.99	2338.7710060.61		2338.7910072.01		2339.4910079.19		2338.92 10082.6		2338.76
10084.47	2338.8610085.47		2338.9510089.43		2338.9710092.44		2339.07 10093.8		2339.17
10097.43	2339.4610104.05		2340.0510110.53		2340.7910120.25		2342.3410132.87		2343.28
10140	2343.9410145.27		2344.22 10157.6		2344.9210164.71		2345.3110176.65		2346.15
10182.72	2346.76	10194	2348.07 10199.6		2348.62				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9742.4	.076	9957.18	.07910053.45		.076

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9957.1810053.45		477.34 470.81	462.36	.1	.3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2339.90	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.39	* Wt. n-Val.	* 0.076	* 0.079	* 0.076	*
* W.S. Elev (ft)	* 2339.51	* Reach Len. (ft)	* 477.34	* 470.81	* 462.36	*
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 168.07	* 240.42	* 21.62	*
* E.G. Slope (ft/ft)	*0.021124	* Area (sq ft)	* 168.07	* 240.42	* 21.62	*
* Q Total (cfs)	* 2097.00	* Flow (cfs)	* 852.09	* 1206.99	* 37.92	*
* [illegible] Width (ft)	* 210.87	* Top Width (ft)	* 70.09	* 96.27	* 44.51	*
* [illegible] otal (ft/s)	* 4.88	* Avg. Vel. (ft/s)	* 5.07	* 5.02	* 1.75	*
* [illegible] hl Dpth (ft)	* 4.68	* Hydr. Depth (ft)	* 2.40	* 2.50	* 0.49	*
* Conv. Total (cfs)	* 14428.0	* Conv. (cfs)	* 5862.6	* 8304.5	* 260.9	*
* Length Wtd. (ft)	* 469.93	* Wetted Per. (ft)	* 70.53	* 96.60	* 44.59	*
* Min Ch El (ft)	* 2334.83	* Shear (lb/sq ft)	* 3.14	* 3.28	* 0.64	*
* Alpha	* 1.05	* Stream Power (lb/ft s)	*10199.60	* 0.00	* 0.00	*
* Frctn Loss (ft)	* 12.06	* Cum Volume (acre-ft)	* 97.45	* 179.64	* 73.33	*
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 46.25	* 33.02	* 38.88	*

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the

need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2340.65	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.37	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* W.S. Elev (ft)	* 2340.28	* Reach Len. (ft)	* 477.34	* 470.81	* 462.36 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 115.30	* 314.60	* 2.71 *
* E.G. Slope (ft/ft)	*0.014351	* Area (sq ft)	* 115.30	* 314.60	* 2.71 *
* Q Total (cfs)	* 2097.00	* Flow (cfs)	* 534.02	* 1557.38	* 5.60 *
* Top Width (ft)	* 135.00	* Top Width (ft)	* 37.18	* 96.27	* 1.55 *
* Vel Total (ft/s)	* 4.85	* Avg. Vel. (ft/s)	* 4.63	* 4.95	* 2.07 *
* Max Chl Dpth (ft)	* 5.45	* Hydr. Depth (ft)	* 3.10	* 3.27	* 1.75 *
* Conv. Total (cfs)	* 17504.9	* Conv. (cfs)	* 4457.8	* 13000.4	* 46.8 *
* Length Wtd. (ft)	* 470.35	* Wetted Per. (ft)	* 41.46	* 96.60	* 3.27 *
* Min Ch El (ft)	* 2334.83	* Shear (lb/sq ft)	* 2.49	* 2.92	* 0.74 *
* Alpha	* 1.01	* Stream Power (lb/ft s)	*10199.60	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 12.49	* Cum Volume (acre-ft)	* 41.42	* 201.14	* 43.63 *
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 12.98	* 33.02	* 14.04 *

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 4.750

INPUT
Description: 4.75
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9730.6	2334.93	9738.53	2334.85	9745.91	2334.59	9754.64	2334.42	9764.58	2334.19
9814.03	2332.17	9816.81	2332.07	9821.48	2331.99	9827.77	2331.83	9857.59	2330.86
9866.79	2330.6	9885.75	2330.13	9889.98	2329.98	9904.01	2329.39	9909.02	2329.04
9931.85	2325.37	9932.24	2325.32	9932.5	2325.31	9935.19	2325.98	9937.72	2326.13
9944.02	2326.48	9946.37	2326.3	9949.53	2326.06	9953.27	2325.68	9955.33	2326.16
9960.87	2326.23	9964.98	2326.05	9965.95	2326.01	9966.91	2326.04	9968.35	2326.06
9984.8	2325.98	9990.48	2325.82	9990.77	2325.81	9994.8	2325.52	9998.79	2325.22
10000.12	2325.1610002.02		2325.06	10002.4	2325.0510006.66		2325.2110013.33		2325.52
[illegible]73	2325.5510020.72		2325.7210030.29		2325.9910031.57		2326.0610034.76		2326.11
[illegible]5	2326.3	10053.4	2326.3810056.05		2326.4	10059	2326.4210077.86		2326.03
[illegible]5	2325.9410083.72		2325.93	10088.1	2325.910099.94		2325.75	10104.3	2325.12
10108.74	2324.4610113.99		2323.9310116.18		2323.7910126.68		2323.6310128.42		2323.62
10131.59	2323.110134.36		2322.6610136.45		2323.27	10142.7	2325.3910144.85		2326.56
10148.27	2327.7510158.13		2329.2110168.15		2330.5310175.41		2331.4810181.58		2332.32
10187.68	2333.0710200.47		2334.0110207.33		2334.3310213.66		2334.8610217.02		2335.01
10228.39	2335.8								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9730.6	.076	9984.8	.07910030.29		.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9984.810030.29 285.76 283.86 282.83 .1 .3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2327.84	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.43	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* W.S. Elev (ft)	* 2327.42	* Reach Len. (ft)	* 285.76	* 283.86	* 282.83 *
* Crit W.S. (ft)	* 2327.02	* Flow Area (sq ft)	* 84.29	* 84.23	* 238.08 *
* E.G. Slope (ft/ft)	*0.031827	* Area (sq ft)	* 84.29	* 84.23	* 238.08 *
* Q Total (cfs)	* 2097.00	* Flow (cfs)	* 345.95	* 425.88	* 1325.16 *
* Top Width (ft)	* 228.17	* Top Width (ft)	* 65.67	* 45.49	* 117.02 *
* Vel Total (ft/s)	* 5.16	* Avg. Vel. (ft/s)	* 4.10	* 5.06	* 5.57 *
* Max Chl Dpth (ft)	* 4.75	* Hydr. Depth (ft)	* 1.28	* 1.85	* 2.03 *
* Conv. Total (cfs)	* 11754.4	* Conv. (cfs)	* 1939.2	* 2387.2	* 7428.0 *
* Length Wtd. (ft)	* 283.48	* Wetted Per. (ft)	* 66.03	* 45.54	* 118.11 *
* Min Ch El (ft)	* 2325.05	* Shear (lb/sq ft)	* 2.54	* 3.68	* 4.01 *
* Alpha	* 1.04	* Stream Power (lb/ft s)	*10228.39	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 8.10	* Cum Volume (acre-ft)	* 96.07	* 177.88	* 71.95 *
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 45.51	* 32.25	* 38.02 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2328.13	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.71	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* W.S. Elev (ft)	* 2327.42	* Reach Len. (ft)	* 285.76	* 283.86	* 282.83 *
[illegible] W.S. (ft)	* 2327.35	* Flow Area (sq ft)	* 79.45	* 84.34	* 148.63 *
Slope (ft/ft)	*0.064812	* Area (sq ft)	* 79.45	* 84.34	* 148.63 *
[illegible]al (cfs)	* 2097.00	* Flow (cfs)	* 480.48	* 609.08	* 1007.44 *
* Top Width (ft)	* 193.00	* Top Width (ft)	* 57.80	* 45.49	* 89.71 *
* Vel Total (ft/s)	* 6.71	* Avg. Vel. (ft/s)	* 6.05	* 7.22	* 6.78 *
* Max Chl Dpth (ft)	* 3.69	* Hydr. Depth (ft)	* 1.37	* 1.85	* 1.66 *
* Conv. Total (cfs)	* 8237.0	* Conv. (cfs)	* 1887.3	* 2392.5	* 3957.2 *
* Length Wtd. (ft)	* 283.59	* Wetted Per. (ft)	* 59.33	* 45.54	* 93.53 *
* Min Ch El (ft)	* 2325.05	* Shear (lb/sq ft)	* 5.42	* 7.49	* 6.43 *
* Alpha	* 1.01	* Stream Power (lb/ft s)	*10228.39	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 7.39	* Cum Volume (acre-ft)	* 40.36	* 198.99	* 42.82 *
* C & E Loss (ft)	* 0.09	* Cum SA (acres)	* 12.46	* 32.25	* 13.55 *

****

[redacted]: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 4.696

INPUT
Description: 4.696
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9795.99	2322.68	9816.53	2322.57	9836.04	2322.38	9839.58	2322.21	9842.71	2322.09
9844.25	2321.95	9845.77	2321.86	9847.57	2321.97	9849.03	2321.99	9851.09	2321.96
9870.74	2321.69	9883.17	2321.75	9892.45	2321.73	9894.48	2321.69	9905.2	2321.22
9912.67	2320.97	9918.49	2320.72	9929.12	2319.23	9938.79	2318.02	9950.69	2318.06
9952.13	2318.07	9954.24	2318.04	9955.08	2318.07	9956.64	2318.1	9970.46	2318.43
9980.05	2317.15	9981.3	2316.99	9983.47	2316.9	9989.49	2316.7	9992.34	2316.37
9994.04	2316.06	9996.39	2315.83	9999.21	2315.6610003.98		2315.8610009.42		2316.55
10016.04	2316.9510018.51		2317.0810019.44		2317.110035.29		2317.4910038.45		2317.38
10052.04	2316.9110052.77		2316.74	10060.8	2315.610063.29		2315.2410071.46		2315.72
10073	2315.7410077.09		2316.0610084.09		2316.6210085.13		2316.7310087.18		2316.78
10095.47	2317.2210099.03		2317.0610105.41		2317.610109.85		2318.510126.73		2320.3
10142.54	2321.5210165.93		2322.610177.23		2323.4510192.79		2324.2710198.12		2324.62
10214.6	2325.510221.44		2325.77						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9795.99	.076	9970.46	.07910035.29		.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9970.4610035.29 382.67 381.79 349.26 .1 .3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2319.73	* Element	* Left OB	* Channel	* Right OB *
* [redacted] Head (ft)	* 0.46	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* [redacted] Elev (ft)	* 2319.28	* Reach Len. (ft)	* 382.67	* 381.79	* 349.26 *
* W.S. (ft)	*	* Flow Area (sq ft)	* 42.24	* 157.08	* 197.08 *
* E.G. Slope (ft/ft)	*0.025817	* Area (sq ft)	* 42.24	* 157.08	* 197.08 *
* Q Total (cfs)	* 2097.00	* Flow (cfs)	* 133.72	* 854.31	* 1108.97 *
* Top Width (ft)	* 188.36	* Top Width (ft)	* 41.68	* 64.83	* 81.85 *
* Vel Total (ft/s)	* 5.29	* Avg. Vel. (ft/s)	* 3.17	* 5.44	* 5.63 *
* Max Chl Dpth (ft)	* 4.04	* Hydr. Depth (ft)	* 1.01	* 2.42	* 2.41 *
* Conv. Total (cfs)	* 13051.2	* Conv. (cfs)	* 832.2	* 5317.0	* 6901.9 *
* Length Wtd. (ft)	* 367.32	* Wetted Per. (ft)	* 41.76	* 65.06	* 82.21 *
* Min Ch El (ft)	* 2315.66	* Shear (lb/sq ft)	* 1.63	* 3.89	* 3.86 *
* Alpha	* 1.05	* Stream Power (lb/ft s)	*10221.44	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 9.37	* Cum Volume (acre-ft)	* 95.65	* 177.10	* 70.54 *
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 45.15	* 31.89	* 37.38 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2320.66	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.42	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* W.S. Elev (ft)	* 2320.24	* Reach Len. (ft)	* 382.67	* 381.79	* 349.26 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 0.83	* 219.36	* 184.90 *
* E.G. Slope (ft/ft)	*0.013956	* Area (sq ft)	* 0.83	* 219.36	* 184.90 *
* Q Total (cfs)	* 2097.00	* Flow (cfs)	* 0.99	* 1095.92	* 1000.09 *
* Top Width (ft)	* 113.00	* Top Width (ft)	* 0.46	* 64.83	* 47.71 *
* Vel Total (ft/s)	* 5.18	* Avg. Vel. (ft/s)	* 1.18	* 5.00	* 5.41 *
* Max Chl Dpth (ft)	* 5.00	* Hydr. Depth (ft)	* 1.81	* 3.38	* 3.88 *
* Conv. Total (cfs)	* 17751.1	* Conv. (cfs)	* 8.3	* 9277.0	* 8465.7 *
* Length Wtd. (ft)	* 374.02	* Wetted Per. (ft)	* 2.28	* 65.06	* 51.60 *
* Min Ch El (ft)	* 2315.66	* Shear (lb/sq ft)	* 0.32	* 2.94	* 3.12 *
* Alpha	* 1.01	* Stream Power (lb/ft s)	*10221.44	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 8.33	* Cum Volume (acre-ft)	* 40.09	* 198.00	* 41.74 *
* C & E Loss (ft)	* 0.11	* Cum SA (acres)	* 12.27	* 31.89	* 13.11 *

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

[redacted] SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 4.624

INPUT
Description: 4.624
Station Elevation Data num= 101

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

```
 9889.14  2312.9 9895.79 2312.67 9897.83 2312.61 9905.96 2312.09 9916.68 2311.51
 9[redacted]78 2310.94 9930.16 2310.59 9936.46 2310.41 9938.98 2310.35 9943.05 2310.16
 [redacted]8 2309.95 9951.94 2309.72 9956.11 2308.98 9961.14 2308.29 9962.99 2308.15
 9[redacted]8 2308.18 9968.04 2308.24 9972.71 2308.37 9974.93 2308.34 9977.42 2308.23
 9986.16 2307.88 9988.33 2307.53 9998.34 2305.56 10002.7 2304.6310003.95  2304.8
 10007.5  2305.410011.62 2306.0810012.46 2306.2210017.37 2307.0310020.51 2306.92
10024.63 2306.9910036.64 2307.6510043.59 2307.5910044.92 2307.5610047.85 2307.72
10049.84 2307.81   10051 2307.8710058.16 2308.0810064.54 2308.1910069.72 2308.27
10073.93 2308.2310075.47 2308.1110081.15 2307.9710084.39 2308.02 10085.9 2308.06
10088.82 2308.0410094.45 2308.1410105.24 2308.2310107.77 2308.2210108.97 2308.26
10115.28 2308.2410115.48 2308.2510122.92 2308.37 10127.8  2308.610131.52 2308.84
10135.98 2308.87 10136.4 2308.8810137.15 2308.9110139.05 2308.8910145.09  2309.1
10152.58 2309.1610158.16  2309.410162.03  2309.510164.13 2309.69 10170.3 2309.91
10171.76 2309.9610172.99    231010185.03 2310.2910189.13 2310.31 10196.6 2310.71
10206.75 2310.9910209.67 2310.9810215.13 2310.85   10216 2310.7810226.99 2309.16
10232.65 2309.7210235.29 2310.05 10239.6 2310.6310249.14 2310.9710251.47 2311.13
 10252.9 2311.1710268.94 2311.4310276.27 2311.5410280.27 2311.5810281.81 2311.63
10291.37 2311.8710315.21 2312.47 10321.7 2312.6210325.68 2312.6810329.63 2312.77
10343.36 2312.9610348.82 2313.0310356.72 2313.2410378.63  2314.7 10382.6 2314.99
10390.79  2315.6

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
 9861.53    .076 9986.16    .07910036.64    .076

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.    Expan.
       9986.1610036.64            309.87   301.6  280.44             .1        .3

CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************************
* E.G. Elev (ft)         * 2310.36  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.48  * Wt. n-Val.            *   0.076  *   0.079  *   0.076  *
* W.S. Elev (ft)         * 2309.88  * Reach Len. (ft)       *  309.87  *  301.60  *  280.44  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)     *   50.81  *  170.28  *  195.79  *
* E.G. Slope (ft/ft)     *0.025202  * Area (sq ft)          *   50.81  *  170.28  *  195.79  *
* Q Total (cfs)          * 2097.00  * Flow (cfs)            *  195.90  * 1135.61  *  765.49  *
* Top Width (ft)         *  231.52  * Top Width (ft)        *   36.57  *   50.48  *  144.47  *
* Vel Total (ft/s)       *    5.03  * Avg. Vel. (ft/s)      *    3.86  *    6.67  *    3.91  *
* Max Chl Dpth (ft)      *    5.25  * Hydr. Depth (ft)      *    1.39  *    3.37  *    1.36  *
* Conv. Total (cfs)      * 13209.2  * Conv. (cfs)           *  1234.0  *  7153.3  *  4821.9  *
* Length Wtd. (ft)       *  295.53  * Wetted Per. (ft)      *   36.70  *   51.01  *  144.62  *
* Min Ch El (ft)         * 2304.63  * Shear (lb/sq ft)      *    2.18  *    5.25  *    2.13  *
* Alpha                  *    1.23  * Stream Power (lb/ft s)*10390.79  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    6.55  * Cum Volume (acre-ft)  *   95.24  *  175.66  *   68.96  *
* [redacted]E Loss (ft)  *    0.02  * Cum SA (acres)       *   44.81  *   31.39  *   36.47  *
*****************************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION OUTPUT  Profile #FW
*****************************************************************************************************
* E.G. Elev (ft)         * 2312.22  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.51  * Wt. n-Val.            *   0.076  *   0.079  *   0.076  *
* W.S. Elev (ft)         * 2310.71  * Reach Len. (ft)       *  309.87  *  301.60  *  280.44  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)     *    0.45  *  212.40  *    1.10  *
* E.G. Slope (ft/ft)     *0.041032  * Area (sq ft)          *    0.45  *  212.40  *    1.10  *
* Q Total (cfs)          * 2097.00  * Flow (cfs)            *    0.51  * 2094.44  *    2.05  *
* Top Width (ft)         *   51.00  * Top Width (ft)        *    0.16  *   50.48  *    0.36  *
* Vel Total (ft/s)       *    9.80  * Avg. Vel. (ft/s)      *    1.13  *    9.86  *    1.86  *
* Max Chl Dpth (ft)      *    6.08  * Hydr. Depth (ft)      *    2.83  *    4.21  *    3.06  *
* Conv. Total (cfs)      * 10352.3  * Conv. (cfs)           *     2.5  * 10339.7  *    10.1  *
* Length Wtd. (ft)       *  300.31  * Wetted Per. (ft)      *    2.98  *   51.01  *    3.42  *
* Min Ch El (ft)         * 2304.63  * Shear (lb/sq ft)      *    0.39  *   10.67  *    0.83  *
* Alpha                  *    1.01  * Stream Power (lb/ft s)*10390.79  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    7.10  * Cum Volume (acre-ft)  *   40.09  *  196.10  *   40.99  *
* C & E Loss (ft)        *    0.21  * Cum SA (acres)       *   12.27  *   31.39  *   12.91  *
*****************************************************************************************************

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
         This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION


RIVER: Rodger Creek
REACH: Main Reach          RS: 4.567

INPUT
Description: 4.567
Station Elevation Data     num=       84
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
**********************************************************************************
 9836.03 2317.88  9836.1 2317.87 9847.52  2316.6 9872.21 2313.93 9882.85 2313.14
 [redacted]37 2311.61 9904.23 2311.14 9921.63 2309.18 9932.78 2308.03 9938.26 2307.15
  [redacted]6 2306.64 9950.56 2305.86 9960.83 2304.01 9963.82 2303.54 9966.64  2303.1
 [redacted],2 2301.71  9979.6 2299.32  9981.4 2299.25 9983.16 2299.18 9984.79 2299.04
 9989.21 2298.69 9993.62 2297.97 9999.81 2296.97 10003.5 2297.1410008.67 2297.87
10011.78 2298.3310013.76 2298.6310017.25 2299.0410018.37 2299.2710019.14 2299.28
10021.75 2299.3710026.25 2299.6510029.28  2300.210030.02 2300.3510033.67 2300.87
10038.81 2301.4110042.23 2301.6610046.45 2301.8610050.92 2302.0610055.91 2302.17
10057.92 2302.3110061.95 2302.2310070.91 2302.0110075.33 2301.9910080.98 2302.16
10086.55 2302.39   10089 2302.3510090.49 2302.3310091.96 2302.3110100.94 2301.95
10101.87 2301.9210103.68 2301.96 10111.2 2302.1210111.82 2302.1110119.65 2302.02
10126.22 2301.6110127.05 2301.5710127.87 2301.66 10130.6 2302.0710134.13 2302.25
10135.12 2302.3210137.53 2302.4110139.53 2302.4810140.59 2302.51 10150.7 2303.46
```

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10151.25 2303.5510152.19 2303.5810160.11 2304.0810162.08 2304.11 10166.6 2304.04
1[redacted]22 2304.1810176.93 2304.7410181.75 2304.7510183.11 2304.8310189.16 2305.22
1[redacted].8 2305.3810209.71 2304.84 10217.6 2304.8610218.68 2304.8310225.59 2305.24
10233.79 2305.3210227.54 2305.5410233.22  2306.610240.37 2306.98

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 9836.03    .076  9979.6    .07910018.37    .076

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9979.610018.37           472.25  469.25  458.84            .1       .3

CROSS SECTION OUTPUT  Profile #Q100
*************************************************************************************************
* E.G. Elev (ft)         * 2303.79  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.67  * Wt. n-Val.           *   0.076  *   0.079  *   0.076  *
* W.S. Elev (ft)         * 2303.12  * Reach Len. (ft)       *  472.25  *  469.25  *  458.84  *
* Crit W.S. (ft)         * 2302.85  * Flow Area (sq ft)     *   24.29  *  190.65  *  168.57  *
* E.G. Slope (ft/ft)     *0.019669  * Area (sq ft)          *   24.29  *  190.65  *  168.57  *
* Q Total (cfs)          * 2097.00  * Flow (cfs)            *   98.04  * 1446.32  *  552.64  *
* Top Width (ft)         *  180.49  * Top Width (ft)        *   13.06  *   38.77  *  128.66  *
* Vel Total (ft/s)       *    5.47  * Avg. Vel. (ft/s)      *    4.04  *    7.59  *    3.28  *
* Max Chl Dpth (ft)      *    6.15  * Hydr. Depth (ft)      *    1.86  *    4.92  *    1.31  *
* Conv. Total (cfs)      * 14952.3  * Conv. (cfs)           *   699.1  * 10312.7  *  3940.5  *
* Length Wtd. (ft)       *  464.54  * Wetted Per. (ft)      *   13.60  *   39.09  *  128.94  *
* Min Ch El (ft)         * 2296.97  * Shear (lb/sq ft)      *    2.19  *    5.99  *    1.61  *
* Alpha                  *    1.45  * Stream Power (lb/ft s) *10240.37  *    0.00  *    0.00  *
* Frctn Loss (ft)        *   11.81  * Cum Volume (acre-ft)  *   94.98  *  174.41  *   67.79  *
* C & E Loss (ft)        *    0.04  * Cum SA (acres)        *   44.63  *   31.08  *   35.59  *
*************************************************************************************************

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION OUTPUT  Profile #FW
*************************************************************************************************
* E.G. Elev (ft)         * 2304.91  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.81  * Wt. n-Val.           *   0.076  *   0.079  *   0.076  *
* W.S. Elev (ft)         * 2304.10  * Reach Len. (ft)       *  472.25  *  469.25  *  458.84  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)     *   18.83  *  228.89  *   52.26  *
* E.G. Slope (ft/ft)     *0.015346  * Area (sq ft)          *   18.83  *  228.89  *   52.26  *
* Q Total (cfs)          * 2097.00  * Flow (cfs)            *   79.32  * 1732.59  *  285.09  *
* Top Width (ft)         *   55.00  * Top Width (ft)        *    4.60  *   38.77  *   11.63  *
* Vel Total (ft/s)       *    6.99  * Avg. Vel. (ft/s)      *    4.21  *    7.57  *    5.46  *
* [redacted]Chl Dpth (ft)*    7.13  * Hydr. Depth (ft)      *    4.09  *    5.90  *    4.49  *
* [redacted] Total (cfs) * 16927.5  * Conv. (cfs)           *   640.3  * 13986.0  *  2301.3  *
* Length Wtd. (ft)       *  466.54  * Wetted Per. (ft)      *    8.21  *   39.09  *   15.46  *
* Min Ch El (ft)         * 2296.97  * Shear (lb/sq ft)      *    2.20  *    5.61  *    3.24  *
* Alpha                  *    1.07  * Stream Power (lb/ft s) *10240.37  *    0.00  *    0.00  *
* Frctn Loss (ft)        *   11.87  * Cum Volume (acre-ft)  *   40.02  *  194.58  *   40.82  *
* C & E Loss (ft)        *    0.02  * Cum SA (acres)        *   12.25  *   31.08  *   12.88  *
*************************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
         This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION


RIVER: Rodger Creek
REACH: Main Reach         RS: 4.478

INPUT
Description: 4.478
Station Elevation Data     num=      76
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*********************************************************************************************
 9870.44 2303.47 9871.83 2303.19 9873.77 2302.84 9882.72 2302.04 9896.18 2300.85
  9902.3 2300.43  9909.9 2299.82 9924.91 2298.43 9928.74    2298 9937.45 2297.52
 9939.45 2297.38 9944.02  2297.1 9945.24 2296.97 9950.27 2296.66 9951.11 2296.62
  9951.5 2296.55 9952.01 2296.51 9963.48 2295.19 9970.91 2294.34 9971.48 2294.27
 9971.89 2294.22 9972.21 2294.14  9980.8 2291.97 9982.67 2291.19 9992.35 2289.04
10005.29 2286.1510012.88 2287.8910019.29 2290.6110020.68  2290.710025.032291.219
10030.32 2291.8510034.24 2292.0310036.27 2292.1210040.58 2292.1610042.97 2292.22
10047.43 2292.2610054.14 2292.1610056.08 2292.2510062.97 2291.8210066.21 2291.75
10067.43 2291.6910079.94 2290.59 10080.7 2290.5110087.99    229110088.56 2291.04
10091.78 2291.2510094.04 2291.1510103.46 2290.6910114.77 2290.3410122.07 2290.08
10124.34 2290.0310131.88 2289.6710134.46 2289.5910152.48 2288.5610153.21 2288.57
10154.14 2288.5510154.67 2288.4110158.61 2287.8310163.38 2287.1210166.76 2286.62
 10172.8 2285.8210179.23    228710180.98 2287.4610184.03  2288.510189.87 2290.15
10192.81 2291.5110199.08 2292.1210210.25 2293.0210228.27 2293.5810233.56  2293.7
10245.08 2293.9910262.83 2294.4210268.64 2294.5210285.24 2294.8910291.77 2295.01
10300.23 2295.61

Manning's n Values        num=       3
[redacted]Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
[redacted]14    .076 9982.67    .07910025.03    .076

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9982.6710025.03           370.22  391.11  405.22            .1       .3

CROSS SECTION OUTPUT  Profile #Q100
*************************************************************************************************
* E.G. Elev (ft)         * 2291.95  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.55  * Wt. n-Val.           *   0.076  *   0.079  *   0.076  *
* W.S. Elev (ft)         * 2291.39  * Reach Len. (ft)       *  370.22  *  391.11  *  405.22  *
```

* E.G. Slope (ft/ft)	*0.034156	* Area (sq ft)	* 0.05	* 111.32	* 242.27	*
* [redacted]al (cfs)	* 2097.00	* Flow (cfs)	* 0.04	* 721.79	* 1375.17	*
* [redacted]idth (ft)	* 166.03	* Top Width (ft)	* 0.48	* 42.36	* 123.19	*
* [redacted]Total (ft/s)	* 5.93	* Avg. Vel. (ft/s)	* 0.74	* 6.48	* 5.68	*
* Max Chl Dpth (ft)	* 5.57	* Hydr. Depth (ft)	* 0.10	* 2.63	* 1.97	*
* Conv. Total (cfs)	* 11346.5	* Conv. (cfs)	* 0.2	* 3905.5	* 7440.8	*
* Length Wtd. (ft)	* 396.29	* Wetted Per. (ft)	* 0.52	* 43.70	* 124.37	*
* Min Ch El (ft)	* 2286.15	* Shear (lb/sq ft)	* 0.20	* 5.43	* 4.15	*
* Alpha	* 1.01	* Stream Power (lb/ft s)	*10300.23	* 0.00	* 0.00	*
* Frctn Loss (ft)	* 8.37	* Cum Volume (acre-ft)	* 94.84	* 172.78	* 65.63	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 44.56	* 30.64	* 34.27	*

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2293.02	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.98	* Wt. n-Val.	* 0.076	* 0.079	* 0.076	*
* W.S. Elev (ft)	* 2292.05	* Reach Len. (ft)	* 370.22	* 391.11	* 405.22	*
* Crit W.S. (ft)	* 2292.05	* Flow Area (sq ft)	* 0.36	* 139.03	* 145.77	*
* E.G. Slope (ft/ft)	*0.050109	* Area (sq ft)	* 0.36	* 139.03	* 145.77	*
* Q Total (cfs)	* 2097.00	* Flow (cfs)	* 0.72	* 1266.20	* 830.07	*
* Top Width (ft)	* 143.07	* Top Width (ft)	* 0.48	* 42.36	* 100.23	*
* Vel Total (ft/s)	* 7.35	* Avg. Vel. (ft/s)	* 2.00	* 9.11	* 5.69	*
* Max Chl Dpth (ft)	* 5.90	* Hydr. Depth (ft)	* 0.76	* 3.28	* 1.45	*
* Conv. Total (cfs)	* 9367.9	* Conv. (cfs)	* 3.2	* 5656.5	* 3708.2	*
* Length Wtd. (ft)	* 397.35	* Wetted Per. (ft)	* 1.18	* 43.70	* 103.76	*
* Min Ch El (ft)	* 2286.15	* Shear (lb/sq ft)	* 0.96	* 9.95	* 4.40	*
* Alpha	* 1.16	* Stream Power (lb/ft s)	*10300.23	* 0.00	* 0.00	*
* Frctn Loss (ft)	* 6.57	* Cum Volume (acre-ft)	* 39.92	* 192.59	* 39.78	*
* C & E Loss (ft)	* 0.17	* Cum SA (acres)	* 12.22	* 30.64	* 12.29	*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
[redacted]: 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: Rodger Creek
REACH: Main Reach RS: 4.404

INPUT
Description: 4.404
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9828.6	2287.98	9842.23	2286.8	9845.8	2286.43	9849.5	2286.04	9852.21	2285.86
9856.11	2285.57	9860.79	2285.33	9862.44	2285.29	9863.39	2285.18	9864.89	2285.14
9879.22	2281.69	9883.51	2280.68	9894.45	2280.22	9894.71	2280.2	9899.01	2281.09
9900.35	2281.37	9911.35	2282.15	9917.94	2282.38	9921.32	2282.58	9928.01	2282.55
9935	2282.43	9942.22	2282.29	9948.04	2281.79	9963.88	2281.06	9967.22	2280.89
9967.98	2280.83	9971.03	2280.49	9979.34	2279.33	9984.72	2278.14	9996.96	2278.32
9997.99	2278.18	9999.22	2278.2510000.95		2278.5910003.45		2278.7510006.34		2279.03
10008.01	2278.8810008.96		2278.94	10010.9	2278.9310011.73		227910012.09		2279.15
10014.82	2279.7110016.63		2279.7710029.51		2280.5910034.13		2280.3410041.02		2280.06
10045.69	2279.8510047.28		2279.5510049.49		2279.0610050.69		2278.7810054.51		2279.59
10055.93	2279.5110062.06		2279.1910062.15		2279.1810062.24		2279.1710062.34		2279.15
10067.16	2279.2910080.22		2279.5310083.46		2279.5710086.87		2279.8810095.28		2281.44
10098.29	2281.9310100.31		2282.1910102.16		2282.4810124.95		2283.8910131.81		2284.34
10141.88	2284.9110157.58		2285.7710188.85		2288.0810192.44		2288.3410195.62		2288.47
10212.62	2289.1510218.27		2289.2310227.39		2289.4110234.12		2289.6510243.38		2289.85
10246.75	2289.94								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9828.6	.076	9971.03	.07910029.51		.076

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

Left	Right	Left	Channel	Right	Coeff Contr.	Expan.
9971.03	10029.51	322.74	338.69	338.89	.1	.3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2283.54	* Element	* Left OB	* Channel	* Right OB	*
* [redacted]Head (ft)	* 0.42	* Wt. n-Val.	* 0.076	* 0.079	* 0.076	*
* [redacted] Elev (ft)	* 2283.12	* Reach Len. (ft)	* 322.74	* 338.69	* 338.89	*
* [redacted] W.S. (ft)	*	* Flow Area (sq ft)	* 141.89	* 230.88	* 232.97	*
* E.G. Slope (ft/ft)	*0.015917	* Area (sq ft)	* 141.89	* 230.88	* 232.97	*
* Q Total (cfs)	* 2948.00	* Flow (cfs)	* 447.08	* 1362.36	* 1138.55	*
* Top Width (ft)	* 239.29	* Top Width (ft)	* 97.76	* 58.48	* 83.05	*
* Vel Total (ft/s)	* 4.87	* Avg. Vel. (ft/s)	* 3.15	* 5.90	* 4.89	*
* Max Chl Dpth (ft)	* 4.98	* Hydr. Depth (ft)	* 1.45	* 3.95	* 2.81	*
* Conv. Total (cfs)	* 23366.6	* Conv. (cfs)	* 3543.7	* 10798.4	* 9024.5	*
* Length Wtd. (ft)	* 334.13	* Wetted Per. (ft)	* 98.29	* 58.88	* 83.54	*
* Min Ch El (ft)	* 2278.14	* Shear (lb/sq ft)	* 1.43	* 3.90	* 2.77	*
* Alpha	* 1.13	* Stream Power (lb/ft s)	*10246.75	* 0.00	* 0.00	*

* Frctn Loss (ft)	* 5.16	* Cum Volume (acre-ft)	* 94.24	* 171.25	* 63.42 *
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 44.14	* 30.19	* 33.31 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2284.49	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.41	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* W.S. Elev (ft)	* 2284.08	* Reach Len. (ft)	* 322.74	* 338.69	* 338.89 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 3.64	* 286.70	* 283.73 *
* E.G. Slope (ft/ft)	*0.009753	* Area (sq ft)	* 3.64	* 286.70	* 283.73 *
* Q Total (cfs)	* 2948.00	* Flow (cfs)	* 6.09	* 1529.92	* 1412.00 *
* Top Width (ft)	* 125.00	* Top Width (ft)	* 1.03	* 58.48	* 65.49 *
* Vel Total (ft/s)	* 5.14	* Avg. Vel. (ft/s)	* 1.67	* 5.34	* 4.98 *
* Max Chl Dpth (ft)	* 5.94	* Hydr. Depth (ft)	* 3.53	* 4.90	* 4.33 *
* Conv. Total (cfs)	* 29851.5	* Conv. (cfs)	* 61.6	* 15492.0	* 14297.9 *
* Length Wtd. (ft)	* 337.11	* Wetted Per. (ft)	* 4.51	* 58.88	* 68.57 *
* Min Ch El (ft)	* 2278.14	* Shear (lb/sq ft)	* 0.49	* 2.96	* 2.52 *
* Alpha	* 1.01	* Stream Power (lb/ft s)	*10246.75	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 4.58	* Cum Volume (acre-ft)	* 39.90	* 190.68	* 37.78 *
* C & E Loss (ft)	* 0.09	* Cum SA (acres)	* 12.22	* 30.19	* 11.52 *

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.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 4.339

INPUT
Description: 4.339
Station Elevation Data num= 75

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9708.8	2286.01	9712.33	2285.7	9719.96	2284.97	9729.07	2284.05	9740.6	2282.92
9754.32	2281.64	9759.7	2280.93	9760.75	2280.83	9761.84	2280.78	9769.98	2280.45
9775.25	2279.16	9777.13	2278.7	9784.32	2277.97	9800.36	2276.37	9804.73	2276.91
[illegible].88	2277.19	9810.14	2277.38	9811.7	2277.11	9812.3	2277.15	9820.78	2276.96
[illegible]57	2276.92	9830.05	2276.89	9837.09	2276.65	9838.05	2276.62	9840.04	2276.49
[illegible]4	2276	9851.93	2275.35	9853.88	2275.08	9853.93	2275.07	9854.05	2275.06
98[illegible]17	2274.46	9866.53	2273.61	9869.16	2273.15	9870.28	2273.4	9879.19	2274.72
9880.31	2274.79	9891.56	2275.83	9900.84	2276.11	9907.5	2276.33	9910.81	2276.44
9913.26	2276.51	9922.23	2276.53	9926.95	2276.38	9937.36	2275.97	9938.27	2275.94
9948.34	2275.62	9957.67	2273.64	9957.77	2273.62	9957.84	2273.6	9977.16	2273.29
9982.97	2271.93	9992.49	2270.28	10001.33	2270.36	10011.07	2270.32	10014.23	2271.99
10018.05	2274.03	10021.77	2275.71	10023.86	2276.21	10033.9	2278.62	10033.93	2278.63
10045.51	2279.85	10048.27	2280.07	10053.62	2280.43	10059.6	2280.97	10061.83	2281.24
10062.13	2281.25	10075.29	2282.82	10085.56	2284.07	10093.27	2285.06	10108.25	2287
10130.8	2289.73	10143.02	2291.32	10144.81	2291.58	10145.31	2291.65	10147.95	2291.93

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9708.8	.076	9977.16	.07	10018.05	.076

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

Left	Right	Left	Channel	Right	Coeff Contr.	Expan.
9977.16	10018.05	242.98	245.4	245.26	.1	.3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2278.35	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.66	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* W.S. Elev (ft)	* 2277.69	* Reach Len. (ft)	* 242.98	* 245.40	* 245.26 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 380.54	* 267.45	* 18.66 *
* E.G. Slope (ft/ft)	*0.015094	* Area (sq ft)	* 380.54	* 267.45	* 18.66 *
* Q Total (cfs)	* 3626.00	* Flow (cfs)	* 1448.22	* 2119.44	* 58.34 *
* Top Width (ft)	* 242.89	* Top Width (ft)	* 190.03	* 40.89	* 11.97 *
* Vel Total (ft/s)	* 5.44	* Avg. Vel. (ft/s)	* 3.81	* 7.92	* 3.13 *
* Max Chl Dpth (ft)	* 7.41	* Hydr. Depth (ft)	* 2.00	* 6.54	* 1.56 *
* Conv. Total (cfs)	* 29513.8	* Conv. (cfs)	* 11787.8	* 17251.1	* 474.9 *
* Length Wtd. (ft)	* 244.57	* Wetted Per. (ft)	* 190.82	* 42.11	* 12.57 *
* Min Ch El (ft)	* 2270.28	* Shear (lb/sq ft)	* 1.88	* 5.98	* 1.40 *
* Alpha	* 1.44	* Stream Power (lb/ft s)	*10147.95	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 4.34	* Cum Volume (acre-ft)	* 92.31	* 169.31	* 62.44 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 43.08	* 29.80	* 32.94 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* [illegible] Elev (ft)	* 2279.83	* Element	* Left OB	* Channel	* Right OB *
* [illegible]ead (ft)	* 1.28	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* [illegible]. Elev (ft)	* 2278.55	* Reach Len. (ft)	* 242.98	* 245.40	* 245.26 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 97.88	* 302.72	* 14.34 *
* E.G. Slope (ft/ft)	*0.018689	* Area (sq ft)	* 97.88	* 302.72	* 14.34 *
* Q Total (cfs)	* 3626.00	* Flow (cfs)	* 665.60	* 2899.16	* 61.24 *
* Top Width (ft)	* 64.00	* Top Width (ft)	* 19.16	* 40.89	* 3.95 *
* Vel Total (ft/s)	* 8.74	* Avg. Vel. (ft/s)	* 6.80	* 9.58	* 4.27 *
* Max Chl Dpth (ft)	* 8.27	* Hydr. Depth (ft)	* 5.11	* 7.40	* 3.63 *
* Conv. Total (cfs)	* 26523.8	* Conv. (cfs)	* 4868.8	* 21207.0	* 448.0 *
* Length Wtd. (ft)	* 245.08	* Wetted Per. (ft)	* 24.12	* 42.11	* 7.11 *

* Alpha	* 1.08	* Stream Power (lb/ft s)	*10147.95	* 0.00	* 0.00	*
* [redacted]n Loss (ft)	* 4.51	* Cum Volume (acre-ft)	* 39.52	* 188.39	* 36.62	*
* [redacted]: Loss (ft)	* 0.09	* Cum SA (acres)	* 12.14	* 29.80	* 11.25	*

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 4.293

INPUT
Description: 4.293
Station Elevation Data num= 58

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9739.96	2279.47	9749.63	2278.74	9762.84	2277.76	9797.96	2275.77	9808.12	2275.17
9811.42	2275.06	9817.94	2274.77	9823.14	2274.29	9824.3	2274.2	9831.78	2273.89
9837.82	2273.64	9841.89	2273.48	9843.25	2273.18	9848.55	2272.93	9855.74	2272.77
9857.77	2272.73	9872.29	2272.67	9875.68	2272.56	9876.88	2272.44	9883.95	2272.07
9888.08	2271.9	9890.38	2271.75	9897.33	2270.77	9899.07	2270.62	9900.98	2270.1
9905.47	2269.38	9913.41	2269.79	9914.34	2269.89	9914.87	2269.91	9925.64	2270.32
9942.44	2270.95	9958.86	2270.08	9969.85	2269.61	9973.96	2269.44	9985.11	2267.94
9988.61	2267.110011.76		2267.4910013.34		2267.4110013.62		2267.4910014.67		2267.7
10025.79	2270.2710031.06		2271.7410034.44		2272.710045.86		2275.9510061.78		2279.22
10078.06	2282.810082.34		2283.510089.17		2284.47 10108.6		2286.9310110.64		2287.23
10113.51	2287.6510127.18		2289.7810127.97		2289.910129.21		2290.0110148.86		2291.63
10152.72	2291.9510174.84		2294.2910175.77		2294.37				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9739.96	.076	9958.86	.07910025.79		.076

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9958.8610025.79		516.88 519.91	516.84	.1	.3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2274.01	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.76	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* W.S. Elev (ft)	* 2273.26	* Reach Len. (ft)	* 516.88	* 519.91	* 516.84 *
* [redacted]t W.S. (ft)	*	* Flow Area (sq ft)	* 228.54	* 326.11	* 15.92 *
* [redacted] Slope (ft/ft)	*0.021131	* Area (sq ft)	* 228.54	* 326.11	* 15.92 *
* [redacted]al (cfs)	* 3626.00	* Flow (cfs)	* 1019.28	* 2548.91	* 57.81 *
* Top Width (ft)	* 193.50	* Top Width (ft)	* 115.96	* 66.93	* 10.61 *
* Vel Total (ft/s)	* 6.36	* Avg. Vel. (ft/s)	* 4.46	* 7.82	* 3.63 *
* Max Chl Dpth (ft)	* 6.16	* Hydr. Depth (ft)	* 1.97	* 4.87	* 1.50 *
* Conv. Total (cfs)	* 24943.8	* Conv. (cfs)	* 7011.7	* 17534.4	* 397.7 *
* Length Wtd. (ft)	* 519.11	* Wetted Per. (ft)	* 116.26	* 67.47	* 11.02 *
* Min Ch El (ft)	* 2267.10	* Shear (lb/sq ft)	* 2.59	* 6.38	* 1.91 *
* Alpha	* 1.21	* Stream Power (lb/ft s)	*10175.77	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 9.73	* Cum Volume (acre-ft)	* 90.61	* 167.64	* 62.34 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 42.22	* 29.50	* 32.87 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2275.23	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.97	* Wt. n-Val.	* 0.076	* 0.079	* 0.076 *
* W.S. Elev (ft)	* 2274.26	* Reach Len. (ft)	* 516.88	* 519.91	* 516.84 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 52.83	* 393.16	* 24.87 *
* E.G. Slope (ft/ft)	*0.018094	* Area (sq ft)	* 52.83	* 393.16	* 24.87 *
* Q Total (cfs)	* 3626.00	* Flow (cfs)	* 292.17	* 3220.96	* 112.87 *
* Top Width (ft)	* 90.00	* Top Width (ft)	* 13.86	* 66.93	* 9.21 *
* Vel Total (ft/s)	* 7.70	* Avg. Vel. (ft/s)	* 5.53	* 8.19	* 4.54 *
* Max Chl Dpth (ft)	* 7.16	* Hydr. Depth (ft)	* 3.81	* 5.87	* 2.70 *
* Conv. Total (cfs)	* 26956.5	* Conv. (cfs)	* 2172.0	* 23945.3	* 839.1 *
* Length Wtd. (ft)	* 519.68	* Wetted Per. (ft)	* 17.32	* 67.47	* 10.97 *
* Min Ch El (ft)	* 2267.10	* Shear (lb/sq ft)	* 3.44	* 6.58	* 2.56 *
* Alpha	* 1.06	* Stream Power (lb/ft s)	*10175.77	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 9.90	* Cum Volume (acre-ft)	* 39.10	* 186.43	* 36.51 *
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 12.05	* 29.50	* 11.21 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 4.194

[redacted]tion: 4.194
Station Elevation Data num= 31

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9862.99	2266.21	9872.46	2264.84	9874.26	2264.62	9874.54	2264.58	9875.74	2264.49
9898.16	2263.14	9913.56	2262.63	9924.29	2262.16	9926.17	2262.02	9929.08	2261.65
9930.83	2261.63	9933.21	2261.6	9937.14	2261.44	9941.93	2261.15	9945.68	2260.91
9969.88	2259.98	9974.65	2259.7	9980.29	2258.6	9994.14	2256.93	9995.67	2256.47
10006.86	2256.4310011.24		2256.4110021.92		2257.1610027.45		2257.62 10031.3		2257.72
10034.45	2259.1210035.99		2259.810040.69		2260.7910048.31		2262.4210052.91		2263.23

10[redacted]72 2265.67

M[redacted]s n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9862.99	.076	9980.29	.07	9910034.45	.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9980.2 9910034.45 311.32 306.48 290.21 .1 .3

CROSS SECTION OUTPUT Profile #Q100

			Left OB	Channel	Right OB
E.G. Elev (ft)	2264.28	Element	0.076	0.079	0.076
Vel Head (ft)	0.86	Wt. n-Val.	311.32	306.48	290.21
W.S. Elev (ft)	2263.42	Reach Len. (ft)	173.77	339.10	37.36
Crit W.S. (ft)		Flow Area (sq ft)	173.77	339.10	37.36
E.G. Slope (ft/ft)	0.016733	Area (sq ft)	697.51	2785.22	143.26
Q Total (cfs)	3626.00	Flow (cfs)	86.70	54.16	19.51
Top Width (ft)	160.37	Top Width (ft)	6.59	4.01	8.21	3.83
Vel Total (ft/s)	7.01	Avg. Vel. (ft/s)	2.00	6.26	1.92
Max Chl Dpth (ft)	28031.0	Hydr. Depth (ft)	5392.2	21531.3	1107.5
Conv. Total (cfs)	306.09	Conv. (cfs)	86.91	54.67	20.01
Length Wtd. (ft)	2256.41	Wetted Per. (ft)	2.09	6.48	1.95
Min Ch El (ft)	1.28	Shear (lb/sq ft)	10066.72	0.00	0.00
Alpha	5.83	Stream Power (lb/ft s)	88.22	163.67	62.02
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	41.02	28.78	32.69
C & E Loss (ft)		Cum SA (acres)			

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

			Left OB	Channel	Right OB
E.G. Elev (ft)	2265.30	Element	0.076	0.079	0.076
Vel Head (ft)	1.36	Wt. n-Val.	311.32	306.48	290.21
W.S. Elev (ft)	2263.94	Reach Len. (ft)	25.50	367.33	2.58
Crit W.S. (ft)		Flow Area (sq ft)	25.50	367.33	2.58
E.G. Slope (ft/ft)	0.020089	Area (sq ft)	134.66	3486.84	4.50
Q Total (cfs)	3626.00	Flow (cfs)	5.29	54.16	0.55
Top Width (ft)	60.00	Top Width (ft)	9.17	5.28	9.49	1.74
Vel Total (ft/s)	7.53	Avg. Vel. (ft/s)	4.82	6.78	4.70
Max Chl Dpth (ft)	25582.8	Hydr. Depth (ft)	950.1	24601.0	31.7
Conv. Total (cfs)	306.43	Conv. (cfs)	9.69	54.67	5.17
[redacted]gth Wtd. (ft)	2256.41	Wetted Per. (ft)	3.30	8.43	0.63
[redacted]h El (ft)	1.04	Shear (lb/sq ft)	10066.72	0.00	0.00
Alpha	6.58	Stream Power (lb/ft s)	38.64	181.89	36.35
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	11.94	28.78	11.15
C & E Loss (ft)		Cum SA (acres)			

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 4.136

INPUT
Description: 4.136
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9806.69	2272.17	9807.26	2272.1	9826.18	2270.59	9841.78	2268.66	9842.13	2268.62
9845.79	2268.37	9865.38	2267.12	9866.88	2266.98	9888.59	2265.45	9894.29	2265.18
9904.88	2264.47	9910.57	2264.11	9915.23	2263.68	9922.61	2263.03	9931.69	2262.26
9947.61	2260.85	9948.92	2260.52	9951.3	2259.84	9960.13	2257.4	9965.71	2255.82
9971.75	2254.7	9973.79	2254.09	9983.34	2251.23	9989.25	2250.8	9997.81	2251.22
10009.2	2250.06	10014.26	2251.53	10022.81	2252.07	10032.45	2252.89	100452	255.042
10054.55	2256.68	10054.85	2256.74	10085.62	2256.77	10096.14	2256.78	10104.95	2256.51
10115.13	2256.28	10122.89	2256.36	10130.23	2256.49	10148.74	2256.96	10149.95	2257.05
10152.99	2256.93	10155.26	2257.22	10156.57	2257.23	10162.71	2258.07	10168.83	2259.62
10178.62	2262.99	10183.67	2264.93	10196.54	2269.67	10200.51	2271.12		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9806.69	.076	9965.71	.079	10045	.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9965.71 10045 339.56 327.98 289.17 .1 .3

CROSS SECTION OUTPUT Profile #Q100

			Left OB	Channel	Right OB
E.G. Elev (ft)	2258.44	Element	0.076	0.079	0.076
Vel Head (ft)	0.99	Wt. n-Val.	339.56	327.98	289.17
[redacted]S. Elev (ft)	2257.45	Reach Len. (ft)	4.68	409.40	94.49
[redacted] W.S. (ft)	2256.35	Flow Area (sq ft)	4.68	409.40	94.49
[redacted] Slope (ft/ft)	0.021903	Area (sq ft)	11.51	3372.35	242.15
Q [redacted]otal (cfs)	3626.00	Flow (cfs)	5.75	79.29	113.17
Top Width (ft)	198.21	Top Width (ft)	2.46	8.24	2.56
Vel Total (ft/s)	7.13	Avg. Vel. (ft/s)	0.81	5.16	0.83
Max Chl Dpth (ft)	7.39	Hydr. Depth (ft)	77.7	22786.4	1636.1
Conv. Total (cfs)	24500.3	Conv. (cfs)	5.98	80.43	113.36
Length Wtd. (ft)	323.76	Wetted Per. (ft)	1.07	6.96	1.14
Min Ch El (ft)	2250.06	Shear (lb/sq ft)	10200.51	0.00	0.00
Alpha	1.25	Stream Power (lb/ft s)	6.78	161.04	61.59
Frctn Loss (ft)		Cum Volume (acre-ft)			

****

Wa[redacted]: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2258.64	Element	Left OB	Channel	Right OB	
Vel Head (ft)	1.11	Wt. n-Val.	0.076	0.079	0.076	
W.S. Elev (ft)	2257.53	Reach Len. (ft)	339.56	327.98	289.17	
Crit W.S. (ft)		Flow Area (sq ft)	5.15	415.91	16.31	
E.G. Slope (ft/ft)	*0.023018	Area (sq ft)	5.15	415.91	16.31	
Q Total (cfs)	3626.00	Flow (cfs)	13.75	3549.11	63.13	
Top Width (ft)	95.00	Top Width (ft)	5.71	79.29	10.00	
Vel Total (ft/s)	8.29	Avg. Vel. (ft/s)	2.67	8.53	3.87	
Max Chl Dpth (ft)	7.47	Hydr. Depth (ft)	0.90	5.25	1.63	
Conv. Total (cfs)	23899.7	Conv. (cfs)	90.6	23393.0	416.1	
Length Wtd. (ft)	323.71	Wetted Per. (ft)	6.03	80.43	10.94	
Min Ch El (ft)	2250.06	Shear (lb/sq ft)	1.23	7.43	2.14	
Alpha	1.04	Stream Power (lb/ft s)	*10200.51	0.00	0.00	
Frctn Loss (ft)	5.98	Cum Volume (acre-ft)	38.53	179.14	36.29	
C & E Loss (ft)	0.04	Cum SA (acres)	11.90	28.31	11.12	

****

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 4.074

INPUT
Description: 4.074
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9868.29	2260.23	9869.06	2260.18	9887.73	2258.84	9897.95	2258.14	9900.78	2257.87
9901.26	2257.79	9930.49	2253.12	9942.07	2249.57	9943.69	2249.26	9947.08	2248.54
9953.66	2247.34	9956.62	2247.28	9962.07	2247.35	9969.29	2247.3	9973.71	2247.27
9975.72	2247.24	9977.16	2247.18	9978.73	2247.05	9992.76	2243.7	9998.05	2241.97
10007.4	2241.92	10009.26	2243.21	10014.33	2246.16	10014.66	2246.14	10015.03	2246.35
10019.92	2246.82	10020.57	2246.91	10027.74	2247.81	10032.22	2247.84	10033.46	2247.86
10034.31	2247.83	10039.38	2247.31	10039.43	2247.29	10042.1	2247.64	10045.6	2248.09
[redacted]23	2248.31	10051.17	2248.45	10055.33	2248.49	10065.25	2249.09	10079.37	2250.04
[redacted]7	2250.72	10097.09	2251.81	10106.63	2253.11	10111.56	2254.55	10120.98	2258.82

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9868.29	.076	9978.73	.07	9910015.03	.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9978.7310015.03 297.55 337.56 352.24 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2251.66	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.97	Wt. n-Val.	0.076	0.079	0.076	
W.S. Elev (ft)	2250.68	Reach Len. (ft)	297.55	337.56	352.24	
Crit W.S. (ft)		Flow Area (sq ft)	113.24	246.35	159.48	
E.G. Slope (ft/ft)	*0.020025	Area (sq ft)	113.24	246.35	159.48	
Q Total (cfs)	3626.00	Flow (cfs)	619.99	2270.72	735.29	
Top Width (ft)	150.47	Top Width (ft)	40.29	36.30	73.88	
Vel Total (ft/s)	6.99	Avg. Vel. (ft/s)	5.48	9.22	4.61	
Max Chl Dpth (ft)	8.76	Hydr. Depth (ft)	2.81	6.79	2.16	
Conv. Total (cfs)	25624.0	Conv. (cfs)	4381.3	16046.6	5196.1	
Length Wtd. (ft)	330.69	Wetted Per. (ft)	40.68	38.22	74.13	
Min Ch El (ft)	2241.92	Shear (lb/sq ft)	3.48	8.06	2.69	
Alpha	1.28	Stream Power (lb/ft s)	*10120.98	0.00	0.00	
Frctn Loss (ft)	6.80	Cum Volume (acre-ft)	87.12	158.57	60.74	
C & E Loss (ft)	0.01	Cum SA (acres)	40.51	27.87	31.63	

****

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2252.62	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.97	Wt. n-Val.	0.076	0.079	0.076	
W.S. Elev (ft)	2251.65	Reach Len. (ft)	297.55	337.56	352.24	
Crit W.S. (ft)		Flow Area (sq ft)	60.27	281.55	143.94	
E.G. Slope (ft/ft)	*0.015139	Area (sq ft)	60.27	281.55	143.94	
Q Total (cfs)	3626.00	Flow (cfs)	323.77	2466.62	835.61	
Top Width (ft)	85.00	Top Width (ft)	13.73	36.30	34.97	
Vel Total (ft/s)	7.46	Avg. Vel. (ft/s)	5.37	8.76	5.81	
[redacted]ax Chl Dpth (ft)	9.73	Hydr. Depth (ft)	4.39	7.76	4.12	
[redacted]v. Total (cfs)	29470.2	Conv. (cfs)	2631.5	20047.4	6791.4	
[redacted]h Wtd. (ft)	334.80	Wetted Per. (ft)	18.06	38.22	38.39	
[redacted]h El (ft)	2241.92	Shear (lb/sq ft)	3.15	6.96	3.54	
Alpha	1.12	Stream Power (lb/ft s)	*10120.98	0.00	0.00	
Frctn Loss (ft)	6.87	Cum Volume (acre-ft)	38.27	176.51	35.75	
C & E Loss (ft)	0.08	Cum SA (acres)	11.82	27.87	10.97	

****

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.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 4.010

INPUT
Description: 4.01
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9798.08	2252.18	9804.36	2251.62	9818.47	2250.35	9819.57	2250.25	9820.27	2250.18
9820.95	2250.1	9823.04	2249.82	9831.61	2248.69	9846.19	2246.69	9852.34	2245.84
9854.45	2245.62	9867.85	2244.23	9871.56	2243.88	9889.3	2242.26	9892.37	2242.21
9896.38	2242.25	9899.78	2242.26	9902.6	2242.32	9907.3	2242.35	9924.98	2242.6
9932.33	2242.65	9933.16	2242.61	9940.62	2242.24	9952.71	2241.41	9964.29	2241.1
9972.78	2241.04	9978.39	2240.48	9988.29	2238.59	9989.04	2238.41	9997.3	2235.73
9998.56	2235.5	9999.06	2235.53	9999.98	2235.7910013.31		2236.9910024.78		2238.82
10025.14	2238.8810029.41		2239.4410041.84		2243.4210042.72		2243.7810043.68		2245.24
10045.24	2248.45								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9798.08	.076	9988.29	.07910029.41		.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9988.2910029.41 443.93 465.86 486.23 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2244.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.06	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2243.79	Reach Len. (ft)	443.93	465.86	486.23
Crit W.S. (ft)	2243.50	Flow Area (sq ft)	218.54	269.13	29.52
E.G. Slope (ft/ft)	*0.021097	Area (sq ft)	218.54	269.13	29.52
Q Total (cfs)	3626.00	Flow (cfs)	946.23	2542.05	137.72
Top Width (ft)	170.19	Top Width (ft)	115.76	41.12	13.32
Vel Total (ft/s)	7.01	Avg. Vel. (ft/s)	4.33	9.45	4.67
Max Chl Dpth (ft)	8.29	Hydr. Depth (ft)	1.89	6.54	2.22
Conv. Total (cfs)	24964.0	Conv. (cfs)	6514.5	17501.3	948.2
Length Wtd. (ft)	463.34	Wetted Per. (ft)	116.08	41.86	14.01
Min Ch El (ft)	2235.50	Shear (lb/sq ft)	2.48	8.47	2.77
Alpha	1.39	Stream Power (lb/ft s)	*10045.24	0.00	0.00
Frctn Loss (ft)	10.34	Cum Volume (acre-ft)	85.99	156.57	59.98
C & E Loss (ft)	0.06	Cum SA (acres)	39.98	27.57	31.28

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2245.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.79	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2243.89	Reach Len. (ft)	443.93	465.86	486.23
Crit W.S. (ft)	2243.13	Flow Area (sq ft)	68.63	273.34	10.46
E.G. Slope (ft/ft)	*0.029334	Area (sq ft)	68.63	273.34	10.46
Q Total (cfs)	3626.00	Flow (cfs)	500.92	3076.19	48.89
Top Width (ft)	62.00	Top Width (ft)	18.29	41.12	2.59
Vel Total (ft/s)	10.29	Avg. Vel. (ft/s)	7.30	11.25	4.67
Max Chl Dpth (ft)	8.39	Hydr. Depth (ft)	3.75	6.65	4.04
Conv. Total (cfs)	21170.9	Conv. (cfs)	2924.7	17960.7	285.4
Length Wtd. (ft)	464.58	Wetted Per. (ft)	21.33	41.86	6.34
Min Ch El (ft)	2235.50	Shear (lb/sq ft)	5.89	11.96	3.02
Alpha	1.09	Stream Power (lb/ft s)	*10045.24	0.00	0.00
Frctn Loss (ft)	10.68	Cum Volume (acre-ft)	37.83	174.36	35.13
C & E Loss (ft)	0.31	Cum SA (acres)	11.71	27.57	10.81

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 3.922

INPUT
Description: 3.922
Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9904.85	2250.21	9915.9	2248.58	9936.2	2245	9937.97	2244.6	9942.73	2243.54
96	2239.67	9976.88	2232.24	9978.42	2231.64	9979.5	2231.2	9981.37	2230.69
.2	2229.57	9996.07	2226.82	9999.13	2226.910007.66		2228.6510017.11		2230.06
.65	2230.3810030.44		2230.5810031.52		2230.49	10035.3	2230.2710049.65		2229.47
10051.13	2229.0710052.91		2228.5810055.18		222810060.39		2228.810064.02		2229.23
10068.94	2229.3310077.88		2229.5410085.62		2230.15	10087.9	2230.310091.71		2231.27
10102.54	223410106.94		2234.5	10112.9	2235.1810132.62		2236.29	10133.6	2236.33
10135.33	2236.4110161.68		2237.6310178.23		2238.3210179.39		2238.3710180.04		2238.42
10190.83	2239.2110201.06		2240.8910208.49		2242.7610216.41		2244.6610222.56		2246.86
10232.41	2249.4510233.67		2249.76						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

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**********************************************
[redacted]S    .076 9981.37    .07910091.71    .076

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.   Expan.
       9981.3710091.71             273.06   286.5  288.34             .1       .3

CROSS SECTION OUTPUT  Profile #Q100
*************************************************************************************************
* E.G. Elev (ft)          * 2234.46  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.87  * Wt. n-Val.            *   0.076  *   0.079  *   0.076  *
* W.S. Elev (ft)          * 2233.59  * Reach Len. (ft)       *  273.06  *  286.50  *  288.34  *
* Crit W.S. (ft)          *         * Flow Area (sq ft)      *   11.76  *  470.09  *   10.65  *
* E.G. Slope (ft/ft)      *0.023636  * Area (sq ft)           *   11.76  *  470.09  *   10.65  *
* Q Total (cfs)           * 3626.00  * Flow (cfs)            *   45.93  * 3545.48  *   34.59  *
* Top Width (ft)          *  126.91  * Top Width (ft)        *    7.38  *  110.34  *    9.19  *
* Vel Total (ft/s)        *    7.36  * Avg. Vel. (ft/s)      *    3.91  *    7.54  *    3.25  *
* Max Chl Dpth (ft)       *    6.77  * Hydr. Depth (ft)      *    1.59  *    4.26  *    1.16  *
* Conv. Total (cfs)       * 23585.3  * Conv. (cfs)           *   298.8  * 23061.6  *   225.0  *
* Length Wtd. (ft)        *  284.91  * Wetted Per. (ft)      *    7.94  *  111.60  *    9.48  *
* Min Ch El (ft)          * 2226.82  * Shear (lb/sq ft)      *    2.19  *    6.22  *    1.66  *
* Alpha                   *    1.03  * Stream Power (lb/ft s) *10233.67  *    0.00  *    0.00  *
* Frctn Loss (ft)         *    5.47  * Cum Volume (acre-ft)  *   84.82  *  152.62  *   59.75  *
* C & E Loss (ft)         *    0.01  * Cum SA (acres)        *   39.35  *   26.76  *   31.15  *
*************************************************************************************************

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION OUTPUT  Profile #FW
*************************************************************************************************
* E.G. Elev (ft)          * 2234.69  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.76  * Wt. n-Val.            *   0.076  *   0.079  *   0.076  *
* W.S. Elev (ft)          * 2233.93  * Reach Len. (ft)       *  273.06  *  286.50  *  288.34  *
* Crit W.S. (ft)          *         * Flow Area (sq ft)      *    4.18  *  507.91  *   13.80  *
* E.G. Slope (ft/ft)      *0.018505  * Area (sq ft)           *    4.18  *  507.91  *   13.80  *
* Q Total (cfs)           * 3626.00  * Flow (cfs)            *   10.95  * 3569.02  *   46.03  *
* Top Width (ft)          *  120.90  * Top Width (ft)        *    1.37  *  110.34  *    9.19  *
* Vel Total (ft/s)        *    6.89  * Avg. Vel. (ft/s)      *    2.62  *    7.03  *    3.34  *
* Max Chl Dpth (ft)       *    7.11  * Hydr. Depth (ft)      *    3.05  *    4.60  *    1.50  *
* Conv. Total (cfs)       * 26655.1  * Conv. (cfs)           *    80.5  * 26236.3  *   338.4  *
* Length Wtd. (ft)        *  285.98  * Wetted Per. (ft)      *    4.29  *  111.60  *    9.82  *
* Min Ch El (ft)          * 2226.82  * Shear (lb/sq ft)      *    1.13  *    5.26  *    1.62  *
* Alpha                   *    1.03  * Stream Power (lb/ft s) *10233.67  *    0.00  *    0.00  *
* Frctn Loss (ft)         *    4.84  * Cum Volume (acre-ft)  *   37.46  *  170.18  *   35.00  *
* [redacted] E Loss (ft)  *    0.02  * Cum SA (acres)        *   11.61  *   26.76  *   10.75  *
*************************************************************************************************

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION


RIVER: Rodger Creek
REACH: Main Reach          RS: 3.868

INPUT
Description: 3.868
Station Elevation Data    num=      34
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
**************************************************************************************
 9886.26 2236.06 9906.78 2232.81 9917.49 2229.68 9921.85 2228.26 9926.79 2226.03
 9940.23 2223.14 9945.49 2223.27 9949.39 2223.63 9960.29 2224.64 9982.05 2222.71
 9982.56 2222.66 9982.68 2222.62 9983.95 2222.29 9992.92 2219.86 9996.37 2219.66
10002.19  2218.9 10005.8 2219.0510006.26 2219.28 10013.3 2222.7310018.65 2226.32
10029.18 2227.9210029.44 2227.9610030.22 2228.2610050.82 2229.4710052.11 2229.55
10052.18 2229.56 10062.4 2230.6610062.94 2230.68 10081.3 2231.5310103.71  2233.8
10104.73 2233.91   10105 2233.9610106.03 2234.1710113.44  2235.7

Manning's n Values        num=       3
     Sta    n Val      Sta    n Val      Sta    n Val
**********************************************
 9886.26     .076 9960.29     .07910018.65     .076

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.   Expan.
       9960.2910018.65             284.36  289.38  289.81             .1       .3

CROSS SECTION OUTPUT  Profile #Q100
*************************************************************************************************
* E.G. Elev (ft)          * 2228.99  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.83  * Wt. n-Val.            *   0.076  *   0.079  *   0.076  *
* W.S. Elev (ft)          * 2228.15  * Reach Len. (ft)       *  284.36  *  289.38  *  289.81  *
* Crit W.S. (ft)          *         * Flow Area (sq ft)      *  141.09  *  359.18  *   10.97  *
* E.G. Slope (ft/ft)      *0.015877  * Area (sq ft)           *  141.09  *  359.18  *   10.97  *
* Q Total (cfs)           * 3626.00  * Flow (cfs)            *  818.67  * 2781.05  *   26.28  *
* Top Width (ft)          *  107.85  * Top Width (ft)        *   38.20  *   58.36  *   11.29  *
* Vel Total (ft/s)        *    7.09  * Avg. Vel. (ft/s)      *    5.80  *    7.74  *    2.39  *
* Max Chl Dpth (ft)       *    9.25  * Hydr. Depth (ft)      *    3.69  *    6.15  *    0.97  *
* [redacted]nv. Total (cfs)  * 28776.8  * Conv. (cfs)        *  6497.1  * 22071.1  *   208.6  *
* [redacted]h Wtd. (ft)   *  288.24  * Wetted Per. (ft)      *   39.03  *   60.83  *   11.45  *
* [redacted]h El (ft)     * 2218.90  * Shear (lb/sq ft)      *    3.58  *    5.85  *    0.95  *
* [redacted]a             *    1.07  * Stream Power (lb/ft s) *10113.44  *    0.00  *    0.00  *
* Frctn Loss (ft)         *    4.86  * Cum Volume (acre-ft)  *   84.34  *  149.89  *   59.68  *
* C & E Loss (ft)         *    0.02  * Cum SA (acres)        *   39.21  *   26.21  *   31.09  *
*************************************************************************************************

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION OUTPUT  Profile #FW
*************************************************************************************************
```

[redacted] Elev (ft)	2229.82	Element	Left OB	Channel	Right OB
[redacted]lead (ft)	0.99	Wt. n-Val.	0.076	0.079	0.076
[redacted] Elev (ft)	2228.84	Reach Len. (ft)	284.36	289.38	289.81
[redacted] W.S. (ft)		Flow Area (sq ft)	53.29	399.14	18.70
E.G. Slope (ft/ft)	*0.015557	Area (sq ft)	53.29	399.14	18.70
Q Total (cfs)	3626.00	Flow (cfs)	283.03	3282.10	60.87
Top Width (ft)	80.94	Top Width (ft)	11.29	58.36	11.29
Vel Total (ft/s)	7.70	Avg. Vel. (ft/s)	5.31	8.22	3.25
Max Chl Dpth (ft)	9.94	Hydr. Depth (ft)	4.72	6.84	1.66
Conv. Total (cfs)	29071.4	Conv. (cfs)	2269.2	26314.2	488.0
Length Wtd. (ft)	288.99	Wetted Per. (ft)	16.58	60.83	12.13
Min Ch El (ft)	2218.90	Shear (lb/sq ft)	3.12	6.37	1.50
Alpha	1.07	Stream Power (lb/ft s)	*10113.44	0.00	0.00
Frctn Loss (ft)	4.58	Cum Volume (acre-ft)	37.28	167.20	34.89
C & E Loss (ft)	0.02	Cum SA (acres)	11.57	26.21	10.68

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 3.813

INPUT
Description: 3.813
Station Elevation Data num= 91

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9878.61	2240.18	9893.02	2236.39	9902.4	2234.22	9916.43	2231.5	9929.81	2227.81
9934.67	2226.34	9942.14	2224.77	9947.87	2223.75	9956.89	2221.79	9960.51	2220.57
9965.07	2218.86	9965.16	2218.83	9965.21	2218.82	9968.94	2218.46	9969.42	2218.4
9974.93	2217.78	9986.54	2217.16	9990.02	2216.65	9992.31	2216.42	9999.65	2215.19
10000.19	2215.2	10000.55	2215.22	10001	2215.24	10001.59	2215.28	10002.39	2215.33
10003.54	2215.42	10008.66	2215.75	10010.1	2215.91	10011.92	2216.11	10013.75	2216.33
10014.1	2216.39	10015.31	2216.62	10016.79	2216.69	10018.54	2216.76	10020.96	2216.89
10022.95	2216.96	10023.46	2216.99	10025.24	2217.11	10026.84	2217.55	10030.84	2218.17
10034.59	2219.37	10038.74	2220.48	10040.96	2221.75	10045.04	2222.4	10051.5	2223.21
10054.41	2223.24	10057.62	2223.28	10068.4	2223.36	10070.67	2223.43	10074.47	2223.59
10079.22	2223.83	10085.13	2224.21	10088.91	2224.09	10102.33	2224.23	10105.56	2224.25
10105.94	2224.26	10108.1	2224.27	10109.73	2224.28	10114.22	2224.31	10118.13	2224.33
10119.05	2224.31	10120.65	2224.28	10121.48	2224.27	10122.3	2224.26	10124.8	2224.25
[redacted]99	2224.61	10135.56	2224.81	10139.6	2225.16	10140.61	2225.25	10141.02	2225.28
[redacted]73	2225.35	10147.98	2225.91	10152.96	2226.55	10163.25	2227.72	10168.84	2228.33
[redacted] 9	2230.45	10184.02	2231.15	10191.97	2232	10197.4	2232.64	10201.35	2233.06
102[redacted]76	2233.51	10207.24	2233.73	10212.14	2234.65	10215.8	2235.31	10217.41	2235.68
10224.41	2237.02	10224.82	2237.09	10225.71	2237.27	10236.97	2239.12	10237.97	2239.31
10241.31	2240								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9878.61	.076	9986.54	.07	10020.96	.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9986.54 10020.96 433.3 421.36 410.53 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2224.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.02	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2223.08	Reach Len. (ft)	433.30	421.36	410.53
Crit W.S. (ft)		Flow Area (sq ft)	138.19	240.64	95.86
E.G. Slope (ft/ft)	*0.017920	Area (sq ft)	138.19	240.64	95.86
Q Total (cfs)	3626.00	Flow (cfs)	881.33	2205.32	539.35
Top Width (ft)	99.55	Top Width (ft)	35.60	34.42	29.53
Vel Total (ft/s)	7.64	Avg. Vel. (ft/s)	6.38	9.16	5.63
Max Chl Dpth (ft)	7.89	Hydr. Depth (ft)	3.88	6.99	3.25
Conv. Total (cfs)	27087.0	Conv. (cfs)	6583.7	16474.2	4029.1
Length Wtd. (ft)	421.00	Wetted Per. (ft)	36.33	34.66	30.41
Min Ch El (ft)	2215.19	Shear (lb/sq ft)	4.26	7.77	3.53
Alpha	1.13	Stream Power (lb/ft s)	*10241.31	0.00	0.00
Frctn Loss (ft)	9.02	Cum Volume (acre-ft)	83.42	147.90	59.33
C & E Loss (ft)	0.02	Cum SA (acres)	38.97	25.90	30.95

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2225.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.19	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2224.04	Reach Len. (ft)	433.30	421.36	410.53
Crit W.S. (ft)		Flow Area (sq ft)	56.77	273.41	99.73
E.G. Slope (ft/ft)	*0.016128	Area (sq ft)	56.77	273.41	99.73
[redacted]Total (cfs)	3626.00	Flow (cfs)	342.77	2588.30	694.93
[redacted]Width (ft)	60.00	Top Width (ft)	8.54	34.42	17.04
[redacted]otal (ft/s)	8.43	Avg. Vel. (ft/s)	6.04	9.47	6.97
M[redacted]hl Dpth (ft)	8.85	Hydr. Depth (ft)	6.65	7.94	5.85
Conv. Total (cfs)	28552.0	Conv. (cfs)	2699.1	20380.9	5472.0
Length Wtd. (ft)	420.93	Wetted Per. (ft)	14.97	34.66	21.22
Min Ch El (ft)	2215.19	Shear (lb/sq ft)	3.82	7.94	4.73
Alpha	1.08	Stream Power (lb/ft s)	*10241.31	0.00	0.00
Frctn Loss (ft)	9.00	Cum Volume (acre-ft)	36.92	164.97	34.49
C & E Loss (ft)	0.03	Cum SA (acres)	11.51	25.90	10.59

need for additional cross sections.

C[redacted]ECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 3.733

INPUT
Description: 3.733
Station Elevation Data num= 54

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9880.64	2225.9	9883.43	2225.49	9888.86	2224.57	9898.2	2222.54	9910.09	2219.58
9919.71	2216.93	9928.3	2214.3	9935.61	2213.48	9936.97	2213.29	9938.03	2213.24
9939.69	2213.19	9940.99	2213.21	9949.79	2212.52	9952.63	2212.3	9959.06	2212.42
9962.53	2211.93	9966.85	2210.7	9970.57	2209.45	9983.76	2208	9988.44	2207.64
9989.45	2207.26	9992.02	2207.0210003.22		2206.5110010.89		2208.6410011.97		2208.76
10012.33	2208.87	10013	2209.0110024.26		2210.6310026.71		2211.1310036.74		2213.26
10041.84	2213.03	10048.2	2212.8810058.25		2212.58	10064	2212.310079.17		2211.57
10080.83	2211.6810085.01		2212.110092.83		2212.0510094.76		2212.1210099.98		2212.38
10100.84	2212.4910102.22		2212.16	10111.2	2211.5410117.64		2211.5110121.77		2212.21
10127.52	2212.7210138.06		2215.24	10140.4	2216.1510147.36		2217.0410149.55		2217.43
10160.42	2219.7710166.04		2220.0810171.91		2220.7910174.55		2222.4		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9880.64	.076	9959.06	.07910036.74		.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9959.0610036.74 389.59 366.31 318.91 .1 .3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2215.07	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.95	* Wt. n-Val.	* 0.076	* 0.079	* 0.076	*
* W.S. Elev (ft)	* 2214.12	* Reach Len. (ft)	* 389.59	* 366.31	* 318.91	*
* Crit W.S. (ft)	* 2213.76	* Flow Area (sq ft)	* 33.72	* 378.91	* 176.52	*
* E.G. Slope (ft/ft)	*0.025366	* Area (sq ft)	* 33.72	* 378.91	* 176.52	*
* Q Total (cfs)	* 4163.00	* Flow (cfs)	* 115.41	* 3228.44	* 819.15	*
* Top Width (ft)	* 203.50	* Top Width (ft)	* 29.18	* 77.68	* 96.65	*
* Vel Total (ft/s)	* 7.07	* Avg. Vel. (ft/s)	* 3.42	* 8.52	* 4.64	*
* Max Chl Dpth (ft)	* 7.61	* Hydr. Depth (ft)	* 1.16	* 4.88	* 1.83	*
* Conv. Total (cfs)	* 26138.3	* Conv. (cfs)	* 724.6	* 20270.5	* 5143.2	*
* [redacted]h Wtd. (ft)	* 364.12	* Wetted Per. (ft)	* 29.27	* 78.99	* 97.03	*
* [redacted]h El (ft)	* 2206.51	* Shear (lb/sq ft)	* 1.82	* 7.60	* 2.88	*
* [redacted].a	* 1.22	* Stream Power (lb/ft s)	*10174.55	* 0.00	* 0.00	*
* Frctn Loss (ft)	* 8.31	* Cum Volume (acre-ft)	* 82.57	* 144.90	* 58.04	*
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 38.65	* 25.36	* 30.36	*

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2216.21	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 1.47	* Wt. n-Val.	* 0.076	* 0.079	* 0.076	*
* W.S. Elev (ft)	* 2214.73	* Reach Len. (ft)	* 389.59	* 366.31	* 318.91	*
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 2.46	* 426.27	* 0.38	*
* E.G. Slope (ft/ft)	*0.028388	* Area (sq ft)	* 2.46	* 426.27	* 0.38	*
* Q Total (cfs)	* 4163.00	* Flow (cfs)	* 6.54	* 4156.00	* 0.46	*
* Top Width (ft)	* 79.00	* Top Width (ft)	* 1.06	* 77.68	* 0.26	*
* Vel Total (ft/s)	* 9.70	* Avg. Vel. (ft/s)	* 2.66	* 9.75	* 1.20	*
* Max Chl Dpth (ft)	* 8.22	* Hydr. Depth (ft)	* 2.32	* 5.49	* 1.48	*
* Conv. Total (cfs)	* 24707.9	* Conv. (cfs)	* 38.8	* 24666.3	* 2.7	*
* Length Wtd. (ft)	* 366.91	* Wetted Per. (ft)	* 3.39	* 78.99	* 1.74	*
* Min Ch El (ft)	* 2206.51	* Shear (lb/sq ft)	* 1.29	* 9.56	* 0.39	*
* Alpha	* 1.01	* Stream Power (lb/ft s)	*10174.55	* 0.00	* 0.00	*
* Frctn Loss (ft)	* 8.25	* Cum Volume (acre-ft)	* 36.63	* 161.58	* 34.02	*
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 11.46	* 25.36	* 10.51	*

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 3.664

INPUT
Description: 3.664
Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9728.78	2226.55	9737.61	2224.91	9754.94	2222.49	9756.15	2222.33	9757.11	2222.2
[redacted]73	2222.09	9761.72	2221.52	9766.11	2220.9	9775.44	2219.85	9780.66	2219.22
[redacted]6	2218.43	9787.97	2217.98	9792.55	2217.13	9799.78	2216.23	9801.11	2216.03
[redacted].51	2215.85	9812.23	2214.7	9819.57	2213.88	9820.34	2213.69	9820.95	2213.54
9826.81	2211.84	9828.95	2211.5	9833.35	2210.49	9840.14	2209.36	9842.52	2208.93
9844.55	2208.66	9849.19	2208.05	9852.91	2207.66	9853.8	2207.48	9860.73	2206.59
9861.62	2206.58	9865.4	2205.89	9871.2	2205.9	9875.17	2205.78	9877.29	2205.7
9889.64	2204.81	9894.21	2204.45	9897.12	2204.51	9910.87	2204.29	9922.04	2203.61
9939.37	2202.66	9940.64	2202.57	9942.48	2202.44	9944.96	2202.32	9965.68	2199.82
9973.9	2198.49	9985.01	2199.79	9986.86	2199.95	9991.86	2198.64	9993.4	2198.16
9997.9	2197.7110000.59		2197.4410004.02		2197.7710010.62		2199.2310013.16		2200.35
10017.6	2203.2310020.36		2204.9510022.14		2206.2210026.39		2209.2610027.67		2210.34
10035.5	2216.5710038.08		2218.8610043.44		2222.17	10045.2	2223.4310047.82		2224.8

[redacted]'s n Values num= 3
Sta n Val Sta n Val Sta n Val
9728.78 .076 9965.68 .07910013.16 .076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9965.6810013.16 431.13 434.49 435.41 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2206.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.15	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2205.59	Reach Len. (ft)	431.13	434.49	435.41
Crit W.S. (ft)		Flow Area (sq ft)	199.71	322.38	21.26
E.G. Slope (ft/ft)	*0.020643	Area (sq ft)	199.71	322.38	21.26
Q Total (cfs)	4163.00	Flow (cfs)	975.90	3085.91	101.20
Top Width (ft)	142.37	Top Width (ft)	86.80	47.48	8.09
Vel Total (ft/s)	7.66	Avg. Vel. (ft/s)	4.89	9.57	4.76
Max Chl Dpth (ft)	8.15	Hydr. Depth (ft)	2.30	6.79	2.63
Conv. Total (cfs)	28974.9	Conv. (cfs)	6792.4	21478.2	704.3
Length Wtd. (ft)	433.71	Wetted Per. (ft)	87.05	48.36	9.64
Min Ch El (ft)	2197.44	Shear (lb/sq ft)	2.96	8.59	2.84
Alpha	1.26	Stream Power (lb/ft s)	*10047.82	0.00	0.00
Frctn Loss (ft)	6.72	Cum Volume (acre-ft)	81.53	141.95	57.32
C & E Loss (ft)	0.12	Cum SA (acres)	38.13	24.83	29.97

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2207.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.39	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2206.55	Reach Len. (ft)	431.13	434.49	435.41
Crit W.S. (ft)		Flow Area (sq ft)	64.98	368.15	22.41
E.G. Slope (ft/ft)	*0.018246	Area (sq ft)	64.98	368.15	22.41
Q Total (cfs)	4163.00	Flow (cfs)	433.31	3619.63	110.06
Top Width (ft)	63.00	Top Width (ft)	10.68	47.48	4.84
Vel Total (ft/s)	9.14	Avg. Vel. (ft/s)	6.67	9.83	4.91
Max Chl Dpth (ft)	9.11	Hydr. Depth (ft)	6.08	7.75	4.63
Conv. Total (cfs)	30819.5	Conv. (cfs)	3207.8	26796.8	814.8
Length Wtd. (ft)	434.25	Wetted Per. (ft)	16.20	48.36	8.83
[redacted] Ch El (ft)	2197.44	Shear (lb/sq ft)	4.57	8.67	2.89
[redacted]a	1.07	Stream Power (lb/ft s)	*10047.82	0.00	0.00
[redacted] Loss (ft)	6.65	Cum Volume (acre-ft)	36.33	158.24	33.94
[redacted] Loss (ft)	0.09	Cum SA (acres)	11.41	24.83	10.49

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 3.582

INPUT
Description: 3.582
Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9807.67	2212.25	9817.53	2210.93	9818.01	2210.85	9818.55	2210.79	9819.58	2210.69
9839.31	2208.78	9841.02	2208.57	9853.81	2207.08	9873.46	2205.11	9874.18	2204.94
9875.97	2204.5	9887.31	2202.93	9893.43	2202.54	9898.28	2202.22	9911.64	2200.84
9913.14	2200.63	9915.05	2200.01	9921.4	2198.01	9927.36	2196.68	9933.7	2196.05
9937.2	2195.76	9942.58	2195.2	9942.77	2195.18	9948.8	2194.83	9956.38	2194.39
9956.48	2194.38	9956.57	2194.37	9971.05	2193.62	9978.07	2192.57	9983.43	2191.7
9984.93	2191.82	9986.71	2191.66	9987.8	2191.56	9996.2	2191.2910000.65		2190.96
10009.64	219210016.33		2191.9610023.27		2192.4710024.64		2192.8210028.87		2194.89
10030.72	2195.7610049.08		2204.4410058.88		2210.69				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9807.67	.076	9971.05	.07910028.87		.076

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9971.0510028.87 322.17 334.64 340.34 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2199.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.76	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2199.15	Reach Len. (ft)	322.17	334.64	340.34
Crit W.S. (ft)		Flow Area (sq ft)	197.28	409.56	19.23
[redacted]G. Slope (ft/ft)	*0.012050	Area (sq ft)	197.28	409.56	19.23
[redacted]tal (cfs)	4163.00	Flow (cfs)	1008.03	3091.05	63.92
[redacted]idth (ft)	120.11	Top Width (ft)	53.27	57.82	9.02
[redacted]otal (ft/s)	6.65	Avg. Vel. (ft/s)	5.11	7.55	3.32
Max Chl Dpth (ft)	8.19	Hydr. Depth (ft)	3.70	7.08	2.13
Conv. Total (cfs)	37923.2	Conv. (cfs)	9182.7	28158.2	582.2
Length Wtd. (ft)	333.61	Wetted Per. (ft)	53.71	58.60	9.98
Min Ch El (ft)	2190.96	Shear (lb/sq ft)	2.76	5.26	1.45
Alpha	1.10	Stream Power (lb/ft s)	*10058.88	0.00	0.00
Frctn Loss (ft)	6.21	Cum Volume (acre-ft)	79.56	138.30	57.12
C & E Loss (ft)	0.10	Cum SA (acres)	37.43	24.31	29.89

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2201.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.10	Wt. n-Val.	0.076	0.079	0.076
W.S. Elev (ft)	2200.10	Reach Len. (ft)	322.17	334.64	340.34
Crit W.S. (ft)		Flow Area (sq ft)	38.27	464.64	5.59
E.G. Slope (ft/ft)	*0.013041	Area (sq ft)	38.27	464.64	5.59
Q Total (cfs)	4163.00	Flow (cfs)	182.83	3968.18	12.00
Top Width (ft)	65.00	Top Width (ft)	6.05	57.82	1.13
Vel Total (ft/s)	8.19	Avg. Vel. (ft/s)	4.78	8.54	2.15
Max Chl Dpth (ft)	9.14	Hydr. Depth (ft)	6.33	8.04	4.95
Conv. Total (cfs)	36454.9	Conv. (cfs)	1601.0	34748.9	105.1
Length Wtd. (ft)	334.33	Wetted Per. (ft)	12.23	58.60	5.93
Min Ch El (ft)	2190.96	Shear (lb/sq ft)	2.55	6.45	0.77
Alpha	1.05	Stream Power (lb/ft s)	*10058.88	0.00	0.00
Frctn Loss (ft)	6.15	Cum Volume (acre-ft)	35.81	154.09	33.80
C & E Loss (ft)	0.11	Cum SA (acres)	11.33	24.31	10.46

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 3.518

INPUT
Description: 3.518
Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9856.19	2196.07	9861.56	2195.78	9861.89	2195.77	9868.16	2195.61	9872.6	2195.48
9893.79	2195.29	9894.2	2195.28	9903.6	2195.17	9904.99	2194.99	9907.05	2194.91
[redacted]9918	2194.54	9924.61	2194.27	9926.81	2194.33	9928.56	2194.27	9929.25	2194.26
[redacted]7	2193.82	9940.4	2193.71	9950.45	2193.3	9961.84	2192.26	9967.67	2191.6
[redacted]4	2190.3	9981.52	2189.93	9983.36	2189.67	9994.63	2187.46	9998.9	2186.09
[redacted].27	2185.99	9999.94	2186.0610007.66		2186.4510021.73		2186.2310024.89		2186.32
10025.99	2186.35	10027.3	2186.5110043.34		2188.7210045.52		2188.9610051.43		2188.19
10051.66	2188.1610051.91		2188.1310053.53		2187.8910056.63		2187.5310059.47		2187.67
10061.85	2187.7810065.01		2188.3110073.71		2190.6310077.19		2190.9910081.21		2192.26
10086.77	2194.4810089.37		2195.33						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9856.19	.066	9983.36	.06610045.52		.066

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9983.3610045.52 360.26 366.39 370.84 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2193.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.75	Wt. n-Val.	0.066	0.066	0.066
W.S. Elev (ft)	2191.85	Reach Len. (ft)	360.26	366.39	370.84
Crit W.S. (ft)	2191.76	Flow Area (sq ft)	19.06	290.67	99.55
E.G. Slope (ft/ft)	*0.032415	Area (sq ft)	19.06	290.67	99.55
Q Total (cfs)	4163.00	Flow (cfs)	80.23	3272.48	810.29
Top Width (ft)	114.44	Top Width (ft)	17.89	62.16	34.39
Vel Total (ft/s)	10.17	Avg. Vel. (ft/s)	4.21	11.26	8.14
Max Chl Dpth (ft)	5.86	Hydr. Depth (ft)	1.07	4.68	2.89
Conv. Total (cfs)	23122.4	Conv. (cfs)	445.6	18176.2	4500.5
Length Wtd. (ft)	366.16	Wetted Per. (ft)	18.02	62.79	34.99
Min Ch El (ft)	2185.99	Shear (lb/sq ft)	2.14	9.37	5.76
Alpha	1.09	Stream Power (lb/ft s)	*10089.37	0.00	0.00
Frctn Loss (ft)	7.00	Cum Volume (acre-ft)	78.76	135.61	56.65
C & E Loss (ft)	0.27	Cum SA (acres)	37.17	23.85	29.72

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

[redacted]E.G. Elev (ft)	2194.95	Element	Left OB	Channel	Right OB
[redacted]Head (ft)	2.15	Wt. n-Val.	0.066	0.066	0.066
[redacted] Elev (ft)	2192.80	Reach Len. (ft)	360.26	366.39	370.84
[redacted] W.S. (ft)	2192.33	Flow Area (sq ft)	6.99	349.67	1.86
E.G. Slope (ft/ft)	*0.027843	Area (sq ft)	6.99	349.67	1.86
Q Total (cfs)	4163.00	Flow (cfs)	32.06	4127.00	3.94
Top Width (ft)	65.00	Top Width (ft)	2.36	62.16	0.48
Vel Total (ft/s)	11.61	Avg. Vel. (ft/s)	4.58	11.80	2.12
Max Chl Dpth (ft)	6.81	Hydr. Depth (ft)	2.96	5.63	3.87
Conv. Total (cfs)	24948.6	Conv. (cfs)	192.1	24732.9	23.6
Length Wtd. (ft)	366.33	Wetted Per. (ft)	5.19	62.79	4.39
Min Ch El (ft)	2185.99	Shear (lb/sq ft)	2.34	9.68	0.74
Alpha	1.03	Stream Power (lb/ft s)	*10089.37	0.00	0.00

* Frctn Loss (ft)	* 7.59	* Cum Volume (acre-ft)	* 35.65	* 150.96	* 33.77 *
* [redacted] Loss (ft)	* 0.24	* Cum SA (acres)	* 11.29	* 23.85	* 10.45 *

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 3.449

INPUT
Description: 3.449 Levee placed at station 9836.46 to keep flow in main channel and out of the tributary
Station Elevation Data num= 75

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9699.73	2194.3	9701.31	2194.14	9705.17	2193.18	9707.53	2192.26	9708.43	2192.03
9714.18	2191.51	9721.93	2190.99	9728.14	2190.69	9731.57	2190.24	9734.05	2189.87
9739.05	2188.54	9742.04	2187.86	9745.33	2186.25	9748.91	2186.14	9753.68	2185.76
9755.24	2185.84	9758.37	2185.96	9760.26	2185.82	9761.5	2185.78	9767.42	2185.88
9771.51	2185.51	9779.45	2184.83	9785.91	2184.75	9788.45	2185.04	9792.96	2185.22
9798.49	2185.71	9809.04	2186.16	9813.56	2186.37	9826.54	2186.8	9830.4	2187.03
9836.46	2187.19	9843.35	2186.97	9851.39	2186.55	9858.32	2185.81	9866.58	2184.99
9875.05	2183.35	9876.23	2183.16	9879.9	2182.52	9891.26	2181.65	9896.7	2182
9902.34	2182.6	9910.16	2183.37	9914.02	2183.52	9918.77	2183.7	9925.61	2183.94
9929.49	2184.28	9933.46	2184.18	9935.7	2183.94	9941.07	2183.92	9951.08	2183.74
9955.1	2184.4	9958.16	2184.82	9968.83	2182.91	9972.25	2182.01	9981.79	2180.26
9988.01	2179.13	9989.59	2178.77	9991.32	2178.5710008.35		2177.3610009.87		2177.35
10010.48	2177.5610012.98		2177.8710021.76		2179.7510034.07		2181.6910035.82		2181.91
10037.86	2182.5910039.46		2183.0910048.68		2185.9810063.12		2188.6810067.71		2189.55
10071.22	2190.1810090.02		2191.8710099.14		2192.5810111.35		2193.4310117.76		2193.88

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9699.73	.066	9968.83	.06610039.46		.066

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
[redacted] 9968.8310039.46 277.13 289.06 293.04 .1 .3
[redacted] vee Station= 9836.46 Elevation= 2187.19

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2186.33	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.85	* Wt. n-Val.	* 0.066	* 0.066	* 0.066 *
* W.S. Elev (ft)	* 2185.48	* Reach Len. (ft)	* 277.13	* 289.06	* 293.04 *
* Crit W.S. (ft)	* 2184.71	* Flow Area (sq ft)	* 212.10	* 408.67	* 9.08 *
* E.G. Slope (ft/ft)	*0.012607	* Area (sq ft)	* 212.10	* 408.67	* 9.08 *
* Q Total (cfs)	* 4163.00	* Flow (cfs)	* 841.84	* 3296.12	* 25.04 *
* Top Width (ft)	* 185.39	* Top Width (ft)	* 107.15	* 70.63	* 7.61 *
* Vel Total (ft/s)	* 6.61	* Avg. Vel. (ft/s)	* 3.97	* 8.07	* 2.76 *
* Max Chl Dpth (ft)	* 8.13	* Hydr. Depth (ft)	* 1.98	* 5.79	* 1.19 *
* Conv. Total (cfs)	* 37076.0	* Conv. (cfs)	* 7497.5	* 29355.5	* 223.0 *
* Length Wtd. (ft)	* 287.02	* Wetted Per. (ft)	* 107.81	* 71.71	* 7.98 *
* Min Ch El (ft)	* 2177.35	* Shear (lb/sq ft)	* 1.55	* 4.49	* 0.90 *
* Alpha	* 1.25	* Stream Power (lb/ft s)	*10117.76	* 9836.46	* 0.00 *
* Frctn Loss (ft)	* 4.44	* Cum Volume (acre-ft)	* 77.81	* 132.67	* 56.19 *
* C & E Loss (ft)	* 0.08	* Cum SA (acres)	* 36.65	* 23.29	* 29.54 *

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2187.11	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.34	* Wt. n-Val.	* 0.066	* 0.066	* 0.066 *
* W.S. Elev (ft)	* 2185.77	* Reach Len. (ft)	* 277.13	* 289.06	* 293.04 *
* Crit W.S. (ft)	* 2184.57	* Flow Area (sq ft)	* 20.51	* 429.58	* 11.34 *
* E.G. Slope (ft/ft)	*0.016033	* Area (sq ft)	* 20.51	* 429.58	* 11.34 *
* Q Total (cfs)	* 4163.00	* Flow (cfs)	* 83.69	* 4039.43	* 39.88 *
* Top Width (ft)	* 89.07	* Top Width (ft)	* 10.83	* 70.63	* 7.61 *
* Vel Total (ft/s)	* 9.02	* Avg. Vel. (ft/s)	* 4.08	* 9.40	* 3.52 *
* Max Chl Dpth (ft)	* 8.42	* Hydr. Depth (ft)	* 1.89	* 6.08	* 1.49 *
* Conv. Total (cfs)	* 32878.0	* Conv. (cfs)	* 661.0	* 31902.1	* 315.0 *
* Length Wtd. (ft)	* 288.23	* Wetted Per. (ft)	* 11.98	* 71.71	* 8.27 *
* Min Ch El (ft)	* 2177.35	* Shear (lb/sq ft)	* 1.71	* 6.00	* 1.37 *
* Alpha	* 1.06	* Stream Power (lb/ft s)	*10117.76	* 9836.46	* 0.00 *
* Frctn Loss (ft)	* 5.08	* Cum Volume (acre-ft)	* 35.53	* 147.68	* 33.71 *
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 11.24	* 23.29	* 10.42 *

[redacted]g: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 3.394

INPUT
De[redacted]tion: 3.394
S[redacted] Elevation Data num= 71
[redacted]ta Elev Sta Elev Sta Elev Sta Elev Sta Elev
****
9694.74 2190.07 9698.91 2189.97 9707.97 2189.8 9712.38 2189.81 9714.15 2189.76
9718.12 2188.41 9719.38 2188.24 9727.48 2187.47 9731.19 2186.45 9733.19 2185.93
9735.59 2185.81 9743.8 2185.57 9745.41 2184.93 9747.07 2184.26 9751.72 2183.79
9761.44 2182.42 9764.97 2182.13 9768.75 2181.81 9778.72 2180.92 9779.59 2180.82
9781.2 2180.76 9783.94 2180.64 9784.29 2180.63 9788.82 2180.53 9789.8 2180.49
9791.23 2180.44 9795.24 2180.32 9798.05 2180.22 9802.79 2180.05 9804.91 2179.97
9810.93 2179.75 9813.31 2179.77 9825.38 2179.5 9830.6 2179.28 9839.69 2179.38
9844.83 2179.28 9846.13 2179.45 9851.77 2179.65 9860.03 2179.56 9869.5 2179.5
9889.06 2179.92 9889.87 2179.94 9894.72 2180.02 9906.24 2180 9913.26 2180.2
9922.98 2180.4 9936.34 2179.75 9950.63 2177.11 9951.35 2177.03 9957.15 2176.63
9969.62 2175.95 9977.84 2175.22 9978.51 2174.91 9990.07 2171.6210000.29 2171.49
10004.54 2171.510013.56 2175.6210015.38 2176.5410019.71 2178.4310021.08 2179.03
10021.25 2179.1110022.45 2179.1610029.12 2179.4110029.23 2179.4210031.24 2179.61
10032.44 2179.6610041.42 2180.3 10044.3 2181.7310054.04 2182.6310056.67 2183.17
10057.62 2183.24

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
****
9694.74 .066 9969.62 .06610013.56 .066

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9969.6210013.56 180.73 174.53 168.53 .1 .3

CROSS SECTION OUTPUT Profile #Q100
****

* E.G. Elev (ft)	* 2181.81	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.64	* Wt. n-Val.	* 0.066	* 0.066	* 0.066 *
* W.S. Elev (ft)	* 2180.18	* Reach Len. (ft)	* 180.73	* 174.53	* 168.53 *
* Crit W.S. (ft)	* 2180.18	* Flow Area (sq ft)	* 151.05	* 305.68	* 32.38 *
* E.G. Slope (ft/ft)	*0.019383	* Area (sq ft)	* 151.05	* 305.68	* 32.38 *
* Q Total (cfs)	* 4163.00	* Flow (cfs)	* 631.49	* 3416.69	* 114.82 *
* Top Width (ft)	* 225.15	* Top Width (ft)	* 155.10	* 43.94	* 26.11 *
* Vel Total (ft/s)	* 8.51	* Avg. Vel. (ft/s)	* 4.18	* 11.18	* 3.55 *
* Max Chl Dpth (ft)	* 8.69	* Hydr. Depth (ft)	* 0.97	* 6.96	* 1.24 *
* Conv. Total (cfs)	* 29901.6	* Conv. (cfs)	* 4535.8	* 24541.1	* 824.7 *
* Length Wtd. (ft)	* 174.83	* Wetted Per. (ft)	* 155.43	* 45.40	* 26.90 *
* Min Ch El (ft)	* 2171.49	* Shear (lb/sq ft)	* 1.18	* 8.15	* 1.46 *
* Alpha	* 1.46	* Stream Power (lb/ft s)	*10057.62	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 2.85	* Cum Volume (acre-ft)	* 76.65	* 130.30	* 56.05 *
* [redacted] Loss (ft)	* 0.18	* Cum SA (acres)	* 35.82	* 22.91	* 29.43 *

****

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

CROSS SECTION OUTPUT Profile #FW
****

* E.G. Elev (ft)	* 2182.00	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.74	* Wt. n-Val.	* 0.066	* 0.066	* 0.066 *
* W.S. Elev (ft)	* 2180.27	* Reach Len. (ft)	* 180.73	* 174.53	* 168.53 *
* Crit W.S. (ft)	* 2179.54	* Flow Area (sq ft)	* 100.83	* 309.73	* 21.67 *
* E.G. Slope (ft/ft)	*0.019427	* Area (sq ft)	* 100.83	* 309.73	* 21.67 *
* Q Total (cfs)	* 4163.00	* Flow (cfs)	* 548.33	* 3496.34	* 118.33 *
* Top Width (ft)	* 95.29	* Top Width (ft)	* 43.91	* 43.94	* 7.44 *
* Vel Total (ft/s)	* 9.63	* Avg. Vel. (ft/s)	* 5.44	* 11.29	* 5.46 *
* Max Chl Dpth (ft)	* 8.78	* Hydr. Depth (ft)	* 2.30	* 7.05	* 2.91 *
* Conv. Total (cfs)	* 29867.6	* Conv. (cfs)	* 3934.0	* 25084.6	* 849.0 *
* Length Wtd. (ft)	* 174.65	* Wetted Per. (ft)	* 44.20	* 45.40	* 9.44 *
* Min Ch El (ft)	* 2171.49	* Shear (lb/sq ft)	* 2.77	* 8.27	* 2.78 *
* Alpha	* 1.20	* Stream Power (lb/ft s)	*10057.62	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 3.33	* Cum Volume (acre-ft)	* 35.15	* 145.23	* 33.60 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 11.07	* 22.91	* 10.37 *

****

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 3.361

INPUT
Description: 3.361
Station Elevation Data num= 140
[redacted]ta Elev Sta Elev Sta Elev Sta Elev Sta Elev
****
[redacted]8 2191.71 9691.53 2191.02 9696.59 2190.38 9698.1 2190.2 9708.34 2189.26
9714.9 2188.63 9716.21 2188.34 9729.49 2185.44 9737.14 2183.31 9740.55 2182.11
9748.73 2179.93 9749.63 2179.69 9749.8 2179.64 9750.76 2179.55 9764.68 2178.4
9768.9 2178.29 9776.1 2177.95 9778.57 2177.41 9782.62 2177.3 9790.15 2176.69
9791.32 2176.73 9792.99 2176.86 9795.62 2176.81 9797.14 2176.71 9798.38 2176.33
9801.09 2176 9803.77 2176.08 9808.99 2175.85 9813.52 2175.53 9818.91 2175.51
9820.35 2175.48 9822.01 2175.11 9825.51 2174.88 9829 2175.43 9830.59 2175.41
9847.29 2175.11 9858.16 2175.27 9861.44 2175.33 9864.65 2174.36 9865.01 2174.38
9869.71 2175.23 9875.83 2175.77 9882.4 2176.27 9890.56 2176.66 9900.76 2176.96
9906.45 2176.99 9909.6 2177.17 9917.31 2177.23 9923.04 2177.27 9934.27 2177.45

[redacted]66 2177.44 9954.25 2177.19 9963.09 2176.06 9969.14 2174.47 9976.69 2172.81
[redacted]7 2172.3 99822171.915 9986.15 2170.5 9990.26 2168.41 9997.74 2168.21
[redacted]9 2167.9110003.49 2168.0910007.61 2169.6810018.05 2171.4510019.51 2171.88
[redacted]76 2172.710029.52 2173.5210038.55 2173.6810043.28 2173.7910050.29 2174.87
10060.27 2176.4110081.11 2175.53 10087.5 2175.2910092.06 2175.1110093.44 2175.01
10095.71 2175.0410123.44 2175.8210129.62 2175.9210130.79 2175.9 10144.1 2176.48
10150.73 2176.7410168.41 2177.81 10186.9 2178.6310192.89 2178.7710195.14 2178.85
10195.47 2178.8910196.54 2178.9710206.72 2179.2310211.85 2179.310212.36 2179.33
10213.98 2179.4810219.42 2179.94 10224.6 2180.3410228.83 2180.65 10235.5 2180.67
10239.54 2180.9110247.37 2181.38 10262.2 2182.3210263.51 2182.4510269.41 2183.13
10289.39 2185.6510292.59 2185.6710293.05 2185.6810293.29 2185.7110311.57 2187.09
10312.17 2187.1710312.81 2187.2610314.04 2187.3810314.65 2187.45 10315.3 2187.53
10316.66 2187.6410317.27 2187.7110317.89 2187.7810318.53 2187.8410319.16 2187.9
10323.11 2188.4110323.69 2188.4710328.74 2189.1310332.79 2189.6610338.75 2190.46
10339.35 2190.55 10340.3 2190.64 10346.2 2190.8910350.31 2191.4310354.19 2192.08
10358.52 2192.0410360.12 2192.2110361.02 2192.43 10366.3 2193.1810366.92 2193.21
10367.7 2193.2610368.08 2193.2810369.88 2193.4610376.46 2194.0710377.73 2194.2
10382.85 2195.0310383.58 2195.1410384.16 2195.210395.38 2196.4210395.52 2196.44

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9685.78	.066	9982	.06610019.51	.066	

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
998210019.51 304.23 294.48 261.7 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2177.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.04	Wt. n-Val.	0.066	0.066	0.066
W.S. Elev (ft)	2176.88	Reach Len. (ft)	304.23	294.48	261.70
Crit W.S. (ft)	2176.78	Flow Area (sq ft)	189.01	275.46	218.27
E.G. Slope (ft/ft)	*0.013896	Area (sq ft)	189.01	275.46	218.27
Q Total (cfs)	4163.00	Flow (cfs)	659.19	2701.62	802.20
Top Width (ft)	306.62	Top Width (ft)	135.57	37.51	133.54
Vel Total (ft/s)	6.10	Avg. Vel. (ft/s)	3.49	9.81	3.68
Max Chl Dpth (ft)	8.97	Hydr. Depth (ft)	1.39	7.34	1.63
Conv. Total (cfs)	35314.6	Conv. (cfs)	5591.9	22917.7	6805.0
Length Wtd. (ft)	291.97	Wetted Per. (ft)	136.59	38.78	133.94
Min Ch El (ft)	2167.91	Shear (lb/sq ft)	1.20	6.16	1.41
Alpha	1.80	Stream Power (lb/ft s)	*10395.52	0.00	0.00
Frctn Loss (ft)	5.60	Cum Volume (acre-ft)	75.94	129.14	55.57
C & E Loss (ft)	0.09	Cum SA (acres)	35.22	22.74	29.12

[redacted] : Divided flow computed for this cross-section.
War[redacted]g: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2178.66	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.71	Wt. n-Val.	0.066	0.066	0.066
W.S. Elev (ft)	2176.95	Reach Len. (ft)	304.23	294.48	261.70
Crit W.S. (ft)	2176.23	Flow Area (sq ft)	62.11	278.06	93.40
E.G. Slope (ft/ft)	*0.018768	Area (sq ft)	62.11	278.06	93.40
Q Total (cfs)	4163.00	Flow (cfs)	338.84	3189.23	634.93
Top Width (ft)	88.87	Top Width (ft)	25.87	37.51	25.49
Vel Total (ft/s)	9.60	Avg. Vel. (ft/s)	5.46	11.47	6.80
Max Chl Dpth (ft)	9.04	Hydr. Depth (ft)	2.40	7.41	3.66
Conv. Total (cfs)	30387.4	Conv. (cfs)	2473.3	23279.5	4634.6
Length Wtd. (ft)	292.14	Wetted Per. (ft)	26.41	38.78	28.54
Min Ch El (ft)	2167.91	Shear (lb/sq ft)	2.76	8.40	3.83
Alpha	1.20	Stream Power (lb/ft s)	*10395.52	0.00	0.00
Frctn Loss (ft)	6.25	Cum Volume (acre-ft)	34.81	144.05	33.38
C & E Loss (ft)	0.02	Cum SA (acres)	10.92	22.74	10.30

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 3.305

INPUT
Description: 3.305
Station Elevation Data num= 138

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9742.23	2183.2	9753.06	2182.89	9757.4	2182.66	9767.45	2182.35	9769.94	2182.32
9770.83	2182.33	9782.5	2182.06	9789.29	2181.86	9792.49	2181.78	9804.62	2181.43
[redacted]3.94	2180.8	9826.61	2179.89	9837.4	2179.2	9848.2	2178.17	9858.68	2176.83
[redacted]8	2175.69	9871.91	2175.54	9874.8	2175.18	9880.4	2174.36	9887.78	2173.52
[redacted]4	2172.89	9900.88	2172.46	9906.69	2172.19	9915.09	2171.55	9924.78	2171.87
99[redacted].74	2171.83	9934.44	2171.42	9944.33	2170.95	9954.21	2170.53	9958.43	2170.24
9965.75	2169.61	9968.06	2169.47	9969.78	2169.32	9979.05	2168.46	9983.16	2168.21
9984.28	2168.1	9990.53	2164.96	9994.76	2162.9810002.57		2162.49	10005.4	2162.4
10006.64	2162.5810008.46		2162.8310009.31		2163.0610016.56		2164.110019.48		2164.37
10024.84	2165.11	10028.4	2165.5810030.47		2165.6410041.88		2166.5810047.36		2167.85
10060.89	2170.5610064.97		2170.35	10075	2169.9710088.06		2170.0810091.63		2170.11
10094.13	2170.1310101.32		2170.2710103.59		2170.310107.66		2170.3610111.75		2170.42
10113.78	2170.5710116.54		2170.76	10118.1	2170.8610119.14		2170.92	10119.9	2170.96
10123.31	2171.0510154.83		2170.6710155.67		2170.6610156.27		2170.6510156.72		2170.64

10210.53 2171.1910211.76 2171.210241.02 2171.5510246.56 2171.3410246.92 2171.35
10[redacted]52 2171.4710248.41 2171.3410249.26 2171.3610262.46 2171.9510268.15 2171.96
10[redacted]5 2171.910276.98 2171.9210283.91 2172.6510285.08 2172.84 10286.4 2173.04
10[redacted].7 2173.510297.41 2173.8110301.64 2174.1510302.22 2174.1710308.08 2174.33
10310.69 2174.36 10319.2 2174.9610325.88 2175.1710328.62 2175.2610331.95 2175.74
10335.39 2175.9410339.07 2175.5710341.03 2175.7910349.53 2176.5410353.95 2176.9
10359.48 2177.510362.79 2177.2710363.44 2177.3410365.51 2177.0210368.92 2176.53
10369.77 2176.3910372.36 2176.54 10373.6 2176.6510375.73 2176.810377.27 2176.92
10378.05 2176.9910380.98 2177.2610382.63 2177.4410385.48 2177.6510386.68 2177.78
10387.06 2177.8210391.59 2178.2210391.89 2178.2510392.19 2178.27 10392.5 2178.3
10392.8 2178.3310393.09 2178.3510393.36 2178.3810393.62 2178.410393.85 2178.42
10394.07 2178.4410394.26 2178.4510394.42 2178.4710394.57 2178.4810394.69 2178.49
10399.32 2178.710403.74 2179.1110405.73 2179.21

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9742.23	.066	9984.28	.06	10047.36	.066

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9984.28 10047.36 243.91 237.54 222.3 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2172.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.99	Wt. n-Val.	0.066	0.066	0.066
W.S. Elev (ft)	2170.24	Reach Len. (ft)	243.91	237.54	222.30
Crit W.S. (ft)	2170.24	Flow Area (sq ft)	27.95	345.65	18.97
E.G. Slope (ft/ft)	*0.028108	Area (sq ft)	27.95	345.65	18.97
Q Total (cfs)	4163.00	Flow (cfs)	111.00	3987.36	64.63
Top Width (ft)	132.38	Top Width (ft)	25.80	63.08	43.49
Vel Total (ft/s)	10.60	Avg. Vel. (ft/s)	3.97	11.54	3.41
Max Chl Dpth (ft)	7.84	Hydr. Depth (ft)	1.08	5.48	0.44
Conv. Total (cfs)	24830.6	Conv. (cfs)	662.1	23783.0	385.5
Length Wtd. (ft)	235.00	Wetted Per. (ft)	25.89	64.70	43.74
Min Ch El (ft)	2162.40	Shear (lb/sq ft)	1.89	9.38	0.76
Alpha	1.14	Stream Power (lb/ft s)	*10405.73	0.00	0.00
Frctn Loss (ft)	3.84	Cum Volume (acre-ft)	75.19	127.04	54.85
C & E Loss (ft)	0.38	Cum SA (acres)	34.65	22.40	28.58

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

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2172.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.88	Wt. n-Val.	0.066	0.066	0.066
W.S. Elev (ft)	2170.51	Reach Len. (ft)	243.91	237.54	222.30
Crit W.S. (ft)		Flow Area (sq ft)	9.58	362.67	17.60
E.G. Slope (ft/ft)	*0.024639	Area (sq ft)	9.58	362.67	17.60
Q Total (cfs)	4163.00	Flow (cfs)	44.35	4044.47	74.17
Top Width (ft)	80.62	Top Width (ft)	4.28	63.08	13.26
Vel Total (ft/s)	10.68	Avg. Vel. (ft/s)	4.63	11.15	4.21
Max Chl Dpth (ft)	8.11	Hydr. Depth (ft)	2.24	5.75	1.33
Conv. Total (cfs)	26521.5	Conv. (cfs)	282.6	25766.4	472.5
Length Wtd. (ft)	235.76	Wetted Per. (ft)	6.40	64.70	13.52
Min Ch El (ft)	2162.40	Shear (lb/sq ft)	2.31	8.62	2.00
Alpha	1.06	Stream Power (lb/ft s)	*10405.73	0.00	0.00
Frctn Loss (ft)	4.47	Cum Volume (acre-ft)	34.56	141.89	33.05
C & E Loss (ft)	0.26	Cum SA (acres)	10.82	22.40	10.19

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.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 3.260

INPUT
Description: 3.26, ineffective flow area added at station 9949.27 for tributary flow
Station Elevation Data num= 186

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
[redacted]765.3	2174.08	9767.52	2173.88	9768.22	2173.82	9780.53	2173.43	9798.66	2172.13
[redacted]94	2171.97	9803.79	2171.39	9806.06	2171.62	9814.42	2170.54	9818.74	2169.93
[redacted]9	2169.56	9828.76	2169.11	9833.21	2168.73	9838.05	2168.58	9841.33	2168.26
[redacted]3	2168.03	9845.1	2167.83	9847.05	2167.73	9847.32	2167.72	9850.77	2167.57
9854.46	2167.55	9854.49	2167.43	9857.06	2167.33	9858.76	2167.3	9861.11	2167.21
9863.25	2167.13	9865.36	2167.07	9867.33	2167	9869.76	2166.89	9871.57	2166.83
9874.19	2166.68	9880.25	2166.53	9883.11	2166.32	9885.06	2166.18	9889.91	2166.29
9892.18	2166.36	9894.13	2166.18	9902.29	2166.09	9902.48	2166.08	9907.2	2165.82
9911.26	2165.88	9911.93	2166.13	9919.12	2166.71	9920.2	2167	9920.77	2166.82
9922.26	2166.95	9928.93	2166.77	9933.22	2166.94	9934.43	2167.01	9949.27	2167.1
9950.44	2167.09	9962.71	2166.46	9964.95	2166.41	9974.48	2165.52	9976.56	2165.25
9978.29	2165.03	9980.82	2163.68	9983.54	2161.92	9988.08	2161.52	9993.18	2160.86

```
10[redacted]62 2160.9610019.81 2161.1710023.91    216110027.66 2161.0310034.84 2162.01
10[redacted]3 2162.3910037.61 2162.4210037.86 2162.4710045.59  2162.810048.04 2163.03
10[redacted]9 2162.7710058.53 2162.5310061.62 2162.2610063.74 2161.4110065.94 2161.22
10[redacted]4 2160.9210072.49 2160.6510073.92 2160.6110074.52 2160.5110075.11 2160.39
10079.58 2160.3110076.63 2160.0710084.39  2160.910086.92 2161.9710088.83 2162.62
10091.65 2163.6310097.86 2166.8310110.15 2167.8710111.95  2167.810125.78 2167.42
10126.06 2167.4310136.03 2167.5310142.76 2167.5510144.49 2167.5410151.52 2167.51
10154.59 2167.49 10158.2 2167.4710163.88 2167.4110164.63  2167.410169.85 2167.35
10170.56 2167.3410170.89 2167.3510171.83 2167.3410178.92 2167.1510179.17 2167.14
10179.41 2167.13 10181.9 2166.9410182.85 2167.0310183.08 2167.0410189.18 2167.46
10190.82 2167.57 10193.5 2167.6610195.01 2167.7310196.69 2167.8510199.24 2167.88
10201.11 2168.0710204.59 2168.15 10208.7 2168.2910211.62 2168.4410217.11 2168.68
10219.12 2168.8310220.63 2168.9710227.33 2169.2510227.72 2169.2810229.84 2169.42
 10232.5 2169.9210235.67 2170.5510237.56 2170.6410238.54 2170.6910245.24 2170.99
10250.99 2171.19 10252.6 2171.2510260.58 2171.8410262.23  2171.910263.43 2171.98
   10265 2172.1710274.56 2172.7610278.47 2173.0510283.47 2173.3210290.83 2173.59
 10291.4 2173.6110292.11 2173.6410303.85 2173.6810305.04 2173.6610308.96 2173.74
10310.73 2173.8410317.67  2174.210318.48 2174.2510318.89 2174.2710319.13 2174.29
10319.95 2174.3210320.82 2174.4310320.89 2174.4410321.01 2174.4510321.17 2174.46
10321.29 2174.4710332.36 2175.7110332.66 2175.7210332.81 2175.7310338.29 2175.95
10338.38 2175.9610338.59 2175.97 10338.7 2175.9810338.93 2175.9910339.05    2176
10339.17 2176.0110339.29 2176.0210340.16 2176.1310340.83 2176.2210348.42  2176.8
10349.08 2176.8810349.99 2176.9910351.24 2177.1410352.23 2177.2510352.71 2177.44
10353.59 2177.7610357.26    217910364.48 2180.1410378.57 2181.9410381.85 2182.31
10388.19 2183.08

Manning's n Values          num=        3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
  9765.3    .066 9980.82    .06610048.04    .066

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9980.8210048.04             65.59   76.91   69.22             .1       .3
Ineffective Flow     num=        1
   Sta L   Sta R    Elev  Permanent
  9765.3 9949.27  2167.1        T

CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************
* E.G. Elev (ft)          * 2167.29  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.74  * Wt. n-Val.            *   0.066  *   0.066  *   0.066  *
* W.S. Elev (ft)          * 2166.56  * Reach Len. (ft)       *   65.59  *   76.91  *   69.22  *
* Crit W.S. (ft)          *          * Flow Area (sq ft)     *   16.43  *  378.99  *  222.36  *
* E.G. Slope (ft/ft)      *0.010664  * Area (sq ft)          *   30.77  *  378.99  *  222.36  *
* [redacted]Total (cfs)   * 4163.00  * Flow (cfs)            *   33.10  * 2746.86  * 1383.05  *
* [redacted]Width (ft)    *  174.44  * Top Width (ft)        *   57.93  *   67.22  *   49.29  *
* [redacted]otal (ft/s)   *    6.74  * Avg. Vel. (ft/s)     *    2.01  *    7.25  *    6.22  *
* [redacted]hl Dpth (ft)  *    8.02  * Hydr. Depth (ft)     *    0.82  *    5.64  *    4.51  *
* Conv. Total (cfs)       * 40312.7  * Conv. (cfs)          *   320.5  * 26599.4  * 13392.9  *
* Length Wtd. (ft)        *   75.58  * Wetted Per. (ft)     *   20.38  *   68.85  *   50.82  *
* Min Ch El (ft)          * 2158.54  * Shear (lb/sq ft)     *    0.54  *    3.66  *    2.91  *
* Alpha                   *    1.05  * Stream Power (lb/ft s) *10388.19  *    0.00  *    0.00  *
* Frctn Loss (ft)         *    0.85  * Cum Volume (acre-ft) *   75.02  *  125.06  *   54.24  *
* C & E Loss (ft)         *    0.02  * Cum SA (acres)       *   34.42  *   22.05  *   28.35  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT  Profile #FW
*****************************************************************************************
* E.G. Elev (ft)          * 2167.66  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)           *    1.02  * Wt. n-Val.            *          *   0.066  *   0.066  *
* W.S. Elev (ft)          * 2166.64  * Reach Len. (ft)       *   65.59  *   76.91  *   69.22  *
* Crit W.S. (ft)          *          * Flow Area (sq ft)     *          *  384.52  *  134.45  *
* E.G. Slope (ft/ft)      *0.015017  * Area (sq ft)          *          *  384.52  *  134.45  *
* Q Total (cfs)           * 4163.00  * Flow (cfs)            *          * 3246.95  *  916.05  *
* Top Width (ft)          *   95.18  * Top Width (ft)        *          *   67.22  *   27.96  *
* Vel Total (ft/s)        *    8.02  * Avg. Vel. (ft/s)     *          *    8.44  *    6.81  *
* Max Chl Dpth (ft)       *    8.10  * Hydr. Depth (ft)     *          *    5.72  *    4.81  *
* Conv. Total (cfs)       * 33971.4  * Conv. (cfs)          *          * 26496.1  *  7475.3  *
* Length Wtd. (ft)        *   76.06  * Wetted Per. (ft)     *          *   71.81  *   34.64  *
* Min Ch El (ft)          * 2158.54  * Shear (lb/sq ft)     *          *    5.02  *    3.64  *
* Alpha                   *    1.02  * Stream Power (lb/ft s) *10388.19  *    0.00  *    0.00  *
* Frctn Loss (ft)         *    0.90  * Cum Volume (acre-ft) *   34.53  *  139.85  *   32.66  *
* C & E Loss (ft)         *    0.06  * Cum SA (acres)       *   10.80  *   22.05  *   10.08  *
*****************************************************************************************

CROSS SECTION


RIVER: Rodger Creek
REACH: Main Reach          RS: 3.246

INPUT
Description: 3.246  Levee set at station 9909.75; tributary flow location
Station Elevation Data     num=       95
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*****************************************************************************************
[redacted]21.76 2172.09 9721.93 2172.08 9738.26 2170.97 9743.98 2170.67 9754.28 2169.63
[redacted]f 39 2169.36 9766.37 2168.52    9767 2168.48 9779.03 2167.42 9779.94 2167.39
[redacted]  1 2167.34  9792.7 2166.99 9795.14 2166.93 9802.03  2166.7 9803.16 2166.65
[redacted]  6 2166.24 9812.89 2166.18 9813.65 2166.16 9815.03  2166.1 9819.74 2165.81
 9827.27 2165.43 9835.41 2164.83 9844.59 2163.77 9852.02 2162.46    9854 2162.07
 9856.55 2162.25 9862.13 2161.32 9866.49 2162.04 9869.98 2162.37 9870.86 2162.47
 9871.96 2162.69 9882.13 2164.91  9891.1  2165.7 9894.64 2166.03 9896.86 2166.01
 9909.75 2166.31 9919.51 2166.49 9935.58 2165.88 9950.31 2165.48 9957.57 2164.85
 9960.33 2164.62 9970.19 2161.35 9973.91 2160.88 9975.67 2160.16 9980.22  2158.5
 9984.35 2158.61 9990.17 2158.47 9995.84 2158.4910001.26 2157.7210005.31 2157.32
10006.99 2157.4810010.07 2157.2510013.35 2158.0710018.98 2158.7210029.51 2158.74
10030.02 2158.6510030.48 2158.7810038.23 2159.4110044.79 2161.6610050.24 2165.09
[redacted]
```

10107.85 2166.0510109.51 2166.0310116.31 2165.9110117.83 2165.7410121.68 2165.62
10[redacted]16 2165.5610131.64 2165.8510132.43 2165.910142.26 2165.9610142.75 2166
1[redacted]8 2166.1210161.27 2166.88 10177.5 2167.57 10188.7 2168.0810197.91 2168.52
10[redacted]6 2169.3910232.43 2170.610236.78 2170.9510242.21 2172.310249.39 2174.04
10257.05 2175.3710263.98 2176.6510267.78 2176.81 10276.6 2177.4810280.86 2177.75
10282.42 2178.1410289.16 2180.3710290.69 2180.4210295.35 2179.710299.03 2180.08

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9721.76 .066 9957.57 .06610050.24 .066

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9957.5710050.24 110.89 129.81 118.31 .1 .3
Left Levee Station= 9909.75 Elevation= 2166.31

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2166.43	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.93	Wt. n-Val.	0.066	0.066	0.066
W.S. Elev (ft)	2165.50	Reach Len. (ft)	110.89	129.81	118.31
Crit W.S. (ft)	2163.45	Flow Area (sq ft)	2.40	537.07	0.13
E.G. Slope (ft/ft)	*0.011807	Area (sq ft)	2.40	537.07	0.13
Q Total (cfs)	4163.00	Flow (cfs)	2.67	4160.24	0.09
Top Width (ft)	101.22	Top Width (ft)	7.83	92.67	0.73
Vel Total (ft/s)	7.71	Avg. Vel. (ft/s)	1.11	7.75	0.71
Max Chl Dpth (ft)	8.25	Hydr. Depth (ft)	0.31	5.80	0.18
Conv. Total (cfs)	38312.4	Conv. (cfs)	24.6	38287.0	0.9
Length Wtd. (ft)	129.39	Wetted Per. (ft)	7.85	95.32	0.84
Min Ch El (ft)	2157.25	Shear (lb/sq ft)	0.23	4.15	0.12
Alpha	1.01	Stream Power (lb/ft s)	*10299.03	9909.75	0.00
Frctn Loss (ft)	2.07	Cum Volume (acre-ft)	75.00	124.25	54.06
C & E Loss (ft)	0.09	Cum SA (acres)	34.37	21.91	28.31

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2166.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.82	Wt. n-Val.	0.066	0.066	0.066
W.S. Elev (ft)	2165.88	Reach Len. (ft)	110.89	129.81	118.31
[redacted] W.S. (ft)	2163.48	Flow Area (sq ft)	1.51	572.98	0.18
[redacted] Slope (ft/ft)	*0.009517	Area (sq ft)	1.51	572.98	0.18
[redacted]al (cfs)	4163.00	Flow (cfs)	2.40	4160.46	0.14
Top Width (ft)	94.50	Top Width (ft)	1.57	92.67	0.26
Vel Total (ft/s)	7.24	Avg. Vel. (ft/s)	1.58	7.26	0.74
Max Chl Dpth (ft)	8.63	Hydr. Depth (ft)	0.96	6.18	0.71
Conv. Total (cfs)	42673.4	Conv. (cfs)	24.6	42647.4	1.4
Length Wtd. (ft)	129.80	Wetted Per. (ft)	2.47	95.32	0.94
Min Ch El (ft)	2157.25	Shear (lb/sq ft)	0.36	3.57	0.12
Alpha	1.00	Stream Power (lb/ft s)	*10299.03	9909.75	0.00
Frctn Loss (ft)	1.73	Cum Volume (acre-ft)	34.53	139.01	32.55
C & E Loss (ft)	0.08	Cum SA (acres)	10.80	21.91	10.06

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 3.221

INPUT
Description: 3.221 Ineffective area set at station 9908.18; tributary flow location
Station Elevation Data num= 116
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9696.17 2169.96 9707.41 2169.38 9710.16 2169.29 9719.16 2168.94 9729.79 2168.76
9733.91 2168.6 9740.51 2168.32 9742.31 2168.21 9744.07 2168.11 9745.27 2168.04
9751.39 2167.58 9757.06 2166.9 9757.39 2166.87 9757.7 2166.84 9773.21 2166.16
9774.32 2166.06 9786.97 2165.34 9792.11 2165.13 9792.92 2165.16 9799.85 2164.75
9807.2 2163.41 9814.24 2163.27 9818.02 2162.36 9828.78 2160.87 9836.53 2160.11
9838.79 2159.89 9840.7 2159.9 9847.26 2158.7 9851.03 2159.45 9854.54 2159.54
9859.46 2160.01 9870.97 2160.26 9876.84 2160.43 9877.72 2160.48 9877.99 2160.5
9888.5 2161.38 9896.66 2161.88 9904.73 2162.74 9908.18 2163.01 9910.18 2162.99
9914.69 2162.96 9917.57 2162.89 9918.91 2162.92 9926.76 2162.83 9939.7 2162.2
9942.82 2161.68 9946.56 2161.01 9956.92159.506 9956.94 2159.5 9957 2159.49
9966.52 2157.99 9967.76 2157.87 9968.48 2157.75 9971.91 2156.88 9974.81 2156.03
[redacted]02 2156.3 9979.83 2156.53 9981.95 2156.46 9986.91 2156.2 9991.28 2155.09
[redacted]7 2154.49 9996.78 2153.9410003.44 2153.7110003.71 2154.11 100162159.693
[redacted]9 2159.87 10022.9 2160.610024.35 2160.7610028.43 2161.6310034.64 2162.39
10035.64 2163.0510045.22 2163.6510056.35 2164.5110057.04 2164.5410078.81 2164.61
10080.01 2164.6310081.94 2164.65 10091.6 2164.6710098.81 2164.310105.24 2163.91
10110.94 2163.8810112.31 2163.8610112.48 2163.910121.06 2165.2110133.16 2166.2
10136.46 2166.5710140.59 2167.2510143.72 2167.8310144.91 2167.5310150.03 2167.86
10153.86 2168.7410155.67 2169.210157.72 2169.510161.18 2170.2110165.94 2170.93
10167.01 2171.0910168.16 2171.2810170.25 2171.4410172.31 2171.29 10177.2 2171.71
10178.84 2171.8810181.52 2172.39 10182.8 2172.6810187.36 2171.8510188.23 2171.68
10188.85 2171.6510189.11 2171.710196.93 2173.6710197.81 2173.6210209.26 2174.63
10211.55 2175.1810213.96 2175.5410225.28 2177.3110229.23 2178.8110229.47 2178.91

10[redacted]54 2178.72

Ma[redacted]'s n Values num= 3
[redacted]a n Val Sta n Val Sta n Val
****
9696.17 .066 9956.94 .06610016.39 .066

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9956.9410016.39 173.91 183.87 178.18 .1 .3
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
9696.17 9908.18 2163.01 F

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2164.27	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.80	* Wt. n-Val.	* 0.066	* 0.066	* 0.066 *
* W.S. Elev (ft)	* 2162.47	* Reach Len. (ft)	* 173.91	* 183.87	* 178.18 *
* Crit W.S. (ft)	* 2162.00	* Flow Area (sq ft)	* 29.70	* 357.77	* 25.31 *
* E.G. Slope (ft/ft)	*0.022899	* Area (sq ft)	* 188.66	* 357.77	* 25.31 *
* Q Total (cfs)	* 4163.00	* Flow (cfs)	* 119.67	* 3939.23	* 104.10 *
* Top Width (ft)	* 185.91	* Top Width (ft)	* 107.57	* 59.45	* 18.89 *
* Vel Total (ft/s)	* 10.09	* Avg. Vel. (ft/s)	* 4.03	* 11.01	* 4.11 *
* Max Chl Dpth (ft)	* 8.76	* Hydr. Depth (ft)	* 1.30	* 6.02	* 1.34 *
* Conv. Total (cfs)	* 27510.8	* Conv. (cfs)	* 790.8	* 26032.0	* 687.9 *
* Length Wtd. (ft)	* 183.07	* Wetted Per. (ft)	* 23.09	* 61.58	* 19.08 *
* Min Ch El (ft)	* 2153.71	* Shear (lb/sq ft)	* 1.84	* 8.31	* 1.90 *
* Alpha	* 1.14	* Stream Power (lb/ft s)	*10237.54	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 3.16	* Cum Volume (acre-ft)	* 74.75	* 122.92	* 54.03 *
* C & E Loss (ft)	* 0.18	* Cum SA (acres)	* 34.22	* 21.68	* 28.28 *

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2164.88	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.67	* Wt. n-Val.	*	* 0.066	* *
* W.S. Elev (ft)	* 2163.22	* Reach Len. (ft)	* 173.91	* 183.87	* 178.18 *
* Crit W.S. (ft)	* 2161.82	* Flow Area (sq ft)	*	* 401.85	* *
* [redacted] Slope (ft/ft)	*0.020066	* Area (sq ft)	*	* 401.85	* *
* [redacted]tal (cfs)	* 4163.00	* Flow (cfs)	*	* 4163.00	* *
* [redacted]idth (ft)	* 59.45	* Top Width (ft)	*	* 59.45	* *
* [redacted]otal (ft/s)	* 10.36	* Avg. Vel. (ft/s)	*	* 10.36	* *
* Max Chl Dpth (ft)	* 9.51	* Hydr. Depth (ft)	*	* 6.76	* *
* Conv. Total (cfs)	* 29388.2	* Conv. (cfs)	*	* 29388.2	* *
* Length Wtd. (ft)	* 183.83	* Wetted Per. (ft)	*	* 68.64	* *
* Min Ch El (ft)	* 2153.71	* Shear (lb/sq ft)	*	* 7.33	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*10237.54	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 2.88	* Cum Volume (acre-ft)	* 34.53	* 137.55	* 32.55 *
* C & E Loss (ft)	* 0.07	* Cum SA (acres)	* 10.80	* 21.68	* 10.06 *

Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 3.186

INPUT
Description: 3.186
Station Elevation Data num= 91
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
****
9705.4 2166.76 9707.32 2166.68 9709.95 2166.56 9713.87 2165.96 9716.48 2165.81
9727.81 2165.63 9728.07 2165.62 9742.73 2165.19 9743.22 2164.82 9752.36 2164.56
9766.46 2164.26 9770.19 2164.07 9781.98 2163.28 9800.8 2163.26 9803.24 2163.15
9808.62 2162.68 9814.21 2162.33 9820.81 2162.13 9827.35 2162.01 9830.23 2162.05
9845.56 2161.1 9846.11 2161.08 9846.76 2161.01 9850.49 2160.99 9853.29 2160.97
9861.84 2161.19 9868.84 2161.2 9876.03 2161.37 9892.04 2161.45 9900.5 2161.68
9916.21 2162.2 9919.21 2161.63 9935.22 2159.19 9946.05 2158.32 9946.35 2158.3
9950.3 2158.11 9957.63 2157.79 9958.53 2157.75 9959.16 2157.69 99752155.136
9990.67 2152.61 9992.8 2151.69 9997.6 2151.25 9999.94 2151.0110003.72 2151.1
10007.38 2151.4910013.56 2152.3610017.96 2152.8810026.35 2154.6610028.01 2155.05
10029.85 2155.3510031.52 2155.610057.26 2159.3710060.02 2159.510061.57 2159.57
10073.8 2160.1110079.88 2160.1210081.82 2160.11 10082.7 2160.1910090.75 2160.23
10097.28 2160.9710098.61 2161.0710103.56 2161.6610108.33 2162.310129.13 2164.49
10130.9 2164.6510132.71 2164.9 10135 2165.1 10149.2 2166.1910153.94 2166.62
10165.06 2168.1910172.05 2169.0810173.78 2169.2410181.41 2169.8210185.23 2169.9
[redacted]8.19 2170.0910191.97 2170.410192.36 2170.4410192.81 2170.4910193.32 2170.54
[redacted]89 2170.5910194.52 2170.6510212.81 2172.0610213.77 2172.1410214.81 2172.22
[redacted]'3 2172.3110220.66 2172.69 10234.9 2173.8 10241 2174.2810242.58 2174.4
10[redacted].6 2174.52

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
****
9705.4 .066 9975 .06610031.52 .066

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
997510031.52 153.76 155.34 157.76 .1 .3

CROSS SECTION OUTPUT Profile #Q100

[redacted] Elev (ft)	* 2160.93	* Element	* Left OB	* Channel	* Right OB *
* [redacted]ead (ft)	* 1.19	* Wt. n-Val.	* 0.066	* 0.066	* 0.066 *
* W.S. Elev (ft)	* 2159.74	* Reach Len. (ft)	* 153.76	* 155.34	* 157.76 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 86.80	* 384.69	* 59.35 *
* E.G. Slope (ft/ft)	*0.013496	* Area (sq ft)	* 86.80	* 384.69	* 59.35 *
* Q Total (cfs)	* 4163.00	* Flow (cfs)	* 358.95	* 3579.27	* 224.78 *
* Top Width (ft)	* 133.66	* Top Width (ft)	* 43.36	* 56.52	* 33.78 *
* Vel Total (ft/s)	* 7.84	* Avg. Vel. (ft/s)	* 4.14	* 9.30	* 3.79 *
* Max Chl Dpth (ft)	* 8.72	* Hydr. Depth (ft)	* 2.00	* 6.81	* 1.76 *
* Conv. Total (cfs)	* 35835.3	* Conv. (cfs)	* 3089.9	* 30810.5	* 1934.9 *
* Length Wtd. (ft)	* 155.20	* Wetted Per. (ft)	* 43.65	* 57.33	* 34.07 *
* Min Ch El (ft)	* 2151.01	* Shear (lb/sq ft)	* 1.68	* 5.65	* 1.47 *
* Alpha	* 1.25	* Stream Power (lb/ft s)	*10244.06	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 2.79	* Cum Volume (acre-ft)	* 74.20	* 121.35	* 53.85 *
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 33.92	* 21.44	* 28.17 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2161.93	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.43	* Wt. n-Val.	* 0.066	* 0.066	* 0.066 *
* W.S. Elev (ft)	* 2160.50	* Reach Len. (ft)	* 153.76	* 155.34	* 157.76 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 10.40	* 427.75	* 2.34 *
* E.G. Slope (ft/ft)	*0.012588	* Area (sq ft)	* 10.40	* 427.75	* 2.34 *
* Q Total (cfs)	* 4163.00	* Flow (cfs)	* 33.99	* 4125.60	* 3.41 *
* Top Width (ft)	* 59.00	* Top Width (ft)	* 2.00	* 56.52	* 0.48 *
* Vel Total (ft/s)	* 9.45	* Avg. Vel. (ft/s)	* 3.27	* 9.64	* 1.46 *
* Max Chl Dpth (ft)	* 9.49	* Hydr. Depth (ft)	* 5.20	* 7.57	* 4.86 *
* Conv. Total (cfs)	* 37104.5	* Conv. (cfs)	* 303.0	* 36771.1	* 30.4 *
* Length Wtd. (ft)	* 155.40	* Wetted Per. (ft)	* 7.06	* 57.33	* 5.31 *
* Min Ch El (ft)	* 2151.01	* Shear (lb/sq ft)	* 1.16	* 5.86	* 0.35 *
* Alpha	* 1.03	* Stream Power (lb/ft s)	*10244.06	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 2.54	* Cum Volume (acre-ft)	* 34.51	* 135.80	* 32.55 *
* C & E Loss (ft)	* 0.05	* Cum SA (acres)	* 10.80	* 21.44	* 10.06 *

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.

[redacted] SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 3.157

INPUT
Description: 3.157
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9766.76	2157.31	9767.7	2157.22	9771.46	2157.48	9777.15	2158.68	9784.97	2158.66
9799.83	2158.42	9800.37	2158.52	9800.73	2158.41	9801.03	2158.4	9806.97	2158.39
9820.63	2157.82	9829.17	2157.35	9831.45	2157.18	9831.88	2157.2	9832.41	2157.21
9832.99	2157.24	9856.36	2157.45	9862.93	2157.61	9864.58	2157.63	9878.3	2158.17
9883.39	2158.32	9891.51	2158.36	9906.6	2158.69	9923.76	2157.62	9932.46	2155.72
9937.87	2154.27	9947.75	2153.24	9954.81	2153.15	9958.54	2153.09	9969.68	2152.77
9976.09	2152.75	9982.19	2152.38	9990.81	2150.21	9991.28	2150.1	9991.7	2150.05
10001.1	2149.75	10002.99	2149.83	10004.36	2149.88	10010.85	2150.08	10017.28	2151.13
10019.86	2151.55	10022.23	2151.96	10023.74	2152.24	10037.73	2155.64	10043.99	2155.91
10051.86	2156.22	10058.64	2156.21	10062.17	2156.34	10082.1	2157.09	10083.67	2157.1
10086.68	2157.19	10087.46	2157.21	10088.65	2157.24	10090.83	2157.31	10096.78	2157.47
10097.71	2157.49	10103.08	2157.73	10111.67	2157.23	10113.54	2157.02	10116.75	2157.47
10124.91	2158.47	10130.37	2158.63	10142.42	2159.06	10144.98	2160.27	10147.42	2160.23
10154.72	2161.11	10157.49	2161.6	10162.1	2162.14	10164.99	2162.72	10176.63	2164.37
10185.43	2165.77	10196.24	2166.74	10208.97	2167.76	10212.78	2168.19	10219.04	2168.73
10227.67	2169.57								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9766.76	.066	9976.09	.066	10023.74	.066

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9976.09	10023.74	383.63	397.75	419.63	.1 .3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2158.10	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.61	* Wt. n-Val.	* 0.066	* 0.066	* 0.066 *
* W.S. Elev (ft)	* 2156.48	* Reach Len. (ft)	* 383.63	* 397.75	* 419.63 *
* Crit W.S. (ft)	* 2156.17	* Flow Area (sq ft)	* 135.43	* 268.88	* 46.03 *
* E.G. Slope (ft/ft)	*0.025085	* Area (sq ft)	* 135.43	* 268.88	* 46.03 *
* [redacted] Total (cfs)	* 4163.00	* Flow (cfs)	* 971.74	* 3018.42	* 172.84 *
* [redacted] Width (ft)	* 136.93	* Top Width (ft)	* 47.11	* 47.65	* 42.17 *
* [redacted] otal (ft/s)	* 9.24	* Avg. Vel. (ft/s)	* 7.18	* 11.23	* 3.76 *
* [redacted] hl Dpth (ft)	* 6.73	* Hydr. Depth (ft)	* 2.87	* 5.64	* 1.09 *
* Conv. Total (cfs)	* 26284.4	* Conv. (cfs)	* 6135.4	* 19057.8	* 1091.3 *
* Length Wtd. (ft)	* 397.93	* Wetted Per. (ft)	* 47.45	* 48.14	* 42.59 *
* Min Ch El (ft)	* 2149.75	* Shear (lb/sq ft)	* 4.47	* 8.75	* 1.69 *
* Alpha	* 1.22	* Stream Power (lb/ft s)	*10227.67	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 6.77	* Cum Volume (acre-ft)	* 73.81	* 120.19	* 53.66 *
* C & E Loss (ft)	* 0.19	* Cum SA (acres)	* 33.76	* 21.25	* 28.04 *

[redacted] The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2159.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.94	Wt. n-Val.	0.066	0.066	0.066
W.S. Elev (ft)	2157.40	Reach Len. (ft)	383.63	397.75	419.63
Crit W.S. (ft)		Flow Area (sq ft)	28.26	312.69	48.41
E.G. Slope (ft/ft)	*0.022123	Area (sq ft)	28.26	312.69	48.41
Q Total (cfs)	4163.00	Flow (cfs)	180.59	3645.51	336.90
Top Width (ft)	67.73	Top Width (ft)	6.09	47.65	13.99
Vel Total (ft/s)	10.69	Avg. Vel. (ft/s)	6.39	11.66	6.96
Max Chl Dpth (ft)	7.65	Hydr. Depth (ft)	4.64	6.56	3.46
Conv. Total (cfs)	27988.6	Conv. (cfs)	1214.1	24509.4	2265.0
Length Wtd. (ft)	398.79	Wetted Per. (ft)	10.72	48.14	16.16
Min Ch El (ft)	2149.75	Shear (lb/sq ft)	3.64	8.97	4.14
Alpha	1.09	Stream Power (lb/ft s)	*10227.67	0.00	0.00
Frctn Loss (ft)	7.07	Cum Volume (acre-ft)	34.44	134.48	32.45
C & E Loss (ft)	0.12	Cum SA (acres)	10.78	21.25	10.03

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 3.082

INPUT
Description: 3.082
Station Elevation Data num= 69

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9715.47	2155.8	9724.49	2155.45	9725.07	2155.42	9745.03	2154.18	9760.23	2153.36
9761.57	2153.29	9762.1	2153.28	9769.6	2153	9775.85	2152.07	9777.06	2151.85
9777.73	2151.78	9778.59	2151.63	9784.03	2151.76	9790.47	2151.95	9794.06	2151.9
9808.4	2151.74	9842.34	2152.3	9869.07	2150.1	9893.31	2149.67	9908.88	2149.25
9912.26	2149.23	9918.48	2149.17	9920.27	2149.16	9922.51	2148.79	9923.68	2148.54
9924.13	2148.61	9926.42	2148.96	9932.33	2148.88	9943.72	2148.73	9944.48	2148.72
[illegible].02	2148.36	9974.47	2146.32	9974.52	146.314	9975.52	146.112	99782	145.608
[illegible]802	145.205	9984.44	2144.31	9987	2143.37	9987.98	2143.01	9991.14	2141.84
[illegible]4	2141.33	9994.99	2141.14	9996.69	2141.25	10009.86	2141.51	10010.22	2141.59
1[illegible].7	2145.06	10024.83	2145.86	10039.36	2147.33	10059.12	2148.2	10062.7	2148.42
10088.79	2148.89	10097.18	2149.12	10104.04	2149.11	10104.47	2149.04	10108.44	2148.86
10110.28	2149.12	10115.7	2149.22	10124.07	2148.98	10126.12	2148.97	10132.32	2149.14
10134.12	2149.19	10153.87	2149.26	10173.22	2149.28	10185.88	2149.31	10212	2149.74
10226.89	2149.85	10235.32	2150.51	10241.55	2150.94	10252.45	2155.4		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9715.47	.066	9975.5	.066	10024.83	.066

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9975.5	10024.83	305.51	333.56	353.18	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2151.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.98	Wt. n-Val.	0.066	0.066	0.066
W.S. Elev (ft)	2150.15	Reach Len. (ft)	305.51	333.56	353.18,
Crit W.S. (ft)	2150.15	Flow Area (sq ft)	130.67	349.57	260.75
E.G. Slope (ft/ft)	*0.012431	Area (sq ft)	130.67	349.57	260.75
Q Total (cfs)	4320.00	Flow (cfs)	374.07	3180.19	765.75
Top Width (ft)	362.25	Top Width (ft)	107.04	49.33	205.89
Vel Total (ft/s)	5.83	Avg. Vel. (ft/s)	2.86	9.10	2.94
Max Chl Dpth (ft)	9.01	Hydr. Depth (ft)	1.22	7.09	1.27
Conv. Total (cfs)	38746.8	Conv. (cfs)	3355.1	28523.6	6868.1
Length Wtd. (ft)	331.18	Wetted Per. (ft)	107.30	50.67	206.05
Min Ch El (ft)	2141.14	Shear (lb/sq ft)	0.95	5.35	0.98
Alpha	1.86	Stream Power (lb/ft s)	*10252.45	0.00	0.00
Frctn Loss (ft)	5.39	Cum Volume (acre-ft)	72.64	117.36	52.18
C & E Loss (ft)	0.04	Cum SA (acres)	33.08	20.81	26.84

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: 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.

[illegible]SS SECTION OUTPUT Profile #FW

[illegible] Elev (ft)	2152.15	Element	Left OB	Channel	Right OB
[illegible] ead (ft)	1.52	Wt. n-Val.	0.066	0.066	0.066
W.S. Elev (ft)	2150.63	Reach Len. (ft)	305.51	333.56	353.18
Crit W.S. (ft)		Flow Area (sq ft)	33.03	373.08	50.51
E.G. Slope (ft/ft)	*0.014617	Area (sq ft)	33.03	373.08	50.51
Q Total (cfs)	4320.00	Flow (cfs)	177.49	3843.69	298.82
Top Width (ft)	70.00	Top Width (ft)	8.50	49.33	12.17
Vel Total (ft/s)	9.46	Avg. Vel. (ft/s)	5.37	10.30	5.92
Max Chl Dpth (ft)	9.49	Hydr. Depth (ft)	3.89	7.56	4.15
Conv. Total (cfs)	35731.4	Conv. (cfs)	1468.1	31791.8	2471.6

* Min Ch El (ft)	* 2141.14	* Shear (lb/sq ft)	* 2.53	* 6.72	* 2.92	*
* [redacted]a	* 1.10	* Stream Power (lb/ft s)	*10252.45	* 0.00	* 0.00	*
* [redacted] Loss (ft)	* 5.67	* Cum Volume (acre-ft)	* 34.17	* 131.35	* 31.98	*
* [redacted]. Loss (ft)	* 0.03	* Cum SA (acres)	* 10.72	* 20.81	* 9.90	*

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 3.018

INPUT
Description: 3.018
Station Elevation Data num= 57

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9660.59	2150.78	9667.57	2150.55	9683.64	2149.94	9720.79	2147.61	9723.85	2147.48
9728.49	2147.29	9757.78	2146.29	9775.74	2146.12	9788.21	2145.64	9790.62	2145.57
9811.5	2144.17	9821.67	2144.44	9828.85	2144.62	9855.1	2145.03	9857.4	2144.06
9861.6	2143.36	9875.83	2139.95	9876.73	2140.11	9879.93	2140.4	9883.26	2140.5
9910.31	2141.44	9912.87	2141.54	9914.85	2141.72	9925.42	2142.41	9933.19	2142.82
9934	2142.84	9951.01	2143.08	9955.96	2142.96	9969.74	2142.44	9970.78	2142.14
9975.58	2141.19	9981.15	2139.37	9982.2	2139.02	9988.8	2137.46	9994.93	2137.03
10000.38	2136.43	10004.35	2136.75	10015.01	2137.6	10016.2	2137.77	10016.6	2137.85
10019.8	2138.57	10025.07	2139.71	10026.05	2140	100292	140.417	100302	140.558
10030.3	2140.6	10040.6	2142.08	10048.71	2143.25	10054.15	2144	10055.92	2144.23
10067.95	2145.35	10077.94	2146.41	10080.07	2146.59	10086.4	2147.32	10089.27	2147.7
10097.78	2149.75	10103.46	2150.69						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9660.59	.066	9975.58	.066	10030	.066

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9975.58 10030 471.53 469.84 466.27 .1 .3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2145.03	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.33	* Wt. n-Val.	* 0.066	* 0.066	* 0.066 *
* [redacted] Elev (ft)	* 2143.70	* Reach Len. (ft)	* 471.53	* 469.84	* 466.27 *
* [redacted] W.S. (ft)	* 2143.70	* Flow Area (sq ft)	* 205.13	* 303.36	* 34.28 *
* [redacted] Slope (ft/ft)	*0.022203	* Area (sq ft)	* 205.13	* 303.36	* 34.28 *
* Q Total (cfs)	* 4320.00	* Flow (cfs)	* 1002.47	* 3163.73	* 153.81 *
* Top Width (ft)	* 192.36	* Top Width (ft)	* 116.00	* 54.42	* 21.95 *
* Vel Total (ft/s)	* 7.96	* Avg. Vel. (ft/s)	* 4.89	* 10.43	* 4.49 *
* Max Chl Dpth (ft)	* 7.27	* Hydr. Depth (ft)	* 1.77	* 5.57	* 1.56 *
* Conv. Total (cfs)	* 28991.8	* Conv. (cfs)	* 6727.6	* 21232.0	* 1032.2 *
* Length Wtd. (ft)	* 470.43	* Wetted Per. (ft)	* 116.66	* 55.35	* 22.17 *
* Min Ch El (ft)	* 2136.43	* Shear (lb/sq ft)	* 2.44	* 7.60	* 2.14 *
* Alpha	* 1.36	* Stream Power (lb/ft s)	*10103.46	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 8.31	* Cum Volume (acre-ft)	* 71.46	* 114.86	* 50.99 *
* C & E Loss (ft)	* 0.19	* Cum SA (acres)	* 32.30	* 20.41	* 25.92 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2146.46	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.77	* Wt. n-Val.	* 0.066	* 0.066	* 0.066 *
* W.S. Elev (ft)	* 2144.69	* Reach Len. (ft)	* 471.53	* 469.84	* 466.27 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 52.62	* 357.22	* 18.85 *
* E.G. Slope (ft/ft)	*0.020084	* Area (sq ft)	* 52.62	* 357.22	* 18.85 *
* Q Total (cfs)	* 4320.00	* Flow (cfs)	* 266.34	* 3951.09	* 102.57 *
* Top Width (ft)	* 84.00	* Top Width (ft)	* 24.58	* 54.42	* 5.00 *
* Vel Total (ft/s)	* 10.08	* Avg. Vel. (ft/s)	* 5.06	* 11.06	* 5.44 *
* Max Chl Dpth (ft)	* 8.26	* Hydr. Depth (ft)	* 2.14	* 6.56	* 3.77 *
* Conv. Total (cfs)	* 30482.9	* Conv. (cfs)	* 1879.4	* 27879.8	* 723.7 *
* Length Wtd. (ft)	* 470.13	* Wetted Per. (ft)	* 26.33	* 55.35	* 8.46 *
* Min Ch El (ft)	* 2136.43	* Shear (lb/sq ft)	* 2.51	* 8.09	* 2.79 *
* Alpha	* 1.12	* Stream Power (lb/ft s)	*10103.46	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 8.99	* Cum Volume (acre-ft)	* 33.87	* 128.56	* 31.70 *
* C & E Loss (ft)	* 0.17	* Cum SA (acres)	* 10.60	* 20.41	* 9.83 *

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
[redacted]ing: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 2.929

INPUT
Description: 2.929
Station Elevation Data num= 57

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
[redacted]9	2142.63	9725.54	2142.26	9751.02	2140.31	9782	2138.03	9788.59	2137.55
[redacted],2	2137.44	9792.45	2137.26	9796.34	2136.87	9829.09	2134.06	9837.23	2133.29
9844.34	2131.65	9847.54	2131.28	9857.72	2131	9859.28	2131.27	9870.58	2131.24
9880.59	2131.23	9881.56	2131.36	9891.06	2132.26	9894.18	2132.3	9896.32	2132.33
9915.98	2132.43	9916.97	2132.45	9918.63	2132.48	9931.07	2132.72	9935.01	2132.7
9945.43	2132.62	9947.07	2132.6	9959.56	2132.46	9963.55	2132.39	9977.03	2131.28
9978.9	2130.7	9981.05	2129.81	9985.22	2128.64	9994.05	2128.34	9996.94	2128.23
9998.27	2128.14	9999.77	2127.99	10005.4	2130.79	100102132.74	910016.74	2135.62	
10019.75	2136.91	10024.33	2138.13	10025.73	2138.15	10039.99	2139.06	10048.11	2139.63
10057.19	2140.18	10093.49	2142.72	10103.25	2143.21	10106.79	2143.38	10107.87	2143.42
10109.18	2143.48	10110.84	2143.55	10113.04	2143.63	10116.14	2143.76	10120.89	2143.94
10129.25	2144.26	10136.01	2144.52						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9720.09	.066	9963.55	.066	10010	.066

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9963.55	10010	316.38	325.29 316.01	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2136.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.69	Wt. n-Val.	0.066	0.066	0.066
W.S. Elev (ft)	2135.32	Reach Len. (ft)	316.38	325.29	316.01
Crit W.S. (ft)		Flow Area (sq ft)	432.75	242.23	7.77
E.G. Slope (ft/ft)	0.014380	Area (sq ft)	432.75	242.23	7.77
Q Total (cfs)	4320.00	Flow (cfs)	2372.43	1924.09	23.48
Top Width (ft)	201.67	Top Width (ft)	149.17	46.45	6.04
Vel Total (ft/s)	6.33	Avg. Vel. (ft/s)	5.48	7.94	3.02
Max Chl Dpth (ft)	7.33	Hydr. Depth (ft)	2.90	5.21	1.29
Conv. Total (cfs)	36025.6	Conv. (cfs)	19784.2	16045.5	195.8
Length Wtd. (ft)	320.57	Wetted Per. (ft)	149.56	48.00	6.57
Min Ch El (ft)	2127.99	Shear (lb/sq ft)	2.60	4.53	1.06
Alpha	1.12	Stream Power (lb/ft s)	10136.01	0.00	0.00
Frctn Loss (ft)	4.69	Cum Volume (acre-ft)	68.01	111.92	50.76
C & E Loss (ft)	0.01	Cum SA (acres)	30.86	19.87	25.77

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.

[redacted] SECTION OUTPUT Profile #FW

Elev (ft)	2137.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.20	Wt. n-Val.	0.066	0.066	0.066
W.S. Elev (ft)	2136.09	Reach Len. (ft)	316.38	325.29	316.01
Crit W.S. (ft)		Flow Area (sq ft)	226.16	277.97	12.42
E.G. Slope (ft/ft)	0.018220	Area (sq ft)	226.16	277.97	12.42
Q Total (cfs)	4320.00	Flow (cfs)	1542.05	2724.32	53.63
Top Width (ft)	116.04	Top Width (ft)	63.55	46.45	6.04
Vel Total (ft/s)	8.36	Avg. Vel. (ft/s)	6.82	9.80	4.32
Max Chl Dpth (ft)	8.10	Hydr. Depth (ft)	3.56	5.98	2.06
Conv. Total (cfs)	32004.3	Conv. (cfs)	11424.1	20182.8	397.3
Length Wtd. (ft)	321.87	Wetted Per. (ft)	67.30	48.00	7.34
Min Ch El (ft)	2127.99	Shear (lb/sq ft)	3.82	6.59	1.93
Alpha	1.11	Stream Power (lb/ft s)	10136.01	0.00	0.00
Frctn Loss (ft)	4.77	Cum Volume (acre-ft)	32.36	125.13	31.53
C & E Loss (ft)	0.09	Cum SA (acres)	10.12	19.87	9.78

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 2.868

INPUT
Description: 2.868
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9849.93	2136.01	9863.81	2135.41	9869.68	2135.2	9887.6	2134.53	9888.13	2134.51
9888.44	2134.49	9911.5	2132.76	9913.37	2132.64	9922.77	2131.97	9949.58	2130.03
9952.42	2129.82	9955.39	2128.81	9956.76	2128.61	9963.72	2127.99	9970.07	2127.69
9970.73	2127.64	9973.39	2127.19	9975.78	2126.86	9978.91	2126.51	9982.25	2125.34
9987.61	2123.39	9988.64	2123.36	10004.82	2123.78	10005.15	2123.77	10005.55	2123.81
10006.97	2124.25	10018.53	212810019.65		2128.01	10025.38	2127.81	10028.71	2127.62
10043.02	2127.44	10070.3	2127.39	10075.92	2127.27	10092.46	2127.29	10104.62	2127.35
10114.5	2127.42	10127.58	2128.06	10127.72	2128.08	10142.22	2131.21	10159.99	2132.89
10183.34	2134.75	10222.85	2137.19	10231.5	2137.78	10232.55	2137.87	10271.97	2139.93

Manning's n Values num= 3

[redacted]Sta	n Val	Sta	n Val	Sta	n Val
[redacted]3	.066	9970.07	.066	10018.53	.066

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9970.07	10018.53	290.13	323.25 354.66	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2131.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.78	Wt. n-Val.	0.066	0.066	0.066
W.S. Elev (ft)	2130.55	Reach Len. (ft)	290.13	323.25	354.66

* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 42.59	* 264.85	* 349.65 *
* [redacted] Slope (ft/ft)	*0.014866	* Area (sq ft)	* 42.59	* 264.85	* 349.65 *
* [redacted]al (cfs)	* 4320.00	* Flow (cfs)	* 155.15	* 2216.59	* 1948.26 *
* [redacted]idth (ft)	* 196.70	* Top Width (ft)	* 27.62	* 48.46	* 120.61 *
* Vel Total (ft/s)	* 6.57	* Avg. Vel. (ft/s)	* 3.64	* 8.37	* 5.57 *
* Max Chl Dpth (ft)	* 7.19	* Hydr. Depth (ft)	* 1.54	* 5.47	* 2.90 *
* Conv. Total (cfs)	* 35431.1	* Conv. (cfs)	* 1272.5	* 18179.7	* 15979.0 *
* Length Wtd. (ft)	* 324.86	* Wetted Per. (ft)	* 27.87	* 49.75	* 120.91 *
* Min Ch El (ft)	* 2123.36	* Shear (lb/sq ft)	* 1.42	* 4.94	* 2.68 *
* Alpha	* 1.17	* Stream Power (lb/ft s)	*10271.97	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 5.41	* Cum Volume (acre-ft)	* 66.28	* 110.03	* 49.47 *
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 30.22	* 19.51	* 25.31 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2132.43	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.89	* Wt. n-Val.	* 0.066	* 0.066	* 0.066 *
* W.S. Elev (ft)	* 2131.53	* Reach Len. (ft)	* 290.13	* 323.25	* 354.66 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 60.34	* 312.69	* 226.77 *
* E.G. Slope (ft/ft)	*0.012308	* Area (sq ft)	* 60.34	* 312.69	* 226.77 *
* Q Total (cfs)	* 4320.00	* Flow (cfs)	* 296.87	* 2659.80	* 1363.33 *
* Top Width (ft)	* 125.00	* Top Width (ft)	* 20.07	* 48.46	* 56.47 *
* Vel Total (ft/s)	* 7.20	* Avg. Vel. (ft/s)	* 4.92	* 8.51	* 6.01 *
* Max Chl Dpth (ft)	* 8.17	* Hydr. Depth (ft)	* 3.01	* 6.45	* 4.02 *
* Conv. Total (cfs)	* 38939.7	* Conv. (cfs)	* 2675.9	* 23975.0	* 12288.8 *
* Length Wtd. (ft)	* 327.17	* Wetted Per. (ft)	* 21.83	* 49.75	* 60.72 *
* Min Ch El (ft)	* 2123.36	* Shear (lb/sq ft)	* 2.12	* 4.83	* 2.87 *
* Alpha	* 1.11	* Stream Power (lb/ft s)	*10271.97	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 5.09	* Cum Volume (acre-ft)	* 31.32	* 122.92	* 30.66 *
* C & E Loss (ft)	* 0.05	* Cum SA (acres)	* 9.82	* 19.51	* 9.55 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 2.807

[redacted]tion: 2.807
St[redacted]. Elevation Data num= 63

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9727.05	2133.98	9730.89	2133.89	9744.08	2133.54	9764.97	2132.05	9771.14	2131.71
9795.12	2130.81	9799.88	2130.65	9804.36	2130.32	9820.86	2129.22	9835.72	2127.23
9839.97	2126.66	9841.81	2126.37	9846.81	2125.99	9879.47	2123.82	9883.03	2123.3
9890.84	2121.84	9895.44	2121.03	9896.9	2120.65	9904.67	2122.01	9907.08	2122.27
9907.87	2122.51	9909.03	2122.46	9924.97	2121.52	9925.92	2121.57	9932.32	2122.28
9937.06	2122.51	9939.04	2122.59	9949.97	2123	9958.04	2123.27	9959.15	2123.18
9968.78	2121.59	9975.13	2120.46	9977.23	2120.43	9981.02	2120.45	9986.68	2120.29
9990.96	2120.4	9997.72	2120.32	9999.08	2120.5	10008.29	2119.94	10019.17	2119.66
10022.21	2119.6	10024.07	2119.81	10030.1	2120.51	10037.04	2121.91	10050.08	2123.8
10053.15	2124.28	10054.52	2124.44	10059.97	2125.11	10068.57	2125.42	10086.35	2126.27
10099.77	2126.76	10121.38	2127.51	10124.98	2127.87	10147.07	2129	10154.05	2129.47
10168.22	2130.6	10182.6	2131.95	10193.19	2133.77	10216.78	2137.53	10219.4	2137.95
10219.96	2138.02	10221.55	2138.22	10222.27	2138.33				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9727.05	.066	9958.04	.066	10050.08	.066

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9958.04 10050.08 245.08 251.85 248.16 .1 .3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2125.91	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.82	* Wt. n-Val.	* 0.066	* 0.066	* 0.066 *
* W.S. Elev (ft)	* 2125.09	* Reach Len. (ft)	* 245.08	* 251.85	* 248.16 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 233.66	* 381.37	* 5.99 *
* E.G. Slope (ft/ft)	*0.018787	* Area (sq ft)	* 233.66	* 381.37	* 5.99 *
* Q Total (cfs)	* 4320.00	* Flow (cfs)	* 1284.22	* 3022.57	* 13.21 *
* Top Width (ft)	* 199.58	* Top Width (ft)	* 97.71	* 92.04	* 9.82 *
* Vel Total (ft/s)	* 6.96	* Avg. Vel. (ft/s)	* 5.50	* 7.93	* 2.21 *
* Max Chl Dpth (ft)	* 5.49	* Hydr. Depth (ft)	* 2.39	* 4.14	* 0.61 *
* Conv. Total (cfs)	* 31517.9	* Conv. (cfs)	* 9369.4	* 22052.1	* 96.4 *
* Length Wtd. (ft)	* 249.34	* Wetted Per. (ft)	* 98.31	* 92.65	* 9.91 *
* Min Ch El (ft)	* 2119.60	* Shear (lb/sq ft)	* 2.79	* 4.83	* 0.71 *
* Alpha	* 1.09	* Stream Power (lb/ft s)	*10222.27	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 4.22	* Cum Volume (acre-ft)	* 65.36	* 107.63	* 48.02 *
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 29.81	* 18.99	* 24.78 *

[redacted]: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2127.29	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.35	* Wt. n-Val.	* 0.066	* 0.066	* 0.066 *
* W.S. Elev (ft)	* 2125.94	* Reach Len. (ft)	* 245.08	* 251.85	* 248.16 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 0.11	* 459.65	* 7.21 *
* E.G. Slope (ft/ft)	*0.020332	* Area (sq ft)	* 0.11	* 459.65	* 7.21 *

* Q Total (cfs)	* 4320.00	* Flow (cfs)	* 0.04	* 4292.31	* 27.65	*
* [redacted]Width (ft)	* 96.00	* Top Width (ft)	* 0.04	* 92.04	* 3.92	*
* [redacted]otal (ft/s)	* 9.25	* Avg. Vel. (ft/s)	* 0.37	* 9.34	* 3.83	*
* [redacted]hl Dpth (ft)	* 6.34	* Hydr. Depth (ft)	* 2.67	* 4.99	* 1.84	*
* Conv. Total (cfs)	* 30296.4	* Conv. (cfs)	* 0.3	* 30102.2	* 193.9	*
* Length Wtd. (ft)	* 250.98	* Wetted Per. (ft)	* 2.71	* 92.65	* 5.53	*
* Min Ch El (ft)	* 2119.60	* Shear (lb/sq ft)	* 0.05	* 6.30	* 1.66	*
* Alpha	* 1.01	* Stream Power (lb/ft s)	*10222.27	* 0.00	* 0.00	*
* Frctn Loss (ft)	* 4.27	* Cum Volume (acre-ft)	* 31.12	* 120.06	* 29.71	*
* C & E Loss (ft)	* 0.12	* Cum SA (acres)	* 9.75	* 18.99	* 9.30	*

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 2.759

INPUT
Description: 2.759
Station Elevation Data num= 88

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9724.38	2127.77	9726.52	2127.67	9743.98	2126.74	9756.18	2125.94	9764.4	2125.22
9774.3	2124.66	9786.73	2123.8	9797.43	2123.15	9809.62	2121.8	9817.05	2121
9826.15	2117.82	9837.49	2115.8	9839.06	2115.46	9846.67	2116.08	9847.53	2116.12
9848.36	2116.22	9870.15	2118.39	9875.28	2118.94	9885.8	2119.07	9893.36	2119.11
9909.19	2119.07	9915.98	2118.89	9917.47	2118.85	9944.37	2118.6	9946.13	2118.58
9946.65	2118.52	9949.04	2118.19	9958.02	2116.88	9959.69	2116.87	9968.06	2116.23
9971.88	2116.57	9974.29	2116.39	9981.14	2116.57	9985.48	2116.08	9996.03	2114.96
10005.39	2114.59	10009.44	2116.46	10012.16	2117.96	10014.53	2119.64	10019.64	2119.92
10022.21	2120.05	10025.3	2120.21	10028.01	2120.44	10031.06	2120.83	10057.63	2121.12
10059.31	2121.14	10060.05	2121.15	10071.71	2121.37	10073.03	2121.42	10074.69	2121.49
10076.75	2121.57	10083.36	2121.96	10085.55	2122.03	10088.09	2122.11	10090.91	2122.18
10091.83	2122.26	10092.66	2122.32	10095.54	2122.39	10096.28	2122.43	10098.65	2122.44
10099.44	2122.48	10101.76	2122.49	10102.64	2122.52	10104.88	2122.54	10105.92	2122.56
10108.05	2122.58	10109.29	2122.61	10111.27	2122.62	10114.57	2122.65	10116.21	2122.7
10117.8	2122.72	10119.74	2122.79	10122	2122.87	10124.46	2122.99	10127.11	2123.09
10130.33	2123.22	10134.45	2123.39	10134.95	2123.41	10136.82	2123.49	10138.37	2123.59
10140.38	2123.73	10151.15	2124.3	10153	2124.34	10154.29	2124.41	10160.17	2124.55
10196.34	2125.57	10212.03	2126	10236.2	2126.2				

M[redacted]ng's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9724.38	.066	9944.37	.066	10012.16	.066

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9944.37	10012.16	236.22	242.05 243.81	.1	.3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2121.66	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.70	* Wt. n-Val.	* 0.066	* 0.066	* 0.066 *
* W.S. Elev (ft)	* 2120.95	* Reach Len. (ft)	* 236.22	* 242.05	* 243.81 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 348.71	* 312.19	* 19.50 *
* E.G. Slope (ft/ft)	*0.015336	* Area (sq ft)	* 348.71	* 312.19	* 19.50 *
* Q Total (cfs)	* 4320.00	* Flow (cfs)	* 1895.40	* 2384.49	* 40.11 *
* Top Width (ft)	* 225.15	* Top Width (ft)	* 127.19	* 67.79	* 30.17 *
* Vel Total (ft/s)	* 6.35	* Avg. Vel. (ft/s)	* 5.44	* 7.64	* 2.06 *
* Max Chl Dpth (ft)	* 6.36	* Hydr. Depth (ft)	* 2.74	* 4.61	* 0.65 *
* Conv. Total (cfs)	* 34884.2	* Conv. (cfs)	* 15305.4	* 19254.9	* 323.9 *
* Length Wtd. (ft)	* 239.32	* Wetted Per. (ft)	* 128.11	* 68.85	* 30.76 *
* Min Ch El (ft)	* 2114.59	* Shear (lb/sq ft)	* 2.61	* 4.34	* 0.61 *
* Alpha	* 1.12	* Stream Power (lb/ft s)	*10236.20	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 4.04	* Cum Volume (acre-ft)	* 63.73	* 105.63	* 47.95 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 29.17	* 18.53	* 24.66 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2122.90	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.94	* Wt. n-Val.	* 0.066	* 0.066	* 0.066 *
* W.S. Elev (ft)	* 2121.95	* Reach Len. (ft)	* 236.22	* 242.05	* 243.81 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 195.46	* 379.93	* 8.55 *
* E.G. Slope (ft/ft)	*0.014464	* Area (sq ft)	* 195.46	* 379.93	* 8.55 *
* Q Total (cfs)	* 4320.00	* Flow (cfs)	* 1077.08	* 3212.44	* 30.48 *
* Top Width (ft)	* 135.00	* Top Width (ft)	* 64.37	* 67.79	* 2.84 *
* Vel Total (ft/s)	* 7.40	* Avg. Vel. (ft/s)	* 5.51	* 8.46	* 3.56 *
* Max Chl Dpth (ft)	* 7.36	* Hydr. Depth (ft)	* 3.04	* 5.60	* 3.01 *
* Conv. Total (cfs)	* 35919.7	* Conv. (cfs)	* 8955.7	* 26710.6	* 253.4 *
* Length Wtd. (ft)	* 240.44	* Wetted Per. (ft)	* 67.33	* 68.85	* 5.66 *
* Min Ch El (ft)	* 2114.59	* Shear (lb/sq ft)	* 2.62	* 4.98	* 1.36 *
* [redacted]pha	* 1.11	* Stream Power (lb/ft s)	*10236.20	* 0.00	* 0.00 *
* [redacted] Loss (ft)	* 4.07	* Cum Volume (acre-ft)	* 30.57	* 117.63	* 29.66 *
* [redacted] Loss (ft)	* 0.03	* Cum SA (acres)	* 9.57	* 18.53	* 9.28 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek

REACH: Main Reach RS: 2.713

I[redacted]
De[redacted]tion: 2.713, ineffective area at station 10065.4 for tributary flow
Station Elevation Data num= 66

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9758.15	2123.28	9762.11	2122.97	9767.33	2122.59	9777.76	2121.76	9781.18	2121.48
9788.22	2120.82	9793.7	2120.39	9809.54	2118.78	9815.2	2118.25	9820.33	2117.59
9824.3	2117.01	9832.78	2116.84	9841.53	2116.85	9850.04	2117.06	9853.36	2116.19
9858.01	2115	9864.84	2113.25	9866.42	2112.82	9867.12	2112.68	9875.32	2112.79
9875.83	2112.86	9884.03	2113.09	9893.9	2113.72	9907.96	2114.01	9914.97	2114.15
9917.02	2114.18	9962.51	2113.36	9968.06	2113.24	9970.96	2112.92	9980.69	2112.46
9988.77	2111.36	9992.93	2110.8410000.98		2110.8810007.44		2112.8610009.02		2113.34
10014.11	2113.3910016.81		2113.4210017.91		2113.4810021.97		2113.9510034.62		2115.56
10035.82	2115.6810040.92		2116.210054.43		2116.7110054.95		2116.7410055.32		2116.75
10056.04	2116.76	10056.9	2116.810065.49		2117.1210066.22		2117.04	10066.7	2117.06
10070.14	2116.9410071.47		2116.9910072.91		2117.0710073.39		2117.0910075.05		2116.99
10075.21	211710079.15		2116.4610079.77		2116.4310080.67		2116.3110084.06		2116.4
10085.76	2116.4410086.01		2116.5910088.64		2118.2410091.33		2118.3410097.93		2117.87
10101.24	2117.64								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9758.15	.066	9968.06	.06610009.02		.066

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9968.0610009.02 197.96 201.17 187.64 .1 .3
Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
10065.4910101.24	2117.12		T

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2117.59	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.83	* Wt. n-Val.	* 0.066	* 0.066	* 0.066 *
* W.S. Elev (ft)	* 2116.77	* Reach Len. (ft)	* 197.96	* 201.17	* 187.64 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 352.52	* 198.09	* 77.65 *
* E.G. Slope (ft/ft)	*0.018694	* Area (sq ft)	* 352.52	* 198.09	* 80.61 *
* Q Total (cfs)	* 4320.00	* Flow (cfs)	* 2257.82	* 1729.59	* 332.59 *
* Top Width (ft)	* 214.35	* Top Width (ft)	* 116.89	* 40.96	* 56.50 *
* Vel Total (ft/s)	* 6.88	* Avg. Vel. (ft/s)	* 6.40	* 8.73	* 4.28 *
* Max Chl Dpth (ft)	* 5.93	* Hydr. Depth (ft)	* 3.02	* 4.84	* 1.65 *
* Conv. Total (cfs)	* 31596.3	* Conv. (cfs)	* 16513.6	* 12650.1	* 2432.6 *
* [redacted]rth Wtd. (ft)	* 198.98	* Wetted Per. (ft)	* 117.45	* 41.46	* 47.31 *
* [redacted]h El (ft)	* 2110.84	* Shear (lb/sq ft)	* 3.50	* 5.58	* 1.92 *
* [redacted]	* 1.13	* Stream Power (lb/ft s)	*10101.24	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 2.83	* Cum Volume (acre-ft)	* 61.82	* 104.21	* 47.67 *
* C & E Loss (ft)	* 0.11	* Cum SA (acres)	* 28.51	* 18.23	* 24.42 *

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2118.80	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.23	* Wt. n-Val.	* 0.066	* 0.066	* 0.066 *
* W.S. Elev (ft)	* 2117.57	* Reach Len. (ft)	* 197.96	* 201.17	* 187.64 *
* Crit W.S. (ft)	* 2116.81	* Flow Area (sq ft)	* 196.48	* 230.94	* 75.08 *
* E.G. Slope (ft/ft)	*0.020081	* Area (sq ft)	* 196.48	* 230.94	* 75.08 *
* Q Total (cfs)	* 4320.00	* Flow (cfs)	* 1474.62	* 2315.01	* 530.38 *
* Top Width (ft)	* 112.00	* Top Width (ft)	* 51.06	* 40.96	* 19.98 *
* Vel Total (ft/s)	* 8.60	* Avg. Vel. (ft/s)	* 7.51	* 10.02	* 7.06 *
* Max Chl Dpth (ft)	* 6.73	* Hydr. Depth (ft)	* 3.85	* 5.64	* 3.76 *
* Conv. Total (cfs)	* 30485.2	* Conv. (cfs)	* 10406.0	* 16336.5	* 3742.7 *
* Length Wtd. (ft)	* 199.79	* Wetted Per. (ft)	* 54.46	* 41.46	* 22.79 *
* Min Ch El (ft)	* 2110.84	* Shear (lb/sq ft)	* 4.52	* 6.98	* 4.13 *
* Alpha	* 1.07	* Stream Power (lb/ft s)	*10101.24	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 3.12	* Cum Volume (acre-ft)	* 29.51	* 115.93	* 29.43 *
* C & E Loss (ft)	* 0.13	* Cum SA (acres)	* 9.26	* 18.23	* 9.22 *

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 2.675

[redacted]tion: 2.675
[redacted] Elevation Data num= 59

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9889.48	2125.71	9899.98	2124.19	9902.28	2124	9913.97	2122.1	9915.28	2122
9928.12	2116.87	9932.28	2116	9933.63	2114.89	9937.28	2114	9944.21	2110.82
9944.69	2110.61	9944.98	2110.49	9945.45	2110.37	9950.08	2108	9950.53	2107.77
9950.66	2107.76	9956.23	2107.24	9956.69	2107.03	9958.04	2107.11	9959.18	2107.13
9962.07	2107.73	9966.82	2107.87	9968.78	2107.89	9975.61	2107.57	9981.47	2107.54
9983.86	2107.53	9986.19	2107.58	9986.68	2107.3	9990.01	2107.4610000.56		2107.55
10004.28	210810010.39		2110.7610011.08		2111.0110012.36		2111.410015.94		2111.42

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10026.55 2112.2710030.78    211210034.75 2112.7910038.76 2112.9310042.06 2112.92
 1[redacted]4 2112.4210054.04 2111.6710063.77 2110.7110065.49 2110.5310066.19 2110.45
10[redacted]8    211010072.59 2109.5410083.38 2108.4310084.32 2109.2310087.15 2108.99
10[redacted].6 2109.0710088.99 2109.3310093.81 2110.4110101.98  2112.7 10103.1 2112.85
10107.67 2113.1410110.91  2113.310120.25 2113.6510132.22 2113.51

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
 9889.48    .038 9944.21    .03810010.39    .071

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9944.2110010.39           342.81  320.13  277.54            .1       .3

CROSS SECTION OUTPUT  Profile #Q100
*************************************************************************************************
* E.G. Elev (ft)         * 2114.66  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.88  * Wt. n-Val.             *   0.038  *   0.038  *   0.071  *
* W.S. Elev (ft)         * 2112.78  * Reach Len. (ft)        *  342.81  *  320.13  *  277.54  *
* Crit W.S. (ft)         * 2112.78  * Flow Area (sq ft)      *    4.20  *  322.87  *  152.92  *
* E.G. Slope (ft/ft)     *0.011149  * Area (sq ft)           *    4.20  *  322.87  *  152.92  *
* Q Total (cfs)          * 4320.00  * Flow (cfs)             *   16.09  * 3775.63  *  528.29  *
* Top Width (ft)         *  154.16  * Top Width (ft)         *    4.28  *   66.18  *   83.70  *
* Vel Total (ft/s)       *    9.00  * Avg. Vel. (ft/s)       *    3.83  *   11.69  *    3.45  *
* Max Chl Dpth (ft)      *    5.75  * Hydr. Depth (ft)       *    0.98  *    4.88  *    1.83  *
* Conv. Total (cfs)      * 40913.9  * Conv. (cfs)            *   152.4  * 35758.2  *  5003.3  *
* Length Wtd. (ft)       *  316.87  * Wetted Per. (ft)       *    4.71  *   67.73  *   84.96  *
* Min Ch El (ft)         * 2107.03  * Shear (lb/sq ft)       *    0.62  *    3.32  *    1.25  *
* Alpha                  *    1.49  * Stream Power (lb/ft s) *10132.22  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    2.56  * Cum Volume (acre-ft)   *   61.01  *  103.01  *   47.16  *
* C & E Loss (ft)        *    0.01  * Cum SA (acres)         *   28.24  *   17.98  *   24.12  *
*************************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
         for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
         water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The program
         defaulted to critical depth.

CROSS SECTION OUTPUT  Profile #FW
*************************************************************************************************
* E.G. Elev (ft)         * 2115.55  * Element                * Left OB *  Channel * Right OB *
* [redacted] Head (ft)   *    2.53  * Wt. n-Val.             *   0.038  *   0.038  *   0.071  *
* [redacted] Elev (ft)   * 2113.01  * Reach Len. (ft)        *  342.81  *  320.13  *  277.54  *
* [redacted] W.S. (ft)   * 2113.01  * Flow Area (sq ft)      *    0.45  *  337.92  *    1.31  *
* E.G. Slope (ft/ft)     *0.012523  * Area (sq ft)           *    0.45  *  337.92  *    1.31  *
* Q Total (cfs)          * 4320.00  * Flow (cfs)             *    0.66  * 4317.45  *    1.90  *
* Top Width (ft)         *   67.00  * Top Width (ft)         *    0.21  *   66.18  *    0.61  *
* Vel Total (ft/s)       *   12.72  * Avg. Vel. (ft/s)       *    1.46  *   12.78  *    1.45  *
* Max Chl Dpth (ft)      *    5.98  * Hydr. Depth (ft)       *    2.14  *    5.11  *    2.14  *
* Conv. Total (cfs)      * 38603.7  * Conv. (cfs)            *     5.9  * 38580.8  *   16.9  *
* Length Wtd. (ft)       *  318.95  * Wetted Per. (ft)       *    2.33  *   67.73  *    2.68  *
* Min Ch El (ft)         * 2107.03  * Shear (lb/sq ft)       *    0.15  *    3.90  *    0.38  *
* Alpha                  *    1.01  * Stream Power (lb/ft s) *10132.22  *    0.00  *    0.00  *
* Frctn Loss (ft)        *    2.13  * Cum Volume (acre-ft)   *   29.06  *  114.62  *   29.27  *
* C & E Loss (ft)        *    0.30  * Cum SA (acres)         *    9.14  *   17.98  *    9.18  *
*************************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
         for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
         water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The program
         defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth.  The program will try the cross section slice/secant
         method to find critical depth.

CROSS SECTION


RIVER: Rodger Creek
REACH: Main Reach         RS: 2.614

INPUT
Description: 2.614
Station Elevation Data    num=      53
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
**********************************************************************************
  9903.6 2120.36 9919.99 2120.23 9925.87 2119.75 9930.42 2119.12 9938.92 2115.81
 9942.84 2114.48 9956.43 2106.62 9960.57 2104.58 9963.28 2103.07  9975.3 2097.46
[redacted]6.56  2096.9  9980.3 2096.35 9992.24  2094.6 9995.52 2094.09 9999.18 2093.96
[redacted] 96 2093.9910003.12 2094.1410004.53 2094.41 10005.4 2094.4410011.24 2096.04
[redacted]  3 2096.9210015.28 2097.1710018.03 2097.9210021.75 2099.51   10024 2099.59
10[redacted].1 2099.99 10034.3 2100.0110035.16 2100.0510037.19  2100.4 10039.1 2100.78
10043.25 2101.6110044.17  2101.710054.79 2102.6610056.67 2102.8410060.68  2103.2
10075.72 2105.81 10078.5 2106.0110079.97 2105.8910084.09 2106.1610085.94 2106.26
10088.82 2106.3610095.08 2106.7210096.56 2106.8810097.23 2106.9810098.65 2107.25
10112.18  2107.410113.34 2107.39 10113.8  2107.410114.18 2107.4110158.24 2107.62
10160.05  2107.610169.76 2107.9210174.69 2107.97

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
```

9903.6 .038 9975.3 .03810018.03 .071

Ba[redacted]: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9975.310018.03 155.6 151.17 142.28 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2105.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.97	Wt. n-Val.	0.038	0.038	0.071
W.S. Elev (ft)	2103.12	Reach Len. (ft)	155.60	151.17	142.28
Crit W.S. (ft)	2102.29	Flow Area (sq ft)	34.33	328.75	90.69
E.G. Slope (ft/ft)	*0.006141	Area (sq ft)	34.33	328.75	90.69
Q Total (cfs)	4320.00	Flow (cfs)	197.23	3875.72	247.06
Top Width (ft)	96.61	Top Width (ft)	12.11	42.73	41.77
Vel Total (ft/s)	9.52	Avg. Vel. (ft/s)	5.75	11.79	2.72
Max Chl Dpth (ft)	9.16	Hydr. Depth (ft)	2.83	7.69	2.17
Conv. Total (cfs)	55127.1	Conv. (cfs)	2516.8	49457.7	3152.7
Length Wtd. (ft)	150.64	Wetted Per. (ft)	13.37	43.56	42.37
Min Ch El (ft)	2093.96	Shear (lb/sq ft)	0.98	2.89	0.82
Alpha	1.40	Stream Power (lb/ft s)	*10174.69	0.00	0.00
Frctn Loss (ft)	1.09	Cum Volume (acre-ft)	60.86	100.61	46.39
C & E Loss (ft)	0.05	Cum SA (acres)	28.17	17.58	23.72

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.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2105.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.54	Wt. n-Val.	0.038	0.038	0.071
W.S. Elev (ft)	2104.07	Reach Len. (ft)	155.60	151.17	142.28
Crit W.S. (ft)		Flow Area (sq ft)	28.49	369.42	98.99
E.G. Slope (ft/ft)	*0.004131	Area (sq ft)	28.49	369.42	98.99
Q Total (cfs)	4320.00	Flow (cfs)	144.02	3860.86	315.12
Top Width (ft)	72.00	Top Width (ft)	5.30	42.73	23.97
Vel Total (ft/s)	8.69	Avg. Vel. (ft/s)	5.05	10.45	3.18
Max Chl Dpth (ft)	10.11	Hydr. Depth (ft)	5.38	8.65	4.13
Conv. Total (cfs)	67215.4	Conv. (cfs)	2240.8	60071.6	4903.0
Length Wtd. (ft)	150.79	Wetted Per. (ft)	9.99	43.56	27.19
Min Ch El (ft)	2093.96	Shear (lb/sq ft)	0.74	2.19	0.94
Alpha	1.31	Stream Power (lb/ft s)	*10174.69	0.00	0.00
Frctn Loss (ft)	0.84	Cum Volume (acre-ft)	28.95	112.02	28.95
C & E Loss (ft)	0.11	Cum SA (acres)	9.12	17.58	9.10

[redacted]: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 2.586

INPUT
Description: 2.586
Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9940.2	2113.97	9942.68	2113.98	9943.91	2113.63	9955.58	2108.41	9967.52	2102.7
9977.82	2097.22	9981.08	2096.12	9987.48	2093.95	9988.12	2093.78	9994.61	2093.55
9998.43	2093.48	10009.4	2093.73	10011.69	2093.78	10016.72	2095.58	10021.33	2097.01
10031	2097.51	10031.75	2097.58	10032.06	2097.57	10033.59	2097.89	10040.6	2099.07
10042.08	2099.32	10049.75	2099.63	10058.34	2100.62	10059.91	2100.84	10060.98	2100.94
10066.28	2102.02	10076.17	2103.93	10087.46	2103.72	10091.11	2103.76	10094.13	2103.69
10098.26	2103.65	10112.29	2103.41	10124.35	2102.59	10132.59	2102.84	10145.16	2103.14
10149.11	2103.21	10152.24	2103.23	10157.43	2103.86	10158.51	210410	160.81	2104.3
10175.5	2104.23	10180.01	2104.48	10192.41	2107.42	10199.33	2108.73	10204.06	2109.59
10205.8	2109.68	10209.79	2109.78						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9940.2	.038	9981.08	.03810016.72		.071

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9981.0810016.72 295.96 297.19 302.11 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2103.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.49	Wt. n-Val.	0.038	0.038	0.071
W.S. Elev (ft)	2101.46	Reach Len. (ft)	295.96	297.19	302.11
Crit W.S. (ft)	2101.46	Flow Area (sq ft)	32.49	264.76	127.59
E.G. Slope (ft/ft)	*0.008636	Area (sq ft)	32.49	264.76	127.59
Q Total (cfs)	4320.00	Flow (cfs)	223.61	3615.74	480.66
Top Width (ft)	93.67	Top Width (ft)	11.23	35.64	46.80
Vel Total (ft/s)	10.17	Avg. Vel. (ft/s)	6.88	13.66	3.77
[redacted] Chl Dpth (ft)	7.98	Hydr. Depth (ft)	2.89	7.43	2.73
[redacted] Total (cfs)	46487.5	Conv. (cfs)	2406.2	38908.9	5172.3
[redacted]h Wtd. (ft)	298.00	Wetted Per. (ft)	12.46	36.34	47.32
Min Ch El (ft)	2093.48	Shear (lb/sq ft)	1.41	3.93	1.45
Alpha	1.55	Stream Power (lb/ft s)	*10209.79	0.00	0.00
Frctn Loss (ft)	2.89	Cum Volume (acre-ft)	60.74	99.58	46.03
C & E Loss (ft)	0.36	Cum SA (acres)	28.13	17.44	23.57

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Wa[redacted]r: 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.
Wa[redacted]: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2104.66	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.68	Wt. n-Val.	0.038	0.038	0.071
W.S. Elev (ft)	2101.97	Reach Len. (ft)	295.96	297.19	302.11
Crit W.S. (ft)	2101.30	Flow Area (sq ft)	28.58	283.17	53.52
E.G. Slope (ft/ft)	*0.007973	Area (sq ft)	28.58	283.17	53.52
Q Total (cfs)	4320.00	Flow (cfs)	202.51	3885.85	231.64
Top Width (ft)	52.00	Top Width (ft)	6.08	35.64	10.28
Vel Total (ft/s)	11.83	Avg. Vel. (ft/s)	7.08	13.72	4.33
Max Chl Dpth (ft)	8.49	Hydr. Depth (ft)	4.70	7.95	5.21
Conv. Total (cfs)	48382.2	Conv. (cfs)	2268.0	43519.9	2594.3
Length Wtd. (ft)	297.54	Wetted Per. (ft)	9.89	36.34	15.18
Min Ch El (ft)	2093.48	Shear (lb/sq ft)	1.44	3.88	1.75
Alpha	1.24	Stream Power (lb/ft s)	*10209.79	0.00	0.00
Frctn Loss (ft)	2.96	Cum Volume (acre-ft)	28.84	110.89	28.70
C & E Loss (ft)	0.17	Cum SA (acres)	9.10	17.44	9.04

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 2.529

INPUT
Description: 2.529 Levee placed at station 9930.56 to keep flow in main channel
Station Elevation Data num= 59

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9775.29	2101.28	9775.98	2101.17	9779.7	2100.92	9794.52	2099.84	9800.36	2099.5
[redacted]67	2099.48	9810.47	2099.09	9825.53	2098.33	9829.89	2098.07	9836.74	2098.1
[redacted]19	2098.52	9873.01	2099.12	9893.05	2100.04	9894.12	2100.13	9895.68	2100.05
[redacted]3	2099.24	9900.78	2099.53	9907.5	2099.75	9915.85	2099.98	9922.48	2100.2
9[redacted]6	2100.55	9933.53	2100.37	9936.05	2100.01	9942.33	2099.54	9953.43	2098.54
9954.92	2098.43	9968.87	2097.37	9970.41	2097.26	9970.522	097.256	9972.63	2097.17
9974.52	2096	9986.06	2093	9988.95	2091.54	9994.32	2090.93	9999.34	2089.42
10009.55	2089.791	0012.69	2090	10023.04	2091.761	0027.23	2092.641	0034.47	2093.78
10039.91	2093.731	0041.71	2093.681	0047.09	2093.971	0050.92	2094.531	0051.12	2094.58
10052.52	2094.941	0053.39	2094.96	10054	2095.111	0063.74	2095.811	0075.98	2096.93
10083.23	2098.661	0092.41	2100.831	0097.97	2102.42	10108.3	2103.661	0115.48	2104.09
10126.97	2104.881	0129.65	2105.031	0137.22	2105.64	10145.2	2105.97		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9775.29	.071	9988.95	.05	9100	23.04 .071

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9988.95 10023.04 390.01 448.64 471.99 .1 .3
Left Levee Station= 9930.56 Elevation= 2100.55

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2099.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.30	Wt. n-Val.	0.071	0.059	0.071
W.S. Elev (ft)	2098.50	Reach Len. (ft)	390.01	448.64	471.99
Crit W.S. (ft)	2097.17	Flow Area (sq ft)	80.88	277.52	212.66
E.G. Slope (ft/ft)	*0.010947	Area (sq ft)	80.88	277.52	212.66
Q Total (cfs)	4320.00	Flow (cfs)	303.24	2935.28	1081.48
Top Width (ft)	128.59	Top Width (ft)	34.98	34.09	59.52
Vel Total (ft/s)	7.56	Avg. Vel. (ft/s)	3.75	10.58	5.09
Max Chl Dpth (ft)	9.08	Hydr. Depth (ft)	2.31	8.14	3.57
Conv. Total (cfs)	41289.5	Conv. (cfs)	2898.3	28054.7	10336.6
Length Wtd. (ft)	445.87	Wetted Per. (ft)	36.09	34.51	60.08
Min Ch El (ft)	2089.42	Shear (lb/sq ft)	1.53	5.50	2.42
Alpha	1.46	Stream Power (lb/ft s)	*10145.20	9930.56	0.00
Frctn Loss (ft)	5.99	Cum Volume (acre-ft)	60.36	97.73	44.85
C & E Loss (ft)	0.02	Cum SA (acres)	27.97	17.20	23.21

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

[redacted]S SECTION OUTPUT Profile #FW

[redacted] Elev (ft)	2101.53	Element	Left OB	Channel	Right OB
[redacted]ead (ft)	2.11	Wt. n-Val.	0.071	0.059	0.071
W.S. Elev (ft)	2099.42	Reach Len. (ft)	390.01	448.64	471.99
Crit W.S. (ft)	2097.63	Flow Area (sq ft)	21.04	308.74	72.50
E.G. Slope (ft/ft)	*0.012748	Area (sq ft)	21.04	308.74	72.50
Q Total (cfs)	4320.00	Flow (cfs)	83.29	3783.41	453.30
Top Width (ft)	48.00	Top Width (ft)	2.95	34.09	10.96
Vel Total (ft/s)	10.74	Avg. Vel. (ft/s)	3.96	12.25	6.25
Max Chl Dpth (ft)	10.00	Hydr. Depth (ft)	7.13	9.06	6.62
Conv. Total (cfs)	38262.0	Conv. (cfs)	737.7	33509.4	4014.8

* Min Ch El (ft)	* 2089.42	* Shear (lb/sq ft)	* 1.73	* 7.12	* 3.43 *
* [redacted]	* 1.18	* Stream Power (lb/ft s)	*10145.20	* 9930.56	* 0.00 *
* [redacted] Loss (ft)	* 6.87	* Cum Volume (acre-ft)	* 28.67	* 108.87	* 28.26 *
* [redacted] Loss (ft)	* 0.03	* Cum SA (acres)	* 9.07	* 17.20	* 8.97 *

Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 2.444

INPUT
Description: 2.444
Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9687.29	2099.21	9706.59	2098.39	9707.75	2098.31	9755.49	2095.63	9760.6	2095.45
9762.2	2095.33	9806.02	2094.88	9834.81	2094.57	9836.46	2094.53	9837.42	2094.46
9858.2	2093.34	9885.19	2091.82	9888.15	2091.63	9912.95	2090.56	9935.16	2089.59
9940	2089.43	9942.65	2089.19	9945.16	2088.95	9953.01	2088	9963.42	2086.74
9966.05	2086.43	9966.84	2086.39	9967.1	2086.37	9984.89	2085.65	9990.47	2086.35
9993.4	2086.57	9998.74	2085.39	10003.36	2085.74	10004.73	2086.34	10011.38	2087.89
10018.35	2090.63	10026.56	2093.87	10030.67	2095.55	10034.74	2095.49	10053.22	2095.41
10079.19	2095.54	10097.44	2095.62	10104.91	2095.78	10138.82	2095.89	10143.05	2095.9

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9687.29	.071	9953.01	.059	10011.38	.071

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9953.01	10011.38	308.47	260.45	219.29	.1 .3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2093.79	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.51	* Wt. n-Val.	* 0.071	* 0.059	* 0.071 *
* W.S. Elev (ft)	* 2092.28	* Reach Len. (ft)	* 308.47	* 260.45	* 219.29 *
* Crit W.S. (ft)	* 2091.92	* Flow Area (sq ft)	* 141.01	* 343.41	* 24.49 *
* [redacted] Slope (ft/ft)	*0.016861	* Area (sq ft)	* 141.01	* 343.41	* 24.49 *
* [redacted] al (cfs)	* 4320.00	* Flow (cfs)	* 578.04	* 3634.78	* 107.18 *
* [redacted] idth (ft)	* 145.49	* Top Width (ft)	* 75.97	* 58.37	* 11.15 *
* Vel Total (ft/s)	* 8.49	* Avg. Vel. (ft/s)	* 4.10	* 10.58	* 4.38 *
* Max Chl Dpth (ft)	* 6.89	* Hydr. Depth (ft)	* 1.86	* 5.88	* 2.20 *
* Conv. Total (cfs)	* 33268.8	* Conv. (cfs)	* 4451.6	* 27991.8	* 825.4 *
* Length Wtd. (ft)	* 262.54	* Wetted Per. (ft)	* 76.12	* 58.98	* 11.98 *
* Min Ch El (ft)	* 2085.39	* Shear (lb/sq ft)	* 1.95	* 6.13	* 2.15 *
* Alpha	* 1.35	* Stream Power (lb/ft s)	*10143.05	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 4.20	* Cum Volume (acre-ft)	* 59.36	* 94.53	* 43.57 *
* C & E Loss (ft)	* 0.09	* Cum SA (acres)	* 27.48	* 16.73	* 22.82 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2094.64	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 2.02	* Wt. n-Val.	* 0.071	* 0.059	* 0.071 *
* W.S. Elev (ft)	* 2092.62	* Reach Len. (ft)	* 308.47	* 260.45	* 219.29 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 13.34	* 363.05	* 14.53 *
* E.G. Slope (ft/ft)	*0.018672	* Area (sq ft)	* 13.34	* 363.05	* 14.53 *
* Q Total (cfs)	* 4320.00	* Flow (cfs)	* 57.14	* 4196.45	* 66.42 *
* Top Width (ft)	* 65.00	* Top Width (ft)	* 3.01	* 58.37	* 3.62 *
* Vel Total (ft/s)	* 11.05	* Avg. Vel. (ft/s)	* 4.28	* 11.56	* 4.57 *
* Max Chl Dpth (ft)	* 7.23	* Hydr. Depth (ft)	* 4.43	* 6.22	* 4.01 *
* Conv. Total (cfs)	* 31614.2	* Conv. (cfs)	* 418.1	* 30710.1	* 486.0 *
* Length Wtd. (ft)	* 257.68	* Wetted Per. (ft)	* 7.28	* 58.98	* 7.19 *
* Min Ch El (ft)	* 2085.39	* Shear (lb/sq ft)	* 2.14	* 7.18	* 2.36 *
* Alpha	* 1.07	* Stream Power (lb/ft s)	*10143.05	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 4.69	* Cum Volume (acre-ft)	* 28.52	* 105.41	* 27.79 *
* C & E Loss (ft)	* 0.15	* Cum SA (acres)	* 9.04	* 16.73	* 8.89 *

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.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 2.395

[redacted]tion: 2.395
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9770.74	2100.64	9772.36	2100.78	9776.9	2100.37	9778.94	2100.19	9792.09	2098.64
9803.15	2097.39	9814.22	2095.46	9819.07	2094.6	9826.6	2093.6	9832.26	2092.41
9843.92	2090.25	9851.56	2089.51	9864.51	2087.24	9872.07	2085.87	9875.06	2085.23
9892.03	2086.46	9892.49	2086.63	9893.12	2086.56	9899.66	2087.41	9900.75	2087.43
9924.46	2087.42	9938.67	2087.77	9941.04	2087.82	9978.13	2087.08	9987.02	2084.68
9994.18	2080.19	9998.68	2080.18	10010.91	2080.98	10015.6	2082.15	10018.84	2082.53

```
10023.62 2084.0310031.17 2083.6210038.77 2084.7110048.92 2084.8210058.71 2085.21
10[redacted]15 2085.7910075.73 2086.0810079.31 2086.2510092.64 2086.7810093.93 2086.92
1[redacted]6 2087.3110101.35 2087.6710102.06 2087.7310103.77 2087.6510116.23 2087.17
10[redacted]3 2087.7310138.77 2089.0810148.01 2089.3810163.98 2089.9210166.81 2090.01
 10167.3 2089.9910182.84 2090.0810196.29 2090.3210220.58  2090.9 10227.1 2091.05
10235.65 2091.79

Manning's n Values         num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************
 9770.74    .071 9987.02    .05910038.77    .071

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.   Expan.
       9987.0210038.77             338.91  317.17  267.97             .1       .3

CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************************
* E.G. Elev (ft)          * 2089.49  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)           *    1.20  * Wt. n-Val.             *   0.071  *   0.059  *   0.071  *
* W.S. Elev (ft)          * 2088.29  * Reach Len. (ft)        *  338.91  *  317.17  *  267.97  *
* Crit W.S. (ft)          * 2088.29  * Flow Area (sq ft)      *  161.16  *  312.40  *  172.91  *
* E.G. Slope (ft/ft)      *0.015224  * Area (sq ft)           *  161.16  *  312.40  *  172.91  *
* Q Total (cfs)           * 4320.00  * Flow (cfs)             *  482.15  * 3145.97  *  691.88  *
* Top Width (ft)          *  269.71  * Top Width (ft)         *  128.49  *   51.75  *   89.47  *
* Vel Total (ft/s)        *    6.68  * Avg. Vel. (ft/s)       *    2.99  *   10.07  *    4.00  *
* Max Chl Dpth (ft)       *    8.11  * Hydr. Depth (ft)       *    1.25  *    6.04  *    1.93  *
* Conv. Total (cfs)       * 35012.0  * Conv. (cfs)            *  3907.6  * 25496.9  *  5607.4  *
* Length Wtd. (ft)        *  312.60  * Wetted Per. (ft)       *  129.23  *   53.55  *   89.64  *
* Min Ch El (ft)          * 2080.18  * Shear (lb/sq ft)       *    1.19  *    5.54  *    1.83  *
* Alpha                   *    1.73  * Stream Power (lb/ft s) *10235.65  *    0.00  *    0.00  *
* Frctn Loss (ft)         *    4.87  * Cum Volume (acre-ft)   *   58.29  *   92.57  *   43.07  *
* C & E Loss (ft)         *    0.01  * Cum SA (acres)         *   26.75  *   16.40  *   22.57  *
*****************************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
         for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section.  This may indicate the
         need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
         water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The program
         defaulted to critical depth.

CROSS SECTION OUTPUT  Profile #FW
*****************************************************************************************************
* E.G. Elev (ft)          * 2089.80  * Element                * Left OB *  Channel * Right OB *
* [redacted] Head (ft)    *    1.51  * Wt. n-Val.             *   0.071  *   0.059  *   0.071  *
* [redacted] Elev (ft)    * 2088.29  * Reach Len. (ft)        *  338.91  *  317.17  *  267.97  *
* [redacted] W.S. (ft)    * 2088.29  * Flow Area (sq ft)      *   52.59  *  312.51  *  159.22  *
* E.G. Slope (ft/ft)      *0.017717  * Area (sq ft)           *   52.59  *  312.51  *  159.22  *
* Q Total (cfs)           * 4320.00  * Flow (cfs)             *  158.29  * 3395.57  *  766.14  *
* Top Width (ft)          *  167.00  * Top Width (ft)         *   46.02  *   51.75  *   69.23  *
* Vel Total (ft/s)        *    8.24  * Avg. Vel. (ft/s)       *    3.01  *   10.87  *    4.81  *
* Max Chl Dpth (ft)       *    8.11  * Hydr. Depth (ft)       *    1.14  *    6.04  *    2.30  *
* Conv. Total (cfs)       * 32455.9  * Conv. (cfs)            *  1189.2  * 25510.7  *  5756.0  *
* Length Wtd. (ft)        *  313.02  * Wetted Per. (ft)       *   46.82  *   53.55  *   70.14  *
* Min Ch El (ft)          * 2080.18  * Shear (lb/sq ft)       *    1.24  *    6.45  *    2.51  *
* Alpha                   *    1.43  * Stream Power (lb/ft s) *10235.65  *    0.00  *    0.00  *
* Frctn Loss (ft)         *    4.74  * Cum Volume (acre-ft)   *   28.29  *  103.39  *   27.35  *
* C & E Loss (ft)         *    0.05  * Cum SA (acres)         *    8.87  *   16.40  *    8.71  *
*****************************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
         for the water surface and continued on with the calculations.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section.  This may indicate the
         need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
         water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The program
         defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth.  The program will try the cross section slice/secant
         method to find critical depth.

CROSS SECTION


RIVER: Rodger Creek
REACH: Main Reach         RS: 2.335

INPUT
Description: 2.335
Station Elevation Data    num=      67
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*****************************************************************************************
 9829.44 2104.93   9830.6 2104.82 9838.48 2104.21 9863.35 2101.89 9875.35 2100.83
 9896.49 2098.68 9907.61 2097.18 9908.42 2097.14 9932.61 2094.07 9949.22 2092.08
 9958.52 2088.46 9968.75 2085.22 9969.86 2084.94  9971.1 2084.82 9972.66 2084.76
 9974.46 2084.74  9976.2 2084.66 9977.11 2084.74 9978.18 2084.77 9979.58 2083.26
 9982.02 2080.55 9983.28 2079.66 9986.46 2077.42 9987.24 2077.01 9994.64 2076.03
  9998.4  2075.9 10004.8 2075.7310007.13 2075.6610009.67 2075.6310017.66 2076.32
[redacted]67 2076.5910030.99 2077.2410042.93 2077.4110053.11 2078.3910063.85 2079.38
[redacted]2 2079.8110074.09 2080.6210095.49 2080.8910102.24 2080.86 10116.1 2081.59
[redacted].8 2081.7210121.19 2081.8610122.22 2081.8710136.23 2082.2310150.25 2082.16
10155.65 2081.9710167.11 2081.92 10175.4 2081.8110195.36    208110195.94 2080.96
10196.52 2080.9310214.64 2084.5310215.51  2084.710217.34 2085.0310242.39    2086
10250.91 2086.3310256.33 2086.62 10265.4 2087.2610285.24 2088.6510290.17 2089.22
10304.46 2090.7210304.92 2090.7610305.61 2090.7710305.85 2090.7810306.23 2090.79
10307.96 2090.8310308.53 2090.85

Manning's n Values         num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************
```

9829.44 .071 9983.28 .05910067.52 .071

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9983.2810067.52 377.96 407.29 409.74 .1 .3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2083.81	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.33	* Wt. n-Val.	* 0.071	* 0.059	* 0.071 *
* W.S. Elev (ft)	* 2082.48	* Reach Len. (ft)	* 377.96	* 407.29	* 409.74 *
* Crit W.S. (ft)	* 2081.92	* Flow Area (sq ft)	* 4.67	* 448.34	* 137.33 *
* E.G. Slope (ft/ft)	*0.015907	* Area (sq ft)	* 4.67	* 448.34	* 137.33 *
* Q Total (cfs)	* 4681.00	* Flow (cfs)	* 13.37	* 4304.68	* 362.95 *
* Top Width (ft)	* 224.04	* Top Width (ft)	* 3.00	* 84.24	* 136.81 *
* Vel Total (ft/s)	* 7.93	* Avg. Vel. (ft/s)	* 2.86	* 9.60	* 2.64 *
* Max Chl Dpth (ft)	* 6.85	* Hydr. Depth (ft)	* 1.56	* 5.32	* 1.00 *
* Conv. Total (cfs)	* 37114.1	* Conv. (cfs)	* 106.0	* 34130.3	* 2877.7 *
* Length Wtd. (ft)	* 404.12	* Wetted Per. (ft)	* 4.14	* 85.31	* 137.06 *
* Min Ch El (ft)	* 2075.63	* Shear (lb/sq ft)	* 1.12	* 5.22	* 1.00 *
* Alpha	* 1.36	* Stream Power (lb/ft s)	*10308.53	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 5.94	* Cum Volume (acre-ft)	* 57.65	* 89.80	* 42.12 *
* C & E Loss (ft)	* 0.09	* Cum SA (acres)	* 26.24	* 15.90	* 21.87 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2084.34	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.33	* Wt. n-Val.	* 0.071	* 0.059	* 0.071 *
* W.S. Elev (ft)	* 2083.01	* Reach Len. (ft)	* 377.96	* 407.29	* 409.74 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 6.25	* 492.76	* 18.35 *
* E.G. Slope (ft/ft)	*0.013210	* Area (sq ft)	* 6.25	* 492.76	* 18.35 *
* Q Total (cfs)	* 4681.00	* Flow (cfs)	* 18.28	* 4591.78	* 70.94 *
* Top Width (ft)	* 93.81	* Top Width (ft)	* 3.00	* 84.24	* 6.57 *
* Vel Total (ft/s)	* 9.05	* Avg. Vel. (ft/s)	* 2.92	* 9.32	* 3.87 *
* Max Chl Dpth (ft)	* 7.38	* Hydr. Depth (ft)	* 2.08	* 5.85	* 2.79 *
* Conv. Total (cfs)	* 40727.0	* Conv. (cfs)	* 159.1	* 39950.8	* 617.2 *
* Length Wtd. (ft)	* 406.92	* Wetted Per. (ft)	* 4.67	* 85.31	* 9.01 *
* Min Ch El (ft)	* 2075.63	* Shear (lb/sq ft)	* 1.10	* 4.76	* 1.68 *
* Alpha	* 1.04	* Stream Power (lb/ft s)	*10308.53	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 5.27	* Cum Volume (acre-ft)	* 28.06	* 100.46	* 26.80 *
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 8.68	* 15.90	* 8.47 *

[redacted] : The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 2.258

INPUT
Description: 2.258
Station Elevation Data num= 74

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9712.18	2098.37	9730.82	2094.22	9736.9	2092.97	9741.56	2091.72	9755.29	2088.42
9763.7	2086.9	9766.56	2086.64	9776.91	2084.92	9785.93	2083.39	9794.92	2082.22
9799.53	2081.74	9802.95	2081.12	9809.35	2080.31	9818.83	2079.36	9824.12	2078.33
9843.44	2077.86	9849.76	2077.7	9863.81	2076.79	9875.83	2075.88	9895.91	2074.9
9900.48	2074.74	9900.81	2074.73	9907.19	2074.57	9918.86	2074.29	9926.38	2074.12
9938.81	2073.85	9949.28	2073.64	9955.27	2073.52	9962.86	2074.04	9968.87	2074.53
9970.76	2074.56	9976.02	2072.91	9987.36	2069.43	9991.01	2068.33	9994.17	2067.57
9999.85	2067.4910001.69		2067.6210002.69		2067.9310005.63		2069.1710008.43		2070.01
10008.85	2070.0910009.99		2070.2910013.15		2070.5310013.77		2070.4910016.42		2071.33
10022.96	2071.910026.34		2072.0710028.14		2072.1310029.36		2072.0210031.05		2071.06
10031.75	2070.7810042.47		2072.5410042.95		2072.710044.19		2072.8610050.21		2074.88
10050.69	2075.0410053.67		2075.7810054.09		2075.7910054.38		2075.7810055.38		2075.89
10061.89	2076.4510076.49		2077.5710080.79		2077.9510082.25		2078.110107.71		2080.25
10119.82	2081.7410132.94		2082.2910142.35		2082.5910155.17		2082.5810162.27		2082.86
10170.68	2083.1810182.26		2083.7810185.66		2083.86 10185.9		2083.89		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9712.18	.066	9976.02	.06510042.95		.066

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9976.0210042.95 464.57 484.81 486.42 .1 .3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2077.77	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.03	* Wt. n-Val.	* 0.066	* 0.065	* 0.066 *
* W.S. Elev (ft)	* 2076.74	* Reach Len. (ft)	* 464.57	* 484.81	* 486.42 *
* [redacted] W.S. (ft)	* 2076.05	* Flow Area (sq ft)	* 242.92	* 424.69	* 32.94 *
Slope (ft/ft)	*0.013701	* Area (sq ft)	* 242.92	* 424.69	* 32.94 *
al (cfs)	* 5006.00	* Flow (cfs)	* 1072.89	* 3823.69	* 109.42 *
* Top Width (ft)	* 201.30	* Top Width (ft)	* 111.60	* 66.93	* 22.77 *
* Vel Total (ft/s)	* 7.15	* Avg. Vel. (ft/s)	* 4.42	* 9.00	* 3.32 *
* Max Chl Dpth (ft)	* 9.25	* Hydr. Depth (ft)	* 2.18	* 6.35	* 1.45 *
* Conv. Total (cfs)	* 42767.9	* Conv. (cfs)	* 9166.0	* 32667.0	* 934.8 *
* Length Wtd. (ft)	* 478.88	* Wetted Per. (ft)	* 111.96	* 68.81	* 23.27 *
* Min Ch El (ft)	* 2067.49	* Shear (lb/sq ft)	* 1.86	* 5.28	* 1.21 *
* Alpha	* 1.30	* Stream Power (lb/ft s)	*10185.90	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 6.90	* Cum Volume (acre-ft)	* 56.58	* 85.72	* 41.31 *
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 25.74	* 15.20	* 21.12 *

****

W[redacted]: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2079.07	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.35	* Wt. n-Val.	* 0.066	* 0.065	* 0.066 *
* W.S. Elev (ft)	* 2077.73	* Reach Len. (ft)	* 464.57	* 484.81	* 486.42 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 26.59	* 490.43	* 40.14 *
* E.G. Slope (ft/ft)	*0.012696	* Area (sq ft)	* 26.59	* 490.43	* 40.14 *
* Q Total (cfs)	* 5006.00	* Flow (cfs)	* 125.58	* 4678.64	* 201.79 *
* Top Width (ft)	* 86.00	* Top Width (ft)	* 7.02	* 66.93	* 12.05 *
* Vel Total (ft/s)	* 8.98	* Avg. Vel. (ft/s)	* 4.72	* 9.54	* 5.03 *
* Max Chl Dpth (ft)	* 10.24	* Hydr. Depth (ft)	* 3.79	* 7.33	* 3.33 *
* Conv. Total (cfs)	* 44427.6	* Conv. (cfs)	* 1114.5	* 41522.3	* 1790.9 *
* Length Wtd. (ft)	* 482.57	* Wetted Per. (ft)	* 10.47	* 68.81	* 14.39 *
* Min Ch El (ft)	* 2067.49	* Shear (lb/sq ft)	* 2.01	* 5.65	* 2.21 *
* Alpha	* 1.07	* Stream Power (lb/ft s)	*10185.90	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 6.64	* Cum Volume (acre-ft)	* 27.92	* 95.86	* 26.53 *
* C & E Loss (ft)	* 0.05	* Cum SA (acres)	* 8.64	* 15.20	* 8.38 *

****

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 2.166

INPUT
Description: 2.166
Station Elevation Data num= 72

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9746.63	2081.27	9759.5	2080.29	9760.67	2080.12	9762.43	2080.06	9767.2	2079.95
9777.96	2078.89	9781.61	2078.59	9786.9	2078.53	9798.29	2077.37	9802.06	2076.58
9813.46	2075	9815.91	2074.87	9822.89	2073.99	9825.18	2073.36	9832.73	2072.59
9839.83	2071.8	9844.49	2071.02	9850.4	2070.31	9854.74	2069.81	9861.5	2068.82
9867.65	2067.93	9874.69	2067.44	9878.68	2067.03	9882.49	2066.93	9894.77	2066.88
9901.75	2066.81	9905.54	2066.53	9921.87	2065.79	9922.45	2065.78	9931.53	2065.66
9936.68	2066.32	9937.57	2066.37	9944.58	2066.15	9967.62	2065.55	9976.73	2064.02
[redacted]74	2063.07	9985.22	2062.46	9990.29	2061.8410002.37		2061.4110003.99		2061.36
[redacted]5	2061.61	10009	2064.5810011.88		2066.2210017.16		2069.2610024.68		2069.58
10[redacted]4	2069.810032.69		2069.9110034.67		2070.0110036.67		2070.17 10040.3		2070.32
10051.48	2070.7110062.49		2071.07 10072.2		2071.7810086.09		2072.7910104.68		2074.29
10105.63	2074.4610106.63		2074.5110109.86		2075.510117.02		2076.3210123.44		2077.06
10142.73	2079.22 10143.8		2079.3510147.01		2079.65 10158.7		2080.9810166.29		2081.44
10167.46	2081.5610167.86		2081.6110179.62		2082.8910182.02		2083.2110190.38		2084.9
10194.34	2085.5410200.09		2086.32						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9746.63	.065	9967.62	.05810011.88		.065

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9967.6210011.88 468.12 500.41 515.9 .1 .3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2070.86	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.31	* Wt. n-Val.	* 0.065	* 0.058	* 0.065 *
* W.S. Elev (ft)	* 2069.55	* Reach Len. (ft)	* 468.12	* 500.41	* 515.90 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 325.47	* 289.16	* 10.56 *
* E.G. Slope (ft/ft)	*0.015159	* Area (sq ft)	* 325.47	* 289.16	* 10.56 *
* Q Total (cfs)	* 5006.00	* Flow (cfs)	* 1872.64	* 3107.40	* 25.96 *
* Top Width (ft)	* 167.50	* Top Width (ft)	* 111.11	* 44.26	* 12.13 *
* Vel Total (ft/s)	* 8.01	* Avg. Vel. (ft/s)	* 5.75	* 10.75	* 2.46 *
* Max Chl Dpth (ft)	* 8.19	* Hydr. Depth (ft)	* 2.93	* 6.53	* 0.87 *
* Conv. Total (cfs)	* 40659.1	* Conv. (cfs)	* 15209.7	* 25238.6	* 210.8 *
* Length Wtd. (ft)	* 491.30	* Wetted Per. (ft)	* 111.35	* 45.99	* 12.95 *
* Min Ch El (ft)	* 2061.36	* Shear (lb/sq ft)	* 2.77	* 5.95	* 0.77 *
* Alpha	* 1.31	* Stream Power (lb/ft s)	*10200.09	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 7.84	* Cum Volume (acre-ft)	* 53.54	* 81.75	* 41.07 *
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 24.56	* 14.58	* 20.93 *

****

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2072.38	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.83	* Wt. n-Val.	* 0.065	* 0.058	* 0.065 *
* W.S. Elev (ft)	* 2070.55	* Reach Len. (ft)	* 468.12	* 500.41	* 515.90 *
* [redacted] W.S. (ft)	*	* Flow Area (sq ft)	* 141.98	* 333.18	* 22.63 *
[redacted] Slope (ft/ft)	*0.014979	* Area (sq ft)	* 141.98	* 333.18	* 22.63 *
* [redacted]al (cfs)	* 5006.00	* Flow (cfs)	* 1006.96	* 3911.63	* 87.41 *
* Top Width (ft)	* 87.33	* Top Width (ft)	* 30.94	* 44.26	* 12.13 *
* Vel Total (ft/s)	* 10.06	* Avg. Vel. (ft/s)	* 7.09	* 11.74	* 3.86 *
* Max Chl Dpth (ft)	* 9.19	* Hydr. Depth (ft)	* 4.59	* 7.53	* 1.87 *
* Conv. Total (cfs)	* 40902.1	* Conv. (cfs)	* 8227.4	* 31960.4	* 714.2 *
* Length Wtd. (ft)	* 497.75	* Wetted Per. (ft)	* 35.18	* 45.99	* 13.94 *
* Min Ch El (ft)	* 2061.36	* Shear (lb/sq ft)	* 3.77	* 6.78	* 1.52 *
* Alpha	* 1.17	* Stream Power (lb/ft s)	*10200.09	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 8.20	* Cum Volume (acre-ft)	* 27.02	* 91.28	* 26.18 *
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 8.43	* 14.58	* 8.25 *

****

W[redacted]: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 2.071

INPUT
Description: 2.071
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9714.16	2067.3	9726.64	2066.26	9734.36	2065.69	9741.86	2065.45	9748.2	2065.19
9754.66	2064.78	9760.27	2064.37	9767.79	2064.2	9770.85	2064.06	9773.66	2063.9
9783.32	2062.81	9784.99	2062.59	9786.96	2062.52	9791.05	2062.25	9799.52	2061.74
9799.75	2061.73	9804.12	2061.66	9809.98	2061.55	9816.75	2061.11	9819.82	2060.96
9820.99	2060.94	9822.55	2060.74	9833.61	2060.36	9836.47	2060.44	9841.42	2060.43
9855.88	2060.51	9858.17	2060.58	9877.34	2059.91	9877.96	2059.88	9887.24	2058.64
9887.52	2058.63	9897.35	2059.17	9904.62	2059.38	9915.61	2059.71	9935.98	2060.28
9942.58	2059.86	9945.65	2059.68	9966.23	2058.15	9973.83	2057.59	9976.15	2057.3
9982.69	2056.39	9989.04	2055.3	9989.52	2055.17	9995.39	2054.9910008.76		2054.53
10010.03	2055.3810013.04		2057.5410017.64		2057.9410031.71		2057.9110038.01		2058.01
10038.72	2057.9810039.78		2058.2310040.63		2058.34	10062	2063.9610068.39		2064.91
10072.19	2065.1310075.34		2065.4910083.08		2066.6310083.37		2066.6710088.18		2067.65
10088.63	2067.710097.89		2068.8610101.27		2069.3210117.24		2071.0310124.13		2071.54
10141.48	2072.79	10147.7	2073.210149.33		2073.3610164.76		2074.4510176.49		2075.14
10197.24	2076.3310200.38		2076.5410212.81		2077.3710219.32		2077.6310221.72		2077.73
10233.87	2078.22								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9714.16	.065	9966.23	.05810017.64		.065

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9966.2310017.64 499.45 451.2 434.5 .1 .3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2062.97	* Element	* Left OB	* Channel	* Right OB *
* [redacted] Head (ft)	* 1.17	* Wt. n-Val.	* 0.065	* 0.058	* 0.065 *
* [redacted] Elev (ft)	* 2061.81	* Reach Len. (ft)	* 499.45	* 451.20	* 434.50 *
* [redacted] W.S. (ft)	* 2061.61	* Flow Area (sq ft)	* 298.04	* 290.59	* 111.25 *
* [redacted] Slope (ft/ft)	*0.016836	* Area (sq ft)	* 298.04	* 290.59	* 111.25 *
* Q Total (cfs)	* 5006.00	* Flow (cfs)	* 1295.38	* 3018.79	* 691.82 *
* Top Width (ft)	* 255.36	* Top Width (ft)	* 167.79	* 51.41	* 36.17 *
* Vel Total (ft/s)	* 7.15	* Avg. Vel. (ft/s)	* 4.35	* 10.39	* 6.22 *
* Max Chl Dpth (ft)	* 7.27	* Hydr. Depth (ft)	* 1.78	* 5.65	* 3.08 *
* Conv. Total (cfs)	* 38580.6	* Conv. (cfs)	* 9983.3	* 23265.5	* 5331.8 *
* Length Wtd. (ft)	* 467.33	* Wetted Per. (ft)	* 168.03	* 52.60	* 36.65 *
* Min Ch El (ft)	* 2054.53	* Shear (lb/sq ft)	* 1.86	* 5.81	* 3.19 *
* Alpha	* 1.47	* Stream Power (lb/ft s)	*10233.87	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 8.65	* Cum Volume (acre-ft)	* 50.19	* 78.42	* 40.35 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 23.06	* 14.03	* 20.64 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2064.16	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.74	* Wt. n-Val.	* 0.065	* 0.058	* 0.065 *
* W.S. Elev (ft)	* 2062.42	* Reach Len. (ft)	* 499.45	* 451.20	* 434.50 *
* Crit W.S. (ft)	* 2061.92	* Flow Area (sq ft)	* 49.93	* 322.00	* 133.34 *
* E.G. Slope (ft/ft)	*0.018187	* Area (sq ft)	* 49.93	* 322.00	* 133.34 *
* Q Total (cfs)	* 5006.00	* Flow (cfs)	* 321.40	* 3722.80	* 961.81 *
* Top Width (ft)	* 100.80	* Top Width (ft)	* 13.23	* 51.41	* 36.16 *
* Vel Total (ft/s)	* 9.91	* Avg. Vel. (ft/s)	* 6.44	* 11.56	* 7.21 *
* Max Chl Dpth (ft)	* 7.89	* Hydr. Depth (ft)	* 3.77	* 6.26	* 3.69 *
* Conv. Total (cfs)	* 37120.0	* Conv. (cfs)	* 2383.2	* 27604.9	* 7131.9 *
* Length Wtd. (ft)	* 457.84	* Wetted Per. (ft)	* 16.55	* 52.60	* 37.26 *
* Min Ch El (ft)	* 2054.53	* Shear (lb/sq ft)	* 3.43	* 6.95	* 4.06 *
* Alpha	* 1.14	* Stream Power (lb/ft s)	*10233.87	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 8.50	* Cum Volume (acre-ft)	* 25.99	* 87.52	* 25.26 *
* C & E Loss (ft)	* 0.07	* Cum SA (acres)	* 8.20	* 14.03	* 7.96 *

Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

[redacted]

RIVER: Rodger Creek
REACH: Main Reach RS: 1.986

INPUT
Description: 1.986
Station Elevation Data num= 79

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9697.34	2065.36	9699.85	2065.28	9703.22	2065.08	9710.45	2064.73	9711.88	2064.6
9726.76	2063.22	9728.82	2062.87	9735.24	2061.87	9736.25	2061.89	9737.71	2061.71

```
 9742.96 2061.17 9746.99 2060.54 9749.09 2060.18 9750.77 2060.14 9756.83 2059.47
 9[illegible]36 2059.44 9762.96 2058.85 9766.59 2058.22 9768.77 2057.12    9779 2055.79
 [illegible]6 2052.79 9798.29 2051.37 9807.82 2050.55 9807.84 2050.56 9823.92 2050.67
 9[illegible]3 2050.08 9832.69 2050.38 9848.24 2049.64 9850.13 2049.57 9851.38 2049.55
 9854.64 2049.44  9856.9 2049.38 9857.16 2049.35 9857.66 2049.36  9869.9 2049.83
 9890.47 2051.41 9891.74 2051.51 9892.21 2051.55 9893.98 2051.59  9908.3 2051.95
 9913.68 2052.08 9921.94 2052.16 9947.62 2051.25 9952.11 2050.82 9955.66 2050.99
 9962.95  2050.9 9971.82 2051.06 9975.22  2051.1 9979.46 2049.16 9980.99  2048.3
 9985.51 2048.99 9989.99 2048.97 9995.55 2047.9210001.43 2046.4610004.12 2045.53
10007.69 2045.8210008.05 2045.9210008.74 2046.1710015.73 2048.8910017.68    2049
10019.19 2049.4810021.75 2049.7410034.01 2051.4710036.59 2051.73 10048.9 2052.99
10056.17 2053.8310059.98 2054.2410065.85 2054.9810078.39 2057.4910086.41    2059
 10093.7 2059.88 10103.5 2060.9110116.41 2061.9310126.14 2063.0510134.74 2063.59
10162.73 2066.5410166.01 2066.9110174.61 2067.7610185.26  2068.7

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************
 9697.34    .065 9979.46    .05810019.19    .065

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9979.4610019.19             487.7  486.64  488.01             .1       .3

CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************
* E.G. Elev (ft)          * 2054.32  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)           *    1.14  * Wt. n-Val.            *   0.065 *   0.058 *   0.065 *
* W.S. Elev (ft)          * 2053.17  * Reach Len. (ft)       *  487.70 *  486.64 *  488.01 *
* Crit W.S. (ft)          * 2053.14  * Flow Area (sq ft)     *  423.62 *  214.69 *   54.75 *
* E.G. Slope (ft/ft)      *0.020436  * Area (sq ft)          *  423.62 *  214.69 *   54.75 *
* Q Total (cfs)           * 5006.00  * Flow (cfs)            * 2380.13 * 2367.21 *  258.66 *
* Top Width (ft)          *  257.97  * Top Width (ft)        *  186.96 *   39.73 *   31.28 *
* Vel Total (ft/s)        *    7.22  * Avg. Vel. (ft/s)      *    5.62 *   11.03 *    4.72 *
* Max Chl Dpth (ft)       *    7.64  * Hydr. Depth (ft)      *    2.27 *    5.40 *    1.75 *
* Conv. Total (cfs)       * 35017.8  * Conv. (cfs)           * 16649.4 * 16559.0 * 1809.4 *
* Length Wtd. (ft)        *  487.06  * Wetted Per. (ft)      *  187.91 *   41.10 *   31.50 *
* Min Ch El (ft)          * 2045.53  * Shear (lb/sq ft)      *    2.88 *    6.66 *    2.22 *
* Alpha                   *    1.41  * Stream Power (lb/ft s) *10185.26 *    0.00 *    0.00 *
* Frctn Loss (ft)         *   10.03  * Cum Volume (acre-ft)  *   46.06 *   75.80 *   39.52 *
* C & E Loss (ft)         *    0.09  * Cum SA (acres)        *   21.02 *   13.56 *   20.31 *
*****************************************************************************************

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.

C[illegible]ECTION OUTPUT  Profile #FW
*[illegible]*****************************************************************************************
* E.G. Elev (ft)          * 2055.57  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)           *    1.49  * Wt. n-Val.            *   0.065 *   0.058 *   0.065 *
* W.S. Elev (ft)          * 2054.08  * Reach Len. (ft)       *  487.70 *  486.64 *  488.01 *
* Crit W.S. (ft)          * 2054.08  * Flow Area (sq ft)     *  264.75 *  250.81 *   83.19 *
* E.G. Slope (ft/ft)      *0.018968  * Area (sq ft)          *  264.75 *  250.81 *   83.19 *
* Q Total (cfs)           * 5006.00  * Flow (cfs)            * 1559.66 * 2955.35 *  490.99 *
* Top Width (ft)          *  170.47  * Top Width (ft)        *   99.46 *   39.73 *   31.28 *
* Vel Total (ft/s)        *    8.36  * Avg. Vel. (ft/s)      *    5.89 *   11.78 *    5.90 *
* Max Chl Dpth (ft)       *    8.55  * Hydr. Depth (ft)      *    2.66 *    6.31 *    2.66 *
* Conv. Total (cfs)       * 36347.7  * Conv. (cfs)           * 11324.4 * 21458.3 * 3565.0 *
* Length Wtd. (ft)        *  487.03  * Wetted Per. (ft)      *  103.44 *   41.10 *   32.41 *
* Min Ch El (ft)          * 2045.53  * Shear (lb/sq ft)      *    3.03 *    7.23 *    3.04 *
* Alpha                   *    1.38  * Stream Power (lb/ft s) *10185.26 *    0.00 *    0.00 *
* Frctn Loss (ft)         *    7.11  * Cum Volume (acre-ft)  *   24.18 *   84.55 *   24.18 *
* C & E Loss (ft)         *    0.05  * Cum SA (acres)        *    7.55 *   13.56 *    7.63 *
*****************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
         for the water surface and continued on with the calculations.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
         water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The program
         defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth.  The program will try the cross section slice/secant
         method to find critical depth.

CROSS SECTION


RIVER: Rodger Creek
REACH: Main Reach         RS: 1.894

INPUT
Description: 1.894
Station Elevation Data    num=      73
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
***************************************************************************************
 9755.61 2052.49 9758.16 2052.33 9760.33 2052.15 9767.07 2051.28 9767.65 2051.21
 9767.95 2051.17 9771.92  2050.5  9774.1 2050.49 9787.41  2050.4 9794.07 2049.96
 [illegible]75 2049.14 9809.76 2048.81 9820.68 2047.97 9824.72 2047.32 9839.33 2046.99
 [illegible]6 2046.92 9856.32 2046.53 9862.71 2046.63 9875.98 2046.28  9887.9 2045.72
 [illegible]7 2045.43 9899.65 2044.92 9907.99 2044.18 9928.31 2041.94 9950.69 2039.45
 995[illegible].21 2039.16 9958.11 2039.06 9966.86 2038.27 9975.37 2037.73 9984.47 2036.14
 9987.28 2035.56 9992.81 2034.69 9994.64 2034.5210001.97 2034.7510002.67 2034.77
10004.22 2035.0110006.55 2035.2710011.86 2035.89 10013.1 2036.02 10017.7 2037.04
 10017.9 2037.0910024.01 2037.6610035.13 2039.2510047.08 2040.9610048.95 2041.22
 10053.5 2042.0810059.74 2043.7110065.98 2045.5710066.08 2045.6110066.18 2045.62
10066.34 2045.6610068.75 2046.29   10085  2050.510086.33  2050.9 10087.3 2051.08
10095.21 2052.8510095.94  2052.910112.85 2053.9310122.59  2054.510127.28 2054.47
10128.19 2054.4210130.69 2054.44 10137.8 2054.4510144.68 2054.7910152.46 2054.51
10161.09 2054.5510167.11 2055.0710167.42  2055.1 10167.7 2055.1210175.93 2057.11
```

10178.1 2056.93 10189.9 2057.3910194.81 2057.5

[redacted]'s n Values num= 3
a n Val Sta n Val Sta n Val
9755.61 .065 9975.37 .05810024.01 .065

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9975.3710024.01 115.15 120.57 126.81 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2044.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.00	Wt. n-Val.	0.065	0.058	0.065
W.S. Elev (ft)	2042.21	Reach Len. (ft)	115.15	120.57	126.81
Crit W.S. (ft)	2042.21	Flow Area (sq ft)	123.07	307.25	71.62
E.G. Slope (ft/ft)	*0.020734	Area (sq ft)	123.07	307.25	71.62
Q Total (cfs)	5006.00	Flow (cfs)	741.10	3846.94	417.96
Top Width (ft)	128.15	Top Width (ft)	49.52	48.64	29.99
Vel Total (ft/s)	9.97	Avg. Vel. (ft/s)	6.02	12.52	5.84
Max Chl Dpth (ft)	7.69	Hydr. Depth (ft)	2.49	6.32	2.39
Conv. Total (cfs)	34765.5	Conv. (cfs)	5146.8	26716.1	2902.6
Length Wtd. (ft)	120.64	Wetted Per. (ft)	49.74	49.14	30.34
Min Ch El (ft)	2034.52	Shear (lb/sq ft)	3.20	8.09	3.06
Alpha	1.29	Stream Power (lb/ft s)	*10194.81	0.00	0.00
Frctn Loss (ft)	2.37	Cum Volume (acre-ft)	43.00	72.89	38.81
C & E Loss (ft)	0.18	Cum SA (acres)	19.70	13.06	19.96

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2044.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.33	Wt. n-Val.	0.065	0.058	0.065
W.S. Elev (ft)	2043.15	Reach Len. (ft)	115.15	120.57	126.81
Crit W.S. (ft)	2042.12	Flow Area (sq ft)	145.25	353.02	90.61
[redacted] Slope (ft/ft)	*0.011582	Area (sq ft)	145.25	353.02	90.61
[redacted]tal (cfs)	5006.00	Flow (cfs)	873.41	3624.07	508.52
[redacted]idth (ft)	108.00	Top Width (ft)	35.37	48.64	23.99
[redacted]otal (ft/s)	8.50	Avg. Vel. (ft/s)	6.01	10.27	5.61
Max Chl Dpth (ft)	8.63	Hydr. Depth (ft)	4.11	7.26	3.78
Conv. Total (cfs)	46515.5	Conv. (cfs)	8115.7	33674.7	4725.2
Length Wtd. (ft)	120.81	Wetted Per. (ft)	38.01	49.14	26.30
Min Ch El (ft)	2034.52	Shear (lb/sq ft)	2.76	5.19	2.49
Alpha	1.19	Stream Power (lb/ft s)	*10194.81	0.00	0.00
Frctn Loss (ft)	1.78	Cum Volume (acre-ft)	21.89	81.18	23.20
C & E Loss (ft)	0.05	Cum SA (acres)	6.80	13.06	7.32

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 1.871

INPUT
Description: 1.871
Station Elevation Data num= 69

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9819.3	2048.09	9821.44	2048.06	9834.96	2047.52	9835.69	2047.5	9836.36	2047.48
9839.08	2047.33	9841.71	2047.15	9842.9	2047.06	9852.32	2046.12	9853.75	2045.97
9867.92	2044.32	9872.31	2043.75	9873.37	2043.59	9873.65	2043.57	9881.59	2042.72
9892.65	2041.57	9895.79	2041.39	9904.49	2040.77	9908.78	2040.61	9917.25	2039.18
9925.12	2038.64	9926.9	2038.83	9935.5	2038.06	9949.55	2037.4	9952.97	2037.49
9954.42	2037.47	9961.19	2037.41	9963.36	2037.46	9964.67	2037.34	9968.07	2036.94
9974.8	2035.91	9976.35	2035.64	9977.41	2035.55	9989.49	2034.51	9992.6	2034.11
9995.63	2033.6	9998.29	2033.4110002.58		2033.310004.66		2033.8410005.47		2034.05
10006.82	2034.210014.14		2034.8710027.66		2036.1510029.13		2036.1110033.92		2036.07
10035.37	2036.14	10041.5	2036.6210048.06		2036.910048.12		2036.9110049.02		2036.93
10055.37	2036.6210055.67		2036.6410057.35		2036.7910067.73		2037.6610071.75		2038.75
10078.71	2040.7310082.72		2041.9110085.21		2042.3510098.28		2044.6710100.77		2045.14
10102.12	2045.310116.88		2044.710123.41		2044.7410130.35		2044.8210137.86		2044.77
10147.75	2044.8310157.71		2044.8410164.23		2044.5610166.05		2044.37		

[redacted]'s n Values num= 3
a n Val Sta n Val Sta n Val
9819.3 .065 9974.8 .05810027.66 .065

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9974.810027.66 217.16 212.34 202.44 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2041.62	Element	Left OB	Channel	Right OB

* Vel Head (ft)	* 1.39	* Wt. n-Val.	* 0.065	* 0.058	* 0.065 *
* [redacted] Elev (ft)	* 2040.24	* Reach Len. (ft)	* 217.16	* 212.34	* 202.44 *
* [redacted] W.S. (ft)	* 2039.98	* Flow Area (sq ft)	* 145.57	* 292.84	* 153.87 *
* [redacted] Slope (ft/ft)	*0.018702	* Area (sq ft)	* 145.57	* 292.84	* 153.87 *
* Q Total (cfs)	* 5006.00	* Flow (cfs)	* 786.37	* 3198.50	* 1021.14 *
* Top Width (ft)	* 166.00	* Top Width (ft)	* 63.82	* 52.86	* 49.32 *
* Vel Total (ft/s)	* 8.45	* Avg. Vel. (ft/s)	* 5.40	* 10.92	* 6.64 *
* Max Chl Dpth (ft)	* 6.94	* Hydr. Depth (ft)	* 2.28	* 5.54	* 3.12 *
* Conv. Total (cfs)	* 36605.4	* Conv. (cfs)	* 5750.1	* 23388.4	* 7466.9 *
* Length Wtd. (ft)	* 210.17	* Wetted Per. (ft)	* 64.09	* 53.20	* 49.75 *
* Min Ch El (ft)	* 2033.30	* Shear (lb/sq ft)	* 2.65	* 6.43	* 3.61 *
* Alpha	* 1.26	* Stream Power (lb/ft s)	*10166.05	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 2.48	* Cum Volume (acre-ft)	* 42.64	* 72.06	* 38.49 *
* C & E Loss (ft)	* 0.20	* Cum SA (acres)	* 19.55	* 12.92	* 19.85 *

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2042.65	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.86	* Wt. n-Val.	* 0.065	* 0.058	* 0.065 *
* W.S. Elev (ft)	* 2040.79	* Reach Len. (ft)	* 217.16	* 212.34	* 202.44 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 44.08	* 322.07	* 117.32 *
* E.G. Slope (ft/ft)	*0.019356	* Area (sq ft)	* 44.08	* 322.07	* 117.32 *
* Q Total (cfs)	* 5006.00	* Flow (cfs)	* 297.07	* 3812.97	* 895.96 *
* Top Width (ft)	* 91.00	* Top Width (ft)	* 10.80	* 52.86	* 27.34 *
* Vel Total (ft/s)	* 10.35	* Avg. Vel. (ft/s)	* 6.74	* 11.84	* 7.64 *
* Max Chl Dpth (ft)	* 7.49	* Hydr. Depth (ft)	* 4.08	* 6.09	* 4.29 *
* Conv. Total (cfs)	* 35981.6	* Conv. (cfs)	* 2135.2	* 27406.4	* 6439.9 *
* Length Wtd. (ft)	* 209.83	* Wetted Per. (ft)	* 14.29	* 53.20	* 31.53 *
* Min Ch El (ft)	* 2033.30	* Shear (lb/sq ft)	* 3.73	* 7.32	* 4.50 *
* Alpha	* 1.12	* Stream Power (lb/ft s)	*10166.05	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 2.36	* Cum Volume (acre-ft)	* 21.64	* 80.24	* 22.90 *
* C & E Loss (ft)	* 0.29	* Cum SA (acres)	* 6.73	* 12.92	* 7.24 *

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

[redacted] SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 1.831

INPUT
Description: 1.831
Station Elevation Data num= 64

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9869.17	2043.34	9869.42	2043.33	9875.79	2042.82	9892.57	2042.53	9894.46	2042.51
9895.97	2042.42	9913.57	2040.7	9925.96	2038.67	9930.29	2037.88	9937.58	2036.8
9945.14	2035.97	9950.05	2035.41	9961.67	2034.19	9975.81	2032.7	9979.02	2032.24
9980.56	2032.18	9987.27	2031.3	9990.86	2030.77	9993.4	2030.28	9996.42	2029.78
10001.34	2030.02	10010.27	2031.04	10013.54	2031.81	10018.04	2032.19	10026.49	2033.07
10031.32	2032.73	10036.31	2032.38	10042.47	2033.08	10054.42	2034.41	10059.64	2034.82
10068.41	2035.08	10081.83	2035.36	10085.62	2034.93	10088.95	2034.49	10092.62	2034.01
10093.13	2033.94	10120.63	2036.93	10121.5	2037.02	10123.14	2037.16	10128.53	2037.45
10134.63	2037.66	10137.26	2038.02	10138.13	2038.07	10143.34	2038.28	10165.98	2039.58
10181.9	2040.36	10184.92	2040.47	10194.99	2040.81	10207.06	2041.22	10207.56	2041.24
10215.57	2041.39	10219.84	2041.46	10226.68	2041.56	10232.42	2041.71	10246.51	2042.26
10247.79	2042.61	10248.28	2042.55	10249.41	2042.63	10261.73	2043.36	10266.1	2043.38
10269.84	2043.53	10280.35	2044.21	10291.36	2044.55	10294.98	2044.51		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9869.17	.065	9975.81	.05	10018.04	.065

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9975.81 10018.04 150.92 153.13 160.08 .1 .3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2038.95	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.73	* Wt. n-Val.	* 0.065	* 0.058	* 0.065 *
* W.S. Elev (ft)	* 2038.23	* Reach Len. (ft)	* 150.92	* 153.13	* 160.08 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 140.55	* 301.32	* 407.05 *
* E.G. Slope (ft/ft)	*0.008124	* Area (sq ft)	* 140.55	* 301.32	* 407.05 *
* Q Total (cfs)	* 5006.00	* Flow (cfs)	* 594.85	* 2563.15	* 1848.00 *
* Top Width (ft)	* 213.59	* Top Width (ft)	* 47.41	* 42.23	* 123.95 *
* [redacted] Total (ft/s)	* 5.90	* Avg. Vel. (ft/s)	* 4.23	* 8.51	* 4.54 *
* [redacted] hl Dpth (ft)	* 8.45	* Hydr. Depth (ft)	* 2.96	* 7.14	* 3.28 *
* [redacted]. Total (cfs)	* 55539.4	* Conv. (cfs)	* 6599.6	* 28437.0	* 20502.7 *
* Length Wtd. (ft)	* 154.98	* Wetted Per. (ft)	* 47.74	* 42.62	* 124.46 *
* Min Ch El (ft)	* 2029.78	* Shear (lb/sq ft)	* 1.49	* 3.59	* 1.66 *
* Alpha	* 1.35	* Stream Power (lb/ft s)	*10294.98	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 0.80	* Cum Volume (acre-ft)	* 41.93	* 70.61	* 37.18 *
* C & E Loss (ft)	* 0.10	* Cum SA (acres)	* 19.27	* 12.69	* 19.44 *

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 OUTPUT Profile #FW

E.G. Elev (ft)	2040.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.90	Wt. n-Val.	0.065	0.058	0.065
W.S. Elev (ft)	2039.10	Reach Len. (ft)	150.92	153.13	160.08
Crit W.S. (ft)		Flow Area (sq ft)	41.16	338.38	329.56
E.G. Slope (ft/ft)	*0.007351	Area (sq ft)	41.16	338.38	329.56
Q Total (cfs)	5006.00	Flow (cfs)	178.24	2958.16	1869.60
Top Width (ft)	112.00	Top Width (ft)	6.81	42.23	62.96
Vel Total (ft/s)	7.06	Avg. Vel. (ft/s)	4.33	8.74	5.67
Max Chl Dpth (ft)	9.32	Hydr. Depth (ft)	6.04	8.01	5.23
Conv. Total (cfs)	58386.9	Conv. (cfs)	2078.9	34502.1	21805.9
Length Wtd. (ft)	154.56	Wetted Per. (ft)	12.53	42.62	66.93
Min Ch El (ft)	2029.78	Shear (lb/sq ft)	1.51	3.64	2.26
Alpha	1.16	Stream Power (lb/ft s)	*10294.98	0.00	0.00
Frctn Loss (ft)	0.90	Cum Volume (acre-ft)	21.42	78.63	21.86
C & E Loss (ft)	0.05	Cum SA (acres)	6.69	12.69	7.03

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 1.802

INPUT
Description: 1.802
Station Elevation Data num= 72

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9791.94	2039.18	9801.05	2039.13	9806.88	2038.84	9811.51	2038.45	9815.01	2038.25
9816.37	2038.09	9819.19	2037.89	9823.19	2037.56	9827.09	2037.04	9832.54	2036.74
9834.14	2036.61	9834.73	2036.6	9838.27	2036.24	9841.41	2035.88	9845.32	2035.84
9850.07	2036.07	9859.96	2037.23	9862.85	2037.16	9872.06	2037.38	9888.01	2037.02
9892.99	2037.01	9898.09	2036.74	9908.56	2036.47	9921.16	2036	9921.57	2035.99
9922.22	2035.97	9941.71	2035.5	9943.55	2035.31	9947.34	2034.84	9950.58	2034.32
9955.56	2033.59	9960.39	2032.97	9961.45	2032.84	9974.24	2031.35	9979.53	2030.81
9982.12	2029.91	9986.5	2028.97	9991.23	2028.6810013.34		2029.3310015.49		2029.35
10029.69	2031.0510036.65		2031.910048.42		2032.5310083.88		2034.28	10086.1	2034.47
10114.68	2035.0110114.95		2035.0210143.47		2035.3610161.01		2035.7710200.02		2036.29
10203.63	2036.3310207.06		2036.410218.91		2036.5610219.85		2036.910226.23		2039.13
10231.9	2040.1410235.99		2041.2510242.71		2041.2410242.79		2041.2510268.73		2040.98
10278.37	2040.9910280.24		2040.8310303.09		2040.7510303.62		2040.72	10304.1	2040.73
[redacted]4.26	2040.7510305.22		2040.8410315.81		2041.8910333.14		2042.9910333.41		2043
[redacted]14	2043.0410345.46		2043.65						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9791.94	.065	9961.45	.05810048.42		.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9961.4510048.42		197.47 204.22	238.16	.3	.5

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2038.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.38	Wt. n-Val.	0.065	0.058	0.065
W.S. Elev (ft)	2037.67	Reach Len. (ft)	197.47	204.22	238.16
Crit W.S. (ft)		Flow Area (sq ft)	200.43	626.04	440.20
E.G. Slope (ft/ft)	*0.003547	Area (sq ft)	200.43	626.04	440.20
Q Total (cfs)	5006.00	Flow (cfs)	346.64	3546.17	1113.19
Top Width (ft)	400.23	Top Width (ft)	139.62	86.97	173.64
Vel Total (ft/s)	3.95	Avg. Vel. (ft/s)	1.73	5.66	2.53
Max Chl Dpth (ft)	8.99	Hydr. Depth (ft)	1.44	7.20	2.54
Conv. Total (cfs)	84053.3	Conv. (cfs)	5820.3	59542.1	18691.0
Length Wtd. (ft)	217.58	Wetted Per. (ft)	140.00	87.52	173.90
Min Ch El (ft)	2028.68	Shear (lb/sq ft)	0.32	1.58	0.56
Alpha	1.56	Stream Power (lb/ft s)	*10345.46	0.00	0.00
Frctn Loss (ft)	1.40	Cum Volume (acre-ft)	41.34	68.98	35.63
C & E Loss (ft)	0.04	Cum SA (acres)	18.95	12.46	18.90

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2039.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.72	Wt. n-Val.	0.065	0.058	0.065
W.S. Elev (ft)	2038.32	Reach Len. (ft)	197.47	204.22	238.16
Crit W.S. (ft)		Flow Area (sq ft)	7.82	682.46	63.75
E.G. Slope (ft/ft)	*0.004769	Area (sq ft)	7.82	682.46	63.75
Q Total (cfs)	5006.00	Flow (cfs)	13.60	4747.71	244.69
Top Width (ft)	100.00	Top Width (ft)	1.45	86.97	11.58
[redacted]el Total (ft/s)	6.64	Avg. Vel. (ft/s)	1.74	6.96	3.84
[redacted] Chl Dpth (ft)	9.64	Hydr. Depth (ft)	5.39	7.85	5.50
Total (cfs)	72491.0	Conv. (cfs)	196.9	68750.8	3543.3
[redacted]:h Wtd. (ft)	214.20	Wetted Per. (ft)	6.76	87.52	16.81
Min Ch El (ft)	2028.68	Shear (lb/sq ft)	0.34	2.32	1.13
Alpha	1.06	Stream Power (lb/ft s)	*10345.46	0.00	0.00
Frctn Loss (ft)	1.39	Cum Volume (acre-ft)	21.34	76.84	21.14
C & E Loss (ft)	0.10	Cum SA (acres)	6.68	12.46	6.90

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.
[redacted] This may indicate the

need for additional cross sections.

CR[redacted]ECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 1.763

INPUT
Description: 1.763 Ineffective flow area set to the lowest top of deck elevation at 2033.33.
Station Elevation Data num= 148

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9676.34	2040.51	9678.69	2040.71	9683.14	2041.11	9683.84	2041.43	9685.97	2041.22
9703.19	2041.97	9709.51	2042.02	9724.56	2041.96	9738.12	2041.35	9744.04	2040.92
9748.26	2041.05	9753.07	2040.57	9755.86	2039.49	9756.06	2039.43	9759.03	2039.19
9765.02	2038.35	9771.23	2037.54	9779.82	2038.29	9780.06	2038.28	9780.88	2038.44
9781.99	2038.54	9784.97	2039.16	9796.91	2039.63	9798.67	2039.59	9799.85	2039.56
9823.58	2039.33	9823.78	2039.32	9843.92	2040.07	9852.8	2038.75	9856.45	2038.54
9857.95	2038.33	9863.4	2038.25	9866.55	2038.17	9866.84	2038.15	9867.59	2038.06
9872.03	2037.88	9876.85	2037.75	9877.61	2037.73	9877.77	2037.71	9878.09	2037.69
9885.11	2037.03	9885.17	2037.02	9900.86	2036.34	9900.96	2036.33	9917.9	2036.57
9918.97	2036.62	9919.54	2036.55	9920.77	2036.47	9928.62	2035.8	9937.04	2035.53
9939.52	2035.47	9968	2034.89	9968.88	2034.88	9970.09	2034.85	9973.23	2034.81
9979.93	2034.28	9983.07	2034.13	9985.76	2034.03	9990.85	2033.28	9996.39	2032.84
9997.62	2033.52	9999.88	2032.651	10000.91	2030.781	10001.61	2029.241	10002.74	2025.37
10003.99	2025.241	10009.23	2028.961	10012.49	2029.621	10012.89	2029.471	10014.01	2028.77
10014.72	2026.181	10019.87	2029.831	10021.23	2030.221	10022.78	2028.081	10023.64	2028.85
10024.94	2032.391	10027.13	2032.321	10027.31	2032.351	10035.38	2033.281	10039.37	2033.47
10043.36	2033.581	10053.11	2033.121	10061.51	2033.351	10064.06	2033.371	10075.98	2033.25
10077.44	2033.211	10078.49	2033.251	10095.43	2032.991	10105.72	2033.081	10108.67	2032.99
10130.78	2032.941	10143.57	2033.11	10156.37	2033.161	10173.98	2033.581	10178.03	2033.51
10182.19	2033.461	10188.33	2033.651	10206.13	2034.11	10223.67	2034.21	10225.46	2034.17
10230.88	2034.291	10248.96	2034.47	10249.6	2034.451	10250.32	2034.461	10267.22	2034.51
10271.15	2034.51	10278.02	2034.511	10281.09	2034.52	10286.1	2034.541	10289.09	2034.55
10291	2034.561	10300.41	2034.681	10303.89	2034.781	10313.45	2035.011	10314.56	2034.97
10319.22	2034.881	10327.93	2034.831	10328.46	2034.841	10330.24	2034.811	10338.66	2034.83
10340.29	2034.871	10355.33	2035.031	10369.97	2035.821	10379.24	2035.831	10392.75	2035.9
10392.95	2035.911	10398.05	203	10398.63	2036.031	10407.16	2036.311	10415.13	2036.53
10420.34	2036.721	10433.81	2036.931	10443.05	2037.271	10449.55	2037.541	10450.09	2037.57
10450.16	2037.591	10451.04	2037.651	10460.06	2038.061	10462.85	2038.091	10465.97	2038
10469.86	2037.69	10470.4	2037.651	10470.64	2037.62	10471.2	2037.631	10479.99	2037.89
10482.15	2038.71	10483.24	2038.951	10484.15	2039.13				

[redacted]q's n Values num= 3

a	n Val	Sta	n Val	Sta	n Val
9676.34	.065	9997.62	.05	10043.36	.065

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9997.621 10043.36 65.79 64.46 68.26 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
9676.341	10001.11	2033.33	T
10019.54	10484.15	2033.33	T

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2036.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.50	Wt. n-Val.	0.065	0.058	0.065
W.S. Elev (ft)	2036.12	Reach Len. (ft)	65.79	64.46	68.26
Crit W.S. (ft)	2035.63	Flow Area (sq ft)	92.62	227.30	685.08
E.G. Slope (ft/ft)	*0.015018	Area (sq ft)	94.42	256.73	710.37
Q Total (cfs)	5006.00	Flow (cfs)	304.01	1743.87	2958.12
Top Width (ft)	476.42	Top Width (ft)	72.73	45.74	357.95
Vel Total (ft/s)	4.98	Avg. Vel. (ft/s)	3.28	7.67	4.32
Max Chl Dpth (ft)	10.88	Hydr. Depth (ft)	1.27	4.97	1.91
Conv. Total (cfs)	40849.3	Conv. (cfs)	2480.7	14230.1	24138.5
Length Wtd. (ft)	64.46	Wetted Per. (ft)	73.03	59.50	358.02
Min Ch El (ft)	2025.24	Shear (lb/sq ft)	1.19	3.58	1.79
Alpha	1.30	Stream Power (lb/ft s)	*10484.15	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	40.67	66.91	32.48
C & E Loss (ft)		Cum SA (acres)	18.47	12.15	17.44

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2037.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.52	Wt. n-Val.	0.065	0.058	0.065
W.S. Elev (ft)	2037.03	Reach Len. (ft)	65.79	64.46	68.26
Crit W.S. (ft)	2035.75	Flow Area (sq ft)	93.33	269.06	536.32
E.G. Slope (ft/ft)	*0.009404	Area (sq ft)	95.14	298.48	561.62
Q Total (cfs)	5006.00	Flow (cfs)	398.08	1827.91	2780.01
Top Width (ft)	225.00	Top Width (ft)	32.62	45.74	146.64
Vel Total (ft/s)	5.57	Avg. Vel. (ft/s)	4.27	6.79	5.18
Max Chl Dpth (ft)	11.79	Hydr. Depth (ft)	2.86	5.88	3.66
Conv. Total (cfs)	51621.2	Conv. (cfs)	4105.0	18849.1	28667.1
[redacted]ngth Wtd. (ft)	64.46	Wetted Per. (ft)	34.98	59.50	150.01
[redacted] Ch El (ft)	2025.24	Shear (lb/sq ft)	1.57	2.65	2.10
	1.07	Stream Power (lb/ft s)	*10484.15	0.00	0.00
[redacted]. Loss (ft)		Cum Volume (acre-ft)	21.11	74.54	19.43
C & E Loss (ft)		Cum SA (acres)	6.60	12.15	6.46

Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CULVERT

RI[redacted] Rodger Creek
R[redacted] Main Reach RS: 1.757

INPUT
Description: 1.757 New River Road 2- 96" CMPs
Distance from Upstream XS = 8
Deck/Roadway Width = 43
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 8

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
9878.09	2037.69	9907.08	2036.74	9962.08	2035.39
10002.08	2034.61	10058.08	2033.79	10112.08	2033.53
10150.08	2033.33	10173.98	2033.58		

Upstream Bridge Cross Section Data
Station Elevation Data num= 139

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9676.34	2040.51	9678.69	2040.71	9683.14	2041.11	9683.84	2041.43	9685.97	2041.22
9703.19	2041.97	9709.51	2042.02	9724.56	2041.96	9738.12	2041.35	9744.04	2040.92
9748.26	2041.05	9753.07	2040.57	9755.86	2039.49	9756.06	2039.43	9759.03	2039.19
9765.02	2038.35	9771.23	2037.54	9779.82	2038.29	9780.06	2038.28	9780.88	2038.44
9781.99	2038.54	9784.97	2039.16	9796.91	2039.63	9798.67	2039.59	9799.85	2039.56
9823.58	2039.33	9823.78	2039.32	9843.92	2040.07	9852.8	2038.75	9856.45	2038.54
9857.95	2038.33	9863.4	2038.25	9866.55	2038.17	9866.84	2038.15	9867.59	2038.06
9872.03	2037.88	9876.85	2037.75	9877.61	2037.73	9877.77	2037.71	9878.09	2037.69
9885.11	2037.03	9885.17	2037.02	9900.86	2036.34	9900.96	2036.33	9917.9	2036.57
9918.97	2036.62	9919.54	2036.55	9920.77	2036.47	9928.62	2035.8	9937.04	2035.53
9939.52	2035.47	9968	2034.89	9968.88	2034.88	9970.09	2034.85	9973.23	2034.81
9979.93	2034.28	9983.07	2034.13	9985.76	2034.03	9990.85	2033.28	9996.39	2032.84
9997.62	2032.5	9999.35	202610001.97	2024.310019.82		2024.310022.78		2028.08	
10023.64	2028.8510024.94	2032.3910027.13		2032.3210027.31		2032.3510035.38		2033.28	
10039.37	2033.4710043.36	2033.5810053.11		2033.1210061.51		2033.3510064.06		2033.37	
10075.98	2033.2510077.44	2033.2110078.49		2033.2510095.43		2032.9910105.72		2033.08	
10108.67	2032.9910130.78	2032.9410143.57		2033.110156.37		2033.1610173.98		2033.58	
10178.03	2033.5110182.19	2033.4610188.33		2033.6510206.13		2034.110223.67		2034.2	
10225.46	2034.1710230.88	2034.2910248.96		2034.47 10249.6		2034.4510250.32		2034.46	
10267.22	2034.5110271.15	2034.510278.02		2034.5110281.09		2034.52 10286.1		2034.54	
10289.09	2034.55 10291	2034.5610300.41		2034.6810303.89		2034.7810313.45		2035.01	
10314.56	2034.9710319.22	2034.8810327.93		2034.8310328.46		2034.8410330.24		2034.81	
10338.66	2034.8310340.29	2034.8710355.33		2035.0310369.97		2035.8210379.24		2035.83	
10392.75	2035.910392.95	2035.9110398.05		203610398.63		2036.0310407.16		2036.31	
[redacted]13	2036.5310420.34	2036.7210433.81		2036.9310443.05		2037.2710449.55		2037.54	
[redacted]9	2037.5710450.16	2037.5910451.04		2037.6510460.06		2038.0610462.85		2038.09	
[redacted]7	203810469.86	2037.69 10470.4		2037.6510470.64		2037.62 10471.2		2037.63	
10479.99	2037.8910482.15	2038.710483.24		2038.9510484.15		2039.13			

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9676.34	.065	9997.62	.05810024.94	.065	

Bank Sta: Left Right Coeff Contr. Expan.
9997.6210024.94 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
9676.3410001.11	2033.33		T
10019.5410484.15	2033.33		T

Downstream Deck/Roadway Coordinates
num= 9

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
9906.63	2037.69	9907.08	2036.74	9962.08	2035.39
10002.08	2034.61	10058.08	2033.79	10112.08	2033.53
10150.08	2033.33	10307.15	2032.56	10311.51	2032.62

Downstream Bridge Cross Section Data
Station Elevation Data num= 102

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9834.94	2042.1	9835.42	2042.09	9875.91	2040.33	9876.21	2040.32	9876.3	2040.3
9876.6	2040.26	9877.42	2040.18	9906.63	2037.69	9909.39	2037.17	9910.41	2036.74
9912.49	2035.88	9918.65	2036.09	9921.93	2036.11	9924.56	2036.04	9928.79	2035.92
9930.08	2035.7	9935.02	2034.6	9941.99	2034.24	9952.72	2033.65	9962.13	2033.42
9966.98	2033.29	9968.13	2033.05	9981.19	2030.39	9987.4	2027.42	9990.62	2023.65
10006	2023.6510009.17		2026.1210010.74		2026.8310012.63		2028.4510017.22		2030.61
10018.41	2031.0210019.17		2031.110024.53		2031.5510029.96		2031.9810037.33		2032.13
10044.53	2032.0410045.96		2031.9710049.95		2032.1310058.66		2032.2210060.15		2032.17
10069.75	2031.7910072.14		2031.7210076.14		2031.7510085.07		2031.4510087.12		2031.3
10091.48	2031.2310098.94		2031.2 10101.5		2031.2810103.64		2031.29 10111		2031.16
10113.95	2031.210123.06		2031.31 10130.6		2031.8510140.65		2031.310142.02		2031.22
10144.34	2031.2710161.48		2031.6710162.23		2031.7 10166.2		2031.8610174.03		2032.12
10175.6	2032.1610192.91		2032.35 10201.9		2032.4410208.25		2032.33 10226.9		2032.43
10237.95	2032.3610251.94		2032.7610274.07		2032.6810275.13		2032.6710294.51		2032.44
10295.65	2032.42 10296.2		2032.4110307.15		2032.5610311.51		2032.6210311.68		2032.63
[redacted]17	2032.6510327.38		2033.0710332.49		2032.7610344.53		2033.0310349.64		2032.95
[redacted]6	2033.2810369.98		2033.910374.04		2034.3110377.82		2034.2410388.37		2033.98
[redacted]2	2034.3710411.17		2035.1310412.68		2035.1210423.96		2035.1410426.62		2035.18
10430.52	2035.1710445.38		2035.5 10455.1		2035.5410483.29		2035.6110488.62		2035.65
10492.59	2035.8210494.96		2036.2610498.28		2036.2210525.98		2036.7410526.74		2036.75
10527.63	2036.7710536.58		2036.88						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9834.94	.065	9981.19	.05810017.22	.06510123.06	.065		

```
Ba[redacted]Sta: Left    Right     Coeff Contr.    Expan.
      9981.1910017.22              .3        .5
In[redacted]tive Flow      num=       2
     L    Sta R     Elev  Permanent
 9834.94 9990.43  2032.6        T
10007.1310536.58  2032.6        T

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       Circular       8
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 1 - Headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef    Exit Loss Coef
                  8   48.39     .027      .027        0                .5                 1
Number of Barrels =  2
Upstream   Elevation =  2024.66
Centerline Stations
    Sta.     Sta.
10005.1210015.53
Downstream Elevation =  2023.86
Centerline Stations
    Sta.     Sta.
9994.43910003.13

CULVERT OUTPUT  Profile #Q100  Culv Group:  Culvert #1
*************************************************************************
* Q Culv Group (cfs)      *  896.29  * Culv Full Len (ft)      *   48.39  *
* # Barrels               *       2  * Culv Vel US (ft/s)      *    8.92  *
* Q Barrel (cfs)          *  448.14  * Culv Vel DS (ft/s)      *    8.92  *
* E.G. US. (ft)           * 2036.63  * Culv Inv El Up (ft)     * 2024.66  *
* W.S. US. (ft)           * 2036.12  * Culv Inv El Dn (ft)     * 2023.86  *
* E.G. DS (ft)            * 2035.11  * Culv Frctn Ls (ft)      *    0.50  *
* W.S. DS (ft)            * 2034.27  * Culv Exit Loss (ft)     *    0.39  *
* Delta EG (ft)           *    1.51  * Culv Entr Loss (ft)     *    0.62  *
*[redacted]ta WS (ft)      *    1.85  * Q Weir (cfs)            * 4109.71  *
*[redacted] IC (ft)        * 2036.45  * Weir Sta Lft (ft)       * 9912.04  *
*[redacted] OC (ft)        * 2036.63  * Weir Sta Rgt (ft)       *10417.55  *
* C[redacted]rt Control    *  Outlet  * Weir Submerg            *    0.12  *
* Culv WS Inlet (ft)      * 2032.66  * Weir Max Depth (ft)     *    3.29  *
* Culv WS Outlet (ft)     * 2031.86  * Weir Avg Depth (ft)     *    2.03  *
* Culv Nml Depth (ft)     *          * Weir Flow Area (sq ft) * 1028.57  *
* Culv Crt Depth (ft)     *    5.39  * Min El Weir Flow (ft)   * 2033.34  *
*************************************************************************

CULVERT OUTPUT  Profile #FW  Culv Group:  Culvert #1
*************************************************************************
* Q Culv Group (cfs)      *  985.84  * Culv Full Len (ft)      *   48.39  *
* # Barrels               *       2  * Culv Vel US (ft/s)      *    9.81  *
* Q Barrel (cfs)          *  492.92  * Culv Vel DS (ft/s)      *    9.81  *
* E.G. US. (ft)           * 2037.55  * Culv Inv El Up (ft)     * 2024.66  *
* W.S. US. (ft)           * 2037.03  * Culv Inv El Dn (ft)     * 2023.86  *
* E.G. DS (ft)            * 2035.85  * Culv Frctn Ls (ft)      *    0.61  *
* W.S. DS (ft)            * 2034.70  * Culv Exit Loss (ft)     *    0.34  *
* Delta EG (ft)           *    1.70  * Culv Entr Loss (ft)     *    0.75  *
* Delta WS (ft)           *    2.33  * Q Weir (cfs)            * 4020.16  *
* E.G. IC (ft)            * 2037.32  * Weir Sta Lft (ft)       * 9965.00  *
* E.G. OC (ft)            * 2037.55  * Weir Sta Rgt (ft)       *10190.00  *
* Culvert Control         *  Outlet  * Weir Submerg            *    0.23  *
* Culv WS Inlet (ft)      * 2032.66  * Weir Max Depth (ft)     *    4.21  *
* Culv WS Outlet (ft)     * 2031.86  * Weir Avg Depth (ft)     *    3.59  *
* Culv Nml Depth (ft)     *          * Weir Flow Area (sq ft) *  808.61  *
* Culv Crt Depth (ft)     *    5.66  * Min El Weir Flow (ft)   * 2033.34  *
*************************************************************************

CROSS SECTION


RIVER: Rodger Creek
REACH: Main Reach         RS: 1.751

INPUT
Description: 1.751  Ineffective flow area set to the mid point between the
             lowest top of deck elevation and the top of pipe at 2032.61.
Station Elevation Data    num=     103
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*************************************************************************************
 9834.94  2042.1 9835.42 2042.09 9875.91 2040.33 9876.21 2040.32  9876.3  2040.3
  9876.6 2040.26 9877.42 2040.18 9906.63 2037.69 9909.39 2037.17 9910.41 2036.74
[redacted]2.49 2035.88 9918.65 2036.09 9921.93 2036.11 9924.56 2036.04 9928.79 2035.92
[redacted] 08  2035.7 9935.02  2034.6 9941.99 2034.24 9952.72 2033.65 9962.13 2033.42
[redacted]  8 2033.29 9968.13 2033.05 9981.19 2030.39  9987.4 2027.42 9990.77 2025.07
[redacted]  2 2025.56 9997.15 2024.8310009.17 2026.1210010.74 2026.8310012.63 2028.45
1001[redacted].22 2030.6110018.41 2031.0210019.17  2031.110024.53 2031.5510029.96 2031.98
10037.33 2032.1310044.53 2032.0410045.96 2031.9710049.95 2032.1310058.66 2032.22
10060.15 2032.1710069.75 2031.7910072.14 2031.7210076.14 2031.7510085.07 2031.45
10087.12  2031.310091.48 2031.2310098.94  2031.2 10101.5 2031.2810103.64 2031.29
   10111 2031.1610113.95  2031.210123.06 2031.31 10130.6 2031.8510140.65  2031.3
10142.02 2031.2210144.34 2031.2710161.48 2031.6710162.23  2031.7 10166.2 2031.86
10174.03 2032.12 10175.6 2032.1610192.91 2032.35 10201.9 2032.4410208.25 2032.33
 10226.9 2032.4310237.95 2032.3610251.94 2032.7610274.07 2032.6810275.13 2032.67
```

```
10[illegible]68 2032.6310312.17 2032.6510327.38 2033.0710332.49 2032.7610344.53 2033.03
10[illegible]4 2032.9510364.26 2033.2810369.98  2033.910374.04 2034.3110377.82 2034.24
10[illegible]7 2033.9810400.32 2034.3710411.17 2035.1310412.68 2035.1210423.96 2035.14
10[illegible]2 2035.1810436.52 2035.1710445.38  2035.5 10455.1 2035.5410483.29 2035.61
10488.62 2035.6510492.59 2035.8210494.96 2036.2610498.28 2036.2210525.98 2036.74
10526.74 2036.7510527.63 2036.7710536.58 2036.88

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 9834.94    .065 9968.13    .05810037.33    .065

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9968.1310037.33           243.01  234.37  176.68            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
 9834.94 9990.43  2032.6       T
10007.1310536.58  2032.6       T

CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************
* E.G. Elev (ft)        * 2035.11  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    0.84  * Wt. n-Val.           *   0.065  *   0.058  *   0.065  *
* W.S. Elev (ft)        * 2034.27  * Reach Len. (ft)       *  243.01  *  234.37  *  176.68  *
* Crit W.S. (ft)        * 2034.22  * Flow Area (sq ft)     *   16.12  *  236.73  *  530.43  *
* E.G. Slope (ft/ft)    *0.028011  * Area (sq ft)          *   16.12  *  355.77  *  685.54  *
* Q Total (cfs)         * 5006.00  * Flow (cfs)            *   43.98  * 2235.95  * 2726.06  *
* Top Width (ft)        *  453.32  * Top Width (ft)        *   26.73  *   69.20  *  357.39  *
* Vel Total (ft/s)      *    6.39  * Avg. Vel. (ft/s)      *    2.73  *    9.44  *    5.14  *
* Max Chl Dpth (ft)     *    9.44  * Hydr. Depth (ft)      *    0.60  *    3.42  *    1.48  *
* Conv. Total (cfs)     * 29910.8  * Conv. (cfs)           *   262.8  * 13359.8  * 16288.2  *
* Length Wtd. (ft)      *  218.07  * Wetted Per. (ft)      *   26.77  *   72.41  *  357.57  *
* Min Ch El (ft)        * 2024.83  * Shear (lb/sq ft)      *    1.05  *    5.72  *    2.59  *
* Alpha                 *    1.33  * Stream Power (lb/ft s) *10536.58  *    0.00  *    0.00  *
* Frctn Loss (ft)       *    4.24  * Cum Volume (acre-ft)  *   40.67  *   65.32  *   32.48  *
* C & E Loss (ft)       *    0.01  * Cum SA (acres)        *   18.39  *   12.07  *   16.88  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION OUTPUT  Profile #EW
*****************************************************************************************
*[illegible]. Elev (ft)        * 2035.85  * Element               *  Left OB *  Channel * Right OB *
*[illegible]Head (ft)          *    1.15  * Wt. n-Val.           *   0.065  *   0.058  *   0.065  *
*[illegible] Elev (ft)         * 2034.70  * Reach Len. (ft)       *  243.01  *  234.37  *  176.68  *
*[illegible] W.S. (ft)         * 2034.70  * Flow Area (sq ft)     *    3.12  *  266.33  *  366.46  *
* E.G. Slope (ft/ft)    *0.027980  * Area (sq ft)          *    3.12  *  385.36  *  511.33  *
* Q Total (cfs)         * 5006.00  * Flow (cfs)            *   11.00  * 2719.54  * 2275.46  *
* Top Width (ft)        *  246.00  * Top Width (ft)        *    2.13  *   69.20  *  174.67  *
* Vel Total (ft/s)      *    7.87  * Avg. Vel. (ft/s)      *    3.52  *   10.21  *    6.21  *
* Max Chl Dpth (ft)     *    9.87  * Hydr. Depth (ft)      *    1.47  *    3.85  *    2.10  *
* Conv. Total (cfs)     * 29927.5  * Conv. (cfs)           *    65.7  * 16258.3  * 13603.4  *
* Length Wtd. (ft)      *  220.25  * Wetted Per. (ft)      *    3.54  *   72.41  *  177.10  *
* Min Ch El (ft)        * 2024.83  * Shear (lb/sq ft)      *    1.54  *    6.42  *    3.61  *
* Alpha                 *    1.20  * Stream Power (lb/ft s) *10536.58  *    0.00  *    0.00  *
* Frctn Loss (ft)       *    2.90  * Cum Volume (acre-ft)  *   21.11  *   73.25  *   19.43  *
* C & E Loss (ft)       *    0.25  * Cum SA (acres)        *    6.57  *   12.07  *    6.21  *
*****************************************************************************************

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 conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
          This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
         water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The program
         defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth.  The program will try the cross section slice/secant
         method to find critical depth.

CROSS SECTION


RIVER: Rodger Creek
REACH: Main Reach         RS: 1.706

INPUT
Description: 1.706
Station Elevation Data    num=      70
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
*********************************************************************************
 9814.96 2034.72 9818.63 2034.45 9827.52 2033.62 9832.28 2033.52 9859.37 2031.25
 9866.11  2030.7 9877.38 2029.82 9878.65 2029.72 9886.37 2029.73 9900.44 2029.09
 9930.82 2028.18 9934.39 2028.09 9935.37 2028.06 9947.71 2027.89 9958.66 2027.74
[illegible]8.99 2027.49 9979.92 2027.21 9983.87 2026.15 9985.95 2025.56 9992.76 2023.02
[illegible] 03 2022.7410006.82  2022.410017.94 2023.5610018.49 2023.6110018.76 2023.64
[illegible]3 2023.6310022.08 2023.6110024.06 2024.3510046.17 2025.96 10047.3 2026.03
10[illegible]7 2026.0910048.56 2026.1210062.38 2026.8110090.29 2028.1210096.14  2028.4
10098.29 2028.4610110.06 2029.0310119.65 2029.33 10128.2 2029.3710130.12 2029.39
10143.93 2029.5910146.05 2029.6410149.33 2029.6910171.42 2029.4610192.39 2029.57
10197.88 2029.5910201.96 2029.6610204.78 2029.5710220.37 2030.17 10220.6 2030.18
10221.47 2030.1910237.97  2030.310240.46 2031.3610241.27  2031.710243.03 2032.26
10243.39 2032.3410245.33 2031.9910246.82  2031.710247.04 2031.6110250.55 2030.31
10254.32 2030.2810256.98 2030.31 10264.6 2030.3510273.45 2030.4610274.46 2030.48
10283.24 2030.6210292.36 2030.9210293.28 2030.9510302.43 2031.39 10302.8 2031.41

Manning's n Values        num=       3
```

Sta	n Val	Sta	n Val	Sta	n Val
[redacted]6	.065	9947.71	.05	810090.29	.065

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9947.7110090.29 225.94 222.56 217.61 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2030.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.89	Wt. n-Val.	0.065	0.058	0.065
W.S. Elev (ft)	2029.97	Reach Len. (ft)	225.94	222.56	217.61
Crit W.S. (ft)	2029.30	Flow Area (sq ft)	83.98	588.02	75.42
E.G. Slope (ft/ft)	*0.014272	Area (sq ft)	83.98	588.02	75.42
Q Total (cfs)	5006.00	Flow (cfs)	253.34	4605.60	147.05
Top Width (ft)	339.84	Top Width (ft)	72.29	142.58	124.96
Vel Total (ft/s)	6.70	Avg. Vel. (ft/s)	3.02	7.83	1.95
Max Chl Dpth (ft)	7.57	Hydr. Depth (ft)	1.16	4.12	0.60
Conv. Total (cfs)	41903.9	Conv. (cfs)	2120.7	38552.3	1230.9
Length Wtd. (ft)	222.20	Wetted Per. (ft)	72.33	143.64	125.00
Min Ch El (ft)	2022.40	Shear (lb/sq ft)	1.03	3.65	0.54
Alpha	1.27	Stream Power (lb/ft s)	*10302.80	0.00	0.00
Frctn Loss (ft)	2.48	Cum Volume (acre-ft)	40.39	62.78	30.94
C & E Loss (ft)	0.10	Cum SA (acres)	18.12	11.50	15.91

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2031.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.66	Wt. n-Val.	0.065	0.058	0.065
W.S. Elev (ft)	2030.95	Reach Len. (ft)	225.94	222.56	217.61
Crit W.S. (ft)		Flow Area (sq ft)	8.25	727.49	54.46
E.G. Slope (ft/ft)	*0.007641	Area (sq ft)	8.25	727.49	54.46
Q Total (cfs)	5006.00	Flow (cfs)	20.99	4804.69	180.33
Top Width (ft)	169.00	Top Width (ft)	2.71	142.58	23.71
Vel Total (ft/s)	6.34	Avg. Vel. (ft/s)	2.55	6.60	3.31
Max Chl Dpth (ft)	8.55	Hydr. Depth (ft)	3.04	5.10	2.30
Conv. Total (cfs)	57270.1	Conv. (cfs)	240.1	54967.0	2063.0
Length Wtd. (ft)	221.89	Wetted Per. (ft)	5.73	143.64	25.53
Min Ch El (ft)	2022.40	Shear (lb/sq ft)	0.69	2.42	1.02
Alpha	1.05	Stream Power (lb/ft s)	*10302.80	0.00	0.00
Frctn Loss (ft)	2.00	Cum Volume (acre-ft)	21.07	70.26	18.28
[redacted]E Loss (ft)	0.04	Cum SA (acres)	6.56	11.50	5.81

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 1.664

INPUT
Description: 1.664
Station Elevation Data num= 70

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9771.72	2035.07	9773.17	2034	9773.48	2034.56	9774.54	2034.24	9781.92	2032
9788.75	2030.85	9791.43	2030.31	9794.92	2030.03	9805.58	2029.29	9820.48	2028.25
9821.12	2028	9830.8	2027.41	9838.13	2027.11	9842.85	2027.5	9843.11	2027.55
9843.57	2027.53	9843.87	2027.52	9871.08	2026.41	9875.67	2026.36	9892.41	2026.34
9897.99	2026.22	9899.12	2026	9909.15	2025.37	9912.9	2025.29	9922.42	2025.17
9929.53	2025.08	9932.94	2025.05	9934.59	2025.04	9941.71	2024.82	9943.24	2024.77
9951.76	2024.6	9953.09	2024.57	9954.35	2024.55	9955.37	2024.53	9956.5	2024.51
9961.3	2024.43	9968.95	2024.1	9983.67	2023.52	9987.52	2022	9990.4	2021.93
10002.73	2020.99	10013	2021.03	10016.32	2022	10018.8	2021.91	10019.87	2022.13
10028.95	2023.06	10039.4	2023.64	10044.32	202410045.29		2023.95	10051.96	2024.26
10060.54	2024.18	10063.35	2024.22	10087.33	2024.54	10095.27	2024.69	10117.14	2025.12
10119.55	2025.11	10126.75	2024.51	10128.18	2024.9	10134.4	2025.55	10135.53	2025.67
10139.94	2025.76	10165.43	2026.25	10186.49	2026.73	10196.1	2026.93	10199.34	2026.96
10205.29	2026.98	10226.04	2027.13	10233.5	2027.26	10235.12	202810243.26		2029.09

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9771.72	.065	9983.67	.058	10039.4	.065

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9983.67 10039.4 260.09 261.13 264.73 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2028.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.54	Wt. n-Val.	0.065	0.058	0.065
[redacted] Elev (ft)	2027.73	Reach Len. (ft)	260.09	261.13	264.73
W.S. (ft)		Flow Area (sq ft)	316.94	315.46	416.34
Slope (ft/ft)	*0.008998	Area (sq ft)	316.94	315.46	416.34
Q otal (cfs)	5006.00	Flow (cfs)	1092.11	2418.91	1494.98
Top Width (ft)	408.96	Top Width (ft)	158.10	55.73	195.13
Vel Total (ft/s)	4.77	Avg. Vel. (ft/s)	3.45	7.67	3.59
Max Chl Dpth (ft)	6.74	Hydr. Depth (ft)	2.00	5.66	2.13
Conv. Total (cfs)	52773.7	Conv. (cfs)	11513.1	25500.4	15760.2
Length Wtd. (ft)	262.00	Wetted Per. (ft)	158.23	56.28	195.39
Min Ch El (ft)	2020.99	Shear (lb/sq ft)	1.13	3.15	1.20
Alpha	1.53	Stream Power (lb/ft s)	*10243.26	0.00	0.00
Frctn Loss (ft)	2.35	Cum Volume (acre-ft)	39.35	60.47	29.71

* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 17.52	* 10.99	* 15.11	*

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2029.57	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 1.04	* Wt. n-Val.	* 0.065	* 0.058	* 0.065	*
* W.S. Elev (ft)	* 2028.53	* Reach Len. (ft)	* 260.09	* 261.13	* 264.73	*
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 55.78	* 360.12	* 235.82	*
* E.G. Slope (ft/ft)	*0.010783	* Area (sq ft)	* 55.78	* 360.12	* 235.82	*
* Q Total (cfs)	* 5006.00	* Flow (cfs)	* 301.61	* 3301.90	* 1402.49	*
* Top Width (ft)	* 123.00	* Top Width (ft)	* 11.67	* 55.73	* 55.60	*
* Vel Total (ft/s)	* 7.68	* Avg. Vel. (ft/s)	* 5.41	* 9.17	* 5.95	*
* Max Chl Dpth (ft)	* 7.54	* Hydr. Depth (ft)	* 4.78	* 6.46	* 4.24	*
* Conv. Total (cfs)	* 48207.9	* Conv. (cfs)	* 2904.5	* 31797.3	* 13506.0	*
* Length Wtd. (ft)	* 262.44	* Wetted Per. (ft)	* 16.23	* 56.28	* 59.47	*
* Min Ch El (ft)	* 2020.99	* Shear (lb/sq ft)	* 2.31	* 4.31	* 2.67	*
* Alpha	* 1.14	* Stream Power (lb/ft s)	*10243.26	* 0.00	* 0.00	*
* Frctn Loss (ft)	* 2.51	* Cum Volume (acre-ft)	* 20.91	* 67.48	* 17.56	*
* C & E Loss (ft)	* 0.08	* Cum SA (acres)	* 6.52	* 10.99	* 5.61	*

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 1.615

INPUT
Description: 1.615
Station Elevation Data num= 71

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9814.58	2030.92	9817.06	2030.57	9830.05	2026.39	9831	2026.02	9831.28	2026.01
9839.27	2026	9843.99	2025.44	9858.41	2024.84	9861.62	2024.7	9873.4	2024.09
9888.78	2023.3	9892.73	2023.04	9896.31	2022.81	9911.98	2022.32	9934.9	2021.82
9940.34	2021.46	9942.22	2021.43	9946.41	2021.36	9952.52	2021.38	9960.45	2021.63
9969.17	2021.93	9974.7	2021.75	9983.71	2021.31	9987.41	2020.2	9992.27	2018.44
[illegible].09	2018.1410003.76		2017.9510004.88		2017.8410010.37		2019.6310020.32		2020.74
[illegible].52	2021.17710023.69		2021.9910026.89		2022.0810031.89		2022.1710037.44		2022.07
[illegible]3	2022.1810046.76		2022.1910053.67		2022.3810054.24		2022.3710061.71		2022.2
[illegible]7	2021.7210081.01		2021.5 10086.4		2020.4210097.38		2019.3910099.82		2019.83
10102.57	2020.8110103.92		2021.2210118.66		2024.5810119.79		2025.0610121.09		2025.05
10125.63	2025.2610156.33		2026.4410162.14		2026.15 10168.3		2026.3510180.12		2026.43
10194.07	2026.3710196.74		2026.3510198.04		2026.3310198.57		2026.3210199.11		2026.3
10199.67	2026.2910200.21		2026.2810206.58		2026.2310207.48		2026.2110208.39		2026.2
10209.3	2026.19 10210.2		2026.18 10212.7		2026.1910213.44		2026.210216.07		2026.19
10226.16	2026.32								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9814.58	.065	9983.71	.058	10021.5	.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9983.71	10021.5	348.67 319.49	275.36	.1	.3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 2025.91	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.56	* Wt. n-Val.	* 0.065	* 0.058	* 0.065	*
* W.S. Elev (ft)	* 2025.36	* Reach Len. (ft)	* 348.67	* 319.49	* 275.36	*
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 362.38	* 231.48	* 351.31	*
* E.G. Slope (ft/ft)	*0.008930	* Area (sq ft)	* 362.38	* 231.48	* 351.31	*
* Q Total (cfs)	* 5006.00	* Flow (cfs)	* 1491.51	* 1845.11	* 1669.38	*
* Top Width (ft)	* 282.08	* Top Width (ft)	* 137.68	* 37.79	* 106.61	*
* Vel Total (ft/s)	* 5.30	* Avg. Vel. (ft/s)	* 4.12	* 7.97	* 4.75	*
* Max Chl Dpth (ft)	* 7.52	* Hydr. Depth (ft)	* 2.63	* 6.13	* 3.30	*
* Conv. Total (cfs)	* 52974.5	* Conv. (cfs)	* 15783.5	* 19525.3	* 17665.7	*
* Length Wtd. (ft)	* 321.95	* Wetted Per. (ft)	* 137.80	* 38.75	* 107.68	*
* Min Ch El (ft)	* 2017.84	* Shear (lb/sq ft)	* 1.47	* 3.33	* 1.82	*
* Alpha	* 1.28	* Stream Power (lb/ft s)	*10226.16	* 0.00	* 0.00	*
* Frctn Loss (ft)	* 4.33	* Cum Volume (acre-ft)	* 37.32	* 58.83	* 27.38	*
* C & E Loss (ft)	* 0.06	* Cum SA (acres)	* 16.63	* 10.71	* 14.19	*

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

[illegible]SS SECTION OUTPUT Profile #FW

* [illegible] Elev (ft)	* 2026.98	* Element	* Left OB	* Channel	* Right OB	*
* [illegible] Head (ft)	* 0.76	* Wt. n-Val.	* 0.065	* 0.058	* 0.065	*
* W.S. Elev (ft)	* 2026.21	* Reach Len. (ft)	* 348.67	* 319.49	* 275.36	*
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 67.10	* 263.90	* 434.45	*
* E.G. Slope (ft/ft)	*0.008542	* Area (sq ft)	* 67.10	* 263.90	* 434.45	*
* Q Total (cfs)	* 5006.00	* Flow (cfs)	* 328.67	* 2245.14	* 2432.20	*
* Top Width (ft)	* 151.00	* Top Width (ft)	* 14.71	* 37.79	* 98.50	*
* Vel Total (ft/s)	* 6.54	* Avg. Vel. (ft/s)	* 4.90	* 8.51	* 5.60	*
* Max Chl Dpth (ft)	* 8.37	* Hydr. Depth (ft)	* 4.56	* 6.98	* 4.41	*
* Conv. Total (cfs)	* 54164.2	* Conv. (cfs)	* 3556.1	* 24292.1	* 26316.0	*
* [illegible]	* 310.75	* [illegible]	* 19.01	* 38.75	* 100.72	*

* [redacted]Ch El (ft)	* 2017.84	* Shear (lb/sq ft)	* 1.88	* 3.63	* 2.30	*
* [redacted]	* 1.15	* Stream Power (lb/ft s)	*10226.16	* 0.00	* 0.00	*
* [redacted]t Loss (ft)	* 3.99	* Cum Volume (acre-ft)	* 20.54	* 65.61	* 15.52	*
* [redacted]s Loss (ft)	* 0.09	* Cum SA (acres)	* 6.44	* 10.71	* 5.14	*

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 1.554

INPUT
Description: 1.554
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9752.69	2043.73	9754.83	2043.24	9781.59	2037.02	9785.58	2035.86	9799.55	2031.84
9806.11	2029.76	9810.54	2028.03	9819.99	2023.93	9828.52	2020.04	9832.08	2018.76
9846.36	2016.57	9848.15	2016.49	9853.12	2015.98	9859.15	2016.78	9862.61	2016.84
9869.73	2016.97	9872.92	2016.89	9880.53	2016.96	9885.67	2017.27	9888.81	2017.59
9898.8	2018.02	9900.37	2018.04	9901.43	2018.11	9918.18	2018.56	9920.35	2018.62
9929.55	2018.84	9937.93	2018.3	9942.25	2018.01	9944.42	2017.85	9948.35	2017.97
9952.05	2018.17	9957.81	2018.22	9961.48	2018.26	9966.23	2018.15	9971.42	2017.99
9978.74	2017.8	9986.07	2017.54	9989.74	2016.53	9992.29	2015.55	9998.06	2013.82
9998.71	2013.58	9999.61	2013.5910015.58		2015.2710017.61		2016.3710021.06		2016.96
10022.6	2017.3610025.87		2017.710028.11		2017.9	10043.7	2018.45	10046.1	2018.54
10048.28	2018.6110051.65		2018.74	10055	2018.87	10059.5	2019.0910062.79		2019.3
10065.39	2019.4610080.67		2020.4810093.09		2021.0710096.12		2021.2510102.84		2021.49
10111.22	2022.0510114.21		2022.19						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9752.69	.065	9989.74	.05810017.61		.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9989.7410017.61		186.38	184.64 177.52	.1	.3

[redacted] SECTION OUTPUT Profile #Q100

* [redacted] Elev (ft)	* 2021.53	* Element	* Left OB	* Channel * Right OB *
* Vel Head (ft)	* 1.20	* Wt. n-Val.	* 0.065	* 0.058 * 0.065 *
* W.S. Elev (ft)	* 2020.33	* Reach Len. (ft)	* 186.38	* 184.64 * 177.52 *
* Crit W.S. (ft)	* 2020.33	* Flow Area (sq ft)	* 412.85	* 157.25 * 102.77 *
* E.G. Slope (ft/ft)	*0.022455	* Area (sq ft)	* 412.85	* 157.25 * 102.77 *
* Q Total (cfs)	* 5006.00	* Flow (cfs)	* 2631.89	* 1875.62 * 498.49 *
* Top Width (ft)	* 250.53	* Top Width (ft)	* 161.86	* 27.87 * 60.80 *
* Vel Total (ft/s)	* 7.44	* Avg. Vel. (ft/s)	* 6.37	* 11.93 * 4.85 *
* Max Chl Dpth (ft)	* 6.75	* Hydr. Depth (ft)	* 2.55	* 5.64 * 1.69 *
* Conv. Total (cfs)	* 33406.5	* Conv. (cfs)	* 17563.3	* 12516.6 * 3326.6 *
* Length Wtd. (ft)	* 184.59	* Wetted Per. (ft)	* 162.63	* 28.72 * 60.99 *
* Min Ch El (ft)	* 2013.58	* Shear (lb/sq ft)	* 3.56	* 7.68 * 2.36 *
* Alpha	* 1.39	* Stream Power (lb/ft s)	*10114.21	* 0.00 * 0.00 *
* Frctn Loss (ft)	* 2.72	* Cum Volume (acre-ft)	* 34.22	* 57.41 * 25.94 *
* C & E Loss (ft)	* 0.20	* Cum SA (acres)	* 15.44	* 10.47 * 13.66 *

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

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2022.90	* Element	* Left OB	* Channel * Right OB *
* Vel Head (ft)	* 1.62	* Wt. n-Val.	* 0.065	* 0.058 * 0.065 *
* W.S. Elev (ft)	* 2021.28	* Reach Len. (ft)	* 186.38	* 184.64 * 177.52 *
* Crit W.S. (ft)	* 2021.28	* Flow Area (sq ft)	* 248.21	* 183.80 * 131.90 *
* E.G. Slope (ft/ft)	*0.021394	* Area (sq ft)	* 248.21	* 183.80 * 131.90 *
* Q Total (cfs)	* 5006.00	* Flow (cfs)	* 1724.37	* 2374.35 * 907.28 *
* Top Width (ft)	* 150.00	* Top Width (ft)	* 79.74	* 27.87 * 42.39 *
* Vel Total (ft/s)	* 8.88	* Avg. Vel. (ft/s)	* 6.95	* 12.92 * 6.88 *
* Max Chl Dpth (ft)	* 7.70	* Hydr. Depth (ft)	* 3.11	* 6.59 * 3.11 *
* Conv. Total (cfs)	* 34224.8	* Conv. (cfs)	* 11789.1	* 16232.9 * 6202.9 *
* Length Wtd. (ft)	* 184.15	* Wetted Per. (ft)	* 82.88	* 28.72 * 44.70 *
* [redacted]n Ch El (ft)	* 2013.58	* Shear (lb/sq ft)	* 4.00	* 8.55 * 3.94 *
* [redacted]ha	* 1.32	* Stream Power (lb/ft s)	*10114.21	* 0.00 * 0.00 *
* [redacted]t Loss (ft)	* 2.39	* Cum Volume (acre-ft)	* 19.28	* 63.97 * 13.73 *
* [redacted]s Loss (ft)	* 0.29	* Cum SA (acres)	* 6.07	* 10.47 * 4.70 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.

need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 1.519

INPUT
Description: 1.519
Station Elevation Data num= 80

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9721.29	2029.65	9725.67	2029.68	9729.73	2029.77	9733.79	2029.47	9734.01	2029.42
9734.95	2029.3	9756.99	2026.96	9762.89	2026.31	9768.84	2025.46	9776.61	2024.25
9781.93	2023.5	9785.39	2023.19	9786.81	2022.91	9788.38	2022.65	9797.39	2020.32
9803.62	2019.13	9803.88	2019.12	9810.68	2018.73	9815.19	2018.62	9817.27	2018.66
9821.67	2018.24	9823.5	2017.83	9827.32	2017.85	9834.85	2017.17	9843.04	2015.94
9845.57	2015.12	9851.38	2013.14	9854.29	2012.55	9858.1	2012.12	9860.59	2011.77
9867.88	2012.92	9871.24	2013.5	9874.75	2013.6	9882.72	2013.86	9898.42	2013.75
9907.5	2013.51	9914.54	2012.72	9922.62	2013.28	9925.52	2013.49	9926.73	2013.6
9931.98	2013.94	9933.26	2014.02	9944.82	2014.76	9948.91	2014.01	9952.55	2013.31
9955.62	2012.8	9956.2	2012.68	9957.26	2012.53	9966.17	2013.29	9971.74	2013.68
9972.46	2013.77	9973.28	2013.81	9974.15	2013.78	9980.62	2013.63	9984.74	2013.58
9989.54	2013.56	9995.24	2012.9410000.75		2011.4210004.65		2011.2710007.08		2012.25
10012.91	2011.8810017.62		2014.6110020.78		2014.6610051.59		2014.7610051.85		2014.77
10074.42	2015.2810090.24		2015.6310099.62		2016.17 10099.8		2016.210108.76		2017.95
10109.18	2017.9810109.78		201810141.39		2019.3810150.12		2019.9910169.71		2021.22
10176.37	2021.6710176.54		2021.6810177.42		2021.7310179.04		2021.8110192.31		2022.46

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9721.29	.065	9944.82	.05810017.62		.065

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9944.8210017.62 478.98 499.06 501.73 .1 .3

CROSS SECTION OUTPUT Profile #Q100

[redacted] Elev (ft)	* 2017.89	* Element	* Left OB	* Channel	* Right OB
[redacted] ead (ft)	* 0.53	* Wt. n-Val.	* 0.065	* 0.058	* 0.065
* [redacted] Elev (ft)	* 2017.35	* Reach Len. (ft)	* 478.98	* 499.06	* 501.73
* Cric W.S. (ft)	*	* Flow Area (sq ft)	* 396.13	* 312.34	* 190.27
* E.G. Slope (ft/ft)	*0.010426	* Area (sq ft)	* 396.13	* 312.34	* 190.27
* Q Total (cfs)	* 5006.00	* Flow (cfs)	* 2135.08	* 2129.49	* 741.43
* Top Width (ft)	* 272.84	* Top Width (ft)	* 111.97	* 72.80	* 88.07
* Vel Total (ft/s)	* 5.57	* Avg. Vel. (ft/s)	* 5.39	* 6.82	* 3.90
* Max Chl Dpth (ft)	* 6.08	* Hydr. Depth (ft)	* 3.54	* 4.29	* 2.16
* Conv. Total (cfs)	* 49027.3	* Conv. (cfs)	* 20910.3	* 20855.7	* 7261.4
* Length Wtd. (ft)	* 491.60	* Wetted Per. (ft)	* 112.89	* 74.23	* 88.21
* Min Ch El (ft)	* 2011.27	* Shear (lb/sq ft)	* 2.28	* 2.74	* 1.40
* Alpha	* 1.11	* Stream Power (lb/ft s)	*10192.31	* 0.00	* 0.00
* Frctn Loss (ft)	* 6.09	* Cum Volume (acre-ft)	* 32.49	* 56.41	* 25.34
* C & E Loss (ft)	* 0.07	* Cum SA (acres)	* 14.85	* 10.26	* 13.36

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.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 2018.99	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.65	* Wt. n-Val.	* 0.065	* 0.058	* 0.065
* W.S. Elev (ft)	* 2018.34	* Reach Len. (ft)	* 478.98	* 499.06	* 501.73
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 289.26	* 384.33	* 128.54
* E.G. Slope (ft/ft)	*0.008732	* Area (sq ft)	* 289.26	* 384.33	* 128.54
* Q Total (cfs)	* 5006.00	* Flow (cfs)	* 1643.34	* 2753.73	* 608.93
* Top Width (ft)	* 170.28	* Top Width (ft)	* 62.10	* 72.80	* 35.38
* Vel Total (ft/s)	* 6.24	* Avg. Vel. (ft/s)	* 5.68	* 7.16	* 4.74
* Max Chl Dpth (ft)	* 7.07	* Hydr. Depth (ft)	* 4.66	* 5.28	* 3.63
* Conv. Total (cfs)	* 53570.0	* Conv. (cfs)	* 17585.6	* 29468.1	* 6516.3
* Length Wtd. (ft)	* 493.77	* Wetted Per. (ft)	* 66.70	* 74.23	* 38.92
* Min Ch El (ft)	* 2011.27	* Shear (lb/sq ft)	* 2.36	* 2.82	* 1.80
* Alpha	* 1.07	* Stream Power (lb/ft s)	*10192.31	* 0.00	* 0.00
* Frctn Loss (ft)	* 6.32	* Cum Volume (acre-ft)	* 18.13	* 62.76	* 13.20
* C & E Loss (ft)	* 0.13	* Cum SA (acres)	* 5.76	* 10.26	* 4.54

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

[redacted] ECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 1.425

INPUT
Description: 1.425, ineffective flow area added to station 9745.09 for tributary flow
Station Elevation Data num= 79

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*[redacted]**********************************************************************
 9[redacted]3 2011.55 9661.86 2010.61 9661.99  2010.6 9683.98 2009.59 9698.19 2009.28
 9[redacted]5 2009.37 9726.14  2010.3 9735.45 2010.21 9745.09 2010.45 9750.03  2009.9
 9751.31 2009.83 9758.71 2008.54 9759.95 2008.05 9761.13 2008.03 9773.09 2007.88
 9779.32 2007.92  9780.3 2007.95 9784.07 2008.06 9789.75 2008.24 9817.44 2009.09
 9819.18 2009.05 9824.42 2009.19 9829.22 2009.16 9829.83 2009.13 9829.97 2009.12
 9861.78 2009.18 9874.55  2009.2 9875.29 2009.18 9879.39 2009.04 9888.24 2008.72
  9904.7 2008.56 9944.46 2007.94 9951.92 2007.78 9973.75 2006.82 9978.23 2006.49
 9980.58  2005.7 9984.67 2004.79 9992.41 2003.0910001.78 2003.1910007.49 2003.06
10018.61 2004.6510021.35    200510022.51 2005.6710023.76 2006.8610026.81 2009.24
   10029 2010.0610030.66 2011.9310032.59 2012.1610037.53 2012.7510044.39 2013.84
10049.84 2013.9310056.57 2014.1510063.21 2014.2810074.82 2014.62 10078.6 2014.69
10086.21 2014.8210090.78 2014.8610098.34 2014.9410102.31 2015.01 10113.6 2015.33
10124.38 2015.7410129.24 2015.7910134.22 2015.7610139.99 2015.7710149.35 2015.65
10166.98 2015.5510170.77 2015.5210171.35 2015.4910174.61 2015.4610187.17 2015.39
10201.55 2014.9310206.96 2014.7910210.18 2014.2510211.92 2013.9610212.15 2014.01
10212.76 2014.0610213.18 2014.0810225.37 2015.2710231.65 2015.57

Manning's n Values         num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
*****************************************************
 9628.43    .065 9973.75    .05810023.76    .065

Bank Sta: Left   Right     Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9973.7510023.76            213.43   294.1  310.95             .1       .3
Ineffective Flow      num=        1
   Sta L   Sta R    Elev  Permanent
 9628.43 9745.09 2010.45       T

CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************
* E.G. Elev (ft)         * 2011.73  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)          *    1.19  * Wt. n-Val.             *   0.065 *   0.058 *   0.065 *
* W.S. Elev (ft)         * 2010.53  * Reach Len. (ft)        *  213.43 *  294.10 *  310.95 *
* Crit W.S. (ft)         * 2010.37  * Flow Area (sq ft)      *  462.29 *  313.32 *    9.61 *
* E.G. Slope (ft/ft)     *0.014984  * Area (sq ft)           *  510.62 *  313.32 *    9.61 *
* Q Total (cfs)          * 5006.00  * Flow (cfs)             * 1686.16 * 3286.11 *   33.73 *
* Top Width (ft)         *  365.98  * Top Width (ft)        *  310.31 *   50.01 *    5.66 *
* Vel Total (ft/s)       *    6.38  * Avg. Vel. (ft/s)      *    3.65 *   10.49 *    3.51 *
* Max Chl Dpth (ft)      *    7.47  * Hydr. Depth (ft)      *    1.49 *    6.27 *    1.70 *
* Conv. Total (cfs)      * 40895.6  * Conv. (cfs)           * 13774.8 * 26845.3 *   275.5 *
* Length Wtd. (ft)       *  274.44  * Wetted Per. (ft)      *  310.66 *   51.23 *    6.84 *
* Min Ch El (ft)         * 2003.06  * Shear (lb/sq ft)      *    1.39 *    5.72 *    1.31 *
* [redacted]ha           *    1.89  * Stream Power (lb/ft s) *10231.65 *    0.00 *    0.00 *
* [redacted]n Loss (ft)  *    4.51  * Cum Volume (acre-ft)  *   27.50 *   52.83 *   24.19 *
* [redacted]' Loss (ft)  *    0.02  * Cum SA (acres)        *   12.53 *    9.55 *   12.82 *
*[redacted]*****************************************************************************************

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.

CROSS SECTION OUTPUT  Profile #FW
*****************************************************************************************
* E.G. Elev (ft)         * 2012.54  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)          *    1.96  * Wt. n-Val.             *   0.065 *   0.058 *   0.065 *
* W.S. Elev (ft)         * 2010.57  * Reach Len. (ft)        *  213.43 *  294.10 *  310.95 *
* Crit W.S. (ft)         * 2010.57  * Flow Area (sq ft)      *  173.12 *  315.26 *    9.83 *
* E.G. Slope (ft/ft)     *0.020522  * Area (sq ft)           *  173.12 *  315.26 *    9.83 *
* Q Total (cfs)          * 5006.00  * Flow (cfs)             * 1079.67 * 3885.51 *   40.83 *
* Top Width (ft)         *  119.42  * Top Width (ft)        *   63.75 *   50.01 *    5.66 *
* Vel Total (ft/s)       *   10.05  * Avg. Vel. (ft/s)      *    6.24 *   12.32 *    4.15 *
* Max Chl Dpth (ft)      *    7.51  * Hydr. Depth (ft)      *    2.72 *    6.30 *    1.74 *
* Conv. Total (cfs)      * 34944.8  * Conv. (cfs)           *  7536.7 * 27123.1 *   285.0 *
* Length Wtd. (ft)       *  280.00  * Wetted Per. (ft)      *   65.87 *   51.23 *    6.88 *
* Min Ch El (ft)         * 2003.06  * Shear (lb/sq ft)      *    3.37 *    7.88 *    1.83 *
* Alpha                  *    1.25  * Stream Power (lb/ft s) *10231.65 *    0.00 *    0.00 *
* Frctn Loss (ft)        *    3.96  * Cum Volume (acre-ft)  *   15.59 *   58.76 *   12.40 *
* C & E Loss (ft)        *    0.28  * Cum SA (acres)        *    5.07 *    9.55 *    4.30 *
*****************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
         for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
         water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The program
         defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth.  The program will try the cross section slice/secant
         method to find critical depth.

CROSS SECTION


RIVER: Rodger Creek
REACH: Main Reach         RS: 1.369

[redacted]
[redacted]tion: 1.369
St[redacted]i Elevation Data    num=      58
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9748.34 2007.77 9749.52 2007.72 9752.41 2007.65 9768.99  2007.3 9776.72 2007.21
 9784.16 2006.88 9785.79 2006.82 9789.74 2006.56  9790.6  2006.5 9791.69 2006.41
 9810.95 2005.01 9819.54 2004.74 9820.44 2004.73 9821.26 2004.71 9822.64 2004.69
 9844.55 2004.22 9852.14 2004.51 9862.87 2004.58 9868.81 2004.69 9871.14 2004.68
 9881.47 2004.69 9885.05  2004.7  9893.5 2004.71  9899.2 2004.44 9907.63 2004.39
 9925.35 2003.35 9939.17 2002.12 9945.78 2001.42 9952.11 2000.55 9955.87 1999.77
```

9999.51 1999.4310009.61 1999.45 10014.3 200010016.98 2002.2210017.642002.434
10[redacted]95 2004.1610027.91 2005.9710035.33 2008.6810037.45 2009.9710039.73 2010.15
10[redacted]7 2010.3 10057.9 2011.0310066.89 2011.0710071.36 2011.1310072.49 2011.11
10[redacted].7 2011.110087.98 2011.14 10099.1 2011.2110099.77 2011.2510100.93 2011.22
10101.63 2011.2410122.92 2011.2210126.64 2011.19

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9748.34 .065 9939.17 .05810016.98 .065

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9939.1710016.98 239.27 239.8 219.34 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2007.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.39	Wt. n-Val.	0.065	0.058	0.065
W.S. Elev (ft)	2005.80	Reach Len. (ft)	239.27	239.80	219.34
Crit W.S. (ft)	2005.80	Flow Area (sq ft)	199.31	404.44	19.30
E.G. Slope (ft/ft)	*0.018133	Area (sq ft)	199.31	404.44	19.30
Q Total (cfs)	5006.00	Flow (cfs)	779.16	4140.79	86.05
Top Width (ft)	227.41	Top Width (ft)	139.13	77.81	10.47
Vel Total (ft/s)	8.03	Avg. Vel. (ft/s)	3.91	10.24	4.46
Max Chl Dpth (ft)	6.37	Hydr. Depth (ft)	1.43	5.20	1.84
Conv. Total (cfs)	37174.9	Conv. (cfs)	5786.1	30749.8	639.0
Length Wtd. (ft)	238.30	Wetted Per. (ft)	139.26	79.11	11.07
Min Ch El (ft)	1999.43	Shear (lb/sq ft)	1.62	5.79	1.97
Alpha	1.39	Stream Power (lb/ft s)	*10126.64	0.00	0.00
Frctn Loss (ft)	1.60	Cum Volume (acre-ft)	25.76	50.40	24.09
C & E Loss (ft)	0.30	Cum SA (acres)	11.43	9.12	12.76

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

CROSS SECTION OUTPUT Profile #FW

[redacted] Elev (ft)	2007.82	Element	Left OB	Channel	Right OB
[redacted] .ead (ft)	1.03	Wt. n-Val.	0.065	0.058	0.065
W.S. Elev (ft)	2006.79	Reach Len. (ft)	239.27	239.80	219.34
Crit W.S. (ft)		Flow Area (sq ft)	150.93	481.36	29.65
E.G. Slope (ft/ft)	*0.010318	Area (sq ft)	150.93	481.36	29.65
Q Total (cfs)	5006.00	Flow (cfs)	705.44	4175.13	125.43
Top Width (ft)	138.95	Top Width (ft)	50.67	77.81	10.47
Vel Total (ft/s)	7.56	Avg. Vel. (ft/s)	4.67	8.67	4.23
Max Chl Dpth (ft)	7.36	Hydr. Depth (ft)	2.98	6.19	2.83
Conv. Total (cfs)	49283.6	Conv. (cfs)	6945.0	41103.8	1234.8
Length Wtd. (ft)	238.85	Wetted Per. (ft)	52.85	79.11	12.06
Min Ch El (ft)	1999.43	Shear (lb/sq ft)	1.84	3.92	1.58
Alpha	1.16	Stream Power (lb/ft s)	*10126.64	0.00	0.00
Frctn Loss (ft)	1.88	Cum Volume (acre-ft)	14.79	56.07	12.26
C & E Loss (ft)	0.04	Cum SA (acres)	4.79	9.12	4.25

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 1.324

INPUT
Description: 1.324
Station Elevation Data num= 77
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9797.26 2012.51 9818.81 2011.06 9820.04 2010.94 9821.19 2010.86 9826.25 2010.36
9830.69 2009.99 9831.32 2009.83 9843.76 2008.88 9845.67 2008.76 9857.7 2007.3
9860.61 2007.05 9866.19 2006.42 9875.64 2005.26 9882.66 2004.37 9884.87 2003.98
9888.16 2003.28 9891.26 2002.69 9892.7 2002.47 9898.14 2001.83 9901.83 2001.04
9903.12 2001.31 9907.58 2001.23 9910.96 2001.19 9912.22 2001.31 9917.3 2001.18
9921.11 2000.75 9936.13 1999.5 9943.18 1999.11 9944.53 1999.04 9945.63 1999.01
9950.85 1998.46 9951.2 1998.48 9959.59 1999.6 9975.11 1999.02 9977.55 1998.9
9979.06 1998.66 9984.8 1997.75 9997.12 1996.0110007.16 1996.0710012.06 1996.27
10015.55 1996.2810031.41 1997.1710035.29 1997.5810038.46 1997.8310040.88 1998.48
10041.76 1998.6810042.81 1998.6710044.99 1998.9710058.36 2000.5610063.94 2001.08
10070.07 2001.51 10079.4 2002.05 10081.4 2002.1310084.75 2002.3410093.26 2002.74
10094.042002.74710104.61 2002.8410109.78 2002.7810115.11 2002.8510126.26 2002.89
[redacted]86 2003.1710140.18 2003.2410140.93 2003.310153.56 2003.9510154.27 2003.97
[redacted]4 2004.0710157.31 2004.0910194.19 2005.210204.83 2005.1210212.09 2005.2
[redacted]9 2005.2510219.66 2005.2410223.29 2004.9710224.76 2004.7910232.95 2005.1
10239.02 2005.2610257.32 2005.32

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9797.26 .065 9975.11 .05810044.99 .065

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9975.1110044.99 197.12 179.24 148.13 1 3

CROSS SECTION OUTPUT Profile #Q100

Elev (ft)	2005.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.38	Wt. n-Val.	0.065	0.058	0.065
W.S. Elev (ft)	2004.67	Reach Len. (ft)	197.12	179.74	148.13
Crit W.S. (ft)		Flow Area (sq ft)	388.96	529.76	271.18
E.G. Slope (ft/ft)	0.003476	Area (sq ft)	388.96	529.76	271.18
Q Total (cfs)	5006.00	Flow (cfs)	1338.38	3075.94	591.68
Top Width (ft)	296.11	Top Width (ft)	94.78	69.88	131.45
Vel Total (ft/s)	4.21	Avg. Vel. (ft/s)	3.44	5.81	2.18
Max Chl Dpth (ft)	8.66	Hydr. Depth (ft)	4.10	7.58	2.06
Conv. Total (cfs)	84912.6	Conv. (cfs)	22701.8	52174.6	10036.2
Length Wtd. (ft)	179.88	Wetted Per. (ft)	95.34	70.29	131.65
Min Ch El (ft)	1996.01	Shear (lb/sq ft)	0.89	1.64	0.45
Alpha	1.38	Stream Power (lb/ft s)	10257.32	0.00	0.00
Frctn Loss (ft)	1.27	Cum Volume (acre-ft)	24.15	47.83	23.36
C & E Loss (ft)	0.23	Cum SA (acres)	10.79	8.72	12.40

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2005.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.91	Wt. n-Val.	0.065	0.058	0.065
W.S. Elev (ft)	2005.00	Reach Len. (ft)	197.12	179.74	148.13
Crit W.S. (ft)		Flow Area (sq ft)	64.13	553.10	69.99
E.G. Slope (ft/ft)	0.006190	Area (sq ft)	64.13	553.10	69.99
Q Total (cfs)	5006.00	Flow (cfs)	283.03	4410.61	312.36
Top Width (ft)	94.36	Top Width (ft)	11.11	69.88	13.37
Vel Total (ft/s)	7.28	Avg. Vel. (ft/s)	4.41	7.97	4.46
Max Chl Dpth (ft)	8.99	Hydr. Depth (ft)	5.77	7.92	5.23
Conv. Total (cfs)	63629.2	Conv. (cfs)	3597.5	56061.5	3970.2
Length Wtd. (ft)	179.23	Wetted Per. (ft)	16.68	70.29	17.90
Min Ch El (ft)	1996.01	Shear (lb/sq ft)	1.49	3.04	1.51
Alpha	1.10	Stream Power (lb/ft s)	10257.32	0.00	0.00
Frctn Loss (ft)	1.90	Cum Volume (acre-ft)	14.20	53.22	12.01
C & E Loss (ft)	0.19	Cum SA (acres)	4.62	8.72	4.19

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 1.290

INPUT
Description: 1.29
Station Elevation Data num= 75

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9895.71	2025.07	9896.36	2024.88	9906.17	2022.8	9912.58	2021.52	9917.92	2020.05
9919.34	2019.71	9926.54	2018.41	9941.38	2016.02	9942.47	2015.74	9953.87	2010.27
9954.66	2009.92	9955.08	2009.69	9972.22	1999.74	9973.78	1999.12	9976.32	1998.113
9976.96	1997.86	9984.63	1995.36	9992.53	1992.77	9993.34	1992.52	9998.33	1992.49
10003.36	1992.86	10019.62	1993.33	10021.04	1993.36	10023.87	1994.35	10026.09	1995.14
10026.21	1995.2	10026.37	1995.29	10026.57	1995.43	10029.43	1997.3	10030.77	1998.19
10035.37	1999.37	10035.43	1999.39	10035.54	1999.41	10035.58	1999.42	10040.54	1999.67
10042.73	1999.63	10047.13	2000.23	10052.5	2000.85	10054	2001.08	10054.22	2001.15
10056.82	2001.86	10057.91	2001.91	10058.88	2001.97	10063.6	2002.27	10064.55	2002.22
10067.56	2002.23	10068.54	2002.31	10070.65	2002.13	10073.49	2001.61	10074.78	2001.12
10076.22	2000.5	10078.15	2000.31	10081.39	2000.75	10081.72	2000.8	10082.76	2001.55
10087.64	2004.48	10088.77	2003.85	10091.51	2002.41	10094.48	2001.61	10097.51	2000.85
10098.24	2000.61	10099.05	2000.67	10104.59	2000.92	10105.94	2000.91	10108.13	2000.99
10118.69	2001.51	10126.83	2001.71	10129.74	2001.72	10134.68	2001.67	10150.6	2001.54
10153.61	2001.44	10161.51	2001.39	10165.11	2001.44	10171.23	2001.55	10180.68	2001.68

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9895.71	.065	9976.32	.05	10029.43	.065

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9976.32 10029.43 276.82 275.39 270.55 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	2003.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.65	Wt. n-Val.	0.065	0.058	0.065
Elev (ft)	2000.90	Reach Len. (ft)	276.82	275.39	270.55
W.S. (ft)	2000.90	Flow Area (sq ft)	9.27	365.73	33.38
E.G. Slope (ft/ft)	0.021380	Area (sq ft)	9.27	365.73	33.38
Q Total (cfs)	5006.00	Flow (cfs)	38.35	4846.02	121.63
Top Width (ft)	96.29	Top Width (ft)	6.10	53.11	37.08
Vel Total (ft/s)	12.26	Avg. Vel. (ft/s)	4.14	13.25	3.64
Max Chl Dpth (ft)	8.41	Hydr. Depth (ft)	1.52	6.89	0.90
Conv. Total (cfs)	34236.7	Conv. (cfs)	262.3	33142.5	831.9
Length Wtd. (ft)	275.23	Wetted Per. (ft)	6.73	54.98	37.80
Min Ch El (ft)	1992.49	Shear (lb/sq ft)	1.84	8.88	1.18
Alpha	1.12	Stream Power (lb/ft s)	10180.68	0.00	0.00

* Frctn Loss (ft)	*	3.77	* Cum Volume (acre-ft)	*	23.25	*	45.98	*	22.84	*
* C & E Loss (ft)	*	0.42	* Cum SA (acres)	*	10.56	*	8.46	*	12.12	*

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

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	*	2003.81	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	2.86	* Wt. n-Val.	*	0.065	*	0.058	*	0.065	*
* W.S. Elev (ft)	*	2000.96	* Reach Len. (ft)	*	276.82	*	275.39	*	270.55	*
* Crit W.S. (ft)	*	2000.51	* Flow Area (sq ft)	*	0.89	*	368.57	*	1.97	*
* E.G. Slope (ft/ft)	*	0.022185	* Area (sq ft)	*	0.89	*	368.57	*	1.97	*
* Q Total (cfs)	*	5006.00	* Flow (cfs)	*	1.33	*	5000.44	*	4.23	*
* Top Width (ft)	*	54.00	* Top Width (ft)	*	0.32	*	53.11	*	0.57	*
* Vel Total (ft/s)	*	13.48	* Avg. Vel. (ft/s)	*	1.49	*	13.57	*	2.14	*
* Max Chl Dpth (ft)	*	8.47	* Hydr. Depth (ft)	*	2.78	*	6.94	*	3.46	*
* Conv. Total (cfs)	*	33609.8	* Conv. (cfs)	*	8.9	*	33572.5	*	28.4	*
* Length Wtd. (ft)	*	275.39	* Wetted Per. (ft)	*	3.06	*	54.98	*	3.95	*
* Min Ch El (ft)	*	1992.49	* Shear (lb/sq ft)	*	0.40	*	9.29	*	0.69	*
* Alpha	*	1.01	* Stream Power (lb/ft s)	*	10180.68	*	0.00	*	0.00	*
* Frctn Loss (ft)	*	3.22	* Cum Volume (acre-ft)	*	14.06	*	51.32	*	11.89	*
* C & E Loss (ft)	*	0.53	* Cum SA (acres)	*	4.59	*	8.46	*	4.16	*

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 1.237

INPUT
Description: 1.237 Levee set at station 10082.2 to keep flow in main channel
Station Elevation Data num= 61

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9873.82	2010	9884.18	2009.31	9884.89	2009.37	9886.3	2009.21	9890.13	2008.76
9895.91	2008.37	9921.7	2006.22	9922.25	2006.17	9923.28	2006.09	9952.26	2001.85
9953.27	2001.73	9963.71	1999.66	9967.9	1998.71	9969.84	1998.27	99751995.351		
9975.51995.068		9980.71	1992.12	9982.16	1990.82	9984.01	1990.3510003.99		1988.91	
10007.17	1988.6610007.73		1988.710008.01		1988.7710018.88		1990.410020.22		1990.5	
10027.5	1991.2310030.71		1991.4110036.81		1992.0910048.42		1993.5110063.02		1995.97	
10066.05	1996.46	10071.5	1997.0510072.74		1997.1910082.21		1998.2810085.03		1998.22	
10087.7	1998.2710100.86		1998.0410104.86		1998.0710117.83		1997.8210122.46		1997.7	
10125.71	1997.8810132.39		199810138.05		1998.1810141.74		1998.1310159.53		1997.91	
10179.83	1997.4210207.32		1997.6310235.75		1997.7710242.43		1997.6710249.91		1997.57	
10251.14	1997.5410253.68		1997.3210254.65		1997.2910261.48		1997.9810261.55		1998	
10261.68	1998.01	10262.6	1998.0310277.83		1998.3710282.01		1998.5710284.62		1998.7	
10289.87	1999.04									

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9873.82	.065	9975	.05810048.42		.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
997510048.42		130.65	129.75	127.89	.1	.3

Right Levee Station= 10082.2 Elevation=

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	*	1999.21	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	1.24	* Wt. n-Val.	*	0.065	*	0.058	*	0.065	*
* W.S. Elev (ft)	*	1997.97	* Reach Len. (ft)	*	130.65	*	129.75	*	127.89	*
* Crit W.S. (ft)	*	1996.17	* Flow Area (sq ft)	*	6.06	*	523.12	*	62.78	*
* E.G. Slope (ft/ft)	*	0.009534	* Area (sq ft)	*	6.06	*	523.12	*	62.78	*
* Q Total (cfs)	*	5006.00	* Flow (cfs)	*	14.76	*	4768.96	*	222.29	*
* Top Width (ft)	*	109.14	* Top Width (ft)	*	4.63	*	73.42	*	31.09	*
* Vel Total (ft/s)	*	8.46	* Avg. Vel. (ft/s)	*	2.44	*	9.12	*	3.54	*
* Max Chl Dpth (ft)	*	9.31	* Hydr. Depth (ft)	*	1.31	*	7.12	*	2.02	*
* Conv. Total (cfs)	*	51269.4	* Conv. (cfs)	*	151.2	*	48841.7	*	2276.6	*
* Length Wtd. (ft)	*	129.63	* Wetted Per. (ft)	*	5.32	*	75.19	*	31.42	*
* Min Ch El (ft)	*	1988.66	* Shear (lb/sq ft)	*	0.68	*	4.14	*	1.19	*
* Alpha	*	1.12	* Stream Power (lb/ft s)	*	10289.87	*	0.00	*	10082.20	*
* Frctn Loss (ft)	*	1.76	* Cum Volume (acre-ft)	*	23.20	*	43.17	*	22.54	*
* C & E Loss (ft)	*	0.07	* Cum SA (acres)	*	10.52	*	8.06	*	11.90	*

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the

need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	2000.06	Element	Left OB	Channel	Right OB	
Vel Head (ft)	1.09	Wt. n-Val.		0.058	0.065	
W.S. Elev (ft)	1998.97	Reach Len. (ft)	130.65	129.75	127.89	
Crit W.S. (ft)	1996.10	Flow Area (sq ft)		596.54	3.14	
E.G. Slope (ft/ft)	*0.007207	Area (sq ft)		596.54	3.14	
Q Total (cfs)	5006.00	Flow (cfs)		5002.02	3.98	
Top Width (ft)	74.00	Top Width (ft)		73.42	0.58	
Vel Total (ft/s)	8.35	Avg. Vel. (ft/s)		8.39	1.27	
Max Chl Dpth (ft)	10.31	Hydr. Depth (ft)		8.13	5.41	
Conv. Total (cfs)	58966.0	Conv. (cfs)		58919.2	46.8	
Length Wtd. (ft)	129.75	Wetted Per. (ft)		78.81	5.95	
Min Ch El (ft)	1988.66	Shear (lb/sq ft)		3.41	0.24	
Alpha	1.01	Stream Power (lb/ft s)	*10289.87	0.00	*10082.20	
Frctn Loss (ft)	1.53	Cum Volume (acre-ft)	14.05	48.27	11.87	
C & E Loss (ft)	0.15	Cum SA (acres)	4.59	8.06	4.16	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 1.213

INPUT
Description: 1.213 Levee set at station 10107.81; tributary flow location
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9902.16	1998.14	9902.63	1998.11	9910.78	1997.69	9912.18	1997.66	9915	1997.58
9924.42	1997.23	9929	1997.17	9936.25	1996.98	9946.22	1996.76	9948.73	1996.67
9952.54	1996.56	9958.6	1994.91	9963.6	1993.26	9966.57	1992.12	9967.79	1992.07
[illegible].85	1991.79	9979.89	1991.45	9985.92	1990.78	9986.4	1990.76	9987.96	1990.16
[illegible]28	1988.43	9993.74	1987.85	9995.51	1987.7410014.34		1988.0210020.35		1989.79
[illegible]2	1990.3910028.89		1991.0710032.44		1991.3810059.27		1993.21 10061.4		1993.36
100[illegible].5	1994.0610079.96		1994.5510098.65		1995.6110107.81		1996.1110109.82		1996.05
10116.72	1995.8510118.14		1995.8210120.08		1995.8110126.76		1995.7710130.91		1995.76
10142.91	1995.7110161.77		1995.63 10167.4		1995.6210168.59		1995.6110169.59		1995.6
10170.04	1995.5910170.48		1995.58 10170.9		1995.5710177.93		1995.4610194.66		1995.18
10204.28	1995.110208.27		1994.5410208.33		1994.5310216.97		1994.7910222.57		1994.82
10228.44	1995.0510238.84		1995.3110242.48		1995.4510243.42		1995.4610244.96		1995.47
10245.39	1995.4810245.72		1995.4910251.65		1995.7310257.71		1996.2910281.46		1998.47
10286.56	1998.74 10286.6		1998.75						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9902.16	.065	9979.89	.05810032.44		.065

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9979.8910032.44 150.15 151.03 156.08 .1 .3
Right Levee Station=10107.81 Elevation= 1996.11

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	1997.38	Element	Left OB	Channel	Right OB	
Vel Head (ft)	1.96	Wt. n-Val.	0.065	0.058	0.065	
W.S. Elev (ft)	1995.42	Reach Len. (ft)	150.15	151.03	156.08	
Crit W.S. (ft)	1995.42	Flow Area (sq ft)	63.15	323.90	122.93	
E.G. Slope (ft/ft)	*0.020804	Area (sq ft)	63.15	323.90	122.93	
Q Total (cfs)	5006.00	Flow (cfs)	399.88	3973.34	632.78	
Top Width (ft)	138.62	Top Width (ft)	23.17	52.55	62.90	
Vel Total (ft/s)	9.82	Avg. Vel. (ft/s)	6.33	12.27	5.15	
Max Chl Dpth (ft)	7.68	Hydr. Depth (ft)	2.73	6.16	1.95	
Conv. Total (cfs)	34707.2	Conv. (cfs)	2772.4	27547.7	4387.1	
Length Wtd. (ft)	152.21	Wetted Per. (ft)	23.73	53.55	63.03	
Min Ch El (ft)	1987.74	Shear (lb/sq ft)	3.46	7.86	2.53	
Alpha	1.31	Stream Power (lb/ft s)	*10286.60	0.00	*10107.81	
Frctn Loss (ft)	2.10	Cum Volume (acre-ft)	23.10	41.91	22.27	
C & E Loss (ft)	0.34	Cum SA (acres)	10.48	7.87	11.77	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
[illegible]g: 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.
Wa[illegible]g: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	1998.38	Element	Left OB	Channel	Right OB	
Vel Head (ft)	2.59	Wt. n-Val.	0.065	0.058	0.065	

* Crit W.S. (ft)	* 1995.48	* Flow Area (sq ft)	* 39.87	* 342.84	* 23.42	*
* [redacted] Slope (ft/ft)	*0.022855	* Area (sq ft)	* 39.87	* 342.84	* 23.42	*
* [redacted]al (cfs)	* 5006.00	* Flow (cfs)	* 280.85	* 4578.41	* 146.74	*
* [redacted]Width (ft)	* 68.00	* Top Width (ft)	* 9.89	* 52.55	* 5.56	*
* Vel Total (ft/s)	* 12.33	* Avg. Vel. (ft/s)	* 7.04	* 13.35	* 6.27	*
* Max Chl Dpth (ft)	* 8.04	* Hydr. Depth (ft)	* 4.03	* 6.52	* 4.21	*
* Conv. Total (cfs)	* 33113.4	* Conv. (cfs)	* 1857.8	* 30285.0	* 970.7	*
* Length Wtd. (ft)	* 151.44	* Wetted Per. (ft)	* 13.71	* 53.55	* 9.60	*
* Min Ch El (ft)	* 1987.74	* Shear (lb/sq ft)	* 4.15	* 9.14	* 3.48	*
* Alpha	* 1.10	* Stream Power (lb/ft s)	*10286.60	* 0.00	*10107.81	*
* Frctn Loss (ft)	* 2.21	* Cum Volume (acre-ft)	* 13.99	* 46.87	* 11.83	*
* C & E Loss (ft)	* 0.41	* Cum SA (acres)	* 4.58	* 7.87	* 4.15	*

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 1.184

INPUT
Description: 1.184 Ineffective area set at station 10155.37; tributary flow location
Station Elevation Data num= 53

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9832.54	1995.01	9886.21	1995.26	9887.92	1995.27	9890.54	1995.23	9940.81	1994.83
9943.63	1994.79	9950.09	1994.04	9951.51	1993.89	9964.73	1990.83	9966.73	1990.34
9971.02	1990.02	9971.25	1990	9989.35	1987.26	9992.63	1985.3710003.32		1985.58
10011.07	1985.3510015.44		1987.2610018.85		1988.0810028.95		1989.2 10040.1		1989.46
10043.34	1989.4710050.12		1989.1710050.38		1989.1910058.56		1989.810060.68		1989.94
10065.65	1990.3210075.16		1990.5 10083.5		1990.6610089.11		1990.6910090.83		1990.59
10091.42	1990.5310093.99		1990.5210097.21		1990.6410112.26		1990.7810119.48		1991
10128.52	1991.11 10134.8		1991.3110145.73		1991.6510150.91		1991.810155.37		1991.97
10[redacted]8.36	1991.9410162.51		1991.8710171.91		1991.7910180.24		1991.7110181.82		1991.24
[redacted]41	1991.3710187.64		1992.4310198.11		1992.5510212.38		1992.74 10219.3		1992.93
[redacted]8	1992.9710224.37		1993.3110251.35		1995.77				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9832.54	.065	9971.02	.05810028.95		.065

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9971.0210028.95		233.26 297.19	325.83	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
10155.3710251.35		1994	T

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 1994.36	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.82	* Wt. n-Val.	* 0.065	* 0.058	* 0.065 *
* W.S. Elev (ft)	* 1993.54	* Reach Len. (ft)	* 233.26	* 297.19	* 325.83 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 36.10	* 363.03	* 379.78 *
* E.G. Slope (ft/ft)	*0.009819	* Area (sq ft)	* 36.10	* 363.03	* 467.43 *
* Q Total (cfs)	* 5006.00	* Flow (cfs)	* 128.37	* 3087.33	* 1790.30 *
* Top Width (ft)	* 273.80	* Top Width (ft)	* 17.98	* 57.93	* 197.89 *
* Vel Total (ft/s)	* 6.43	* Avg. Vel. (ft/s)	* 3.56	* 8.50	* 4.71 *
* Max Chl Dpth (ft)	* 8.19	* Hydr. Depth (ft)	* 2.01	* 6.27	* 3.00 *
* Conv. Total (cfs)	* 50520.5	* Conv. (cfs)	* 1295.5	* 31157.3	* 18067.7 *
* Length Wtd. (ft)	* 293.75	* Wetted Per. (ft)	* 18.36	* 59.21	* 126.50 *
* Min Ch El (ft)	* 1985.35	* Shear (lb/sq ft)	* 1.21	* 3.76	* 1.84 *
* Alpha	* 1.28	* Stream Power (lb/ft s)	*10251.35	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 3.47	* Cum Volume (acre-ft)	* 22.92	* 40.72	* 21.21 *
* C & E Loss (ft)	* 0.05	* Cum SA (acres)	* 10.41	* 7.68	* 11.30 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 1995.76	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.23	* Wt. n-Val.	* 0.065	* 0.058	* 0.065 *
* W.S. Elev (ft)	* 1994.53	* Reach Len. (ft)	* 233.26	* 297.19	* 325.83 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 54.02	* 420.76	* 124.88 *
* E.G. Slope (ft/ft)	*0.010100	* Area (sq ft)	* 54.02	* 420.76	* 124.88 *
* [redacted] Total (cfs)	* 5006.00	* Flow (cfs)	* 246.00	* 4004.31	* 755.69 *
* [redacted] Width (ft)	* 99.96	* Top Width (ft)	* 17.98	* 57.93	* 24.05 *
* [redacted] otal (ft/s)	* 8.35	* Avg. Vel. (ft/s)	* 4.55	* 9.52	* 6.05 *
* [redacted] hl Dpth (ft)	* 9.18	* Hydr. Depth (ft)	* 3.00	* 7.26	* 5.19 *
* Conv. Total (cfs)	* 49812.1	* Conv. (cfs)	* 2447.8	* 39844.8	* 7519.5 *
* Length Wtd. (ft)	* 294.43	* Wetted Per. (ft)	* 19.36	* 59.21	* 29.21 *
* Min Ch El (ft)	* 1985.35	* Shear (lb/sq ft)	* 1.76	* 4.48	* 2.70 *
* Alpha	* 1.13	* Stream Power (lb/ft s)	*10251.35	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 4.02	* Cum Volume (acre-ft)	* 13.83	* 45.54	* 11.57 *
* C & E Loss (ft)	* 0.08	* Cum SA (acres)	* 4.53	* 7.68	* 4.10 *

[redacted] This 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.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 1.128

INPUT
Description: 1.128
Station Elevation Data num= 80

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9661.21	1993.12	9665.13	1993.02	9672.77	1992.71	9686.44	1992.48	9694.88	1992.37
9700.91	1992.35	9712.91	1992.6	9726.31	1992.67	9731.12	1992.83	9743.64	1992.55
9752.27	1992.13	9758.4	1991.79	9771.16	1989.92	9773.46	1989.74	9776.15	1989.53
9790.38	1988.57	9799.94	1987.81	9804.23	1987.56	9811.21	1987.74	9820.2	1987.75
9844.26	1987.67	9857.9	1987.79	9868.31	1987.72	9892.3	1988.11	9903.48	1988.12
9911.89	1987.93	9916.94	1987.82	9917.51	1987.81	9927.78	1987.69	9938.86	1987.49
9947.18	1987.43	9951.32	1987.44	9952.3	1987.41	9955.51	1987.43	9956.17	1987.4
9956.39	1987.43	9961.61	1987.28	9962.42	1987.04	9966.21	1986.49	9971.51	1985.24
9983.51	1983.92	9988.65	1983.5	9991.27	1982.04	9991.36	1982.01	9991.42	1981.99
9995.44	1981.27	9998.18	1980.781	10001.09	1980.591	10006.94	1980.381	10011.52	1981.77
10012.35	1981.941	10012.92	1982.2	100221	1986.292	10024.68	1987.51	10024.96	1987.61
10025.36	1987.761	10026.56	1988.21	10044.83	1995.291	10049.29	1996.161	10054.34	1997.09
10058.58	1997.871	10062.34	1998.451	10071.99	1999.841	10077.38	2000.86	10088.4	2003.08
10090.42	2003.511	10091.72	2003.79	10099.6	2005.451	10102.98	2006.481	10107.78	2007.18
10110.51	2007.741	10112.77	2007.81	10117.98	2008.651	10125.22	2009.54	10126.1	2009.65
10127.63	2010.561	10131.56	2012.82	10131.7	2012.811	10132.07	2012.831	10138.38	2013.31

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9661.21	.065	9966.21	.058	10022	.065

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9966.21 10022 392.74 413.7 415.27 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	1990.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.32	Wt. n-Val.	0.065	0.058	0.065
W.S. Elev (ft)	1989.52	Reach Len. (ft)	392.74	413.70	415.27
[illegible] W.S. (ft)	1989.49	Flow Area (sq ft)	317.63	357.86	12.38
[illegible] Slope (ft/ft)	*0.014523	Area (sq ft)	317.63	357.86	12.38
[illegible] al (cfs)	5006.00	Flow (cfs)	1232.47	3730.00	43.53
[illegible] Width (ft)	253.60	Top Width (ft)	189.86	55.79	7.95
Vel Total (ft/s)	7.28	Avg. Vel. (ft/s)	3.88	10.42	3.52
Max Chl Dpth (ft)	9.14	Hydr. Depth (ft)	1.67	6.41	1.56
Conv. Total (cfs)	41539.9	Conv. (cfs)	10227.0	30951.6	361.2
Length Wtd. (ft)	409.04	Wetted Per. (ft)	190.02	57.69	8.58
Min Ch El (ft)	1980.38	Shear (lb/sq ft)	1.52	5.62	1.31
Alpha	1.60	Stream Power (lb/ft s)	*10138.38	0.00	0.00
Frctn Loss (ft)	6.44	Cum Volume (acre-ft)	21.98	38.26	19.42
C & E Loss (ft)	0.05	Cum SA (acres)	9.85	7.29	10.53

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	1991.66	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.06	Wt. n-Val.	0.065	0.058	0.065
W.S. Elev (ft)	1989.59	Reach Len. (ft)	392.74	413.70	415.27
Crit W.S. (ft)	1989.59	Flow Area (sq ft)	107.63	362.16	12.99
E.G. Slope (ft/ft)	*0.019436	Area (sq ft)	107.63	362.16	12.99
Q Total (cfs)	5006.00	Flow (cfs)	549.88	4401.85	54.27
Top Width (ft)	114.95	Top Width (ft)	51.21	55.79	7.95
Vel Total (ft/s)	10.37	Avg. Vel. (ft/s)	5.11	12.15	4.18
Max Chl Dpth (ft)	9.21	Hydr. Depth (ft)	2.10	6.49	1.63
Conv. Total (cfs)	35908.1	Conv. (cfs)	3944.3	31574.5	389.3
Length Wtd. (ft)	411.04	Wetted Per. (ft)	53.02	57.69	8.66
Min Ch El (ft)	1980.38	Shear (lb/sq ft)	2.46	7.62	1.82
Alpha	1.24	Stream Power (lb/ft s)	*10138.38	0.00	0.00
Frctn Loss (ft)	5.31	Cum Volume (acre-ft)	13.40	42.87	11.05
C & E Loss (ft)	0.38	Cum SA (acres)	4.35	7.29	3.98

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
[illegible]ing: 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.
Wa[illegible]g: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 1.050

```
Description: 1.05
Station Elevation Data    num=      79
   Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
 9827.22 1985.88    9832 1985.87 9838.36 1986.04 9842.43 1985.95 9848.41 1985.43
 9854.72 1984.89 9862.59 1982.96 9866.03 1982.16  9874.3 1980.72 9880.35 1979.41
 9882.24 1979.93 9894.61 1980.48 9898.95 1981.07 9906.84 1981.42 9926.29  1981.4
  9946.8 1981.46 9951.05 1981.45 9959.59 1981.44 9969.01 1981.43 9979.18 1980.94
   99811980.616 9986.48 1979.64 9995.14 1978.02 9999.96 1976.8710005.21 1977.16
10009.19 1977.27 10016.9 1978.5810034.07 1979.17 10039.7 1979.8210043.47 1979.96
10048.25 1980.1710051.17 1980.1410052.72 1980.1810058.95 1980.2410060.13 1980.38
10076.27 1980.9210076.99 1980.9510078.13 1980.9710079.73 1981.0210084.61 1981.36
10100.37 1981.64 10111.9 1981.7710113.78 1981.8910118.62 1981.8710124.66 1981.69
 10136.7 1981.63 10138.7 1980.0510140.06 1979.4310141.27 1980.81 10141.9 1981.99
10142.92 1982.33 10147.4 1983.3810149.21 1983.7710149.52 1983.7510149.64 1983.72
10150.19 1983.5510154.32  1982.110155.07 1982.1310156.69 1982.24 10161.5 1982.59
10163.13 1982.7910166.49 1982.9610169.41 1983.19 10170.4 1983.1210170.88 1983.14
10171.53 1983.1710173.95 1983.3510175.89 1983.7510178.63 1985.0510179.24 1985.18
 10179.9 1985.4710183.11 1985.13 10184.3 1984.9910187.02  1984.6 10191.6 1985.12
10201.19 1986.2110219.04 1988.8610231.65 1990.8310239.98 1991.98

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************
 9827.22     .07     9981    .05110048.25     .07

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.   Expan.
          998110048.25              259.63  227.18  190.58              .1       .3

CROSS SECTION OUTPUT  Profile #Q100
*********************************************************************************************
* E.G. Elev (ft)          * 1984.33  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)           *    1.14  * Wt. n-Val.             *   0.070 *   0.051 *   0.070 *
* W.S. Elev (ft)          * 1983.20  * Reach Len. (ft)        *  259.63 *  227.18 *  190.58 *
* Crit W.S. (ft)          * 1983.20  * Flow Area (sq ft)      *  240.19 *  301.76 *  201.38 *
* E.G. Slope (ft/ft)      *0.017130  * Area (sq ft)           *  240.19 *  301.76 *  201.38 *
* Q Total (cfs)           * 5006.00  * Flow (cfs)             * 1060.26 * 3113.56 *  832.18 *
* Top Width (ft)          *  305.69  * Top Width (ft)         *  119.38 *   67.25 *  119.06 *
* Vel Total (ft/s)        *    6.73  * Avg. Vel. (ft/s)       *    4.41 *   10.32 *    4.13 *
* Max Chl Dpth (ft)       *    6.33  * Hydr. Depth (ft)       *    2.01 *    4.49 *    1.69 *
* Conv. Total (cfs)       * 38248.3  * Conv. (cfs)           *  8100.9 * 23789.1 *  6358.3 *
* Length Wtd. (ft)        *  228.53  * Wetted Per. (ft)       *  119.93 *   67.80 *  121.51 *
* Min Ch El (ft)          * 1976.87  * Shear (lb/sq ft)      *    2.14 *    4.76 *    1.77 *
* Alpha                   *    1.61  * Stream Power (lb/ft s) *10239.98 *    0.00 *    0.00 *
* [redacted]tn Loss (ft)  *    3.30  * Cum Volume (acre-ft)  *   19.46 *   35.13 *   18.40 *
* [redacted]E Loss (ft)   *    0.04  * Cum SA (acres)        *    8.46 *    6.71 *    9.92 *
*********************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
         for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
         water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The program
         defaulted to critical depth.

CROSS SECTION OUTPUT  Profile #FW
*********************************************************************************************
* E.G. Elev (ft)          * 1984.97  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)           *    0.81  * Wt. n-Val.             *   0.070 *   0.051 *   0.070 *
* W.S. Elev (ft)          * 1984.15  * Reach Len. (ft)        *  259.63 *  227.18 *  190.58 *
* Crit W.S. (ft)          *         * Flow Area (sq ft)      *  205.58 *  365.92 *  258.55 *
* E.G. Slope (ft/ft)      *0.009191  * Area (sq ft)           *  205.58 *  365.92 *  258.55 *
* Q Total (cfs)           * 5006.00  * Flow (cfs)             *  805.63 * 3144.97 * 1055.40 *
* Top Width (ft)          *  229.86  * Top Width (ft)         *   74.16 *   67.25 *   88.45 *
* Vel Total (ft/s)        *    6.03  * Avg. Vel. (ft/s)       *    3.92 *    8.59 *    4.08 *
* Max Chl Dpth (ft)       *    7.28  * Hydr. Depth (ft)       *    2.77 *    5.44 *    2.92 *
* Conv. Total (cfs)       * 52215.9  * Conv. (cfs)           *  8403.3 * 32804.1 * 11008.6 *
* Length Wtd. (ft)        *  224.62  * Wetted Per. (ft)       *   76.93 *   67.80 *   91.01 *
* Min Ch El (ft)          * 1976.87  * Shear (lb/sq ft)      *    1.53 *    3.10 *    1.63 *
* Alpha                   *    1.44  * Stream Power (lb/ft s) *10239.98 *    0.00 *    0.00 *
* Frctn Loss (ft)         *    2.42  * Cum Volume (acre-ft)  *   11.99 *   39.42 *    9.76 *
* C & E Loss (ft)         *    0.08  * Cum SA (acres)        *    3.78 *    6.71 *    3.52 *
*********************************************************************************************

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.

CROSS SECTION


RIVER: Rodger Creek
REACH: Main Reach         RS: 1.007

INPUT
Description: 1.007
Station Elevation Data    num=     103
   Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
    6 1986.14  9669.3 1985.87 9676.43 1985.77 9693.11 1985.37 9699.73 1985.22
 9703.2  1985.1 9707.52 1984.98 9715.49 1984.69 9721.52 1984.53  9735.7 1983.94
9738.85 1983.85 9749.07 1983.16  9752.4 1982.88 9753.83 1983.08  9759.8 1983.16
9770.67 1982.85 9772.08 1982.73 9772.55 1982.71 9773.51 1982.65 9773.82 1982.62
9790.24 1981.84 9790.72 1981.82 9790.85 1981.81  9791.1  1981.8 9802.75 1981.74
9813.34 1981.54 9817.39 1981.44 9836.46 1980.99 9847.76 1980.49 9854.49 1978.35
9855.86 1978.13  9857.3 1977.95 9860.22 1977.65 9865.98 1976.95 9866.72 1976.89
9868.49 1976.81  9870.7 1976.86 9873.51 1976.82 9880.35 1976.91 9887.37 1976.97
9892.83 1977.25 9900.28 1977.56  9907.2 1977.63    9917 1977.82 9922.77 1977.72
```

[redacted]37 1977.94 9952.48 1977.65 9973.7 1976.35 9975.33 1976.11 9982.35 1975.1
[redacted]3 1974.83 9989.88 1974.5810001.32 1972.7610003.79 1972.3310004.91 1972.49
10[redacted]2 1972.8210019.65 1975.67 10021.9 1976.0910026.96 1976.95 10031.4 1977.26
1[redacted].1 1977.4710042.65 1977.5610044.21 1977.6510046.18 1977.7510047.89 1977.86
10051.85 1977.9810062.25 1978.7310066.75 1978.8410075.41 1979.0910094.09 1979.54
10096.95 1979.6110105.42 1979.7110114.06 1979.6310127.54 1979.2210135.65 1978.79
10143.32 1978.59 10152.1 1978.3610161.79 1978.2210176.85 1977.9710180.91 1977.89
10188.4 1977.7210188.75 1977.710194.61 1977.310195.48 1977.2910204.32 1977.24
10205.01 1977.23 10210.8 1977.5610219.86 1978.8910227.73 1979.8510229.93 1980.17
10251.94 1984.4410252.16 1984.48 10252.2 1984.4910252.47 1984.5410288.53 1991.49
10290.24 1991.7910293.13 1992.3310315.24 1996.75

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9657.66	.07	9975.33	.051	10021.9	.07

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9975.33 10021.9 274.62 275.37 252.36 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	1980.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.99	Wt. n-Val.	0.070	0.051	0.070
W.S. Elev (ft)	1979.93	Reach Len. (ft)	274.62	275.37	252.36
Crit W.S. (ft)	1979.93	Flow Area (sq ft)	312.84	265.67	305.74
E.G. Slope (ft/ft)	*0.012346	Area (sq ft)	312.84	265.67	305.74
Q Total (cfs)	5006.00	Flow (cfs)	1351.33	2718.58	936.09
Top Width (ft)	378.75	Top Width (ft)	125.81	46.57	206.37
Vel Total (ft/s)	5.66	Avg. Vel. (ft/s)	4.32	10.23	3.06
Max Chl Dpth (ft)	7.60	Hydr. Depth (ft)	2.49	5.70	1.48
Conv. Total (cfs)	45052.6	Conv. (cfs)	12161.6	24466.4	8424.5
Length Wtd. (ft)	267.51	Wetted Per. (ft)	126.23	47.28	206.72
Min Ch El (ft)	1972.33	Shear (lb/sq ft)	1.91	4.33	1.14
Alpha	1.99	Stream Power (lb/ft s)	*10315.24	0.00	0.00
Frctn Loss (ft)	3.81	Cum Volume (acre-ft)	17.81	33.65	17.29
C & E Loss (ft)	0.02	Cum SA (acres)	7.73	6.41	9.21

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CRO SECTION OUTPUT Profile #FW

E.G. Elev (ft)	1982.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.59	Wt. n-Val.	0.070	0.051	0.070
W.S. Elev (ft)	1980.88	Reach Len. (ft)	274.62	275.37	252.36
Crit W.S. (ft)	1980.71	Flow Area (sq ft)	103.55	309.73	200.71
E.G. Slope (ft/ft)	*0.012845	Area (sq ft)	103.55	309.73	200.71
Q Total (cfs)	5006.00	Flow (cfs)	564.70	3581.05	860.25
Top Width (ft)	157.00	Top Width (ft)	27.33	46.57	83.10
Vel Total (ft/s)	8.15	Avg. Vel. (ft/s)	5.45	11.56	4.29
Max Chl Dpth (ft)	8.55	Hydr. Depth (ft)	3.79	6.65	2.42
Conv. Total (cfs)	44170.0	Conv. (cfs)	4982.6	31597.0	7590.3
Length Wtd. (ft)	269.40	Wetted Per. (ft)	30.34	47.28	84.41
Min Ch El (ft)	1972.33	Shear (lb/sq ft)	2.74	5.25	1.91
Alpha	1.54	Stream Power (lb/ft s)	*10315.24	0.00	0.00
Frctn Loss (ft)	3.99	Cum Volume (acre-ft)	11.07	37.65	8.75
C & E Loss (ft)	0.02	Cum SA (acres)	3.48	6.41	3.14

Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 0.954

INPUT
Description: 0.954 Levee placed at station 9924.45 to keep flow in main channel
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9697.57	1977.81	9700.02	1977.75	9700.46	1977.74	9715.28	1977.73	9717.76	1977.7
9731.1	1977.5	9737.78	1977.33	9746.06	1977.23	9759.96	1976.94	9765.47	1976.83
9774.37	1976.63	9775.6	1976.6	9786.81	1976.32	9788.96	1976.34	9791.91	1976.37
9796.88	1976.49	9800.24	1976.5	9804.27	1976.52	9808.92	1976.54	9810.93	1976.56
9813.05	1976.59	9816.74	1976.63	9828.44	1976.89	9841.32	1976.76	9845.83	1976.74
[redacted]8.22	1976.77	9863.49	1976.88	9908.23	1977.47	9909.09	1977.49	9922.33	1977.78
[redacted]54	1977.95	9923.02	1978.1	9935.22	1978.07	9936.02	1977.76	9938.22	1977.7
[redacted]9	1977.65	9959.62	1976.63	9979.7	1975.62	9980.33	1975.29	9983	1973.519
9[redacted].5	1971.23	9987.73	1970.75	9998.57	1968.1110006.77		1969.6910017.49		1971.81
10024.45	1972.7710037.57		1972.9910048.86		1973.210050.47		1973.3510057.63		1974.13
10067.59	1973.9710076.95		1973.9810090.64		1973.8910092.74		1973.7610099.63		1973.42
10100.66	1973.3110103.37		1972.7910104.02		1972.7510105.99		1972.6510114.54		1973.5
10115.05	1973.5410115.74		1973.6710116.96		1973.65 10132.6		1973.3810146.29		1973.09
10148.49	1973.03 10153.6		1972.9110159.33		1973.0410168.34		1973.3610174.63		1973.59
10181.09	1973.7710194.67		1973.8510197.75		1973.8310199.43		1973.6910211.08		1973.05
10214.27	1972.6110222.24		1973.5810226.05		1974.0210227.81		1974.29 10234.6		1976.48
10242.42	1978.8910262.42		1984.9910268.21		1986.7510273.59		1986.9810273.59		1988.82

10[redacted]57 1991.3910302.71 1991.0410309.27 1990.1510310.13 1990.0510321.52 1988.83
1[redacted]4 1988.8110333.18 1988.2810348.03 1987.3410348.48 1987.32

Mai[redacted]g's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9697.57	.07	9983	.05	10024.45	.07

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
998 10024.45 186.9 218.1 251.71 .1 .3
Left Levee Station= 9924.45 Elevation=

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	1977.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.20	Wt. n-Val.	0.070	0.051	0.070
W.S. Elev (ft)	1975.88	Reach Len. (ft)	186.90	218.10	251.71
Crit W.S. (ft)	1975.88	Flow Area (sq ft)	4.87	225.42	499.18
E.G. Slope (ft/ft)	*0.016614	Area (sq ft)	4.87	225.42	499.18
Q Total (cfs)	5006.00	Flow (cfs)	8.80	2555.94	2441.27
Top Width (ft)	258.17	Top Width (ft)	8.44	41.45	208.28
Vel Total (ft/s)	6.86	Avg. Vel. (ft/s)	1.81	11.34	4.89
Max Chl Dpth (ft)	7.77	Hydr. Depth (ft)	0.58	5.44	2.40
Conv. Total (cfs)	38837.8	Conv. (cfs)	68.2	19829.6	18939.9
Length Wtd. (ft)	225.04	Wetted Per. (ft)	9.06	42.97	208.90
Min Ch El (ft)	1968.11	Shear (lb/sq ft)	0.56	5.44	2.48
Alpha	1.64	Stream Power (lb/ft s)	*10348.48	9924.45	0.00
Frctn Loss (ft)	2.20	Cum Volume (acre-ft)	16.81	32.10	14.96
C & E Loss (ft)	0.11	Cum SA (acres)	7.31	6.14	8.01

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: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #FW

[redacted]. Elev (ft)	1978.45	Element	Left OB	Channel	Right OB
[redacted] Head (ft)	1.80	Wt. n-Val.	0.070	0.051	0.070
[redacted] Elev (ft)	1976.65	Reach Len. (ft)	186.90	218.10	251.71
[redacted] W.S. (ft)	1976.65	Flow Area (sq ft)	11.38	257.42	292.50
E.G. Slope (ft/ft)	*0.017282	Area (sq ft)	11.38	257.42	292.50
Q Total (cfs)	5006.00	Flow (cfs)	35.01	3252.32	1718.67
Top Width (ft)	142.44	Top Width (ft)	8.44	41.45	92.55
Vel Total (ft/s)	8.92	Avg. Vel. (ft/s)	3.08	12.63	5.88
Max Chl Dpth (ft)	8.54	Hydr. Depth (ft)	1.35	6.21	3.16
Conv. Total (cfs)	38079.3	Conv. (cfs)	266.3	24739.5	13073.4
Length Wtd. (ft)	222.88	Wetted Per. (ft)	9.83	42.97	95.73
Min Ch El (ft)	1968.11	Shear (lb/sq ft)	1.25	6.46	3.30
Alpha	1.45	Stream Power (lb/ft s)	*10348.48	9924.45	0.00
Frctn Loss (ft)	1.62	Cum Volume (acre-ft)	10.70	35.86	7.32
C & E Loss (ft)	0.34	Cum SA (acres)	3.36	6.14	2.63

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 0.913

INPUT
Description: 0.913 Levee placed at station 9856.72 to keep flow in main channel
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9643.45	1976.99	9648.14	1976.56	9658.1	1974.93	9660.87	1974.65	9676.63	1974.28
9699.13	1974.09	9710.88	1974.03	9715.64	1974.05	9731.44	1974.11	9736.45	1974.1
9743.66	1974.11	9744.75	1974.12	9746.59	1974.15	9752.01	1974.27	9786.99	1974.91
[redacted]9.35	1974.96	9790.01	1974.97	9790.52	1974.98	9814.73	1975.29	9815.77	1975.28
[redacted]86	1975.27	9817.98	1975.24	9819.14	1975.26	9826.63	1975.23	9827.76	1975.25
[redacted]9	1975.26	9830	1975.27	9836.66	1975.26	9842.16	1975.21	9843.3	1975.2
9[redacted]3	1975.19	9845.26	1975.17	9855.17	1975.21	9865.51	1974.9	9867.2	1974.79
9877.56	1973.91	9887.28	1973.54	9891.22	1973.45	9893.92	1973.31	9896.06	1973.14
9920.81	1971.42	9926.89	1970.97	9930.43	1970.96	9936.18	1971.1	9961.95	1970.75
9963.23	1970.46	9974.83	1967.03	9975.96	1966.86	9976.42	1966.89	9984.5	1967.69
9989.52	1967.56	9994.56	1966.85	9998.04	1966.51	10000.49	1967.05	10002.36	1967.52
10004.83	1968.31	10015.45	1968.33	10019.35	1968.15	10021.94	1968.19	10027.65	1967.77
10032.35	1967.42	10035.04	1966.99	10037.64	1967.28	10042.6	1967.65	10043.45	1967.55
10051.28	1966.66	10052.03	1966.73	10061.84	1969.26	10063.2	1969.94	10079.88	1982.49
10086.1	1985.98	10091.61	1986.81	10091.93	1986.82	10092.67	1986.98	10096.25	1988.17

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 1[redacted]4 1990.0910121.56 1989.6510128.85 1989.7110136.01  1990.210145.55 1990.06
10[redacted]6 1990.1910168.62 1990.2910178.88 1990.3410186.02 1990.4310190.41 1990.35
10[redacted]5 1990.27 10201.2 1991.96 10203.5 1991.6810208.33 1990.0910214.48 1989.92
1022[redacted]98 1989.5510225.18 1989.1110228.76 1988.6110237.52 1987.21

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 9643.45     .07 9963.23    .051 10063.2     .07

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9963.23 10063.2          221.22  268.06   280.4             .1       .3
Left Levee      Station= 9856.72      Elevation=

CROSS SECTION OUTPUT  Profile #Q100
*****************************************************************************************
* E.G. Elev (ft)          * 1974.58  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.83  * Wt. n-Val.             *   0.070  *   0.051 *   0.070  *
* W.S. Elev (ft)          * 1973.75  * Reach Len. (ft)        *  221.22  *  268.06 *  280.40  *
* Crit W.S. (ft)          * 1972.19  * Flow Area (sq ft)      *  157.77  *  598.94 *    9.64  *
* E.G. Slope (ft/ft)      *0.006422  * Area (sq ft)           *  157.77  *  598.94 *    9.64  *
* Q Total (cfs)           * 5006.00  * Flow (cfs)             *  416.75  * 4567.56 *   21.68  *
* Top Width (ft)          *  186.44  * Top Width (ft)         *   81.41  *   99.97 *    5.06  *
* Vel Total (ft/s)        *    6.53  * Avg. Vel. (ft/s)       *    2.64  *    7.63 *    2.25  *
* Max Chl Dpth (ft)       *    7.25  * Hydr. Depth (ft)       *    1.94  *    5.99 *    1.90  *
* Conv. Total (cfs)       * 62467.2  * Conv. (cfs)           *  5200.5  * 56996.2 *  270.6  *
* Length Wtd. (ft)        *  257.94  * Wetted Per. (ft)       *   81.54  *  101.47 *    6.33  *
* Min Ch El (ft)          * 1966.50  * Shear (lb/sq ft)      *    0.78  *    2.37 *    0.61  *
* Alpha                   *    1.26  * Stream Power (lb/ft s) *10237.52  * 9856.72 *    0.00  *
* Frctn Loss (ft)         *    2.59  * Cum Volume (acre-ft)   *   16.46  *   30.04 *   13.49  *
* C & E Loss (ft)         *    0.10  * Cum SA (acres)         *    7.11  *    5.78 *    7.39  *
*****************************************************************************************

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
         This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT  Profile #FW
*****************************************************************************************
* E.G. Elev (ft)          * 1975.40  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.65  * Wt. n-Val.             *   0.070  *   0.051 *   0.070  *
* [redacted] Elev (ft)    * 1974.75  * Reach Len. (ft)        *  221.22  *  268.06 *  280.40  *
* [redacted] W.S. (ft)    * 1972.13  * Flow Area (sq ft)      *  104.46  *  698.86 *   14.69  *
* [redacted] Slope (ft/ft)*0.003995  * Area (sq ft)           *  104.46  *  698.86 *   14.69  *
* Q [redacted]al (cfs)    * 5006.00  * Flow (cfs)             *  315.60  * 4659.06 *   31.33  *
* Top Width (ft)          *  132.26  * Top Width (ft)         *   27.23  *   99.97 *    5.06  *
* Vel Total (ft/s)        *    6.12  * Avg. Vel. (ft/s)       *    3.02  *    6.67 *    2.13  *
* Max Chl Dpth (ft)       *    8.25  * Hydr. Depth (ft)       *    3.84  *    6.99 *    2.90  *
* Conv. Total (cfs)       * 79198.4  * Conv. (cfs)           *  4993.0  * 73709.6 *  495.7  *
* Length Wtd. (ft)        *  258.28  * Wetted Per. (ft)       *   30.92  *  101.47 *    7.33  *
* Min Ch El (ft)          * 1966.50  * Shear (lb/sq ft)      *    0.84  *    1.72 *    0.50  *
* Alpha                   *    1.12  * Stream Power (lb/ft s) *10237.52  * 9856.72 *    0.00  *
* Frctn Loss (ft)         *    1.98  * Cum Volume (acre-ft)   *   10.45  *   33.47 *    6.44  *
* C & E Loss (ft)         *    0.20  * Cum SA (acres)         *    3.29  *    5.78 *    2.35  *
*****************************************************************************************

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
         This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
         need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, energy was used.

CROSS SECTION


RIVER: Rodger Creek
REACH: Main Reach         RS: 0.862

INPUT
Description: 0.862
Station Elevation Data    num=      74
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*********************************************************************************
 9678.28 1978.14 9693.04 1978.26 9704.29 1978.19 9705.61 1978.21 9709.03 1977.59
 9712.21 1978.02 9714.55 1977.77 9717.33 1977.23 9719.07 1976.68 9723.22 1974.28
 9727.03 1973.08 9728.41 1972.94 9732.43 1972.75 9735.81 1972.71 9753.53  1972.5
 9758.83 1972.46 9764.15 1972.39 9787.77 1972.47 9788.77 1972.48 9793.98 1972.49
 9810.54  1972.6 9831.67 1972.34 9837.65 1972.16 9847.19 1971.88 9849.21 1971.81
 9870.64 1970.54 9881.44 1969.98 9887.46  1969.3 9899.11 1968.47  9908.3 1967.67
  9912.6 1967.11 9917.13 1967.28 9917.56  1967.3  9926.4 1967.24 9936.67 1967.09
 9952.48 1966.43 9954.52  1966.2  9965.3 1965.65 9970.03 1965.62  9976.3 1964.92
 9984.63 1964.52 9986.49 1963.58  9989.7 1963.4810000.47 1963.2110008.07 1962.45
10008.89 1962.5410009.97 1963.05 10012.9 1964.4310023.71 1967.0110030.64 1967.59
10031.82 1967.74 10043.7 1969.2210049.52 1970.2110060.69 1972.2910062.99 1972.71
[redacted]7.21 1975.8410082.38 1976.8610092.32 1978.5610100.64 1980.0910107.56 1981.24
[redacted]15 1981.7810124.02  1983.8 10124.2 1983.8310124.36 1983.8510141.39 1987.14
[redacted]4 1987.5210144.67 1987.7810147.34 1988.3110162.85 1991.3810180.05 1994.75
101[redacted]52 1997.8810207.29 1999.3510227.35 2002.0610228.81 2002.21

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 9678.28     .07 9984.63    .051 10012.9     .07

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9984.63 10012.9          480.95  493.11  499.81             .1       .3
```

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	1971.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.81	Wt. n-Val.	0.070	0.051	0.070
W.S. Elev (ft)	1970.09	Reach Len. (ft)	480.95	493.11	499.81
Crit W.S. (ft)	1970.09	Flow Area (sq ft)	317.55	192.82	90.77
E.G. Slope (ft/ft)	*0.017848	Area (sq ft)	317.55	192.82	90.77
Q Total (cfs)	5006.00	Flow (cfs)	1876.90	2655.85	473.25
Top Width (ft)	169.49	Top Width (ft)	105.30	28.27	35.91
Vel Total (ft/s)	8.33	Avg. Vel. (ft/s)	5.91	13.77	5.21
Max Chl Dpth (ft)	7.64	Hydr. Depth (ft)	3.02	6.82	2.53
Conv. Total (cfs)	37471.2	Conv. (cfs)	14049.1	19879.7	3542.4
Length Wtd. (ft)	491.08	Wetted Per. (ft)	105.54	28.97	36.41
Min Ch El (ft)	1962.45	Shear (lb/sq ft)	3.35	7.42	2.78
Alpha	1.68	Stream Power (lb/ft s)	*10228.81	0.00	0.00
Frctn Loss (ft)	4.95	Cum Volume (acre-ft)	15.26	27.60	13.16
C & E Loss (ft)	0.30	Cum SA (acres)	6.64	5.39	7.26

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

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	1973.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.67	Wt. n-Val.	0.070	0.051	0.070
W.S. Elev (ft)	1970.55	Reach Len. (ft)	480.95	493.11	499.81
Crit W.S. (ft)	1970.55	Flow Area (sq ft)	223.52	205.94	12.33
E.G. Slope (ft/ft)	*0.020266	Area (sq ft)	223.52	205.94	12.33
Q Total (cfs)	5006.00	Flow (cfs)	1796.95	3158.40	50.65
Top Width (ft)	78.33	Top Width (ft)	47.96	28.27	2.10
Vel Total (ft/s)	11.33	Avg. Vel. (ft/s)	8.04	15.34	4.11
Max Chl Dpth (ft)	8.10	Hydr. Depth (ft)	4.66	7.28	5.87
Conv. Total (cfs)	35164.9	Conv. (cfs)	12622.8	22186.3	355.8
Length Wtd. (ft)	490.96	Wetted Per. (ft)	51.51	28.97	7.78
Min Ch El (ft)	1962.45	Shear (lb/sq ft)	5.49	9.00	2.01
Alpha	1.34	Stream Power (lb/ft s)	*10228.81	0.00	0.00
Frctn Loss (ft)	4.95	Cum Volume (acre-ft)	9.62	30.68	6.35
C & E Loss (ft)	0.55	Cum SA (acres)	3.10	5.39	2.33

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 0.769

INPUT
Description: 0.769
Station Elevation Data num= 82

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9829.77	1973.5	9842.14	1972	9849.09	1970.89	9853.83	1970	9863.29	1968
9865.87	1967.08	9868.61	1966.42	9869.35	1966.22	9871.13	1966	9878.46	1964
9880.73	1963.21	9884.04	1962.12	9893.27	1960.79	9896.02	1960.43	9899.85	1959.99
9900.77	1960	9913.58	1959.05	9924.8	1959.21	9929.77	1959.07	9937.62	1959.17
9939.56	1958.67	9940.14	1958.52	9941.43	1958.27	9944	1958.78	9951.57	1958.9
9971.31	1958.31	9972.77	1959.63	9977.84	1958.86	9979.69	1958.78	9983.38	1958.22
9984.43	1958.04	9994.28	1959.18	9997.64	195810000.06		1957.510002.88		1958
10007.43	196010008.07		1960.7610009.47		1961.0610016.15		196210019.17		1962.77
10022.53	1963.02	10032.8	1963.7810037.77		196410040.02		1964.2710044.43		1964.55
10048.8	1964.6710059.08		1964.6910070.92		1965.4310071.12		1965.4410073.63		1965.53
10077.2	1965.6310081.85		1965.9110085.69		1966.05	10095.3	1966.5710103.67		1966.82
10111.09	1967.0610125.44		1967.5810132.07		1967.8610138.26		1968.0610142.18		1968.27
10150.81	1969.3410152.83		1969.4910157.11		1969.8410163.97		1970.3310175.74		1971.86
10175.83	1971.8710175.97		1971.8910176.52		1971.9310186.63		1972.710189.17		1972.88
10190.25	1973.4210209.53		1973.9710214.79		1974.2610216.14		1974.2910218.61		1974.46
72	1975.1410247.98		1975.6410248.71		1975.6710261.37		1976.2410272.96		1976.81
8	1977.0210288.22		1977.6						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9829.77	.07	9893.27	.05	10009.47	.07

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9893.27	10009.47	359.05	356.5	318.7	.1	.3

[redacted] Elev (ft)	1965.41	Element	Left OB	Channel	Right OB
[redacted] ead (ft)	0.80	Wt. n-Val.	0.070	0.051	0.070
[redacted] Elev (ft)	1964.61	Reach Len. (ft)	359.05	356.50	318.70
Crit W.S. (ft)		Flow Area (sq ft)	38.54	653.73	51.12
E.G. Slope (ft/ft)	*0.006463	Area (sq ft)	38.54	653.73	51.12
Q Total (cfs)	5006.00	Flow (cfs)	111.18	4787.40	107.42
Top Width (ft)	170.44	Top Width (ft)	17.05	116.20	37.19
Vel Total (ft/s)	6.73	Avg. Vel. (ft/s)	2.88	7.32	2.10
Max Chl Dpth (ft)	7.11	Hydr. Depth (ft)	2.26	5.63	1.37
Conv. Total (cfs)	62270.5	Conv. (cfs)	1383.0	59551.3	1336.2
Length Wtd. (ft)	354.76	Wetted Per. (ft)	17.54	118.25	37.42
Min Ch El (ft)	1957.50	Shear (lb/sq ft)	0.89	2.23	0.55
Alpha	1.14	Stream Power (lb/ft s)	*10288.22	0.00	0.00
Frctn Loss (ft)	2.79	Cum Volume (acre-ft)	13.29	22.81	12.35
C & E Loss (ft)	0.07	Cum SA (acres)	5.96	4.57	6.84

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.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	1965.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.83	Wt. n-Val.	0.070	0.051	0.070
W.S. Elev (ft)	1964.89	Reach Len. (ft)	359.05	356.50	318.70
Crit W.S. (ft)		Flow Area (sq ft)	1.10	685.64	2.01
E.G. Slope (ft/ft)	*0.006022	Area (sq ft)	1.10	685.64	2.01
Q Total (cfs)	5006.00	Flow (cfs)	0.73	5003.28	2.00
Top Width (ft)	117.00	Top Width (ft)	0.27	116.20	0.53
Vel Total (ft/s)	7.27	Avg. Vel. (ft/s)	0.66	7.30	0.99
Max Chl Dpth (ft)	7.39	Hydr. Depth (ft)	4.08	5.90	3.79
Conv. Total (cfs)	64510.4	Conv. (cfs)	9.3	64475.3	25.7
Length Wtd. (ft)	356.50	Wetted Per. (ft)	4.33	118.25	4.29
Min Ch El (ft)	1957.50	Shear (lb/sq ft)	0.10	2.18	0.18
Alpha	1.01	Stream Power (lb/ft s)	*10288.22	0.00	0.00
Frctn Loss (ft)	2.35	Cum Volume (acre-ft)	8.38	25.64	6.27
C & E Loss (ft)	0.06	Cum SA (acres)	2.83	4.57	2.31

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.

[redacted] SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 0.701

INPUT
Description: 0.701
Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9919.59	1985.68	9924.99	1985.16	9925.11	1985.15	9940.6	1983.84	9943.2	1983.19
9946	1982.7	9949.96	1982.3	9955.58	1979.89	9957.15	1979.15	9957.75	1978.82
9964.76	1976.12	9974.54	1968.2	9979.15	1964.38	9986.33	1957.78	9988.14	1956.28
9988.52	1956	9990.31	1954.94	9994.29	1952.5910006.02		1952.6310008.62		1952.89
10015.24	1954.5610039.91		1956.2710065.07		1958.1210068.94		1958.3610078.53		1958.56
10086.68	1958.7310098.07		1958.9310109.14		1960.8810119.29		1962.7710124.76		1962.76
10140.24	1962.6310171.34		1962.9410192.36		1963.1810206.46		1963.1310232.94		1963.02
10240.65	1963.0410254.28		1963.610255.68		1963.64 10256.5		1963.6810275.06		1964.27
10279.74	1964.3410281.93		1964.3710291.56		1964.4810294.02		1964.5110304.73		1965.08
10315.13	1965.52								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9919.59	.06	9986.33	.04	10065.07	.06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9986.3310065.07 407.46 405.66 393.74 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	1962.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.53	Wt. n-Val.	0.060	0.045	0.060
W.S. Elev (ft)	1961.02	Reach Len. (ft)	407.46	405.66	393.74
Crit W.S. (ft)		Flow Area (sq ft)	5.69	450.46	91.80
E.G. Slope (ft/ft)	*0.009772	Area (sq ft)	5.69	450.46	91.80
Q Total (cfs)	5006.00	Flow (cfs)	15.66	4628.79	361.55
Top Width (ft)	127.06	Top Width (ft)	3.52	78.74	44.80
Vel Total (ft/s)	9.14	Avg. Vel. (ft/s)	2.75	10.28	3.94
Max Chl Dpth (ft)	8.43	Hydr. Depth (ft)	1.62	5.72	2.05
Conv. Total (cfs)	50639.9	Conv. (cfs)	158.4	46824.1	3657.4
Length Wtd. (ft)	404.25	Wetted Per. (ft)	4.78	80.65	44.99
[redacted] n Ch El (ft)	1952.59	Shear (lb/sq ft)	0.73	3.41	1.24
[redacted] ha	1.18	Stream Power (lb/ft s)	*10315.13	0.00	0.00
[redacted] n Loss (ft)	4.56	Cum Volume (acre-ft)	13.11	18.29	11.83
[redacted] Loss (ft)	0.01	Cum SA (acres)	5.88	3.77	6.54

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	1963.30	Element	Left OB	Channel	Right OB

* [redacted] Elev (ft)	* 1961.85	* Reach Len. (ft)	* 407.46	* 405.66	* 393.74 *
* [redacted] W.S. (ft)	*	* Flow Area (sq ft)	* 4.60	* 515.99	* 0.04 *
* [redacted] Slope (ft/ft)	*0.007241	* Area (sq ft)	* 4.60	* 515.99	* 0.04 *
* [redacted]al (cfs)	* 5006.00	* Flow (cfs)	* 9.61	* 4996.39	* 0.00 *
* Top Width (ft)	* 80.08	* Top Width (ft)	* 1.33	* 78.74	* *
* Vel Total (ft/s)	* 9.62	* Avg. Vel. (ft/s)	* 2.09	* 9.68	* 0.10 *
* Max Chl Dpth (ft)	* 9.26	* Hydr. Depth (ft)	* 3.46	* 6.55	* 3.73 *
* Conv. Total (cfs)	* 58830.6	* Conv. (cfs)	* 113.0	* 58717.6	* 0.0 *
* Length Wtd. (ft)	* 405.41	* Wetted Per. (ft)	* 4.65	* 80.65	* 3.74 *
* Min Ch El (ft)	* 1952.59	* Shear (lb/sq ft)	* 0.45	* 2.89	* 0.00 *
* Alpha	* 1.01	* Stream Power (lb/ft s)	*10315.13	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 4.10	* Cum Volume (acre-ft)	* 8.36	* 20.72	* 6.26 *
* C & E Loss (ft)	* 0.09	* Cum SA (acres)	* 2.82	* 3.77	* 2.31 *

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 0.625

INPUT
Description: 0.625
Station Elevation Data num= 81

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9709	1964.43	9714.28	1963.96	9730.71	1962.2	9734.38	1961.72	9748.27	1960.1
9749.88	1960.09	9761.33	1960.08	9761.75	1960.07	9786.96	1959.26	9793.81	1959.03
9798.27	1958.91	9830.13	1958.01	9837.25	1957.83	9839.36	1957.78	9859.93	1956.96
9868.4	1956.82	9876.32	1956.62	9885.26	1956.36	9891.98	1956.19	9893.5	1956.21
9902.75	1955.42	9914.25	1954.3	9918.29	1954.34	9925.41	1954.31	9931.26	1954.46
9933.45	1954.41	9933.6	1954.42	9934.01	1954.45	9947.53	1953.88	9954.63	1953.79
9963.92	1952.83	9970.69	1952.34	9976.36	1951.14	9978.64	1950.62	9982.55	1949.72
9984.25	1949.43	9984.87	1949.59	9997.6	1949.81	9999.06	1949.8210001.64		1949.72
10002.2	1949.6910005.11		1950.3310008.19		1951.0110009.85		1951.3910010.15		1951.44
10011.02	1951.5910017.89		1952.8110030.04		1953.1110034.08		1952.7810034.72		1952.71
10036.62	1952.7610050.47		1953.0610054.46		1953.1510071.03		1954.5510074.39		1955.35
10081.93	1955.6410086.86		1955.7910091.06		1955.9310096.05		1956.0910106.41		1956.69
1[redacted]08	1956.8710128.35		1957.07 10131.7		1957.1410137.74		1957.2210142.34		1957.25
1[redacted]15	1957.1310178.66		1957.3110194.32		1957.6110203.98		1957.8310233.04		1957.82
1[redacted]3	1957.7910250.61		1957.8110255.38		1958.0510262.84		1958.3110268.73		1958.56
10[redacted].6	1959.1810287.68		1959.7410299.02		1960.43 10301.4		1960.4810312.59		1960.72
10326.96	1961.22								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9709	.06	9963.92	.04	10017.89	.06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9963.92 10017.89 235.83 235.89 237.92 .1 .3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 1957.98	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.61	* Wt. n-Val.	* 0.060	* 0.045	* 0.060 *
* W.S. Elev (ft)	* 1956.37	* Reach Len. (ft)	* 235.83	* 235.89	* 237.92 *
* Crit W.S. (ft)	* 1956.37	* Flow Area (sq ft)	* 139.71	* 298.89	* 186.73 *
* E.G. Slope (ft/ft)	*0.013175	* Area (sq ft)	* 139.71	* 298.89	* 186.73 *
* Q Total (cfs)	* 5006.00	* Flow (cfs)	* 579.38	* 3517.19	* 909.43 *
* Top Width (ft)	* 216.17	* Top Width (ft)	* 79.13	* 53.97	* 83.06 *
* Vel Total (ft/s)	* 8.01	* Avg. Vel. (ft/s)	* 4.15	* 11.77	* 4.87 *
* Max Chl Dpth (ft)	* 6.94	* Hydr. Depth (ft)	* 1.77	* 5.54	* 2.25 *
* Conv. Total (cfs)	* 43612.6	* Conv. (cfs)	* 5047.6	* 30642.0	* 7923.1 *
* Length Wtd. (ft)	* 236.17	* Wetted Per. (ft)	* 79.29	* 54.63	* 83.26 *
* Min Ch El (ft)	* 1949.43	* Shear (lb/sq ft)	* 1.45	* 4.50	* 1.84 *
* Alpha	* 1.62	* Stream Power (lb/ft s)	*10328.96	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 2.90	* Cum Volume (acre-ft)	* 12.43	* 14.80	* 10.57 *
* C & E Loss (ft)	* 0.14	* Cum SA (acres)	* 5.49	* 3.15	* 5.97 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 1959.12	* Element	* Left OB	* Channel	* Right OB *
* [redacted]l Head (ft)	* 2.36	* Wt. n-Val.	* 0.060	* 0.045	* 0.060 *
* [redacted] Elev (ft)	* 1956.76	* Reach Len. (ft)	* 235.83	* 235.89	* 237.92 *
* [redacted] W.S. (ft)	* 1956.76	* Flow Area (sq ft)	* 85.60	* 319.73	* 46.03 *
* [redacted] Slope (ft/ft)	*0.015086	* Area (sq ft)	* 85.60	* 319.73	* 46.03 *
* Q [redacted]otal (cfs)	* 5006.00	* Flow (cfs)	* 508.80	* 4211.22	* 285.98 *
* Top Width (ft)	* 95.00	* Top Width (ft)	* 28.92	* 53.97	* 12.11 *
* Vel Total (ft/s)	* 11.09	* Avg. Vel. (ft/s)	* 5.94	* 13.17	* 6.21 *
* Max Chl Dpth (ft)	* 7.33	* Hydr. Depth (ft)	* 2.96	* 5.92	* 3.80 *
* Conv. Total (cfs)	* 40756.6	* Conv. (cfs)	* 4142.5	* 34285.9	* 2328.3 *
* Length Wtd. (ft)	* 236.06	* Wetted Per. (ft)	* 31.33	* 54.63	* 15.77 *
* Min Ch El (ft)	* 1949.43	* Shear (lb/sq ft)	* 2.57	* 5.51	* 2.75 *
* Alpha	* 1.23	* Stream Power (lb/ft s)	*10328.96	* 0.00	* 0.00 *

* [redacted]E Loss (ft)	* 0.34	* Cum SA (acres)	* 2.68	* 3.15	* 2.26	*

Wai j: 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 cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 0.580

INPUT
Description: 0.58
Station Elevation Data num= 73

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9629.33	1966.93	9646.06	1964.78	9652.04	1964.11	9666.28	1962.63	9669.53	1962.14
9687.01	1960.41	9712.07	1958.08	9732.15	1957.32	9749.2	1956.8	9761.26	1956.27
9783.71	1955.84	9808.88	1955.35	9828.27	1954.8	9837.37	1954.61	9843.21	1954.41
9845.89	1954.51	9855.21	1954.34	9874.76	1953.9	9879.48	1953.47	9881.39	1953.29
9888.31	1952.5	9897.46	1951.08	9919.55	1950.17	9927.74	1949.88	9935.55	1950.18
9940.35	1950.36	9940.45	1950.37	9942.41	1950.38	9983.67	1949.44	9995.23	1947.15
10006.56	1948.09	10014.55	1948.71	10024.75	1950.06	10047.5	1952.26	10049.05	1952.44
10049.79	1952.53	10063.87	1952.55	10080.78	1952.61	10104.11	1952.66	10105.17	1952.63
10106.46	1952.61	10109.16	1952.79	10110.39	1952.74	10115.37	1952.93	10128.43	1952.47
10157.06	1953.01	10181.14	1953.62	10197.37	1954.21	10201.14	1954.34	10205.23	1954.45
10207.13	1954.51	10208.86	1954.61	10239.39	1956.64	10262.04	1957.85	10286.75	1958.79
10296.09	1959.08	10304.61	1959.26	10309.11	1959.44	10317.59	1959.76	10332.61	1959.89
10345.12	1960.16	10360.12	1960.72	10373.23	1961.04	10379.19	1961.33	10383.02	1961.32
10395.46	1961.93	10401.27	1961.97	10402.3	1961.98	10408.14	1962.37	10409.69	1962.44
10427.57	1963.24	10431.73	1963.37	10453.92	1964.57				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
[redacted]33	.06	9940.35	.045	10024.75	.06

Bai a: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9940.35 10024.75 477.5 492.31 498.33 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	1954.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.13	Wt. n-Val.	0.060	0.045	0.060
W.S. Elev (ft)	1953.69	Reach Len. (ft)	477.50	492.31	498.33
Crit W.S. (ft)	1953.57	Flow Area (sq ft)	166.12	379.74	179.22
E.G. Slope (ft/ft)	*0.011487	Area (sq ft)	166.12	379.74	179.22
Q Total (cfs)	5006.00	Flow (cfs)	837.77	3651.53	516.70
Top Width (ft)	305.79	Top Width (ft)	63.22	84.40	158.17
Vel Total (ft/s)	6.90	Avg. Vel. (ft/s)	5.04	9.62	2.88
Max Chl Dpth (ft)	6.53	Hydr. Depth (ft)	2.63	4.50	1.13
Conv. Total (cfs)	46708.2	Conv. (cfs)	7816.8	34070.4	4821.0
Length Wtd. (ft)	487.27	Wetted Per. (ft)	63.43	84.79	158.32
Min Ch El (ft)	1947.15	Shear (lb/sq ft)	1.88	3.21	0.81
Alpha	1.52	Stream Power (lb/ft s)	*10453.92	0.00	0.00
Frctn Loss (ft)	6.70	Cum Volume (acre-ft)	11.60	12.96	9.57
C & E Loss (ft)	0.00	Cum SA (acres)	5.11	2.78	5.31

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	1955.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.22	Wt. n-Val.	0.060	0.045	0.060
W.S. Elev (ft)	1954.42	Reach Len. (ft)	477.50	492.31	498.33
Crit W.S. (ft)		Flow Area (sq ft)	44.01	441.54	143.93
E.G. Slope (ft/ft)	*0.009164	Area (sq ft)	44.01	441.54	143.93
Q Total (cfs)	5006.00	Flow (cfs)	215.67	4193.20	597.13
Top Width (ft)	155.00	Top Width (ft)	10.35	84.40	60.25
Vel Total (ft/s)	7.95	Avg. Vel. (ft/s)	4.90	9.50	4.15
Max Chl Dpth (ft)	7.27	Hydr. Depth (ft)	4.25	5.23	2.39
Conv. Total (cfs)	52294.3	Conv. (cfs)	2253.0	43803.5	6237.8
Length Wtd. (ft)	489.89	Wetted Per. (ft)	14.81	84.79	62.18
Min Ch El (ft)	1947.15	Shear (lb/sq ft)	1.70	2.98	1.32
Alpha	1.24	Stream Power (lb/ft s)	*10453.92	0.00	0.00
Frctn Loss (ft)	5.99	Cum Volume (acre-ft)	7.59	14.77	5.53
[redacted]& E Loss (ft)	0.05	Cum SA (acres)	2.58	2.78	2.06

Wai j: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 0.487

```
Description: 0.487
Station Elevation Data    num=      64
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
**********************************************************************************
 9588.18 1954.23 9594.44 1953.99  9627.9  1953.2 9629.73 1953.17 9663.27 1952.62
 9680.72 1952.23 9715.17  1951.8 9718.13 1951.76 9720.81  1951.7 9778.81 1950.43
 9786.14  1950.4 9792.29 1950.13 9797.73 1949.96 9803.71 1949.71 9809.73 1949.46
 9814.35  1949.2 9820.44 1948.81 9825.79 1948.17 9835.11 1946.78 9837.71 1946.33
 9847.19 1944.28 9857.14 1942.07 9861.03 1941.06 9863.77 1940.77 9864.97 1940.52
 9867.67  1941.2 9870.52 1941.67 9879.11 1943.81    9881 1943.74 9897.49 1944.36
 9903.18 1944.63 9910.55 1944.56 9935.21 1944.44 9935.24 1944.44 9945.64 1944.38
 9950.72 1944.35 9954.62 1944.41 9982.72  1944.4 9984.94 1943.52 9988.93 1942.06
 9992.75  1941.5 9995.14 1941.5210003.41 1941.6510008.88 1942.7310013.19  1943.6
10023.24 1944.3910032.69 1944.9410046.19 1945.7310070.05 1948.4710070.23  1948.5
10075.37 1948.9710087.32 1949.99 10100.2 1950.5710104.18  1950.7 10155.2 1952.83
10194.18 1953.5810200.31 1953.7610241.11 1955.1610302.37 1957.16 10305.4 1957.27
10337.84 1958.3710338.36  1958.410403.46 1960.7510404.33 1960.78

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9588.18     .06 9982.72    .04510023.24     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9982.7210023.24             499.86  490.83  480.36             .1      .3

CROSS SECTION OUTPUT  Profile #Q100
*************************************************************************************************
* E.G. Elev (ft)        * 1948.11  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    1.14  * Wt. n-Val.           *    0.060 *    0.045 *    0.060 *
* W.S. Elev (ft)        * 1946.97  * Reach Len. (ft)      *   499.86 *   490.83 *   480.36 *
* Crit W.S. (ft)        * 1946.75  * Flow Area (sq ft)    *   437.48 *   173.25 *    50.58 *
* E.G. Slope (ft/ft)    *0.016771  * Area (sq ft)         *   437.48 *   173.25 *    50.58 *
* Q Total (cfs)         * 5006.00  * Flow (cfs)           *  2864.34 *  1929.71 *   211.95 *
* Top Width (ft)        *  223.16  * Top Width (ft)       *   148.89 *    40.52 *    33.75 *
* Vel Total (ft/s)      *    7.57  * Avg. Vel. (ft/s)     *     6.55 *    11.14 *     4.19 *
* Max Chl Dpth (ft)     *    6.45  * Hydr. Depth (ft)     *     2.94 *     4.28 *     1.50 *
* Conv. Total (cfs)     * 38655.6  * Conv. (cfs)          *  22118.0 * 14900.9  *  1636.6 *
* Length Wtd. (ft)      *  493.49  * Wetted Per. (ft)     *   149.98 *    41.21 *    33.86 *
* Min Ch El (ft)        * 1941.50  * Shear (lb/sq ft)     *     3.05 *     4.40 *     1.56 *
* Alpha                 *    1.28  * Stream Power (lb/ft s) *10404.33 *     0.00 *     0.00 *
* Frctn Loss (ft)       *    5.95  * Cum Volume (acre-ft) *     8.29 *     9.84 *     8.25 *
* C & E Loss (ft)       *    0.06  * Cum SA (acres)       *     3.94 *     2.07 *     4.21 *
*************************************************************************************************

[redacted]g: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
        need for additional cross sections.

CROSS SECTION OUTPUT  Profile #FW
*************************************************************************************************
* E.G. Elev (ft)        * 1949.60  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    1.71  * Wt. n-Val.           *    0.060 *    0.045 *    0.060 *
* W.S. Elev (ft)        * 1947.88  * Reach Len. (ft)      *   499.86 *   490.83 *   480.36 *
* Crit W.S. (ft)        * 1947.88  * Flow Area (sq ft)    *   257.39 *   210.23 *    80.42 *
* E.G. Slope (ft/ft)    *0.017136  * Area (sq ft)         *   257.39 *   210.23 *    80.42 *
* Q Total (cfs)         * 5006.00  * Flow (cfs)           *  1849.25 *  2692.90 *   463.85 *
* Top Width (ft)        *  148.00  * Top Width (ft)       *    74.72 *    40.52 *    32.76 *
* Vel Total (ft/s)      *    9.13  * Avg. Vel. (ft/s)     *     7.18 *    12.81 *     5.77 *
* Max Chl Dpth (ft)     *    6.38  * Hydr. Depth (ft)     *     3.44 *     5.19 *     2.45 *
* Conv. Total (cfs)     * 38241.4  * Conv. (cfs)          *  14126.6 *  20571.4 *  3543.4 *
* Length Wtd. (ft)      *  492.56  * Wetted Per. (ft)     *    78.02 *    41.21 *    33.89 *
* Min Ch El (ft)        * 1941.50  * Shear (lb/sq ft)     *     3.53 *     5.46 *     2.54 *
* Alpha                 *    1.32  * Stream Power (lb/ft s) *10404.33 *     0.00 *     0.00 *
* Frctn Loss (ft)       *    6.51  * Cum Volume (acre-ft) *     5.93 *    11.08 *     4.25 *
* C & E Loss (ft)       *    0.11  * Cum SA (acres)       *     2.11 *     2.07 *     1.53 *
*************************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
        for the water surface and continued on with the calculations.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate the
        need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
        water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The program
        defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth.  The program will try the cross section slice/secant
        method to find critical depth.

CROSS SECTION


RIVER: Rodger Creek
REACH: Main Reach         RS: 0.394

INPUT
Description: 0.394
Station Elevation Data    num=      78
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
**********************************************************************************
[redacted]  35 1948.41 9588.36 1948.15 9600.13 1948.06 9616.35 1947.93  9655.7  1947.8
        3 1947.65 9700.82 1947.52 9713.02 1947.38  9721.7 1947.26 9738.94 1947.01
 9      35 1946.39 9811.69 1944.97 9815.31  1944.8 9831.71 1941.23 9833.25 1941.01
 9835.51 1940.53 9860.29 1939.55 9870.88 1939.28 9890.87  1939.2 9914.31 1939.11
 9916.42  1939.1 9928.15 1939.06 9930.86 1939.03 9945.67 1938.85 9955.62 1938.66
 9960.26 1937.84 9960.55 1937.79 9969.01 1938.12 9973.28 1938.08 9975.53 1937.69
 9980.82 1937.13 9986.95 1936.25  9992.2 1934.13 9995.31 1933.2510007.98 1933.39
10009.65 1934.0910014.71 1936.2110023.16 1937.0610025.92 1937.33 10026.1 1937.35
10028.32 1937.4510046.68 1938.3710051.17 1938.4610054.45  1938.410063.33 1938.33
10073.75 1938.2410081.63 1938.5310083.61 1938.61 10086.8 1938.7310093.04 1939.06
 10108.4 1939.9210110.55 1939.9810115.44  1940.2 10137.3 1941.3210148.79 1941.42
```

[redacted]31 1945.0610201.81 1945.0710239.16 1945.7810247.11 1945.9110264.64 1946.23
[redacted]96 1946.3910298.59 1946.6210333.61 1947.6410340.66 1947.7410368.33 1948.63
[redacted].1 1949.0110389.69 1949.2810397.04 1949.3510436.47 1950.2710440.78 1950.42
[redacted]96 1950.4310468.72 1951.0610475.83 1951.28

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9560.35 .06 9973.28 .04510046.68 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9973.2810046.68 520.3 501.07 488.64 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	1942.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.94	Wt. n-Val.	0.060	0.045	0.060
W.S. Elev (ft)	1941.16	Reach Len. (ft)	520.30	501.07	488.64
Crit W.S. (ft)		Flow Area (sq ft)	277.90	368.89	167.24
E.G. Slope (ft/ft)	0.009090	Area (sq ft)	277.90	368.89	167.24
Q Total (cfs)	5006.00	Flow (cfs)	1030.39	3367.43	608.19
Top Width (ft)	301.87	Top Width (ft)	141.05	73.40	87.42
Vel Total (ft/s)	6.15	Avg. Vel. (ft/s)	3.71	9.13	3.64
Max Chl Dpth (ft)	7.91	Hydr. Depth (ft)	1.97	5.03	1.91
Conv. Total (cfs)	52507.1	Conv. (cfs)	10807.6	35320.4	6379.2
Length Wtd. (ft)	501.87	Wetted Per. (ft)	141.22	74.71	87.49
Min Ch El (ft)	1933.25	Shear (lb/sq ft)	1.12	2.80	1.08
Alpha	1.60	Stream Power (lb/ft s)	10475.83	0.00	0.00
Frctn Loss (ft)	5.19	Cum Volume (acre-ft)	4.19	6.78	7.05
C & E Loss (ft)	0.03	Cum SA (acres)	2.28	1.43	3.54

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

E.G. Elev (ft)	1942.82	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.36	Wt. n-Val.	0.060	0.045	0.060
W.S. Elev (ft)	1941.45	Reach Len. (ft)	520.30	501.07	488.64
Crit W.S. (ft)		Flow Area (sq ft)	171.00	390.78	40.64
E.G. Slope (ft/ft)	0.010515	Area (sq ft)	171.00	390.78	40.64
Q Total (cfs)	5006.00	Flow (cfs)	830.14	3987.05	188.81
Top Width (ft)	149.00	Top Width (ft)	62.28	73.40	13.32
[redacted] Total (ft/s)	8.31	Avg. Vel. (ft/s)	4.85	10.20	4.65
[redacted] Chl Dpth (ft)	8.20	Hydr. Depth (ft)	2.75	5.32	3.05
[redacted] Total (cfs)	48818.9	Conv. (cfs)	8095.6	38882.1	1841.3
[redacted]ch Wtd. (ft)	503.04	Wetted Per. (ft)	64.70	74.71	16.42
Min Ch El (ft)	1933.25	Shear (lb/sq ft)	1.74	3.43	1.62
Alpha	1.27	Stream Power (lb/ft s)	10475.83	0.00	0.00
Frctn Loss (ft)	4.82	Cum Volume (acre-ft)	3.48	7.70	3.58
C & E Loss (ft)	0.13	Cum SA (acres)	1.32	1.43	1.27

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 0.299

INPUT
Description: 0.299
Station Elevation Data num= 88
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9555.97 1946.24 9556.66 1946.23 9585.25 1945.75 9587.81 1945.71 9595.37 1945.46
9600.01 1945.36 9622.23 1944.62 9638.17 1944.13 9651.92 1943.61 9680.79 1942.42
9690.51 1942.07 9706.75 1941.46 9728.94 1940.6 9739.05 1940.15 9751.93 1939.86
9758.33 1939.6 9779.12 1938.98 9788.58 1938.65 9793.88 1938.61 9797.27 1938.46
9813.33 1938 9842.39 1937.18 9852.3 1937.08 9854.58 1937.06 9862.43 1936.64
9865.97 1936.23 9870.51 1935.87 9874.17 1935.17 9875.82 1934.91 9887.49 1933.98
9894.04 1933.2 9897.62 1933.28 9901.3 1933.83 9905.23 1933.84 9920 1933.38
9920.5 1933.34 9921.96 1933.44 9930.93 1934.02 9948.99 1934.51 9951.36 1934.57
9957.51 1934.5 9959.68 1934.79 9979.73 1934.36 9982.18 1934.25 9987.8 1931.2
9989.77 1930.41 9995.56 1928.43 9999.68 1928.3810008.61 1928.8610012.78 1931.74
10026.41 1933.310026.58 1933.33 10026.9 1933.3610037.61 1934.410040.87 1934.49
10072.32 1934.4610077.45 1934.16 10089.6 1932.8510090.07 1932.8410091.81 1932.85
10098.43 1932.89 10110.2 1932.9610113.64 1932.4810125.94 1932.0910128.09 1932.43
10131.38 1932.9910145.51 1933.4710166.71 1934.1610176.19 1934.410182.69 1934.52
10194.13 1934.8410202.69 1935.1910213.75 1935.5310235.97 1936.210271.13 1937.42
10271.29 1937.4310296.11 1938.0110309.35 1938.6910318.34 1939.0910329.28 1939.22
10343.7 1939.4310348.54 1939.5110358.75 1939.6410364.34 1939.710377.86 1939.73
10412.74 1940.3210422.87 1940.4610424.17 1940.48

Manning's n Values num= 3
[redacted] Sta n Val Sta n Val Sta n Val
[redacted]7 .06 9979.73 .04510040.87 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9979.7310040.87 321.3 304.33 283.97 .1 .3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	1936.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.84	Wt. n-Val.	0.060	0.045	0.060
W.S. Elev (ft)	1936.03	Reach Len. (ft)	321.30	304.33	283.97

* [redacted]Slope (ft/ft)	*0.011870	* Area (sq ft)	* 204.59	* 270.41	* 379.05 *
* [redacted]al (cfs)	* 5006.00	* Flow (cfs)	* 827.05	* 2557.13	* 1621.82 *
* [redacted]idth (ft)	* 362.00	* Top Width (ft)	* 111.28	* 61.14	* 189.58 *
* [redacted]otal (ft/s)	* 5.86	* Avg. Vel. (ft/s)	* 4.04	* 9.46	* 4.28 *
* Max Chl Dpth (ft)	* 7.65	* Hydr. Depth (ft)	* 1.84	* 4.42	* 2.00 *
* Conv. Total (cfs)	* 45948.0	* Conv. (cfs)	* 7591.1	* 23470.8	* 14886.0 *
* Length Wtd. (ft)	* 298.78	* Wetted Per. (ft)	* 111.56	* 63.45	* 189.82 *
* Min Ch El (ft)	* 1928.38	* Shear (lb/sq ft)	* 1.36	* 3.16	* 1.48 *
* Alpha	* 1.58	* Stream Power (lb/ft s)	*10424.17	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 3.92	* Cum Volume (acre-ft)	* 1.31	* 3.11	* 3.99 *
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 0.77	* 0.66	* 1.99 *

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #FW

* E.G. Elev (ft)	* 1937.86	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.92	* Wt. n-Val.	* 0.060	* 0.045	* 0.060 *
* W.S. Elev (ft)	* 1936.94	* Reach Len. (ft)	* 321.30	* 304.33	* 283.97 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 219.40	* 325.93	* 215.31 *
* E.G. Slope (ft/ft)	*0.008767	* Area (sq ft)	* 219.40	* 325.93	* 215.31 *
* Q Total (cfs)	* 5006.00	* Flow (cfs)	* 980.92	* 3000.03	* 1025.05 *
* Top Width (ft)	* 209.00	* Top Width (ft)	* 78.73	* 61.14	* 69.13 *
* Vel Total (ft/s)	* 6.58	* Avg. Vel. (ft/s)	* 4.47	* 9.20	* 4.76 *
* Max Chl Dpth (ft)	* 8.56	* Hydr. Depth (ft)	* 2.79	* 5.33	* 3.11 *
* Conv. Total (cfs)	* 53463.8	* Conv. (cfs)	* 10476.2	* 32040.2	* 10947.5 *
* Length Wtd. (ft)	* 302.27	* Wetted Per. (ft)	* 81.95	* 63.45	* 73.19 *
* Min Ch El (ft)	* 1928.38	* Shear (lb/sq ft)	* 1.47	* 2.81	* 1.61 *
* Alpha	* 1.37	* Stream Power (lb/ft s)	*10424.17	* 0.00	* 0.00 *
* Frctn Loss (ft)	* 3.47	* Cum Volume (acre-ft)	* 1.14	* 3.58	* 2.15 *
* C & E Loss (ft)	* 0.10	* Cum SA (acres)	* 0.48	* 0.66	* 0.81 *

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.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 0.241

[redacted]
Description: 0.241
Station Elevation Data num= 74

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9710.07	1943.93	9711.54	1943.79	9743.79	1941.03	9746.72	1940.81	9792.08	1937.2
9811.45	1935.62	9813.36	1935.47	9817.76	1935.17	9855.51	1932.97	9858.66	1932.81
9875.46	1932.45	9905.75	1933.02	9915.23	1933.1	9918.38	1933.13	9926.06	1933.21
9935.86	1933.35	9946.6	1933.47	9953.62	1933.38	9961.14	1933.23	9965.22	1933.11
9970.23	1932.77	9976.41	1932.35	9979.69	1932.1	9983.3	1931.7	9990.53	1931.08
9995.76	1927.96	9999.25	1924.99	10001.05	1923.85	10007.43	1922.75	10008.4	1922.72
10014.05	1924.53	10016.28	1925.21	10017.53	1925.57	10026.12	1927.91	10028.69	1928.06
10043.9	1929.1	10049.8	1929.44	10057.51	1929.63	10065.45	1929.66	10068.16	1929.53
10088.3	1929.42	10098.2	1929.51	10102.51	1929.65	10106.81	1929.79	10109.97	1929.63
10111.44	1929.55	10119.11	1928.73	10123.66	1928.25	10124.22	1928.38	10128.81	1929.16
10151.01	1929.71	10158.53	1929.85	10164.8	1929.99	10195.55	1929.74	10208.61	1929.5
10212.8	1929.29	10220.96	1929.22	10228.03	1930.15	10228.79	1930.29	10230.28	1930.43
10245.7	1931.78	10254.78	1932.61	10255.76	1932.66	10280.02	1933.52	10281.04	1933.56
10283.89	1933.69	10321.75	1935.43	10321.81	1935.44	10322.46	1935.45	10351.25	1936.03
10358.96	1936.2	10363.4	1936.32	10374.47	1936.55	10388.72	1936.83		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9710.07	.06	9990.53	.045	10057.51	.06

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9990.53	10057.51	181.32	169.91	166.9	.1	.3

CROSS SECTION OUTPUT Profile #Q100

* E.G. Elev (ft)	* 1932.92	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.24	* Wt. n-Val.	* 0.060	* 0.045	* 0.060 *
* W.S. Elev (ft)	* 1931.68	* Reach Len. (ft)	* 181.32	* 169.91	* 166.90 *
* Crit W.S. (ft)	* 1931.68	* Flow Area (sq ft)	* 2.09	* 302.95	* 377.27 *
* E.G. Slope (ft/ft)	*0.014586	* Area (sq ft)	* 2.09	* 302.95	* 377.27 *
* Q Total (cfs)	* 5006.00	* Flow (cfs)	* 2.78	* 3203.75	* 1799.47 *
* Top Width (ft)	* 260.98	* Top Width (ft)	* 6.97	* 66.98	* 187.02 *
* Vel Total (ft/s)	* 7.34	* Avg. Vel. (ft/s)	* 1.33	* 10.58	* 4.77 *
* Max Chl Dpth (ft)	* 8.96	* Hydr. Depth (ft)	* 0.30	* 4.52	* 2.02 *
* Conv. Total (cfs)	* 41450.1	* Conv. (cfs)	* 23.0	* 26527.3	* 14899.7 *
* Length Wtd. (ft)	* 169.86	* Wetted Per. (ft)	* 7.00	* 70.16	* 187.34 *
* Min Ch El (ft)	* 1922.72	* Shear (lb/sq ft)	* 0.27	* 3.93	* 1.83 *
* [redacted]pha	* 1.48	* Stream Power (lb/ft s)	*10388.72	* 0.00	* 0.00 *
* [redacted]n Loss (ft)	* 1.84	* Cum Volume (acre-ft)	* 0.54	* 1.10	* 1.52 *
* [redacted] Loss (ft)	* 0.09	* Cum SA (acres)	* 0.34	* 0.21	* 0.76 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CR[redacted] SECTION OUTPUT Profile #FW

E Elev (ft)	1934.29	Element	Left OB	Channel	Right OB
V ead (ft)	1.96	Wt. n-Val.	0.060	0.045	0.060
W.S. Elev (ft)	1932.33	Reach Len. (ft)	181.32	169.91	166.90
Crit W.S. (ft)	1932.33	Flow Area (sq ft)	6.63	346.65	138.17
E.G. Slope (ft/ft)	*0.015729	Area (sq ft)	6.63	346.65	138.17
Q Total (cfs)	5006.00	Flow (cfs)	18.73	4164.52	822.75
Top Width (ft)	123.44	Top Width (ft)	6.97	66.98	49.49
Vel Total (ft/s)	10.19	Avg. Vel. (ft/s)	2.82	12.01	5.95
Max Chl Dpth (ft)	9.61	Hydr. Depth (ft)	0.95	5.18	2.79
Conv. Total (cfs)	39915.3	Conv. (cfs)	149.4	33205.7	6560.2
Length Wtd. (ft)	169.81	Wetted Per. (ft)	7.65	70.16	52.05
Min Ch El (ft)	1922.72	Shear (lb/sq ft)	0.85	4.85	2.61
Alpha	1.21	Stream Power (lb/ft s)	*10388.72	0.00	0.00
Frctn Loss (ft)	1.92	Cum Volume (acre-ft)	0.31	1.23	0.99
C & E Loss (ft)	0.23	Cum SA (acres)	0.17	0.21	0.42

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 cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION

RIVER: Rodger Creek
REACH: Main Reach RS: 0.209

INPUT
Description: 0.209 Section is 0.24 miles US of Skunk Creek/Rodger Creek
Station Elevation Data num= 72

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9686	1946.36	9703.07	1944.72	9719.85	1942.99	9734.94	1941.4	9748.18	1939.25
9773.02	1935.73	9787.57	1933.97	9813.29	1930.28	9830.63	1927.96	9832.92	1927.51
[redacted]67	1927.66	9852.76	1926.65	9853.89	1926.68	9874.9	1927.17	9893.41	1927.68
[redacted]48	1927.76	9901.83	1927.8	9912.5	1928.08	9922.32	1928.34	9923.06	1928.36
[redacted]6	1928.39	9938.87	1928.47	9941.15	1928.41	9943.54	1928.35	9947.51	1928.28
9[redacted]1	1927.64	9954.48	1927.4	9959.46	1926.96	9972.44	1926.51	9976.15	1926.42
9981.02	1924.89	9985.49	1922.97	9988.49	1922.18	9991.49	1921.52	10000.55	1921.46
10007.99	1921.39	10013.88	1924.23	10016.77	1925.79	10018.61	1925.91	10023.66	1925.97
10039.21	1927.11	10049.08	1926.95	10061.78	1927.18	10080.44	1927.64	10095.61	1928.03
10109.43	1928.68	10115.07	1928.64	10117.84	1928.62	10141.9	1928.46	10142.63	1928.39
10154.51	1927.38	10155.41	1927.41	10158.93	1927.33	10190.45	1926.51	10194.52	1925.66
10200.99	1924.14	10209.98	1925.41	10214.58	1926.48	10223.12	1928.48	10228.82	1929.91
10237.09	1930.21	10257.65	1931.01	10263.89	1931.09	10283.42	1931.68	10290.42	1931.84
10296.05	1931.97	10323.32	1932.44	10328.73	1932.61	10336.78	1932.86	10337.77	1932.88
10353.64	1932.74	10368.28	1932.91						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9686	.06	9976.15	.045	10016.77	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9976.15	10016.77	0	0	.1	.3

CROSS SECTION OUTPUT Profile #Q100

E.G. Elev (ft)	1930.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.95	Wt. n-Val.	0.060	0.045	0.060
W.S. Elev (ft)	1929.26	Reach Len. (ft)			
Crit W.S. (ft)	1929.26	Flow Area (sq ft)	259.58	262.65	418.58
E.G. Slope (ft/ft)	*0.008386	Area (sq ft)	259.58	262.65	418.58
Q Total (cfs)	5006.00	Flow (cfs)	828.40	2676.00	1501.60
Top Width (ft)	405.32	Top Width (ft)	155.24	40.62	209.46
Vel Total (ft/s)	5.32	Avg. Vel. (ft/s)	3.19	10.19	3.59
Max Chl Dpth (ft)	7.87	Hydr. Depth (ft)	1.67	6.47	2.00
Conv. Total (cfs)	54664.5	Conv. (cfs)	9046.0	29221.4	16397.2
Length Wtd. (ft)		Wetted Per. (ft)	155.52	42.47	210.40
Min Ch El (ft)	1921.39	Shear (lb/sq ft)	0.87	3.24	1.04
Alpha	2.16	Stream Power (lb/ft s)	*10368.28	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Slope too steep for slope area to converge during supercritical flow calculations (normal depth is below critical depth). Water surface set to critical depth.

[redacted]S SECTION OUTPUT Profile #FW

Elev (ft)	1930.92	Element	Left OB	Channel	Right OB
\ ead (ft)	1.18	Wt. n-Val.	0.060	0.045	0.060
W.S. Elev (ft)	1929.74	Reach Len. (ft)			
Crit W.S. (ft)	1929.74	Flow Area (sq ft)	142.51	282.02	380.95
E.G. Slope (ft/ft)	*0.008534	Area (sq ft)	142.51	282.02	380.95
Q Total (cfs)	5006.00	Flow (cfs)	500.88	3039.47	1465.66
Top Width (ft)	284.86	Top Width (ft)	72.85	40.62	171.39
Vel Total (ft/s)	6.21	Avg. Vel. (ft/s)	3.51	10.78	3.85
Max Chl Dpth (ft)	8.35	Hydr. Depth (ft)	1.96	6.94	2.22
Conv. Total (cfs)	54188.3	Conv. (cfs)	5421.8	32901.2	15865.3

* [redacted]Ch El (ft)	* 1921.39	* Shear (lb/sq ft)	* 1.01	* 3.54	* 1.16	*
*	* 1.97	* Stream Power (lb/ft s)	*10368.28	* 0.00	* 0.00	*
* [redacted] Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*	*
* [redacted] Loss (ft)	*	* Cum SA (acres)	*	*	*	*

Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: Slope too steep for slope area to converge during supercritical flow calculations (normal depth is below critical depth). Water surface set to critical depth.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

SUMMARY OF MANNING'S N VALUES

River:Rodger Creek

Reach	River Sta.	n1	n2	n3
Main Reach	6.345	.076	.079	.076
Main Reach	6.268	.076	.079	.076
Main Reach	6.213	.076	.079	.076
Main Reach	6.170	.076	.079	.076
Main Reach	6.104	.076	.079	.076
Main Reach	6.025	.076	.079	.076
Main Reach	5.934	.076	.079	.076
Main Reach	5.881	.076	.079	.076
Main Reach	5.815	.076	.079	.076
Main Reach	5.743	.076	.079	.076
Main Reach	5.653	.076	.079	.076
Main Reach	5.562	.076	.079	.076
Main Reach	5.477	.076	.079	.076
Main Reach	5.391	.076	.079	.076
Main Reach	5.297	.076	.079	.076
Main Reach	5.210	.076	.079	.076
Main Reach	5.115	.076	.079	.076
Main Reach	5.021	.076	.079	.076
Main Reach	4.927	.076	.079	.076
Main Reach	4.839	.076	.079	.076
Main Reach	4.750	.076	.079	.076
Main Reach	4.696	.076	.079	.076
Main Reach	4.624	.076	.079	.076
Main Reach	4.567	.076	.079	.076
[redacted] Reach	4.478	.076	.079	.076
[redacted] Reach	4.404	.076	.079	.076
[redacted] Reach	4.339	.076	.079	.076
Main Reach	4.293	.076	.079	.076
Main Reach	4.194	.076	.079	.076
Main Reach	4.136	.076	.079	.076
Main Reach	4.074	.076	.079	.076
Main Reach	4.010	.076	.079	.076
Main Reach	3.922	.076	.079	.076
Main Reach	3.868	.076	.079	.076
Main Reach	3.813	.076	.079	.076
Main Reach	3.733	.076	.079	.076
Main Reach	3.664	.076	.079	.076
Main Reach	3.582	.076	.079	.076
Main Reach	3.518	.066	.066	.066
Main Reach	3.449	.066	.066	.066
Main Reach	3.394	.066	.066	.066
Main Reach	3.361	.066	.066	.066
Main Reach	3.305	.066	.066	.066
Main Reach	3.260	.066	.066	.066
Main Reach	3.246	.066	.066	.066
Main Reach	3.221	.066	.066	.066
Main Reach	3.186	.066	.066	.066
Main Reach	3.157	.066	.066	.066
Main Reach	3.082	.066	.066	.066
Main Reach	3.018	.066	.066	.066
Main Reach	2.929	.066	.066	.066
Main Reach	2.868	.066	.066	.066
Main Reach	2.807	.066	.066	.066
Main Reach	2.759	.066	.066	.066
Main Reach	2.713	.066	.066	.066
Main Reach	2.675	.038	.038	.071
Main Reach	2.614	.038	.038	.071
Main Reach	2.586	.038	.038	.071
Main Reach	2.529	.071	.059	.071
Main Reach	2.444	.071	.059	.071
Main Reach	2.395	.071	.059	.071
Main Reach	2.335	.071	.059	.071
Main Reach	2.258	.066	.065	.066
Main Reach	2.166	.065	.058	.065
Main Reach	2.071	.065	.058	.065
Main Reach	1.986	.065	.058	.065
Main Reach	1.894	.065	.058	.065
Main Reach	1.871	.065	.058	.065
[redacted] Reach	1.831	.065	.058	.065
[redacted] Reach	1.802	.065	.058	.065
[redacted] Reach	1.763	.065	.058	.065
Main Reach	1.757	Culvert		
Main Reach	1.751	.065	.058	.065
Main Reach	1.706	.065	.058	.065
Main Reach	1.664	.065	.058	.065
Main Reach	1.615	.065	.058	.065
Main Reach	1.554	.065	.058	.065
Main Reach	1.519	.065	.058	.065
Main Reach	1.425	.065	.058	.065
Main Reach	1.369	.065	.058	.065

*[redacted] Reach	* 1.290	* .065*	.058*	.065*
*[redacted]each	* 1.237	* .065*	.058*	.065*
*[redacted]each	* 1.213	* .065*	.058*	.065*
*[redacted]each	* 1.184	* .065*	.058*	.065*
*Main Reach	* 1.128	* .065*	.058*	.065*
*Main Reach	* 1.050	* .07*	.051*	.07*
*Main Reach	* 1.007	* .07*	.051*	.07*
*Main Reach	* 0.954	* .07*	.051*	.07*
*Main Reach	* 0.913	* .07*	.051*	.07*
*Main Reach	* 0.862	* .07*	.051*	.07*
*Main Reach	* 0.769	* .07*	.051*	.07*
*Main Reach	* 0.701	* .06*	.045*	.06*
*Main Reach	* 0.625	* .06*	.045*	.06*
*Main Reach	* 0.580	* .06*	.045*	.06*
*Main Reach	* 0.487	* .06*	.045*	.06*
*Main Reach	* 0.394	* .06*	.045*	.06*
*Main Reach	* 0.299	* .06*	.045*	.06*
*Main Reach	* 0.241	* .06*	.045*	.06*
*Main Reach	* 0.209	* .06*	.045*	.06*

SUMMARY OF REACH LENGTHS

River: Rodger Creek

Reach	River Sta.	Left	Channel	Right
*Main Reach	* 6.345	* 453.91*	406.25*	394.49*
*Main Reach	* 6.268	* 283.03*	289.37*	307.23*
*Main Reach	* 6.213	* 224.86*	229.16*	234.19*
*Main Reach	* 6.170	* 348.8*	344.75*	335.2*
*Main Reach	* 6.104	* 423.63*	418.14*	414.87*
*Main Reach	* 6.025	* 469.34*	478.28*	504.97*
*Main Reach	* 5.934	* 280.19*	280.62*	268.06*
*Main Reach	* 5.881	* 362.75*	352.04*	338.98*
*Main Reach	* 5.815	* 384.22*	380.96*	370.04*
*Main Reach	* 5.743	* 474.27*	473.93*	472.98*
*Main Reach	* 5.653	* 483.26*	481.45*	476.11*
*Main Reach	* 5.562	* 435.15*	448.41*	445.29*
*Main Reach	* 5.477	* 441.23*	452.53*	459.5*
*Main Reach	* 5.391	* 477.68*	497.93*	527.94*
*Main Reach	* 5.297	* 477.05*	457.75*	436.12*
*[redacted] Reach	* 5.210	* 502.9*	498.93*	487.96*
*[redacted] Reach	* 5.115	* 493.77*	500.02*	515.44*
*[redacted]each	* 5.021	* 515.64*	494.84*	476.48*
*M[redacted]each	* 4.927	* 470.83*	465.41*	460.32*
*Main Reach	* 4.839	* 477.34*	470.81*	462.36*
*Main Reach	* 4.750	* 285.76*	283.86*	282.83*
*Main Reach	* 4.696	* 382.67*	381.79*	349.26*
*Main Reach	* 4.624	* 309.87*	301.6*	280.44*
*Main Reach	* 4.567	* 472.25*	469.25*	458.84*
*Main Reach	* 4.478	* 370.22*	391.11*	405.22*
*Main Reach	* 4.404	* 322.74*	338.69*	338.89*
*Main Reach	* 4.339	* 242.98*	245.4*	245.26*
*Main Reach	* 4.293	* 516.88*	519.91*	516.84*
*Main Reach	* 4.194	* 311.32*	306.48*	290.21*
*Main Reach	* 4.136	* 339.56*	327.98*	289.17*
*Main Reach	* 4.074	* 297.55*	337.56*	352.24*
*Main Reach	* 4.010	* 443.93*	465.86*	486.23*
*Main Reach	* 3.922	* 273.06*	286.5*	288.34*
*Main Reach	* 3.868	* 284.36*	289.38*	289.81*
*Main Reach	* 3.813	* 433.3*	421.36*	410.53*
*Main Reach	* 3.733	* 389.59*	366.31*	318.91*
*Main Reach	* 3.664	* 431.13*	434.49*	435.41*
*Main Reach	* 3.582	* 322.17*	334.64*	340.34*
*Main Reach	* 3.518	* 360.26*	366.39*	370.84*
*Main Reach	* 3.449	* 277.13*	289.06*	293.04*
*Main Reach	* 3.394	* 180.73*	174.53*	168.53*
*Main Reach	* 3.361	* 304.23*	294.48*	261.7*
*Main Reach	* 3.305	* 243.91*	237.54*	222.3*
*Main Reach	* 3.260	* 65.59*	76.91*	69.22*
*Main Reach	* 3.246	* 110.89*	129.81*	118.31*
*Main Reach	* 3.221	* 173.91*	183.87*	178.18*
*Main Reach	* 3.186	* 153.76*	155.34*	157.76*
*Main Reach	* 3.157	* 383.63*	397.75*	419.63*
*Main Reach	* 3.082	* 305.51*	333.56*	353.18*
*Main Reach	* 3.018	* 471.53*	469.84*	466.27*
*Main Reach	* 2.929	* 316.38*	325.29*	316.01*
*Main Reach	* 2.868	* 290.13*	323.25*	354.66*
*Main Reach	* 2.807	* 245.08*	251.85*	248.16*
*Main Reach	* 2.759	* 236.22*	242.05*	243.81*
*Main Reach	* 2.713	* 197.96*	201.17*	187.64*
*Main Reach	* 2.675	* 342.81*	320.13*	277.54*
*Main Reach	* 2.614	* 155.6*	151.17*	142.28*
*Main Reach	* 2.586	* 295.96*	297.19*	302.11*
*Main Reach	* 2.529	* 390.01*	448.64*	471.99*
*[redacted]n Reach	* 2.444	* 308.47*	260.45*	219.29*
*[redacted] Reach	* 2.395	* 338.91*	317.17*	267.97*
*[redacted]each	* 2.335	* 377.96*	407.29*	409.74*
*M[redacted]each	* 2.258	* 464.57*	484.81*	486.42*
*Main Reach	* 2.166	* 468.12*	500.41*	515.9*
*Main Reach	* 2.071	* 499.45*	451.2*	434.5*
*Main Reach	* 1.986	* 487.7*	486.64*	488.01*
*Main Reach	* 1.894	* 115.15*	120.57*	126.81*
*Main Reach	* 1.871	* 217.16*	212.34*	202.44*
*Main Reach	* 1.831	* 150.92*	153.13*	160.08*
*Main Reach	* 1.802	* 197.47*	204.22*	238.16*
*Main Reach	* 1.763	* 65.79*	64.46*	68.26*

*Main Reach	*	1.751	*	243.01*	234.37*	176.68*
*[redacted]Reach	*	1.706	*	225.94*	222.56*	217.61*
*[redacted]each	*	1.664	*	260.09*	261.13*	264.73*
*[redacted]each	*	1.615	*	348.67*	319.49*	275.36*
*Main Reach	*	1.554	*	186.38*	184.64*	177.52*
*Main Reach	*	1.519	*	478.98*	499.06*	501.73*
*Main Reach	*	1.425	*	213.43*	294.1*	310.95*
*Main Reach	*	1.369	*	239.27*	239.8*	219.34*
*Main Reach	*	1.324	*	197.12*	179.74*	148.13*
*Main Reach	*	1.290	*	276.82*	275.39*	270.55*
*Main Reach	*	1.237	*	130.65*	129.75*	127.89*
*Main Reach	*	1.213	*	150.15*	151.03*	156.08*
*Main Reach	*	1.184	*	233.26*	297.19*	325.83*
*Main Reach	*	1.128	*	392.74*	413.7*	415.27*
*Main Reach	*	1.050	*	259.63*	227.18*	190.58*
*Main Reach	*	1.007	*	274.62*	275.37*	252.36*
*Main Reach	*	0.954	*	186.9*	218.1*	251.71*
*Main Reach	*	0.913	*	221.22*	268.06*	280.4*
*Main Reach	*	0.862	*	480.95*	493.11*	499.81*
*Main Reach	*	0.769	*	359.05*	356.5*	318.7*
*Main Reach	*	0.701	*	407.46*	405.66*	393.74*
*Main Reach	*	0.625	*	235.83*	235.89*	237.92*
*Main Reach	*	0.580	*	477.5*	492.31*	498.33*
*Main Reach	*	0.487	*	499.86*	490.83*	480.36*
*Main Reach	*	0.394	*	520.3*	501.07*	488.64*
*Main Reach	*	0.299	*	321.3*	304.33*	283.97*
*Main Reach	*	0.241	*	181.32*	169.91*	166.9*
*Main Reach	*	0.209	*	0*	0*	0*

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Rodger Creek

Reach	River Sta.	Contr.	Expan.
*Main Reach	* 6.345	.1*	.3*
*Main Reach	* 6.268	.1*	.3*
*Main Reach	* 6.213	.1*	.3*
*Main Reach	* 6.170	.1*	.3*
*Main Reach	* 6.104	.1*	.3*
*Main Reach	* 6.025	.1*	.3*
*Main Reach	* 5.934	.1*	.3*
*[redacted]Reach	* 5.881	.1*	.3*
*[redacted]each	* 5.815	.1*	.3*
*[redacted]each	* 5.743	.1*	.3*
*Main Reach	* 5.653	.1*	.3*
*Main Reach	* 5.562	.1*	.3*
*Main Reach	* 5.477	.1*	.3*
*Main Reach	* 5.391	.1*	.3*
*Main Reach	* 5.297	.1*	.3*
*Main Reach	* 5.210	.1*	.3*
*Main Reach	* 5.115	.1*	.3*
*Main Reach	* 5.021	.1*	.3*
*Main Reach	* 4.927	.1*	.3*
*Main Reach	* 4.839	.1*	.3*
*Main Reach	* 4.750	.1*	.3*
*Main Reach	* 4.696	.1*	.3*
*Main Reach	* 4.624	.1*	.3*
*Main Reach	* 4.567	.1*	.3*
*Main Reach	* 4.478	.1*	.3*
*Main Reach	* 4.404	.1*	.3*
*Main Reach	* 4.339	.1*	.3*
*Main Reach	* 4.293	.1*	.3*
*Main Reach	* 4.194	.1*	.3*
*Main Reach	* 4.136	.1*	.3*
*Main Reach	* 4.074	.1*	.3*
*Main Reach	* 4.010	.1*	.3*
*Main Reach	* 3.922	.1*	.3*
*Main Reach	* 3.868	.1*	.3*
*Main Reach	* 3.813	.1*	.3*
*Main Reach	* 3.733	.1*	.3*
*Main Reach	* 3.664	.1*	.3*
*Main Reach	* 3.582	.1*	.3*
*Main Reach	* 3.518	.1*	.3*
*Main Reach	* 3.449	.1*	.3*
*Main Reach	* 3.394	.1*	.3*
*Main Reach	* 3.361	.1*	.3*
*Main Reach	* 3.305	.1*	.3*
*Main Reach	* 3.260	.1*	.3*
*Main Reach	* 3.246	.1*	.3*
*Main Reach	* 3.221	.1*	.3*
*Main Reach	* 3.186	.1*	.3*
*Main Reach	* 3.157	.1*	.3*
*Main Reach	* 3.082	.1*	.3*
*Main Reach	* 3.018	.1*	.3*
*Main Reach	* 2.929	.1*	.3*
*[redacted]Reach	* 2.868	.1*	.3*
*[redacted]each	* 2.807	.1*	.3*
*[redacted]each	* 2.759	.1*	.3*
*Main Reach	* 2.713	.1*	.3*
*Main Reach	* 2.675	.1*	.3*
*Main Reach	* 2.614	.1*	.3*
*Main Reach	* 2.586	.1*	.3*
*Main Reach	* 2.529	.1*	.3*
*Main Reach	* 2.444	.1*	.3*
*Main Reach	* 2.395	.1*	.3*
*Main Reach	* 2.335	.1*	.3*

*Main Reach	*	2.166	*	.1*	.3*
*[redacted]each	*	2.071	*	.1*	.3*
*[redacted]each	*	1.986	*	.1*	.3*
*[redacted]each	*	1.894	*	.1*	.3*
*Main Reach	*	1.871	*	.1*	.3*
*Main Reach	*	1.831	*	.1*	.3*
*Main Reach	*	1.802	*	.3*	.5*
*Main Reach	*	1.763	*	.3*	.5*
*Main Reach	*	1.757	*Culvert	*	*
*Main Reach	*	1.751	*	.3*	.5*
*Main Reach	*	1.706	*	.1*	.3*
*Main Reach	*	1.664	*	.1*	.3*
*Main Reach	*	1.615	*	.1*	.3*
*Main Reach	*	1.554	*	.1*	.3*
*Main Reach	*	1.519	*	.1*	.3*
*Main Reach	*	1.425	*	.1*	.3*
*Main Reach	*	1.369	*	.1*	.3*
*Main Reach	*	1.324	*	.1*	.3*
*Main Reach	*	1.290	*	.1*	.3*
*Main Reach	*	1.237	*	.1*	.3*
*Main Reach	*	1.213	*	.1*	.3*
*Main Reach	*	1.184	*	.1*	.3*
*Main Reach	*	1.128	*	.1*	.3*
*Main Reach	*	1.050	*	.1*	.3*
*Main Reach	*	1.007	*	.1*	.3*
*Main Reach	*	0.954	*	.1*	.3*
*Main Reach	*	0.913	*	.1*	.3*
*Main Reach	*	0.862	*	.1*	.3*
*Main Reach	*	0.769	*	.1*	.3*
*Main Reach	*	0.701	*	.1*	.3*
*Main Reach	*	0.625	*	.1*	.3*
*Main Reach	*	0.580	*	.1*	.3*
*Main Reach	*	0.487	*	.1*	.3*
*Main Reach	*	0.394	*	.1*	.3*
*Main Reach	*	0.299	*	.1*	.3*
*Main Reach	*	0.241	*	.1*	.3*
*Main Reach	*	0.209	*	.1*	.3*

Profile Output Table - Encroachment 3

Reach	River Sta	Profile	Top Wdth Act (ft)	Area (sq ft)	Vel Total (ft/s)	W.S. Elev (ft)	Base WS (ft)	Prof Delta WS (ft)
Main Reach	0.209	Q100	405.32	940.80	5.32	1929.26	1929.26	
[redacted] Reach	0.209	FW	284.86	805.48	6.21	1929.74	1929.26	0.48
[redacted] Reach	0.241	Q100	260.98	682.31	7.34	1931.68	1931.68	
Main Reach	0.241	FW	123.44	491.45	10.19	1932.33	1931.68	0.65
Main Reach	0.299	Q100	362.00	854.05	5.86	1936.03	1936.03	
Main Reach	0.299	FW	209.00	760.65	6.58	1936.94	1936.03	0.91
Main Reach	0.394	Q100	301.87	814.03	6.15	1941.16	1941.16	
Main Reach	0.394	FW	149.00	602.41	8.31	1941.45	1941.16	0.30
Main Reach	0.487	Q100	223.16	661.30	7.57	1946.97	1946.97	
Main Reach	0.487	FW	148.00	548.05	9.13	1947.88	1946.97	0.91
Main Reach	0.580	Q100	305.79	725.09	6.90	1953.69	1953.69	
Main Reach	0.580	FW	155.00	629.48	7.95	1954.42	1953.69	0.73
Main Reach	0.625	Q100	216.17	625.33	8.01	1956.37	1956.37	
Main Reach	0.625	FW	95.00	451.35	11.09	1956.76	1956.37	0.39
Main Reach	0.701	Q100	127.06	547.96	9.14	1961.02	1961.02	
Main Reach	0.701	FW	80.08	520.62	9.62	1961.85	1961.02	0.83
Main Reach	0.769	Q100	170.44	743.39	6.73	1964.61	1964.61	
Main Reach	0.769	FW	117.00	688.75	7.27	1964.89	1964.61	0.27
Main Reach	0.862	Q100	169.49	601.14	8.33	1970.09	1970.09	
Main Reach	0.862	FW	78.33	441.80	11.33	1970.55	1970.09	0.46
Main Reach	0.913	Q100	186.44	766.35	6.53	1973.75	1973.75	
Main Reach	0.913	FW	132.26	818.02	6.12	1974.75	1973.75	1.00
Main Reach	0.954	Q100	258.17	729.47	6.86	1975.88	1975.88	
Main Reach	0.954	FW	142.44	561.30	8.92	1976.65	1975.88	0.77
Main Reach	1.007	Q100	378.75	884.25	5.66	1979.93	1979.93	
Main Reach	1.007	FW	157.00	613.99	8.15	1980.88	1979.93	0.95
Main Reach	1.050	Q100	305.69	743.33	6.73	1983.20	1983.20	
Main Reach	1.050	FW	229.86	830.04	6.03	1984.15	1983.20	0.95
Main Reach	1.128	Q100	253.60	687.86	7.28	1989.52	1989.52	
Main Reach	1.128	FW	114.95	482.78	10.37	1989.59	1989.52	0.08
[redacted] Reach	1.184	Q100	202.33	866.56	6.43	1993.54	1993.54	
[redacted] Reach	1.184	FW	99.96	599.66	8.35	1994.53	1993.54	1.00
Main Reach	1.213	Q100	138.62	509.98	9.82	1995.42	1995.42	
Main Reach	1.213	FW	68.00	406.14	12.33	1995.78	1995.42	0.36
Main Reach	1.237	Q100	109.14	591.95	8.46	1997.97	1997.97	
Main Reach	1.237	FW	74.00	599.68	8.35	1998.97	1997.97	1.00
Main Reach	1.290	Q100	96.29	408.37	12.26	2000.90	2000.90	
Main Reach	1.290	FW	54.00	371.43	13.48	2000.96	2000.90	0.05

Main Reach	1.324	Q100	296.11	1189.90	4.21	2004.67	2004.67		
Main Reach	1.324	FW	94.36	687.22	7.28	2005.00	2004.67	0.33	
[redacted] Reach	1.369	Q100	227.41	623.04	8.03	2005.80	2005.80		
Main Reach	1.369	FW	138.95	661.94	7.56	2006.79	2005.80	0.99	
Main Reach	1.425	Q100	365.98	833.54	6.38	2010.53	2010.53		
Main Reach	1.425	FW	119.42	498.20	10.05	2010.57	2010.53	0.04	
Main Reach	1.519	Q100	272.84	898.74	5.57	2017.35	2017.35		
Main Reach	1.519	FW	170.28	802.13	6.24	2018.34	2017.35	0.99	
Main Reach	1.554	Q100	250.53	672.87	7.44	2020.33	2020.33		
Main Reach	1.554	FW	150.00	563.90	8.88	2021.28	2020.33	0.95	
Main Reach	1.615	Q100	282.08	945.17	5.30	2025.36	2025.36		
Main Reach	1.615	FW	151.00	765.45	6.54	2026.21	2025.36	0.86	
Main Reach	1.664	Q100	408.96	1048.74	4.77	2027.73	2027.73		
Main Reach	1.664	FW	123.00	651.73	7.68	2028.53	2027.73	0.80	
Main Reach	1.706	Q100	339.84	747.42	6.70	2029.97	2029.97		
Main Reach	1.706	FW	169.00	790.19	6.34	2030.95	2029.97	0.98	
Main Reach	1.751	Q100	453.32	1057.42	6.39	2034.27	2034.27		
Main Reach	1.751	FW	246.00	899.82	7.87	2034.70	2034.27	0.43	
Main Reach	1.757		Culvert						
Main Reach	1.763	Q100	476.42	1061.52	4.98	2036.12	2036.12		
Main Reach	1.763	FW	225.00	955.24	5.57	2037.03	2036.12	0.91	
Main Reach	1.802	Q100	400.23	1266.67	3.95	2037.67	2037.67		
Main Reach	1.802	FW	100.00	754.03	6.64	2038.32	2037.67	0.65	
Main Reach	1.831	Q100	213.59	848.92	5.90	2038.23	2038.23		
Main Reach	1.831	FW	112.00	709.10	7.06	2039.10	2038.23	0.88	
Main Reach	1.871	Q100	166.00	592.29	8.45	2040.24	2040.24		
Main Reach	1.871	FW	91.00	483.47	10.35	2040.79	2040.24	0.55	
Main Reach	1.894	Q100	128.15	501.94	9.97	2042.21	2042.21		
Main Reach	1.894	FW	108.00	588.88	8.50	2043.15	2042.21	0.94	
Main Reach	1.986	Q100	257.97	693.05	7.22	2053.17	2053.17		
[redacted] Reach	1.986	FW	170.47	598.75	8.36	2054.08	2053.17	0.91	
[redacted] Reach	2.071	Q100	255.36	699.88	7.15	2061.81	2061.81		
Main Reach	2.071	FW	100.80	505.27	9.91	2062.42	2061.81	0.61	
Main Reach	2.166	Q100	167.50	625.19	8.01	2069.55	2069.55		
Main Reach	2.166	FW	87.33	497.78	10.06	2070.55	2069.55	0.99	
Main Reach	2.258	Q100	201.30	700.55	7.15	2076.74	2076.74		
Main Reach	2.258	FW	86.00	557.16	8.98	2077.73	2076.74	0.98	
Main Reach	2.335	Q100	224.04	590.34	7.93	2082.48	2082.48		
Main Reach	2.335	FW	93.81	517.37	9.05	2083.01	2082.48	0.53	
Main Reach	2.395	Q100	269.71	646.47	6.68	2088.29	2088.29		
Main Reach	2.395	FW	167.00	524.32	8.24	2088.29	2088.29	0.00	
Main Reach	2.444	Q100	145.49	508.91	8.49	2092.28	2092.28		
Main Reach	2.444	FW	65.00	390.92	11.05	2092.62	2092.28	0.34	
Main Reach	2.529	Q100	128.59	571.05	7.56	2098.50	2098.50		
Main Reach	2.529	FW	48.00	402.27	10.74	2099.42	2098.50	0.92	
Main Reach	2.586	Q100	93.67	424.84	10.17	2101.46	2101.46		
Main Reach	2.586	FW	52.00	365.27	11.83	2101.97	2101.46	0.52	
Main Reach	2.614	Q100	96.61	453.77	9.52	2103.12	2103.12		
Main Reach	2.614	FW	72.00	496.91	8.69	2104.07	2103.12	0.95	
Main Reach	2.675	Q100	154.16	479.99	9.00	2112.78	2112.78		
Main Reach	2.675	FW	67.00	339.68	12.72	2113.01	2112.78	0.23	
Main Reach	2.713	Q100	204.99	631.21	6.88	2116.77	2116.77		
Main Reach	2.713	FW	112.00	502.50	8.60	2117.57	2116.77	0.80	
Main Reach	2.759	Q100	225.15	680.40	6.35	2120.95	2120.95		
Main Reach	2.759	FW	135.00	583.95	7.40	2121.95	2120.95	1.00	
Main Reach	2.807	Q100	199.58	621.02	6.96	2125.09	2125.09		
Main Reach	2.807	FW	96.00	466.97	9.25	2125.94	2125.09	0.85	
Main Reach	2.868	Q100	196.70	657.10	6.57	2130.55	2130.55		
Main Reach	2.868	FW	125.00	599.79	7.20	2131.53	2130.55	0.99	
[redacted] Reach	2.929	Q100	201.67	682.76	6.33	2135.32	2135.32		
[redacted] Reach	2.929	FW	116.04	516.56	8.36	2136.09	2135.32	0.77	
Main Reach	3.018	Q100	192.36	542.77	7.96	2143.70	2143.70		
Main Reach	3.018	FW	84.00	428.69	10.08	2144.69	2143.70	0.99	
Main Reach	3.082	Q100	362.25	740.99	5.83	2150.15	2150.15		
Main Reach	3.082	FW	70.00	456.62	9.46	2150.63	2150.15	0.48	
Main Reach	3.157	Q100	136.93	450.34	9.24	2156.48	2156.48		
Main Reach	3.157	FW	67.73	389.36	10.69	2157.40	2156.48	0.92	

Main Reach	3.186	Q100	133.66	530.84	7.84	2159.74	2159.74		
Main Reach	3.186	FW	59.00	440.49	9.45	2160.50	2159.74	0.76	
[redacted] Reach	3.221	Q100	101.21	571.75	10.09	2162.47	2162.47		
Main Reach	3.221	FW	59.45	401.85	10.36	2163.22	2162.47	0.74	
Main Reach	3.246	Q100	101.22	539.61	7.71	2165.50	2165.50		
Main Reach	3.246	FW	94.50	574.68	7.24	2165.88	2165.50	0.39	
Main Reach	3.260	Q100	136.47	632.12	6.74	2166.56	2166.56		
Main Reach	3.260	FW	95.18	518.96	8.02	2166.64	2166.56	0.08	
Main Reach	3.305	Q100	132.38	392.58	10.60	2170.24	2170.24		
Main Reach	3.305	FW	80.62	389.86	10.68	2170.51	2170.24	0.27	
Main Reach	3.361	Q100	306.62	682.74	6.10	2176.88	2176.88		
Main Reach	3.361	FW	88.87	433.57	9.60	2176.95	2176.88	0.07	
Main Reach	3.394	Q100	225.15	489.11	8.51	2180.18	2180.18		
Main Reach	3.394	FW	95.29	432.24	9.63	2180.27	2180.18	0.09	
Main Reach	3.449	Q100	185.39	629.85	6.61	2185.48	2185.48		
Main Reach	3.449	FW	89.07	461.43	9.02	2185.77	2185.48	0.30	
Main Reach	3.518	Q100	114.44	409.28	10.17	2191.85	2191.85		
Main Reach	3.518	FW	65.00	358.52	11.61	2192.80	2191.85	0.95	
Main Reach	3.582	Q100	120.11	626.07	6.65	2199.15	2199.15		
Main Reach	3.582	FW	65.00	508.50	8.19	2200.10	2199.15	0.95	
Main Reach	3.664	Q100	142.37	543.35	7.66	2205.59	2205.59		
Main Reach	3.664	FW	63.00	455.54	9.14	2206.55	2205.59	0.96	
Main Reach	3.733	Q100	203.50	589.15	7.07	2214.12	2214.12		
Main Reach	3.733	FW	79.00	429.11	9.70	2214.73	2214.12	0.61	
Main Reach	3.813	Q100	99.55	474.69	7.64	2223.08	2223.08		
Main Reach	3.813	FW	60.00	429.92	8.43	2224.04	2223.08	0.95	
Main Reach	3.868	Q100	107.85	511.24	7.09	2228.15	2228.15		
Main Reach	3.868	FW	80.94	471.14	7.70	2228.84	2228.15	0.68	
Main Reach	3.922	Q100	126.91	492.50	7.36	2233.59	2233.59		
Main Reach	3.922	FW	120.90	525.89	6.89	2233.93	2233.59	0.34	
[redacted] Reach	4.010	Q100	170.19	517.18	7.01	2243.79	2243.79		
Reach	4.010	FW	62.00	352.44	10.29	2243.89	2243.79	0.10	
Main Reach	4.074	Q100	150.47	519.06	6.99	2250.68	2250.68		
Main Reach	4.074	FW	85.00	485.76	7.46	2251.65	2250.68	0.97	
Main Reach	4.136	Q100	198.21	508.57	7.13	2257.45	2257.45		
Main Reach	4.136	FW	95.00	437.37	8.29	2257.53	2257.45	0.08	
Main Reach	4.194	Q100	160.37	550.23	6.59	2263.42	2263.42		
Main Reach	4.194	FW	60.00	395.41	9.17	2263.94	2263.42	0.52	
Main Reach	4.293	Q100	193.50	570.57	6.36	2273.26	2273.26		
Main Reach	4.293	FW	90.00	470.85	7.70	2274.26	2273.26	1.00	
Main Reach	4.339	Q100	242.89	666.65	5.44	2277.69	2277.69		
Main Reach	4.339	FW	64.00	414.94	8.74	2278.55	2277.69	0.86	
Main Reach	4.404	Q100	239.29	605.74	4.87	2283.12	2283.12		
Main Reach	4.404	FW	125.00	574.07	5.14	2284.08	2283.12	0.95	
Main Reach	4.478	Q100	166.03	353.64	5.93	2291.39	2291.39		
Main Reach	4.478	FW	143.07	285.16	7.35	2292.05	2291.39	0.65	
Main Reach	4.567	Q100	180.49	383.51	5.47	2303.12	2303.12		
Main Reach	4.567	FW	55.00	299.97	6.99	2304.10	2303.12	0.99	
Main Reach	4.624	Q100	231.52	416.88	5.03	2309.88	2309.88		
Main Reach	4.624	FW	51.00	213.96	9.80	2310.71	2309.88	0.83	
Main Reach	4.696	Q100	188.36	396.40	5.29	2319.28	2319.28		
Main Reach	4.696	FW	113.00	405.09	5.18	2320.24	2319.28	0.96	
Main Reach	4.750	Q100	228.17	406.60	5.16	2327.42	2327.42		
Main Reach	4.750	FW	193.00	312.42	6.71	2327.42	2327.42	0.00	
Main Reach	4.839	Q100	210.87	430.11	4.88	2339.51	2339.51		
Main Reach	4.839	FW	135.00	432.61	4.85	2340.28	2339.51	0.77	
Main Reach	4.927	Q100	209.04	367.33	5.71	2352.74	2352.74		
Main Reach	4.927	FW	161.60	289.62	7.24	2352.80	2352.74	0.06	
Main Reach	5.021	Q100	195.32	425.07	4.93	2366.02	2366.02		
Main Reach	5.021	FW	99.00	376.38	5.57	2366.63	2366.02	0.61	
[redacted] Reach	5.115	Q100	119.89	293.13	7.15	2378.31	2378.31		
Reach	5.115	FW	61.48	212.92	9.85	2378.32	2378.31	0.01	
Main Reach	5.210	Q100	80.47	295.74	7.09	2391.58	2391.58		
Main Reach	5.210	FW	60.00	305.40	6.87	2392.06	2391.58	0.47	
Main Reach	5.297	Q100	106.12	285.69	7.34	2403.03	2403.03		
Main Reach	5.297	FW	75.13	223.75	9.37	2403.17	2403.03	0.15	
Main Reach	5.391	Q100	121.72	341.28	6.14	2415.95	2415.95		
Main Reach	5.391	FW	68.90	306.54	6.84	2416.90	2415.95	0.95	

[redacted] Reach	5.477	Q100	143.49	340.18	6.16	2426.11	2426.11		
[redacted] Reach	5.477	FW	51.00	231.40	9.06	2426.57	2426.11	0.46	
[redacted] Reach	5.562	Q100	204.96	375.07	5.59	2439.77	2439.77		
Main Reach	5.562	FW	110.97	321.73	6.52	2440.76	2439.77	0.99	
Main Reach	5.653	Q100	129.22	339.33	6.18	2452.63	2452.63		
Main Reach	5.653	FW	40.00	226.49	9.26	2453.30	2452.63	0.67	
Main Reach	5.743	Q100	132.99	303.20	6.92	2464.66	2464.66		
Main Reach	5.743	FW	54.00	256.31	8.18	2465.59	2464.66	0.93	
Main Reach	5.815	Q100	144.46	358.69	5.85	2475.20	2475.20		
Main Reach	5.815	FW	63.00	256.31	8.18	2475.82	2475.20	0.62	
Main Reach	5.881	Q100	79.31	272.28	7.70	2483.90	2483.90		
Main Reach	5.881	FW	47.00	252.10	8.32	2484.87	2483.90	0.97	
Main Reach	5.934	Q100	90.39	299.12	5.12	2489.70	2489.70		
Main Reach	5.934	FW	36.00	216.55	7.07	2490.34	2489.70	0.64	
Main Reach	6.025	Q100	54.79	157.51	9.73	2504.98	2504.98		
Main Reach	6.025	FW	45.00	149.84	10.22	2505.00	2504.98	0.02	
Main Reach	6.104	Q100	51.64	230.65	6.64	2516.70	2516.70		
Main Reach	6.104	FW	38.00	218.82	7.00	2516.84	2516.70	0.13	
Main Reach	6.170	Q100	44.58	148.15	10.34	2526.53	2526.53		
Main Reach	6.170	FW	41.74	147.87	10.36	2526.54	2526.53	0.01	
Main Reach	6.213	Q100	72.64	250.90	6.11	2534.43	2534.43		
Main Reach	6.213	FW	62.00	244.35	6.27	2534.48	2534.43	0.05	
Main Reach	6.268	Q100	85.79	193.55	7.92	2542.63	2542.63		
Main Reach	6.268	FW	58.94	167.09	9.17	2543.02	2542.63	0.39	
Main Reach	6.345	Q100	183.10	307.88	4.98	2559.42	2559.42		
Main Reach	6.345	FW	186.72	318.39	4.81	2559.47	2559.42	0.06	

APPENDIX E.6

DVD CONTAINING HYDRAULIC DOCUMENTATION

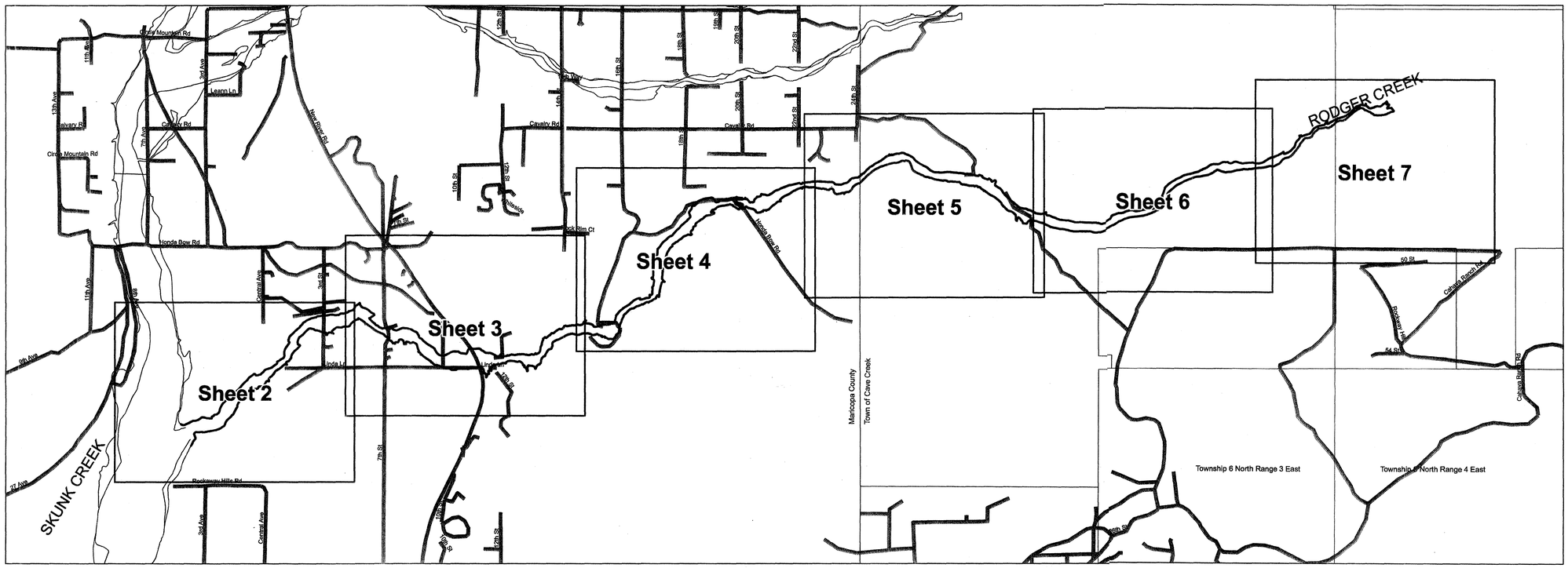
APPENDIX E.7

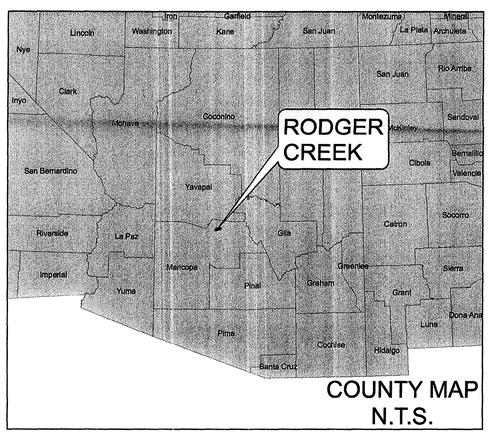
HYDRAULIC WORK MAPS

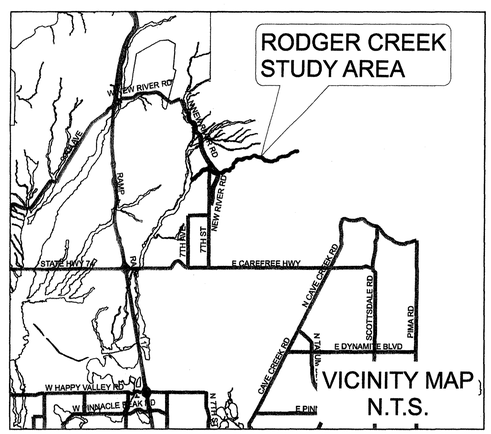
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY IN COOPERATION WITH FEMA'S CTP PROGRAM

FEMA

RODGER CREEK
FLOODPLAIN DELINEATION STUDY
FCD CONTRACT NO. 2010-C003, ASSIGNMENT #2, FEMA Grant #EMF-2009-GR-0909







ELEVATION REFERENCE MARKS

ELEVATION REFERENCE MARKS ARE DESCRIBED PER SHEET

NOTES

1. HORIZONTAL PROJECTION IS ARIZONA STATE PLANE CENTRAL ZONE, NORTH AMERICAN DATUM 1983 (NAD 83 HARN) INTERNATIONAL FEET.

2. ALL ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

3. MAPPING FOR THIS PROJECT IS PROVIDED BY FCDMC AND OBTAINED FOR RODGER CREEK MAPPING, FCD CONTRACT NO. 08-20.

4. THE AERIAL BASE IMAGERY FOR THIS PROJECT IS PROVIDED BY THE FCDMC AND WAS OBTAINED FOR RODGER CREEK MAPPING, FCD CONTRACT NO. 08-20, FLOWN ON APRIL 7, 2010.

5. THE HYDROLOGY REPORT FOR RODGER CREEK FLOODPLAIN DELINEATION STUDY, UPON WHICH THIS HYDRAULIC STUDY WAS BASED, WAS PREPARED BY CARDNO WRG UNDER FCDMC CONTRACT FCD 2010-C003.

STATEMENT OF PROFESSIONAL REGISTRATION

THE FLOODPLAIN AND FLOODWAY DELINEATION WERE PREPARED UNDER MY DIRECT SUPERVISION USING NEW HYDROLOGY AND NEW SURVEY UNDER THIS CONTRACT

6. ELEVATION CONVERSION:
EI(NGVD29) = EL(NAVD88) - 2.03 ft

STATEMENT OF STRUCTURAL SURVEY

I, TEX J. BROOKS, AN ARIZONA REGISTERED LAND SURVEYOR, CERTIFY THAT THE FIELD SURVEYS, DOCUMENTED HEREIN, ALONG WITH ALL FIELD AND OFFICE PROCESS PROCEDURES USED DURING THE COURSE OF THIS SURVEY, WERE PERFORMED UNDER MY DIRECT SUPERVISION, AND THESE SURVEYS ARE RETRACEABLE AND REPEATABLE. FURTHER I CERTIFY THAT THE SURVEY REPORT WAS PREPARED UNDER MY DIRECT SUPERVISION AND THAT THE COORDINATE VALUES AND THEIR ACCURACIES, AS SHOWN IN THE REPORT, ARE CORRECT.

TEX J. BROOKS
AZ RLS #49231

N
W E
S

1,200 600 0 1,200 2,400 Feet

1 inch = 1,200 feet

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ROGER CREEK FLOODPLAIN DELINEATION STUDY
FCD CONTRACT 2010-C003, ASSIGNMENT #2,
FEMA Grant #EMF-2009-GR-0909
April 2012

MICHAEL BAKER JR., INC.
Baker
2929 N. Central Ave.
Suite 800
Phoenix, AZ, 85012
(602) 279-1234

Sheet 1 of 7

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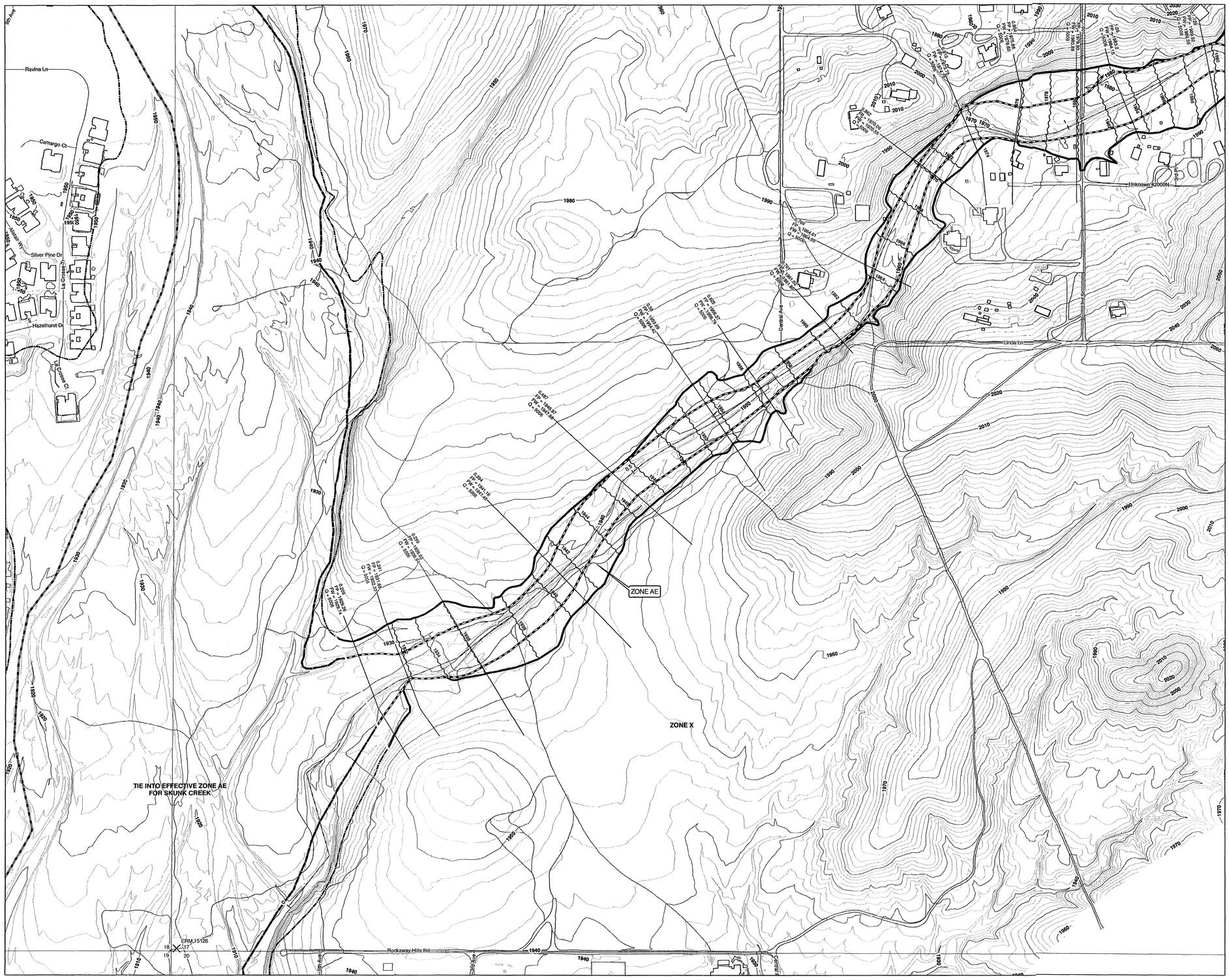

LEGEND

- 100-Year Floodplain
- Floodway
- Hydraulic Base Line with River Mile (0.5)
- Cross-Sections
  - FP=100-Year Floodplain Elevation
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- Skunk Creek Effective 100-Year Floodplain
- Elevation Reference Marks
- Structures
- Roads

NOTES

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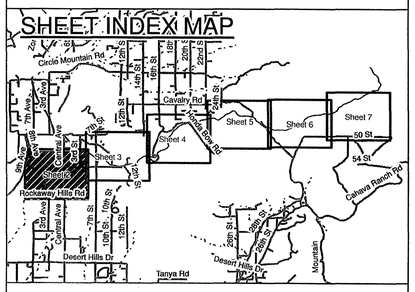
ELEVATION REFERENCE MARKS

ID Number	Elevation(Ft)	DESCRIPTION
15126	1912.43	Aluminum cap, stamped FCD 5126, approximately 25 feet northeast of the northeast corner of Section 19, T6N R3E.

SHEET INDEX MAP



N W E S

0 100 200 400 600 Feet

1 inch = 200 feet

2' CONTOUR INTERVAL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RODGER CREEK FLOODPLAIN DELINEATION STUDY

FCD CONTRACT 2010-C003

45155 CYNTHIA M.S. DeFONTI — Registered Land Surveyor — ARIZONA, U.S.A. — Expires 12/31/2012

MICHAEL BAKER JR., INC.

Baker

2929 N. Central Ave.
Suite 800
Phoenix, AZ, 85012
(602) 279-1234

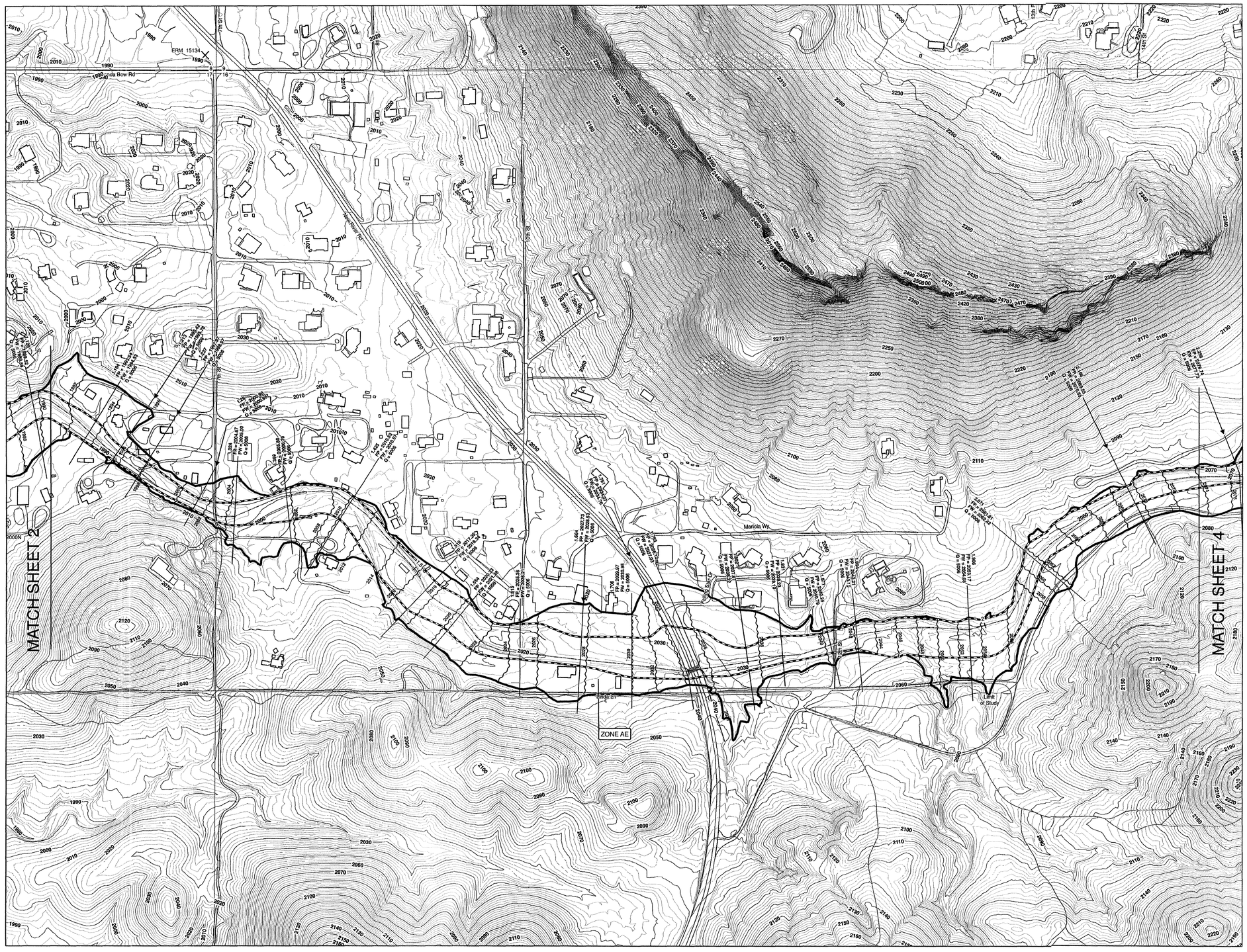
Sheet 2 of 7

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS FOR 1"=200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS

AERIAL MAPPING PROVIDED BY FLOOD CONTROL DISTRICT OF MARICOPA COUNTY FOR RODGER CREEK MAPPING, FCD CONTRACT NO. 08-20, FLIGHT DATE APRIL 7, 2010.

GROUND CONTROL SURVEY DATA PROVIDED BY FLOOD CONTROL DISTRICT OF MARICOPA COUNTY AND PERFORMED FOR FLOOD CONTROL DISTRICT OF MARICOPA COUNTY UNDER SEPARATE CONTRACTS.

W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Work Study Map\Rodger Creek Work Study Maps Sheet 2.mxd



LEGEND

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- Floodway
- Hydraulic Base Line with River Mile (0.5)
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NOTES

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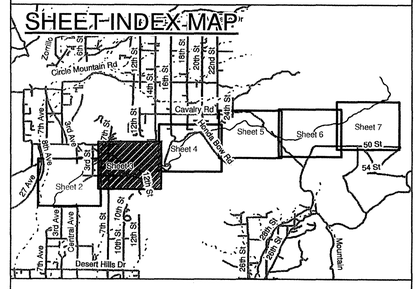
EI(NGVD29) = EL(NAVD88) - 2.03 ft

ELEVATION REFERENCE MARKS

ID Number	Elevation(Ft)	DESCRIPTION
15134	1992.16	Aluminum cap, stamped FCD 5134, approximately 100 feet northwest of the intersection of 7th Street and Honda Bow Road.

SHEET INDEX MAP



N W E S

0 100 200 400 600 Feet

1 inch = 200 feet

2' CONTOUR INTERVAL

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS FOR 1"=200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS

AERIAL MAPPING PROVIDED BY FLOOD CONTROL DISTRICT OF MARICOPA COUNTY FOR RODGER CREEK MAPPING, FCD CONTRACT NO. 08-20, FLIGHT DATE APRIL 7, 2010.

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RODGER CREEK FLOODPLAIN DELINEATION STUDY

FCD CONTRACT 2010-C003

45155 CYNTHIA M.S. DePONTI Date Signed 4/2/12 ARIZONA, U.S.A.

EXPIRES 12/31/2012

MICHAEL BAKER JR., INC.
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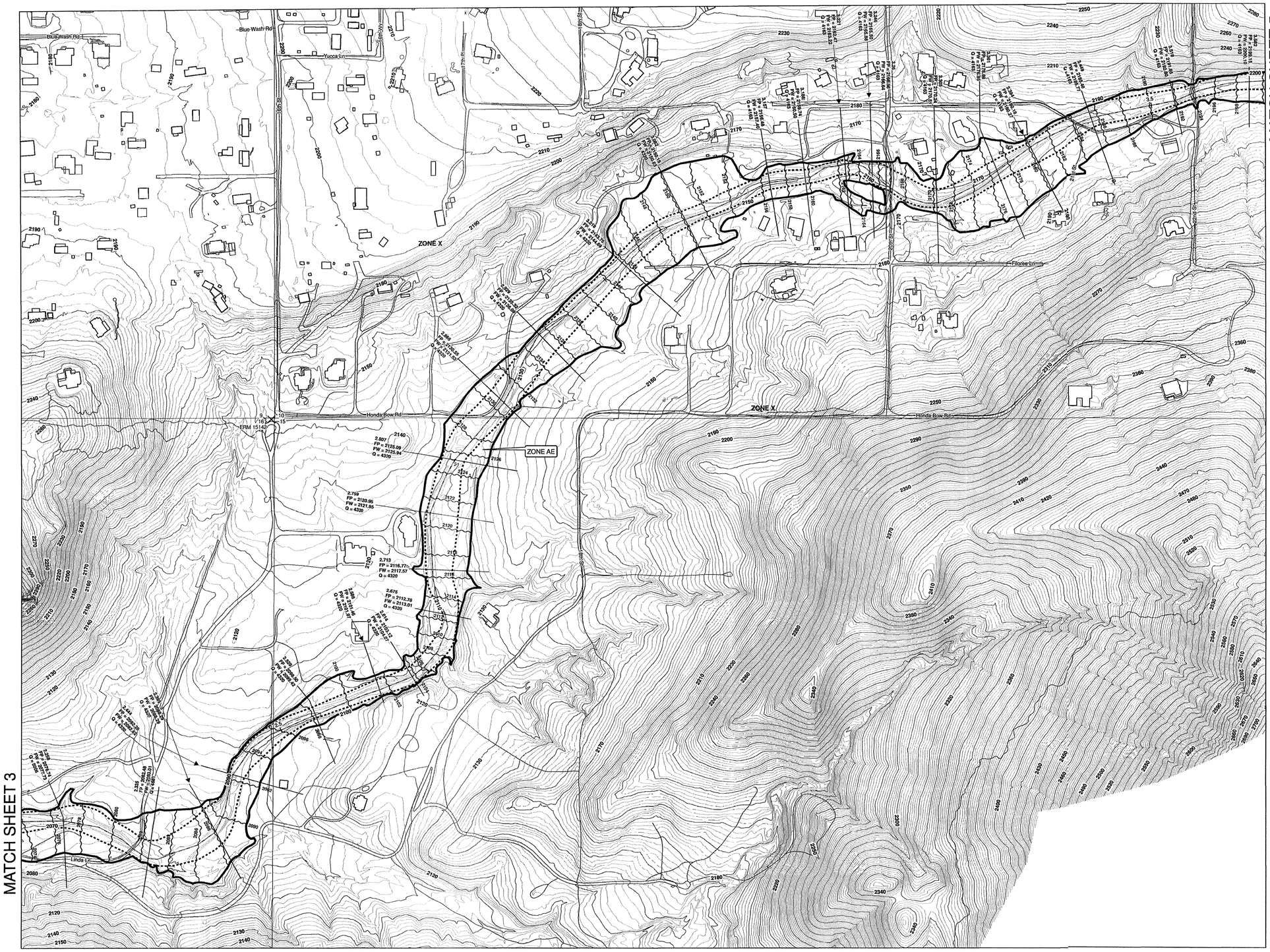
MATCH SHEET 5

MATCH SHEET 3



LEGEND

- 100-Year Floodplain
- Floodway
- 0.5 Hydraulic Base Line with River Mile
- Cross-Sections
  - FP=100-Year Floodplain Elevation
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- Skunk Creek Effective 100-Year Floodplain
- Elevation Reference Marks
- Structures
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NOTES

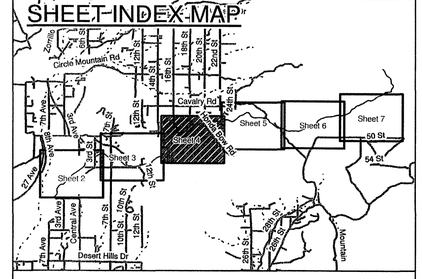
ALL ELEVATIONS ARE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

EI(NGVD29) = EL(NAVD88) - 2.03 ft

ELEVATION REFERENCE MARKS

ID Number	Elevation(Ft)	DESCRIPTION
15142	2142.42	Aluminum cap, stamped FCD 5142 at end of 16th Street, approximately 0.5 miles south of Calvary Road, on the west side of the 16th Street right of way on south side of wire fence.

SHEET INDEX MAP



N W E S

0 100 200 400 600 Feet

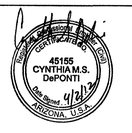
1 inch = 200 feet

2' CONTOUR INTERVAL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RODGER CREEK FLOODPLAIN DELINEATION STUDY

FCD CONTRACT 2010-C003



EXPIRES 12/31/2012

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(602) 279-1234

Sheet 4 of 7

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS FOR 1"=200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS

AERIAL MAPPING PROVIDED BY FLOOD CONTROL DISTRICT OF MARICOPA COUNTY FOR RODGER CREEK MAPPING, FCD CONTRACT NO. 08-20, FLIGHT DATE APRIL 7, 2010.

GROUND CONTROL SURVEY DATA PROVIDED BY FLOOD CONTROL DISTRICT OF MARICOPA COUNTY AND PERFORMED FOR FLOOD CONTROL DISTRICT OF MARICOPA COUNTY UNDER SEPARATE CONTRACTS.

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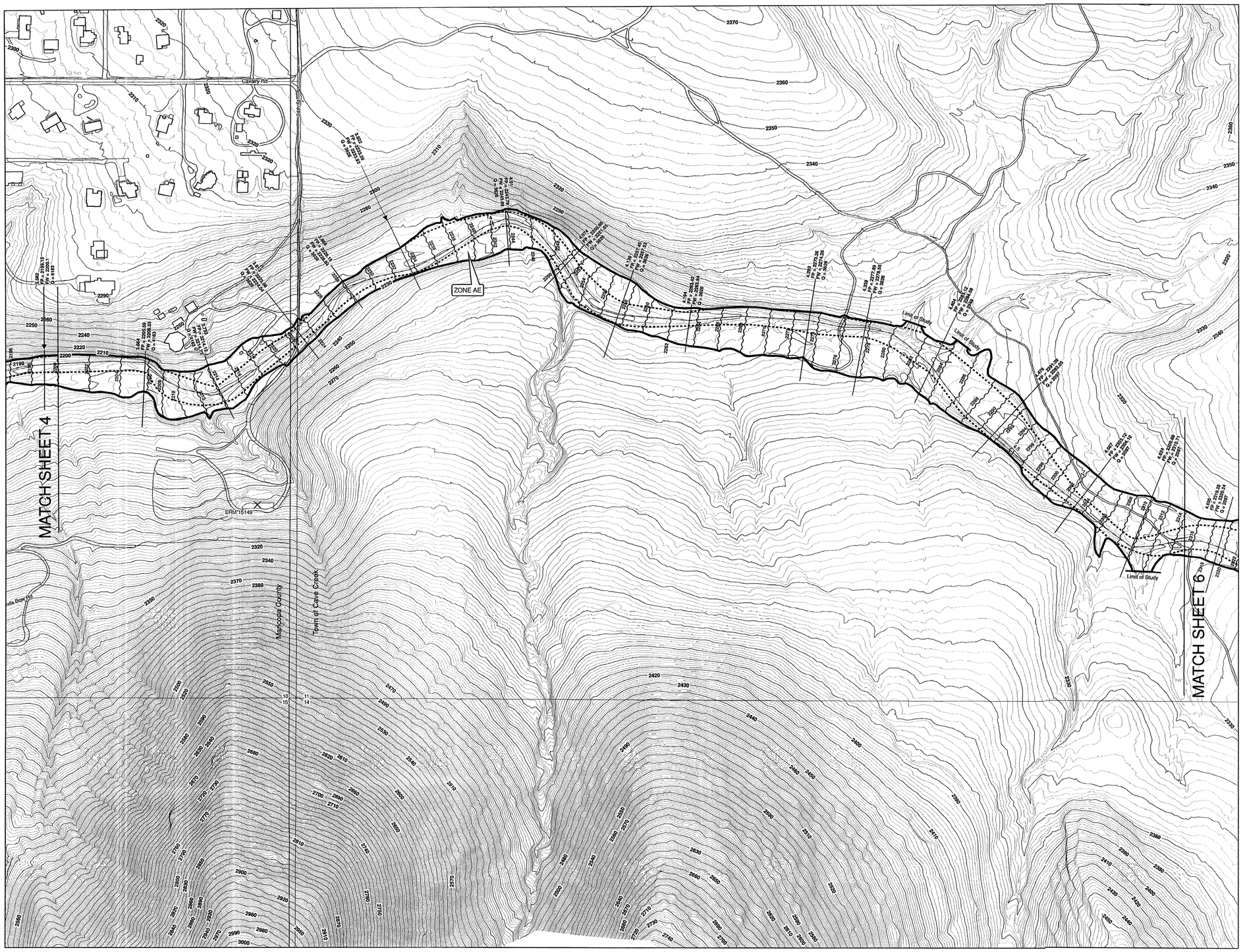

LEGEND

- 100-Year Floodplain
- Floodway
- Hydraulic Base Line with River Mile (0.5)
- Cross-Sections
  - FP=100-Year Floodplain Elevation
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NOTES

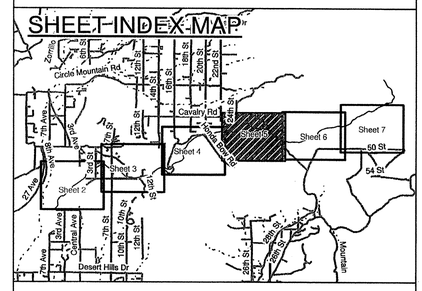
ALL ELEVATIONS ARE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

El(NGVD29) = EL(NAVD88) - 2.03 ft

ELEVATION REFERENCE MARKS

ID Number	Elevation(Ft)	DESCRIPTION
15149	2280.19	Aluminum cap, stamped FCD 5149, in desert area, no intersections nearby.

SHEET INDEX MAP



N W E S

0 100 200 400 600 Feet

1 inch = 200 feet

2' CONTOUR INTERVAL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RODGER CREEK FLOODPLAIN DELINEATION STUDY

FCD CONTRACT 2010-C003

45155 CYNTHIA M.S. DePONTI REGISTERED LAND SURVEYOR ARIZONA, U.S.A. 9/21/12

EXPIRES 12/31/2012

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Baker
2929 N. Central Ave.
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Sheet 5 of 7

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MATCH SHEET 5

MATCH SHEET 7

T6N R3E
Section 12

ZONE X

ZONE AE

ERM 6

ERM 15154

NOTE: **In order to process this study quickly as a LOMR, the District requested that FEMA remove the proposed floodplain/floodway, shown on these work maps, upstream of cross section 5.21 from the District's original revision request. The floodplain/floodway upstream of cross section 5.21 will be processed under a future PMR.**

Please refer to the 1990 Rodger Creek Floodplain Delineation Study by Michael Baker Jr., Inc. for effective floodplain/floodway information upstream of cross section 5.21.

CWR 12/5/12

LEGEND

- 100-Year Floodplain
- Floodway
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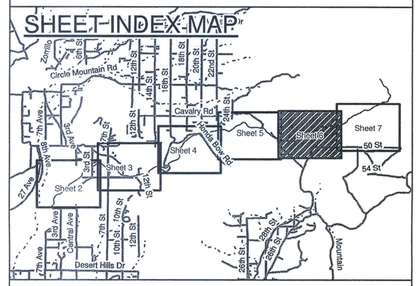
EI(NGVD29) = EL(NAVD88) - 2.03 ft

ELEVATION REFERENCE MARKS

ID Number	Elevation(Ft)	DESCRIPTION
6	2383.14	Aluminum cap, stamped FCD 6, in desert area, no intersections nearby.
15154	2363.78	Aluminum cap, stamped FCD 5154, in desert area, no intersections nearby.

SHEET INDEX MAP



N W E S

0 100 200 400 600 Feet

1 inch = 200 feet

2' CONTOUR INTERVAL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RODGER CREEK FLOODPLAIN DELINEATION STUDY

FCD CONTRACT 2010-C003

45155 CYNTHIA M.S. DePONTI — Date Signed 6/11/12 — ARIZONA, U.S.A.

EXPIRES 12/31/2012

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Baker

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Sheet 6 of 7

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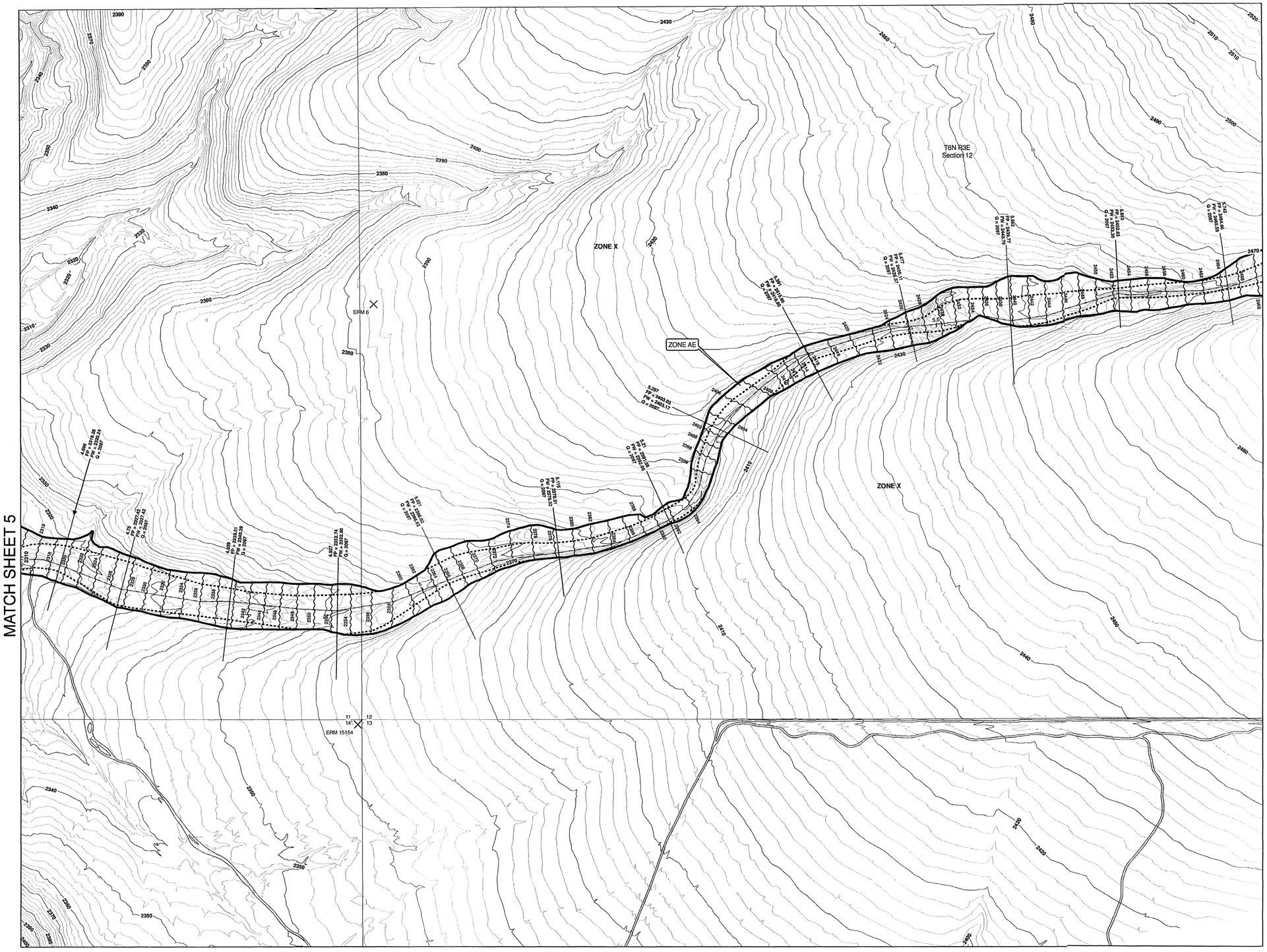

LEGEND

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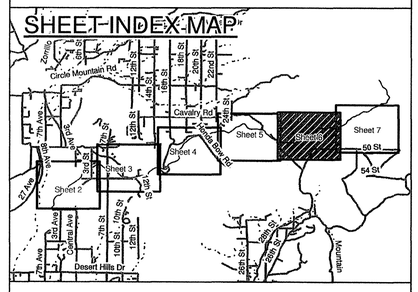
15154	2363.78	Aluminum cap, stamped FCD 5154, in desert area, no intersections nearby.

SHEET INDEX MAP



N W E S

0 100 200 400 600 Feet

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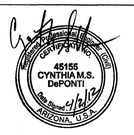
2' CONTOUR INTERVAL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RODGER CREEK FLOODPLAIN DELINEATION STUDY

FCD CONTRACT 2010-C003



EXPIRES 12/31/2012

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Baker

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Sheet 6 of 7

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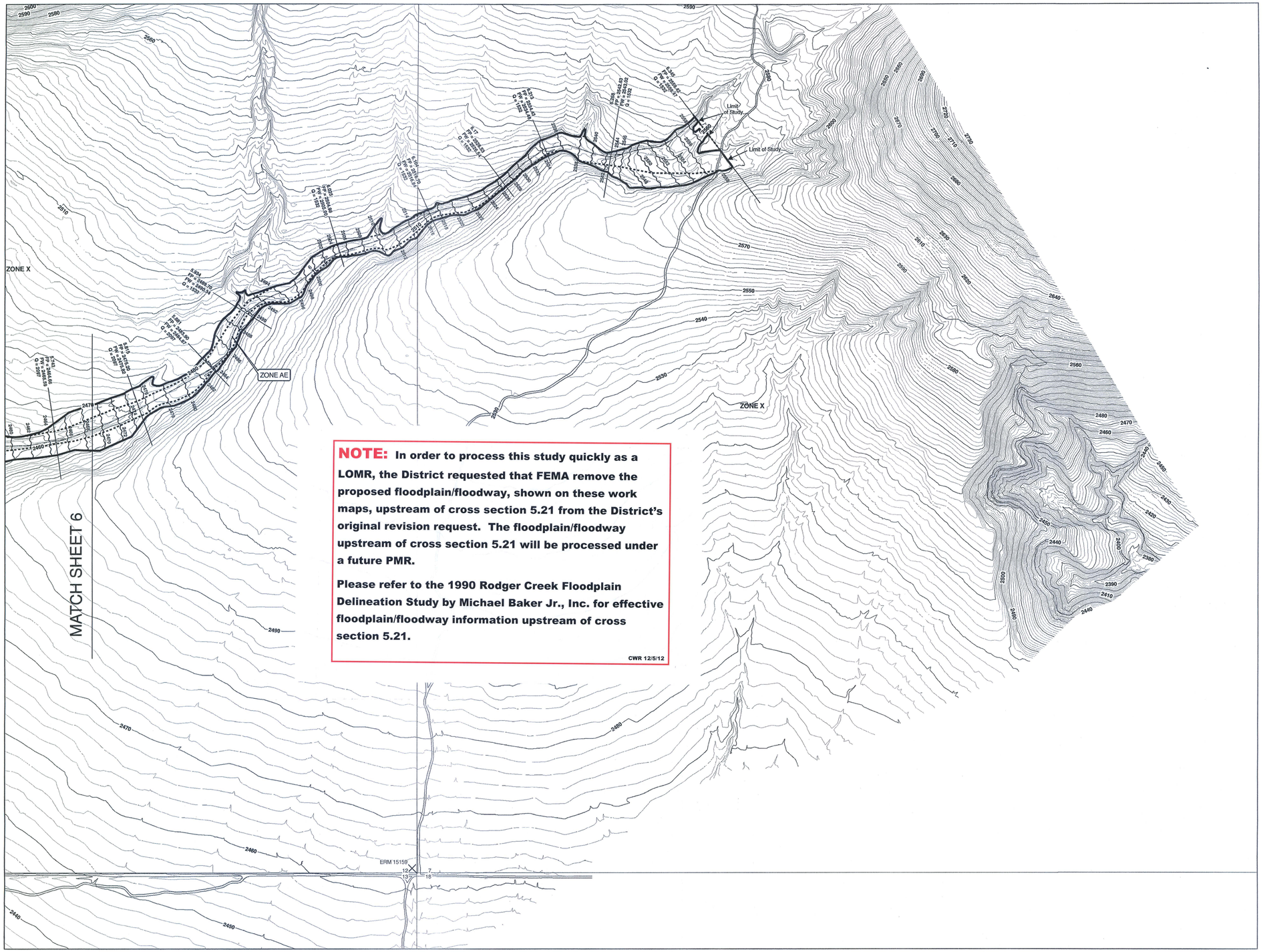

NOTE: **In order to process this study quickly as a LOMR, the District requested that FEMA remove the proposed floodplain/floodway, shown on these work maps, upstream of cross section 5.21 from the District's original revision request. The floodplain/floodway upstream of cross section 5.21 will be processed under a future PMR.**

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CWR 12/5/12

LEGEND

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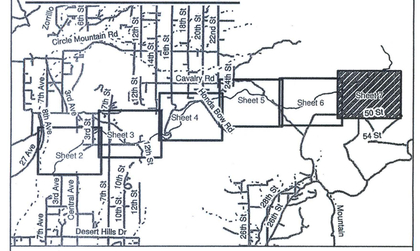
ELEVATION REFERENCE MARKS

ID Number	Elevation(Ft)	DESCRIPTION
15159	2462.62	Aluminum cap, stamped FCD 5159, in desert area, no intersections nearby.

SHEET INDEX MAP



N W E S

0 100 200 400 600 Feet

1 inch = 200 feet

2' CONTOUR INTERVAL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RODGER CREEK FLOODPLAIN DELINEATION STUDY

FCD CONTRACT 2010-C003

EXPIRES 12/31/2012

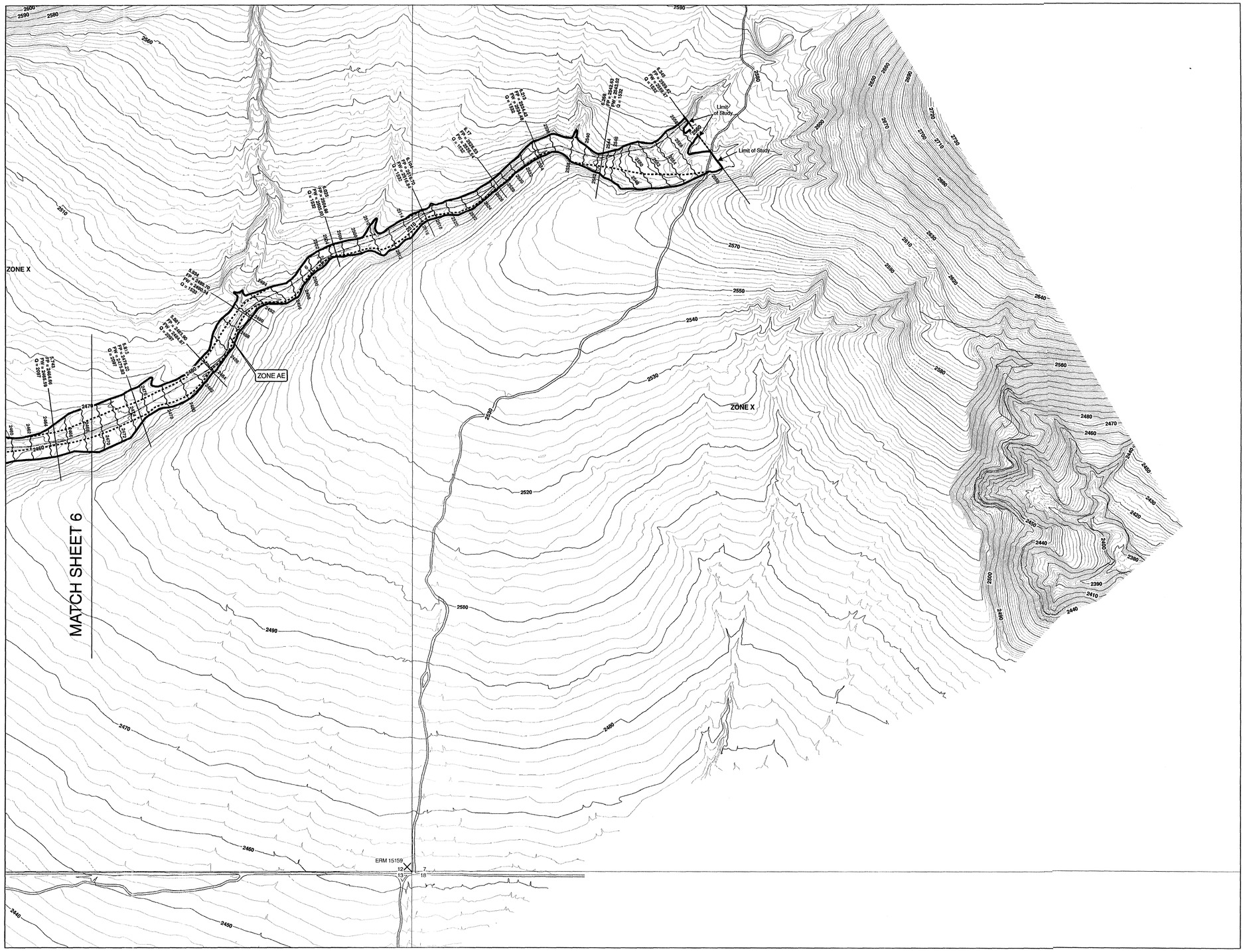
MICHAEL BAKER JR., INC.
Baker
2929 N. Central Ave.
Suite 800
Phoenix, AZ, 85012
(602) 279-1234

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS FOR 1"=200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS

AERIAL MAPPING PROVIDED BY FLOOD CONTROL DISTRICT OF MARICOPA COUNTY FOR RODGER CREEK MAPPING, FCD CONTRACT NO. 08-20, FLIGHT DATE APRIL 7, 2010.

GROUND CONTROL SURVEY DATA PROVIDED BY FLOOD CONTROL DISTRICT OF MARICOPA COUNTY AND PERFORMED FOR FLOOD CONTROL DISTRICT OF MARICOPA COUNTY UNDER SEPARATE CONTRACTS.

W:\Proj\FCDMC\01_PMR_On_Call\11_Rodger_Creek_FDS\Work Study Map\Rodger Creek Work Study Maps Sheet 7.mxd



LEGEND

- 100-Year Floodplain
- Floodway
- Hydraulic Base Line with River Mile (0.5)
- Cross-Sections
  - FP=100-Year Floodplain Elevation
  - FW=Floodway Elevation
  - Q=100-Year Discharge in CFS
- Section Lines
- Base Flood Elevations
- Skunk Creek Effective 100-Year Floodway
- Skunk Creek Effective 100-Year Floodplain
- Elevation Reference Marks
- Structures
- Roads

NOTES

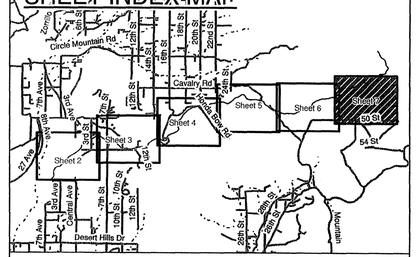
ALL ELEVATIONS ARE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

EI(NGVD29) = EL(NAVD88) - 2.03 ft

ELEVATION REFERENCE MARKS

ID Number	Elevation(Ft)	DESCRIPTION
15159	2462.62	Aluminum cap, stamped FCD 5159, in desert area, no intersections nearby.

SHEET INDEX MAP



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45155 CYNTHIA M.S. DePONTI — 11/2/12 — ARIZONA, U.S.A.

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