I-10 CULVERT WASH FLOODPLAIN ANALYSIS

Loop 303 Corridor/White Tanks
Area Drainage Master Plan Update
Contract FCD 99-40

Prepared for

Flood Control District of Maricopa County

URS

URS Job No. E1-00001526

March 24, 20003

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Registered Professional Engineer (Civil) CERTIFICATE NO. 21874 ROBERT L. DAVIES Date Signed 11-04-02 ARIZONA, U.S.A.

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Registered Professional Engineer (Civil)
CERTIFICATE NO.
21674
ROBERT L.
DAVIES
Date Signed 11-04-02
ARIZONA, U.S.A.

1.0 INTRODUCTION

1.1 PURPOSE OF STUDY

This study is for the delineation of the 100-year floodplain for I-10 Culvert Wash located within Maricopa County, Arizona. The purpose of this work is to apply for and ultimately receive a Letter of Map Revision (LOMR) or a Physical Map Revision from the Federal Emergency Management Agency (FEMA). Updated hydrologic analysis and recent field survey data were used in this study. The analysis and survey took place after the effective Flood Insurance Study (FIS) hydraulic models were developed.

1.2 AUTHORITY FOR STUDY

Under contract number FCD 99-40, URS Corporation was tasked by the Flood Control District of Maricopa County (FCDMC) to perform this floodplain study. The FCDMC floodplain Project Manager is Mr. Michael Duncan, P.E.

1.3 LOCATION

A general location map and a vicinity map are shown in Figures 1.3.1 and 1.3.2. The study covers the I-10 Culvert Wash which has the following location description:

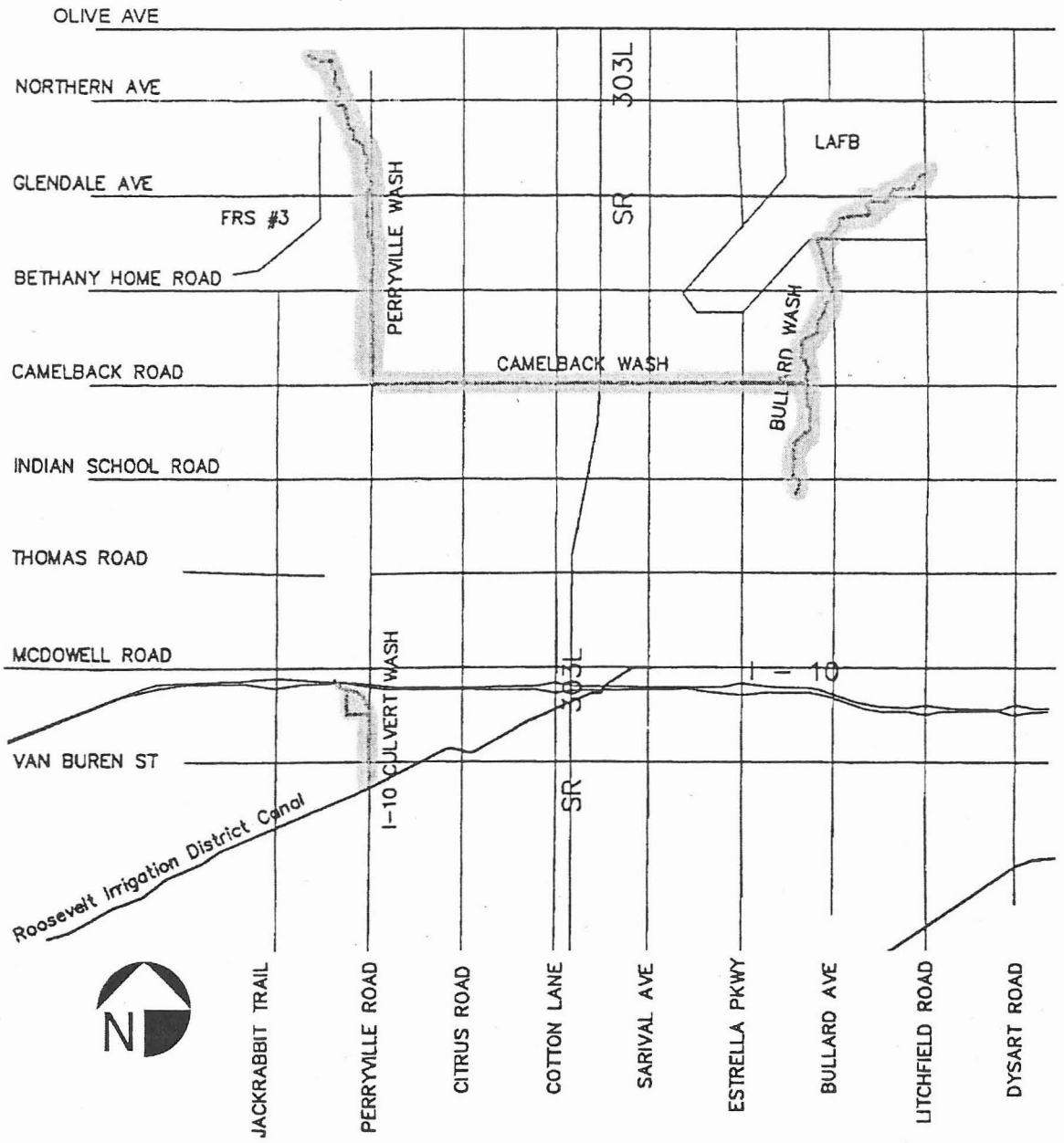
TABLE 1-1
LOCATION OF THE STUDY WASH

Wash	Section	Township	Range	Community(ies)	County
I-10 Culvert	3, 4, 9, 10	T1N	R2W	Maricopa County Unincorporated Areas, Town of Buckeye, City of Goodyear.	Maricopa County

Location Map

URS

Figure 1.3.1



Vicinity Map

URS

Figure 1.3.2

1.4 METHODOLOGY

The hydrologic analysis was originally performed by the WLB Group and has recently been updated by URS as part of the Loop 303 Corridor/White Tanks Area Drainage Master Plan Update (ADMP). The WLB study was submitted in 1992. Flow rates from the updated hydrologic model were used in the hydraulic analysis, which was conducted by step backwater calculations using the United States Army Corps of Engineers (USACE) HEC-RAS River Analysis System, Version 3.0.1.

1.5 ACKNOWLEDGEMENT

The FCDMC played an integral part in the accurate and timely conclusion of this study through maintaining effective and open channels of communication and valuable technical input.

1.6 RESULTS

This study incorporates the revised discharges resulting from the ADMP. In summary, this study resulted in floodplain delineation for the I-10 Culvert Wash (flooding source is the 191st Avenue Wash and the I-10 Wash) based on the updated flow rates. The hydraulic analyses, results and floodplain maps for this wash are included as part of this TDN.

2.0 ADWR/FEMA FORMS

2.1 STUDY DOCUMENTATION ABSTRACT

2.1.1 Date Study Accepted

Not determined as of date of submittal to FCDMC.

2.1.2 Study Contractor

URS Corporation
7720 N. 16th Street, Suite 100
Phoenix, Arizona 85020
Contact: Elliot Silverston, PhD, P.E.
Phone: (602) 371-1100
Fax: (602) 371-1615
Contract No. FCD 99-40

2.1.3 FEMA Mapping and Coordination Contractor

Michael Baker Jr., Inc.
3601 Eisenhower Avenue, Suite 600
Alexandria , Virginia 22304
Phone: (703) 960-8800
Fax: (703) 329-3023

2.1.4 FEMA Regional Reviewer

Not Applicable

2.1.5 State Technical Reviewer

Not Applicable

2.1.6 Local Technical Reviewer

Mr. Michael Duncan, P.E.
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009
Phone: (602) 506-4732
Fax: (602) 506-4601

2.1.7 Reach Description

This study will result in the following:

- I-10 Culvert Wash: new delineation using detailed methods from south of the box-culvert crossing on highway I-10 downstream (south) to the Roosevelt Irrigation District Canal.

The study affects the following FIRM panels for Maricopa County and Incorporated Areas:

- I-10 Culvert Wash: FIRM panel 2055.

2.1.8 USGS Quad Sheets

TABLE 2-1
USGS QUAD SHEETS COVERING THE STUDY AREA

Quadrangle Name	Photorevision Date	Size
Perryville	1982	7.5

2.1.9 Unique Conditions and Problems

A discussion of these problems is included in Section 5.7: Problems Encountered during the Study.

2.1.10 Coordination of Peak Discharges

Coordination related to peak discharges was done with the FCDMC as part of the ADMP Update.

2.2 FEMA FORMS

The latest version of the FEMA Certification forms dated September 2002 have been completed and included in the TDN.

2.3 HYDROLOGY

An update to the original hydrology (White Tanks ADMS) was done by URS under Contract No. FCD 99-40. A copy of the FCDC approved existing conditions hydrologic analysis has been included as part of this LOMR request.

2.3.1 Model or Method Used (see attached supporting hydrologic documentation)

HEC-1 Version 4.1 USACE.

2.3.2 Storm Duration

24-hour storm.

2.3.3 Hydrograph Type

Phoenix Valley S-Graph.

2.3.4 Frequencies Determined

100-year.

2.3.5 List of Gages Used in Frequency Analysis or Calibration

No gages were utilized. Calibration was not performed as part of this study.

2.3.6 Rainfall Amounts and Reference

A value of 4.03 inches was used for the 100-year 24-hour precipitation. This precipitation was taken from data excerpted from the NOAA Atlas II and included in the FCDMC Hydrology manual. The area reduction factor was taken from the depth-area reduction factor Table2.1A in the Drainage Design Manual for Maricopa County Volume I – Hydrology.

2.3.7 Unique Conditions and Problems

The Loop 303 Corridor/White Tanks watershed covers an approximate 220 square mile watershed with widely varying terrain, groundcover and land use. The watershed includes three large flood retarding structures constructed in the 1950s.

2.3.8 Coordination of Q's

The White Tanks HEC-1 model was reviewed by URS and updated using more detailed comprehensive land use, soils mapping, and currently accepted variable Green & Ampt soils parameters. The updated model was then submitted to the FCDMC for technical review and comment. The comments were incorporated. Pre-final coordination of discharges in October 2002. The contact person at the FCDMC is Mr. Bill Haas P.E.

2.4 HYDRAULICS

2.4.1 Model or Method Used

The United States Army Corps of Engineers (USACE) HEC-RAS River Analysis System, Version 3.0.1 was used for this study.

2.4.2 Regime

The flow regime used throughout the study was subcritical.

2.4.3 Frequencies for which Profiles were Computed

Profiles were developed for the 100-year flood only.

2.4.4 Method of Floodway Calculation

The initial floodway calculation was conducted using Method 4 (equal conveyance). Method 1 was then used to smooth the results of Method 4 by adjusting the left and right stationing for encroachment.

2.4.5 Unique Conditions and Problems

A discussion of these problems is included in Section 5.7: Problems Encountered during the Study.

2.5 ADDITIONAL STUDY INFORMATION

Not applicable.

3.0 SURVEY AND MAPPING INFORMATION

3.1 FIELD SURVEY INFORMATION

Field survey to obtain cross section information at each of the four washes was carried out by a URS Corp. survey team. The work started in August 2001 and was concluded by June 2002. The data that was collected and processed included:

1. Horizontal control for survey cross-sections used the adjusted state plane coordinate system. (NAD 1983 coordinate system)

2. Vertical control for survey cross-sections was collected in the NAVD 88 datum). A conversion factor applied to this data to convert it from NAVD 88 to NGVD 29.

3. Culvert structures were surveyed.

A copy of survey data was delivered to FCDMC in November 2002 and included the horizontal and vertical control and survey cross-sections.

3.2 MAPPING

The floodplain analysis was performed based on cross-section data collected as part of this study. Floodplain mapping was delineated using the original White Tanks ADMS base mapping. This study which was completed in 1992 utilized aerial mapping performed for that study. The map scale is 1"=400' with a 2' contour interval. The cross-section alignments collected as part of the URS study are plotted on the 1992 base mapping. The original mapping was established using a NAD 27 horizontal datum and a NGVD 29 vertical datum. The FCDMC translated the NAD horizontal datum to NAD 83 state plane coordinate system and provided it to URS for this project. An average vertical datum shift from NAVD 88 to NGVD 29 is -1.78 feet.

4.0 HYDROLOGY

4.1 METHOD DESCRIPTION

The hydrologic model utilized for this study was the HEC-1 rainfall-runoff model developed by the USACE. Version 4.1 was utilized in this study.

4.2 PARAMETER ESTIMATION

4.2.1 Drainage Area Boundaries

The main drainage area boundaries include the White Tank Mountains on the west side, the Gila River on the south side, the Agua Fria River on the east side, McMicken Dam on the northwest side and US 60 on the northeast side of the watershed boundary. See the attached 11"x17" watershed subbasin map.

4.2.2 Watershed Work Maps

1. Subbasin boundaries and concentration points: See the attached 11"x17" watershed boundary map. The subbasin boundary for the wash of interest can be established by starting at the concentration point on the Subbasin Map of interest, and including all the subbasins upstream which contribute to this concentration point. This is accomplished by including the super basin boundary shown on the Subbasin Map above the starting point of interest. In addition to this any diversions across the super basin boundaries require that super basin also be added to the contributing area for the wash of interest.

2. Time-of-concentration- or lag flow paths: Data, calculations, computer printouts, and summary tables of the time of concentration parameters are included in the hydrologic backup.

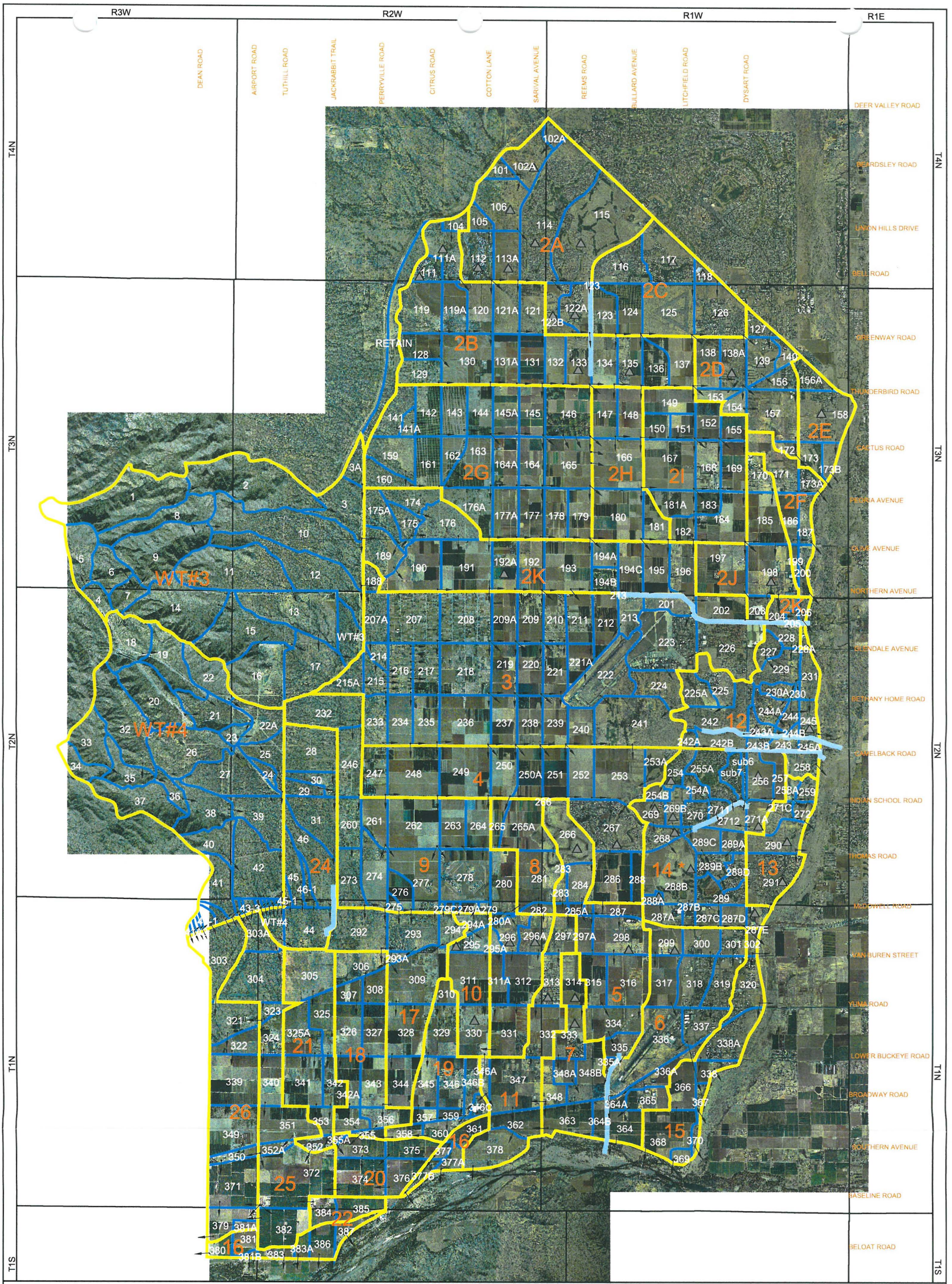
3. Hydrograph routing paths: (see 2)

4. Soils boundaries: The soils boundaries and land use boundaries are variable within the watershed. The FCDMC used GIS coverages of both the soils and land use data to overlay this information on a single map. From this composite GIS layering a weighted average RTIMP parameter was determined per subbasin. This parameter was used in the LG record for each subbasin. The FCDMC provided the RTIMP parameters for use in this ADMP Update. Summary tables are provided in the hydrologic backup.

5. Land-use boundaries: See 4.

4.2.3 Gage Data

None used



Legend

- Super Basin Boundary
- Drainage Area Boundary
- 2C Super Basins
- Flow Path
- Retention
- Sub-basin Identification No.
- *△ Off-line Detention Basin
- Existing Flood Control Facility

N W E S

1 0 1 2

Scale in Miles

Map Produced 06/08/01

SUB BASIN/AERIAL MAP
Loop 303 Corridor/White Tanks Area
Drainage Master Plan Update
Existing Condition

Figure 4.1

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x:\loop303\e1-00001526\gis\aprs\11x17_photo.apr

4.2.4 Statistical Parameters

A statistical discharge frequency analysis was not performed for the ADMP or this FIS. The scope was to update the rainfall runoff model in areas where there had been changes since the original study performed by WLB. Stream gage data is not available for this watershed. The Phoenix Valley S-graph was used to compute the unit hydrographs and is based on a statistical analysis of streamflow in and around Maricopa County (U.S. Army Corps of Engineer, 1974).

4.2.5 Precipitation

The White Tanks watershed is approximately 220 square miles in size. The severe flooding that occurred in the early 1950's, 1970's and 1990's was the impetus for the major flood control structures that are in place today. In the early 1950's severe flooding created standing water which spread throughout the watershed. This flooding led to the construction of three flood retarding structures and a major drain to alleviate the standing water during floods. These structures are the Flood Retarding Structures No. 3 and No. 4, and the McMicken Dam. The major drain is the Dysart Drain along Northern Avenue.

In the early 70's there was also significant flooding which occurred. Due to groundwater overpumping throughout several decades, significant subsidence occurred which diminished the capacity of the Dysart Drain and contributed to the flooding of Luke Air Force base. The drain was improved in 1995, to provide conveyance for stormwater runoff resulting from the 100-year flood.

4.2.6 Physical Parameters

See supporting documentation. The Green Ampt methodology was utilized to determine rainfall losses. See discussion under section 4.2.2 (4 & 5) describing how soils and land use data and the use of a GIS database was used to establish RTIMP values for all subareas. This study is an ADMP Update to the White Tanks Study done in 1992. All physical parameters were not reestablished for the URS study, only those that had changed.

4.3 PROBLEMS ENCOUNTERED DURING THE STUDY

4.3.1 Special Problems and Solutions

No special problems were encountered outside the TDN outline.

4.3.2 Modeling Warning and Error Messages

Occasionally routing warning messages occurred for either a subarea channel routing or a storage routing stating that the "routed outflow is greater than that given in the table provided". Usually, a close examination and correction of the NSTPS parameter for the normal depth routing eliminated this warning. In some cases even with the adjustment of the NSTPS parameter and time interval it is difficult to eliminate the warning message. In other cases elimination of the warning message did not change the routed discharge. The impact and significance of all the messages was examined. The effect on the accuracy of the results varied. For large differences

routing parameters were examined closely and revised. Hydrologic calibration was not performed.

4.4 FINAL RESULTS

4.4.1 Hydrologic Analysis Results

See attached supporting documentation for summary results.

4.4.2 Verification of Results

In the 1992 White Tanks study in the Section entitled Calibration, WLB discusses methods by which results were compared to several and hydraulic analyses to determine whether the results seemed reasonable. In some cases differences were due to modeling techniques, in other cases differences were attributed to a difference in precipitation amounts. In some instances the loss rate used was different. An SCS Curve number loss rate was used in some studies while WLB used the Green Ampt method. Additional verification efforts were not performed as part of the URS study and were not in the scope of work.

5.0 HYDRAULICS

5.1 METHOD DESCRIPTION

This study reach is as follows:

- I-10 Culvert Wash: new delineation using detailed methods from south of the box-culvert crossing on highway I-10 downstream (south) to the Roosevelt Irrigation District Canal.

In general, the above reaches pass through sparsely populated areas of Maricopa County. The channel beds are sandy with gravel and small cobbles. The overbank areas range from undisturbed desert to cotton fields, with some exceptions of larger trees at some locations. Photo logs were organized as part of the Manning's 'n' report and provide a good overview of the physical characteristics of the study area.

The USACE hydraulic model HEC-RAS Version 3.0.1 was used for this study to calculate the Base Flood Elevations (BFEs) using step backwater calculations. The name of the HEC-RAS electronic file for this wash is listed below:

I-10 Culvert Wash: I10CWASHFINAL.prj

The starting water surface elevation was calculated using the known water surface method.

5.2 WORK STUDY MAPS

The following maps are included:

- 8.5" x 11" report figure (Figure 1.3.2) showing a general overview of the study area, floodplain delineation reaches, and key features of the study area.
- 11" x 17" figures of reduced scale work-study maps.
- Full scale work-study maps.

The work maps for this study are full size (24" x 36") sheets. 1"=400' was used at a contour interval of 2 ft. The maps show a hydraulic baseline, which was also identified as the station 10,000 line for all the cross sections.

The floodplain delineation was generated using the computed water surface elevations from HEC-RAS and the available 2-ft contour maps. These floodplains were then traced using AutoCAD to create electronic files. BFEs are shown on all floodplains.

5.3 PARAMETER ESTIMATION

5.3.1 Roughness Coefficients

Manning's 'n' values were estimated based on field reconnaissance and photo logs, and according to the procedure in the reference *"Estimated Manning's Roughness Coefficients for Stream Channels and Floodplains in Maricopa County, Arizona"*, which was developed by the USGS in 1991 for the FCDMC. A Manning's 'n' values determination report including all calculations and assumptions used was developed and submitted to the FCDMC.

For most of the study cross sections the n values were fairly uniform and applied through HEC-RAS to the main channel and the left and right overbank areas. In some areas, horizontal variations were applied to the cross section geometry to reflect unique conditions such as buildings.

5.3.2 Expansion and Contraction Coefficients

Expansion and contraction coefficients used were 0.1 and 0.3 for all the study washes. Typical values of 0.3 and 0.5 were used at culvert crossings for the two cross sections immediately upstream of the culvert and the cross section immediately downstream of the culvert crossing.

5.4 CROSS SECTION DESCRIPTION

Cross sections were chosen to be at approximately 500-ft spacing and immediately upstream and downstream of culvert crossings. The orientation of the cross sections was at a right angle to the expected 100-year flow. Geometry data for the cross sections were obtained through field survey.

5.5 MODELING CONSIDERATIONS

5.5.1 Hydraulic Jump and Drop Analysis

No hydraulic jumps or drops occurred.

5.5.2 Bridges and Culverts

No bridge crossings existed in this study, only culvert crossings. Culvert modeling in HEC-RAS was used to model all the culvert crossings. All culverts were modeled as clean culverts and the geometry of the cross sections at the upstream and downstream faces of the culvert were amended to reflect such conditions. As built dimensions were obtained by field survey. A list of all culverts is included here:

I-10 Culvert Wash:

- At I-10: concrete box culvert consisting of five 10x3 boxes.
- At Roosevelt Road: concrete pipe culvert consisting of two 4-ft diameter pipes.

- At Van Buren Street: CMP culvert consisting of two 4-ft diameter pipes.

5.5.3 Levees and Dikes

No certified levees exist in the study area.

5.5.4 Islands and Flow Splits

I-10 Culvert Wash

A flow split occurred at the I-10 Culvert Wash about 500 feet downstream of the I-10 culvert. Flow splits towards the east away from the main flow path along the West Side of 189th Avenue to Roosevelt Street. The easterly split flow then joins the main flow path at the intersection of Perryville Road and Roosevelt Street. To perform the split flow analysis, the energy method in HEC-RAS junction editor was used to compute the losses over the junction.

5.5.5 Ineffective Flow Areas

Ineffective flow areas were designated upstream and downstream of the I-10 culvert crossing. The other two culvert crossings were inundated and had weir flow upstream and downstream of the crossing and did not require the ineffective flow boundaries. No other areas of ineffective flow were defined.

5.5.6 Supercritical Flow

There were no reaches of supercritical flow in this model. Two isolated cross sections had a Froude number equal to one, sections 16.9 at the outlet of a culvert and 20.

5.6 FLOODWAY MODELING

There was no floodway developed for this wash.

5.7 PROBLEMS ENCOUNTERED DURING THE STUDY

5.7.1 Special Problems and Solutions

A description of some of the special problems encountered during the study are listed below and divided into general problems and wash specific problems:

General Problems:

- In the beginning of the study test sections were surveyed at several locations of the study area to evaluate the accuracy of the available topographic mapping (1989 topographic maps provided by the FCDMC). The results of this comparison showed several areas were the differences warranted surveying of all the cross sections on all the washes. However, whenever field surveyed cross sections needed to be extended, or cross sections needed to be developed to provide additional needed detail, attention was paid to

the correspondence between the survey data and topographic information in the neighboring areas.

- Almost all of the culverts in the study area showed accumulation of sediments at the culvert reducing its capacity. The FCDMC has requested that all culverts be modeled as "clean" and that the cross sections immediately upstream and downstream of the structure reflect such conditions. This entailed adjusting the surveyed ground data for these cross sections in the vicinity of the culverts to match the invert elevations of the culverts.

Wash-specific problems:

I-10 Culvert Wash

A flow split occurred at the I-10 Culvert Wash about 500 feet downstream of the I-10 culvert. Flow splits towards the east away from the main flow path along the West Side of 189th Avenue to Roosevelt Street. The easterly split flow then joins the main flow path at the intersection of Perryville Road and Roosevelt Street.

To perform the split flow analysis, the energy method in HEC-RAS junction editor was used to compute the losses over the junction. HEC-RAS split flow optimization option of the steady flow simulation was used, which produced a 65 percent (619.8 cfs) in the main reach and 35 percent (328.2 cfs) in the easterly reach.

5.7.2 Modeling Warning and Error Messages

The CHECK-RAS program was run and the majority of all warning messages were addressed. The HEC-RAS warning messages were also reviewed. All error messages were reviewed and eliminated. The warning messages were reviewed and eliminated wherever possible.

5.8 CALIBRATION

Calibration was not performed.

5.9 FINAL RESULTS

5.9.1 Hydraulic Analysis Results

Summary tables are provided in the TDN.

5.9.2 Verification of Results

No previous studies have been performed in this area. There is no effective study. Discussion with homeowner at the public meetings confirmed the extent and location of the flooding in several areas including around Van Buren Street and as the wash approaches the RWCD canal.

6.0 EROSION AND SEDIMENT TRANSPORT

Sediment transport was not performed for this study.

7.0 DRAFT FIS REPORT DATA

The Draft FIS Report Data section in the TDN contains a draft Summary of Discharges results table, an annotated FIRM map, and a Flood Profile.

FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

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

PAPERWORK BURDEN DISCLOSURE NOTICE

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

A. REQUESTED RESPONSE FROM FEMA

This request is for a (check one):

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

☒ LOMR: A letter from FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See Parts 60 & 65 of the NFIP Regulations.)

B. OVERVIEW

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

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Ex: 480301 480287	City of Katy Harris County	TX TX	480301 48201C	0005D 0220G	02/08/83 09/28/90
040037	Maricopa County	AZ	04013C	2055F	07/19/01
40045	City of Goodyear	AZ	04013C	1590F	07/19/01

2. Flooding Source: I-10 Culvert Wash

3. Project Name/Identifier: Loop 303 White Tanks ADMP Update Floodpllain Delineations

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

5. Basis for Request and Type of Revision:

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

☐ Physical Change ☒ Improved Methodology/Data

☐ Regulatory Floodway Revision ☐ Other (Attach Description)

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

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

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

☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

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

☐ Dam ☐ Fill ☐ Other, Attach Description

FEDERAL EMERGENCY MANAGEMENT AGENCY

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

☒ LOMR: A letter from FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See Parts 60 & 65 of the NFIP Regulations.)

B. OVERVIEW

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

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Ex: 480301	City of Katy	TX	480301	0005D	02/08/83
480287	Harris County	TX	48201C	0220G	09/28/90
040039	Town of Buckeye	AZ	04013C	2055F	07/19/01

2. Flooding Source: I-10 Culvert Wash

3. Project Name/Identifier: Loop 303 White Tanks ADMP Update Floodpllain Delineations

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

5. Basis for Request and Type of Revision:

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

   ☐ Physical Change ☒ Improved Methodology/Data

   ☐ Regulatory Floodway Revision ☐ Other (Attach Description)

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

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

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

   ☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

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

   ☐ Dam ☐ Fill ☐ Other, Attach Description

C. REVIEW FEE

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

☒ No, Attach Explanation

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

D. SIGNATURE

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

Name: Michael Duncan PE - Senior Engineer	Company: Flood Control District Maricopa County	
Mailing Address: 2801 West Durango Street Phoenix, Arizona 85009-6399	Daytime Telephone No.: 602-506-4732	Fax No.: 602-506-4601
	E-Mail Address: MWD@MAIL.MARICOPA.GOV	
Signature of Requester (required):		Date:

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

Community Official's Name and Title: Mike Elegood P.E. - Chief Engineer & General Manager		Telephone No.: 602-506-1502
Community Name: Maricopa County	Community Official's Signature (required):	Date:

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

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

Certifier's Name: Robert L. Davies Jr. P.E.	License No.: 21674	Expiration Date: 9-30-2005
Company Name: URS Corporation	Telephone No.: 602-648-2464	Fax No.: 602-371-1615
Signature: Robert L Davies Jr		Date: 11-04-02

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

Registered Professional Engineer (Civil) CERTIFICATE NO. 21674 ROBERT L. DAVIES Date Signed 11-04-02 ARIZONA, U.S.A.

Seal (Optional)

Robert L Davies Jr

C. REVIEW FEE

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

☒ No, Attach Explanation

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

D. SIGNATURE

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Name: Michael Duncan PE - Senior Engineer	Company: Flood Control District Maricopa County	
Mailing Address: 2801 West Durango Street Phoenix, Arizona 85009-6399	Daytime Telephone No.: 602-506-4732	Fax No.: 602-506-4601
	E-Mail Address: MWD@MAIL.MARICOPA.GOV	
Signature of Requester (required):		Date:

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

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

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

Certifier's Name: Robert L. Davies Jr. P.E.	License No.: 21674	Expiration Date: 9-30-2005
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☐ Coastal Structures Form (Form 5)	Addition/revision of coastal structure
☐ Alluvial Fan Flooding Form (Form 6)	Flood control measures on alluvial fans

Seal (Optional)

C. REVIEW FEE

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

☒ No, Attach Explanation

ıease see the FEMA Web site at http://www.fema.gov/mit/tsd/frm_fees.htm **for Fee Amounts and Exemptions.**

D. SIGNATURE

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

Name: Michael Duncan PE - Senior Engineer	Company: Flood Control District Maricopa County	
Mailing Address: 2801 West Durango Street Phoenix, Arizona 85009-6399	Daytime Telephone No.: 602-506-4732	Fax No.: 602-506-4601
	E-Mail Address: MWD@MAIL.MARICOPA.GOV	
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Community Official's Name and Title:		Telephone No.:
ommunity Name: Town of Buckeye	Community Official's Signature (required):	Date:

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

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

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☐ Coastal Analysis Form (Form 4)	New or revised coastal elevations
☐ Coastal Structures Form (Form 5)	Addition/revision of coastal structure
☐ Alluvial Fan Flooding Form (Form 6)	Flood control measures on alluvial fans

Seal (Optional)

Explanation for Section C. Review Fee

The review fee is not included in this submittal. The Flood Control District of Maricopa County (FCDMC) submits their request package to FEMA. FEMA then assesses the review fees required, assigns a case number, and the FCDC submits the fee.

This study is a new study.

FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE HYDROLOGY & HYDRAULICS FORM

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

PAPERWORK REDUCTION ACT

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

Flooding Source: I-10 Culvert Wash
Note: Fill out one form for each flooding source studied

A. HYDROLOGY

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

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

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

Location	Drainage Area (Sq. Mi.)	FIS (cfs)	Revised (cfs)
I-10	2.83 calc this study	617	948

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

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

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

4. Review/Approval of Analysis

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

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation 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	D/S limit of detailed study	1	1006.07	1006.07
Upstream Limit	U/S limit of detailed study	18	1057	1057.38

2. Hydraulic Method Used

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

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009-6399
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5897

BOARD OF DIRECTORS
Fulton Brock
Andrew Kunasek
Don Stapley
Mary Rose Garrido Wilcox
Max W. Wilson

July 3, 2002

RE: Loop 303 / White Tanks Floodplain Studies

Dear Sir or Madam:

The hydrologic modeling for the referenced project has been approved by the Flood Control District of Maricopa County.

Project name:	Loop 303 White Tanks Area Drainage Master Plan Update
Consultant name:	URS
Date of model:	March 27, 2002
HEC-1 ver.:	V. 4.1 June 1998

If you have any questions or if we can be of further assistance, please contact me at 506-1501.

Sincerely,

William Haas P.E.
Civil Engineer
Flood Control District of Maricopa County

B. HYDRAULICS (CONTINUED)

3. Pre-Submittal Review of Hydraulic Models

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

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

4. Models Submitted

Duplicate Effective Model*	Natural File Name: no prev. study	Floodway File Name: no prev. study
Corrected Effective Model*	Natural File Name:	Floodway File Name:
Existing or Pre-Project Conditions Model	Natural File Name:	Floodway File Name:
Revised or Post-Project Conditions Model	Natural File Name: i10cwashfinal.prj	Floodway File Name: i10cwashfinal.prj
Other - (attach description)	Natural File Name:	Floodway File Name:

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

The document "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/mit/tsd/en_modl.htm.

C. MAPPING REQUIREMENTS

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

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

D. COMMON REGULATORY REQUIREMENTS

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

For CLOMR requests, if either of the following is true, please submit evidence of compliance with Section 65.12 of the NFIP regulations:
- The proposed project encroaches upon a regulatory floodway and would result in increases above 0.00 foot.
- The proposed project encroaches upon a SFHA with BFEs established and would result in increases above 1.00 foot.

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

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

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

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

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

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

FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

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

PAPERWORK REDUCTION ACT

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

Flooding Source: I-10 Culvert Wash
Note: Fill out one form for each flooding source studied

A. GENERAL

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

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

Description Of Structure

1. **Name of Structure: I-10 Culvert**

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

   Location of Structure: 16.5

   Downstream Limit/Cross Section: 17

   Upstream Limit/Cross Section: 16.9

2. **Name of Structure: Roosevelt Street Culvert**

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

   Location of Structure: 9.5

   Downstream Limit/Cross Section: 9

   Upstream Limit/Cross Section: 9.8

3. **Name of Structure: Van Buren Street Culvert**

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

   Location of Structure: 3.9

   Downstream Limit/Cross Section: 3.5

   Upstream Limit/Cross Section: 3.95

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

B. CHANNELIZATION

Flooding Source:

Name of Structure:

1. Accessory Structures

The channelization includes (check one):

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

2. Drawing Checklist

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

3. Hydraulic Considerations

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

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

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

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

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

4. Sediment Transport Considerations

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

C. BRIDGE/CULVERT

Flooding Source: 191st Avenue Wash

Name of Structure: I-10 Culvert

1. This revision reflects (check one):

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

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

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

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

4. Sediment Transport Considerations

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

B. CHANNELIZATION

Flooding Source:

Name of Structure:

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
- ☐ Superelevated sections
- ☐ Debris basin/detention basin
- ☐ Other (Describe):
- ☐ Drop structures
- ☐ Transitions in cross sectional geometry
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C. BRIDGE/CULVERT

Flooding Source: 191st Avenue Wash

Name of Structure: Roosevelt Street Culvert

1. This revision reflects (check one):

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

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

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- ☒ Cross-Section Locations

4. Sediment Transport Considerations

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

B. CHANNELIZATION

Flooding Source:

Name of Structure:

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
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☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☐ At Transitions
☐ Other locations (specify):

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☐ No If Yes, then fill out Section F (Sediment Transport).
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C. BRIDGE/CULVERT

Flooding Source: 191st Avenue Wash

Name of Structure: Van Buren Street Culvert

1. This revision reflects (check one):

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

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

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

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

4. Sediment Transport Considerations

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

Explanation on Sediment Transport Considerations

Culverts are periodically maintained by either the FCDMC or the appropriate local government maintenance staff. Culverts were modeled in a clean condition.

Explanation on availability of plans for this structure.

As-builts or design plans were not available for the structure. Surveyors picked up the location and dimensions for this structure. This information is included in the survey notes.

MT-2 Form 3 Pages 3 to 10 Section D through F

Explanation on Omission of pages 3 to 10.

Pages 3 to 10 are not applicable to this revision request and are omitted on purpose.

TABLE OF CONTENTS

- HEC-RAS REPORT (input & output)
- SUMMARY TABLES
- PROFILE AND CROSS SECTIONS
- CHECK-RAS
- REACH BOUNDARY CONDITIONS
- HYDROLOGY
- CROSS SECTION LAYOUT
- FLOODPLAIN MAP
- DISK - HEC-RAS MODEL ELECTRONIC COPY

I-10 CULVERT WASH

Study Reach

The study reach for this wash is from the downstream side of the I-10 culvert located approximately 600 feet north west of the intersection of 189th Avenue and Culver Street to the intersection of Perryville Road with Roosevelt Canal.

Split Flow Analysis

A flow split occurred at the I-10 Culvert Wash about 500 feet downstream of the I-10 culvert. Flow splits towards the east away from the main flow path along the west side of 189th Avenue to Roosevelt Street. The easterly split flow then joins the main flow path at the intersection of Perryville Road and Roosevelt Street.

To perform the split flow analysis, the energy method in HEC-RAS junction editor was used to compute the losses over the junction. HEC-RAS split flow optimization option of the steady flow simulation was used, which produced a 65 percent (619.8 cfs) in the main reach and 35 percent (328.2 cfs) in the easterly reach.

Please Note:

URS responses to general HEC-RAS warnings messages are located directly following the HEC-RAS Report.

```
                    HEC-RAS Version 3.0.1  Mar 2001
                      U.S. Army Corp of Engineers
                     Hydrologic Engineering Center
                       609 Second Street, Suite D
                       Davis, California 95616-4687
                            (916) 756-1104

          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: I-10 CULVERT WASH - FINAL
Project File : I10CWASHFINAL.prj
Run Date and Time: 10/19/2002 4:23:39 PM

Project in English units

Project Description:
I-10 Culvert Wash HEC-RAS Model (FCDMC Comments Incorporated)

*******************************************************************************

PLAN DATA

Plan Title: Plan 01
Plan File : P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash\FINAL I-10 CULVERT WASH - WITH FCDMC COMMENTS-afc(this
is final)\I10CWASHFINAL.p01

          Geometry Title: I-10 Culvert Wash geo
          Geometry File : P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash\FINAL I-10 CULVERT WASH - WITH FCDMC
COMMENTS-afc(this is final)\I10CWASHFINAL.g01

          Flow Title    : I-10 Culvert Wash Flow 02
          Flow File     : P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash\FINAL I-10 CULVERT WASH - WITH FCDMC
COMMENTS-afc(this is final)\I10CWASHFINAL.f02

Plan Summary Information:
Number of:  Cross Sections =   28    Mulitple Openings =    0
            Culverts       =    3    Inline Weirs      =    0
            Bridges        =    0

Computational Information
    Water surface calculation tolerance =  0.01
    Critical depth calculaton tolerance =  0.01
    Maximum number of interations       =  40
    Maximum difference tolerance        =  0.3
    Flow tolerance factor               =  0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method:         Average Conveyance
    Computational Flow Regime:     Subcritical Flow

*******************************************************************************

FLOW DATA

Flow Title: I-10 Culvert Wash Flow 02
Flow File : P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash\FINAL I-10 CULVERT WASH - WITH FCDMC COMMENTS-afc(this
is final)\I10CWASHFINAL.f02

Flow Data (cfs)
*********************************************************
* River            Reach            RS      *          PF 1 *
* Beardsley Wash   I - 10  to Split18      *           948 *
* Beardsley Wash   S. Split-189 Ave14.5*   *           474 *
* Beardsley Wash   E Split to Rsvlt22      *           474 *
* Beardsley Wash   Rsvlt St-Rsvlt C9.8     *           948 *
* Beardsley Wash   Rsvlt St-Rsvlt C9       *          1508 *
*********************************************************

Boundary Conditions
*****************************************************************************************************
* River            Reach            Profile          *          Upstream                  Downstream    *
*****************************************************************************************************
* Beardsley Wash   I - 10  to SplitPF 1             *          Normal S = .005                         *
* Beardsley Wash   Rsvlt St-Rsvlt CPF 1             *                                  Known WS = 1006.07 *
*****************************************************************************************************

*******************************************************************************

GEOMETRY DATA

Geometry Title: I-10 Culvert Wash geo
Geometry File : P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash\FINAL I-10 CULVERT WASH - WITH FCDMC
COMMENTS-afc(this is final)\I10CWASHFINAL.g01

Reach Connection Table
*******************************************************************************
* River            Reach            *  Upstream Boundary  * Downstream Boundary *
*******************************************************************************
* Beardsley Wash   I - 10  to Split *                     *   upstream         *
* Beardsley Wash   S. Split-189 Ave *   upstream          *   downstream       *
* Beardsley Wash   E Split to Rsvlt *   upstream          *   downstream       *
* Beardsley Wash   Rsvlt St-Rsvlt C *   downstream        *                    *
*******************************************************************************

CROSS SECTION          RIVER: Beardsley Wash
REACH: I - 10  to Split   RS: 18

INPUT
Description: Cross Section 18

-Developed cross section from a combination of
             suvey data (near culvert) and elevations from topo map.  Used same
             n values as xs17
Station Elevation Data    num=       11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9875    1058    9901  1057.3    9931 1055.75    9956 1055.87    9993 1055.08
    9996 1055.08   10000 1053.92   10006 1055.48   10029  1055.5   10069 1055.59
   10231    1058

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
```

```
    9875    .049    9956    .028   10006    .049

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9956   10006                 85      60      45            .3       .5

CROSS SECTION OUTPUT    Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1057.54  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.16  * Wt. n-Val.              *   0.049  *   0.028  *   0.049  *
* W.S. Elev (ft)          * 1057.38  * Reach Len. (ft)         *   85.00  *   60.00  *   45.00  *
* Crit W.S. (ft)          *          * Flow Area (sq ft)       *   65.16  *  105.11  *  225.01  *
* E.G. Slope (ft/ft)      *0.002474  * Area (sq ft)            *   65.16  *  105.11  *  225.01  *
* Q Total (cfs)           *  948.00  * Flow (cfs)              *  106.10  *  453.06  *  388.84  *
* Top Width (ft)          *  291.55  * Top Width (ft)          *   58.06  *   50.00  *  183.49  *
* Vel Total (ft/s)        *    2.40  * Avg. Vel. (ft/s)        *    1.63  *    4.31  *    1.73  *
* Max Chl Dpth (ft)       *    3.46  * Hydr. Depth (ft)        *    1.12  *    2.10  *    1.23  *
* Conv. Total (cfs)       * 19058.3  * Conv. (cfs)             *  2132.9  *  9108.3  *  7817.1  *
* Length Wtd. (ft)        *   58.32  * Wetted Per. (ft)        *   58.10  *   50.37  *  183.50  *
* Min Ch El (ft)          * 1053.92  * Shear (lb/sq ft)        *    0.17  *    0.32  *    0.19  *
* Alpha                   *    1.81  * Stream Power (lb/ft s)  *    0.28  *    1.39  *    0.33  *
* Frctn Loss (ft)         *    0.09  * Cum Volume (acre-ft)    *    1.62  *    7.54  *    3.40  *
* C & E Loss (ft)         *    0.02  * Cum SA (acres)          *    0.73  *    4.93  *    3.11  *
*****************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
         than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION          RIVER: Beardsley Wash
REACH: I - 10  to Split   RS: 17

INPUT
Description: Cross Section 17
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
    9902    1058 9937.27 1057.09 9938.46 1053.61   10000 1053.6110053.85 1053.61
10160.45  1054.910257.96 1054.9210338.39 1055.35   10425    1058

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
    9902    .049 9937.27    .02810160.45    .049

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9937.2710160.45                240     260     320            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

CROSS SECTION OUTPUT    Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1057.43  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.24  * Wt. n-Val.              *          *   0.028  *          *
* W.S. Elev (ft)          * 1057.20  * Reach Len. (ft)         *  240.00  *  260.00  *  320.00  *
* Crit W.S. (ft)          * 1055.43  * Flow Area (sq ft)       *          *  242.78  *          *
* E.G. Slope (ft/ft)      *0.000986  * Area (sq ft)            *    0.22  *  729.64  *  444.51  *
* Q Total (cfs)           *  948.00  * Flow (cfs)              *          *  948.00  *          *
* Top Width (ft)          *  465.61  * Top Width (ft)          *    4.13  *  223.18  *  238.29  *
* Vel Total (ft/s)        *    3.90  * Avg. Vel. (ft/s)        *          *    3.90  *          *
* Max Chl Dpth (ft)       *    3.59  * Hydr. Depth (ft)        *          *    3.59  *          *
* Conv. Total (cfs)       * 30189.1  * Conv. (cfs)             *          * 30189.1  *          *
* Length Wtd. (ft)        *  260.00  * Wetted Per. (ft)        *          *   67.69  *          *
* Min Ch El (ft)          * 1053.61  * Shear (lb/sq ft)        *          *    0.22  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s)  *          *    0.86  *          *
* Frctn Loss (ft)         *          * Cum Volume (acre-ft)    *    1.56  *    6.96  *    3.05  *
* C & E Loss (ft)         *          * Cum SA (acres)          *    0.67  *    4.74  *    2.90  *
*****************************************************************************************

CULVERT                RIVER: Beardsley Wash
REACH: I - 10  to Split   RS: 16.9

INPUT
Description: Culvert at I-10 consisting of 5 - 10x3 concrete box culverts
Distance from Upstream XS =       25
Deck/Roadway Width        =      200
Weir Coefficient          =        3
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*************************************************
    9200    1060            10460    1060

Upstream Bridge Cross Section Data
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
    9902    1058 9937.27 1057.09 9938.46 1053.61   10000 1053.6110053.85 1053.61
10160.45  1054.910257.96 1054.9210338.39 1055.35   10425    1058

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
    9902    .049 9937.27    .02810160.45    .049

Bank Sta: Left   Right    Coeff Contr.   Expan.
       9937.2710160.45            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*************************************************
    9400  1058.3            11000  1058.3

Downstream Bridge Cross Section Data
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
    9400    1056    9480    1056    9605    1054    9775    1052 9963.08 1051.99
    9985 1051.44 9996.92 1051.4410009.23 1051.34   10025  1051.310043.08 1051.94
   10230    1054   10585    1056   11000    1056

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
    9400     .03    9605     .03   10230     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
          9605   10230            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
```

```
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1          Box       3      10
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                 10     220       .014                .4                 1
Number of Barrels =  5
Upstream   Elevation =  1053.634
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.
  9948.3  9960.8  9974.3  9986.8  9999.3
Downstream Elevation =  1051.898
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.
    9980    9993   10005   10018   10030

CULVERT OUTPUT    Profile #PF 1
Culvert ID : Culvert #1
*********************************************************************
* Culv Q (cfs)            *  948.00  * Culv Ful Lngh (ft)     *          *
* # Barrels               *       5  * Culv Vel US (ft/s)     *    8.48  *
* Q Barrel (cfs)          *  189.60  * Culv Vel DS (ft/s)     *   10.96  *
* E.G. US. (ft)           * 1057.43  * Culv Inv El Up (ft)   * 1053.63  *
* W.S. US. (ft)           * 1057.20  * Culv Inv El Dn (ft)   * 1051.90  *
* E.G. DS (ft)            * 1054.24  * Culv Frctn Ls (ft)     *    1.49  *
* W.S. DS (ft)            * 1053.31  * Culv Ext Lss (ft)      *    1.26  *
* Delta EG (ft)           *    3.20  * Culv Ent Lss (ft)      *    0.45  *
* Delta WS (ft)           *    3.89  * Q Weir (cfs)           *          *
* E.G. IC (ft)            * 1057.36  * Weir Sta Lft (ft)      *          *
* E.G. OC (ft)            * 1057.43  * Weir Sta Rgt (ft)      *          *
* Culvert Control         *  Outlet  * Weir Submerg           *          *
* Culv WS Inlet (ft)      * 1055.87  * Weir Max Depth (ft)    *          *
* Culv WS Outlet (ft)     * 1053.63  * Weir Avg Depth (ft)    *          *
* Culv Nml Depth (ft)     *    1.71  * Wr Flw Area (sq ft)    *          *
* Culv Crt Depth (ft)     *    2.23  * Min El Weir Flow (ft) * 1060.01  *
*********************************************************************

Note:    The flow in the culvert is entirely supercritical.

CROSS SECTION          RIVER: Beardsley Wash
REACH: I - 10  to Split   RS: 16.5

INPUT
Description: Cross Section 16.5

-Developed cross section from a combination
             of suvey data (near culvert) and elevations from topo map.  Used
             same n values as xs16
Station Elevation Data     num=      13
    Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
    9400    1056    9480    1056    9605    1054    9775    1052 9963.08 1051.99
    9985 1051.44 9996.92 1051.4410009.23 1051.34   10025  1051.310043.08 1051.94
   10230    1054   10585    1056   11000    1056

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    9400     .03    9605     .03   10230     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9605   10230             250     400     450              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F

CROSS SECTION OUTPUT    Profile #PF 1
*********************************************************************************************
* E.G. Elev (ft)          * 1054.24  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.93  * Wt. n-Val.              *          *    0.030 *          *
* W.S. Elev (ft)          * 1053.31  * Reach Len. (ft)         *  250.00  *   400.00 *   450.00 *
* Crit W.S. (ft)          * 1053.31  * Flow Area (sq ft)       *          *   122.61 *          *
* E.G. Slope (ft/ft)      *0.010673  * Area (sq ft)            *          *   548.03 *          *
* Q Total (cfs)           *  948.00  * Flow (cfs)              *          *   948.00 *          *
* Top Width (ft)          *  503.67  * Top Width (ft)          *          *   503.67 *          *
* Vel Total (ft/s)        *    7.73  * Avg. Vel. (ft/s)         *          *     7.73 *          *
* Max Chl Dpth (ft)       *    2.01  * Hydr. Depth (ft)         *          *     1.86 *          *
* Conv. Total (cfs)       *  9176.3  * Conv. (cfs)              *          *   9176.3 *          *
* Length Wtd. (ft)        *  365.45  * Wetted Per. (ft)         *          *    66.01 *          *
* Min Ch El (ft)          * 1051.30  * Shear (lb/sq ft)         *          *     1.24 *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s)   *          *     9.57 *          *
* Frctn Loss (ft)         *    3.95  * Cum Volume (acre-ft)     *    1.56  *     3.15 *    1.42  *
* C & E Loss (ft)         *    0.38  * Cum SA (acres)           *    0.66  *     2.57 *    2.02  *
*********************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program selected the water surface that had the least amount of error between computed
         and assumed values.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to
         critical depth, the calculated water surface came back below critical depth.  This indicates
         that there is not a valid subcritical answer.  The program defaulted to critical depth.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.

CROSS SECTION          RIVER: Beardsley Wash
REACH: I - 10  to Split   RS: 16

INPUT
Description: Cross Section 16

-Extended both left and right ends of
             X-section using data from available topo maps to contain flow.
Station Elevation Data     num=      20
    Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
    9622    1052    9722    1050 9822.39 1048.98 9913.01 1048.82 9980.18 1049.06
 9985.08 1049.99 9995.76 1048.06   10000 1047.8610004.43 1049.4310008.15 1049.08
10059.08 1049.9310140.97 1049.4910177.51 1048.8110193.58 1049.5510207.94 1049.06
10218.02 1048.9210232.49 1049.4710382.49  1049.210582.49    105010772.49  1050.7

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    9622     .03 9985.08     .0310059.08     .03
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      9985.0810059.08                 0       0       0              .1       .3

CROSS SECTION OUTPUT    Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 1049.84  * Element                  *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.18  * Wt. n-Val.               *   0.030  *   0.030  *   0.030  *
* W.S. Elev (ft)         * 1049.67  * Reach Len. (ft)          *  500.00  *  500.00  *  500.00  *
* Crit W.S. (ft)         * 1049.64  * Flow Area (sq ft)        *  142.45  *   30.74  *  125.41  *
* E.G. Slope (ft/ft)     *0.010930  * Area (sq ft)             *  142.45  *   30.74  *  125.41  *
* Q Total (cfs)          *  948.00  * Flow (cfs)               *  538.12  *  105.65  *  304.22  *
* Top Width (ft)         *  676.04  * Top Width (ft)           *  228.57  *   56.43  *  391.05  *
* Vel Total (ft/s)       *    3.17  * Avg. Vel. (ft/s)         *    3.78  *    3.44  *    2.43  *
* Max Chl Dpth (ft)      *    1.81  * Hydr. Depth (ft)         *    0.62  *    0.54  *    0.32  *
* Conv. Total (cfs)      *  9067.8  * Conv. (cfs)              *  5147.3  *  1010.6  *  2909.9  *
* Length Wtd. (ft)       *  500.00  * Wetted Per. (ft)         *  228.63  *   56.87  *  391.10  *
* Min Ch El (ft)         * 1047.86  * Shear (lb/sq ft)         *    0.43  *    0.37  *    0.22  *
* Alpha                  *    1.12  * Stream Power (lb/ft s)   *    1.61  *    1.27  *    0.53  *
* Frctn Loss (ft)        *    4.48  * Cum Volume (acre-ft)     *    1.15  *    0.49  *    0.77  *
* C & E Loss (ft)        *    0.04  * Cum SA (acres)           *          *          *          *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: A flow split was encountered.  The program first calculated the momentum of both channels
         below the junction.  An energy balance was performed across the junction from the stream
         with the highest momentum downstream to the section upstream.
Warning: The energy loss was 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: Beardsley Wash
REACH: S. Split-189 Ave   RS: 14.5*

INPUT
Description: Cross Section 14.5 - Interpolated using HEC-RAS
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
    9680 1044.93    9780    1045    9880  1045.3    9980    1044   10000 1041.54
10004.83 1042.1510008.65 1042.5810022.73 1043.8110036.81 1044.1310040.41 1044.61
10041.83 1044.6210047.48 1044.6110050.25 1045.2110053.44 1045.2110176.67 1045.25
10177.52 1045.2510320.45 1045.69

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
    9680    .032    9980     .0310022.73    .038

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         998010022.73                340     275     225              .1       .3

CROSS SECTION OUTPUT    Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 1045.33  * Element                  *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.58  * Wt. n-Val.               *   0.032  *   0.030  *   0.038  *
* W.S. Elev (ft)         * 1044.76  * Reach Len. (ft)          *  340.00  *  275.00  *  225.00  *
* Crit W.S. (ft)         * 1044.76  * Flow Area (sq ft)        *   22.02  *   84.92  *   13.52  *
* E.G. Slope (ft/ft)     *0.006825  * Area (sq ft)             *   22.02  *   84.92  *   13.52  *
* Q Total (cfs)          *  619.84  * Flow (cfs)               *   44.19  *  547.02  *   28.63  *
* Top Width (ft)         *  126.37  * Top Width (ft)           *   58.21  *   42.73  *   25.43  *
* Vel Total (ft/s)       *    5.15  * Avg. Vel. (ft/s)         *    2.01  *    6.44  *    2.12  *
* Max Chl Dpth (ft)      *    3.22  * Hydr. Depth (ft)         *    0.38  *    1.99  *    0.53  *
* Conv. Total (cfs)      *  7503.0  * Conv. (cfs)              *   534.9  *  6621.6  *   346.5  *
* Length Wtd. (ft)       *  295.86  * Wetted Per. (ft)         *   58.21  *   43.00  *   25.48  *
* Min Ch El (ft)         * 1041.54  * Shear (lb/sq ft)         *    0.16  *    0.84  *    0.23  *
* Alpha                  *    1.40  * Stream Power (lb/ft s)   *    0.32  *    5.42  *    0.48  *
* Frctn Loss (ft)        *    2.11  * Cum Volume (acre-ft)     *    3.32  *    3.19  *   11.08  *
* C & E Loss (ft)        *    0.12  * Cum SA (acres)           *    8.90  *    1.46  *   15.79  *
*****************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to
         critical depth, the calculated water surface came back below critical depth.  This indicates
         that there is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION          RIVER: Beardsley Wash
REACH: S. Split-189 Ave   RS: 14

INPUT
Description: Cross Section 14
-Extended left end by adding one data point from
          topo maps
Station Elevation Data    num=      10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
9549.319  1042.59849.319 1041.459986.191 1042.28   10000 1039.5910008.17  1040.7
10021.46 1041.8110035.91 1042.32 10039.6 1043.2410180.32 1042.99   10327 1043.38

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
9549.319    .0329986.191     .0310035.91     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      9986.19110035.91                480     480     480              .1       .3

CROSS SECTION OUTPUT    Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 1042.48  * Element                  *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.17  * Wt. n-Val.               *   0.032  *   0.030  *          *
* W.S. Elev (ft)         * 1042.30  * Reach Len. (ft)          *  480.00  *  480.00  *  480.00  *
* Crit W.S. (ft)         * 1042.25  * Flow Area (sq ft)        *  163.94  *   53.90  *          *
* E.G. Slope (ft/ft)     *0.007490  * Area (sq ft)             *  163.94  *   53.90  *          *
* Q Total (cfs)          *  619.84  * Flow (cfs)               *  375.75  *  244.09  *          *
* Top Width (ft)         *  429.86  * Top Width (ft)           *  380.62  *   49.24  *          *
* Vel Total (ft/s)       *    2.85  * Avg. Vel. (ft/s)         *    2.29  *    4.53  *          *
* Max Chl Dpth (ft)      *    2.71  * Hydr. Depth (ft)         *    0.43  *    1.09  *          *
* Conv. Total (cfs)      *  7162.2  * Conv. (cfs)              *  4341.7  *  2820.4  *          *
* Length Wtd. (ft)       *  480.00  * Wetted Per. (ft)         *  380.62  *   49.63  *          *
* Min Ch El (ft)         * 1039.59  * Shear (lb/sq ft)         *    0.20  *    0.51  *          *
* Alpha                  *    1.39  * Stream Power (lb/ft s)   *    0.46  *    2.30  *          *
* Frctn Loss (ft)        *    2.53  * Cum Volume (acre-ft)     *    2.60  *    2.75  *   11.04  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)           *    7.19  *    1.17  *   15.73  *
*****************************************************************************************

Warning: The energy loss was 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: Beardsley Wash
REACH: S. Split-189 Ave   RS: 13

INPUT
Description: Cross Section 13
-Extended x-section on both sides using topo map.
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
*****************************************************************************
9341.058    10409991.058 1039.15 9994.31 1038.22   10000 1036.5910006.67  1037.4
10018.64 1038.23 10030.6 1038.5710035.93 1038.5410106.08 1039.3410153.72 1039.43
10353.72    1040

Manning's n Values         num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
***********************************************
9341.058    .0329991.058     .03 10030.6    .054

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      9991.058 10030.6                160     190     240            .1       .3

CROSS SECTION OUTPUT    Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1039.95  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.20  * Wt. n-Val.              *   0.032  *   0.030  *   0.054  *
* W.S. Elev (ft)          * 1039.75  * Reach Len. (ft)         *  160.00  *  190.00  *  240.00  *
* Crit W.S. (ft)          * 1039.75  * Flow Area (sq ft)       *  136.63  *   74.40  *   98.02  *
* E.G. Slope (ft/ft)      *0.003905  * Area (sq ft)            *  136.63  *   74.40  *   98.02  *
* Q Total (cfs)           *  619.84  * Flow (cfs)              *  177.23  *  348.41  *   94.20  *
* Top Width (ft)          *  731.30  * Top Width (ft)          *  457.14  *   39.54  *  234.62  *
* Vel Total (ft/s)        *    2.01  * Avg. Vel. (ft/s)        *    1.30  *    4.68  *    0.96  *
* Max Chl Dpth (ft)       *    3.16  * Hydr. Depth (ft)        *    0.30  *    1.88  *    0.42  *
* Conv. Total (cfs)       *  9919.1  * Conv. (cfs)             *  2836.2  *  5575.4  *  1507.4  *
* Length Wtd. (ft)        *  188.59  * Wetted Per. (ft)        *  457.14  *   39.98  *  234.63  *
* Min Ch El (ft)          * 1036.59  * Shear (lb/sq ft)        *    0.07  *    0.45  *    0.10  *
* Alpha                   *    3.22  * Stream Power (lb/ft s) *    0.09  *    2.12  *    0.10  *
* Frctn Loss (ft)         *    0.99  * Cum Volume (acre-ft)   *    0.94  *    2.05  *   10.50  *
* C & E Loss (ft)         *    0.01  * Cum SA (acres)         *    2.57  *    0.68  *   14.44  *
*****************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to
         critical depth, the calculated water surface came back below critical depth.  This indicates
         that there is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION          RIVER: Beardsley Wash
REACH: S. Split-189 Ave   RS: 12

INPUT
Description: Cross Section 12
Station Elevation Data     num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
9479.737    10389929.737 1037.149989.855 1038.43   10000 1035.1410004.73 1036.11
10037.35 1037.4410062.16 1037.8110089.43  1037.610105.22 1037.2710475.22    1038
10555.22  1038.510615.22    103910685.22  1039.510755.22    1040

Manning's n Values         num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
***********************************************
9479.737     .039989.855     .0310037.35    .033

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      9989.85510037.35                250     270     170            .1       .3

CROSS SECTION OUTPUT    Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1037.97  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.18  * Wt. n-Val.              *   0.030  *   0.030  *   0.033  *
* W.S. Elev (ft)          * 1037.79  * Reach Len. (ft)         *  250.00  *  270.00  *  170.00  *
* Crit W.S. (ft)          * 1037.79  * Flow Area (sq ft)       *  119.18  *   54.03  *   79.52  *
* E.G. Slope (ft/ft)      *0.007488  * Area (sq ft)            *  119.18  *   54.03  *   79.52  *
* Q Total (cfs)           *  619.84  * Flow (cfs)              *  240.64  *  257.59  *  121.61  *
* Top Width (ft)          *  739.25  * Top Width (ft)          *  368.55  *   45.51  *  325.19  *
* Vel Total (ft/s)        *    2.45  * Avg. Vel. (ft/s)        *    2.02  *    4.77  *    1.53  *
* Max Chl Dpth (ft)       *    2.65  * Hydr. Depth (ft)        *    0.32  *    1.19  *    0.24  *
* Conv. Total (cfs)       *  7162.9  * Conv. (cfs)             *  2780.9  *  2976.8  *  1405.3  *
* Length Wtd. (ft)        *  214.83  * Wetted Per. (ft)        *  368.56  *   46.05  *  325.20  *
* Min Ch El (ft)          * 1035.14  * Shear (lb/sq ft)        *    0.15  *    0.55  *    0.11  *
* Alpha                   *    1.91  * Stream Power (lb/ft s) *    0.31  *    2.61  *    0.17  *
* Frctn Loss (ft)         *    0.79  * Cum Volume (acre-ft)   *    0.47  *    1.77  *   10.02  *
* C & E Loss (ft)         *    0.04  * Cum SA (acres)         *    1.06  *    0.50  *   12.89  *
*****************************************************************************************

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 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          RIVER: Beardsley Wash
REACH: S. Split-189 Ave   RS: 11

INPUT
Description: Cross Section 11
Station Elevation Data     num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  9760.1    1036 9990.11  1036.8 9994.35 1035.94   10000 1033.2510006.46 1034.01
10014.62 1034.8910021.77 1034.7910038.46 1034.3510040.06 1034.3410048.98 1036.99
10073.75 1034.9410865.75    1036

Manning's n Values         num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
***********************************************
  9760.1    .032 9994.35     .0310014.62    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      9994.3510014.62                250     260     515            .1       .3

CROSS SECTION OUTPUT    Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1035.92  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.05  * Wt. n-Val.              *          *   0.030  *   0.032  *
* W.S. Elev (ft)          * 1035.87  * Reach Len. (ft)         *  250.00  *  260.00  *  515.00  *
* Crit W.S. (ft)          * 1035.61  * Flow Area (sq ft)       *          *   33.28  *  364.16  *
* E.G. Slope (ft/ft)      *0.002196  * Area (sq ft)            *          *   33.28  *  364.16  *
* Q Total (cfs)           *  619.84  * Flow (cfs)              *          *  105.63  *  514.20  *
* Top Width (ft)          *  757.19  * Top Width (ft)          *          *   20.13  *  737.07  *
* Vel Total (ft/s)        *    1.56  * Avg. Vel. (ft/s)        *          *    3.17  *    1.41  *
* Max Chl Dpth (ft)       *    2.62  * Hydr. Depth (ft)        *          *    1.65  *    0.49  *
* Conv. Total (cfs)       * 13226.0  * Conv. (cfs)             *          *  2254.0  * 10972.0  *
* Length Wtd. (ft)        *  463.23  * Wetted Per. (ft)        *          *   20.81  *  737.34  *
* Min Ch El (ft)          * 1033.25  * Shear (lb/sq ft)        *          *    0.22  *    0.07  *
* Alpha                   *    1.39  * Stream Power (lb/ft s) *          *    0.70  *    0.10  *
* Frctn Loss (ft)         *    1.70  * Cum Volume (acre-ft)   *    0.13  *    1.50  *    9.15  *
* C & E Loss (ft)         *    0.01  * Cum SA (acres)         *          *    0.29  *   10.82  *
*****************************************************************************************
```

```
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          RIVER: Beardsley Wash
REACH: S. Split-189 Ave   RS: 10.5*

INPUT
Description:
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9753.86  1034.5 9961.13 1034.88 9987.11 1035.11 9988.78 1034.99 9993.11 1034.24
 9997.82 1032.21   10000 1031.6710004.13 1032.1410009.35  1032.710015.78 1032.65
10025.43  1032.5 10030.8 1032.4310032.24 1032.4210040.27 1033.7410045.78 1033.49
10050.45 1033.5310058.93 1034.3610062.56 1034.1210100.04 1033.3910133.79 1033.52
10167.55 1034.0510201.31 1033.5710493.89 1033.7910775.21  1034.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 9753.86    .032 9993.11     .0310009.35    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9993.1110009.35              250     260     235            .1        .3

CROSS SECTION OUTPUT    Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1034.21  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.18  * Wt. n-Val.              *          *   0.030  *   0.032  *
* W.S. Elev (ft)          * 1034.03  * Reach Len. (ft)         *  250.00  *  260.00  *  235.00  *
* Crit W.S. (ft)          * 1034.03  * Flow Area (sq ft)       *          *   25.52  *  204.57  *
* E.G. Slope (ft/ft)      *0.007307  * Area (sq ft)            *          *   25.52  *  204.57  *
* Q Total (cfs)           *  619.84  * Flow (cfs)              *          *  146.07  *  473.77  *
* Top Width (ft)          *  578.98  * Top Width (ft)          *          *   15.74  *  563.24  *
* Vel Total (ft/s)        *    2.69  * Avg. Vel. (ft/s)        *          *    5.72  *    2.32  *
* Max Chl Dpth (ft)       *    2.36  * Hydr. Depth (ft)        *          *    1.62  *    0.36  *
* Conv. Total (cfs)       *  7251.2  * Conv. (cfs)             *          *  1708.7  *  5542.4  *
* Length Wtd. (ft)        *  242.92  * Wetted Per. (ft)        *          *   16.24  *  563.39  *
* Min Ch El (ft)          * 1031.67  * Shear (lb/sq ft)        *          *    0.72  *    0.17  *
* Alpha                   *    1.63  * Stream Power (lb/ft s) *          *    4.10  *    0.38  *
* Frctn Loss (ft)         *    1.84  * Cum Volume (acre-ft)   *    0.13  *    1.32  *    5.79  *
* C & E Loss (ft)         *    0.00  * Cum SA (acres)         *          *    0.19  *    3.13  *
*****************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to
         critical depth, the calculated water surface came back below critical depth.  This indicates
         that there is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION          RIVER: Beardsley Wash
REACH: S. Split-189 Ave   RS: 10

INPUT
Description: Cross Section 10
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9747.62    1033 9959.22 1033.06 9985.74 1033.43 9991.87 1032.54 9997.43 1030.32
   10000 1030.0810004.08  1030.510018.37  1030.510036.45  1030.5 10040.6    1031
   10050    1032   10077  1032.6   10100    1032   10560    1031   11020    1032
   11110  1032.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 9747.62    .032 9991.87     .03 10040.6    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9991.87 10040.6                 0       0       0            .1        .3

CROSS SECTION OUTPUT    Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1031.82  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.17  * Wt. n-Val.              *          *   0.030  *   0.032  *
* W.S. Elev (ft)          * 1031.64  * Reach Len. (ft)         *  470.00  *  470.00  *  470.00  *
* Crit W.S. (ft)          * 1031.64  * Flow Area (sq ft)       *          *   52.19  *  192.97  *
* E.G. Slope (ft/ft)      *0.007861  * Area (sq ft)            *          *   52.19  *  192.97  *
* Q Total (cfs)           *  619.84  * Flow (cfs)              *          *  246.46  *  373.37  *
* Top Width (ft)          *  645.40  * Top Width (ft)          *          *   46.49  *  598.91  *
* Vel Total (ft/s)        *    2.53  * Avg. Vel. (ft/s)        *          *    4.72  *    1.93  *
* Max Chl Dpth (ft)       *    1.56  * Hydr. Depth (ft)        *          *    1.12  *    0.32  *
* Conv. Total (cfs)       *  6991.1  * Conv. (cfs)             *          *  2779.8  *  4211.3  *
* Length Wtd. (ft)        *  470.00  * Wetted Per. (ft)        *          *   46.80  *  598.95  *
* Min Ch El (ft)          * 1030.08  * Shear (lb/sq ft)        *          *    0.55  *    0.16  *
* Alpha                   *    1.74  * Stream Power (lb/ft s) *          *    2.58  *    0.31  *
* Frctn Loss (ft)         *    0.27  * Cum Volume (acre-ft)   *    0.13  *    1.09  *    4.72  *
* C & E Loss (ft)         *    0.05  * Cum SA (acres)         *          *          *          *
*****************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: 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.
Warning: During the standard step iterations, when the assumed water surface was set equal to
         critical depth, the calculated water surface came back below critical depth.  This indicates
         that there is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION          RIVER: Beardsley Wash
REACH: E Split to Rsvlt   RS: 22

INPUT
Description: Cross Section 22
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  9649.8    1048  9710.6  1045.1  9736.7  1044.9  9980.9  1044.7   10000    1044
 10011.6  1044.6 10028.4  1045.4 10045.8  1045.3 10052.5  1044.9 10070.6  1045.7
 10122.3  1045.6

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
  9649.8    .041  9980.9    .035 10011.6    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9980.9 10011.6              650     620     600            .1        .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
888        F
```

```
CROSS SECTION OUTPUT     Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1045.33  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.16  * Wt. n-Val.              *   0.041  *   0.035  *   0.035  *
* W.S. Elev (ft)          * 1045.17  * Reach Len. (ft)         *  650.00  *  620.00  *  600.00  *
* Crit W.S. (ft)          * 1045.17  * Flow Area (sq ft)       *   94.39  *   25.70  *    3.39  *
* E.G. Slope (ft/ft)      *0.014541  * Area (sq ft)            *   94.39  *   25.70  *    4.81  *
* Q Total (cfs)           *  328.16  * Flow (cfs)              *  203.85  *  116.82  *    7.50  *
* Top Width (ft)          *  324.93  * Top Width (ft)          *  271.73  *   30.70  *   22.50  *
* Vel Total (ft/s)        *    2.66  * Avg. Vel. (ft/s)        *    2.16  *    4.54  *    2.21  *
* Max Chl Dpth (ft)       *    1.17  * Hydr. Depth (ft)        *    0.35  *    0.84  *    0.28  *
* Conv. Total (cfs)       *  2721.4  * Conv. (cfs)             *  1690.5  *   968.7  *    62.2  *
* Length Wtd. (ft)        *  628.13  * Wetted Per. (ft)        *  271.74  *   30.73  *   11.95  *
* Min Ch El (ft)          * 1044.00  * Shear (lb/sq ft)        *    0.32  *    0.76  *    0.26  *
* Alpha                   *    1.47  * Stream Power (lb/ft s)  *    0.68  *    3.45  *    0.57  *
* Frctn Loss (ft)         *    5.06  * Cum Volume (acre-ft)    *    0.75  *    6.02  *    1.09  *
* C & E Loss (ft)         *    0.03  * Cum SA (acres)          *    2.33  *    8.81  *    2.45  *
*****************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: 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.
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.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

CROSS SECTION           RIVER: Beardsley Wash
REACH: E Split to Rsvlt   RS: 21

INPUT
Description: Cross Section 21

-Extended cross section LEP to intersect with
          1042 ft contour from existing topo map.
Station Elevation Data     num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************************
    9540    1042    9900 1039.49   10000 1038.7910146.66 1039.1610283.98 1039.63
10437.47 1041.87

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
    9540    .035    9900    .03310146.66    .033

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          990010146.66              460     450     450            .1        .3

CROSS SECTION OUTPUT     Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1039.66  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.07  * Wt. n-Val.              *   0.035  *   0.033  *   0.033  *
* W.S. Elev (ft)          * 1039.60  * Reach Len. (ft)         *  460.00  *  450.00  *  450.00  *
* Crit W.S. (ft)          * 1039.41  * Flow Area (sq ft)       *    0.79  *  136.36  *   27.61  *
* E.G. Slope (ft/ft)      *0.005113  * Area (sq ft)            *    0.79  *  136.36  *   27.61  *
* Q Total (cfs)           *  328.16  * Flow (cfs)              *    0.33  *  295.70  *   32.13  *
* Top Width (ft)          *  388.69  * Top Width (ft)          *   15.02  *  246.66  *  127.01  *
* Vel Total (ft/s)        *    1.99  * Avg. Vel. (ft/s)        *    0.42  *    2.17  *    1.16  *
* Max Chl Dpth (ft)       *    0.80  * Hydr. Depth (ft)        *    0.05  *    0.55  *    0.22  *
* Conv. Total (cfs)       *  4589.5  * Conv. (cfs)             *     4.7  *  4135.5  *   449.3  *
* Length Wtd. (ft)        *  450.01  * Wetted Per. (ft)        *   15.02  *  246.66  *  127.01  *
* Min Ch El (ft)          * 1038.79  * Shear (lb/sq ft)        *    0.02  *    0.18  *    0.07  *
* Alpha                   *    1.10  * Stream Power (lb/ft s)  *    0.01  *    0.38  *    0.08  *
* Frctn Loss (ft)         *    4.33  * Cum Volume (acre-ft)    *    0.04  *    4.87  *    0.86  *
* C & E Loss (ft)         *    0.01  * Cum SA (acres)          *    0.19  *    6.84  *    1.42  *
*****************************************************************************************

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: Beardsley Wash
REACH: E Split to Rsvlt   RS: 20

INPUT
Description: Cross Section 20
Station Elevation Data     num=      10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************************
 9791.92 1035.87 9824.23 1035.73   10000 1034.7610131.99 1034.8410275.81 1035.11
10283.95 1035.4810313.31 1034.6710427.71 1036.48 10573.6 1036.1110702.99  1036.9

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 9791.92    .033 9824.23    .03310275.81    .033

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9824.2310275.81             600     590     520            .1        .3

CROSS SECTION OUTPUT     Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1035.32  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.14  * Wt. n-Val.              *          *   0.033  *   0.033  *
* W.S. Elev (ft)          * 1035.19  * Reach Len. (ft)         *  600.00  *  590.00  *  520.00  *
* Crit W.S. (ft)          * 1035.19  * Flow Area (sq ft)       *          *   97.37  *   13.25  *
* E.G. Slope (ft/ft)      *0.024446  * Area (sq ft)            *          *   97.37  *   13.25  *
* Q Total (cfs)           *  328.16  * Flow (cfs)              *          *  290.56  *   37.60  *
* Top Width (ft)          *  405.67  * Top Width (ft)          *          *  352.81  *   52.86  *
* Vel Total (ft/s)        *    2.97  * Avg. Vel. (ft/s)        *          *    2.98  *    2.84  *
* Max Chl Dpth (ft)       *    0.51  * Hydr. Depth (ft)        *          *    0.28  *    0.25  *
* Conv. Total (cfs)       *  2098.9  * Conv. (cfs)             *          *  1858.4  *   240.5  *
* Length Wtd. (ft)        *  585.90  * Wetted Per. (ft)        *          *  352.81  *   52.87  *
* Min Ch El (ft)          * 1034.76  * Shear (lb/sq ft)        *          *    0.42  *    0.38  *
* Alpha                   *    1.00  * Stream Power (lb/ft s)  *          *    1.26  *    1.09  *
* Frctn Loss (ft)         *    0.50  * Cum Volume (acre-ft)    *    0.04  *    3.66  *    0.65  *
* C & E Loss (ft)         *    0.04  * Cum SA (acres)          *    0.11  *    3.74  *    0.49  *
*****************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: 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.
Warning: During the standard step iterations, when the assumed water surface was set equal to
         critical depth, the calculated water surface came back below critical depth.  This indicates
         that there is not a valid subcritical answer.  The program defaulted to critical depth.
```

```
CROSS SECTION          RIVER: Beardsley Wash
REACH: E Split to Rsvlt   RS: 19.5

INPUT
Description: Cross Section 19.5

-New Cross Section cut from topo with
          thalwag elevation from from survey information.
Station Elevation Data     num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9825    1032    9940    1030    10000 1026.76   10140    1030   10345    1032

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    9825     .03    9940    .043   10140     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9940   10140                 0       0       0              .1       .3

CROSS SECTION OUTPUT    Profile #PF 1
*******************************************************************************************
* E.G. Elev (ft)          * 1030.29  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.01  * Wt. n-Val.              *   0.030  *   0.043  *   0.030  *
* W.S. Elev (ft)          * 1030.28  * Reach Len. (ft)         *   70.00  *   70.00  *   70.00  *
* Crit W.S. (ft)          *          * Flow Area (sq ft)       *    2.29  *  380.49  *    4.09  *
* E.G. Slope (ft/ft)      *0.000262  * Area (sq ft)            *    2.29  *  380.49  *    4.09  *
* Q Total (cfs)           *  328.16  * Flow (cfs)              *    0.50  *  326.78  *    0.89  *
* Top Width (ft)          *  245.20  * Top Width (ft)          *   16.24  *  200.00  *   28.95  *
* Vel Total (ft/s)        *    0.85  * Avg. Vel. (ft/s)        *    0.22  *    0.86  *    0.22  *
* Max Chl Dpth (ft)       *    3.52  * Hydr. Depth (ft)        *    0.14  *    1.90  *    0.14  *
* Conv. Total (cfs)       * 20264.9  * Conv. (cfs)             *    30.8  * 20179.2  *    54.9  *
* Length Wtd. (ft)        *   70.00  * Wetted Per. (ft)        *   16.24  *  200.12  *   28.95  *
* Min Ch El (ft)          * 1026.76  * Shear (lb/sq ft)        *    0.00  *    0.03  *    0.00  *
* Alpha                   *    1.02  * Stream Power (lb/ft s) *    0.00  *    0.03  *    0.00  *
* Frctn Loss (ft)         *    0.02  * Cum Volume (acre-ft)   *    0.02  *    0.43  *    0.55  *
* C & E Loss (ft)         *    0.00  * Cum SA (acres)         *          *          *          *
*******************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
         than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION          RIVER: Beardsley Wash
REACH: Rsvlt St-Rsvlt C   RS: 9.8

INPUT
Description: Cross Section 9.8 U/S of Culvert at Roosevelt Road.

-Cross
             Section channel lowered to match culvert invert at clean
             conditions.  Extended left end of xs to be perpendicular to flow
             by adding one point from the topo. Extended right end by adding
             one point at elev 1032 using topo.
Station Elevation Data     num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9825    10329835.445 1030.959940.863 1030.069959.717 1030.01 9972.01 1029.88
 9986.26 1029.339993.959  1029.9   10000  1024.610009.15  1024.610027.21 1027.06
10128.06 1028.0510238.16 1028.69 10344.7 1029.3610451.56 1029.8910601.56    1032

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    9825     .039993.959    .04310027.21     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
      9993.95910027.21              140     130     120              .3       .5

CROSS SECTION OUTPUT    Profile #PF 1
*******************************************************************************************
* E.G. Elev (ft)          * 1030.27  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.02  * Wt. n-Val.              *   0.030  *   0.043  *   0.030  *
* W.S. Elev (ft)          * 1030.25  * Reach Len. (ft)         *  140.00  *  130.00  *  120.00  *
* Crit W.S. (ft)          * 1028.45  * Flow Area (sq ft)       *   24.08  *  149.67  *  681.07  *
* E.G. Slope (ft/ft)      *0.000262  * Area (sq ft)            *   24.08  *  149.67  *  681.07  *
* Q Total (cfs)           *  948.00  * Flow (cfs)              *    9.00  *  218.94  *  720.06  *
* Top Width (ft)          *  558.95  * Top Width (ft)          *   75.70  *   33.25  *  450.00  *
* Vel Total (ft/s)        *    1.11  * Avg. Vel. (ft/s)        *    0.37  *    1.46  *    1.06  *
* Max Chl Dpth (ft)       *    5.65  * Hydr. Depth (ft)        *    0.32  *    4.50  *    1.51  *
* Conv. Total (cfs)       * 58543.6  * Conv. (cfs)             *   555.8  * 13520.6  * 44467.2  *
* Length Wtd. (ft)        *  130.00  * Wetted Per. (ft)        *   75.73  *   35.41  *  450.01  *
* Min Ch El (ft)          * 1024.60  * Shear (lb/sq ft)        *    0.01  *    0.07  *    0.02  *
* Alpha                   *    1.09  * Stream Power (lb/ft s) *    0.00  *    0.10  *    0.03  *
* Frctn Loss (ft)         *          * Cum Volume (acre-ft)   *   50.59  *    7.34  *    5.85  *
* C & E Loss (ft)         *          * Cum SA (acres)         *   67.07  *    3.82  *   13.41  *
*******************************************************************************************

CULVERT                RIVER: Beardsley Wash
REACH: Rsvlt St-Rsvlt C   RS: 9.5

INPUT
Description: Concrete Pipe Culvert at Roosevelt Road (2 -  4-ft dia)
Distance from Upstream XS =       10
Deck/Roadway Width        =       35
Weir Coefficient          =        3
Upstream  Deck/Roadway Coordinates
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*******************************************************************************
    9400    1030            9890    1030            10000 1028.95
   10320    1030           10570    1032         10601.56    1032

Upstream Bridge Cross Section Data
Station Elevation Data     num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    9825    10329835.445 1030.959940.863 1030.069959.717 1030.01 9972.01 1029.88
 9986.26 1029.339993.959  1029.9   10000  1024.610009.15  1024.610027.21 1027.06
10128.06 1028.0510238.16 1028.69 10344.7 1029.3610451.56 1029.8910601.56    1032

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    9825     .039993.959    .04310027.21     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
      9993.95910027.21              .3       .5

Downstream  Deck/Roadway Coordinates
    num=       5
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*******************************************************************************
    9400    1030            9890    1030            10000 1028.95
   10320    1030           10570    1032

Downstream Bridge Cross Section Data
Station Elevation Data     num=       6
```

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9534.87  1030.4    9910    1028 9986.87 1023.26   10030    1027   10220  1027.8
   10570    1028

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 9534.87     .04    9910     .04   10030     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          9910   10030            .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular       4
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                 10      50      .014                   .5                1
Number of Barrels =  2
Upstream   Elevation =  1024.6
Centerline Stations
    Sta.    Sta.
   10004   10009
Downstream Elevation =  1023.44
Centerline Stations
    Sta.    Sta.
    9985    9990

CULVERT OUTPUT    Profile #PF 1
Culvert ID : Culvert #1
*********************************************************************
* Culv Q (cfs)          *  225.23  * Culv Ful Lngh (ft)    *   50.00  *
* # Barrels             *       2  * Culv Vel US (ft/s)    *    8.96  *
* Q Barrel (cfs)        *  112.62  * Culv Vel DS (ft/s)    *    8.96  *
* E.G. US. (ft)         * 1030.27  * Culv Inv El Up (ft)   * 1024.60  *
* W.S. US. (ft)         * 1030.25  * Culv Inv El Dn (ft)   * 1023.44  *
* E.G. DS (ft)          * 1028.29  * Culv Frctn Ls (ft)    *    0.56  *
* W.S. DS (ft)          * 1028.05  * Culv Ext Lss (ft)     *    1.00  *
* Delta EG (ft)         *    1.98  * Culv Ent Lss (ft)     *    0.62  *
* Delta WS (ft)         *    2.21  * Q Weir (cfs)          *  722.77  *
* E.G. IC (ft)          * 1030.24  * Weir Sta Lft (ft)     * 9918.98  *
* E.G. OC (ft)          * 1030.27  * Weir Sta Rgt (ft)     *10350.59  *
* Culvert Control       *  Outlet  * Weir Submerg          *    0.00  *
* Culv WS Inlet (ft)    * 1028.60  * Weir Max Depth (ft)   *    1.29  *
* Culv WS Outlet (ft)   * 1027.44  * Weir Avg Depth (ft)   *    0.65  *
* Culv Nml Depth (ft)   *    2.13  * Wr Flw Area (sq ft)   *  280.88  *
* Culv Crt Depth (ft)   *    3.21  * Min El Weir Flow (ft) * 1028.96  *
*********************************************************************

Warning: During the supercritical analysis, the program could not balance the energy equation during
         the forewater calculations inside of the culvert.  The program assumed critical depth at the
         outlet and continued on.
Note:    During the supercritical calculations a hydraulic jump occurred inside of the culvert.
Note:    The culvert inlet is submerged and the culvert flows full over part or all of its length.
         Therefore, the culvert inlet equations are not valid and the supercritical result has been
         discarded.  The outlet answer will be used.

CROSS SECTION          RIVER: Beardsley Wash
REACH: Rsvlt St-Rsvlt C   RS: 9

INPUT
Description: Cross Section 9 D/S of Culvert at Roosevelt Road

-Cross section
             developed using topographic data and Lowered channel elevation to
             match culvert invert to reflect clean conditions just D/S of
             culvert.
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9534.87  1030.4    9910    1028 9986.87 1023.26   10030    1027   10220  1027.8
   10570    1028

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 9534.87     .04    9910     .04   10030     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9910   10030               400     380     265              .3       .5

CROSS SECTION OUTPUT    Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)          * 1028.29  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.25  * Wt. n-Val.              *   0.040  *   0.040  *   0.040  *
* W.S. Elev (ft)          * 1028.05  * Reach Len. (ft)         *  400.00  *  380.00  *  265.00  *
* Crit W.S. (ft)          * 1026.99  * Flow Area (sq ft)       *    0.16  *  311.36  *  173.24  *
* E.G. Slope (ft/ft)      *0.003692  * Area (sq ft)            *    0.16  *  311.36  *  173.24  *
* Q Total (cfs)           * 1508.00  * Flow (cfs)              *    0.03  * 1324.72  *  183.25  *
* Top Width (ft)          *  667.02  * Top Width (ft)          *    7.02  *  120.00  *  540.00  *
* Vel Total (ft/s)        *    3.11  * Avg. Vel. (ft/s)        *    0.18  *    4.25  *    1.06  *
* Max Chl Dpth (ft)       *    4.78  * Hydr. Depth (ft)        *    0.02  *    2.59  *    0.32  *
* Conv. Total (cfs)       * 24818.5  * Conv. (cfs)             *     0.5  * 21802.1  *  3015.9  *
* Length Wtd. (ft)        *  379.59  * Wetted Per. (ft)        *    7.02  *  120.31  *  540.05  *
* Min Ch El (ft)          * 1023.26  * Shear (lb/sq ft)        *    0.01  *    0.60  *    0.07  *
* Alpha                   *    1.66  * Stream Power (lb/ft s)  *    0.00  *    2.54  *    0.08  *
* Frctn Loss (ft)         *    2.13  * Cum Volume (acre-ft)    *   50.55  *    6.65  *    4.68  *
* C & E Loss (ft)         *    0.01  * Cum SA (acres)          *   66.93  *    3.59  *   12.05  *
*************************************************************************************************

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
         than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.

CROSS SECTION          RIVER: Beardsley Wash
REACH: Rsvlt St-Rsvlt C   RS: 8

INPUT
Description: Cross Section 8
xs8 Extended LEP 100 ft to intersect 1026 contour
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9492.68 1026.08 9594.93 1024.82 9699.46 1025.22 9932.84 1025.15 9945.21 1025.08
 9954.24 1025.26  9967.5 1025.14 9982.38 1024.64 9991.82 1024.68   10000 1023.03
```

```
10004.98 1023.2310012.88 1026.28   10135  1025.6   10305    1026   10445  1026.5

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
**********************************************
 9492.68    .036 9991.82    .03710012.88    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9991.8210012.88               500     500     460             .1       .3

CROSS SECTION OUTPUT     Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1026.15  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.23  * Wt. n-Val.              *   0.036  *   0.037  *   0.032  *
* W.S. Elev (ft)          * 1025.92  * Reach Len. (ft)         *  500.00  *  500.00  *  460.00  *
* Crit W.S. (ft)          * 1025.85  * Flow Area (sq ft)       *  367.23  *   40.12  *   30.57  *
* E.G. Slope (ft/ft)      *0.009480  * Area (sq ft)            *  367.23  *   40.12  *   30.57  *
* Q Total (cfs)           * 1508.00  * Flow (cfs)              * 1224.33  *  243.11  *   40.56  *
* Top Width (ft)          *  698.36  * Top Width (ft)          *  486.00  *   20.12  *  192.24  *
* Vel Total (ft/s)        *    3.44  * Avg. Vel. (ft/s)        *    3.33  *    6.06  *    1.33  *
* Max Chl Dpth (ft)       *    2.89  * Hydr. Depth (ft)        *    0.76  *    1.99  *    0.16  *
* Conv. Total (cfs)       * 15487.8  * Conv. (cfs)             * 12574.4  *  2496.8  *   416.6  *
* Length Wtd. (ft)        *  499.09  * Wetted Per. (ft)        *  486.01  *   20.79  *  192.24  *
* Min Ch El (ft)          * 1023.03  * Shear (lb/sq ft)        *    0.45  *    1.14  *    0.09  *
* Alpha                   *    1.26  * Stream Power (lb/ft s) *    1.49  *    6.92  *    0.12  *
* Frctn Loss (ft)         *    3.07  * Cum Volume (acre-ft)    *   48.86  *    5.12  *    4.06  *
* C & E Loss (ft)         *    0.04  * Cum SA (acres)          *   64.67  *    2.98  *    9.82  *
*****************************************************************************************

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           RIVER: Beardsley Wash
REACH: Rsvlt St-Rsvlt C   RS: 7

INPUT
Description: Cross Section 7
Extended 1 point to the left to contain flow.
Station Elevation Data     num=       15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
    9163    1024 9682.93 1021.61 9695.32 1021.79 9919.79 1021.89 9942.96 1021.71
 9952.71 1022.06 9966.91 1022.04 9980.89 1021.67 9991.28  1020.8   10000 1019.47
10008.73 1022.3810107.19 1023.0810192.09 1023.3710299.93 1024.4210405.96 1025.14

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
**********************************************
    9163    .037 9980.89    .04210008.73    .032

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9980.8910008.73               440     500     480             .1       .3

CROSS SECTION OUTPUT     Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1023.05  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.11  * Wt. n-Val.              *   0.037  *   0.042  *   0.032  *
* W.S. Elev (ft)          * 1022.94  * Reach Len. (ft)         *  440.00  *  500.00  *  480.00  *
* Crit W.S. (ft)          *          * Flow Area (sq ft)       *  517.34  *   59.68  *   21.81  *
* E.G. Slope (ft/ft)      *0.004300  * Area (sq ft)            *  517.34  *   59.68  *   21.81  *
* Q Total (cfs)           * 1508.00  * Flow (cfs)              * 1252.83  *  226.87  *   28.31  *
* Top Width (ft)          *  692.77  * Top Width (ft)          *  586.60  *   27.84  *   78.32  *
* Vel Total (ft/s)        *    2.52  * Avg. Vel. (ft/s)        *    2.42  *    3.80  *    1.30  *
* Max Chl Dpth (ft)       *    3.47  * Hydr. Depth (ft)        *    0.88  *    2.14  *    0.28  *
* Conv. Total (cfs)       * 22997.8  * Conv. (cfs)             * 19106.3  *  3459.8  *   431.7  *
* Length Wtd. (ft)        *  454.26  * Wetted Per. (ft)        *  586.62  *   28.45  *   78.32  *
* Min Ch El (ft)          * 1019.47  * Shear (lb/sq ft)        *    0.24  *    0.56  *    0.07  *
* Alpha                   *    1.12  * Stream Power (lb/ft s) *    0.57  *    2.14  *    0.10  *
* Frctn Loss (ft)         *    2.52  * Cum Volume (acre-ft)    *   43.79  *    4.54  *    3.78  *
* C & E Loss (ft)         *    0.01  * Cum SA (acres)          *   58.51  *    2.71  *    8.39  *
*****************************************************************************************

Warning: The energy loss was 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: Beardsley Wash
REACH: Rsvlt St-Rsvlt C   RS: 6

INPUT
Description: Cross Section 6
Deleted LEP.  Skewed cross section to be
          perpendicular to flow and added new LEP from topo
Station Elevation Data     num=       13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
 9391.22 1020.41 9942.88 1019.18 9944.12 1018.55 9954.89 1019.12  9968.9 1018.99
 9982.77 1018.76 9994.28 1017.88   10000 1016.8110004.85 1018.9210088.95 1019.86
10186.66 1020.1210275.58 1020.8610419.88 1021.78

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
**********************************************
 9391.22    .037 9982.77    .04210004.85    .037

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9982.7710004.85               430     480     510             .1       .3

CROSS SECTION OUTPUT     Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1020.52  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.16  * Wt. n-Val.              *   0.037  *   0.042  *   0.037  *
* W.S. Elev (ft)          * 1020.35  * Reach Len. (ft)         *  430.00  *  480.00  *  510.00  *
* Crit W.S. (ft)          * 1020.20  * Flow Area (sq ft)       *  364.84  *   52.65  *  119.50  *
* E.G. Slope (ft/ft)      *0.007422  * Area (sq ft)            *  364.84  *   52.65  *  119.50  *
* Q Total (cfs)           * 1508.00  * Flow (cfs)              *  942.25  *  281.56  *  284.19  *
* Top Width (ft)          *  797.28  * Top Width (ft)          *  565.52  *   22.08  *  209.68  *
* Vel Total (ft/s)        *    2.81  * Avg. Vel. (ft/s)        *    2.58  *    5.35  *    2.38  *
* Max Chl Dpth (ft)       *    3.54  * Hydr. Depth (ft)        *    0.65  *    2.38  *    0.57  *
* Conv. Total (cfs)       * 17504.2  * Conv. (cfs)             * 10937.2  *  3268.3  *  3298.7  *
* Length Wtd. (ft)        *  443.84  * Wetted Per. (ft)        *  565.69  *   22.65  *  209.69  *
* Min Ch El (ft)          * 1016.81  * Shear (lb/sq ft)        *    0.30  *    1.08  *    0.26  *
* Alpha                   *    1.34  * Stream Power (lb/ft s) *    0.77  *    5.76  *    0.63  *
* Frctn Loss (ft)         *    3.57  * Cum Volume (acre-ft)    *   39.33  *    3.90  *    3.00  *
* C & E Loss (ft)         *    0.01  * Cum SA (acres)          *   52.70  *    2.42  *    6.80  *
*****************************************************************************************

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: Beardsley Wash
REACH: Rsvlt St-Rsvlt C   RS: 5

INPUT
Description: Cross Section 5
Deleted LEP.  Skewed LOB to be perpendicular to
            flow.  Added 2 points from topo
```

```
Station Elevation Data     num=       15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
    8729    1018    9629    1016 9928.76 1015.48 9941.36 1016.85 9945.94 1015.74
 9954.98 1016.45 9969.01 1016.41 9982.77 1016.13 9994.84 1015.64   10000 1014.49
10007.28 1016.9710098.27  1017.610179.69 1017.7110281.68 1018.4610409.94  1018.8

Manning's n Values         num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************
    8729    .037 9982.77    .04210007.28    .032

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.    Expan.
       9982.7710007.28               255     275     280              .1        .3

CROSS SECTION OUTPUT     Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1016.93  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.14  * Wt. n-Val.              *   0.037  *   0.042  *         *
* W.S. Elev (ft)          * 1016.79  * Reach Len. (ft)         *  255.00  *  275.00  *  280.00 *
* Crit W.S. (ft)          * 1016.54  * Flow Area (sq ft)       *  482.73  *   27.55  *         *
* E.G. Slope (ft/ft)      *0.008762  * Area (sq ft)            *  482.73  *   27.55  *         *
* Q Total (cfs)           * 1508.00  * Flow (cfs)              * 1409.31  *   98.69  *         *
* Top Width (ft)          *  731.73  * Top Width (ft)          *  707.75  *   23.98  *         *
* Vel Total (ft/s)        *    2.96  * Avg. Vel. (ft/s)        *    2.92  *    3.58  *         *
* Max Chl Dpth (ft)       *    2.30  * Hydr. Depth (ft)        *    0.68  *    1.15  *         *
* Conv. Total (cfs)       * 16110.1  * Conv. (cfs)             * 15055.8  *  1054.3  *         *
* Length Wtd. (ft)        *  256.09  * Wetted Per. (ft)        *  707.98  *   24.49  *         *
* Min Ch El (ft)          * 1014.49  * Shear (lb/sq ft)        *    0.37  *    0.62  *         *
* Alpha                   *    1.01  * Stream Power (lb/ft s) *    1.09  *    2.20  *         *
* Frctn Loss (ft)         *    1.38  * Cum Volume (acre-ft)    *   35.15  *    3.46  *    2.30 *
* C & E Loss (ft)         *    0.03  * Cum SA (acres)          *   46.41  *    2.17  *    5.57 *
*****************************************************************************************

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          RIVER: Beardsley Wash
REACH: Rsvlt St-Rsvlt C   RS: 4.5*

INPUT
Description: Cross Section 4.5* - Interpolated using HEC-RAS
Station Elevation Data     num=       26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
  8750.5    1016 9630.15 1014.01  9641.1 1013.99 9923.14 1014.98 9935.45 1015.72
 9939.93 1015.18 9948.49 1015.56 9948.76 1015.52 9950.45 1015.17 9961.37 1015.13
 9962.48 1015.12 9975.92 1014.96  9986.1  1014.7 9992.79  1014.6 9995.57 1014.37
 9997.91 1013.73   10000 1013.5310002.34 1014.2310022.84 1015.4210117.22 1015.82
10130.03 1015.8410201.67 1016.1910242.85 1016.5210294.89 1016.9810307.46 1017.05
 10440.5 1017.53

Manning's n Values         num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************
  8750.5    .042 9975.92    .04710022.84    .035

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.    Expan.
       9975.9210022.84               255     275     280              .1        .3

CROSS SECTION OUTPUT     Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1015.52  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.05  * Wt. n-Val.              *   0.042  *   0.047  *   0.035 *
* W.S. Elev (ft)          * 1015.47  * Reach Len. (ft)         *  255.00  *  275.00  *  280.00 *
* Crit W.S. (ft)          * 1014.97  * Flow Area (sq ft)       *  779.90  *   38.93  *    0.32 *
* E.G. Slope (ft/ft)      *0.003657  * Area (sq ft)            *  779.90  *   38.93  *    0.32 *
* Q Total (cfs)           * 1508.00  * Flow (cfs)              * 1442.43  *   65.50  *    0.07 *
* Top Width (ft)          * 1042.36  * Top Width (ft)          *  983.23  *   46.92  *   12.21 *
* Vel Total (ft/s)        *    1.84  * Avg. Vel. (ft/s)        *    1.85  *    1.68  *    0.22 *
* Max Chl Dpth (ft)       *    1.94  * Hydr. Depth (ft)        *    0.79  *    0.83  *    0.03 *
* Conv. Total (cfs)       * 24935.5  * Conv. (cfs)             * 23851.2  *  1083.1  *     1.2 *
* Length Wtd. (ft)        *  255.47  * Wetted Per. (ft)        *  983.30  *   47.17  *   12.21 *
* Min Ch El (ft)          * 1013.53  * Shear (lb/sq ft)        *    0.18  *    0.19  *    0.01 *
* Alpha                   *    1.00  * Stream Power (lb/ft s) *    0.33  *    0.32  *    0.00 *
* Frctn Loss (ft)         *    2.22  * Cum Volume (acre-ft)    *   31.45  *    3.25  *    2.30 *
* C & E Loss (ft)         *    0.02  * Cum SA (acres)          *   41.46  *    1.94  *    5.54 *
*****************************************************************************************

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          RIVER: Beardsley Wash
REACH: Rsvlt St-Rsvlt C   RS: 4

INPUT
Description: Cross Section 4
-Skewed LOB to be perpendicular to flow. Extended
             X-section on left using topo to provide containment.
Station Elevation Data     num=       16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
    8472    1014    9692    1012 9942.28  1014.7 9944.19 1013.89 9954.86 1013.84
 9969.08  1013.8 9982.15 1013.56 9994.31 1013.55 9997.32 1012.63   10000 1012.57
10003.94 1013.71 10038.4 1013.8710149.44 1014.0610266.31 1015.0310320.22 1015.58
10471.05 1016.26

Manning's n Values         num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************
    8472    .047 9969.08    .052 10038.4    .037

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.    Expan.
       9969.08 10038.4               120      60      60              .3        .5

CROSS SECTION OUTPUT     Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1013.28  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.26  * Wt. n-Val.              *   0.047  *   0.052  *         *
* W.S. Elev (ft)          * 1013.02  * Reach Len. (ft)         *  120.00  *   60.00  *   60.00 *
* Crit W.S. (ft)          * 1013.02  * Flow Area (sq ft)       *  365.78  *    1.73  *         *
* E.G. Slope (ft/ft)      *0.041464  * Area (sq ft)            *  365.78  *    1.73  *         *
* Q Total (cfs)           * 1508.00  * Flow (cfs)              * 1503.44  *    4.56  *         *
* Top Width (ft)          *  722.49  * Top Width (ft)          *  716.98  *    5.51  *         *
* Vel Total (ft/s)        *    4.10  * Avg. Vel. (ft/s)        *    4.11  *    2.64  *         *
* Max Chl Dpth (ft)       *    1.02  * Hydr. Depth (ft)        *    0.51  *    0.31  *         *
* Conv. Total (cfs)       *  7405.7  * Conv. (cfs)             *  7383.3  *    22.4  *         *
* Length Wtd. (ft)        *   95.67  * Wetted Per. (ft)        *  716.98  *    5.64  *         *
* Min Ch El (ft)          * 1012.57  * Shear (lb/sq ft)        *    1.32  *    0.79  *         *
* Alpha                   *    1.00  * Stream Power (lb/ft s) *    5.43  *    2.10  *         *
* Frctn Loss (ft)         *    0.17  * Cum Volume (acre-ft)    *   28.10  *    3.12  *    2.30 *
* C & E Loss (ft)         *    0.10  * Cum SA (acres)          *   36.49  *    1.78  *    5.50 *
*****************************************************************************************
```

```
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 conveyance ratio (upstream conveyance divided by downstream conveyance) is less
         than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to
         critical depth, the calculated water surface came back below critical depth.  This indicates
         that there is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION          RIVER: Beardsley Wash
REACH: Rsvlt St-Rsvlt C   RS: 3.95

INPUT
Description: Cross Section 3.95
Added cross section to model culvert.
             Elevations were taken from topo and the surveyed invert
             elevations.  Used n values from xs4 and assumed a clean approach
             to the culvert and an n = 0.03.
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    8475    1013    9235    1012    9575  1011.5    9875    1012    99901008.375
  100001008.375  100101008.375  10175    1014   10465    1016

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    8475    .047    9875     .03   10175    .037

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9875   10175                 70     100     150              .3       .5

CROSS SECTION OUTPUT    Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 1012.55  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.05  * Wt. n-Val.              *   0.047  *   0.030  *          *
* W.S. Elev (ft)         * 1012.50  * Reach Len. (ft)         *   70.00  *  100.00  *  150.00  *
* Crit W.S. (ft)         * 1010.79  * Flow Area (sq ft)       *  573.69  *  597.67  *          *
* E.G. Slope (ft/ft)     *0.000547  * Area (sq ft)            *  573.69  *  597.67  *          *
* Q Total (cfs)          * 1508.00  * Flow (cfs)              *  289.34  * 1218.66  *          *
* Top Width (ft)         * 1274.99  * Top Width (ft)          * 1019.03  *  255.96  *          *
* Vel Total (ft/s)       *    1.29  * Avg. Vel. (ft/s)        *    0.50  *    2.04  *          *
* Max Chl Dpth (ft)      *    4.12  * Hydr. Depth (ft)        *    0.56  *    2.33  *          *
* Conv. Total (cfs)      * 64451.9  * Conv. (cfs)             * 12366.3  * 52085.6  *          *
* Length Wtd. (ft)       *  100.00  * Wetted Per. (ft)        * 1019.03  *  256.09  *          *
* Min Ch El (ft)         * 1008.38  * Shear (lb/sq ft)        *    0.02  *    0.08  *          *
* Alpha                  *    2.06  * Stream Power (lb/ft s)  *    0.01  *    0.16  *          *
* Frctn Loss (ft)        *          * Cum Volume (acre-ft)    *   26.80  *    2.70  *    2.30  *
* C & E Loss (ft)        *          * Cum SA (acres)          *   34.09  *    1.60  *    5.50  *
*****************************************************************************************

CULVERT                RIVER: Beardsley Wash
REACH: Rsvlt St-Rsvlt C   RS: 3.9

INPUT
Description: CMP Culvert at Van Buren Road (2 -  4-ft dia)
Distance from Upstream XS =      20
Deck/Roadway Width        =      72
Weir Coefficient          =       3
Upstream  Deck/Roadway Coordinates
    num=       5
    Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*******************************************************************************
    9050    1010            9720    1012            9975 1012.38
   10210    1014           10750    1016

Upstream Bridge Cross Section Data
Station Elevation Data    num=       9
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    8475    1013    9235    1012    9575  1011.5    9875    1012    99901008.375
  100001008.375  100101008.375  10175    1014   10465    1016

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    8475    .047    9875     .03   10175    .037

Bank Sta: Left   Right    Coeff Contr.   Expan.
          9875   10175             .3       .5

Downstream  Deck/Roadway Coordinates
    num=       5
    Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*******************************************************************************
    9050    1010            9720    1012            9975 1012.38
   10210    1014           10750    1016

Downstream Bridge Cross Section Data
Station Elevation Data    num=      10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    8440  1011.5    8800  1011.4    9140  1011.1    9500  1010.7    9920  1012.5
   99901008.255  100001008.255  100101008.255  10275    1014   10650    1016

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    8440     .04    9920     .03   10275    .038

Bank Sta: Left   Right    Coeff Contr.   Expan.
          9920   10275             .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular       4
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 1 - Headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                 10      80       .024                   .5                1
Number of Barrels =  2
Upstream   Elevation =  1008.375
Centerline Stations
    Sta.    Sta.
  9998.4 10003.9
Downstream Elevation =  1008.255
Centerline Stations
    Sta.    Sta.
```

9995.2210001.22

```
CULVERT OUTPUT    Profile #PF 1
Culvert ID : Culvert #1
*********************************************************************
* Culv Q (cfs)          *  121.65  * Culv Ful Lngh (ft)    *        *
* # Barrels             *       2  * Culv Vel US (ft/s)    *    5.15 *
* Q Barrel (cfs)        *   60.83  * Culv Vel DS (ft/s)    *    5.85 *
* E.G. US. (ft)         * 1012.55  * Culv Inv El Up (ft)   * 1008.38 *
* W.S. US. (ft)         * 1012.50  * Culv Inv El Dn (ft)   * 1008.26 *
* E.G. DS (ft)          * 1011.52  * Culv Frctn Ls (ft)    *    0.48 *
* W.S. DS (ft)          * 1011.34  * Culv Ext Lss (ft)     *    0.35 *
* Delta EG (ft)         *    1.04  * Culv Ent Lss (ft)     *    0.21 *
* Delta WS (ft)         *    1.16  * Q Weir (cfs)          * 1386.35 *
* E.G. IC (ft)          * 1012.53  * Weir Sta Lft (ft)     * 8812.93 *
* E.G. OC (ft)          * 1012.55  * Weir Sta Rgt (ft)     *10000.43 *
* Culvert Control       *  Outlet  * Weir Submerg          *    0.00 *
* Culv WS Inlet (ft)    * 1011.94  * Weir Max Depth (ft)   *    1.03 *
* Culv WS Outlet (ft)   * 1011.34  * Weir Avg Depth (ft)   *    0.50 *
* Culv Nml Depth (ft)   *    4.00  * Wr Flw Area (sq ft)   *  597.87 *
* Culv Crt Depth (ft)   *    2.35  * Min El Weir Flow (ft) * 1011.53 *
*********************************************************************

Note:    The normal depth exceeds the height of the culvert.  The program assumes that the normal
         depth is equal to the height of the culvert.

CROSS SECTION          RIVER: Beardsley Wash
REACH: Rsvlt St-Rsvlt C   RS: 3.5

INPUT
Description: Cross Section 3.5

-New Cross section for modeling culvert.
            Used LOB and ROB manning n values from section 3.  Assumed a clean
            channel downstream of culvert with n = 0.03
-Cross section data
            was developed using survey data and available topographic maps.
Station Elevation Data    num=      10
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
    8440  1011.5    8800  1011.4    9140  1011.1    9500  1010.7    9920  1012.5
   99901008.255   100001008.255   100101008.255   10275    1014   10650    1016

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    8440     .04    9920     .03   10275    .038

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          9920   10275              260     340     215              .3       .5

CROSS SECTION OUTPUT    Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)         * 1011.52  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.18  * Wt. n-Val.              *   0.040  *   0.030  *         *
* W.S. Elev (ft)         * 1011.34  * Reach Len. (ft)        *  260.00  *  340.00  *  215.00  *
* Crit W.S. (ft)         * 1010.63  * Flow Area (sq ft)      *  237.61  *  359.34  *         *
* E.G. Slope (ft/ft)     *0.002666  * Area (sq ft)           *  237.61  *  359.34  *         *
* Q Total (cfs)          * 1508.00  * Flow (cfs)             *  206.49  * 1301.52  *         *
* Top Width (ft)         *  992.26  * Top Width (ft)         *  779.18  *  213.08  *         *
* Vel Total (ft/s)       *    2.53  * Avg. Vel. (ft/s)       *    0.87  *    3.62  *         *
* Max Chl Dpth (ft)      *    3.08  * Hydr. Depth (ft)       *    0.30  *    1.69  *         *
* Conv. Total (cfs)      * 29205.6  * Conv. (cfs)            *  3999.0  * 25206.6  *         *
* Length Wtd. (ft)       *  294.53  * Wetted Per. (ft)       *  779.19  *  213.20  *         *
* Min Ch El (ft)         * 1008.26  * Shear (lb/sq ft)       *    0.05  *    0.28  *         *
* Alpha                  *    1.79  * Stream Power (lb/ft s) *    0.04  *    1.02  *         *
* Frctn Loss (ft)        *    0.85  * Cum Volume (acre-ft)   *   26.15  *    1.61  *    2.30 *
* C & E Loss (ft)        *    0.07  * Cum SA (acres)         *   32.65  *    1.06  *    5.50 *
*************************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION          RIVER: Beardsley Wash
REACH: Rsvlt St-Rsvlt C   RS: 3

INPUT
Description: Cross Section 3

-Extended LOB to be perpendicular to flow by
            adding 3 points from the topo.
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
    8155    1011     8718    1010     8988  1009.5    9105    1010     9183    1010
    9432  1009.5     9772    1010 9944.61 1011.17 9950.81 1011.26 9964.51 1011.26
 9978.77 1010.96 9986.17 1010.93 9991.44 1012.28 9997.32  1009.3    10000 1009.21
10002.23 1010.1610104.45 1010.4710251.53 1010.9510396.83 1011.55

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
    8155     .04 9991.44    .04810002.23    .038

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9991.4410002.23             370     480     500              .1       .3

CROSS SECTION OUTPUT    Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)         * 1010.60  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.04  * Wt. n-Val.              *   0.040  *   0.048  *   0.038 *
* W.S. Elev (ft)         * 1010.56  * Reach Len. (ft)        *  370.00  *  480.00  *  500.00 *
* Crit W.S. (ft)         *         * Flow Area (sq ft)       *  942.37  *    7.00  *   26.00 *
* E.G. Slope (ft/ft)     *0.003163  * Area (sq ft)           *  942.37  *    7.00  *   26.00 *
* Q Total (cfs)          * 1508.00  * Flow (cfs)             * 1477.11  *   11.25  *   19.64 *
* Top Width (ft)         * 1586.79  * Top Width (ft)         * 1450.29  *    7.39  *  129.11 *
* Vel Total (ft/s)       *    1.55  * Avg. Vel. (ft/s)       *    1.57  *    1.61  *    0.76 *
* Max Chl Dpth (ft)      *    1.35  * Hydr. Depth (ft)       *    0.65  *    0.95  *    0.20 *
* Conv. Total (cfs)      * 26811.6  * Conv. (cfs)            * 26262.4  *   200.0  *   349.2 *
* Length Wtd. (ft)       *  372.46  * Wetted Per. (ft)       * 1450.30  *    7.89  *  129.11 *
* Min Ch El (ft)         * 1009.21  * Shear (lb/sq ft)       *    0.13  *    0.18  *    0.04 *
* Alpha                  *    1.02  * Stream Power (lb/ft s) *    0.20  *    0.28  *    0.03 *
* Frctn Loss (ft)        *    2.58  * Cum Volume (acre-ft)   *   22.63  *    0.18  *    2.23 *
* C & E Loss (ft)        *    0.02  * Cum SA (acres)         *   26.00  *    0.20  *    5.18 *
*************************************************************************************************

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          RIVER: Beardsley Wash
REACH: Rsvlt St-Rsvlt C   RS: 2

INPUT
Description: Cross Section 2
Deleted 4 points from the LOB.  Skewed the LOB to
            be perpendicular with flow and added 2 points from topo.  Also
            extended ROB by adding one point from the topo.
```

```
Station Elevation Data     num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
    7583    1009    8123    1008    8218  1007.7    8249    1008    8351    1008
    9158    1007 9942.55 1008.69  9953.5 1008.88 9967.59 1008.88 9981.56 1008.75
 9986.78 1008.69 9993.09 1008.91   10000 1006.4410002.34  1006.5 10005.5    1008
10110.85 1007.8910268.23 1007.97   10418 1008.23   10823    1010

Manning's n Values         num=       3
     Sta    n Val     Sta    n Val     Sta    n Val
*****************************************************
    7583     .037 9993.09     .047 10005.5     .037

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9993.09 10005.5             400     460     590            .1        .3

CROSS SECTION OUTPUT     Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1008.00  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.19  * Wt. n-Val.              *   0.037  *   0.047  *         *
* W.S. Elev (ft)          * 1007.81  * Reach Len. (ft)         *  400.00  *  460.00  *  590.00 *
* Crit W.S. (ft)          * 1007.81  * Flow Area (sq ft)       *  421.93  *    7.59  *         *
* E.G. Slope (ft/ft)      *0.025430  * Area (sq ft)            *  421.93  *    7.59  *         *
* Q Total (cfs)           * 1508.00  * Flow (cfs)              * 1475.01  *   32.99  *         *
* Top Width (ft)          * 1088.55  * Top Width (ft)          * 1079.61  *    8.94  *         *
* Vel Total (ft/s)        *    3.51  * Avg. Vel. (ft/s)        *    3.50  *    4.35  *         *
* Max Chl Dpth (ft)       *    1.37  * Hydr. Depth (ft)        *    0.39  *    0.85  *         *
* Conv. Total (cfs)       *  9456.5  * Conv. (cfs)             *  9249.6  *  206.9  *         *
* Length Wtd. (ft)        *  408.15  * Wetted Per. (ft)        * 1079.61  *    9.48  *         *
* Min Ch El (ft)          * 1006.44  * Shear (lb/sq ft)        *    0.62  *    1.27  *         *
* Alpha                   *    1.00  * Stream Power (lb/ft s) *    2.17  *    5.53  *         *
* Frctn Loss (ft)         *    0.33  * Cum Volume (acre-ft)    *   16.84  *    0.10  *    2.09 *
* C & E Loss (ft)         *    0.06  * Cum SA (acres)          *   15.25  *    0.11  *    4.44 *
*****************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The 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          RIVER: Beardsley Wash
REACH: Rsvlt St-Rsvlt C   RS: 1

INPUT
Description: Cross Section 1
Deleted 4 points from the LOB and 2 points from
             the ROB.  Skewed cross section to be perpindicular with flow and
             added 3 points from the topo.
Station Elevation Data     num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
    7072    1008    7429    1006    7906    1004    8752    1004    9233    1005
 9865.53 1006.59 9927.93 1007.13 9931.31  1006.5 9942.99 1007.37 9960.13  1007.8
 9975.12 1007.68  9984.7 1007.64  9989.4 1008.28 9997.16 1004.71   10000 1004.47
10006.41 1006.3110153.29 1005.1310765.85  1006.2

Manning's n Values         num=       3
     Sta    n Val     Sta    n Val     Sta    n Val
*****************************************************
    7072      .07  9989.4    .05110006.41    .037

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9989.410006.41               0       0       0            .1        .3

CROSS SECTION OUTPUT     Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1006.07  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.00  * Wt. n-Val.              *   0.070  *   0.051  *   0.037 *
* W.S. Elev (ft)          * 1006.07  * Reach Len. (ft)         *         *         *         *
* Crit W.S. (ft)          * 1004.43  * Flow Area (sq ft)       * 3244.96  *   10.67  *  307.92 *
* E.G. Slope (ft/ft)      *0.000247  * Area (sq ft)            * 3244.96  *   10.67  *  307.92 *
* Q Total (cfs)           * 1508.00  * Flow (cfs)              * 1385.90  *    4.55  *  117.55 *
* Top Width (ft)          * 2908.67  * Top Width (ft)          * 2242.16  *   11.37  *  655.14 *
* Vel Total (ft/s)        *    0.42  * Avg. Vel. (ft/s)        *    0.43  *    0.43  *    0.38 *
* Max Chl Dpth (ft)       *    2.07  * Hydr. Depth (ft)        *    1.45  *    0.94  *    0.47 *
* Conv. Total (cfs)       * 95896.6  * Conv. (cfs)             * 88132.2  *  289.1  *  7475.2 *
* Length Wtd. (ft)        *          * Wetted Per. (ft)        * 2242.16  *   11.90  *  655.15 *
* Min Ch El (ft)          * 1004.47  * Shear (lb/sq ft)        *    0.02  *    0.01  *    0.01 *
* Alpha                   *    1.00  * Stream Power (lb/ft s) *    0.01  *    0.01  *    0.00 *
* Frctn Loss (ft)         *          * Cum Volume (acre-ft)    *         *         *         *
* C & E Loss (ft)         *          * Cum SA (acres)          *         *         *         *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.

*****************************************************************************

SUMMARY OF MANNING'S N VALUES

River:Beardsley Wash
*****************************************************************
*     Reach       *  River Sta.   *   n1    *   n2    *   n3    *
*****************************************************************
*I - 10  to Split*    18          *     .049*     .028*     .049*
*I - 10  to Split*    17          *     .049*     .028*     .049*
*I - 10  to Split*    16.9        *Culvert  *       *       *
*I - 10  to Split*    16.5        *      .03*      .03*      .03*
*I - 10  to Split*    16          *      .03*      .03*      .03*
*S. Split-189 Ave*    14.5*       *     .032*      .03*     .038*
*S. Split-189 Ave*    14          *     .032*      .03*      .04*
*S. Split-189 Ave*    13          *     .032*      .03*     .054*
*S. Split-189 Ave*    12          *      .03*      .03*     .033*
*S. Split-189 Ave*    11          *     .032*      .03*     .032*
*S. Split-189 Ave*    10.5*       *     .032*      .03*     .032*
*S. Split-189 Ave*    10          *     .032*      .03*     .032*
*E Split to Rsvlt*    22          *     .041*     .035*     .035*
*E Split to Rsvlt*    21          *     .035*     .033*     .033*
*E Split to Rsvlt*    20          *     .033*     .033*     .033*
*E Split to Rsvlt*    19.5        *      .03*     .043*      .03*
*Rsvlt St-Rsvlt C*    9.8         *      .03*     .043*      .03*
*Rsvlt St-Rsvlt C*    9.5         *Culvert  *       *       *
*Rsvlt St-Rsvlt C*    9           *      .04*      .04*      .04*
*Rsvlt St-Rsvlt C*    8           *     .036*     .037*     .032*
*Rsvlt St-Rsvlt C*    7           *     .037*     .042*     .032*
*Rsvlt St-Rsvlt C*    6           *     .037*     .042*     .037*
*Rsvlt St-Rsvlt C*    5           *     .037*     .042*     .032*
*Rsvlt St-Rsvlt C*    4.5*        *     .042*     .047*     .035*
*Rsvlt St-Rsvlt C*    4           *     .047*     .052*     .037*
*Rsvlt St-Rsvlt C*    3.95        *     .047*      .03*     .037*
*Rsvlt St-Rsvlt C*    3.9         *Culvert  *       *       *
*Rsvlt St-Rsvlt C*    3.5         *      .04*      .03*     .038*
*Rsvlt St-Rsvlt C*    3           *      .04*     .048*     .038*
*Rsvlt St-Rsvlt C*    2           *     .037*     .047*     .037*
```

Rsvlt St-Rsvlt C	1	.07	.051	.037

SUMMARY OF REACH LENGTHS

River: Beardsley Wash

Reach	River Sta.	Left	Channel	Right
I - 10 to Split	18	85	60	45
I - 10 to Split	17	240	260	320
I - 10 to Split	16.9	Culvert		
I - 10 to Split	16.5	250	400	450
I - 10 to Split	16	0	0	0
S. Split-189 Ave	14.5	340	275	225
S. Split-189 Ave	14	480	480	480
S. Split-189 Ave	13	160	190	240
S. Split-189 Ave	12	250	270	170
S. Split-189 Ave	11	250	260	515
S. Split-189 Ave	10.5	250	260	235
S. Split-189 Ave	10	0	0	0
E Split to Rsvlt	22	650	620	600
E Split to Rsvlt	21	460	450	450
E Split to Rsvlt	20	600	590	520
E Split to Rsvlt	19.5	0	0	0
Rsvlt St-Rsvlt C	9.8	140	130	120
Rsvlt St-Rsvlt C	9.5	Culvert		
Rsvlt St-Rsvlt C	9	400	380	265
Rsvlt St-Rsvlt C	8	500	500	460
Rsvlt St-Rsvlt C	7	440	500	480
Rsvlt St-Rsvlt C	6	430	480	510
Rsvlt St-Rsvlt C	5	255	275	280
Rsvlt St-Rsvlt C	4.5	255	275	280
Rsvlt St-Rsvlt C	4	120	60	60
Rsvlt St-Rsvlt C	3.95	70	100	150
Rsvlt St-Rsvlt C	3.9	Culvert		
Rsvlt St-Rsvlt C	3.5	260	340	215
Rsvlt St-Rsvlt C	3	370	480	500
Rsvlt St-Rsvlt C	2	400	460	590
Rsvlt St-Rsvlt C	1	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Beardsley Wash

Reach	River Sta.	Contr.	Expan.
I - 10 to Split	18	.3	.5
I - 10 to Split	17	.3	.5
I - 10 to Split	16.9	Culvert	
I - 10 to Split	16.5	.3	.5
I - 10 to Split	16	.1	.3
S. Split-189 Ave	14.5	.1	.3
S. Split-189 Ave	14	.1	.3
S. Split-189 Ave	13	.1	.3
S. Split-189 Ave	12	.1	.3
S. Split-189 Ave	11	.1	.3
S. Split-189 Ave	10.5	.1	.3
S. Split-189 Ave	10	.1	.3
E Split to Rsvlt	22	.1	.3
E Split to Rsvlt	21	.1	.3
E Split to Rsvlt	20	.1	.3
E Split to Rsvlt	19.5	.1	.3
Rsvlt St-Rsvlt C	9.8	.3	.5
Rsvlt St-Rsvlt C	9.5	Culvert	
Rsvlt St-Rsvlt C	9	.3	.5
Rsvlt St-Rsvlt C	8	.1	.3
Rsvlt St-Rsvlt C	7	.1	.3
Rsvlt St-Rsvlt C	6	.1	.3
Rsvlt St-Rsvlt C	5	.1	.3
Rsvlt St-Rsvlt C	4.5	.1	.3
Rsvlt St-Rsvlt C	4	.3	.5
Rsvlt St-Rsvlt C	3.95	.3	.5
Rsvlt St-Rsvlt C	3.9	Culvert	
Rsvlt St-Rsvlt C	3.5	.3	.5
Rsvlt St-Rsvlt C	3	.1	.3
Rsvlt St-Rsvlt C	2	.1	.3
Rsvlt St-Rsvlt C	1	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
I - 10 to Split	18	948.00	1053.92	1057.38		1057.54	0.002474	4.31	395.28	291.55	0.52
I - 10 to Split	17	948.00	1053.61	1057.20	1055.43	1057.43	0.000986	3.90	242.78	465.61	0.36
I - 10 to Split	16.9	Culvert									
I - 10 to Split	16.5	948.00	1051.30	1053.31	1053.31	1054.24	0.010673	7.73	122.61	503.67	1.00
I - 10 to Split	16	948.00	1047.86	1049.67	1049.64	1049.84	0.010930	3.44	298.60	676.04	0.82
S. Split-189 Ave	14.5	619.84	1041.54	1044.76	1044.76	1045.33	0.006825	6.44	120.47	126.37	0.81
S. Split-189 Ave	14	619.84	1039.59	1042.30	1042.25	1042.48	0.007490	4.53	217.84	429.86	0.76
S. Split-189 Ave	13	619.84	1036.59	1039.75	1039.75	1039.95	0.003905	4.68	309.06	731.30	0.60
S. Split-189 Ave	12	619.84	1035.14	1037.79	1037.79	1037.97	0.007488	4.77	252.72	739.25	0.77
S. Split-189 Ave	11	619.84	1033.25	1035.87	1035.61	1035.92	0.002196	3.17	397.44	757.19	0.44
S. Split-189 Ave	10.5	619.84	1031.67	1034.03	1034.03	1034.21	0.007307	5.72	230.09	578.98	0.79
S. Split-189 Ave	10	619.84	1030.08	1031.64	1031.64	1031.82	0.007861	4.72	245.16	645.40	0.79
E Split to Rsvlt	22	328.16	1044.00	1045.17	1045.17	1045.33	0.014541	4.54	123.49	324.93	0.88
E Split to Rsvlt	21	328.16	1038.79	1039.60	1039.41	1039.66	0.005113	2.17	164.75	388.69	0.51
E Split to Rsvlt	20	328.16	1034.76	1035.19	1035.19	1035.32	0.024446	2.98	110.61	405.67	1.00
E Split to Rsvlt	19.5	328.16	1026.76	1030.28		1030.29	0.000262	0.86	386.88	245.20	0.11
Rsvlt St-Rsvlt C	9.8	948.00	1024.60	1030.25	1028.45	1030.27	0.000262	1.46	854.83	558.95	0.12
Rsvlt St-Rsvlt C	9.5	Culvert									
Rsvlt St-Rsvlt C	9	1508.00	1023.26	1028.05	1026.99	1028.29	0.003692	4.25	484.76	667.02	0.47
Rsvlt St-Rsvlt C	8	1508.00	1023.03	1025.92	1025.85	1026.15	0.009480	6.06	437.91	698.36	0.76
Rsvlt St-Rsvlt C	7	1508.00	1019.47	1022.94		1023.05	0.004300	3.80	598.82	692.77	0.46
Rsvlt St-Rsvlt C	6	1508.00	1016.81	1020.35	1020.20	1020.52	0.007422	5.35	536.98	797.28	0.61
Rsvlt St-Rsvlt C	5	1508.00	1014.49	1016.79	1016.54	1016.93	0.008762	3.58	510.29	731.73	0.59
Rsvlt St-Rsvlt C	4.5	1508.00	1013.53	1015.47	1014.97	1015.52	0.003657	1.68	819.15	1042.36	0.33
Rsvlt St-Rsvlt C	4	1508.00	1012.57	1013.02	1013.02	1013.28	0.041464	2.64	367.50	722.49	0.83
Rsvlt St-Rsvlt C	3.95	1508.00	1008.38	1012.50	1010.79	1012.55	0.000547	2.04	1171.37	1274.99	0.24
Rsvlt St-Rsvlt C	3.9	Culvert									
Rsvlt St-Rsvlt C	3.5	1508.00	1008.26	1011.34	1010.63	1011.52	0.002666	3.62	596.95	992.26	0.49
Rsvlt St-Rsvlt C	3	1508.00	1009.21	1010.56		1010.60	0.003163	1.61	975.36	1586.79	0.29
Rsvlt St-Rsvlt C	2	1508.00	1006.44	1007.81	1007.81	1008.00	0.025430	4.35	429.52	1088.55	0.83
Rsvlt St-Rsvlt C	1	1508.00	1004.47	1006.07	1004.43	1006.07	0.000247	0.43	3563.55	2908.67	0.08

Profile Output Table - Standard Table 2

Reach	River Sta	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
I - 10 to Split	18	1057.54	1057.38	0.16	0.09	0.02	106.10	453.06	388.84	291.55

I - 10 to Split	17	1057.43	1057.20	0.24					948.00		465.61
I - 10 to Split	16.9	Culvert									
I - 10 to Split	16.5	1054.24	1053.31	0.93	3.95	0.38			948.00		503.67
I - 10 to Split	16	1049.84	1049.67	0.18	4.48	0.04	538.12		105.65	304.22	676.04
S. Split-189 Ave	14.5*	1045.33	1044.76	0.58	2.11	0.12	44.19		547.02	28.63	126.37
S. Split-189 Ave	14	1042.48	1042.30	0.17	2.53	0.00	375.75		244.09		429.86
S. Split-189 Ave	13	1039.95	1039.75	0.20	0.99	0.01	177.23		348.41	94.20	731.30
S. Split-189 Ave	12	1037.97	1037.79	0.18	0.79	0.04	240.64		257.59	121.61	739.25
S. Split-189 Ave	11	1035.92	1035.87	0.05	1.70	0.01			105.63	514.20	757.19
S. Split-189 Ave	10.5*	1034.21	1034.03	0.18	1.84	0.00			146.07	473.77	578.98
S. Split-189 Ave	10	1031.82	1031.64	0.17	0.27	0.05			246.46	373.37	645.40
E Split to Rsvlt	22	1045.33	1045.17	0.16	5.06	0.03	203.85		116.82	7.50	324.93
E Split to Rsvlt	21	1039.66	1039.60	0.07	4.33	0.01	0.33		295.70	32.13	388.69
E Split to Rsvlt	20	1035.32	1035.19	0.14	0.50	0.04			290.56	37.60	405.67
E Split to Rsvlt	19.5	1030.29	1030.28	0.01	0.02	0.00	0.50		326.78	0.89	245.20
Rsvlt St-Rsvlt C	9.8	1030.27	1030.25	0.02			9.00		218.94	720.06	558.95
Rsvlt St-Rsvlt C	9.5	Culvert									
Rsvlt St-Rsvlt C	9	1028.29	1028.05	0.25	2.13	0.01	0.03		1324.72	183.25	667.02
Rsvlt St-Rsvlt C	8	1026.15	1025.92	0.23	3.07	0.04	1224.33		243.11	40.56	698.36
Rsvlt St-Rsvlt C	7	1023.05	1022.94	0.11	2.52	0.01	1252.83		226.87	28.31	692.77
Rsvlt St-Rsvlt C	6	1020.52	1020.35	0.16	3.57	0.01	942.25		281.56	284.19	797.28
Rsvlt St-Rsvlt C	5	1016.93	1016.79	0.14	1.38	0.03	1409.31		98.69		731.73
Rsvlt St-Rsvlt C	4.5*	1015.52	1015.47	0.05	2.22	0.02	1442.43		65.50	0.07	1042.36
Rsvlt St-Rsvlt C	4	1013.28	1013.02	0.26	0.17	0.10	1503.44		4.56		722.49
Rsvlt St-Rsvlt C	3.95	1012.55	1012.50	0.05			289.34		1218.66		1274.99
Rsvlt St-Rsvlt C	3.9	Culvert									
Rsvlt St-Rsvlt C	3.5	1011.52	1011.34	0.18	0.85	0.07	206.49		1301.52		992.26
Rsvlt St-Rsvlt C	3	1010.60	1010.56	0.04	2.58	0.02	1477.11		11.25	19.64	1586.79
Rsvlt St-Rsvlt C	2	1008.00	1007.81	0.19	0.33	0.06	1475.01		32.99		1088.55
Rsvlt St-Rsvlt C	1	1006.07	1006.07	0.00			1385.90		4.55	117.55	2908.67

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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Plan 01

River: Beardsley Wash Reach: I - 10 to Split RS: 18 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Beardsley Wash Reach: I - 10 to Split RS: 16.9 Profile: PF 1 Culv: Culvert #1
Note: The flow in the culvert is entirely supercritical.
River: Beardsley Wash Reach: I - 10 to Split RS: 16.5 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Beardsley Wash Reach: I - 10 to Split RS: 16 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:A flow split was encountered. The program first calculated the momentum of both channels below the junction. An energy balance was performed across the junction from the stream with the highest momentum downstream to the section upstream.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: Beardsley Wash Reach: S. Split-189 Ave RS: 14.5* Profile: PF 1
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.
River: Beardsley Wash Reach: S. Split-189 Ave RS: 14 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: Beardsley Wash Reach: S. Split-189 Ave RS: 13 Profile: PF 1
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.
River: Beardsley Wash Reach: S. Split-189 Ave RS: 12 Profile: PF 1
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 conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: Beardsley Wash Reach: S. Split-189 Ave RS: 11 Profile: PF 1
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.
River: Beardsley Wash Reach: S. Split-189 Ave RS: 10.5* Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: Beardsley Wash Reach: S. Split-189 Ave RS: 10 Profile: PF 1
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 conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: Beardsley Wash Reach: E Split to Rsvlt RS: 22 Profile: PF 1
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 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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was

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            used.
River: Beardsley Wash  Reach: E Split to Rsvlt     RS: 21     Profile: PF 1
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Beardsley Wash  Reach: E Split to Rsvlt     RS: 20     Profile: PF 1
     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 conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
             water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
             program defaulted to critical depth.
River: Beardsley Wash  Reach: E Split to Rsvlt     RS: 19.5     Profile: PF 1
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
River: Beardsley Wash  Reach: Rsvlt St-Rsvlt C     RS: 9.5     Profile: PF 1     Culv: Culvert #1
     Warning:During the supercritical analysis, the program could not balance the energy equation during the forewater
             calculations inside of the culvert.  The program assumed critical depth at the outlet and continued on.
     Note:   During the supercritical calculations a hydraulic jump occurred inside of the culvert.
     Note:   The culvert inlet is submerged and the culvert flows full over part or all of its length.  Therefore, the culvert
             inlet equations are not valid and the supercritical result has been discarded.  The outlet answer will be used.
River: Beardsley Wash  Reach: Rsvlt St-Rsvlt C     RS: 9     Profile: PF 1
     Warning:The cross-section end points had to be extended vertically for the computed water surface.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Beardsley Wash  Reach: Rsvlt St-Rsvlt C     RS: 8     Profile: PF 1
     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.
River: Beardsley Wash  Reach: Rsvlt St-Rsvlt C     RS: 7     Profile: PF 1
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Beardsley Wash  Reach: Rsvlt St-Rsvlt C     RS: 6     Profile: PF 1
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
River: Beardsley Wash  Reach: Rsvlt St-Rsvlt C     RS: 5     Profile: PF 1
     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.
River: Beardsley Wash  Reach: Rsvlt St-Rsvlt C     RS: 4.5*     Profile: PF 1
     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.
River: Beardsley Wash  Reach: Rsvlt St-Rsvlt C     RS: 4     Profile: PF 1
     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 conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
             water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
             program defaulted to critical depth.
River: Beardsley Wash  Reach: Rsvlt St-Rsvlt C     RS: 3.9     Profile: PF 1     Culv: Culvert #1
     Note:   The normal depth exceeds the height of the culvert.  The program assumes that the normal depth is equal to the height
             of the culvert.
River: Beardsley Wash  Reach: Rsvlt St-Rsvlt C     RS: 3.5     Profile: PF 1
     Warning:Divided flow computed for this cross-section.
River: Beardsley Wash  Reach: Rsvlt St-Rsvlt C     RS: 3     Profile: PF 1
     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.
River: Beardsley Wash  Reach: Rsvlt St-Rsvlt C     RS: 2     Profile: PF 1
     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 conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
             water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
             program defaulted to critical depth.
River: Beardsley Wash  Reach: Rsvlt St-Rsvlt C     RS: 1     Profile: PF 1
     Warning:Divided flow computed for this cross-section.
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General Responses to HEC-RAS warning messages - I-10 Culvert Wash

There are several warning messages which are repeated in the output. Following is a list of typical unique messages from the output and a URS response to each warning message.

1) 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.

Response: The scope for this project required spacing the cross-sections at approximate intervals of 500-feet. Adding new physical cross-sections would be outside of the original scope and budget. Additional sections may or may not eliminate these messages and provide a more accurate water surface profile. At select locations attempts were made to interpolate cross-sections, using HEC-RAS, to resolve this warning. In some cases the model required interpolating more than one cross-section to eliminate the message. However, the resulting change in water surface elevation was not significant (0.01 to 0.04 feet) for the locations reviewed. Unlike surveying, interpolated cross-sections do not pick up physical features in field, so it was decided not to rely on model interpolation.

2) Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Response: The scope for this project required spacing the cross-sections at approximate intervals of 500-feet. Adding new physical cross-sections would be outside of the original scope and budget. Additional sections may or may not eliminate these messages and provide a more accurate water surface profile. At select locations attempts were made to interpolate cross-sections, using HEC-RAS, to resolve this warning. In some cases the model required interpolating more than one cross-section to eliminate the message. However, the resulting change in water surface elevation was not significant (0.01 to 0.04 feet) for the locations reviewed. Unlike surveying, interpolated cross-sections do not pick up physical features in field, so it was decided not to rely on model interpolation.

3) Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Response: The scope for this project required spacing the cross-sections at approximate intervals of 500-feet. Adding new physical cross-sections would be outside of the original scope and budget. Additional sections may or may not eliminate these messages and provide a more accurate water surface profile. At select locations attempts were made to interpolate cross-sections, using HEC-RAS, to resolve this warning. In some cases the model required interpolating more than one cross-section to eliminate the message. However, the resulting change in water surface elevation was not significant (0.01 to 0.04 feet) for the locations reviewed. Unlike surveying,

interpolated cross-sections do not pick up physical features in field, so it was decided not to rely on model interpolation.

4) 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.

Response: FEMA requires that a subcritical profile be used for floodplain delineations. Mixed flow profile is not allowed in FEMA floodplain analysis.

5) Warning: Divided flow computed for this cross-section.

Response: High ground occurs separating conveyance areas triggering this warning message.

6) Warning: A flow split was encountered. The program first calculated the momentum of both channels below the junction. An energy balance was performed across the junction from the stream with the highest momentum downstream to the section upstream.

Response: A flow split was intentionally modeled here using the junction in HEC-RAS. This is the procedure the program uses internally to model the split.

7) 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.

Response: FEMA requires that a subcritical profile be used for floodplain delineations. Mixed flow profile is not allowed in FEMA floodplain analysis.

8) 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.

FEMA requires that a subcritical profile be used for floodplain delineations. Mixed flow profile in FEMA floodplain analysis.

9) Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

Response: This has to do with the numerical stability default convergence targets set within HEC-RAS. The default values have been adopted for this analysis. Changing the convergence criteria may help at this location but will affect convergence at other cross sections.

10) 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.

Response: HEC-RAS attempts to calculate critical using different methods. If the first doesn't work it defaults to the second, and after so many trials will default to the closest solution attempted.

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

HEC-RAS attempts to calculate critical using different methods. If the first doesn't work it defaults to the second, and after so many trials will default to the closest solution attempted.

12) Warning: During the supercritical analysis, the program could not balance the energy equation during the forewater calculations inside of the culvert. The program assumed critical depth at the outlet and continued on.

Response: To determine the flow profile through the culvert a supercritical profile was assumed. When an energy balance could not be attained Critical depth is defaulted to. This model uses a subcritical analysis for floodplain analysis.

13) Note: During the supercritical calculations a hydraulic jump occurred inside of the culvert.

Response: When the CWSEL goes from supercritical to subcritical flow a hydraulic jump occurs.

14) Note: The culvert inlet is submerged and the culvert flows full over part or all of its length. Therefore, the culvert inlet equations are not valid and the supercritical result has been discarded. The outlet answer will be used.

Response: Yes URS is very familiar with culvert modeling procedures. FHWA culvert routines follow the approach described above. If the culvert is submerged the inlet control headwater nomographs do not apply and friction losses will be calculated through the culvet to determine the headwater elevation.

HEC-RAS Plan: Plan 01 Profile: PF 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
I - 10 to Split	18	948.00	1053.92	1057.38		1057.54	0.002474	4.31	395.28	291.55	0.52
I - 10 to Split	17	948.00	1053.61	1057.20	1055.43	1057.43	0.000986	3.90	242.78	465.61	0.36
I - 10 to Split	16.9	Culvert									
I - 10 to Split	16.5	948.00	1051.30	1053.31	1053.31	1054.24	0.010673	7.73	122.61	503.67	1.00
I - 10 to Split	16	948.00	1047.86	1049.67	1049.64	1049.84	0.010930	3.44	298.60	676.04	0.82
S. Split-189 Ave	14.5*	619.84	1041.54	1044.76	1044.76	1045.33	0.006825	6.44	120.47	126.37	0.81
S. Split-189 Ave	14	619.84	1039.59	1042.30	1042.25	1042.48	0.007490	4.53	217.84	429.86	0.76
S. Split-189 Ave	13	619.84	1036.59	1039.75	1039.75	1039.95	0.003905	4.68	309.06	731.30	0.60
S. Split-189 Ave	12	619.84	1035.14	1037.79	1037.79	1037.97	0.007488	4.77	252.72	739.25	0.77
S. Split-189 Ave	11	619.84	1033.25	1035.87	1035.61	1035.92	0.002196	3.17	397.44	757.19	0.44
S. Split-189 Ave	10.5*	619.84	1031.67	1034.03	1034.03	1034.21	0.007307	5.72	230.09	578.98	0.79
S. Split-189 Ave	10	619.84	1030.08	1031.64	1031.64	1031.82	0.007861	4.72	245.16	645.40	0.79
E Split to Rsvlt	22	328.16	1044.00	1045.17	1045.17	1045.33	0.014541	4.54	123.49	324.93	0.88
E Split to Rsvlt	21	328.16	1038.79	1039.60	1039.41	1039.66	0.005113	2.17	164.75	388.69	0.51
E Split to Rsvlt	20	328.16	1034.76	1035.19	1035.19	1035.32	0.024446	2.98	110.61	405.67	1.00
E Split to Rsvlt	19.5	328.16	1026.76	1030.28		1030.29	0.000262	0.86	386.88	245.20	0.11
Rsvlt St-Rsvlt C	9.8	948.00	1024.60	1030.25	1028.45	1030.27	0.000262	1.46	854.83	558.95	0.12
Rsvlt St-Rsvlt C	9.5	Culvert									
Rsvlt St-Rsvlt C	9	1508.00	1023.26	1028.05	1026.99	1028.29	0.003692	4.25	484.76	667.02	0.47
Rsvlt St-Rsvlt C	8	1508.00	1023.03	1025.92	1025.85	1026.15	0.009480	6.06	437.91	698.36	0.76
Rsvlt St-Rsvlt C	7	1508.00	1019.47	1022.94		1023.05	0.004300	3.80	598.82	692.77	0.46
Rsvlt St-Rsvlt C	6	1508.00	1016.81	1020.35	1020.20	1020.52	0.007422	5.35	536.98	797.28	0.61
Rsvlt St-Rsvlt C	5	1508.00	1014.49	1016.79	1016.54	1016.93	0.008762	3.58	510.29	731.73	0.59
Rsvlt St-Rsvlt C	4.5*	1508.00	1013.53	1015.47	1014.97	1015.52	0.003657	1.68	819.15	1042.36	0.33
Rsvlt St-Rsvlt C	4	1508.00	1012.57	1013.02	1013.02	1013.28	0.041464	2.64	367.50	722.49	0.83
Rsvlt St-Rsvlt C	3.95	1508.00	1008.38	1012.50	1010.79	1012.55	0.000547	2.04	1171.37	1274.99	0.24
Rsvlt St-Rsvlt C	3.9	Culvert									
Rsvlt St-Rsvlt C	3.5	1508.00	1008.26	1011.34	1010.63	1011.52	0.002666	3.62	596.95	992.26	0.49
Rsvlt St-Rsvlt C	3	1508.00	1009.21	1010.56		1010.60	0.003163	1.61	975.36	1586.79	0.29
Rsvlt St-Rsvlt C	2	1508.00	1006.44	1007.81	1007.81	1008.00	0.025430	4.35	429.52	1088.55	0.83
Rsvlt St-Rsvlt C	1	1508.00	1004.47	1006.07	1004.43	1006.07	0.000247	0.43	3563.55	2908.67	0.08

HEC-RAS Plan: Plan 01 Profile: PF 1

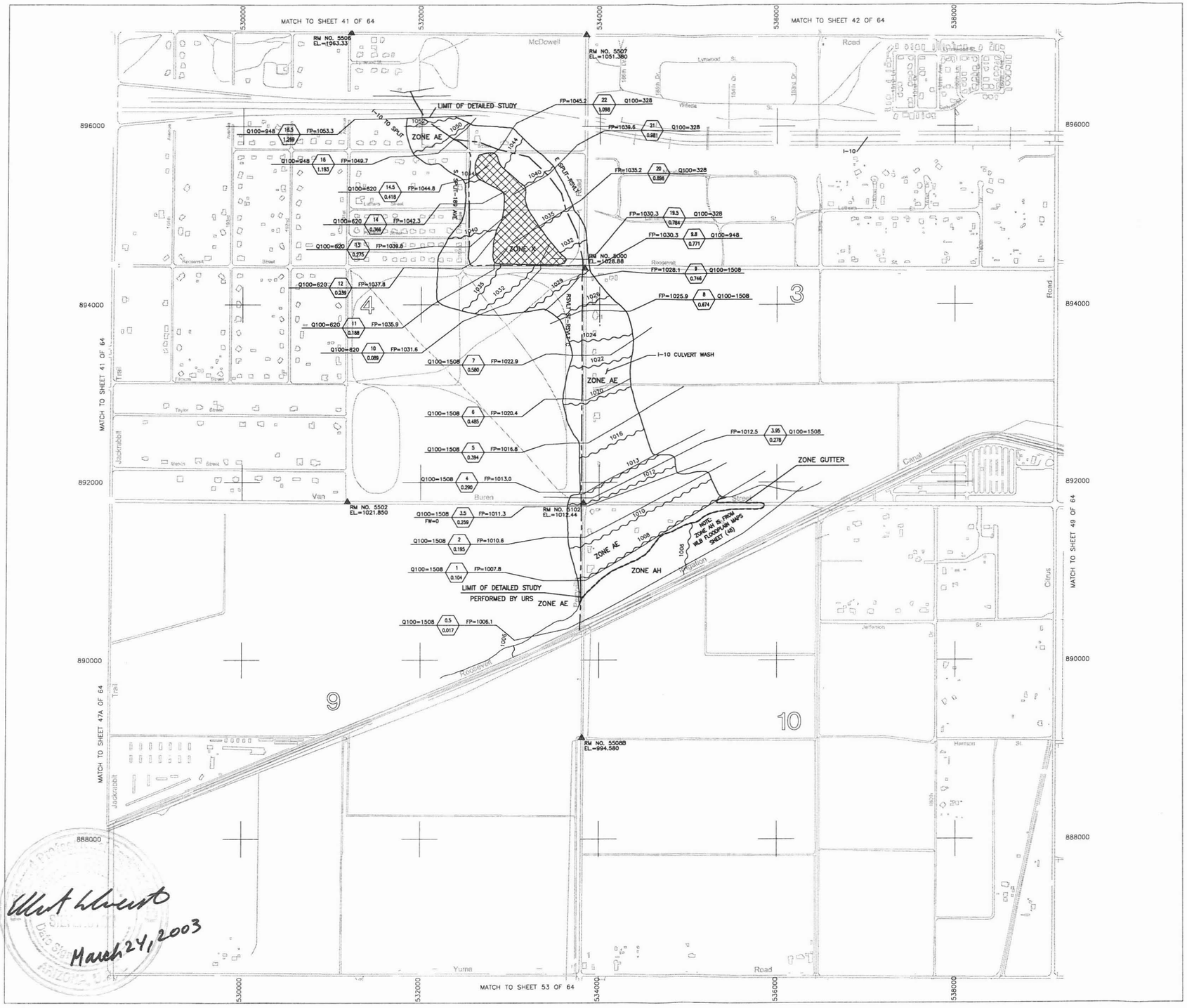
Reach	River Sta	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
		(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
I - 10 to Split	18	1057.54	1057.38	0.16	0.09	0.02	106.10	453.06	388.84	291.55
I - 10 to Split	17	1057.43	1057.20	0.24				948.00		465.61
I - 10 to Split	16.9	Culvert								
I - 10 to Split	16.5	1054.24	1053.31	0.93	3.95	0.38		948.00		503.67
I - 10 to Split	16	1049.84	1049.67	0.18	4.48	0.04	538.12	105.65	304.22	676.04
S. Split-189 Ave	14.5*	1045.33	1044.76	0.58	2.11	0.12	44.19	547.02	28.63	126.37
S. Split-189 Ave	14	1042.48	1042.30	0.17	2.53	0.00	375.75	244.09		429.86
S. Split-189 Ave	13	1039.95	1039.75	0.20	0.99	0.01	177.23	348.41	94.20	731.30
S. Split-189 Ave	12	1037.97	1037.79	0.18	0.79	0.04	240.64	257.59	121.61	739.25
S. Split-189 Ave	11	1035.92	1035.87	0.05	1.70	0.01		105.63	514.20	757.19
S. Split-189 Ave	10.5*	1034.21	1034.03	0.18	1.84	0.00		146.07	473.77	578.98
S. Split-189 Ave	10	1031.82	1031.64	0.17	0.27	0.05		246.46	373.37	645.40
E Split to Rsvlt	22	1045.33	1045.17	0.16	5.06	0.03	203.85	116.82	7.50	324.93
E Split to Rsvlt	21	1039.66	1039.60	0.07	4.33	0.01	0.33	295.70	32.13	388.69
E Split to Rsvlt	20	1035.32	1035.19	0.14	0.50	0.04		290.56	37.60	405.67
E Split to Rsvlt	19.5	1030.29	1030.28	0.01	0.02	0.00	0.50	326.78	0.89	245.20
Rsvlt St-Rsvlt C	9.8	1030.27	1030.25	0.02			9.00	218.94	720.06	558.95
Rsvlt St-Rsvlt C	9.5	Culvert								
Rsvlt St-Rsvlt C	9	1028.29	1028.05	0.25	2.13	0.01	0.03	1324.72	183.25	667.02
Rsvlt St-Rsvlt C	8	1026.15	1025.92	0.23	3.07	0.04	1224.33	243.11	40.56	698.36
Rsvlt St-Rsvlt C	7	1023.05	1022.94	0.11	2.52	0.01	1252.83	226.87	28.31	692.77
Rsvlt St-Rsvlt C	6	1020.52	1020.35	0.16	3.57	0.01	942.25	281.56	284.19	797.28
Rsvlt St-Rsvlt C	5	1016.93	1016.79	0.14	1.38	0.03	1409.31	98.69		731.73
Rsvlt St-Rsvlt C	4.5*	1015.52	1015.47	0.05	2.22	0.02	1442.43	65.50	0.07	1042.36
Rsvlt St-Rsvlt C	4	1013.28	1013.02	0.26	0.17	0.10	1503.44	4.56		722.49
Rsvlt St-Rsvlt C	3.95	1012.55	1012.50	0.05			289.34	1218.66		1274.99
Rsvlt St-Rsvlt C	3.9	Culvert								
Rsvlt St-Rsvlt C	3.5	1011.52	1011.34	0.18	0.85	0.07	206.49	1301.52		992.26
Rsvlt St-Rsvlt C	3	1010.60	1010.56	0.04	2.58	0.02	1477.11	11.25	19.64	1586.79
Rsvlt St-Rsvlt C	2	1008.00	1007.81	0.19	0.33	0.06	1475.01	32.99		1088.55
Rsvlt St-Rsvlt C	1	1006.07	1006.07	0.00			1385.90	4.55	117.55	2908.67

HEC-RAS Plan: Plan 01 Profile: PF 1

Reach	River Sta	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
		(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
I - 10 to Split	18	1057.38		1057.54	291.55	106.10	453.06	388.84		9956.00	10006.00	
I - 10 to Split	17	1057.20		1057.43	67.69		948.00			9937.27	10160.45	
I - 10 to Split	16.9	Culvert										
I - 10 to Split	16.5	1053.31		1054.24	66.00		948.00			9605.00	10230.00	
I - 10 to Split	16	1049.67		1049.84	676.04	538.12	105.65	304.22		9985.08	10059.08	
S. Split-189 Ave	14.5*	1044.76		1045.33	126.37	44.19	547.02	28.63		9980.00	10022.73	
S. Split-189 Ave	14	1042.30		1042.48	429.86	375.75	244.09			9986.19	10035.91	
S. Split-189 Ave	13	1039.75		1039.95	731.30	177.23	348.41	94.20		9991.06	10030.60	
S. Split-189 Ave	12	1037.79		1037.97	739.25	240.64	257.59	121.61		9989.86	10037.35	
S. Split-189 Ave	11	1035.87		1035.92	757.19		105.63	514.20		9994.35	10014.62	
S. Split-189 Ave	10.5*	1034.03		1034.21	578.98		146.07	473.77		9993.11	10009.35	
S. Split-189 Ave	10	1031.64		1031.82	645.40		246.46	373.37		9991.87	10040.60	
E Split to Rsvlt	22	1045.17		1045.33	314.37	203.85	116.82	7.50		9980.90	10011.60	
E Split to Rsvlt	21	1039.60		1039.66	388.69	0.33	295.70	32.13		9900.00	10146.66	
E Split to Rsvlt	20	1035.19		1035.32	405.67		290.56	37.60		9824.23	10275.81	
E Split to Rsvlt	19.5	1030.28		1030.29	245.20	0.50	326.78	0.89		9940.00	10140.00	
Rsvlt St-Rsvlt C	9.8	1030.25		1030.27	558.95	9.00	218.94	720.06		9993.96	10027.21	
Rsvlt St-Rsvlt C	9.5	Culvert										
Rsvlt St-Rsvlt C	9	1028.05		1028.29	667.02	0.03	1324.72	183.25		9910.00	10030.00	
Rsvlt St-Rsvlt C	8	1025.92		1026.15	698.36	1224.33	243.11	40.56		9991.82	10012.88	
Rsvlt St-Rsvlt C	7	1022.94		1023.05	692.77	1252.83	226.87	28.31		9980.89	10008.73	
Rsvlt St-Rsvlt C	6	1020.35		1020.52	797.28	942.25	281.56	284.19		9982.77	10004.85	
Rsvlt St-Rsvlt C	5	1016.79		1016.93	731.73	1409.31	98.69			9982.77	10007.28	
Rsvlt St-Rsvlt C	4.5*	1015.47		1015.52	1042.36	1442.43	65.50	0.07		9975.92	10022.84	
Rsvlt St-Rsvlt C	4	1013.02		1013.28	722.49	1503.44	4.56			9969.08	10038.40	
Rsvlt St-Rsvlt C	3.95	1012.50		1012.55	1274.99	289.34	1218.66			9875.00	10175.00	
Rsvlt St-Rsvlt C	3.9	Culvert										
Rsvlt St-Rsvlt C	3.5	1011.34		1011.52	992.26	206.49	1301.52			9920.00	10275.00	
Rsvlt St-Rsvlt C	3	1010.56		1010.60	1586.79	1477.11	11.25	19.64		9991.44	10002.23	
Rsvlt St-Rsvlt C	2	1007.81		1008.00	1088.55	1475.01	32.99			9993.09	10005.50	
Rsvlt St-Rsvlt C	1	1006.07		1006.07	2908.67	1385.90	4.55	117.55		9989.40	10006.41	

HEC-RAS Plan: Plan 01 Profile: PF 1

Reach	River Sta	Q Total	W.S. Elev	Top Width	Sta W.S. Lft	Sta W.S. Rgt
		(cfs)	(ft)	(ft)	(ft)	(ft)
I - 10 to Split	18	948.00	1057.38	291.55	9897.94	10189.49
I - 10 to Split	17	948.00	1057.20	465.61	9933.14	10398.74
I - 10 to Split	16.9	Culvert				
I - 10 to Split	16.5	948.00	1053.31	503.67	9663.69	10167.35
I - 10 to Split	16	948.00	1049.67	676.04	9754.81	10499.15
S. Split-189 Ave	14.5*	619.84	1044.76	126.37	9921.79	10048.16
S. Split-189 Ave	14	619.84	1042.30	429.86	9605.57	10035.43
S. Split-189 Ave	13	619.84	1039.75	731.30	9533.92	10265.22
S. Split-189 Ave	12	619.84	1037.79	739.25	9591.33	10367.13
S. Split-189 Ave	11	619.84	1035.87	757.19	9994.50	10768.98
S. Split-189 Ave	10.5*	619.84	1034.03	578.98	9993.61	10587.58
S. Split-189 Ave	10	619.84	1031.64	645.40	9994.11	10856.43
E Split to Rsvlt	22	328.16	1045.17	324.93	9709.17	10058.57
E Split to Rsvlt	21	328.16	1039.60	388.69	9884.98	10273.67
E Split to Rsvlt	20	328.16	1035.19	405.67	9923.00	10345.85
E Split to Rsvlt	19.5	328.16	1030.28	245.20	9923.76	10168.95
Rsvlt St-Rsvlt C	9.8	948.00	1030.25	558.95	9918.26	10477.21
Rsvlt St-Rsvlt C	9.5	Culvert				
Rsvlt St-Rsvlt C	9	1508.00	1028.05	667.02	9902.98	10570.00
Rsvlt St-Rsvlt C	8	1508.00	1025.92	698.36	9505.83	10270.14
Rsvlt St-Rsvlt C	7	1508.00	1022.94	692.77	9394.29	10087.05
Rsvlt St-Rsvlt C	6	1508.00	1020.35	797.28	9417.25	10214.53
Rsvlt St-Rsvlt C	5	1508.00	1016.79	731.73	9274.20	10006.75
Rsvlt St-Rsvlt C	4.5*	1508.00	1015.47	1042.36	8984.01	10035.05
Rsvlt St-Rsvlt C	4	1508.00	1013.02	722.49	9069.60	10001.56
Rsvlt St-Rsvlt C	3.95	1508.00	1012.50	1274.99	8855.98	10130.96
Rsvlt St-Rsvlt C	3.9	Culvert				
Rsvlt St-Rsvlt C	3.5	1508.00	1011.34	992.26	8869.78	10152.23
Rsvlt St-Rsvlt C	3	1508.00	1010.56	1586.79	8403.99	10131.34
Rsvlt St-Rsvlt C	2	1508.00	1007.81	1088.55	8182.47	10005.10
Rsvlt St-Rsvlt C	1	1508.00	1006.07	2908.67	7416.50	10691.42



LEGEND

100-YR FLOODPLAIN BOUNDARY	
FLOODWAY BOUNDARY	
HYDRAULIC BASE LINE WITH RIVER MILE	
EROSION SETBACK (WHEN APPLICABLE)	
CROSS SECTION	13 / 4.563 — FP= 1888.74, FW= 1889.54, Q = CFS (FLOODPLAIN WATER SURFACE ELEVATION; ENCROACHED WATER SURFACE ELEVATION; 100 YEAR DISCHARGE; RIVER BASTION DESIGNATION; RIVER MILE DESIGNATION)
BASE FLOOD ELEVATIONS	1221
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	Corporate Limits
COUNTY, PARISH, STATE OR INTERNATIONAL BOUNDARY	County Boundary
ZONE GUTTER	

NOTES: ALL ELEVATIONS ARE BASED ON, **"NATIONAL GEODETIC VERTICAL DATUM OF 1929"**

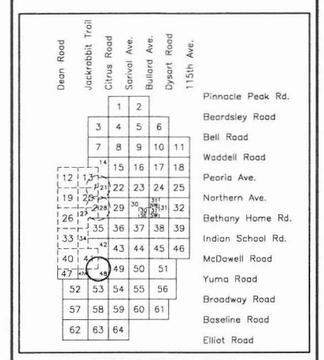
ALL FLOODPLAINS BY URS ARE BASED ON CROSS SECTIONS FIELD-SURVEYED BY URS.

ELEVATION REFERENCE FOR HYDRAULIC CROSS SECTIONS BY URS, 2001

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
5102	1012.440	MARICOPA COUNTY HIGHWAY DEPT. BRASS CAP IN HAND HOLE, AT INTERSECTION OF VAN BUREN ST. AND PERRYVILLE RD.
5502	1021.850	1/2" REBAR IN POTHOLE AT INTERSECTION OF VAN BUREN ST. AND 191ST AVE.
5506	1063.330	1" I.P. IN HAND HOLE AT INTERSECTION OF McDOWELL RD. AND 191ST AVE.
5507	1051.380	MARICOPA COUNTY HIGHWAY DEPT. BRASS CAP IN HAND HOLE, AT INTERSECTION OF McDOWELL RD. AND PERRYVILLE RD.
5000	1028.880	MARICOPA COUNTY HIGHWAY DEPT. BRASS CAP IN HAND HOLE, AT INTERSECTION OF PERRYVILLE RD. AND ROOSEVELT ST.
5508B	994.580	1/2" REBAR IN POTHOLE OF SOUTH BOUND LANE OF PERRYVILLE RD., ±0.5 MI. SOUTH OF VAN BUREN ST.

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS SECTION STATION 10,000 UNLESS NOTED OTHERWISE



SHEET INDEX MAP

400' 0' 400' 800'

SCALE: 1"= 400'
HORIZONTAL DATUM: NAD 1983
STATEPLANE PROJECTION

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

LOOP 303 CORRIDOR/WHITE TANKS
ADMP UPDATE
FLOOD DELINEATION STUDY
F.C.D. CONTRACT NO. 99-40

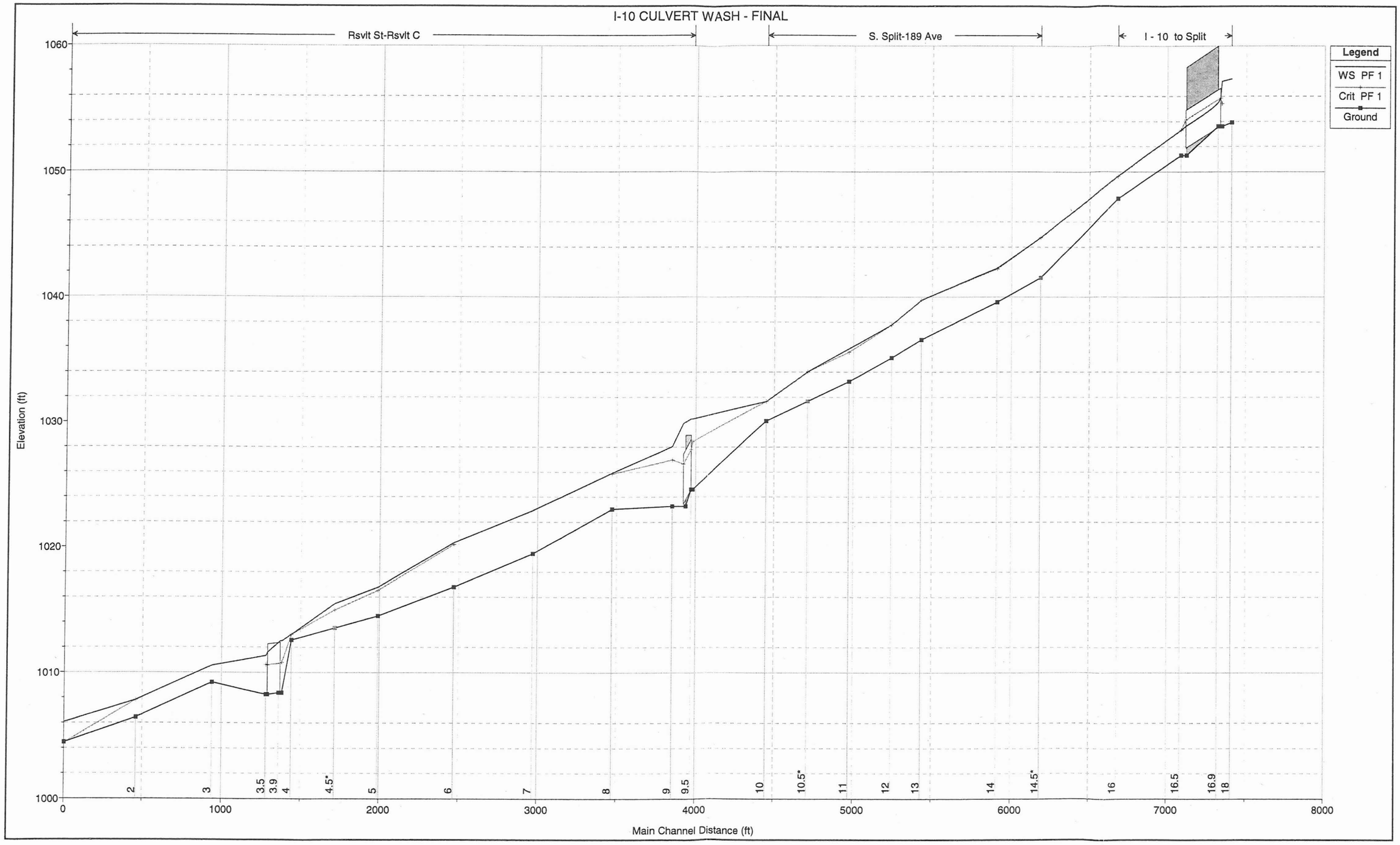
URS
7720 N. 16th Street
Phoenix, Arizona 85020
(602) 371-1100

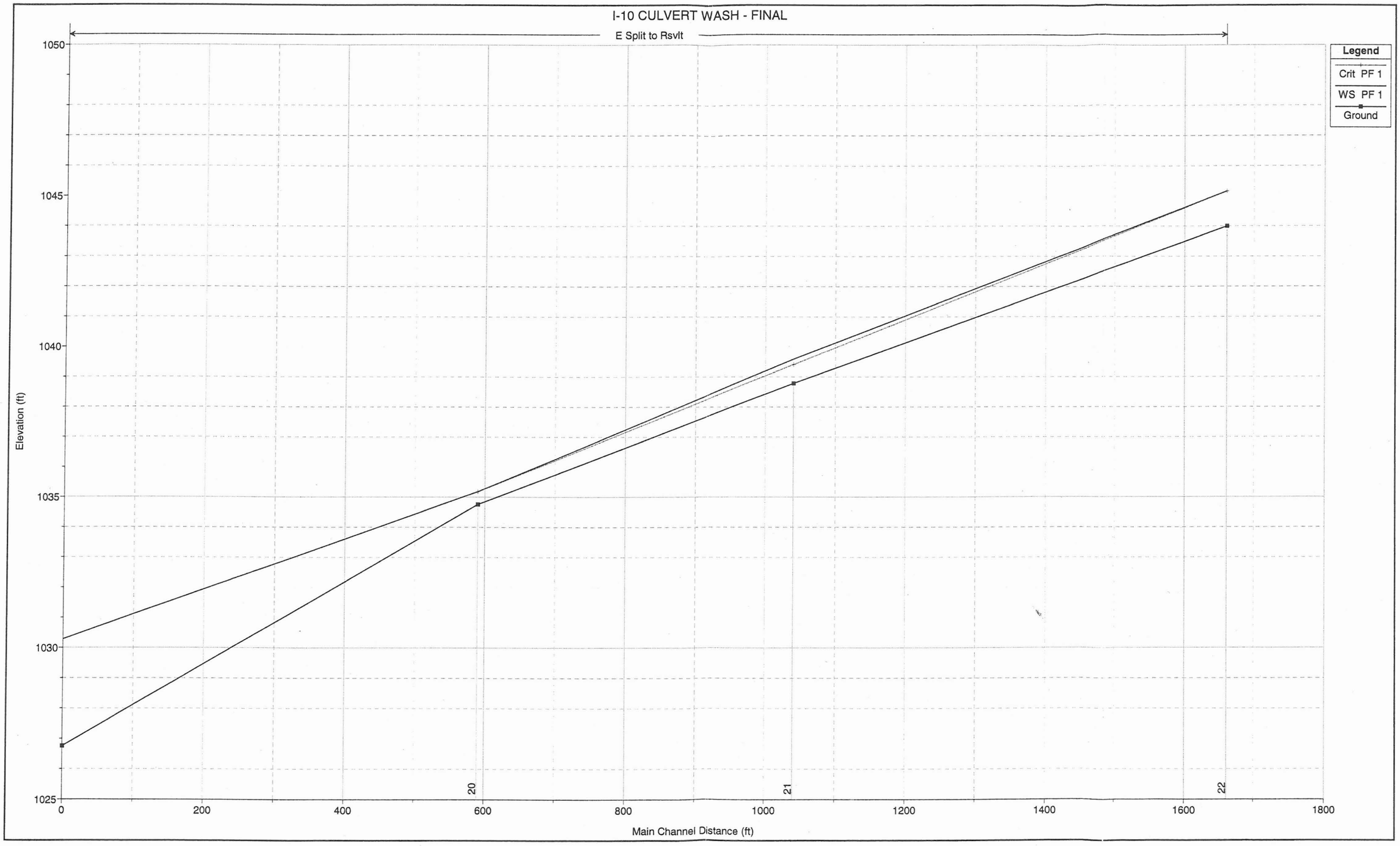
	BY	DATE
DESIGN	MKN	10-02
DESIGN CHK.	RLN	10-02
PLANS	MH	10-02
PLANS CHK.	RID	10-02

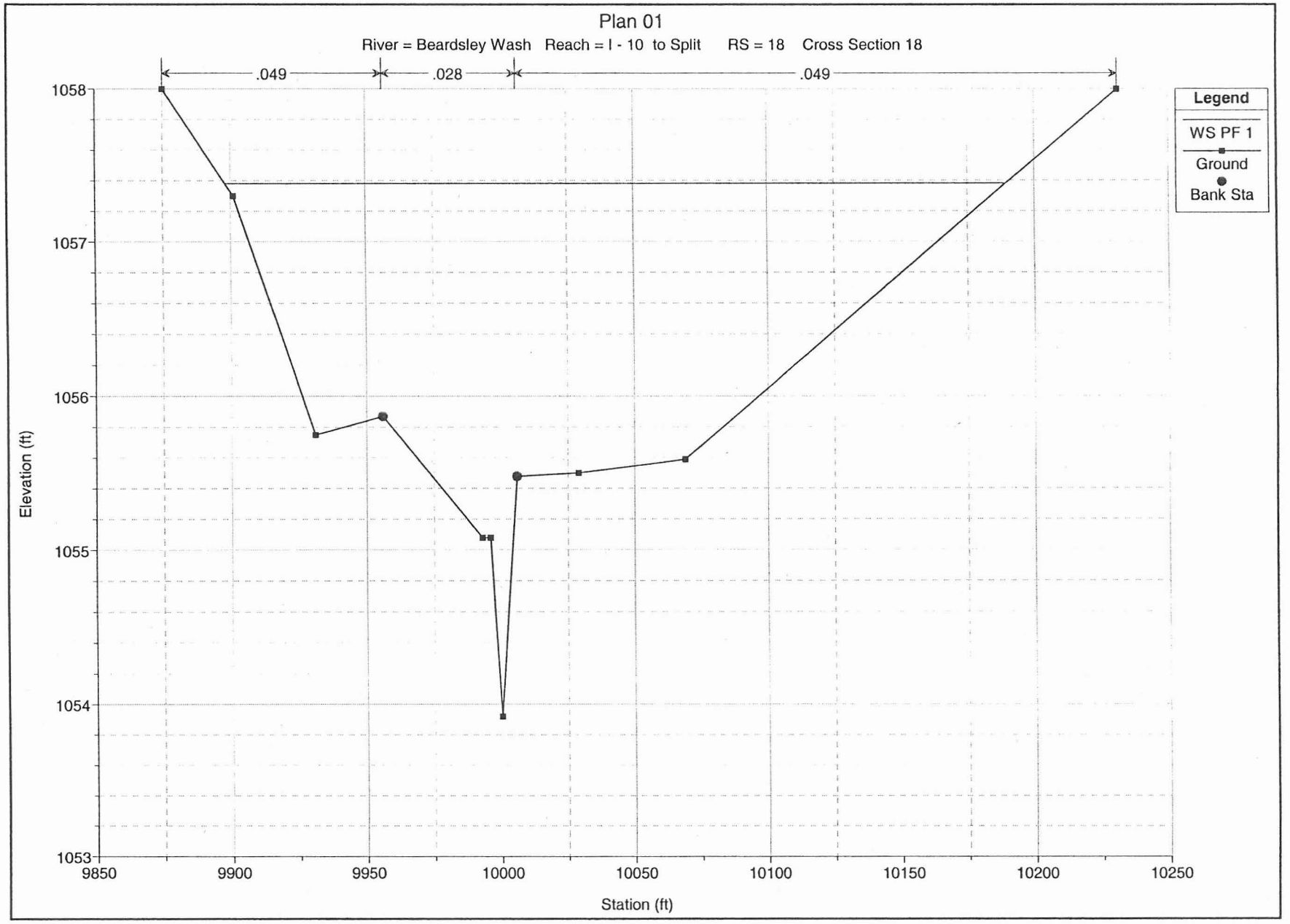
SHEET 41SE/48 OF 64

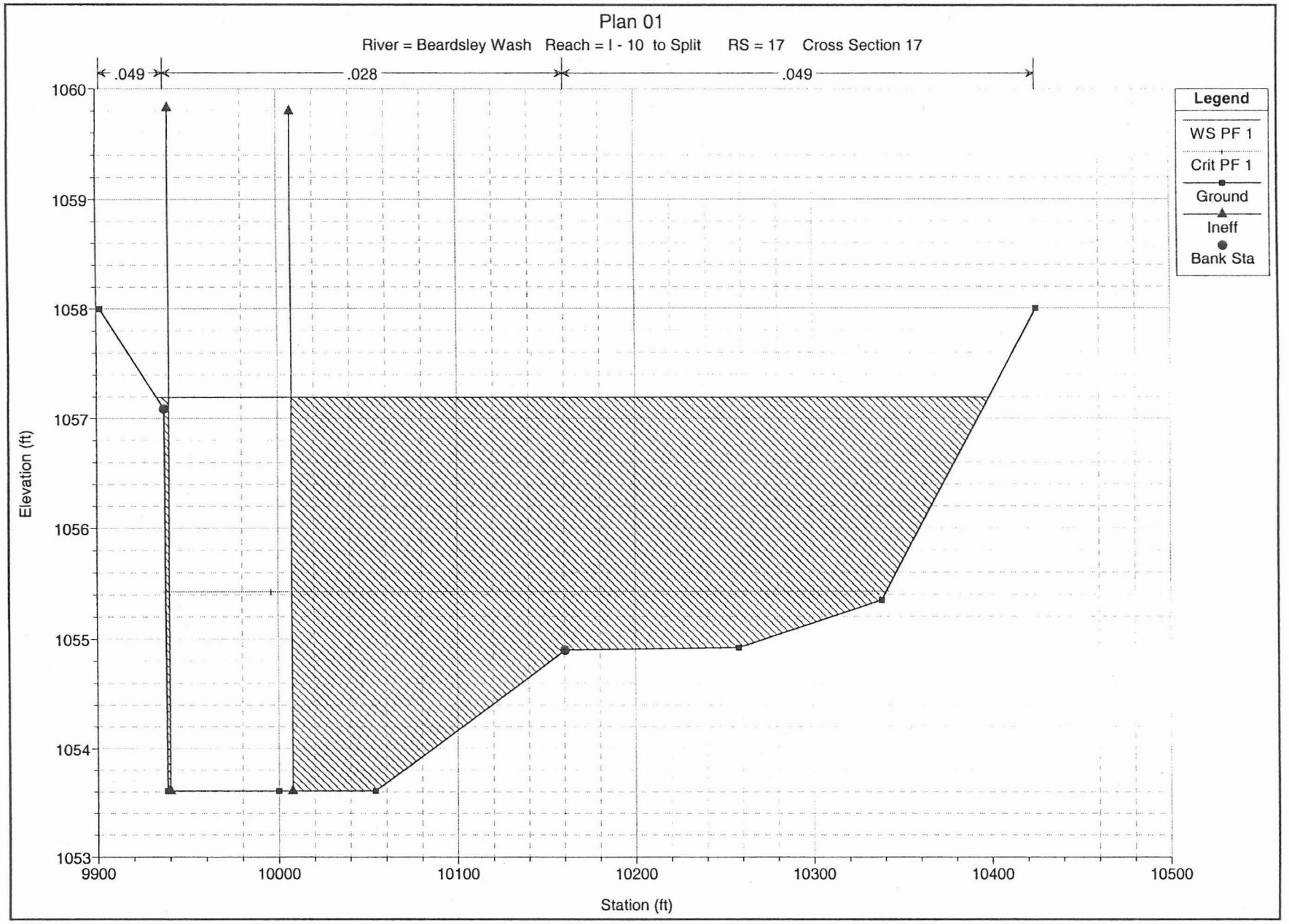
March 24, 2003

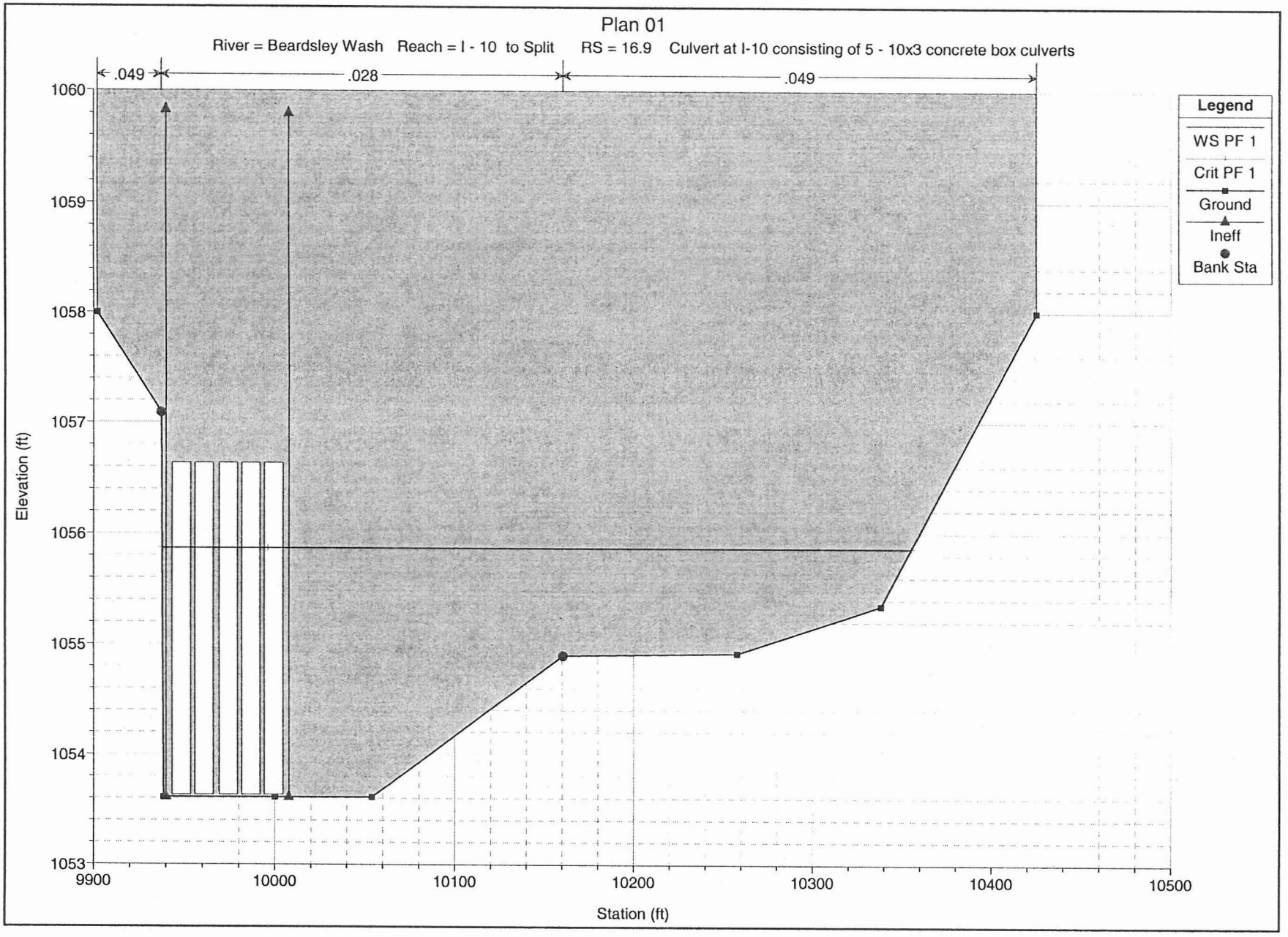
P:\FCDMC\FS3800\CAD\MAP SHEETS\FS3040-B8.DWG - LATEST REV. 2-4-03
WED, 2-12-03 9:21:33 AM PDT(MKN) FS3040_HYDR1_TOPO_400

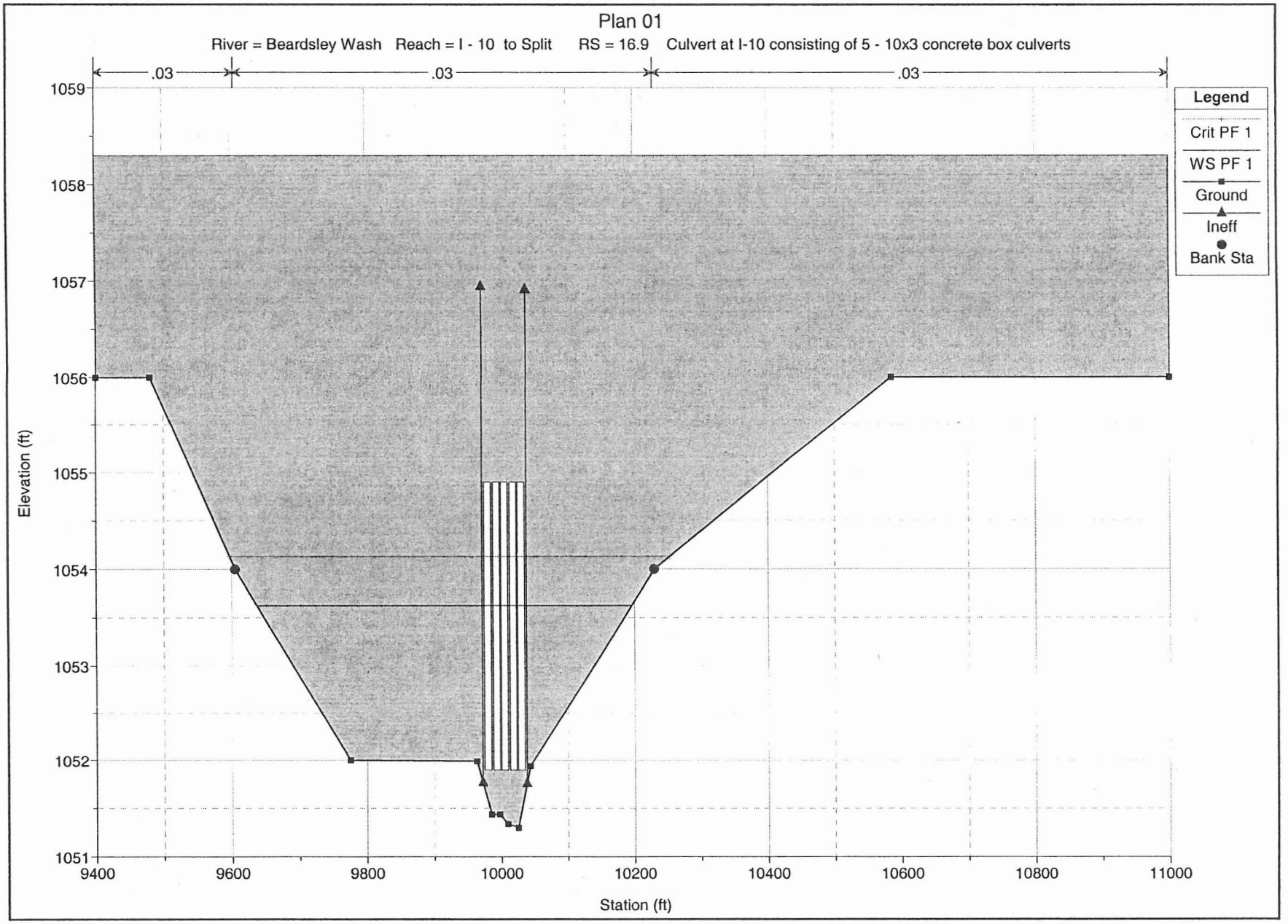

I-10 CULVERT WASH - FINAL
Rsvlt St-Rsvlt C
S. Split-189 Ave
I - 10 to Split
Legend
WS PF 1
Crit PF 1
Ground
Elevation (ft)
1060
1050
1040
1030
1020
1010
1000
0
1000
2000
3000
4000
5000
6000
7000
8000
Main Channel Distance (ft)
2
3
3.5
3.9
4
4.5*
5
6
7
8
9
9.5
10
10.5*
11
12
13
14
14.5*
16
16.5
16.9
18

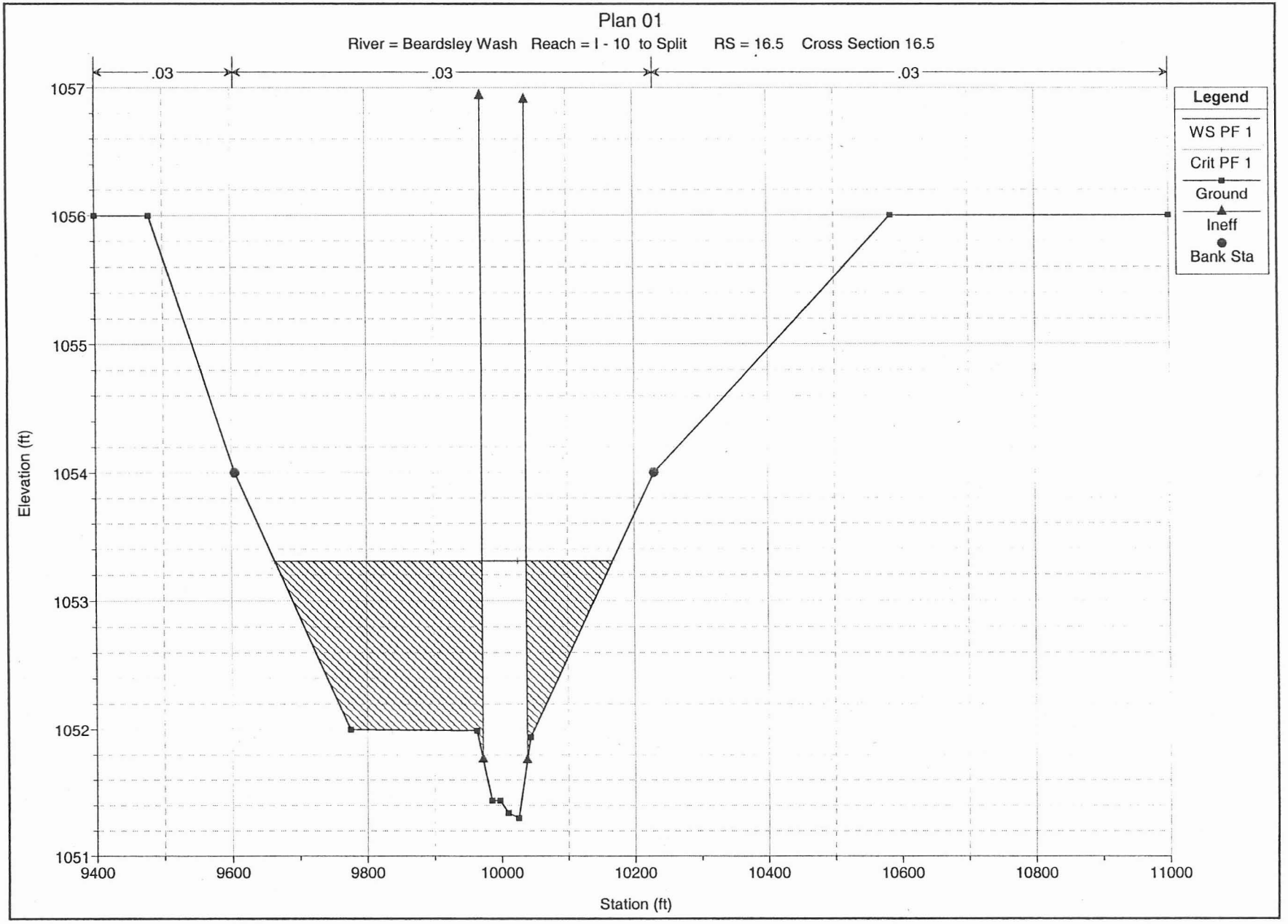

I-10 CULVERT WASH - FINAL
E Split to Rsvlt
Legend
Crit PF 1
WS PF 1
Ground
Elevation (ft)
1050
1045
1040
1035
1030
1025
0
200
400
600
800
1000
1200
1400
1600
1800
Main Channel Distance (ft)
20
21
22

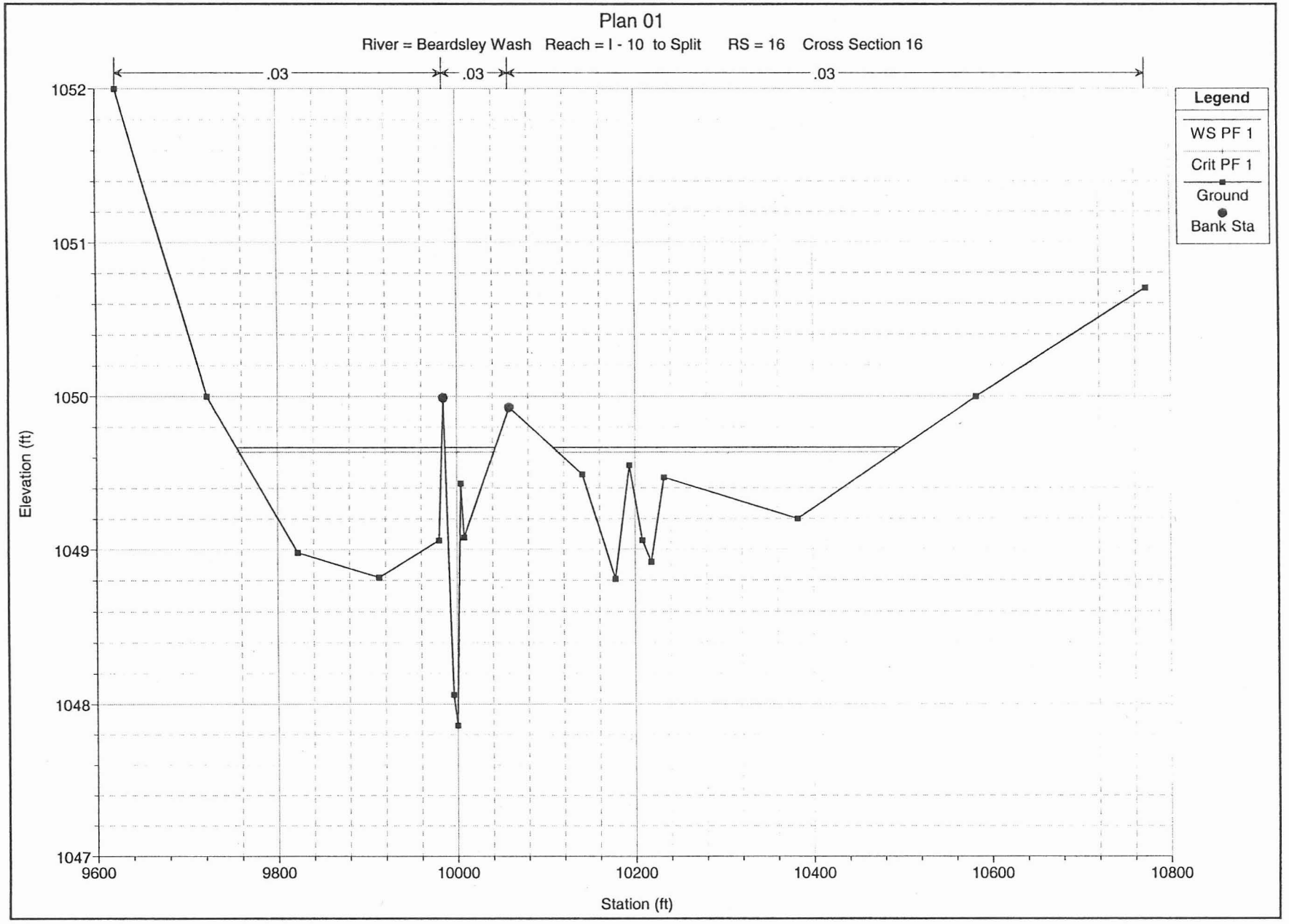

Plan 01
River = Beardsley Wash Reach = I - 10 to Split RS = 18 Cross Section 18
.049
.028
.049
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1058
1057
1056
1055
1054
1053
9850
9900
9950
10000
10050
10100
10150
10200
10250
Station (ft)

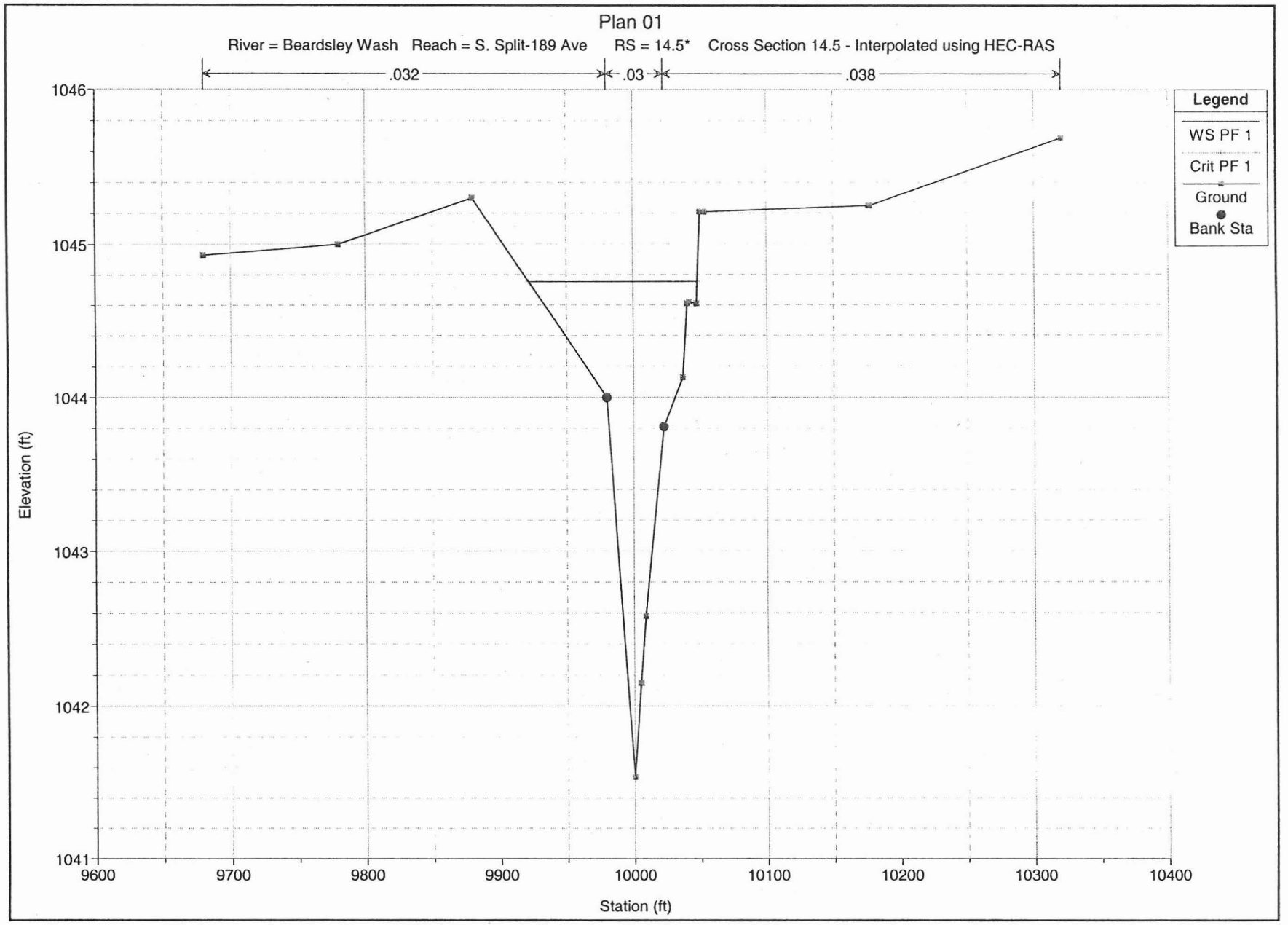

Plan 01
River = Beardsley Wash Reach = I - 10 to Split RS = 17 Cross Section 17
.049
.028
.049
Legend
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1060
1059
1058
1057
1056
1055
1054
1053
9900
10000
10100
10200
10300
10400
10500
Station (ft)

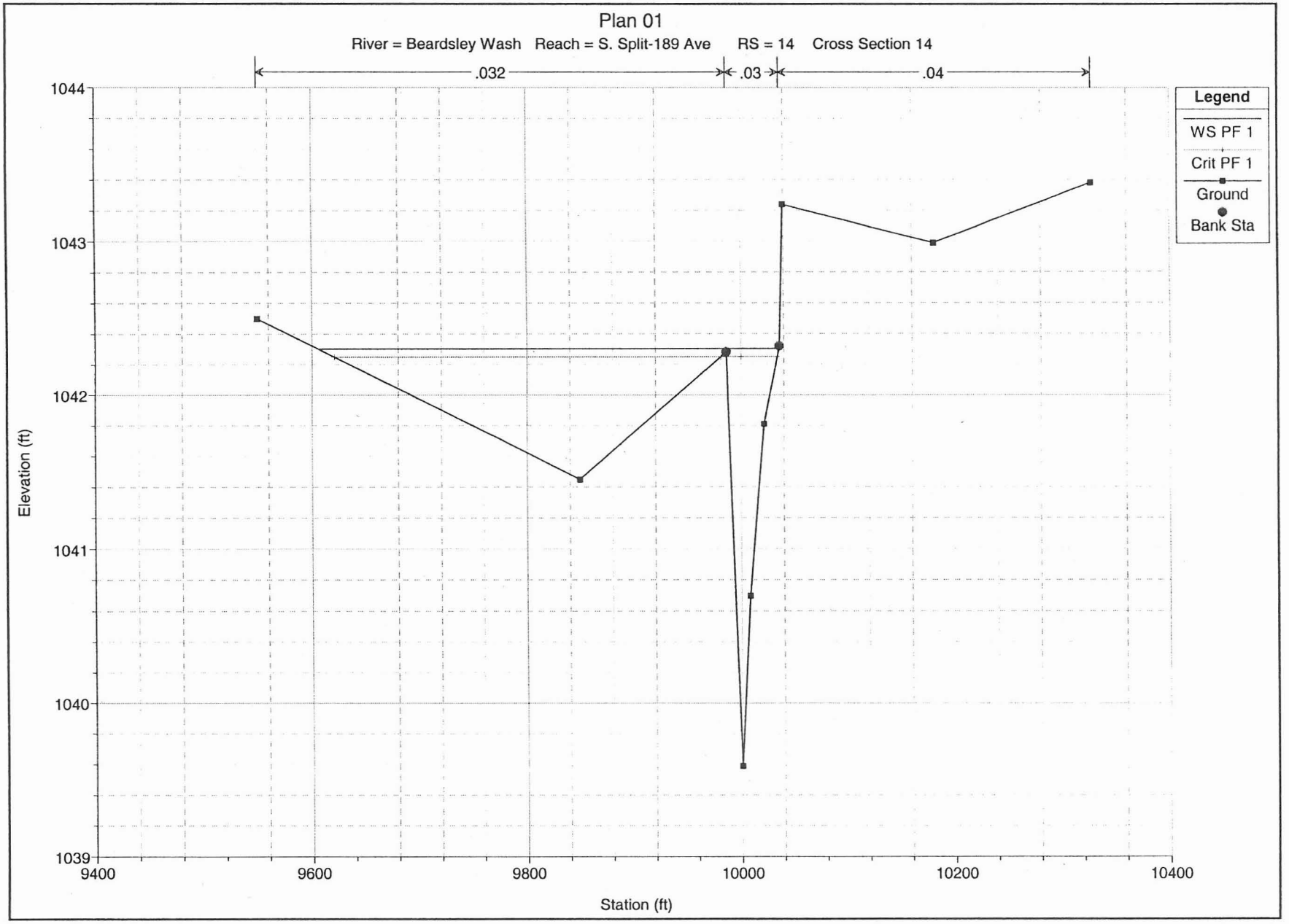

Plan 01
River = Beardsley Wash Reach = I - 10 to Split RS = 16.9 Culvert at I-10 consisting of 5 - 10x3 concrete box culverts
.049
.028
.049
Legend
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1060
1059
1058
1057
1056
1055
1054
1053
9900
10000
10100
10200
10300
10400
10500
Station (ft)

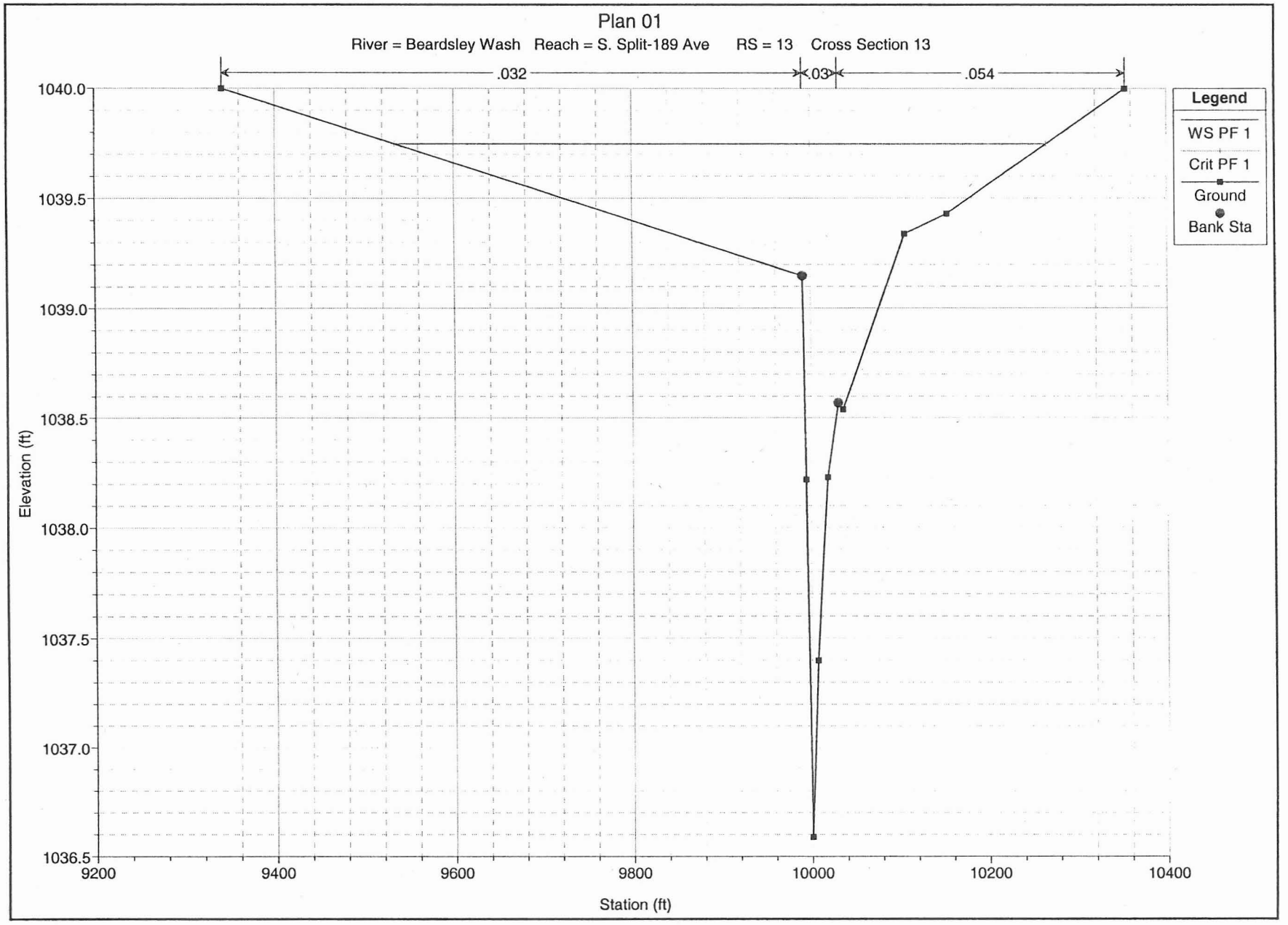

Plan 01
River = Beardsley Wash Reach = I - 10 to Split RS = 16.9 Culvert at I-10 consisting of 5 - 10x3 concrete box culverts
.03
.03
.03
Legend
Crit PF 1
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1059
1058
1057
1056
1055
1054
1053
1052
1051
9400
9600
9800
10000
10200
10400
10600
10800
11000
Station (ft)

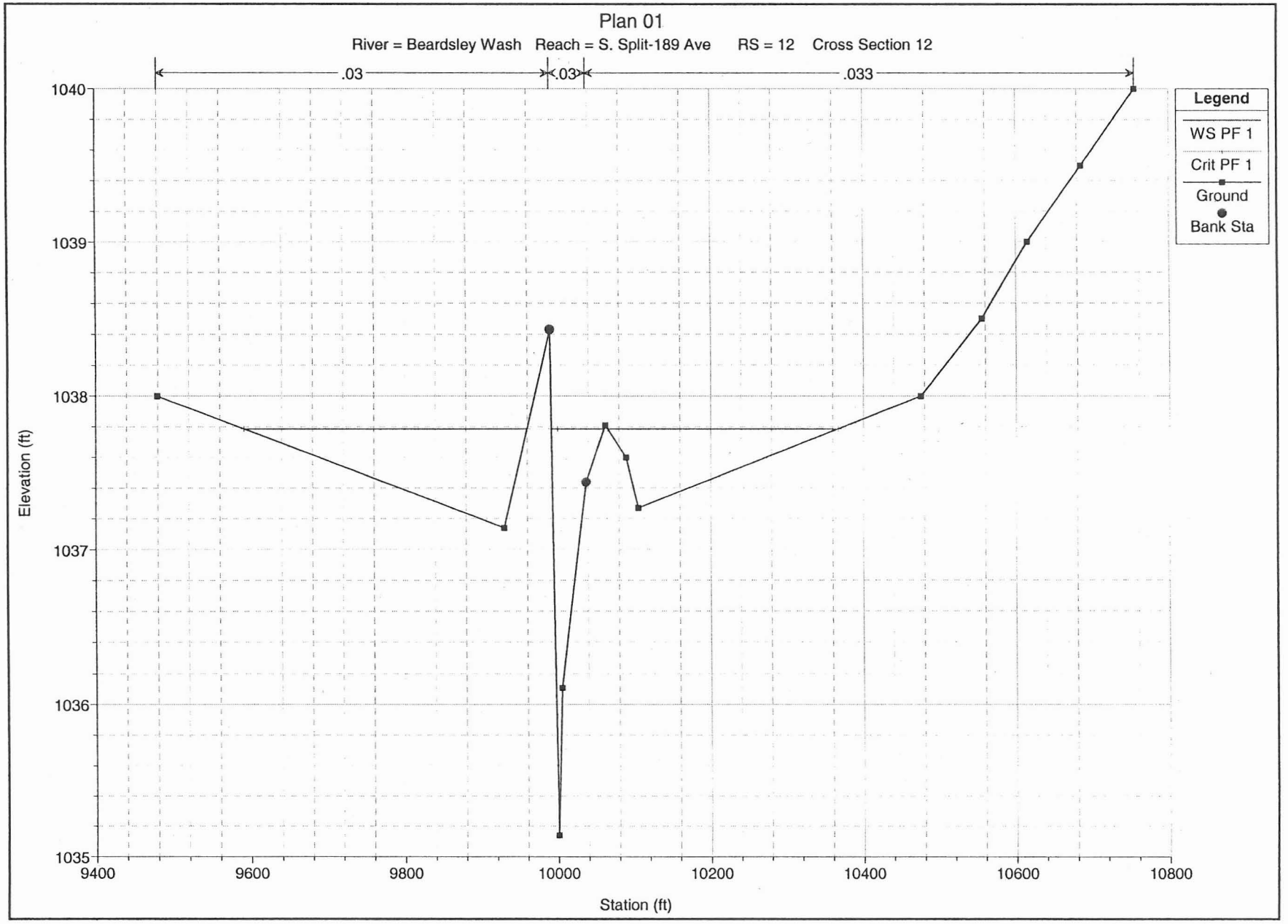

Plan 01
River = Beardsley Wash Reach = I - 10 to Split RS = 16.5 Cross Section 16.5
.03
.03
.03
Legend
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1057
1056
1055
1054
1053
1052
1051
9400
9600
9800
10000
10200
10400
10600
10800
11000
Station (ft)

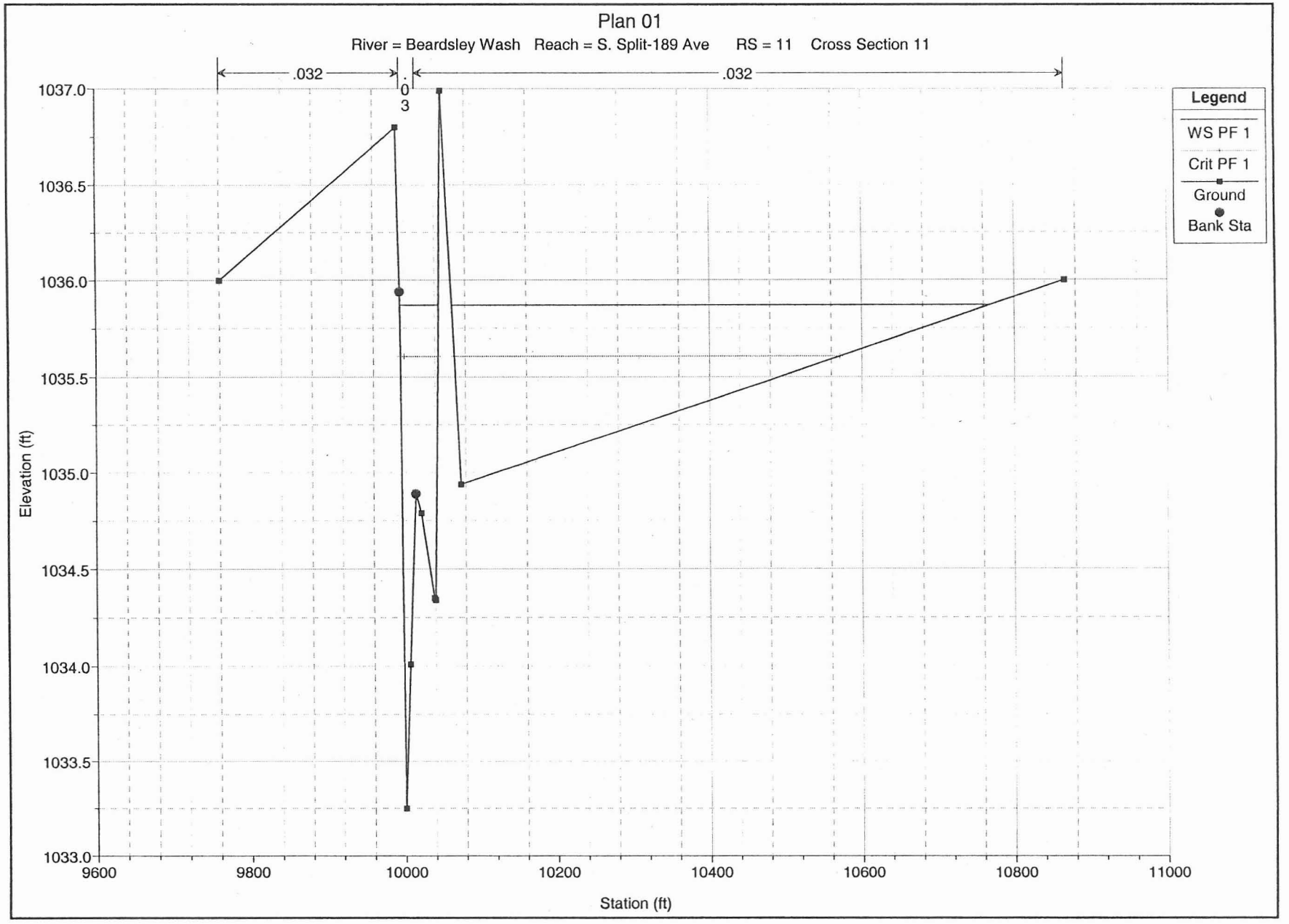

Plan 01
River = Beardsley Wash Reach = I - 10 to Split RS = 16 Cross Section 16
.03
.03
.03
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1052
1051
1050
1049
1048
1047
9600
9800
10000
10200
10400
10600
10800
Station (ft)

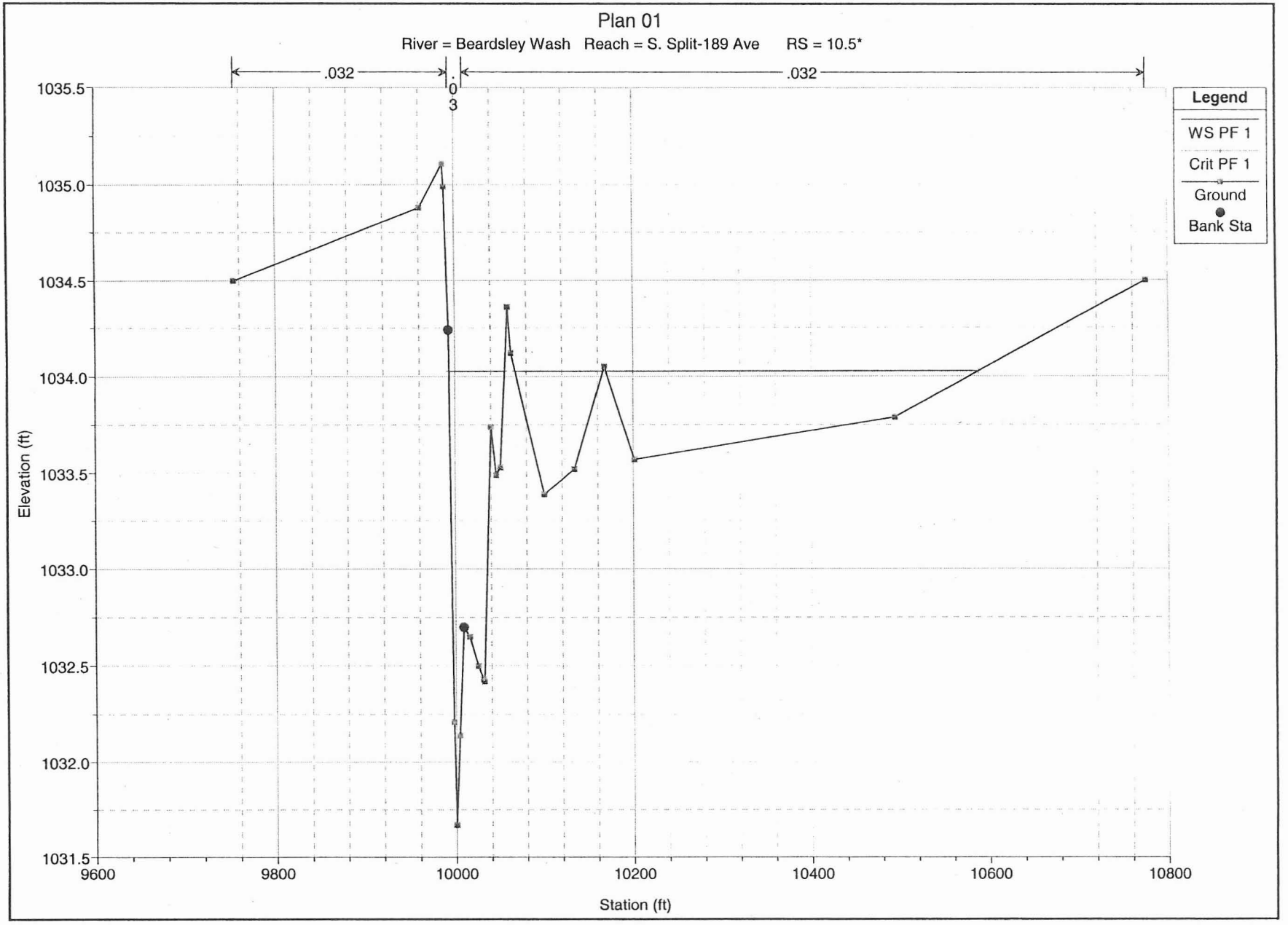

Plan 01
River = Beardsley Wash Reach = S. Split-189 Ave RS = 14.5* Cross Section 14.5 - Interpolated using HEC-RAS
.032
.03
.038
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1046
1045
1044
1043
1042
1041
9600
9700
9800
9900
10000
10100
10200
10300
10400
Station (ft)

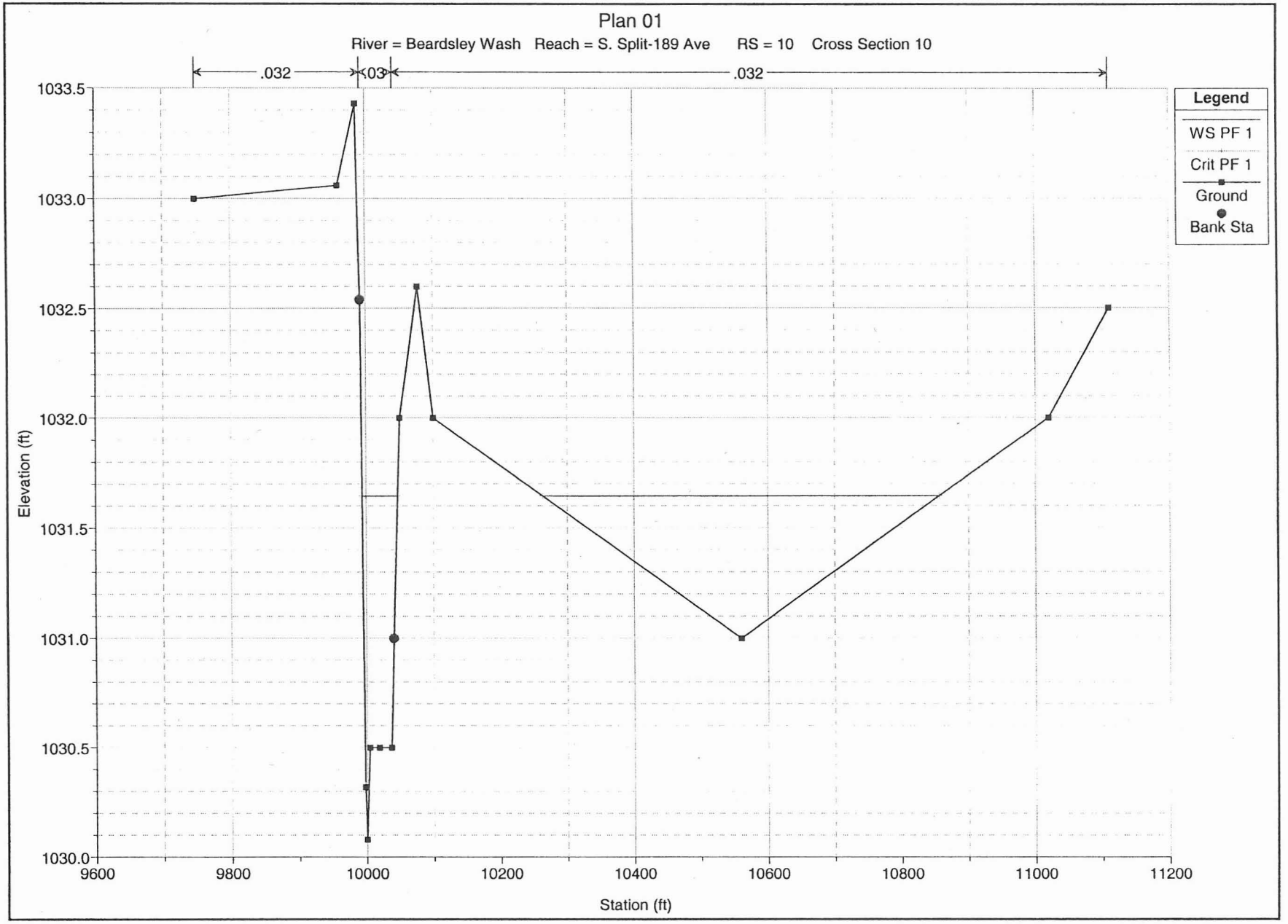

Plan 01
River = Beardsley Wash Reach = S. Split-189 Ave RS = 14 Cross Section 14
.032
.03
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1044
1043
1042
1041
1040
1039
9400
9600
9800
10000
10200
10400
Station (ft)

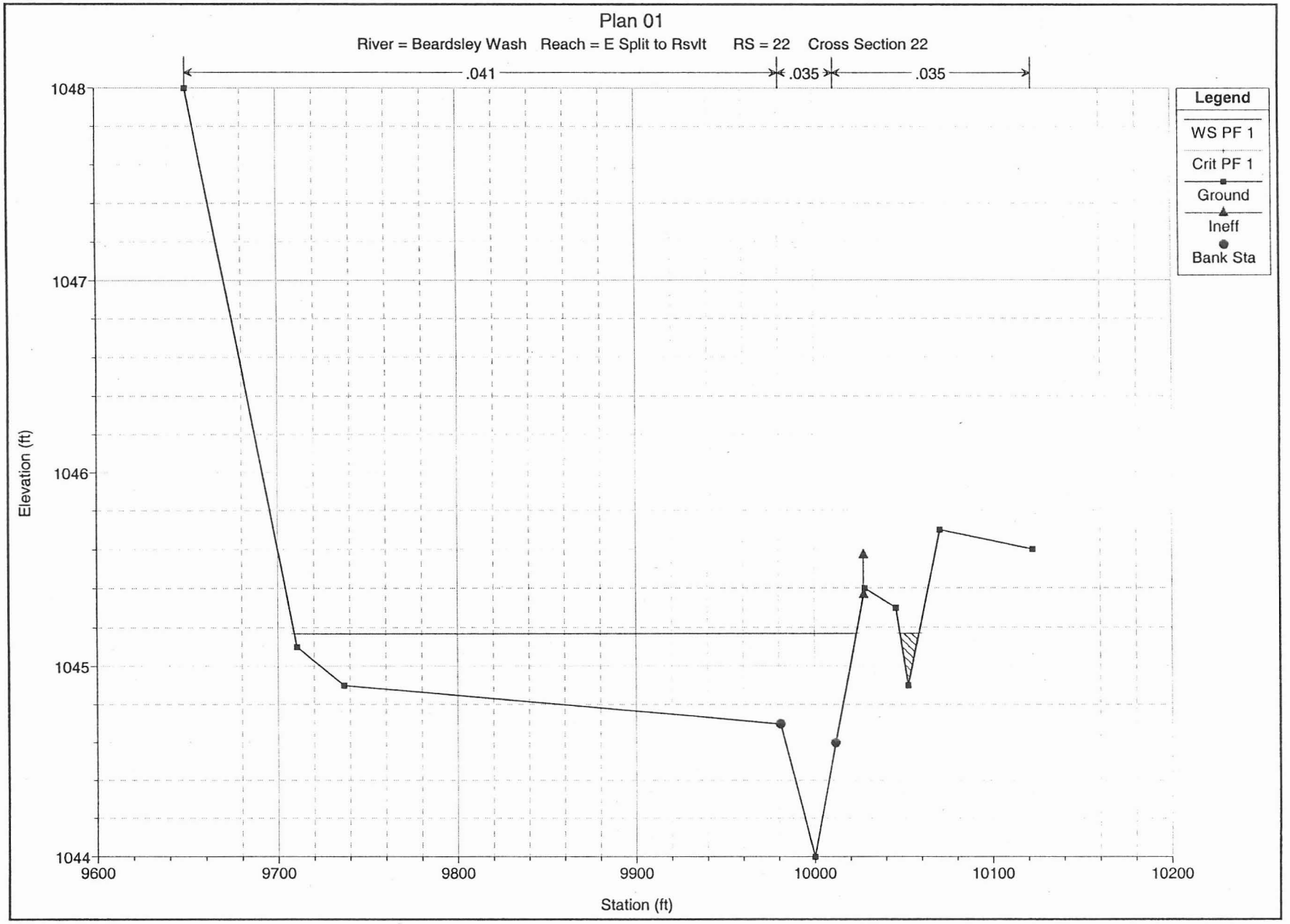

Plan 01
River = Beardsley Wash Reach = S. Split-189 Ave RS = 13 Cross Section 13
.032
.03
.054
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1040.0
1039.5
1039.0
1038.5
1038.0
1037.5
1037.0
1036.5
9200
9400
9600
9800
10000
10200
10400
Station (ft)

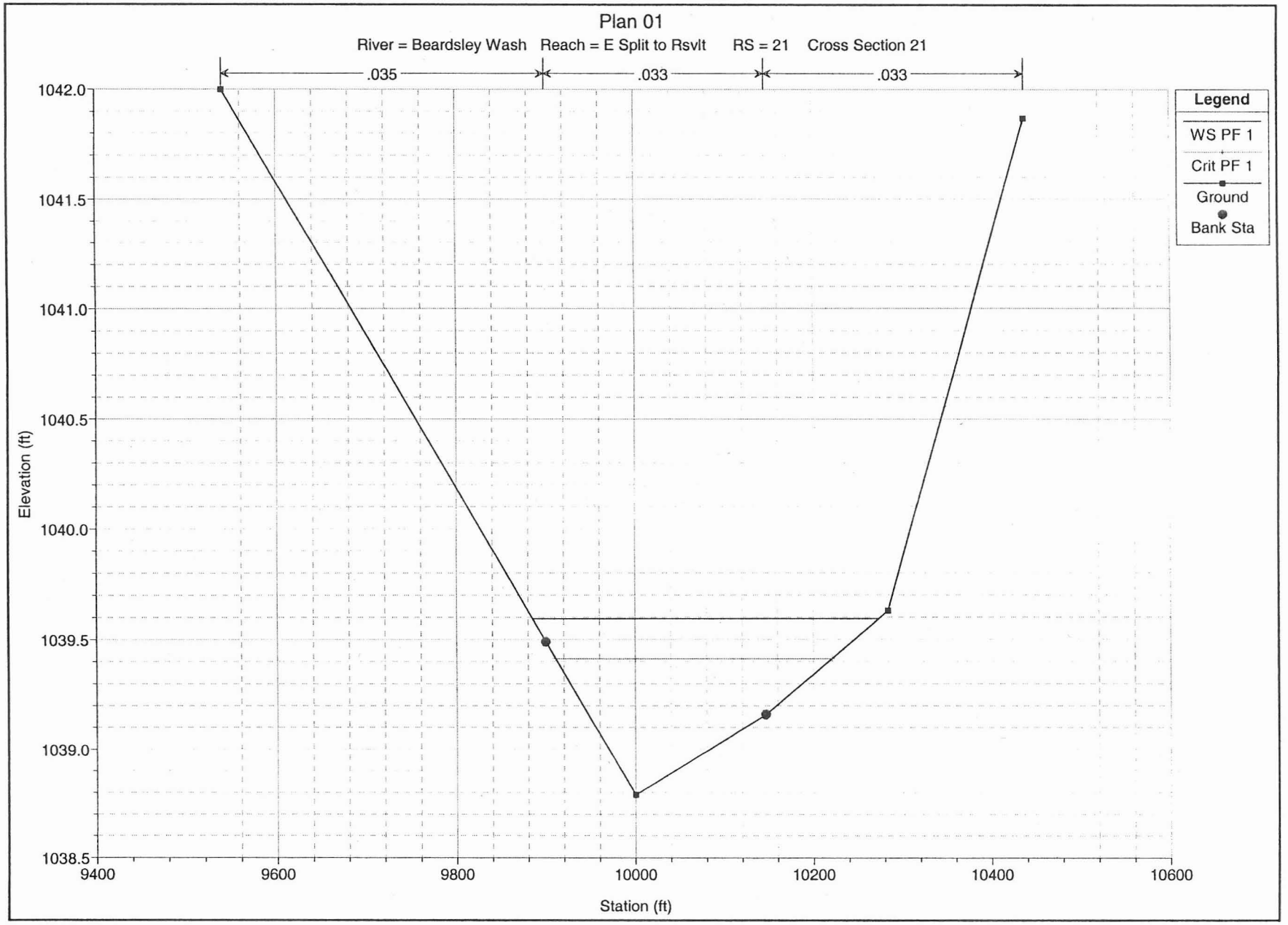

Plan 01
River = Beardsley Wash Reach = S. Split-189 Ave RS = 12 Cross Section 12
.03
.03
.033
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1040
1039
1038
1037
1036
1035
9400
9600
9800
10000
10200
10400
10600
10800
Station (ft)

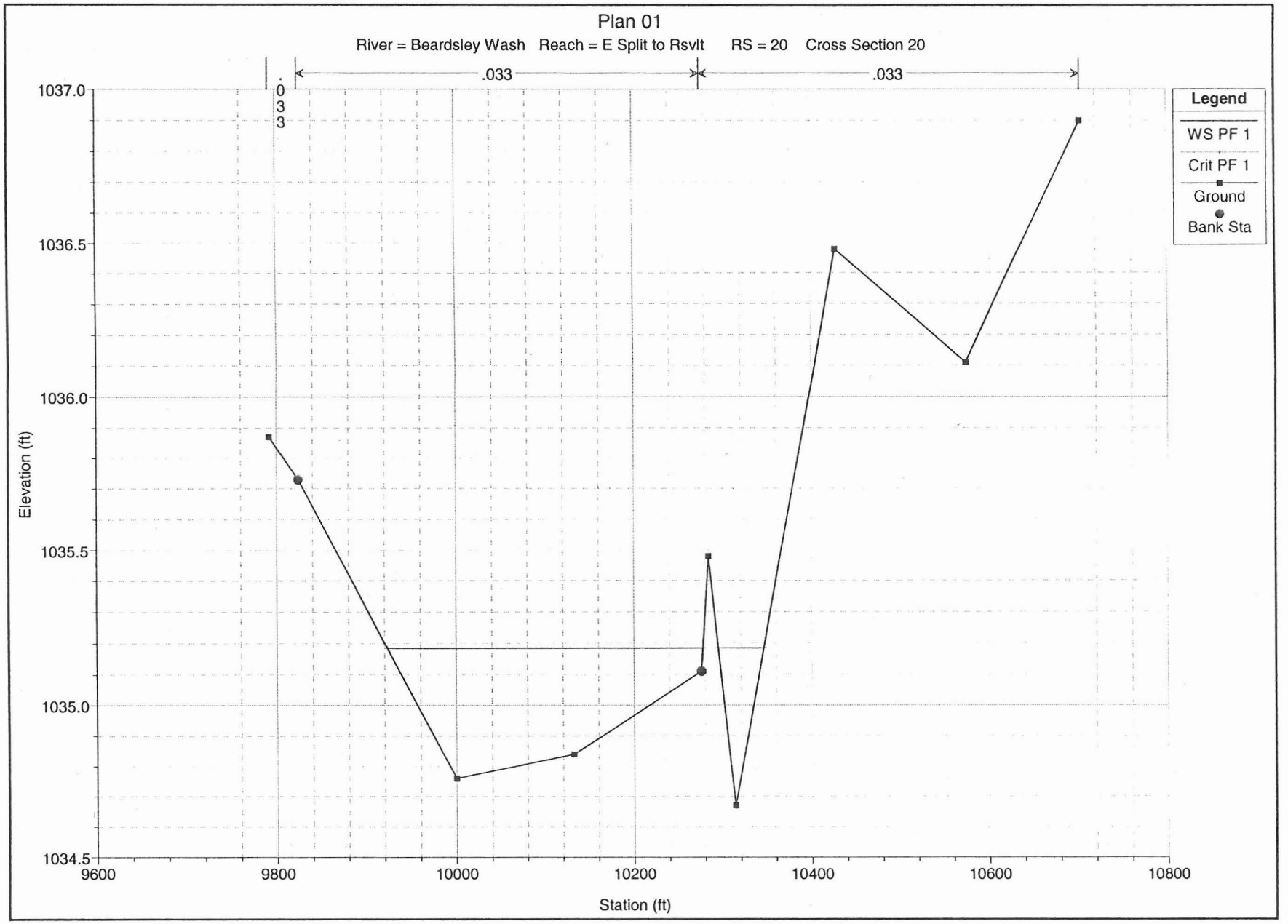

Plan 01
River = Beardsley Wash Reach = S. Split-189 Ave RS = 11 Cross Section 11
.032
.03
.032
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1037.0
1036.5
1036.0
1035.5
1035.0
1034.5
1034.0
1033.5
1033.0
9600
9800
10000
10200
10400
10600
10800
11000
Station (ft)

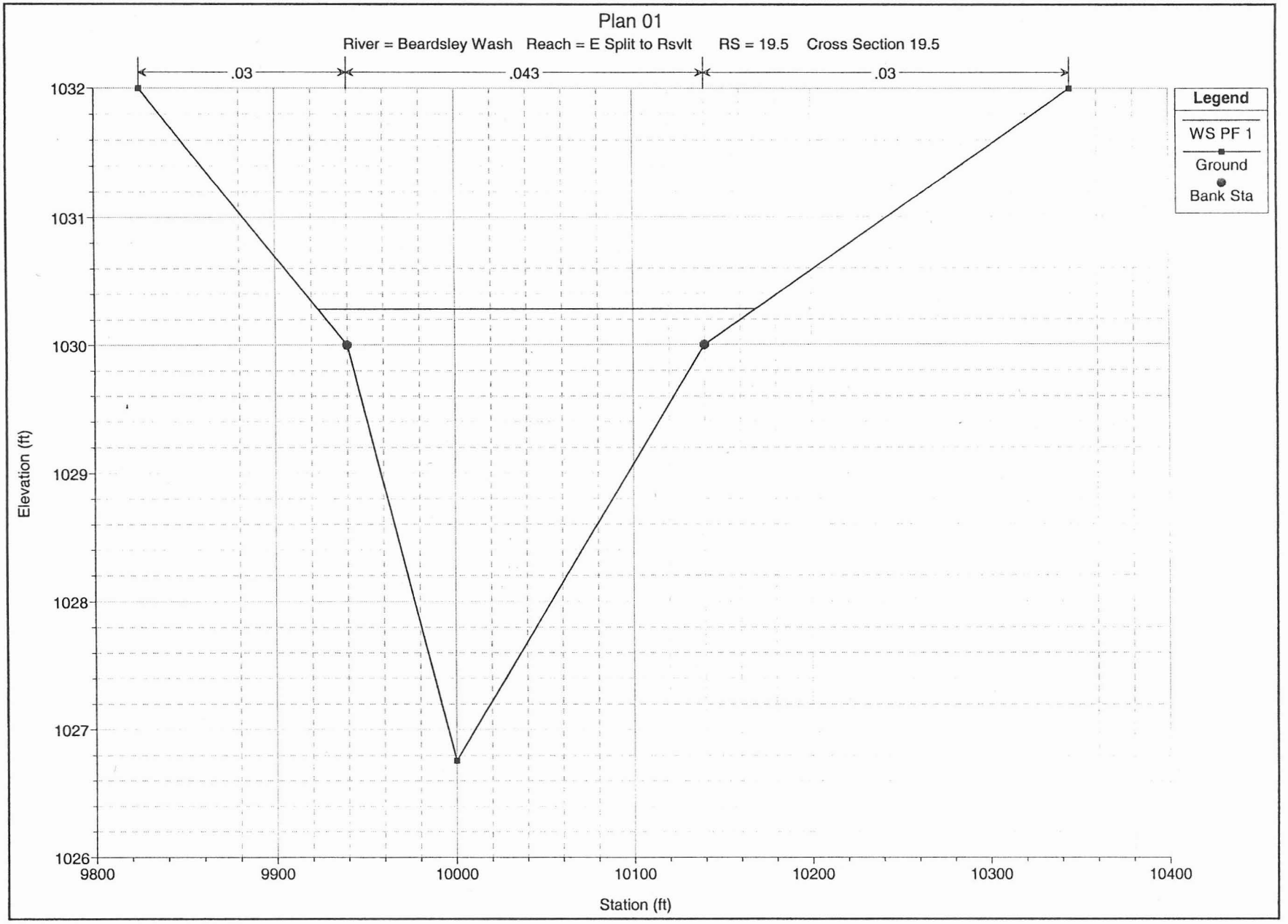

Plan 01
River = Beardsley Wash Reach = S. Split-189 Ave RS = 10.5*
.032
.03
.032
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1035.5
1035.0
1034.5
1034.0
1033.5
1033.0
1032.5
1032.0
1031.5
9600
9800
10000
10200
10400
10600
10800
Station (ft)

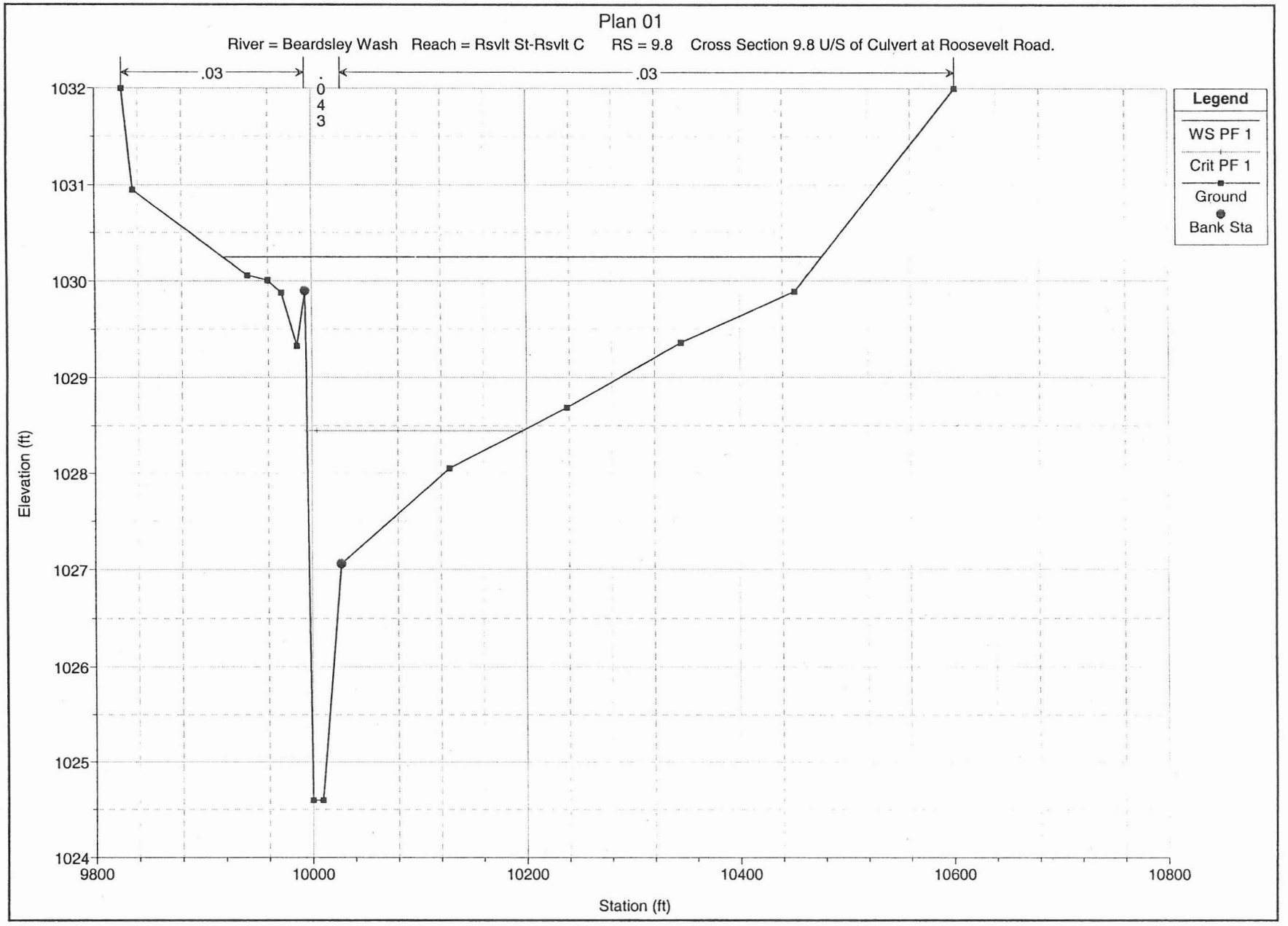

Plan 01
River = Beardsley Wash Reach = S. Split-189 Ave RS = 10 Cross Section 10
.032
.03
.032
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1033.5
1033.0
1032.5
1032.0
1031.5
1031.0
1030.5
1030.0
9600
9800
10000
10200
10400
10600
10800
11000
11200
Station (ft)

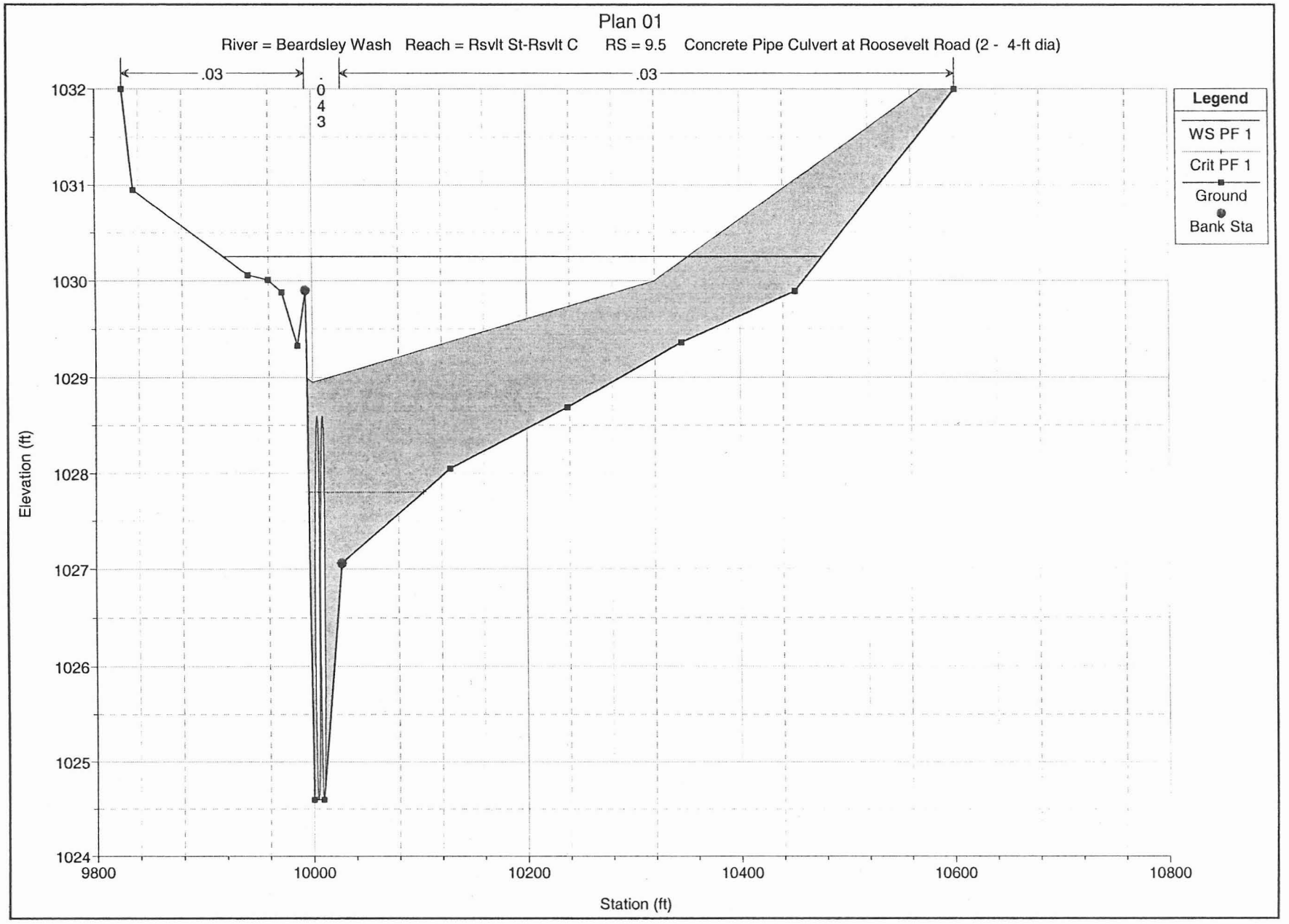

Plan 01
River = Beardsley Wash Reach = E Split to Rsvlt RS = 22 Cross Section 22
.041
.035
.035
Legend
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1048
1047
1046
1045
1044
9600
9700
9800
9900
10000
10100
10200
Station (ft)

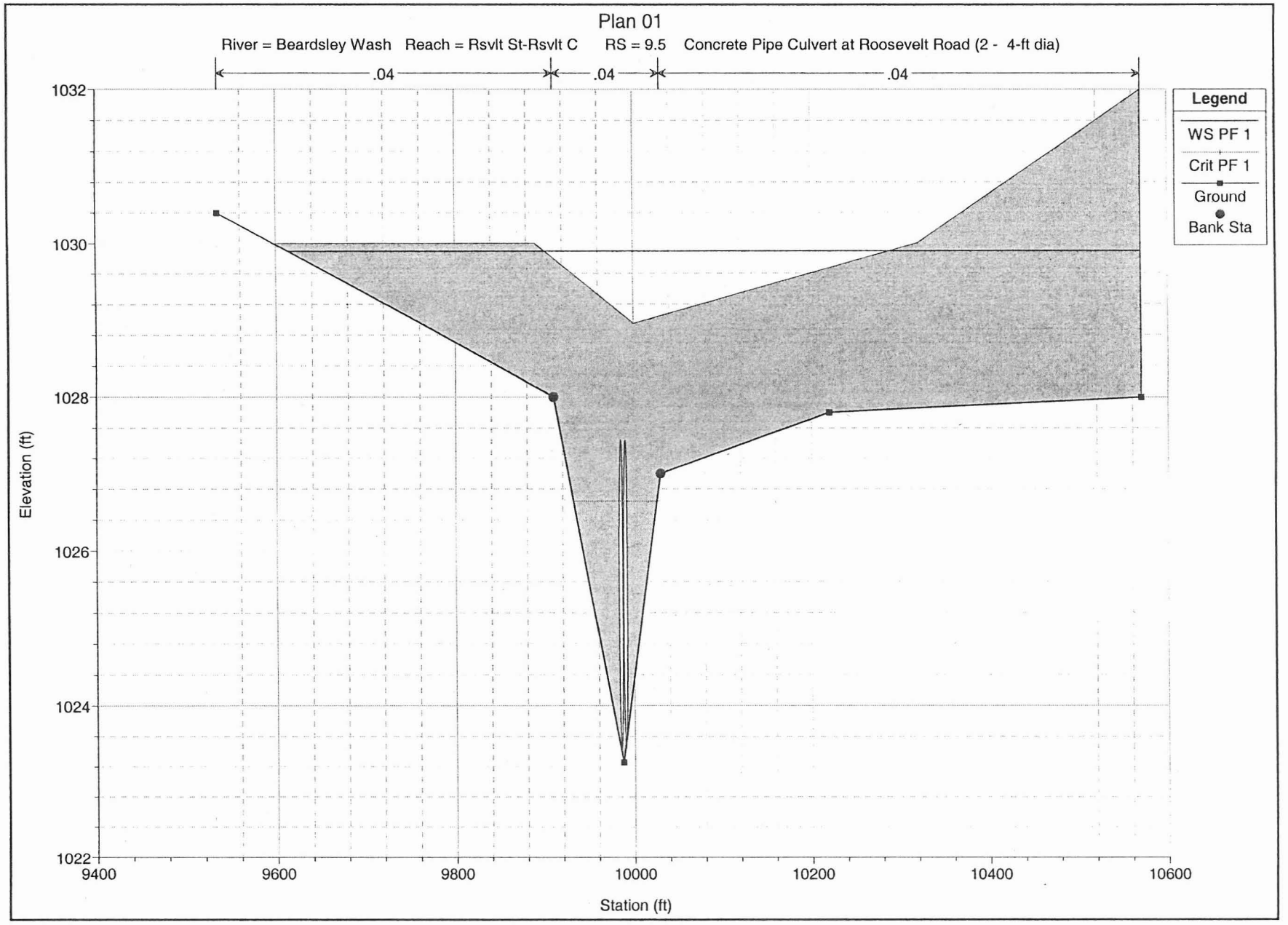

Plan 01
River = Beardsley Wash Reach = E Split to Rsvlt RS = 21 Cross Section 21
.035
.033
.033
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1042.0
1041.5
1041.0
1040.5
1040.0
1039.5
1039.0
1038.5
9400
9600
9800
10000
10200
10400
10600
Station (ft)

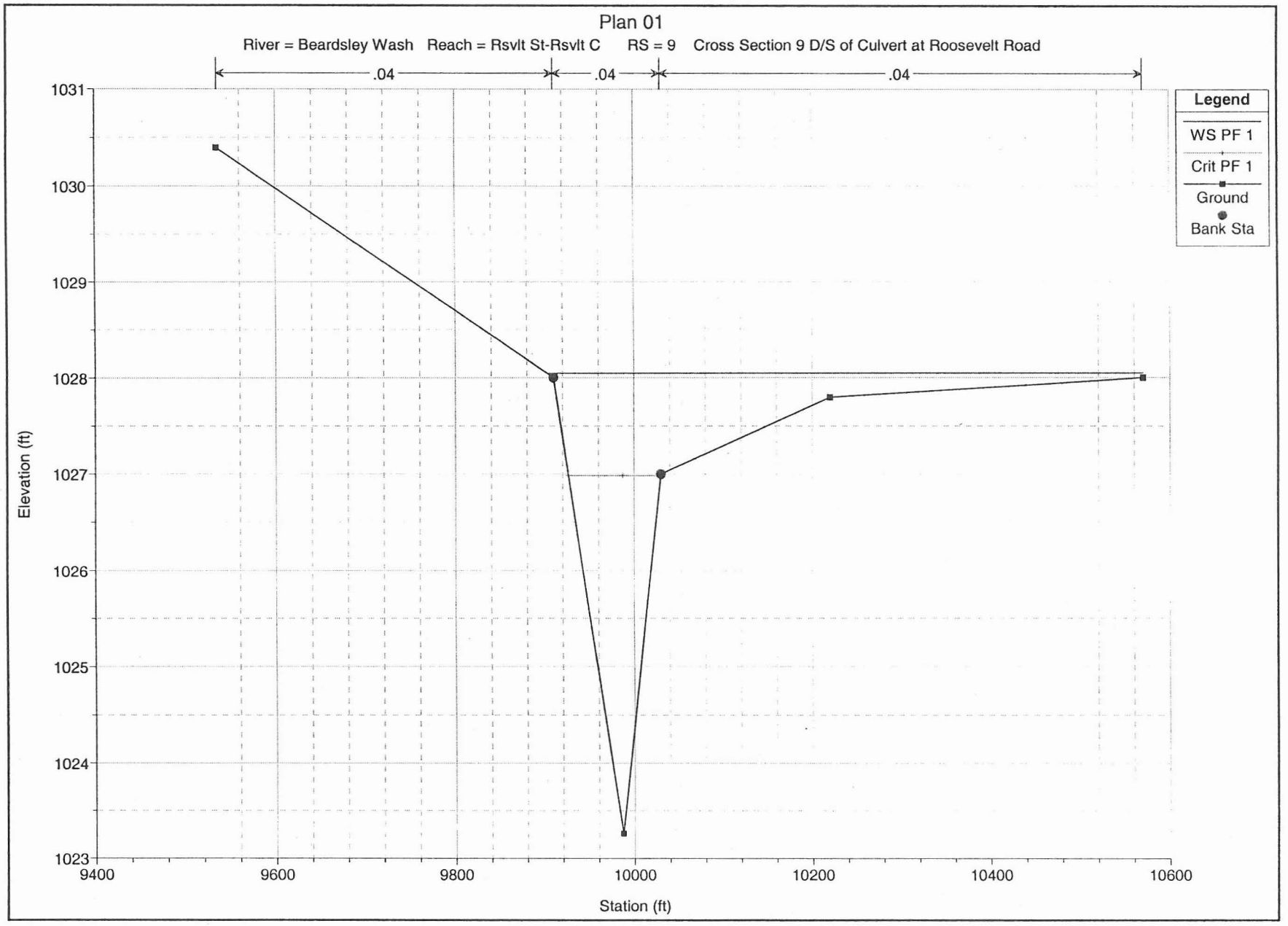

Plan 01
River = Beardsley Wash Reach = E Split to Rsvlt RS = 20 Cross Section 20
.033
.033
.033
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1037.0
1036.5
1036.0
1035.5
1035.0
1034.5
9600
9800
10000
10200
10400
10600
10800
Station (ft)

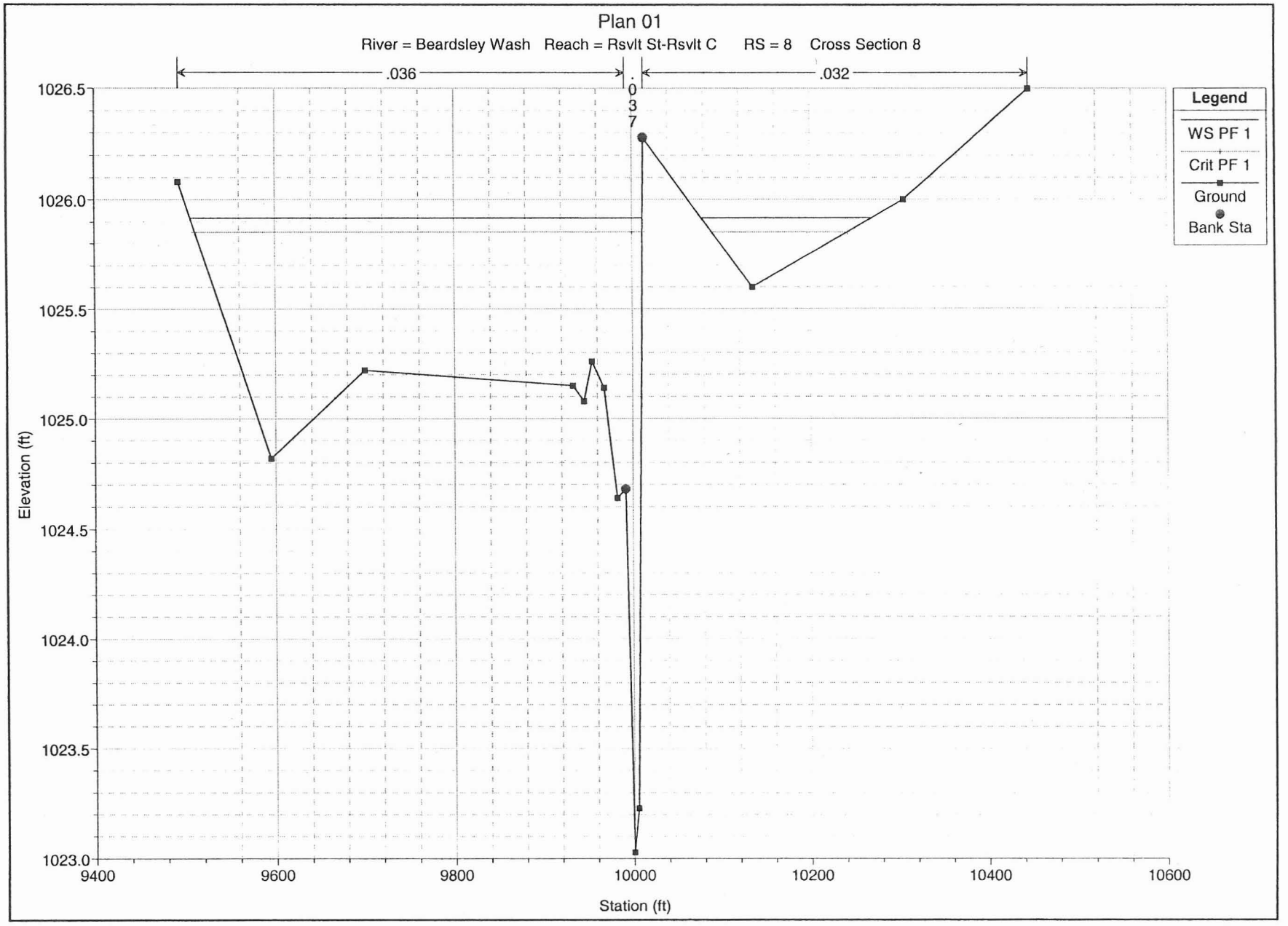

Plan 01
River = Beardsley Wash Reach = E Split to Rsvlt RS = 19.5 Cross Section 19.5
.03
.043
.03
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1032
1031
1030
1029
1028
1027
1026
9800
9900
10000
10100
10200
10300
10400
Station (ft)

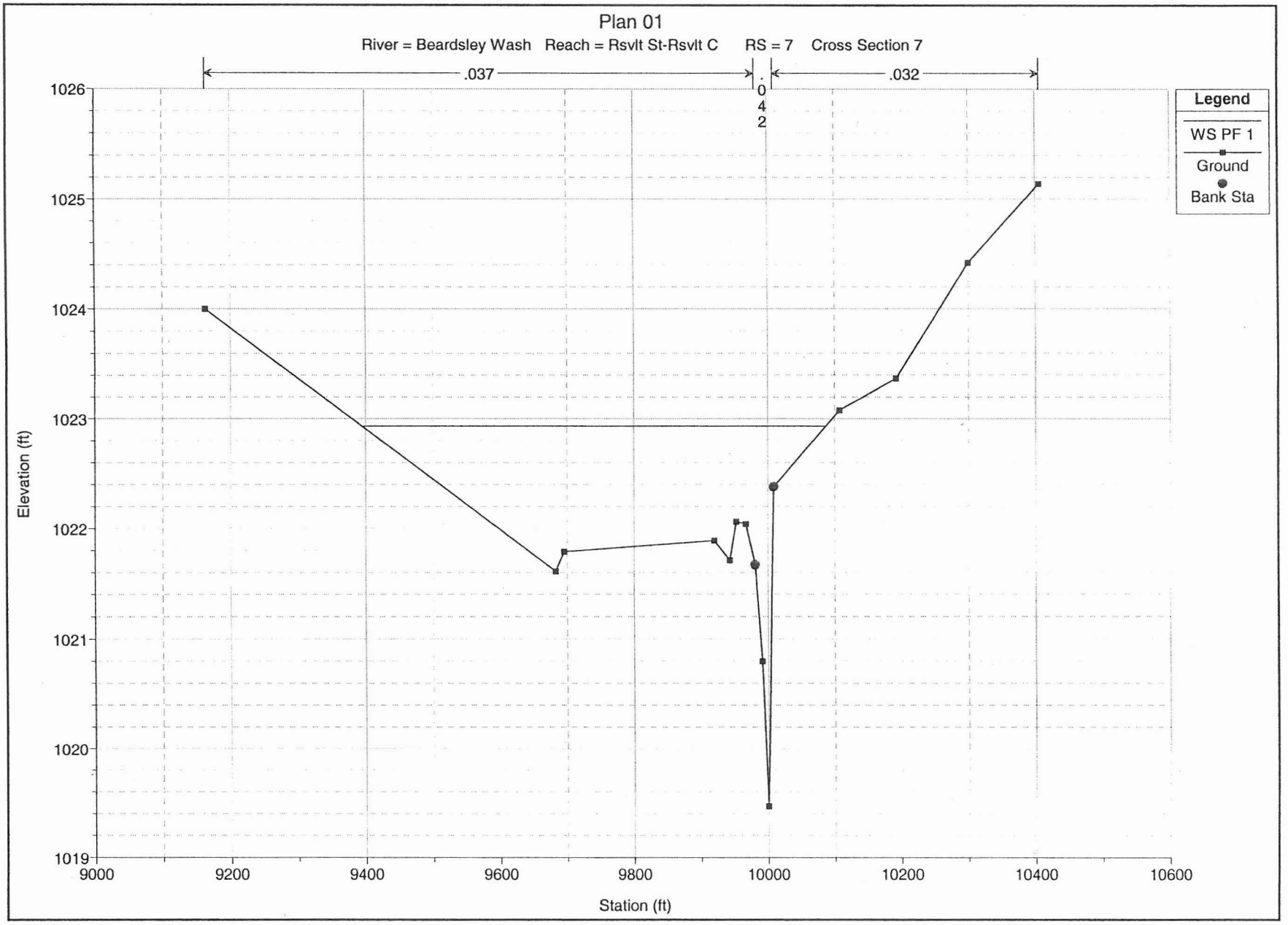

Plan 01
River = Beardsley Wash Reach = Rsvlt St-Rsvlt C RS = 9.8 Cross Section 9.8 U/S of Culvert at Roosevelt Road.
.03
.043
.03
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1032
1031
1030
1029
1028
1027
1026
1025
1024
9800
10000
10200
10400
10600
10800
Station (ft)

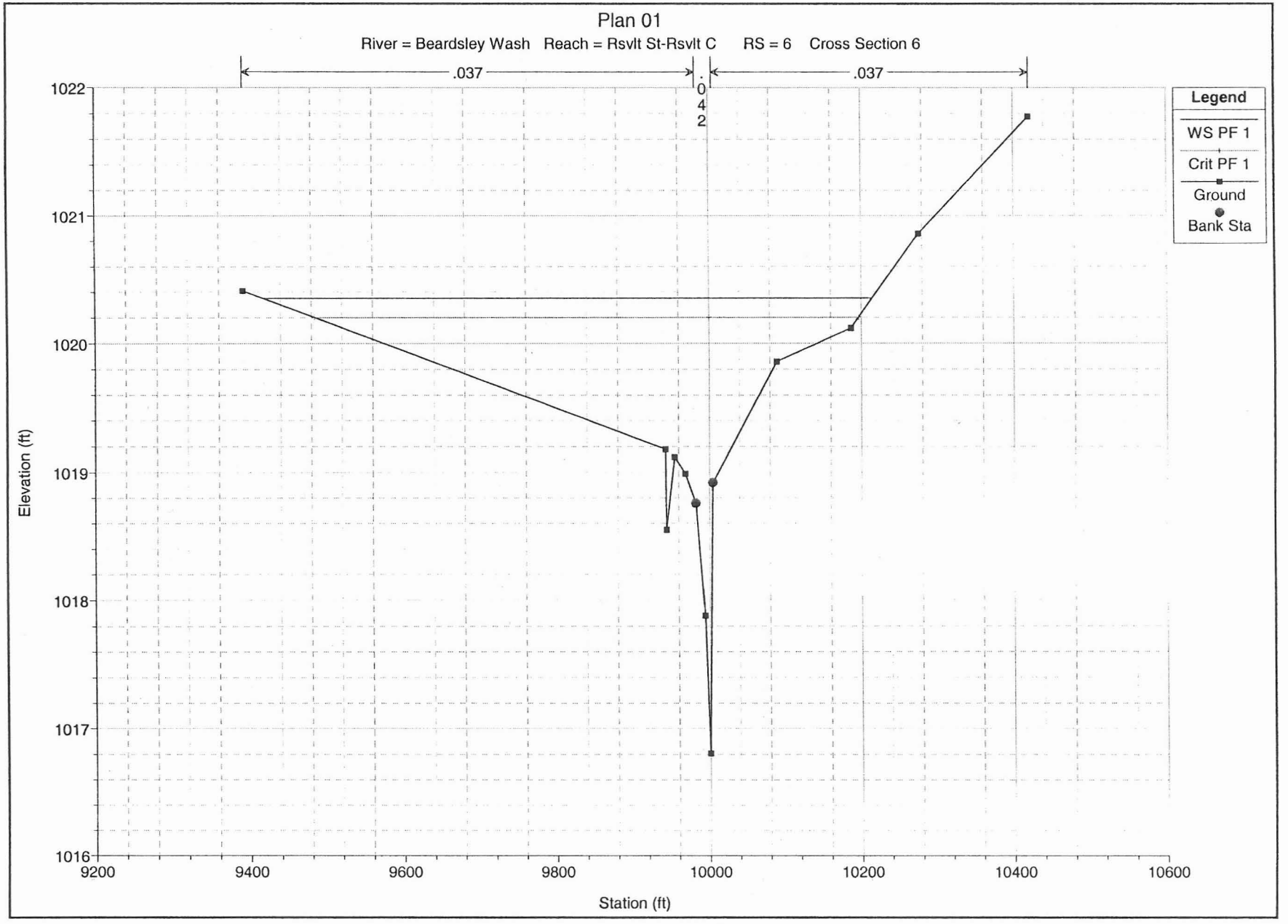

Plan 01
River = Beardsley Wash Reach = Rsvlt St-Rsvlt C RS = 9.5 Concrete Pipe Culvert at Roosevelt Road (2 - 4-ft dia)
.03
.043
.03
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1032
1031
1030
1029
1028
1027
1026
1025
1024
9800
10000
10200
10400
10600
10800
Station (ft)

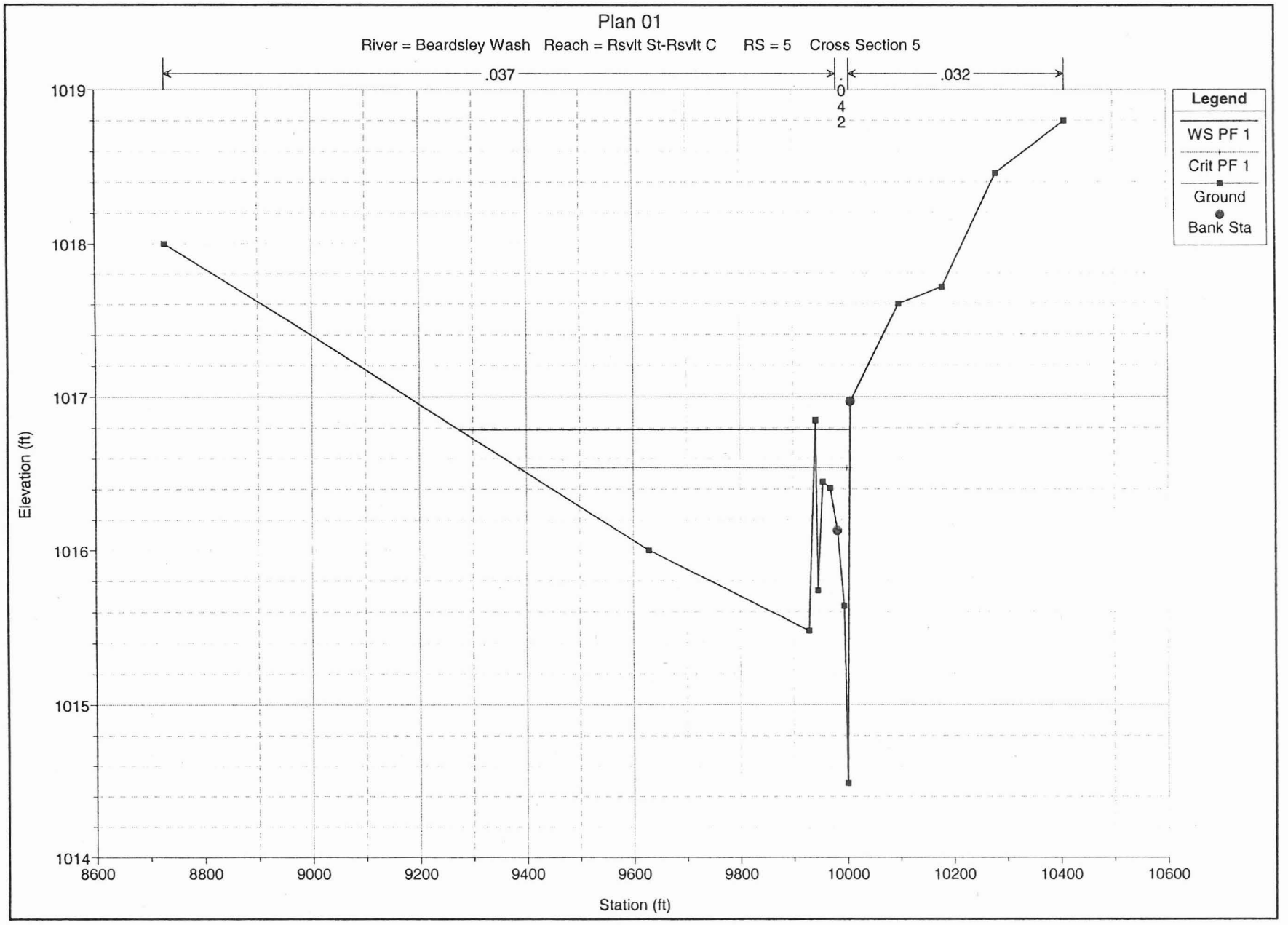

Plan 01
River = Beardsley Wash Reach = Rsvlt St-Rsvlt C RS = 9.5 Concrete Pipe Culvert at Roosevelt Road (2 - 4-ft dia)
.04
.04
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1032
1030
1028
1026
1024
1022
9400
9600
9800
10000
10200
10400
10600
Station (ft)

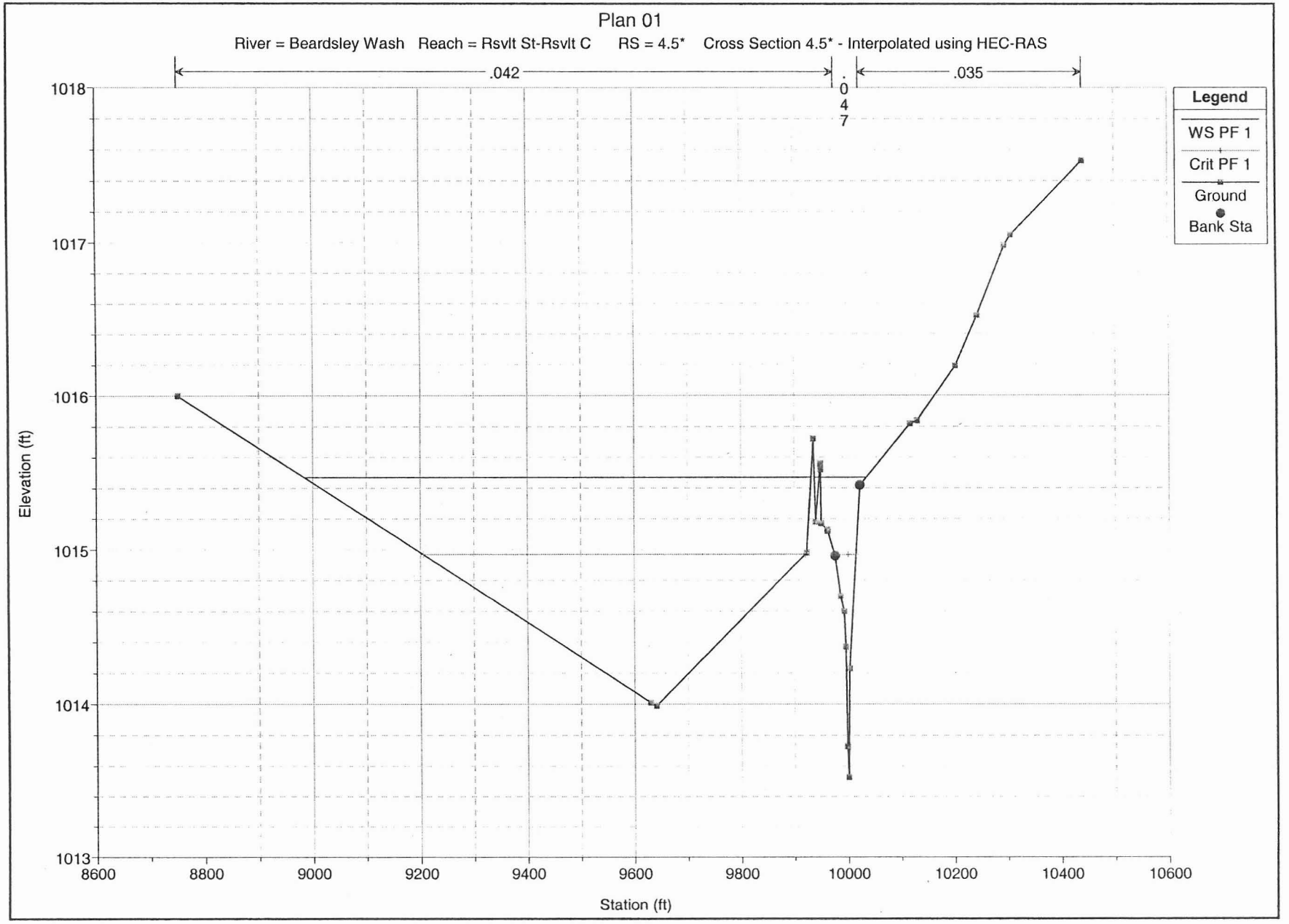

Plan 01
River = Beardsley Wash Reach = Rsvlt St-Rsvlt C RS = 9 Cross Section 9 D/S of Culvert at Roosevelt Road
.04
.04
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1031
1030
1029
1028
1027
1026
1025
1024
1023
9400
9600
9800
10000
10200
10400
10600
Station (ft)

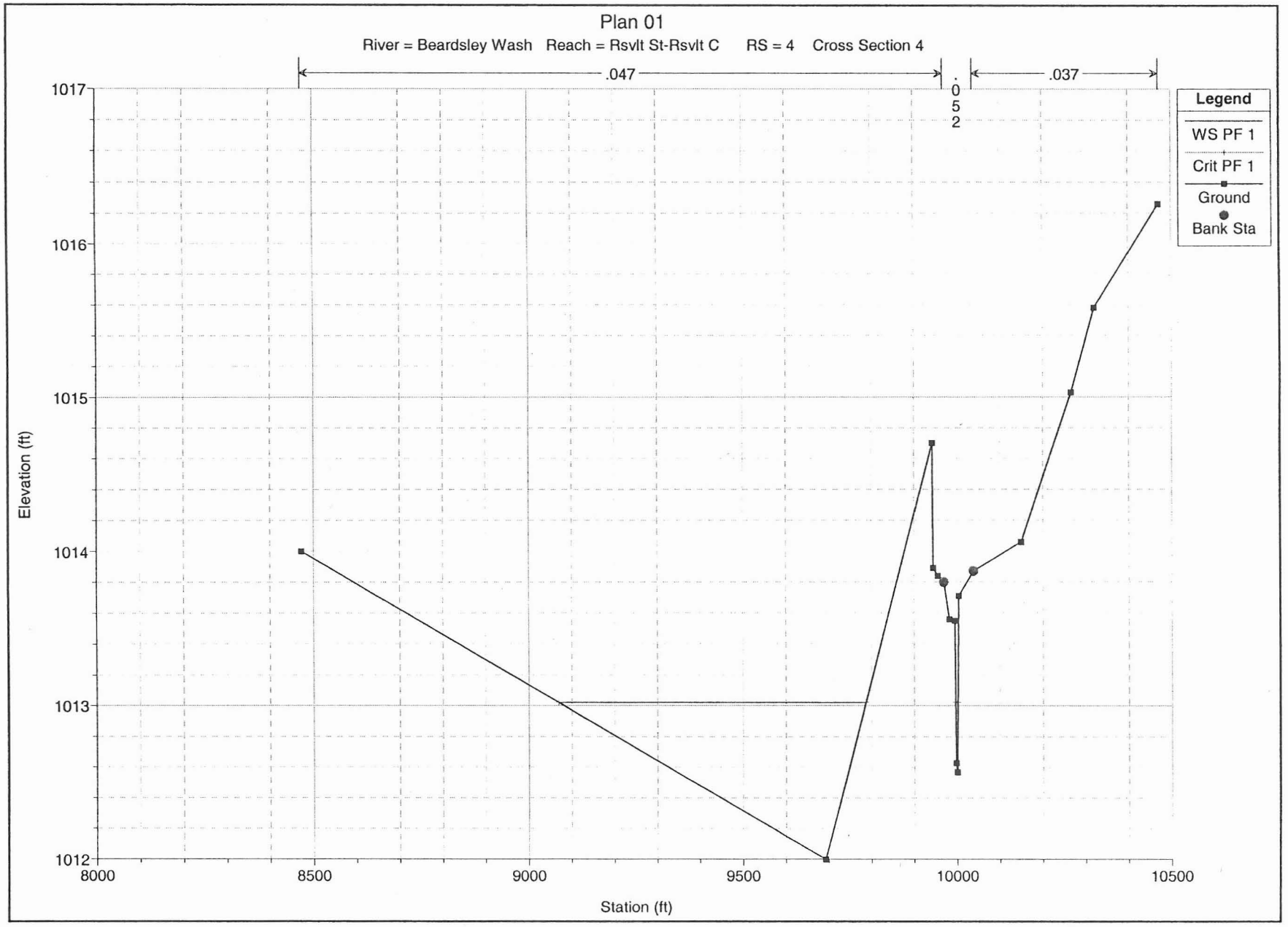

Plan 01
River = Beardsley Wash Reach = Rsvlt St-Rsvlt C RS = 8 Cross Section 8
.036
.037
.032
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1026.5
1026.0
1025.5
1025.0
1024.5
1024.0
1023.5
1023.0
9400
9600
9800
10000
10200
10400
10600
Station (ft)

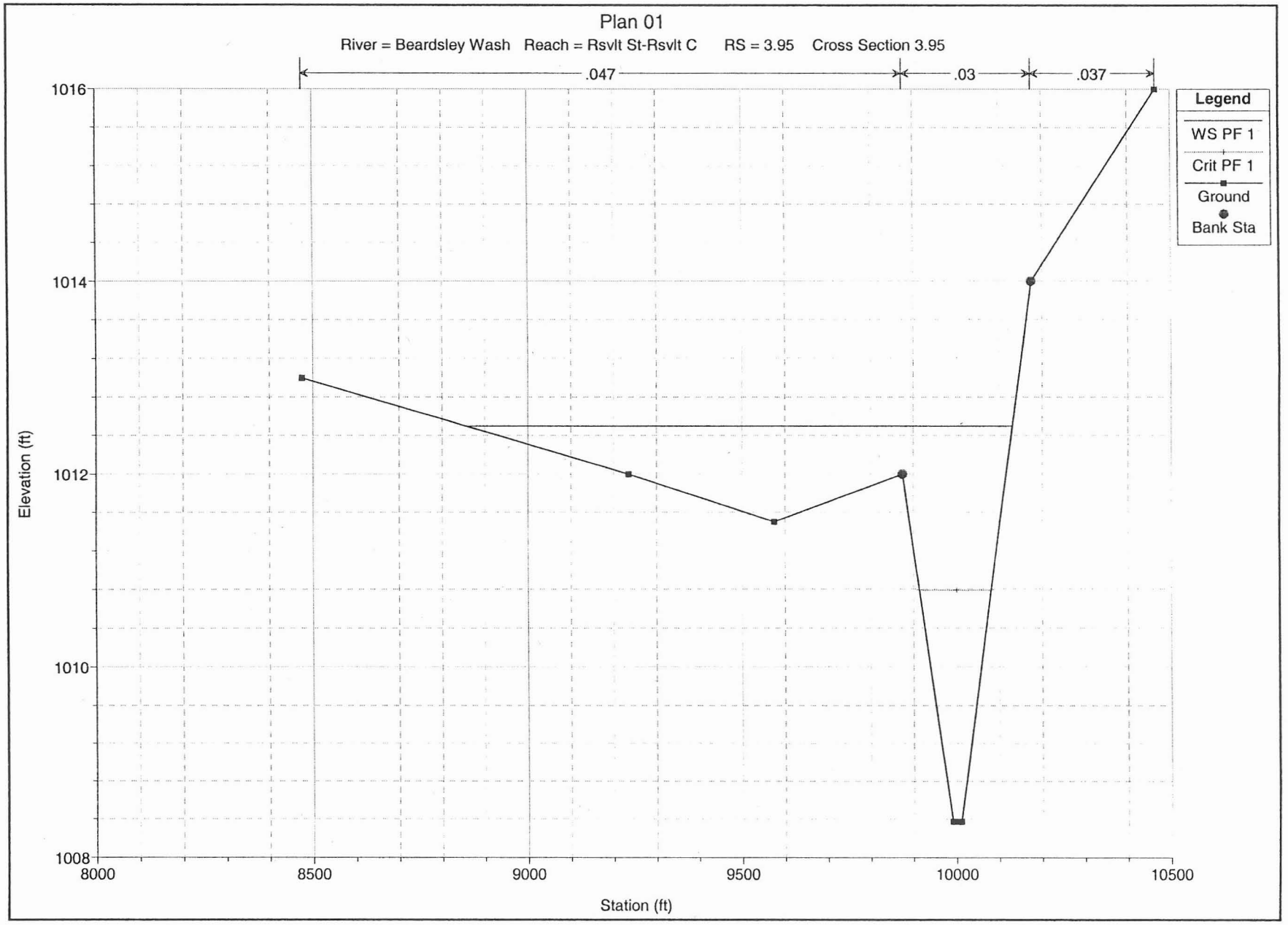

Plan 01
River = Beardsley Wash Reach = Rsvlt St-Rsvlt C RS = 7 Cross Section 7
.037
.042
.032
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1026
1025
1024
1023
1022
1021
1020
1019
9000
9200
9400
9600
9800
10000
10200
10400
10600
Station (ft)

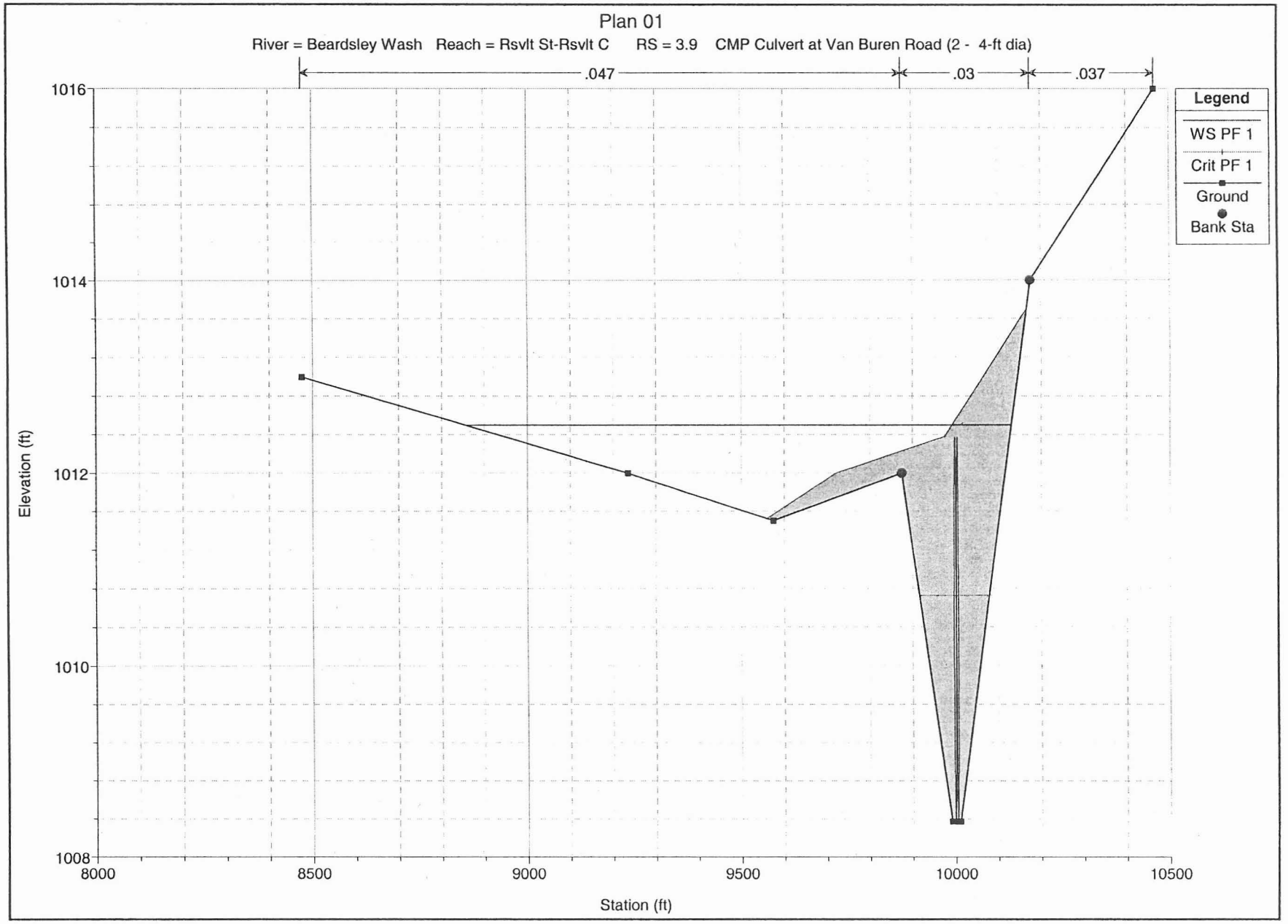

Plan 01
River = Beardsley Wash Reach = Rsvlt St-Rsvlt C RS = 6 Cross Section 6
.037
.042
.037
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1022
1021
1020
1019
1018
1017
1016
9200
9400
9600
9800
10000
10200
10400
10600
Station (ft)

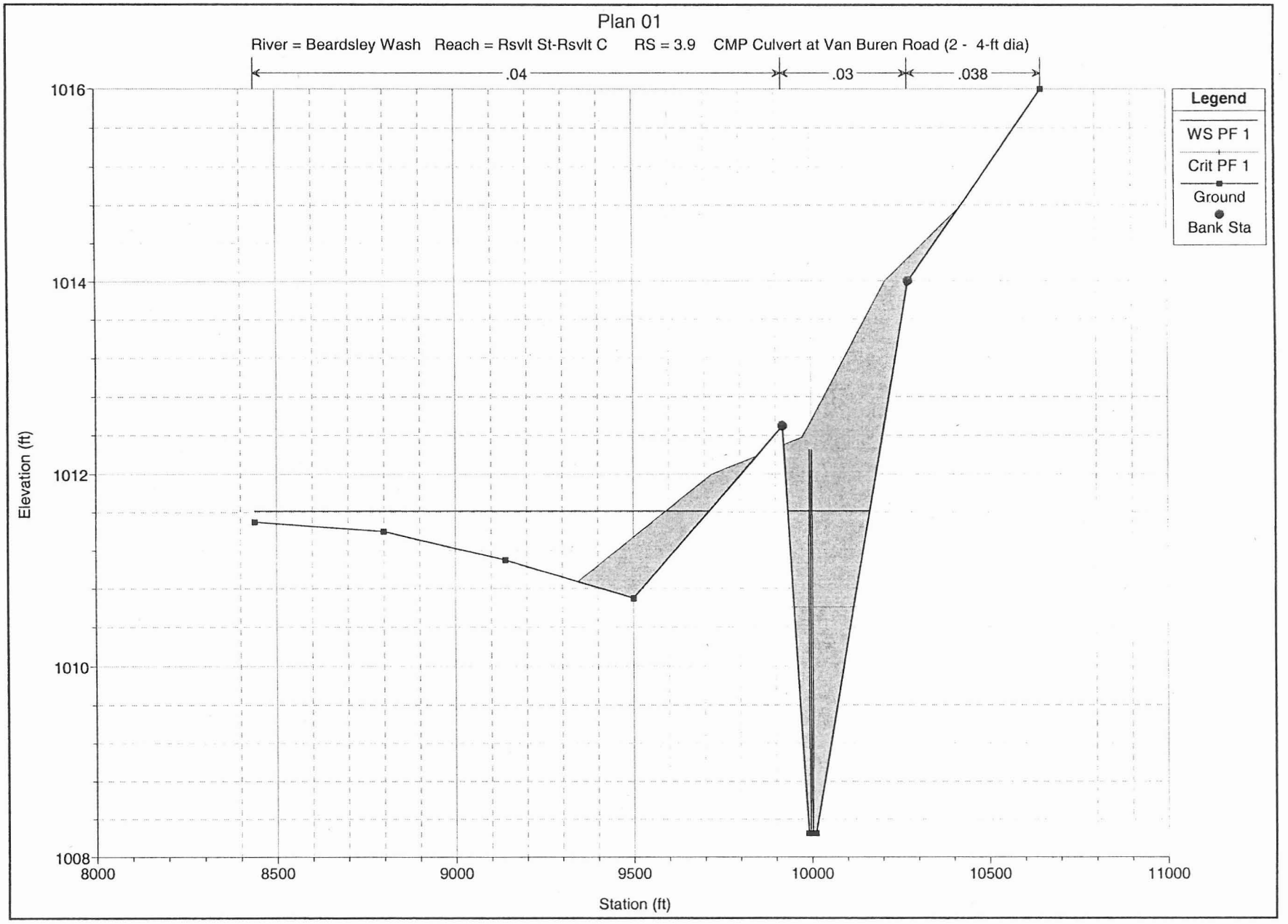

Plan 01
River = Beardsley Wash Reach = Rsvlt St-Rsvlt C RS = 5 Cross Section 5
.037
.042
.032
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1019
1018
1017
1016
1015
1014
8600
8800
9000
9200
9400
9600
9800
10000
10200
10400
10600
Station (ft)

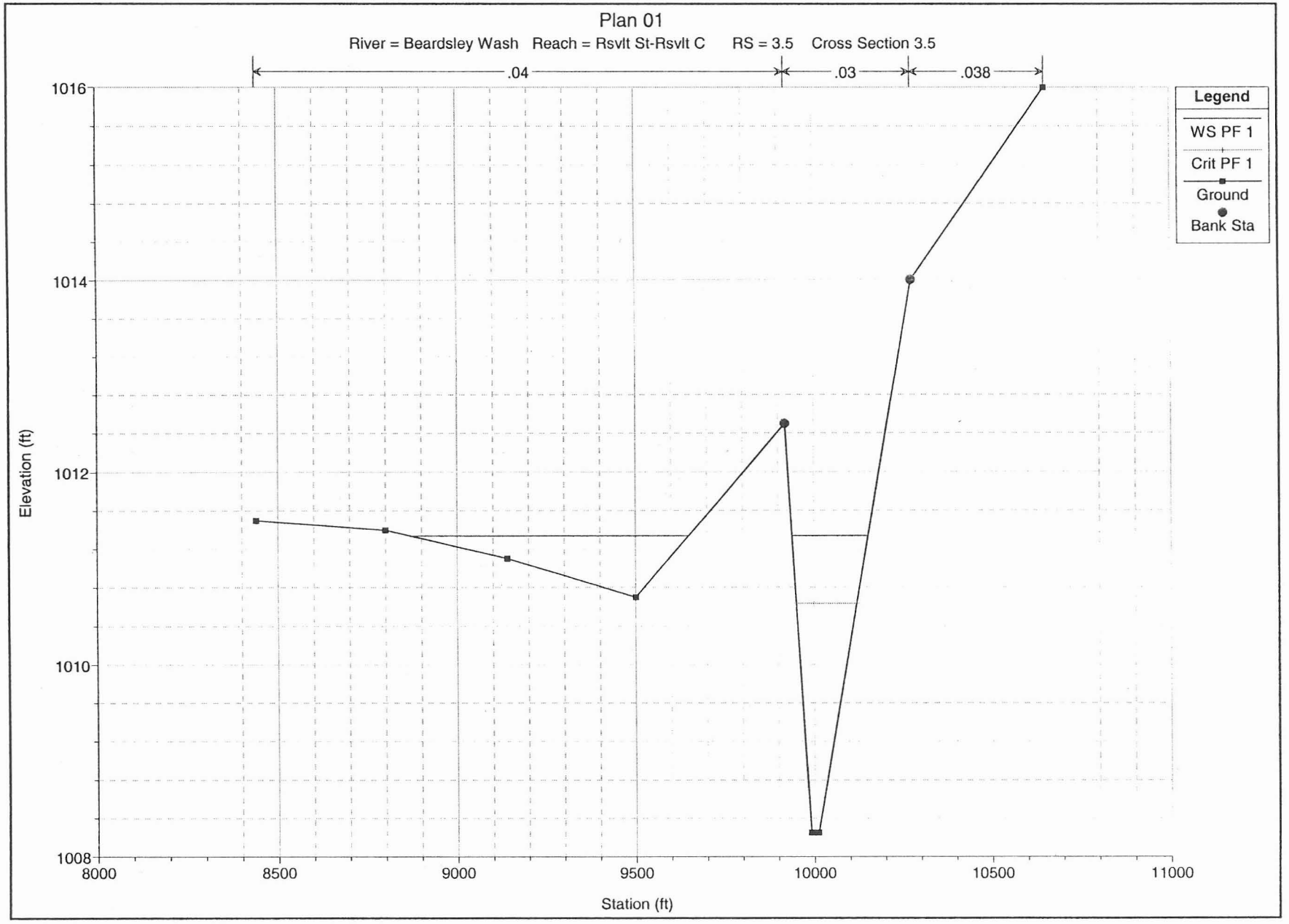

Plan 01
River = Beardsley Wash Reach = Rsvlt St-Rsvlt C RS = 4.5* Cross Section 4.5* - Interpolated using HEC-RAS
.042
.047
.035
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1018
1017
1016
1015
1014
1013
8600
8800
9000
9200
9400
9600
9800
10000
10200
10400
10600
Station (ft)

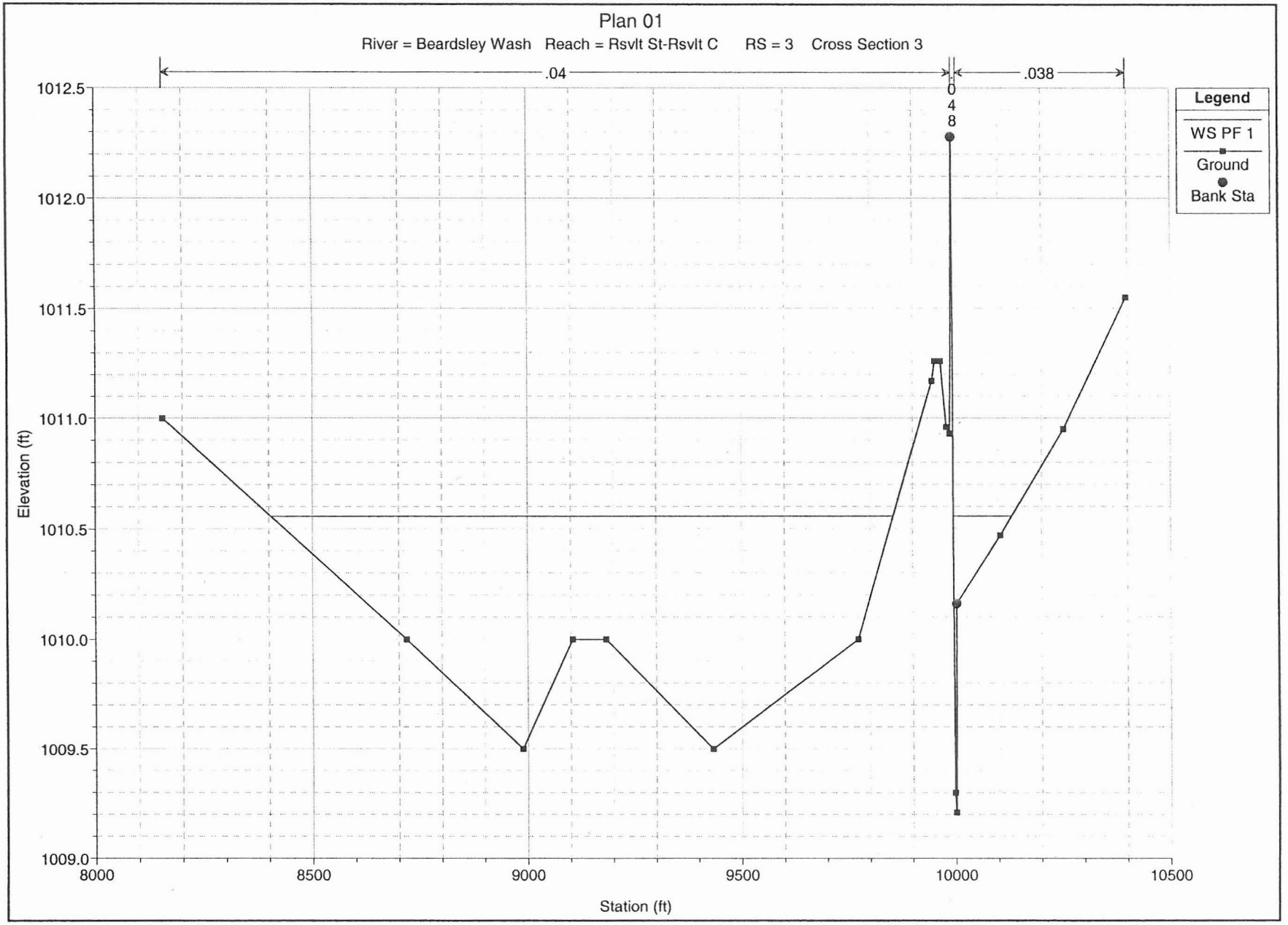

Plan 01
River = Beardsley Wash Reach = Rsvlt St-Rsvlt C RS = 4 Cross Section 4
.047
.052
.037
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1017
1016
1015
1014
1013
1012
8000
8500
9000
9500
10000
10500
Station (ft)

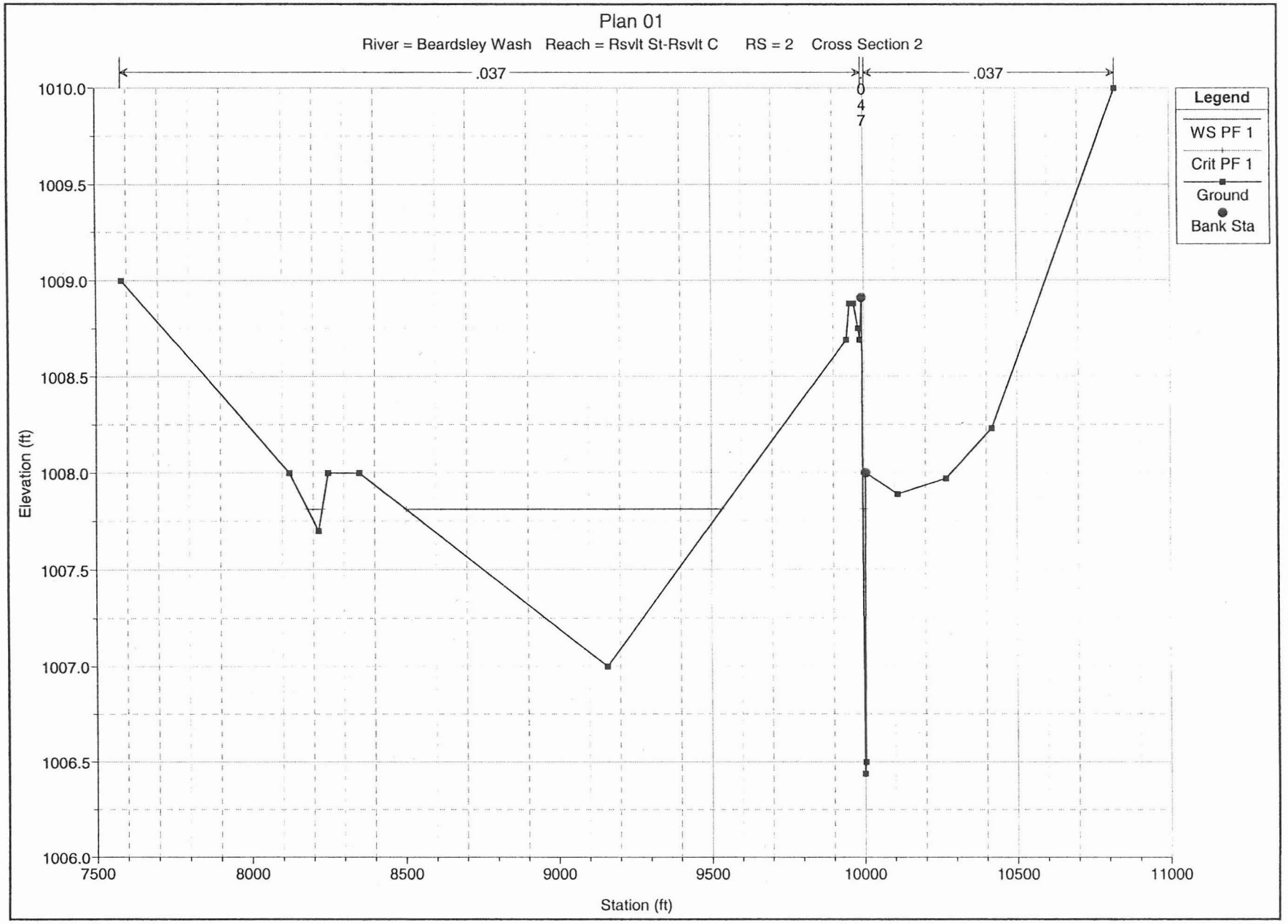

Plan 01
River = Beardsley Wash Reach = Rsvlt St-Rsvlt C RS = 3.95 Cross Section 3.95
.047
.03
.037
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1016
1014
1012
1010
1008
8000
8500
9000
9500
10000
10500
Station (ft)

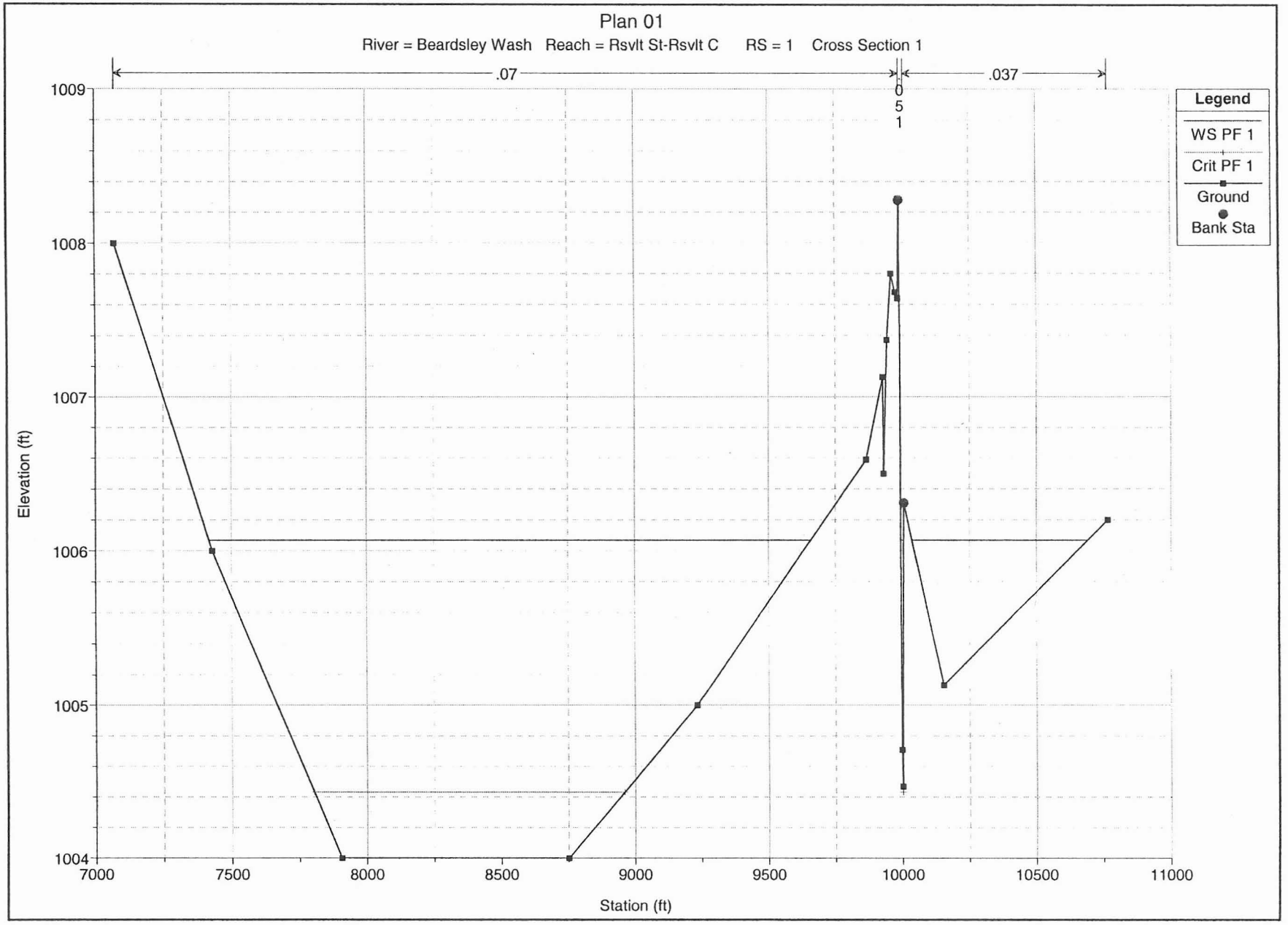

Plan 01
River = Beardsley Wash Reach = Rsvlt St-Rsvlt C RS = 3.9 CMP Culvert at Van Buren Road (2 - 4-ft dia)
.047
.03
.037
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1016
1014
1012
1010
1008
8000
8500
9000
9500
10000
10500
Station (ft)


Plan 01
River = Beardsley Wash Reach = Rsvlt St-Rsvlt C RS = 3.9 CMP Culvert at Van Buren Road (2 - 4-ft dia)
.04
.03
.038
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1016
1014
1012
1010
1008
8000
8500
9000
9500
10000
10500
11000
Station (ft)


Plan 01
River = Beardsley Wash Reach = Rsvlt St-Rsvlt C RS = 3.5 Cross Section 3.5
.04
.03
.038
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1016
1014
1012
1010
1008
8000
8500
9000
9500
10000
10500
11000
Station (ft)


Plan 01
River = Beardsley Wash Reach = Rsvlt St-Rsvlt C RS = 3 Cross Section 3
.04
.038
0
4
8
Legend
WS PF 1
Ground
Bank Sta
1012.5
1012.0
1011.5
1011.0
1010.5
1010.0
1009.5
1009.0
Elevation (ft)
8000
8500
9000
9500
10000
10500
Station (ft)


Plan 01
River = Beardsley Wash Reach = Rsvlt St-Rsvlt C RS = 2 Cross Section 2
.037
.037
0
4
7
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1010.0
1009.5
1009.0
1008.5
1008.0
1007.5
1007.0
1006.5
1006.0
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)


Plan 01
River = Beardsley Wash Reach = Rsvlt St-Rsvlt C RS = 1 Cross Section 1
.07
.037
0
5
1
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1009
1008
1007
1006
1005
1004
7000
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)

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

Project File: P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash \FINAL I-10 CULVERT WASH - WITH FCDMC COMMENTS-afc(this is final)\I10CWASHFINAL.prj
Plan File: P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash \FINAL I-10 CULVERT WASH - WITH FCDMC COMMENTS-afc(this is final)\I10CWASHFINAL.p01
Geometry File: P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash \FINAL I-10 CULVERT WASH - WITH FCDMC COMMENTS-afc(this is final)\I10CWASHFINAL.g01
Flow File: P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash \FINAL I-10 CULVERT WASH - WITH FCDMC COMMENTS-afc(this is final)\I10CWASHFINAL.f02
Report File: P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash \FINAL I-10 CULVERT WASH - WITH FCDMC COMMENTS-afc(this is final)\I10CWASHFINAL.nt
Selected profiles: PF 1
Date: 10/19/2002
Time: 3:50:22 PM

SECNO	STRUCTURE	NLOB	NCHL	NROB	CNTR	EXP
Beardsley Wash,I - 10 to Split						
18		0.049	0.028	0.049	0.3	0.5
17		0.049	0.028	0.049	0.3	0.5
16.9	Culvert-Up	0.049	0.028	0.049	0.3	0.5
16.9	Culvert-Dn	0.03	0.03	0.03	0.3	0.5
16.5		0.03	0.03	0.03	0.3	0.5
Beardsley Wash,S. Split-189 Ave						
16		0.03	0.03	0.03	0.1	0.3
14.5		0.032	0.03	0.038	0.1	0.3
14		0.032	0.03	0.04	0.1	0.3
13		0.032	0.03	0.054	0.1	0.3
12		0.03	0.03	0.033	0.1	0.3
11		0.032	0.03	0.032	0.1	0.3
10.5		0.032	0.03	0.032	0.1	0.3
Beardsley Wash,E Split to Rsvlt						
10		0.032	0.03	0.032	0.1	0.3
22		0.041	0.035	0.035	0.1	0.3
21		0.035	0.033	0.033	0.1	0.3
20		0.033	0.033	0.033	0.1	0.3
Beardsley Wash,Rsvlt St-Rsvlt C						
19.5		0.03	0.043	0.03	0.1	0.3
9.8		0.03	0.043	0.03	0.3	0.5
[illegible]	Culvert-Up	0.03	0.043	0.03	0.3	0.5
[illegible]	Culvert-Dn	0.04	0.04	0.04	0.3	0.5
9		0.04	0.04	0.04	0.3	0.5
8		0.036	0.037	0.032	0.1	0.3
7		0.037	0.042	0.032	0.1	0.3
6		0.037	0.042	0.037	0.1	0.3
5		0.037	0.042	0.032	0.1	0.3
4.5		0.042	0.047	0.035	0.1	0.3
4		0.047	0.052	0.037	0.3	0.5
3.95		0.047	0.03	0.037	0.3	0.5
3.9	Culvert-Up	0.047	0.03	0.037	0.3	0.5
3.9	Culvert-Dn	0.04	0.03	0.038	0.3	0.5
3.5		0.04	0.03	0.038	0.3	0.5
3		0.04	0.048	0.038	0.1	0.3
2		0.037	0.047	0.037	0.1	0.3
1		0.07	0.051	0.037	0.1	0.3

---Summary of Statistics---

	Minimum	Maximum
Left Overbank n Value:	0.03	0.07
Right Overbank n Value:	0.03	0.054
Channel n Value:	0.028	0.052
Contraction Coefficient:	0.1	0.3
Expansion Coefficient:	0.3	0.5

ROUGHNESS COEFFICIENT CHECK

RS: 16.9
NT RC 01 Left overbank n value is less than 0.035
The n value for overbank is usually larger then 0.035.
The n value should be reevaluated.

RS: 16.9
NT RC 01 Right overbank n value is less than 0.035
The n value for overbank is usually larger then 0.035.
The n value should be reevaluated.

RS: 16.9
NT RC 05 The left overbank n value of 0.03 and the right overbank n value

```
          of 0.03 are less than or equal to the channel n value of 0.03
          The overbank n values should be reevaluated.

RS:       16.5
NT RC 01 Left overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

          16.5
.. RC 01 Right overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       16.5
NT RC 05 The left overbank n value of 0.03 and the right overbank n value
          of 0.03 are less than or equal to the channel n value of 0.03
          The overbank n values should be reevaluated.

RS:       16
NT RC 01 Left overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       16
NT RC 01 Right overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       16
NT RC 05 The left overbank n value of 0.03 and the right overbank n value
          of 0.03 are less than or equal to the channel n value of 0.03
          The overbank n values should be reevaluated.

RS:       14.5
NT RC 01 Left overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       14
NT RC 01 Left overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

          13
NT RC 01 Left overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       12
NT RC 01 Left overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       12
NT RC 01 Right overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       11
NT RC 01 Left overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       11
NT RC 01 Right overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       10.5
NT RC 01 Left overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       10.5
NT RC 01 Right overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       10
NT RC 01 Left overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       10
NT RC 01 Right overbank n value is less than 0.035
```

```
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       21
NT RC 01  Right overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

          20
   RC 01  Left overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       20
NT RC 01  Right overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       20
NT RC 05  The left overbank n value of 0.033 and the right overbank n value
          of 0.033 are less than or equal to the channel n value of 0.033
          The overbank n values should be reevaluated.

RS:       19.5
NT RC 01  Left overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       19.5
NT RC 01  Right overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       19.5
NT RC 05  The left overbank n value of 0.03 and the right overbank n value
          of 0.03 are less than or equal to the channel n value of 0.043
          The overbank n values should be reevaluated.

RS:       9.8
NT RC 01  Left overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

          9.8
NT RC 01  Right overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       9.8
NT RC 05  The left overbank n value of 0.03 and the right overbank n value
          of 0.03 are less than or equal to the channel n value of 0.043
          The overbank n values should be reevaluated.

RS:       9.5
NT RC 01  Left overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       9.5
NT RC 01  Right overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       9.5
NT RC 05  The left overbank n value of 0.03 and the right overbank n value
          of 0.03 are less than or equal to the channel n value of 0.043
          The overbank n values should be reevaluated.

RS:       9.5
NT RC 05  The left overbank n value of 0.04 and the right overbank n value
          of 0.04 are less than or equal to the channel n value of 0.04
          The overbank n values should be reevaluated.

RS:       9
NT RC 05  The left overbank n value of 0.04 and the right overbank n value
          of 0.04 are less than or equal to the channel n value of 0.04
          The overbank n values should be reevaluated.

RS:       8
NT RC 01  Right overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       8
NT RC 05  The left overbank n value of 0.036 and the right overbank n value
```

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          of 0.032 are less than or equal to the channel n value of 0.037
          The overbank n values should be reevaluated.

RS:       7
NT RC 01  Right overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

          7
NT RC 05  The left overbank n value of 0.037 and the right overbank n value
          of 0.032 are less than or equal to the channel n value of 0.042
          The overbank n values should be reevaluated.

RS:       6
NT RC 05  The left overbank n value of 0.037 and the right overbank n value
          of 0.037 are less than or equal to the channel n value of 0.042
          The overbank n values should be reevaluated.

RS:       5
NT RC 01  Right overbank n value is less than 0.035
          The n value for overbank is usually larger then 0.035.
          The n value should be reevaluated.

RS:       5
NT RC 05  The left overbank n value of 0.037 and the right overbank n value
          of 0.032 are less than or equal to the channel n value of 0.042
          The overbank n values should be reevaluated.

RS:       4.5
NT RC 05  The left overbank n value of 0.042 and the right overbank n value
          of 0.035 are less than or equal to the channel n value of 0.047
          The overbank n values should be reevaluated.

RS:       4
NT RC 05  The left overbank n value of 0.047 and the right overbank n value
          of 0.037 are less than or equal to the channel n value of 0.052
          The overbank n values should be reevaluated.

RS:       3
NT RC 05  The left overbank n value of 0.04 and the right overbank n value
          of 0.038 are less than or equal to the channel n value of 0.048
          The overbank n values should be reevaluated.

          2
NT RC 05  The left overbank n value of 0.037 and the right overbank n value
          of 0.037 are less than or equal to the channel n value of 0.047
          The overbank n values should be reevaluated.

TRANSITION LOSS COEFFICIENT CHECK
---------------------------------

ROUGHNESS COEFFICIENT AT STRUCTURES
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RS:       3.5
NT RS 01  This is Section 2.
          Channel n value of 0.03 is less than the channel n value of 0.048
          at Section 1.

RS:       3.95
NT RS 01  This is Section 3.
          Channel n value of 0.03 is less than the channel n value of 0.052
          at Section 4.

---END---
```

THIS n-VALUE WAS USED BASED ON FIELD INVESTIGATION AND THE ACCOMPANYING n-VALUE REPORT.

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

Project File: P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash \FINAL I-10 CULVERT WASH - WITH FCDMC COMMENTS-afc(this is final)\I10CWASHFINAL.prj
Plan File: P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash NAL I-10 CULVERT WASH - WITH FCDMC COMMENTS-afc(this is final)\I10CWASHFINAL.p01
Geometry File: P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash \FINAL I-10 CULVERT WASH - WITH FCDMC COMMENTS-afc(this is final)\I10CWASHFINAL.g01
Flow File: P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash \FINAL I-10 CULVERT WASH - WITH FCDMC COMMENTS-afc(this is final)\I10CWASHFINAL.f02
Report File: P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash \FINAL I-10 CULVERT WASH - WITH FCDMC COMMENTS-afc(this is final)\I10CWASHFINAL.xs
Selected profiles: PF 1
Date: 10/19/2002
Time: 3:50:42 PM

SECNO	Len Lob	Len Chl	Len Rob	TopWdthAct	Q Total	Flow Code
Beardsley Wash,I - 10 to Split						
18	85	60	45	291.55	948	
17	240	260	320	67.69	948	
16.9	Culvert #1-Up					
16.9	Culvert #1-Dn					
16.5	250	400	450	64.61	948	C
16	0	0	0	676.04	948	D
Beardsley Wash,S. Split-189 Ave						
14.5	340	275	225	126.37	619.84	C
14	480	480	480	429.86	619.84	
13	160	190	240	731.3	619.84	C
12	250	270	170	739.25	619.84	D,C
11	250	260	515	757.19	619.84	D
10.5	250	260	235	578.98	619.84	D,C
10	0	0	0	645.4	619.84	D,C
Beardsley Wash,E Split to Rsvlt						
22	650	620	600	314.37	328.16	C
21	460	450	450	388.69	328.16	
20	600	590	520	405.67	328.16	D,C
19.5	0	0	0	245.2	328.16	
rdsley Wash,Rsvlt St-Rsvlt C						
3	140	130	120	558.95	948	
.5	Culvert #1-Up					
9.5	Culvert #1-Dn					
9	400	380	265	667.02	1508	E
8	500	500	460	698.36	1508	D
7	440	500	480	692.77	1508	
6	430	480	510	797.28	1508	
5	255	275	280	731.73	1508	D
4.5	255	275	280	1042.36	1508	D
4	120	60	60	722.49	1508	D,C
3.95	70	100	150	1274.99	1508	
3.9	Culvert #1-Up					
3.9	Culvert #1-Dn					
3.5	260	340	215	992.26	1508	D
3	370	480	500	1586.79	1508	D
2	400	460	590	1088.55	1508	D,C
1	0	0	0	2908.67	1508	D

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

DISTANCE CHECK

SPACING CHECK

FFECTIVE FLOW CHECK

DISCHARGE CHECK

RS: 9
XS DC 03 Discharge is different between the upstream side and downstream

OK! STREAM CONFLUENCE.

side of the structure

XS DC 02 Constant dicharge used for the Beardsley Wash,I - 10 to Split

XS DC 02 Constant dicharge used for the Beardsley Wash,S. Split-189 Ave

XS DC 02 Constant dicharge used for the Beardsley Wash,E Split to Rsvlt

LOCATION CHECK

BOUNDARY CONDITION CHECK

XS BC 02 The name of the stream is Beardsley Wash,I - 10 to Split
Normal S = .005 is specified as the upstream boundary
for profile PF 1

XS BC 02 The name of the stream is Beardsley Wash,Rsvlt St-Rsvlt C
Known WS = 1006.07 is specified as the downstream boundary
for profile PF 1

YES TIE-IN TO EFFECTIVE AH ZONE AT THE RWCD CANAL.

LATERAL WEIRS CHECK

---END---

CHECK-RAS Program: Structure Check

Project File: P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash \FINAL I-10 CULVERT WASH - WITH FCDMC COMMENTS-afc(this is final)\I10CWASHFINAL.prj
Plan File: P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash \FINAL I-10 CULVERT WASH - WITH FCDMC COMMENTS-afc(this is final)\I10CWASHFINAL.p01
Geometry File: P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash FINAL I-10 CULVERT WASH - WITH FCDMC COMMENTS-afc(this is final)\I10CWASHFINAL.g01
File: P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash NAL I-10 CULVERT WASH - WITH FCDMC COMMENTS-afc(this is final)\I10CWASHFINAL.f02
Report File: P:\FCDMC\E152600\Floodplain Study\HEC-RAS Analysis\RAS\I-10 Culvert Wash\1 Final - I-10 Culvert Wash \FINAL I-10 CULVERT WASH - WITH FCDMC COMMENTS-afc(this is final)\I10CWASHFINAL.br
Selected profiles: PF 1
Date: 10/19/2002
Time: 4:24:45 PM

RS	MaxLoChord	MnTpRd	EGEL	WSEL	MinChEl	Structure
Beardsley Wash,I - 10 to Split						
18			1057.54	1057.38	1053.92	
17			1057.43	1057.2	1053.61	
16.9	1056.63	1060	0	1055.87	1053.63	Culvert #1-Up
16.9	1054.9	1058.3	0	1053.63	1051.9	Culvert #1-Dn
16.5			1054.24	1053.31	1051.3	
16			1049.84	1049.67	1047.86	
Beardsley Wash,S. Split-189 Ave						
14.5			1045.33	1044.76	1041.54	
14			1042.48	1042.3	1039.59	
13			1039.95	1039.75	1036.59	
12			1037.97	1037.79	1035.14	
11			1035.92	1035.87	1033.25	
10.5			1034.21	1034.03	1031.67	
10			1031.82	1031.64	1030.08	
Beardsley Wash,E Split to Rsvlt						
22			1045.33	1045.17	1044	
21			1039.66	1039.6	1038.79	
20			1035.32	1035.19	1034.76	
19.5			1030.29	1030.28	1026.76	
Beardsley Wash,Rsvlt St-Rsvlt C						
9.8			1030.27	1030.25	1024.6	
9.5	1028.6	1028.95	0	1028.6	1024.6	Culvert #1-Up
	1027.44	1028.95	0	1027.44	1023.44	Culvert #1-Dn
			1028.29	1028.05	1023.26	
8			1026.15	1025.92	1023.03	
7			1023.05	1022.94	1019.47	
6			1020.52	1020.35	1016.81	
5			1016.93	1016.79	1014.49	
4.5			1015.52	1015.47	1013.53	
4			1013.28	1013.02	1012.57	
3.95			1012.55	1012.5	1008.38	
3.9	1012.38	1011.57	0	1011.94	1008.38	Culvert #1-Up
3.9	1012.26	1011.1	0	1011.34	1008.26	Culvert #1-Dn
3.5			1011.52	1011.34	1008.26	
3			1010.6	1010.56	1009.21	
2			1008	1007.81	1006.44	
1			1006.07	1006.07	1004.47	

RIVER/REACH: Beardsley Wash, I - 10 to Split
RIVER STATION: 16.9
TYPE OF STRUCTURE: Culvert

Description:	Culvert at I-10 consisting of 5 - 10x3 concrete b
Distance from Upstream XS:	25
Deck/Roadway Width:	200
Weir Coefficient:	3
Maximum allowable submergence for weir flow:	0.95
Elevation at which weir flow begins:	0
Weir crest shape:	Broad Crested

Sec	River Station	Length Channel	WSEL	Surch.	EGEL	TopWidth Actual	
4	18	60.00	1057.38		1057.54	291.55	
3	17	260.00	1057.2		1057.43	67.69	
	16.9	220.00	1055.87		0	0	Culvert #1-Up
	16.9	30.00	1053.63		0	0	Culvert #1-Dn
2	16.5	400.00	1053.31		1054.24	66	
1	16	0.00	1049.67		1049.84	676.04	

	Ineffective Flow, Section 3			Ineffective Flow, Section 2		
	Sta L	Sta R	Elev	Sta L	Sta R	Elev
1	9902	9940	1059.83	9400	9972	1056.94
2	10007.69	10425	1059.8	10038	11000	1056.91

Opening Type	StagStaL	StagStaR	EncStaL	EncStaR	LIfStaS	RIfStaS	
Culvert Group					9940	10007.69	
							U
					9972	10038	D

CULVERT:
Culvert Name: Culvert #1
Shape: Box Rise: 3 Span: 10 Barrels: 5
FHWA Chart #: # 8 - flared wingwalls
FHWA Scale #: # 1 - Wingwall flared 30 to 75 deg.
Solution Crit:Highest U.S. EG

UpstrmDist:	10	Length:	220	n-Value:	0.014		
EntLossCoef:	0.4	ExtLossCoef:	1	CulvInvElU	1053.63	CulvInvElD	1051.9
LCntStaU:	9948.3	RCntStaU:	9999.3	LCntStaD	9980	RCntStaD	10030

Culvert Depth Blocked: 0

Culv Area:	150	CulvQ:	948	MinTopRd:	1060.01		

	LAbutSt	RAbutSt	LMnTpRd	RMnTpRd	MnTpRd	MxLoCd	
Culvert #1	9943.3	10004.3	1060	1060	1060	1056.63	U
	9975	10035	1058.3	1058.3	1058.3	1054.9	D

Name	Q Total.	Q Struc	Q Weir	Selected Method	Flow Type
vert #1		948	0	Highest U.S. EG	Low Flow

GEOMETRIC CHECK

TYPE OF FLOW CHECK

RS: 16.9 This is Culvert #1
CV LF 01 Type of flow is low flow because,
1. EGEL 3 of 1057.43 is less than or equal to MinTopRd of 1060.01.
2. CulvWSIn of 1055.87 is less than MxLoCdU of 1056.63.
3. CulvWSout of 1053.63 is less than MxLoCdD of 1054.90.
4. Q/AD^0.5 of 3.65 is less than 4.0.

DISTANCE CHECK

CULVERT COEFFICIENT CHECK

CULVERT CRITERIA CHECK

INEFFECTIVE FLOW CHECK

RIVER/REACH: Beardsley Wash, Rsvlt St-Rsvlt C
RIVER STATION: 9.5
TYPE OF STRUCTURE: Culvert

cription:	Concrete Pipe Culvert at Roosevelt Road (2 - 4-f
tance from Upstream XS:	10
eck/Roadway Width:	35
Weir Coefficient:	3
Maximum allowable submergence for weir flow:	0.95
Elevation at which weir flow begins:	0
Weir crest shape:	Broad Crested

Sec	River Station	Length Channel	WSEL	Surch.	EGEL	TopWidth Actual	
3	9.8	130.00	1030.25		1030.27	558.95	
	9.5	50.00	1028.6		0	0	Culvert #1-Up
	9.5	70.00	1027.44		0	0	Culvert #1-Dn
	9	380.00	1028.05		1028.29	667.02	
	8	500.00	1025.92		1026.15	698.36	

Ineffective Flow, Section 3			Ineffective Flow, Section 2		
Sta L	Sta R	Elev	Sta L	Sta R	Elev

Opening Type	StagStaL	StagStaR	EncStaL	EncStaR	LIfStaS	RIfStaS	
Culvert Group					0	0	U
					0	0	D

CULVERT:
Culvert Name: Culvert #1
Shape: Circular Rise: 4 Span: 0 Barrels: 2
FHWA Chart #: # 1 - Concrete Pipe Culvert
FHWA Scale #: # 1 - Square edge entrance with headwall
Solution Crit:Highest U.S. EG

UpstrmDist:	10	Length:	50	n-Value:	0.014		
EntLossCoef:	0.5	ExtLossCoef:	1	CulvInvElU	1024.6	CulvInvElD	1023.44
LCntStaU:	10004	RCntStaU:	10009	LCntStaD	9985	RCntStaD	9990

Culvert Depth Blocked: 0

Culv Area:	25.13	CulvQ:	225.23	MinTopRd:	1028.96

	LAbutSt	RAbutSt	LMnTpRd	RMnTpRd	MnTpRd	MxLoCd	
ert #1	10002	10011	1028.95	1028.98	1028.95	1028.6	U
	9983	9992	1029.08	1028.95	1028.95	1027.44	D

Name	Q Total.	Q Struc	Q Weir	Selected Method	Flow Type
Culvert #1		225.23	722.77	Highest U.S. EG	Pressure and Weir Flow

GEOMETRIC CHECK

TYPE OF FLOW CHECK

RS: 9.5 This is Culvert #1
CV PW 01 Type of flow is pressure and weir flow because,
1. EGEL 3 of 1030.27 is greater than MinTopRd of 1028.96.
2. CulvWSIn of 1028.60 is greater than or equal to MxLoCdU of 1028.60.
3. CulvWSOut of 1027.44 is greater than or equal to MxLoCdD of 1027.44.

DISTANCE CHECK

CULVERT COEFFICIENT CHECK

CULVERT CRITERIA CHECK

INEFFECTIVE FLOW CHECK

RIVER/REACH: Beardsley Wash, Rsvlt St-Rsvlt C
RIVER STATION: 3.9
TYPE OF STRUCTURE: Culvert

Description:	CMP Culvert at Van Buren Road (2 - 4-ft dia)
Distance from Upstream XS:	20
Deck/Roadway Width:	72

```
Weir Coefficient:                                3
Maximum allowable submergence for weir flow:     0.95
Elevation at which weir flow begins:             0
Weir crest shape:                                Broad Crested
-------------------------------------------------------------------------------


    River    Length   WSEL      Surch.    EGEL      TopWidth
    Station  Channel                                Actual
-------------------------------------------------------------------------------
 4  4        60.00   1013.02            1013.28   722.49
 3  3.95     100.00  1012.5             1012.55   1274.99
    3.9      80.00   1011.94            0         0         Culvert #1-Up
    3.9      10.00   1011.34            0         0         Culvert #1-Dn
 2  3.5      340.00  1011.34            1011.52   992.26
 1  3        480.00  1010.56            1010.6    1586.79
-------------------------------------------------------------------------------


        Ineffective Flow, Section 3            Ineffective Flow, Section 2
        Sta L     Sta R     Elev               Sta L     Sta R     Elev
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------


Opening Type      StagStaL    StagStaR  EncStaL   EncStaR   LIfStaS   RIfStaS
-------------------------------------------------------------------------------
Culvert Group                                                0         0      U
                                                             0         0      D

CULVERT:
Culvert Name: Culvert #1
Shape:        Circular       Rise:      4        Span:          0        Barrels:        2
FHWA Chart #: # 2 - Corrugated Metal Pipe C
FHWA Scale #: # 1 - Headwall
Solution Crit:Highest U.S. EG

UpstrmDist:    10       Length:         80       n-Value:        0.024
EntLossCoef:   0.5      ExtLossCoef:    1        CulvInvElU      1008.38  CulvInvElD      1008.26
LCntStaU:      9998.4   RCntStaU:       10003.9  LCntStaD        9995.22  RCntStaD        10001.22
Culvert Depth Blocked:   0

-------------------------------------------------------------------------------
Culv Area:     25.13    CulvQ:          121.65   MinTopRd:       1011.53
-------------------------------------------------------------------------------

                    LAbutSt   RAbutSt   LMnTpRd   RMnTpRd   MnTpRd    MxLoCd
-------------------------------------------------------------------------------
Culvert #1          9996.4    10005.9   1011.57   1012.55   1011.57   1012.38  U
                    9993.22   10003.22  1011.1    1012.55   1011.1    1012.26  D
-------------------------------------------------------------------------------


Name          Q Total.  Q Struc   Q Weir    Selected Method     Flow Type
-------------------------------------------------------------------------------
Culvert #1              121.65    1386.35   Highest U.S. EG     Low and Weir Flow
-------------------------------------------------------------------------------

GEOMETRIC CHECK
-----------------

TYPE OF FLOW CHECK
------------------

RS:       3.9 This is Culvert #1
CV LW 01  Type of flow is low and weir flow because,
          1. EGEL 3 of 1012.55 is greater than MinTopRd of 1011.53.
          2. CulvWSIn of 1011.94 is less than MxLoCdU of 1012.38.
          3. CulvWSOut of 1011.34 is less than MxLoCdD of 1012.26.
          4. Q/AD^0.5 of 2.42 is less than 4.0.

DISTANCE CHECK
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CULVERT COEFFICIENT CHECK
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CULVERT CRITERIA CHECK
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INEFFECTIVE FLOW CHECK
----------------------

---END
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URS

Job Loop 303 - Floodplain
Description Steady Flow Boundary Conditions

Project No.
Computed by MKR
Checked by RLD

Page ____ of ____
Sheet ____ of ____
Date
Date
Reference

I-10 Culvert Wash

- Reach I-10 to Split

  Upstream Normal Depth = Slope between X-sections 18 & 17

  $$= \frac{1053.92 - 1053.61}{60}$$

  $$= 0.005$$

  Downstream "Junction = Upstream"

- South Split along 189th Ave

  Upstream "Junction = Upstream"

  Downstream "Junction = Downstream"

- East Split to Roosevelt Street

  Upstream "Junction = Upstream"

  Downstream "Junction = Downstream"

- Roosevelt Street to Roosevelt Canal

  Upstream "Junction = Downstream"

  *Downstream Known WSEL = 1006.07 ft

  ↳ Using Storage Route analysis from HEC-1 shown next:

Loop 303 / White Tanks ADMP
I-10 Culvert Wash

by Mike Duncan 3-12-02

From HEC-1 model received by FCD on 1-22-02

for storage routing: SR293A

AREA (sq.mi.)	Maximum Stage Elev.
0	1006.14
10	1006.09
50	1006.04
100	1006.02
200	1006

Darinage area for SR293A is 26.05

Interpolated Max. Stage = 1006.09 - 0.05 * (26.05 - 10) / (50 - 10) = 1006.069

Use 1006.07 feet

Use known WSEL of 1006.07 feet as boundary condition at the D/s end of the Roosevelt St. to Roosevelt Canal portion of the I-10 Culvert Wash.

Excerpt from HEC-1

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
8688 KK     *    SR293A  *
            *            *
            **************

8689 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           1  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                               STORAGE ROUTE BEHIND ROOSEVELT CANAL AT CP293A

               HYDROGRAPH ROUTING DATA

8691 RS          STORAGE ROUTING
                       NSTPS           1  NUMBER OF SUBREACHES
                        ITYP        STOR  TYPE OF INITIAL CONDITION
                      RSVRIC         .00  INITIAL CONDITION
                           X         .00 WORKING R AND D COEFFICIENT

8692 SV            STORAGE          .0       3.5       8.2      18.7      34.4      48.4

8693 SQ          DISCHARGE          0.        0.        0.        0.      891.     2563.

8694 SE          ELEVATION     1002.50   1004.00   1004.60   1005.30   1006.00   1006.50
                                                                  ***

*****************************************************************************************************************************************

                                                   HYDROGRAPH AT    SR293A
                                              TRANSPOSITION AREA     .0 SQ MI

*****************************************************************************************************************************************
                                                 *                                                 *
 DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE *  DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE *  DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE
                                                 *                                                 *
  1     0000   1       0.       .0  1002.5 *   1     0820 101       0.       .0  1002.5 *   1     1640 201     584.     29.0  1005.8
  1     0005   2       0.       .0  1002.5 *   1     0825 102       0.       .0  1002.5 *   1     1645 202     554.     28.4  1005.7
  1     0010   3       0.       .0  1002.5 *   1     0830 103       0.       .0  1002.5 *   1     1650 203     524.     27.9  1005.7
  1     0015   4       0.       .0  1002.5 *   1     0835 104       0.       .0  1002.5 *   1     1655 204     496.     27.4  1005.7
  1     0020   5       0.       .0  1002.5 *   1     0840 105       0.       .0  1002.5 *   1     1700 205     468.     26.9  1005.7
  1     0025   6       0.       .0  1002.5 *   1     0845 106       0.       .0  1002.5 *   1     1705 206     441.     26.4  1005.6
  1     0030   7       0.       .0  1002.5 *   1     0850 107       0.       .0  1002.5 *   1     1710 207     416.     26.0  1005.6
  1     0035   8       0.       .0  1002.5 *   1     0855 108       0.       .0  1002.5 *   1     1715 208     391.     25.6  1005.6
  1     0040   9       0.       .0  1002.5 *   1     0900 109       0.       .0  1002.5 *   1     1720 209     368.     25.2  1005.6
  1     0045  10       0.       .0  1002.5 *   1     0905 110       0.       .0  1002.5 *   1     1725 210     346.     24.8  1005.6
  1     0050  11       0.       .0  1002.5 *   1     0910 111       0.       .0  1002.5 *   1     1730 211     325.     24.4  1005.6
  1     0055  12       0.       .0  1002.5 *   1     0915 112       0.       .0  1002.5 *   1     1735 212     306.     24.1  1005.5
  1     0100  13       0.       .0  1002.5 *   1     0920 113       0.       .0  1002.5 *   1     1740 213     289.     23.8  1005.5
  1     0105  14       0.       .0  1002.5 *   1     0925 114       0.       .0  1002.5 *   1     1745 214     273.     23.5  1005.5
  1     0110  15       0.       .0  1002.5 *   1     0930 115       0.       .0  1002.5 *   1     1750 215     259.     23.2  1005.5
```

1	0115	16	0.	.0	1002.5	*	1	0935	116	0.	.0	1002.5	*	1	1755	216	245.	23.0	1005.5
1	0120	17	0.	.0	1002.5	*	1	0940	117	0.	.0	1002.5	*	1	1800	217	232.	22.8	1005.5
1	0125	18	0.	.0	1002.5	*	1	0945	118	0.	.0	1002.5	*	1	1805	218	220.	22.5	1005.5
1	0130	19	0.	.0	1002.5	*	1	0950	119	0.	.0	1002.5	*	1	1810	219	208.	22.3	1005.5
1	0135	20	0.	.0	1002.5	*	1	0955	120	0.	.0	1002.5	*	1	1815	220	197.	22.1	1005.5
1	0140	21	0.	.0	1002.5	*	1	1000	121	0.	.0	1002.5	*	1	1820	221	188.	22.0	1005.4
1	0145	22	0.	.0	1002.5	*	1	1005	122	0.	.0	1002.5	*	1	1825	222	179.	21.8	1005.4
1	0150	23	0.	.0	1002.5	*	1	1010	123	0.	.0	1002.5	*	1	1830	223	171.	21.7	1005.4
1	0155	24	0.	.0	1002.5	*	1	1015	124	0.	.0	1002.5	*	1	1835	224	164.	21.6	1005.4
1	0200	25	0.	.0	1002.5	*	1	1020	125	0.	.0	1002.5	*	1	1840	225	157.	21.4	1005.4
1	0205	26	0.	.0	1002.5	*	1	1025	126	0.	.0	1002.5	*	1	1845	226	149.	21.3	1005.4
1	0210	27	0.	.0	1002.5	*	1	1030	127	0.	.0	1002.5	*	1	1850	227	142.	21.2	1005.4
1	0215	28	0.	.0	1002.5	*	1	1035	128	0.	.0	1002.5	*	1	1855	228	135.	21.0	1005.4
1	0220	29	0.	.0	1002.5	*	1	1040	129	0.	.0	1002.5	*	1	1900	229	128.	20.9	1005.4
1	0225	30	0.	.0	1002.5	*	1	1045	130	0.	.0	1002.5	*	1	1905	230	121.	20.8	1005.4
1	0230	31	0.	.0	1002.5	*	1	1050	131	0.	.0	1002.5	*	1	1910	231	115.	20.7	1005.4
1	0235	32	0.	.0	1002.5	*	1	1055	132	0.	.0	1002.5	*	1	1915	232	109.	20.6	1005.4
1	0240	33	0.	.0	1002.5	*	1	1100	133	0.	.0	1002.5	*	1	1920	233	104.	20.5	1005.4
1	0245	34	0.	.0	1002.5	*	1	1105	134	0.	.0	1002.5	*	1	1925	234	99.	20.4	1005.4
1	0250	35	0.	.0	1002.5	*	1	1110	135	0.	.0	1002.5	*	1	1930	235	95.	20.3	1005.4
1	0255	36	0.	.0	1002.5	*	1	1115	136	0.	.0	1002.5	*	1	1935	236	91.	20.3	1005.4
1	0300	37	0.	.0	1002.5	*	1	1120	137	0.	.0	1002.5	*	1	1940	237	87.	20.2	1005.4
1	0305	38	0.	.0	1002.5	*	1	1125	138	0.	.0	1002.5	*	1	1945	238	84.	20.1	1005.4
1	0310	39	0.	.0	1002.5	*	1	1130	139	0.	.0	1002.5	*	1	1950	239	81.	20.1	1005.4
1	0315	40	0.	.0	1002.5	*	1	1135	140	0.	.0	1002.5	*	1	1955	240	77.	20.0	1005.4
1	0320	41	0.	.0	1002.5	*	1	1140	141	0.	.0	1002.5	*	1	2000	241	75.	20.0	1005.4
1	0325	42	0.	.0	1002.5	*	1	1145	142	0.	.0	1002.5	*	1	2005	242	72.	19.9	1005.4
1	0330	43	0.	.0	1002.5	*	1	1150	143	0.	.1	1002.5	*	1	2010	243	69.	19.9	1005.4
1	0335	44	0.	.0	1002.5	*	1	1155	144	0.	.1	1002.6	*	1	2015	244	67.	19.9	1005.4
1	0340	45	0.	.0	1002.5	*	1	1200	145	0.	.2	1002.6	*	1	2020	245	65.	19.8	1005.4
1	0345	46	0.	.0	1002.5	*	1	1205	146	0.	.4	1002.7	*	1	2025	246	63.	19.8	1005.3
1	0350	47	0.	.0	1002.5	*	1	1210	147	0.	.7	1002.8	*	1	2030	247	62.	19.8	1005.3
1	0355	48	0.	.0	1002.5	*	1	1215	148	0.	1.0	1002.9	*	1	2035	248	60.	19.7	1005.3
1	0400	49	0.	.0	1002.5	*	1	1220	149	0.	1.4	1003.1	*	1	2040	249	59.	19.7	1005.3
1	0405	50	0.	.0	1002.5	*	1	1225	150	0.	1.9	1003.3	*	1	2045	250	58.	19.7	1005.3
1	0410	51	0.	.0	1002.5	*	1	1230	151	0.	2.4	1003.5	*	1	2050	251	56.	19.7	1005.3
1	0415	52	0.	.0	1002.5	*	1	1235	152	0.	2.9	1003.7	*	1	2055	252	55.	19.6	1005.3
1	0420	53	0.	.0	1002.5	*	1	1240	153	0.	3.4	1003.9	*	1	2100	253	54.	19.6	1005.3
1	0425	54	0.	.0	1002.5	*	1	1245	154	0.	3.7	1004.0	*	1	2105	254	53.	19.6	1005.3
1	0430	55	0.	.0	1002.5	*	1	1250	155	0.	4.1	1004.1	*	1	2110	255	52.	19.6	1005.3
1	0435	56	0.	.0	1002.5	*	1	1255	156	0.	4.3	1004.1	*	1	2115	256	51.	19.6	1005.3
1	0440	57	0.	.0	1002.5	*	1	1300	157	0.	4.5	1004.1	*	1	2120	257	50.	19.5	1005.3
1	0445	58	0.	.0	1002.5	*	1	1305	158	0.	4.8	1004.2	*	1	2125	258	49.	19.5	1005.3
1	0450	59	0.	.0	1002.5	*	1	1310	159	0.	5.8	1004.3	*	1	2130	259	48.	19.5	1005.3
1	0455	60	0.	.0	1002.5	*	1	1315	160	0.	8.6	1004.6	*	1	2135	260	47.	19.5	1005.3
1	0500	61	0.	.0	1002.5	*	1	1320	161	0.	13.6	1005.0	*	1	2140	261	46.	19.5	1005.3
1	0505	62	0.	.0	1002.5	*	1	1325	162	82.	20.1	1005.4	*	1	2145	262	46.	19.5	1005.3
1	0510	63	0.	.0	1002.5	*	1	1330	163	429.	26.2	1005.6	*	1	2150	263	45.	19.5	1005.3
1	0515	64	0.	.0	1002.5	*	1	1335	164	690.	30.8	1005.8	*	1	2155	264	44.	19.5	1005.3
1	0520	65	0.	.0	1002.5	*	1	1340	165	881.	34.2	1006.0	*	1	2200	265	44.	19.4	1005.3
1	0525	66	0.	.0	1002.5	*	1	1345	166	1117.	36.3	1006.1	*	1	2205	266	43.	19.4	1005.3
1	0530	67	0.	.0	1002.5	*	1	1350	167	1234.	37.3	1006.1	*	1	2210	267	42.	19.4	1005.3
1	0535	68	0.	.0	1002.5	*	1	1355	168	1292.	37.7	1006.1	*	1	2215	268	41.	19.4	1005.3
1	0540	69	0.	.0	1002.5	*	1	1400	169	1322.	38.0	1006.1	*	1	2220	269	40.	19.4	1005.3
1	0545	70	0.	.0	1002.5	*	1	1405	170	1339.	38.1	1006.1	*	1	2225	270	40.	19.4	1005.3
1	0550	71	0.	.0	1002.5	*	1	1410	171	1346.	38.2	1006.1	*	1	2230	271	39.	19.4	1005.3
1	0555	72	0.	.0	1002.5	*	1	1415	172	1342.	38.2	1006.1	*	1	2235	272	38.	19.3	1005.3
1	0600	73	0.	.0	1002.5	*	1	1420	173	1329.	38.0	1006.1	*	1	2240	273	37.	19.3	1005.3

1	0605	74	0.	.0	1002.5	*	1	1425	174	1305.	37.9	1006.1	*	1	2245	274	36.	19.3	1005.3
1	0610	75	0.	.0	1002.5	*	1	1430	175	1273.	37.6	1006.1	*	1	2250	275	36.	19.3	1005.3
1	0615	76	0.	.0	1002.5	*	1	1435	176	1235.	37.3	1006.1	*	1	2255	276	35.	19.3	1005.3
1	0620	77	0.	.0	1002.5	*	1	1440	177	1192.	36.9	1006.1	*	1	2300	277	34.	19.3	1005.3
1	0625	78	0.	.0	1002.5	*	1	1445	178	1147.	36.5	1006.1	*	1	2305	278	33.	19.3	1005.3
1	0630	79	0.	.0	1002.5	*	1	1450	179	1100.	36.1	1006.1	*	1	2310	279	33.	19.2	1005.3
1	0635	80	0.	.0	1002.5	*	1	1455	180	1052.	35.7	1006.0	*	1	2315	280	32.	19.2	1005.3
1	0640	81	0.	.0	1002.5	*	1	1500	181	1004.	35.3	1006.0	*	1	2320	281	31.	19.2	1005.3
1	0645	82	0.	.0	1002.5	*	1	1505	182	959.	34.9	1006.0	*	1	2325	282	31.	19.2	1005.3
1	0650	83	0.	.0	1002.5	*	1	1510	183	920.	34.6	1006.0	*	1	2330	283	30.	19.2	1005.3
1	0655	84	0.	.0	1002.5	*	1	1515	184	890.	34.4	1006.0	*	1	2335	284	30.	19.2	1005.3
1	0700	85	0.	.0	1002.5	*	1	1520	185	876.	34.1	1006.0	*	1	2340	285	29.	19.2	1005.3
1	0705	86	0.	.0	1002.5	*	1	1525	186	864.	33.9	1006.0	*	1	2345	286	28.	19.2	1005.3
1	0710	87	0.	.0	1002.5	*	1	1530	187	855.	33.7	1006.0	*	1	2350	287	28.	19.2	1005.3
1	0715	88	0.	.0	1002.5	*	1	1535	188	848.	33.6	1006.0	*	1	2355	288	28.	19.2	1005.3
1	0720	89	0.	.0	1002.5	*	1	1540	189	844.	33.5	1006.0	*	2	0000	289	27.	19.1	1005.3
1	0725	90	0.	.0	1002.5	*	1	1545	190	839.	33.4	1006.0	*	2	0005	290	27.	19.1	1005.3
1	0730	91	0.	.0	1002.5	*	1	1550	191	832.	33.3	1006.0	*	2	0010	291	26.	19.1	1005.3
1	0735	92	0.	.0	1002.5	*	1	1555	192	821.	33.1	1005.9	*	2	0015	292	26.	19.1	1005.3
1	0740	93	0.	.0	1002.5	*	1	1600	193	806.	32.9	1005.9	*	2	0020	293	25.	19.1	1005.3
1	0745	94	0.	.0	1002.5	*	1	1605	194	786.	32.5	1005.9	*	2	0025	294	25.	19.1	1005.3
1	0750	95	0.	.0	1002.5	*	1	1610	195	763.	32.1	1005.9	*	2	0030	295	24.	19.1	1005.3
1	0755	96	0.	.0	1002.5	*	1	1615	196	737.	31.7	1005.9	*	2	0035	296	24.	19.1	1005.3
1	0800	97	0.	.0	1002.5	*	1	1620	197	708.	31.1	1005.9	*	2	0040	297	23.	19.1	1005.3
1	0805	98	0.	.0	1002.5	*	1	1625	198	678.	30.6	1005.8	*	2	0045	298	23.	19.1	1005.3
1	0810	99	0.	.0	1002.5	*	1	1630	199	646.	30.1	1005.8	*	2	0050	299	22.	19.1	1005.3
1	0815	100	0.	.0	1002.5	*	1	1635	200	615.	29.5	1005.8	*	2	0055	300	22.	19.0	1005.3

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 1346.	14.17		639.	170.	164.	164.
		(INCHES)	.228	.243	.243	.243
		(AC-FT)	317.	338.	338.	338.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
38.	14.17	29.	12.	12.	12.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1006.14	14.17	1005.77	1004.04	1003.99	1003.99

CUMULATIVE AREA = 26.05 SQ MI

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HYDROGRAPH AT SR293A
TRANSPOSITION AREA 10.0 SQ MI

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
							*								*							
1		0000	1	0.	.0	1002.5	*	1		0820	101	0.	.0	1002.5	*	1		1640	201	527.	28.0	1005.7
1		0005	2	0.	.0	1002.5	*	1		0825	102	0.	.0	1002.5	*	1		1645	202	503.	27.5	1005.7
1		0010	3	0.	.0	1002.5	*	1		0830	103	0.	.0	1002.5	*	1		1650	203	479.	27.1	1005.7
1		0015	4	0.	.0	1002.5	*	1		0835	104	0.	.0	1002.5	*	1		1655	204	455.	26.7	1005.7
1		0020	5	0.	.0	1002.5	*	1		0840	105	0.	.0	1002.5	*	1		1700	205	432.	26.3	1005.6
1		0025	6	0.	.0	1002.5	*	1		0845	106	0.	.0	1002.5	*	1		1705	206	410.	25.9	1005.6
1		0030	7	0.	.0	1002.5	*	1		0850	107	0.	.0	1002.5	*	1		1710	207	388.	25.5	1005.6
1		0035	8	0.	.0	1002.5	*	1		0855	108	0.	.0	1002.5	*	1		1715	208	367.	25.1	1005.6
1		0040	9	0.	.0	1002.5	*	1		0900	109	0.	.0	1002.5	*	1		1720	209	346.	24.8	1005.6
1		0045	10	0.	.0	1002.5	*	1		0905	110	0.	.0	1002.5	*	1		1725	210	326.	24.4	1005.6
1		0050	11	0.	.0	1002.5	*	1		0910	111	0.	.0	1002.5	*	1		1730	211	307.	24.1	1005.5
1		0055	12	0.	.0	1002.5	*	1		0915	112	0.	.0	1002.5	*	1		1735	212	291.	23.8	1005.5
1		0100	13	0.	.0	1002.5	*	1		0920	113	0.	.0	1002.5	*	1		1740	213	276.	23.5	1005.5
1		0105	14	0.	.0	1002.5	*	1		0925	114	0.	.0	1002.5	*	1		1745	214	262.	23.3	1005.5
1		0110	15	0.	.0	1002.5	*	1		0930	115	0.	.0	1002.5	*	1		1750	215	248.	23.0	1005.5
1		0115	16	0.	.0	1002.5	*	1		0935	116	0.	.0	1002.5	*	1		1755	216	236.	22.8	1005.5
1		0120	17	0.	.0	1002.5	*	1		0940	117	0.	.0	1002.5	*	1		1800	217	223.	22.6	1005.5
1		0125	18	0.	.0	1002.5	*	1		0945	118	0.	.0	1002.5	*	1		1805	218	212.	22.4	1005.5
1		0130	19	0.	.0	1002.5	*	1		0950	119	0.	.0	1002.5	*	1		1810	219	201.	22.2	1005.5
1		0135	20	0.	.0	1002.5	*	1		0955	120	0.	.0	1002.5	*	1		1815	220	191.	22.0	1005.5
1		0140	21	0.	.0	1002.5	*	1		1000	121	0.	.0	1002.5	*	1		1820	221	182.	21.9	1005.4
1		0145	22	0.	.0	1002.5	*	1		1005	122	0.	.0	1002.5	*	1		1825	222	174.	21.7	1005.4
1		0150	23	0.	.0	1002.5	*	1		1010	123	0.	.0	1002.5	*	1		1830	223	167.	21.6	1005.4
1		0155	24	0.	.0	1002.5	*	1		1015	124	0.	.0	1002.5	*	1		1835	224	160.	21.5	1005.4
1		0200	25	0.	.0	1002.5	*	1		1020	125	0.	.0	1002.5	*	1		1840	225	152.	21.4	1005.4
1		0205	26	0.	.0	1002.5	*	1		1025	126	0.	.0	1002.5	*	1		1845	226	145.	21.2	1005.4
1		0210	27	0.	.0	1002.5	*	1		1030	127	0.	.0	1002.5	*	1		1850	227	138.	21.1	1005.4
1		0215	28	0.	.0	1002.5	*	1		1035	128	0.	.0	1002.5	*	1		1855	228	131.	21.0	1005.4
1		0220	29	0.	.0	1002.5	*	1		1040	129	0.	.0	1002.5	*	1		1900	229	124.	20.9	1005.4
1		0225	30	0.	.0	1002.5	*	1		1045	130	0.	.0	1002.5	*	1		1905	230	117.	20.7	1005.4
1		0230	31	0.	.0	1002.5	*	1		1050	131	0.	.0	1002.5	*	1		1910	231	111.	20.6	1005.4
1		0235	32	0.	.0	1002.5	*	1		1055	132	0.	.0	1002.5	*	1		1915	232	106.	20.5	1005.4
1		0240	33	0.	.0	1002.5	*	1		1100	133	0.	.0	1002.5	*	1		1920	233	101.	20.4	1005.4
1		0245	34	0.	.0	1002.5	*	1		1105	134	0.	.0	1002.5	*	1		1925	234	97.	20.4	1005.4
1		0250	35	0.	.0	1002.5	*	1		1110	135	0.	.0	1002.5	*	1		1930	235	92.	20.3	1005.4
1		0255	36	0.	.0	1002.5	*	1		1115	136	0.	.0	1002.5	*	1		1935	236	89.	20.2	1005.4
1		0300	37	0.	.0	1002.5	*	1		1120	137	0.	.0	1002.5	*	1		1940	237	85.	20.2	1005.4
1		0305	38	0.	.0	1002.5	*	1		1125	138	0.	.0	1002.5	*	1		1945	238	81.	20.1	1005.4
1		0310	39	0.	.0	1002.5	*	1		1130	139	0.	.0	1002.5	*	1		1950	239	78.	20.0	1005.4
1		0315	40	0.	.0	1002.5	*	1		1135	140	0.	.0	1002.5	*	1		1955	240	74.	20.0	1005.4
1		0320	41	0.	.0	1002.5	*	1		1140	141	0.	.0	1002.5	*	1		2000	241	71.	19.9	1005.4
1		0325	42	0.	.0	1002.5	*	1		1145	142	0.	.0	1002.5	*	1		2005	242	68.	19.9	1005.4
1		0330	43	0.	.0	1002.5	*	1		1150	143	0.	.1	1002.5	*	1		2010	243	66.	19.8	1005.4
1		0335	44	0.	.0	1002.5	*	1		1155	144	0.	.1	1002.6	*	1		2015	244	63.	19.8	1005.3
1		0340	45	0.	.0	1002.5	*	1		1200	145	0.	.2	1002.6	*	1		2020	245	61.	19.7	1005.3
1		0345	46	0.	.0	1002.5	*	1		1205	146	0.	.4	1002.7	*	1		2025	246	59.	19.7	1005.3
1		0350	47	0.	.0	1002.5	*	1		1210	147	0.	.6	1002.8	*	1		2030	247	57.	19.7	1005.3
1		0355	48	0.	.0	1002.5	*	1		1215	148	0.	.9	1002.9	*	1		2035	248	55.	19.6	1005.3
1		0400	49	0.	.0	1002.5	*	1		1220	149	0.	1.3	1003.1	*	1		2040	249	54.	19.6	1005.3
1		0405	50	0.	.0	1002.5	*	1		1225	150	0.	1.7	1003.2	*	1		2045	250	52.	19.6	1005.3
1		0410	51	0.	.0	1002.5	*	1		1230	151	0.	2.2	1003.4	*	1		2050	251	51.	19.6	1005.3
1		0415	52	0.	.0	1002.5	*	1		1235	152	0.	2.7	1003.6	*	1		2055	252	50.	19.6	1005.3
1		0420	53	0.	.0	1002.5	*	1		1240	153	0.	3.1	1003.8	*	1		2100	253	49.	19.5	1005.3
1		0425	54	0.	.0	1002.5	*	1		1245	154	0.	3.5	1004.0	*	1		2105	254	48.	19.5	1005.3
1		0430	55	0.	.0	1002.5	*	1		1250	155	0.	3.8	1004.0	*	1		2110	255	47.	19.5	1005.3
1		0435	56	0.	.0	1002.5	*	1		1255	156	0.	4.0	1004.1	*	1		2115	256	47.	19.5	1005.3

1	0440	57	0.	.0	1002.5	*	1	1300	157	0.	4.2	1004.1	*	1	2120	257	46.	19.5	1005.3
1	0445	58	0.	.0	1002.5	*	1	1305	158	0.	4.4	1004.1	*	1	2125	258	45.	19.5	1005.3
1	0450	59	0.	.0	1002.5	*	1	1310	159	0.	4.9	1004.2	*	1	2130	259	45.	19.5	1005.3
1	0455	60	0.	.0	1002.5	*	1	1315	160	0.	6.6	1004.4	*	1	2135	260	44.	19.4	1005.3
1	0500	61	0.	.0	1002.5	*	1	1320	161	0.	10.2	1004.7	*	1	2140	261	44.	19.4	1005.3
1	0505	62	0.	.0	1002.5	*	1	1325	162	0.	15.7	1005.1	*	1	2145	262	43.	19.4	1005.3
1	0510	63	0.	.0	1002.5	*	1	1330	163	181.	21.9	1005.4	*	1	2150	263	42.	19.4	1005.3
1	0515	64	0.	.0	1002.5	*	1	1335	164	473.	27.0	1005.7	*	1	2155	264	42.	19.4	1005.3
1	0520	65	0.	.0	1002.5	*	1	1340	165	686.	30.7	1005.8	*	1	2200	265	41.	19.4	1005.3
1	0525	66	0.	.0	1002.5	*	1	1345	166	837.	33.4	1006.0	*	1	2205	266	40.	19.4	1005.3
1	0530	67	0.	.0	1002.5	*	1	1350	167	987.	35.2	1006.0	*	1	2210	267	40.	19.4	1005.3
1	0535	68	0.	.0	1002.5	*	1	1355	168	1099.	36.1	1006.1	*	1	2215	268	39.	19.4	1005.3
1	0540	69	0.	.0	1002.5	*	1	1400	169	1151.	36.6	1006.1	*	1	2220	269	38.	19.3	1005.3
1	0545	70	0.	.0	1002.5	*	1	1405	170	1178.	36.8	1006.1	*	1	2225	270	38.	19.3	1005.3
1	0550	71	0.	.0	1002.5	*	1	1410	171	1191.	36.9	1006.1	*	1	2230	271	37.	19.3	1005.3
1	0555	72	0.	.0	1002.5	*	1	1415	172	1195.	36.9	1006.1	*	1	2235	272	36.	19.3	1005.3
1	0600	73	0.	.0	1002.5	*	1	1420	173	1190.	36.9	1006.1	*	1	2240	273	36.	19.3	1005.3
1	0605	74	0.	.0	1002.5	*	1	1425	174	1176.	36.8	1006.1	*	1	2245	274	35.	19.3	1005.3
1	0610	75	0.	.0	1002.5	*	1	1430	175	1154.	36.6	1006.1	*	1	2250	275	34.	19.3	1005.3
1	0615	76	0.	.0	1002.5	*	1	1435	176	1127.	36.4	1006.1	*	1	2255	276	34.	19.3	1005.3
1	0620	77	0.	.0	1002.5	*	1	1440	177	1094.	36.1	1006.1	*	1	2300	277	33.	19.3	1005.3
1	0625	78	0.	.0	1002.5	*	1	1445	178	1058.	35.8	1006.0	*	1	2305	278	32.	19.2	1005.3
1	0630	79	0.	.0	1002.5	*	1	1450	179	1017.	35.4	1006.0	*	1	2310	279	32.	19.2	1005.3
1	0635	80	0.	.0	1002.5	*	1	1455	180	974.	35.1	1006.0	*	1	2315	280	31.	19.2	1005.3
1	0640	81	0.	.0	1002.5	*	1	1500	181	931.	34.7	1006.0	*	1	2320	281	31.	19.2	1005.3
1	0645	82	0.	.0	1002.5	*	1	1505	182	890.	34.4	1006.0	*	1	2325	282	30.	19.2	1005.3
1	0650	83	0.	.0	1002.5	*	1	1510	183	867.	34.0	1006.0	*	1	2330	283	30.	19.2	1005.3
1	0655	84	0.	.0	1002.5	*	1	1515	184	841.	33.5	1006.0	*	1	2335	284	29.	19.2	1005.3
1	0700	85	0.	.0	1002.5	*	1	1520	185	814.	33.0	1005.9	*	1	2340	285	29.	19.2	1005.3
1	0705	86	0.	.0	1002.5	*	1	1525	186	790.	32.6	1005.9	*	1	2345	286	28.	19.2	1005.3
1	0710	87	0.	.0	1002.5	*	1	1530	187	769.	32.2	1005.9	*	1	2350	287	28.	19.2	1005.3
1	0715	88	0.	.0	1002.5	*	1	1535	188	752.	31.9	1005.9	*	1	2355	288	27.	19.1	1005.3
1	0720	89	0.	.0	1002.5	*	1	1540	189	739.	31.7	1005.9	*	2	0000	289	27.	19.1	1005.3
1	0725	90	0.	.0	1002.5	*	1	1545	190	727.	31.5	1005.9	*	2	0005	290	26.	19.1	1005.3
1	0730	91	0.	.0	1002.5	*	1	1550	191	717.	31.3	1005.9	*	2	0010	291	26.	19.1	1005.3
1	0735	92	0.	.0	1002.5	*	1	1555	192	706.	31.1	1005.9	*	2	0015	292	25.	19.1	1005.3
1	0740	93	0.	.0	1002.5	*	1	1600	193	694.	30.9	1005.8	*	2	0020	293	25.	19.1	1005.3
1	0745	94	0.	.0	1002.5	*	1	1605	194	679.	30.6	1005.8	*	2	0025	294	24.	19.1	1005.3
1	0750	95	0.	.0	1002.5	*	1	1610	195	661.	30.3	1005.8	*	2	0030	295	24.	19.1	1005.3
1	0755	96	0.	.0	1002.5	*	1	1615	196	641.	30.0	1005.8	*	2	0035	296	23.	19.1	1005.3
1	0800	97	0.	.0	1002.5	*	1	1620	197	619.	29.6	1005.8	*	2	0040	297	23.	19.1	1005.3
1	0805	98	0.	.0	1002.5	*	1	1625	198	596.	29.2	1005.8	*	2	0045	298	22.	19.1	1005.3
1	0810	99	0.	.0	1002.5	*	1	1630	199	573.	28.8	1005.8	*	2	0050	299	22.	19.1	1005.3
1	0815	100	0.	.0	1002.5	*	1	1635	200	550.	28.4	1005.7	*	2	0055	300	21.	19.0	1005.3
						*							*						

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
+ (CFS)	(HR)		6-HR	24-HR	72-HR	24.92-HR
		(CFS)				
+ 1195.	14.25		568.	152.	146.	146.
		(INCHES)	.203	.217	.217	.217
		(AC-FT)	281.	301.	301.	301.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				

37.	14.25	28.	12.	11.	11.
PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
+ (FEET)	(HR)	6-HR	24-HR	72-HR	24.92-HR
1006.09	14.25	1005.72	1004.03	1003.97	1003.97

CUMULATIVE AREA = 26.05 SQ MI

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HYDROGRAPH AT SR293A
TRANSPOSITION AREA 50.0 SQ MI

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	1002.5	*	1		0820	101	0.	.0	1002.5	*	1		1640	201	469.	26.9	1005.7
1		0005	2	0.	.0	1002.5	*	1		0825	102	0.	.0	1002.5	*	1		1645	202	450.	26.6	1005.7
1		0010	3	0.	.0	1002.5	*	1		0830	103	0.	.0	1002.5	*	1		1650	203	431.	26.3	1005.6
1		0015	4	0.	.0	1002.5	*	1		0835	104	0.	.0	1002.5	*	1		1655	204	412.	25.9	1005.6
1		0020	5	0.	.0	1002.5	*	1		0840	105	0.	.0	1002.5	*	1		1700	205	394.	25.6	1005.6
1		0025	6	0.	.0	1002.5	*	1		0845	106	0.	.0	1002.5	*	1		1705	206	375.	25.3	1005.6
1		0030	7	0.	.0	1002.5	*	1		0850	107	0.	.0	1002.5	*	1		1710	207	356.	24.9	1005.6
1		0035	8	0.	.0	1002.5	*	1		0855	108	0.	.0	1002.5	*	1		1715	208	337.	24.6	1005.6
1		0040	9	0.	.0	1002.5	*	1		0900	109	0.	.0	1002.5	*	1		1720	209	319.	24.3	1005.6
1		0045	10	0.	.0	1002.5	*	1		0905	110	0.	.0	1002.5	*	1		1725	210	302.	24.0	1005.5
1		0050	11	0.	.0	1002.5	*	1		0910	111	0.	.0	1002.5	*	1		1730	211	287.	23.7	1005.5
1		0055	12	0.	.0	1002.5	*	1		0915	112	0.	.0	1002.5	*	1		1735	212	273.	23.5	1005.5
1		0100	13	0.	.0	1002.5	*	1		0920	113	0.	.0	1002.5	*	1		1740	213	260.	23.3	1005.5
1		0105	14	0.	.0	1002.5	*	1		0925	114	0.	.0	1002.5	*	1		1745	214	247.	23.0	1005.5
1		0110	15	0.	.0	1002.5	*	1		0930	115	0.	.0	1002.5	*	1		1750	215	235.	22.8	1005.5
1		0115	16	0.	.0	1002.5	*	1		0935	116	0.	.0	1002.5	*	1		1755	216	224.	22.6	1005.5
1		0120	17	0.	.0	1002.5	*	1		0940	117	0.	.0	1002.5	*	1		1800	217	213.	22.4	1005.5
1		0125	18	0.	.0	1002.5	*	1		0945	118	0.	.0	1002.5	*	1		1805	218	202.	22.2	1005.5
1		0130	19	0.	.0	1002.5	*	1		0950	119	0.	.0	1002.5	*	1		1810	219	192.	22.1	1005.5
1		0135	20	0.	.0	1002.5	*	1		0955	120	0.	.0	1002.5	*	1		1815	220	183.	21.9	1005.4
1		0140	21	0.	.0	1002.5	*	1		1000	121	0.	.0	1002.5	*	1		1820	221	176.	21.8	1005.4
1		0145	22	0.	.0	1002.5	*	1		1005	122	0.	.0	1002.5	*	1		1825	222	168.	21.6	1005.4
1		0150	23	0.	.0	1002.5	*	1		1010	123	0.	.0	1002.5	*	1		1830	223	161.	21.5	1005.4
1		0155	24	0.	.0	1002.5	*	1		1015	124	0.	.0	1002.5	*	1		1835	224	154.	21.4	1005.4
1		0200	25	0.	.0	1002.5	*	1		1020	125	0.	.0	1002.5	*	1		1840	225	147.	21.3	1005.4
1		0205	26	0.	.0	1002.5	*	1		1025	126	0.	.0	1002.5	*	1		1845	226	140.	21.1	1005.4
1		0210	27	0.	.0	1002.5	*	1		1030	127	0.	.0	1002.5	*	1		1850	227	132.	21.0	1005.4
1		0215	28	0.	.0	1002.5	*	1		1035	128	0.	.0	1002.5	*	1		1855	228	126.	20.9	1005.4
1		0220	29	0.	.0	1002.5	*	1		1040	129	0.	.0	1002.5	*	1		1900	229	119.	20.8	1005.4
1		0225	30	0.	.0	1002.5	*	1		1045	130	0.	.0	1002.5	*	1		1905	230	113.	20.7	1005.4
1		0230	31	0.	.0	1002.5	*	1		1050	131	0.	.0	1002.5	*	1		1910	231	107.	20.6	1005.4
1		0235	32	0.	.0	1002.5	*	1		1055	132	0.	.0	1002.5	*	1		1915	232	102.	20.5	1005.4
1		0240	33	0.	.0	1002.5	*	1		1100	133	0.	.0	1002.5	*	1		1920	233	98.	20.4	1005.4
1		0245	34	0.	.0	1002.5	*	1		1105	134	0.	.0	1002.5	*	1		1925	234	93.	20.3	1005.4
1		0250	35	0.	.0	1002.5	*	1		1110	135	0.	.0	1002.5	*	1		1930	235	89.	20.2	1005.4
1		0255	36	0.	.0	1002.5	*	1		1115	136	0.	.0	1002.5	*	1		1935	236	86.	20.2	1005.4
1		0300	37	0.	.0	1002.5	*	1		1120	137	0.	.0	1002.5	*	1		1940	237	82.	20.1	1005.4
1		0305	38	0.	.0	1002.5	*	1		1125	138	0.	.0	1002.5	*	1		1945	238	78.	20.0	1005.4
1		0310	39	0.	.0	1002.5	*	1		1130	139	0.	.0	1002.5	*	1		1950	239	75.	20.0	1005.4

1	0315	40	0.	.0	1002.5	*	1	1135	140	0.	.0	1002.5	*	1	1955	240	71.	19.9	1005.4
1	0320	41	0.	.0	1002.5	*	1	1140	141	0.	.0	1002.5	*	1	2000	241	68.	19.9	1005.4
1	0325	42	0.	.0	1002.5	*	1	1145	142	0.	.0	1002.5	*	1	2005	242	65.	19.8	1005.4
1	0330	43	0.	.0	1002.5	*	1	1150	143	0.	.1	1002.5	*	1	2010	243	62.	19.8	1005.3
1	0335	44	0.	.0	1002.5	*	1	1155	144	0.	.1	1002.5	*	1	2015	244	60.	19.7	1005.3
1	0340	45	0.	.0	1002.5	*	1	1200	145	0.	.2	1002.6	*	1	2020	245	57.	19.7	1005.3
1	0345	46	0.	.0	1002.5	*	1	1205	146	0.	.4	1002.7	*	1	2025	246	55.	19.6	1005.3
1	0350	47	0.	.0	1002.5	*	1	1210	147	0.	.6	1002.7	*	1	2030	247	53.	19.6	1005.3
1	0355	48	0.	.0	1002.5	*	1	1215	148	0.	.9	1002.9	*	1	2035	248	51.	19.6	1005.3
1	0400	49	0.	.0	1002.5	*	1	1220	149	0.	1.2	1003.0	*	1	2040	249	50.	19.5	1005.3
1	0405	50	0.	.0	1002.5	*	1	1225	150	0.	1.6	1003.2	*	1	2045	250	48.	19.5	1005.3
1	0410	51	0.	.0	1002.5	*	1	1230	151	0.	2.0	1003.4	*	1	2050	251	47.	19.5	1005.3
1	0415	52	0.	.0	1002.5	*	1	1235	152	0.	2.4	1003.5	*	1	2055	252	46.	19.5	1005.3
1	0420	53	0.	.0	1002.5	*	1	1240	153	0.	2.8	1003.7	*	1	2100	253	45.	19.5	1005.3
1	0425	54	0.	.0	1002.5	*	1	1245	154	0.	3.1	1003.8	*	1	2105	254	45.	19.5	1005.3
1	0430	55	0.	.0	1002.5	*	1	1250	155	0.	3.4	1004.0	*	1	2110	255	44.	19.4	1005.3
1	0435	56	0.	.0	1002.5	*	1	1255	156	0.	3.6	1004.0	*	1	2115	256	43.	19.4	1005.3
1	0440	57	0.	.0	1002.5	*	1	1300	157	0.	3.8	1004.0	*	1	2120	257	42.	19.4	1005.3
1	0445	58	0.	.0	1002.5	*	1	1305	158	0.	3.9	1004.1	*	1	2125	258	41.	19.4	1005.3
1	0450	59	0.	.0	1002.5	*	1	1310	159	0.	4.1	1004.1	*	1	2130	259	41.	19.4	1005.3
1	0455	60	0.	.0	1002.5	*	1	1315	160	0.	4.9	1004.2	*	1	2135	260	40.	19.4	1005.3
1	0500	61	0.	.0	1002.5	*	1	1320	161	0.	7.0	1004.4	*	1	2140	261	39.	19.4	1005.3
1	0505	62	0.	.0	1002.5	*	1	1325	162	0.	10.9	1004.8	*	1	2145	262	38.	19.3	1005.3
1	0510	63	0.	.0	1002.5	*	1	1330	163	0.	16.2	1005.1	*	1	2150	263	38.	19.3	1005.3
1	0515	64	0.	.0	1002.5	*	1	1335	164	174.	21.7	1005.4	*	1	2155	264	37.	19.3	1005.3
1	0520	65	0.	.0	1002.5	*	1	1340	165	429.	26.2	1005.6	*	1	2200	265	37.	19.3	1005.3
1	0525	66	0.	.0	1002.5	*	1	1345	166	611.	29.4	1005.8	*	1	2205	266	36.	19.3	1005.3
1	0530	67	0.	.0	1002.5	*	1	1350	167	739.	31.7	1005.9	*	1	2210	267	35.	19.3	1005.3
1	0535	68	0.	.0	1002.5	*	1	1355	168	828.	33.3	1006.0	*	1	2215	268	35.	19.3	1005.3
1	0540	69	0.	.0	1002.5	*	1	1400	169	891.	34.4	1006.0	*	1	2220	269	34.	19.3	1005.3
1	0545	70	0.	.0	1002.5	*	1	1405	170	969.	35.0	1006.0	*	1	2225	270	34.	19.3	1005.3
1	0550	71	0.	.0	1002.5	*	1	1410	171	1005.	35.3	1006.0	*	1	2230	271	33.	19.3	1005.3
1	0555	72	0.	.0	1002.5	*	1	1415	172	1021.	35.5	1006.0	*	1	2235	272	33.	19.3	1005.3
1	0600	73	0.	.0	1002.5	*	1	1420	173	1025.	35.5	1006.0	*	1	2240	273	33.	19.2	1005.3
1	0605	74	0.	.0	1002.5	*	1	1425	174	1022.	35.5	1006.0	*	1	2245	274	32.	19.2	1005.3
1	0610	75	0.	.0	1002.5	*	1	1430	175	1010.	35.4	1006.0	*	1	2250	275	32.	19.2	1005.3
1	0615	76	0.	.0	1002.5	*	1	1435	176	992.	35.2	1006.0	*	1	2255	276	31.	19.2	1005.3
1	0620	77	0.	.0	1002.5	*	1	1440	177	969.	35.0	1006.0	*	1	2300	277	31.	19.2	1005.3
1	0625	78	0.	.0	1002.5	*	1	1445	178	941.	34.8	1006.0	*	1	2305	278	30.	19.2	1005.3
1	0630	79	0.	.0	1002.5	*	1	1450	179	910.	34.5	1006.0	*	1	2310	279	30.	19.2	1005.3
1	0635	80	0.	.0	1002.5	*	1	1455	180	883.	34.2	1006.0	*	1	2315	280	30.	19.2	1005.3
1	0640	81	0.	.0	1002.5	*	1	1500	181	860.	33.8	1006.0	*	1	2320	281	29.	19.2	1005.3
1	0645	82	0.	.0	1002.5	*	1	1505	182	832.	33.3	1006.0	*	1	2325	282	29.	19.2	1005.3
1	0650	83	0.	.0	1002.5	*	1	1510	183	801.	32.8	1005.9	*	1	2330	283	28.	19.2	1005.3
1	0655	84	0.	.0	1002.5	*	1	1515	184	770.	32.2	1005.9	*	1	2335	284	28.	19.2	1005.3
1	0700	85	0.	.0	1002.5	*	1	1520	185	741.	31.7	1005.9	*	1	2340	285	28.	19.2	1005.3
1	0705	86	0.	.0	1002.5	*	1	1525	186	715.	31.3	1005.9	*	1	2345	286	27.	19.2	1005.3
1	0710	87	0.	.0	1002.5	*	1	1530	187	692.	30.9	1005.8	*	1	2350	287	27.	19.1	1005.3
1	0715	88	0.	.0	1002.5	*	1	1535	188	671.	30.5	1005.8	*	1	2355	288	27.	19.1	1005.3
1	0720	89	0.	.0	1002.5	*	1	1540	189	654.	30.2	1005.8	*	2	0000	289	26.	19.1	1005.3
1	0725	90	0.	.0	1002.5	*	1	1545	190	638.	29.9	1005.8	*	2	0005	290	26.	19.1	1005.3
1	0730	91	0.	.0	1002.5	*	1	1550	191	624.	29.7	1005.8	*	2	0010	291	25.	19.1	1005.3
1	0735	92	0.	.0	1002.5	*	1	1555	192	610.	29.4	1005.8	*	2	0015	292	25.	19.1	1005.3
1	0740	93	0.	.0	1002.5	*	1	1600	193	597.	29.2	1005.8	*	2	0020	293	24.	19.1	1005.3
1	0745	94	0.	.0	1002.5	*	1	1605	194	583.	28.9	1005.8	*	2	0025	294	24.	19.1	1005.3
1	0750	95	0.	.0	1002.5	*	1	1610	195	569.	28.7	1005.7	*	2	0030	295	23.	19.1	1005.3
1	0755	96	0.	.0	1002.5	*	1	1615	196	554.	28.4	1005.7	*	2	0035	296	23.	19.1	1005.3
1	0800	97	0.	.0	1002.5	*	1	1620	197	538.	28.2	1005.7	*	2	0040	297	22.	19.1	1005.3

1	0805	98	0.	.0	1002.5	*	1	1625	198	522.	27.9	1005.7	*	2	0045	298	22.	19.1	1005.3
1	0810	99	0.	.0	1002.5	*	1	1630	199	505.	27.6	1005.7	*	2	0050	299	21.	19.0	1005.3
1	0815	100	0.	.0	1002.5	*	1	1635	200	487.	27.3	1005.7	*	2	0055	300	21.	19.0	1005.3

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1025.	14.33		492.	132.	127.	127.
		(INCHES)	.176	.189	.189	.189
		(AC-FT)	244.	262.	262.	262.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
35.	14.33	27.	11.	11.	11.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1006.04	14.33	1005.68	1004.01	1003.95	1003.95

CUMULATIVE AREA = 26.05 SQ MI

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HYDROGRAPH AT SR293A
TRANSPOSITION AREA 100.0 SQ MI

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	1002.5	*	1		0820	101	0.	.0	1002.5	*	1		1640	201	445.	26.5	1005.6
1		0005	2	0.	.0	1002.5	*	1		0825	102	0.	.0	1002.5	*	1		1645	202	428.	26.2	1005.6
1		0010	3	0.	.0	1002.5	*	1		0830	103	0.	.0	1002.5	*	1		1650	203	411.	25.9	1005.6
1		0015	4	0.	.0	1002.5	*	1		0835	104	0.	.0	1002.5	*	1		1655	204	394.	25.6	1005.6
1		0020	5	0.	.0	1002.5	*	1		0840	105	0.	.0	1002.5	*	1		1700	205	376.	25.3	1005.6
1		0025	6	0.	.0	1002.5	*	1		0845	106	0.	.0	1002.5	*	1		1705	206	358.	25.0	1005.6
1		0030	7	0.	.0	1002.5	*	1		0850	107	0.	.0	1002.5	*	1		1710	207	340.	24.7	1005.6
1		0035	8	0.	.0	1002.5	*	1		0855	108	0.	.0	1002.5	*	1		1715	208	323.	24.4	1005.6
1		0040	9	0.	.0	1002.5	*	1		0900	109	0.	.0	1002.5	*	1		1720	209	306.	24.1	1005.5
1		0045	10	0.	.0	1002.5	*	1		0905	110	0.	.0	1002.5	*	1		1725	210	291.	23.8	1005.5
1		0050	11	0.	.0	1002.5	*	1		0910	111	0.	.0	1002.5	*	1		1730	211	278.	23.6	1005.5
1		0055	12	0.	.0	1002.5	*	1		0915	112	0.	.0	1002.5	*	1		1735	212	265.	23.3	1005.5
1		0100	13	0.	.0	1002.5	*	1		0920	113	0.	.0	1002.5	*	1		1740	213	253.	23.1	1005.5
1		0105	14	0.	.0	1002.5	*	1		0925	114	0.	.0	1002.5	*	1		1745	214	241.	22.9	1005.5
1		0110	15	0.	.0	1002.5	*	1		0930	115	0.	.0	1002.5	*	1		1750	215	229.	22.7	1005.5
1		0115	16	0.	.0	1002.5	*	1		0935	116	0.	.0	1002.5	*	1		1755	216	218.	22.5	1005.5
1		0120	17	0.	.0	1002.5	*	1		0940	117	0.	.0	1002.5	*	1		1800	217	207.	22.3	1005.5
1		0125	18	0.	.0	1002.5	*	1		0945	118	0.	.0	1002.5	*	1		1805	218	197.	22.1	1005.5
1		0130	19	0.	.0	1002.5	*	1		0950	119	0.	.0	1002.5	*	1		1810	219	188.	22.0	1005.4
1		0135	20	0.	.0	1002.5	*	1		0955	120	0.	.0	1002.5	*	1		1815	220	180.	21.8	1005.4
1		0140	21	0.	.0	1002.5	*	1		1000	121	0.	.0	1002.5	*	1		1820	221	172.	21.7	1005.4
1		0145	22	0.	.0	1002.5	*	1		1005	122	0.	.0	1002.5	*	1		1825	222	165.	21.6	1005.4

1	0150	23	0.	.0	1002.5	*	1	1010	123	0.	.0	1002.5	*	1	1830	223	158.	21.5	1005.4
1	0155	24	0.	.0	1002.5	*	1	1015	124	0.	.0	1002.5	*	1	1835	224	151.	21.3	1005.4
1	0200	25	0.	.0	1002.5	*	1	1020	125	0.	.0	1002.5	*	1	1840	225	144.	21.2	1005.4
1	0205	26	0.	.0	1002.5	*	1	1025	126	0.	.0	1002.5	*	1	1845	226	137.	21.1	1005.4
1	0210	27	0.	.0	1002.5	*	1	1030	127	0.	.0	1002.5	*	1	1850	227	130.	21.0	1005.4
1	0215	28	0.	.0	1002.5	*	1	1035	128	0.	.0	1002.5	*	1	1855	228	123.	20.8	1005.4
1	0220	29	0.	.0	1002.5	*	1	1040	129	0.	.0	1002.5	*	1	1900	229	117.	20.7	1005.4
1	0225	30	0.	.0	1002.5	*	1	1045	130	0.	.0	1002.5	*	1	1905	230	111.	20.6	1005.4
1	0230	31	0.	.0	1002.5	*	1	1050	131	0.	.0	1002.5	*	1	1910	231	105.	20.5	1005.4
1	0235	32	0.	.0	1002.5	*	1	1055	132	0.	.0	1002.5	*	1	1915	232	101.	20.4	1005.4
1	0240	33	0.	.0	1002.5	*	1	1100	133	0.	.0	1002.5	*	1	1920	233	96.	20.4	1005.4
1	0245	34	0.	.0	1002.5	*	1	1105	134	0.	.0	1002.5	*	1	1925	234	92.	20.3	1005.4
1	0250	35	0.	.0	1002.5	*	1	1110	135	0.	.0	1002.5	*	1	1930	235	88.	20.2	1005.4
1	0255	36	0.	.0	1002.5	*	1	1115	136	0.	.0	1002.5	*	1	1935	236	84.	20.2	1005.4
1	0300	37	0.	.0	1002.5	*	1	1120	137	0.	.0	1002.5	*	1	1940	237	80.	20.1	1005.4
1	0305	38	0.	.0	1002.5	*	1	1125	138	0.	.0	1002.5	*	1	1945	238	77.	20.0	1005.4
1	0310	39	0.	.0	1002.5	*	1	1130	139	0.	.0	1002.5	*	1	1950	239	73.	20.0	1005.4
1	0315	40	0.	.0	1002.5	*	1	1135	140	0.	.0	1002.5	*	1	1955	240	70.	19.9	1005.4
1	0320	41	0.	.0	1002.5	*	1	1140	141	0.	.0	1002.5	*	1	2000	241	67.	19.8	1005.4
1	0325	42	0.	.0	1002.5	*	1	1145	142	0.	.0	1002.5	*	1	2005	242	64.	19.8	1005.4
1	0330	43	0.	.0	1002.5	*	1	1150	143	0.	.0	1002.5	*	1	2010	243	61.	19.7	1005.3
1	0335	44	0.	.0	1002.5	*	1	1155	144	0.	.1	1002.5	*	1	2015	244	58.	19.7	1005.3
1	0340	45	0.	.0	1002.5	*	1	1200	145	0.	.2	1002.6	*	1	2020	245	56.	19.7	1005.3
1	0345	46	0.	.0	1002.5	*	1	1205	146	0.	.3	1002.6	*	1	2025	246	54.	19.6	1005.3
1	0350	47	0.	.0	1002.5	*	1	1210	147	0.	.6	1002.7	*	1	2030	247	52.	19.6	1005.3
1	0355	48	0.	.0	1002.5	*	1	1215	148	0.	.8	1002.9	*	1	2035	248	50.	19.6	1005.3
1	0400	49	0.	.0	1002.5	*	1	1220	149	0.	1.1	1003.0	*	1	2040	249	49.	19.5	1005.3
1	0405	50	0.	.0	1002.5	*	1	1225	150	0.	1.5	1003.1	*	1	2045	250	47.	19.5	1005.3
1	0410	51	0.	.0	1002.5	*	1	1230	151	0.	1.9	1003.3	*	1	2050	251	46.	19.5	1005.3
1	0415	52	0.	.0	1002.5	*	1	1235	152	0.	2.3	1003.5	*	1	2055	252	45.	19.5	1005.3
1	0420	53	0.	.0	1002.5	*	1	1240	153	0.	2.7	1003.7	*	1	2100	253	44.	19.4	1005.3
1	0425	54	0.	.0	1002.5	*	1	1245	154	0.	3.0	1003.8	*	1	2105	254	43.	19.4	1005.3
1	0430	55	0.	.0	1002.5	*	1	1250	155	0.	3.3	1003.9	*	1	2110	255	42.	19.4	1005.3
1	0435	56	0.	.0	1002.5	*	1	1255	156	0.	3.5	1004.0	*	1	2115	256	41.	19.4	1005.3
1	0440	57	0.	.0	1002.5	*	1	1300	157	0.	3.6	1004.0	*	1	2120	257	40.	19.4	1005.3
1	0445	58	0.	.0	1002.5	*	1	1305	158	0.	3.7	1004.0	*	1	2125	258	40.	19.4	1005.3
1	0450	59	0.	.0	1002.5	*	1	1310	159	0.	3.9	1004.0	*	1	2130	259	39.	19.4	1005.3
1	0455	60	0.	.0	1002.5	*	1	1315	160	0.	4.3	1004.1	*	1	2135	260	38.	19.3	1005.3
1	0500	61	0.	.0	1002.5	*	1	1320	161	0.	5.9	1004.3	*	1	2140	261	37.	19.3	1005.3
1	0505	62	0.	.0	1002.5	*	1	1325	162	0.	9.0	1004.7	*	1	2145	262	36.	19.3	1005.3
1	0510	63	0.	.0	1002.5	*	1	1330	163	0.	13.7	1005.0	*	1	2150	263	36.	19.3	1005.3
1	0515	64	0.	.0	1002.5	*	1	1335	164	26.	19.1	1005.3	*	1	2155	264	35.	19.3	1005.3
1	0520	65	0.	.0	1002.5	*	1	1340	165	304.	24.0	1005.5	*	1	2200	265	34.	19.3	1005.3
1	0525	66	0.	.0	1002.5	*	1	1345	166	502.	27.5	1005.7	*	1	2205	266	34.	19.3	1005.3
1	0530	67	0.	.0	1002.5	*	1	1350	167	642.	30.0	1005.8	*	1	2210	267	33.	19.3	1005.3
1	0535	68	0.	.0	1002.5	*	1	1355	168	741.	31.7	1005.9	*	1	2215	268	33.	19.2	1005.3
1	0540	69	0.	.0	1002.5	*	1	1400	169	810.	32.9	1005.9	*	1	2220	269	32.	19.2	1005.3
1	0545	70	0.	.0	1002.5	*	1	1405	170	858.	33.8	1006.0	*	1	2225	270	32.	19.2	1005.3
1	0550	71	0.	.0	1002.5	*	1	1410	171	894.	34.4	1006.0	*	1	2230	271	32.	19.2	1005.3
1	0555	72	0.	.0	1002.5	*	1	1415	172	936.	34.7	1006.0	*	1	2235	272	31.	19.2	1005.3
1	0600	73	0.	.0	1002.5	*	1	1420	173	952.	34.9	1006.0	*	1	2240	273	31.	19.2	1005.3
1	0605	74	0.	.0	1002.5	*	1	1425	174	954.	34.9	1006.0	*	1	2245	274	31.	19.2	1005.3
1	0610	75	0.	.0	1002.5	*	1	1430	175	947.	34.8	1006.0	*	1	2250	275	30.	19.2	1005.3
1	0615	76	0.	.0	1002.5	*	1	1435	176	933.	34.7	1006.0	*	1	2255	276	30.	19.2	1005.3
1	0620	77	0.	.0	1002.5	*	1	1440	177	913.	34.6	1006.0	*	1	2300	277	30.	19.2	1005.3
1	0625	78	0.	.0	1002.5	*	1	1445	178	890.	34.4	1006.0	*	1	2305	278	29.	19.2	1005.3
1	0630	79	0.	.0	1002.5	*	1	1450	179	874.	34.1	1006.0	*	1	2310	279	29.	19.2	1005.3
1	0635	80	0.	.0	1002.5	*	1	1455	180	852.	33.7	1006.0	*	1	2315	280	29.	19.2	1005.3

1	0640	81	0.	.0	1002.5	*	1	1500	181	825.	33.2	1005.9	*	1	2320	281	28.	19.2	1005.3
1	0645	82	0.	.0	1002.5	*	1	1505	182	795.	32.7	1005.9	*	1	2325	282	28.	19.2	1005.3
1	0650	83	0.	.0	1002.5	*	1	1510	183	765.	32.1	1005.9	*	1	2330	283	28.	19.2	1005.3
1	0655	84	0.	.0	1002.5	*	1	1515	184	735.	31.6	1005.9	*	1	2335	284	27.	19.2	1005.3
1	0700	85	0.	.0	1002.5	*	1	1520	185	707.	31.1	1005.9	*	1	2340	285	27.	19.1	1005.3
1	0705	86	0.	.0	1002.5	*	1	1525	186	681.	30.7	1005.8	*	1	2345	286	27.	19.1	1005.3
1	0710	87	0.	.0	1002.5	*	1	1530	187	658.	30.3	1005.8	*	1	2350	287	26.	19.1	1005.3
1	0715	88	0.	.0	1002.5	*	1	1535	188	637.	29.9	1005.8	*	1	2355	288	26.	19.1	1005.3
1	0720	89	0.	.0	1002.5	*	1	1540	189	620.	29.6	1005.8	*	2	0000	289	26.	19.1	1005.3
1	0725	90	0.	.0	1002.5	*	1	1545	190	604.	29.3	1005.8	*	2	0005	290	25.	19.1	1005.3
1	0730	91	0.	.0	1002.5	*	1	1550	191	590.	29.1	1005.8	*	2	0010	291	25.	19.1	1005.3
1	0735	92	0.	.0	1002.5	*	1	1555	192	577.	28.8	1005.8	*	2	0015	292	25.	19.1	1005.3
1	0740	93	0.	.0	1002.5	*	1	1600	193	564.	28.6	1005.7	*	2	0020	293	24.	19.1	1005.3
1	0745	94	0.	.0	1002.5	*	1	1605	194	551.	28.4	1005.7	*	2	0025	294	24.	19.1	1005.3
1	0750	95	0.	.0	1002.5	*	1	1610	195	538.	28.2	1005.7	*	2	0030	295	23.	19.1	1005.3
1	0755	96	0.	.0	1002.5	*	1	1615	196	524.	27.9	1005.7	*	2	0035	296	23.	19.1	1005.3
1	0800	97	0.	.0	1002.5	*	1	1620	197	510.	27.7	1005.7	*	2	0040	297	22.	19.1	1005.3
1	0805	98	0.	.0	1002.5	*	1	1625	198	495.	27.4	1005.7	*	2	0045	298	22.	19.1	1005.3
1	0810	99	0.	.0	1002.5	*	1	1630	199	479.	27.1	1005.7	*	2	0050	299	21.	19.0	1005.3
1	0815	100	0.	.0	1002.5	*	1	1635	200	462.	26.8	1005.7	*	2	0055	300	20.	19.0	1005.3

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PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.92-HR
+		(CFS)				
+ 954.	14.42		461.	124.	119.	119.
		(INCHES)	.165	.177	.177	.177
		(AC-FT)	229.	246.	246.	246.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	24.92-HR
+ 35.	14.42	27.	11.	11.	11.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	24.92-HR
+ 1006.02	14.42	1005.66	1004.00	1003.94	1003.94

CUMULATIVE AREA = 26.05 SQ MI

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HYDROGRAPH AT SR293A
TRANSPOSITION AREA 200.0 SQ MI

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	1002.5	*	1		0820	101	0.	.0	1002.5	*	1		1640	201	424.	26.1	1005.6
1		0005	2	0.	.0	1002.5	*	1		0825	102	0.	.0	1002.5	*	1		1645	202	408.	25.9	1005.6
1		0010	3	0.	.0	1002.5	*	1		0830	103	0.	.0	1002.5	*	1		1650	203	393.	25.6	1005.6
1		0015	4	0.	.0	1002.5	*	1		0835	104	0.	.0	1002.5	*	1		1655	204	376.	25.3	1005.6
1		0020	5	0.	.0	1002.5	*	1		0840	105	0.	.0	1002.5	*	1		1700	205	359.	25.0	1005.6

1	0025	6	0.	.0	1002.5	*	1	0845	106	0.	.0	1002.5	*	1	1705	206	343.	24.7	1005.6
1	0030	7	0.	.0	1002.5	*	1	0850	107	0.	.0	1002.5	*	1	1710	207	326.	24.4	1005.6
1	0035	8	0.	.0	1002.5	*	1	0855	108	0.	.0	1002.5	*	1	1715	208	310.	24.1	1005.5
1	0040	9	0.	.0	1002.5	*	1	0900	109	0.	.0	1002.5	*	1	1720	209	295.	23.9	1005.5
1	0045	10	0.	.0	1002.5	*	1	0905	110	0.	.0	1002.5	*	1	1725	210	282.	23.6	1005.5
1	0050	11	0.	.0	1002.5	*	1	0910	111	0.	.0	1002.5	*	1	1730	211	270.	23.4	1005.5
1	0055	12	0.	.0	1002.5	*	1	0915	112	0.	.0	1002.5	*	1	1735	212	258.	23.2	1005.5
1	0100	13	0.	.0	1002.5	*	1	0920	113	0.	.0	1002.5	*	1	1740	213	246.	23.0	1005.5
1	0105	14	0.	.0	1002.5	*	1	0925	114	0.	.0	1002.5	*	1	1745	214	235.	22.8	1005.5
1	0110	15	0.	.0	1002.5	*	1	0930	115	0.	.0	1002.5	*	1	1750	215	224.	22.6	1005.5
1	0115	16	0.	.0	1002.5	*	1	0935	116	0.	.0	1002.5	*	1	1755	216	213.	22.4	1005.5
1	0120	17	0.	.0	1002.5	*	1	0940	117	0.	.0	1002.5	*	1	1800	217	203.	22.2	1005.5
1	0125	18	0.	.0	1002.5	*	1	0945	118	0.	.0	1002.5	*	1	1805	218	193.	22.1	1005.5
1	0130	19	0.	.0	1002.5	*	1	0950	119	0.	.0	1002.5	*	1	1810	219	185.	21.9	1005.4
1	0135	20	0.	.0	1002.5	*	1	0955	120	0.	.0	1002.5	*	1	1815	220	177.	21.8	1005.4
1	0140	21	0.	.0	1002.5	*	1	1000	121	0.	.0	1002.5	*	1	1820	221	170.	21.7	1005.4
1	0145	22	0.	.0	1002.5	*	1	1005	122	0.	.0	1002.5	*	1	1825	222	163.	21.5	1005.4
1	0150	23	0.	.0	1002.5	*	1	1010	123	0.	.0	1002.5	*	1	1830	223	156.	21.4	1005.4
1	0155	24	0.	.0	1002.5	*	1	1015	124	0.	.0	1002.5	*	1	1835	224	149.	21.3	1005.4
1	0200	25	0.	.0	1002.5	*	1	1020	125	0.	.0	1002.5	*	1	1840	225	142.	21.2	1005.4
1	0205	26	0.	.0	1002.5	*	1	1025	126	0.	.0	1002.5	*	1	1845	226	135.	21.0	1005.4
1	0210	27	0.	.0	1002.5	*	1	1030	127	0.	.0	1002.5	*	1	1850	227	128.	20.9	1005.4
1	0215	28	0.	.0	1002.5	*	1	1035	128	0.	.0	1002.5	*	1	1855	228	121.	20.8	1005.4
1	0220	29	0.	.0	1002.5	*	1	1040	129	0.	.0	1002.5	*	1	1900	229	115.	20.7	1005.4
1	0225	30	0.	.0	1002.5	*	1	1045	130	0.	.0	1002.5	*	1	1905	230	109.	20.6	1005.4
1	0230	31	0.	.0	1002.5	*	1	1050	131	0.	.0	1002.5	*	1	1910	231	104.	20.5	1005.4
1	0235	32	0.	.0	1002.5	*	1	1055	132	0.	.0	1002.5	*	1	1915	232	99.	20.4	1005.4
1	0240	33	0.	.0	1002.5	*	1	1100	133	0.	.0	1002.5	*	1	1920	233	95.	20.3	1005.4
1	0245	34	0.	.0	1002.5	*	1	1105	134	0.	.0	1002.5	*	1	1925	234	91.	20.3	1005.4
1	0250	35	0.	.0	1002.5	*	1	1110	135	0.	.0	1002.5	*	1	1930	235	87.	20.2	1005.4
1	0255	36	0.	.0	1002.5	*	1	1115	136	0.	.0	1002.5	*	1	1935	236	83.	20.1	1005.4
1	0300	37	0.	.0	1002.5	*	1	1120	137	0.	.0	1002.5	*	1	1940	237	79.	20.1	1005.4
1	0305	38	0.	.0	1002.5	*	1	1125	138	0.	.0	1002.5	*	1	1945	238	76.	20.0	1005.4
1	0310	39	0.	.0	1002.5	*	1	1130	139	0.	.0	1002.5	*	1	1950	239	72.	19.9	1005.4
1	0315	40	0.	.0	1002.5	*	1	1135	140	0.	.0	1002.5	*	1	1955	240	69.	19.9	1005.4
1	0320	41	0.	.0	1002.5	*	1	1140	141	0.	.0	1002.5	*	1	2000	241	66.	19.8	1005.4
1	0325	42	0.	.0	1002.5	*	1	1145	142	0.	.0	1002.5	*	1	2005	242	63.	19.8	1005.3
1	0330	43	0.	.0	1002.5	*	1	1150	143	0.	.0	1002.5	*	1	2010	243	60.	19.7	1005.3
1	0335	44	0.	.0	1002.5	*	1	1155	144	0.	.1	1002.5	*	1	2015	244	57.	19.7	1005.3
1	0340	45	0.	.0	1002.5	*	1	1200	145	0.	.2	1002.6	*	1	2020	245	55.	19.6	1005.3
1	0345	46	0.	.0	1002.5	*	1	1205	146	0.	.3	1002.6	*	1	2025	246	53.	19.6	1005.3
1	0350	47	0.	.0	1002.5	*	1	1210	147	0.	.5	1002.7	*	1	2030	247	51.	19.6	1005.3
1	0355	48	0.	.0	1002.5	*	1	1215	148	0.	.8	1002.8	*	1	2035	248	49.	19.5	1005.3
1	0400	49	0.	.0	1002.5	*	1	1220	149	0.	1.1	1003.0	*	1	2040	249	48.	19.5	1005.3
1	0405	50	0.	.0	1002.5	*	1	1225	150	0.	1.4	1003.1	*	1	2045	250	47.	19.5	1005.3
1	0410	51	0.	.0	1002.5	*	1	1230	151	0.	1.8	1003.3	*	1	2050	251	45.	19.5	1005.3
1	0415	52	0.	.0	1002.5	*	1	1235	152	0.	2.2	1003.5	*	1	2055	252	44.	19.5	1005.3
1	0420	53	0.	.0	1002.5	*	1	1240	153	0.	2.6	1003.6	*	1	2100	253	43.	19.4	1005.3
1	0425	54	0.	.0	1002.5	*	1	1245	154	0.	2.9	1003.7	*	1	2105	254	42.	19.4	1005.3
1	0430	55	0.	.0	1002.5	*	1	1250	155	0.	3.1	1003.8	*	1	2110	255	41.	19.4	1005.3
1	0435	56	0.	.0	1002.5	*	1	1255	156	0.	3.3	1003.9	*	1	2115	256	40.	19.4	1005.3
1	0440	57	0.	.0	1002.5	*	1	1300	157	0.	3.5	1004.0	*	1	2120	257	39.	19.4	1005.3
1	0445	58	0.	.0	1002.5	*	1	1305	158	0.	3.6	1004.0	*	1	2125	258	38.	19.3	1005.3
1	0450	59	0.	.0	1002.5	*	1	1310	159	0.	3.7	1004.0	*	1	2130	259	37.	19.3	1005.3
1	0455	60	0.	.0	1002.5	*	1	1315	160	0.	4.0	1004.1	*	1	2135	260	36.	19.3	1005.3
1	0500	61	0.	.0	1002.5	*	1	1320	161	0.	5.1	1004.2	*	1	2140	261	36.	19.3	1005.3
1	0505	62	0.	.0	1002.5	*	1	1325	162	0.	7.6	1004.5	*	1	2145	262	35.	19.3	1005.3
1	0510	63	0.	.0	1002.5	*	1	1330	163	0.	11.7	1004.8	*	1	2150	263	34.	19.3	1005.3

1	0515	64	0.	.0	1002.5	*	1	1335	164	0.	16.7	1005.2	*	1	2155	264	33.	19.3	1005.3
1	0520	65	0.	.0	1002.5	*	1	1340	165	171.	21.7	1005.4	*	1	2200	265	33.	19.2	1005.3
1	0525	66	0.	.0	1002.5	*	1	1345	166	393.	25.6	1005.6	*	1	2205	266	32.	19.2	1005.3
1	0530	67	0.	.0	1002.5	*	1	1350	167	548.	28.3	1005.7	*	1	2210	267	32.	19.2	1005.3
1	0535	68	0.	.0	1002.5	*	1	1355	168	657.	30.2	1005.8	*	1	2215	268	31.	19.2	1005.3
1	0540	69	0.	.0	1002.5	*	1	1400	169	733.	31.6	1005.9	*	1	2220	269	31.	19.2	1005.3
1	0545	70	0.	.0	1002.5	*	1	1405	170	788.	32.6	1005.9	*	1	2225	270	30.	19.2	1005.3
1	0550	71	0.	.0	1002.5	*	1	1410	171	827.	33.2	1005.9	*	1	2230	271	30.	19.2	1005.3
1	0555	72	0.	.0	1002.5	*	1	1415	172	854.	33.7	1006.0	*	1	2235	272	30.	19.2	1005.3
1	0600	73	0.	.0	1002.5	*	1	1420	173	873.	34.1	1006.0	*	1	2240	273	29.	19.2	1005.3
1	0605	74	0.	.0	1002.5	*	1	1425	174	884.	34.2	1006.0	*	1	2245	274	29.	19.2	1005.3
1	0610	75	0.	.0	1002.5	*	1	1430	175	887.	34.3	1006.0	*	1	2250	275	29.	19.2	1005.3
1	0615	76	0.	.0	1002.5	*	1	1435	176	884.	34.2	1006.0	*	1	2255	276	29.	19.2	1005.3
1	0620	77	0.	.0	1002.5	*	1	1440	177	875.	34.1	1006.0	*	1	2300	277	28.	19.2	1005.3
1	0625	78	0.	.0	1002.5	*	1	1445	178	860.	33.8	1006.0	*	1	2305	278	28.	19.2	1005.3
1	0630	79	0.	.0	1002.5	*	1	1450	179	839.	33.5	1006.0	*	1	2310	279	28.	19.2	1005.3
1	0635	80	0.	.0	1002.5	*	1	1455	180	815.	33.0	1005.9	*	1	2315	280	28.	19.2	1005.3
1	0640	81	0.	.0	1002.5	*	1	1500	181	789.	32.6	1005.9	*	1	2320	281	28.	19.2	1005.3
1	0645	82	0.	.0	1002.5	*	1	1505	182	760.	32.1	1005.9	*	1	2325	282	27.	19.2	1005.3
1	0650	83	0.	.0	1002.5	*	1	1510	183	732.	31.6	1005.9	*	1	2330	283	27.	19.1	1005.3
1	0655	84	0.	.0	1002.5	*	1	1515	184	704.	31.1	1005.9	*	1	2335	284	27.	19.1	1005.3
1	0700	85	0.	.0	1002.5	*	1	1520	185	676.	30.6	1005.8	*	1	2340	285	27.	19.1	1005.3
1	0705	86	0.	.0	1002.5	*	1	1525	186	651.	30.1	1005.8	*	1	2345	286	26.	19.1	1005.3
1	0710	87	0.	.0	1002.5	*	1	1530	187	628.	29.7	1005.8	*	1	2350	287	26.	19.1	1005.3
1	0715	88	0.	.0	1002.5	*	1	1535	188	608.	29.4	1005.8	*	1	2355	288	26.	19.1	1005.3
1	0720	89	0.	.0	1002.5	*	1	1540	189	591.	29.1	1005.8	*	2	0000	289	25.	19.1	1005.3
1	0725	90	0.	.0	1002.5	*	1	1545	190	576.	28.8	1005.8	*	2	0005	290	25.	19.1	1005.3
1	0730	91	0.	.0	1002.5	*	1	1550	191	563.	28.6	1005.7	*	2	0010	291	25.	19.1	1005.3
1	0735	92	0.	.0	1002.5	*	1	1555	192	551.	28.4	1005.7	*	2	0015	292	24.	19.1	1005.3
1	0740	93	0.	.0	1002.5	*	1	1600	193	539.	28.2	1005.7	*	2	0020	293	24.	19.1	1005.3
1	0745	94	0.	.0	1002.5	*	1	1605	194	526.	27.9	1005.7	*	2	0025	294	23.	19.1	1005.3
1	0750	95	0.	.0	1002.5	*	1	1610	195	514.	27.7	1005.7	*	2	0030	295	23.	19.1	1005.3
1	0755	96	0.	.0	1002.5	*	1	1615	196	500.	27.5	1005.7	*	2	0035	296	22.	19.1	1005.3
1	0800	97	0.	.0	1002.5	*	1	1620	197	486.	27.2	1005.7	*	2	0040	297	22.	19.1	1005.3
1	0805	98	0.	.0	1002.5	*	1	1625	198	471.	27.0	1005.7	*	2	0045	298	21.	19.0	1005.3
1	0810	99	0.	.0	1002.5	*	1	1630	199	455.	26.7	1005.7	*	2	0050	299	21.	19.0	1005.3
1	0815	100	0.	.0	1002.5	*	1	1635	200	440.	26.4	1005.6	*	2	0055	300	20.	19.0	1005.3
						*							*						

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 887.	14.50		434.	117.	113.	113.
		(INCHES)	.155	.167	.167	.167
		(AC-FT)	215.	232.	232.	232.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
34.	14.50	26.	11.	11.	11.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1006.00	14.50	1005.64	1003.99	1003.93	1003.93

CUMULATIVE AREA = 26.05 SQ MI

INTERPOLATED HYDROGRAPH AT SR293A

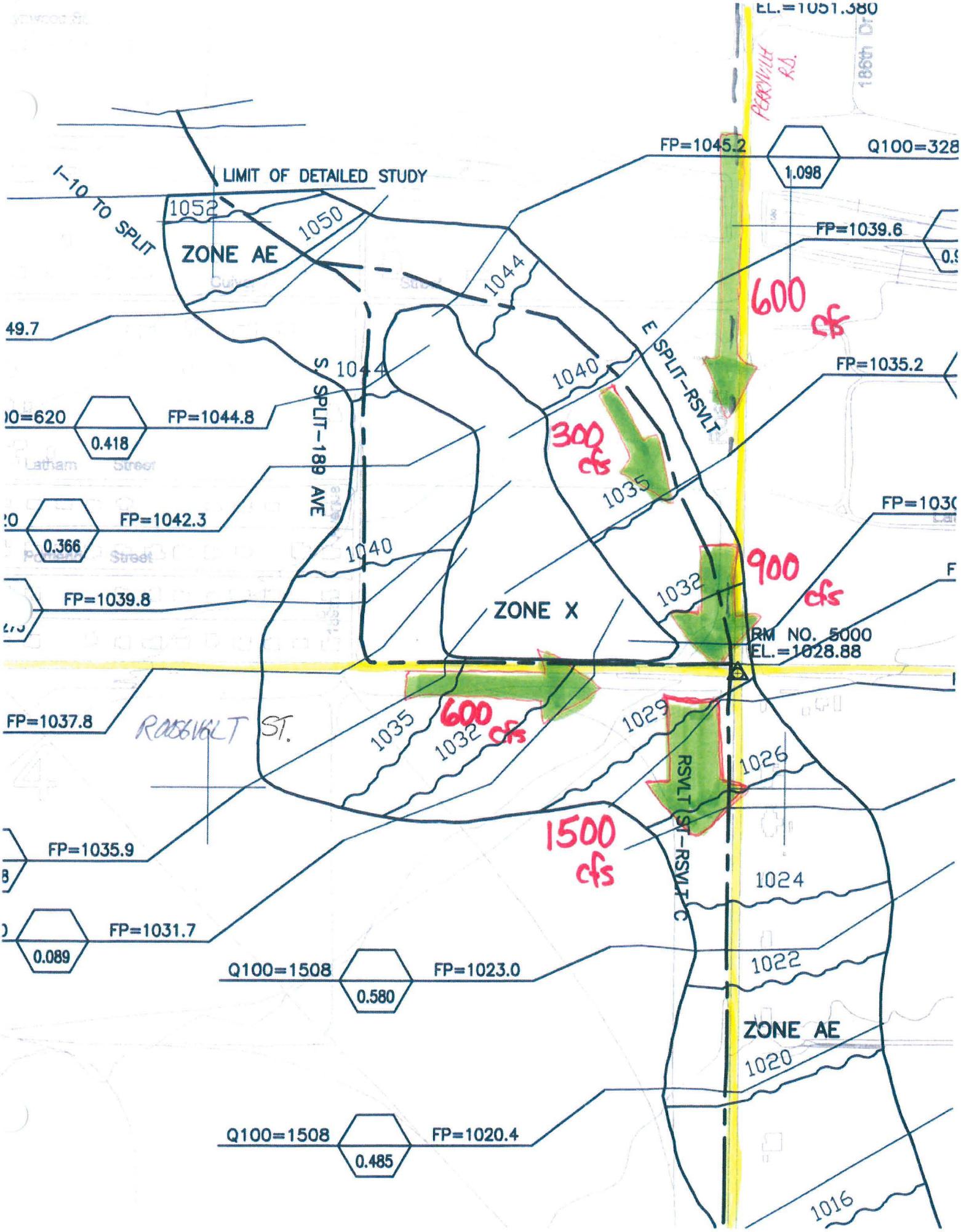
DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0615	76	0.	1		1230	151	0.	1		1845	226	142.
1		0005	2	0.	1		0620	77	0.	1		1235	152	0.	1		1850	227	135.
1		0010	3	0.	1		0625	78	0.	1		1240	153	0.	1		1855	228	128.
1		0015	4	0.	1		0630	79	0.	1		1245	154	0.	1		1900	229	121.
1		0020	5	0.	1		0635	80	0.	1		1250	155	0.	1		1905	230	115.
1		0025	6	0.	1		0640	81	0.	1		1255	156	0.	1		1910	231	109.
1		0030	7	0.	1		0645	82	0.	1		1300	157	0.	1		1915	232	104.
1		0035	8	0.	1		0650	83	0.	1		1305	158	0.	1		1920	233	99.
1		0040	9	0.	1		0655	84	0.	1		1310	159	0.	1		1925	234	95.
1		0045	10	0.	1		0700	85	0.	1		1315	160	0.	1		1930	235	91.
1		0050	11	0.	1		0705	86	0.	1		1320	161	0.	1		1935	236	87.
1		0055	12	0.	1		0710	87	0.	1		1325	162	0.	1		1940	237	83.
1		0100	13	0.	1		0715	88	0.	1		1330	163	73.	1		1945	238	79.
1		0105	14	0.	1		0720	89	0.	1		1335	164	295.	1		1950	239	76.
1		0110	15	0.	1		0725	90	0.	1		1340	165	533.	1		1955	240	72.
1		0115	16	0.	1		0730	91	0.	1		1345	166	703.	1		2000	241	69.
1		0120	17	0.	1		0735	92	0.	1		1350	167	839.	1		2005	242	66.
1		0125	18	0.	1		0740	93	0.	1		1355	168	938.	1		2010	243	64.
1		0130	19	0.	1		0745	94	0.	1		1400	169	996.	1		2015	244	61.
1		0135	20	0.	1		0750	95	0.	1		1405	170	1053.	1		2020	245	59.
1		0140	21	0.	1		0755	96	0.	1		1410	171	1080.	1		2025	246	57.
1		0145	22	0.	1		0800	97	0.	1		1415	172	1091.	1		2030	247	55.
1		0150	23	0.	1		0805	98	0.	1		1420	173	1092.	1		2035	248	53.
1		0155	24	0.	1		0810	99	0.	1		1425	174	1084.	1		2040	249	51.
1		0200	25	0.	1		0815	100	0.	1		1430	175	1069.	1		2045	250	50.
1		0205	26	0.	1		0820	101	0.	1		1435	176	1047.	1		2050	251	49.
1		0210	27	0.	1		0825	102	0.	1		1440	177	1020.	1		2055	252	48.
1		0215	28	0.	1		0830	103	0.	1		1445	178	988.	1		2100	253	47.
1		0220	29	0.	1		0835	104	0.	1		1450	179	954.	1		2105	254	46.
1		0225	30	0.	1		0840	105	0.	1		1455	180	920.	1		2110	255	45.
1		0230	31	0.	1		0845	106	0.	1		1500	181	889.	1		2115	256	44.
1		0235	32	0.	1		0850	107	0.	1		1505	182	855.	1		2120	257	44.
1		0240	33	0.	1		0855	108	0.	1		1510	183	828.	1		2125	258	43.
1		0245	34	0.	1		0900	109	0.	1		1515	184	799.	1		2130	259	42.
1		0250	35	0.	1		0905	110	0.	1		1520	185	771.	1		2135	260	42.
1		0255	36	0.	1		0910	111	0.	1		1525	186	745.	1		2140	261	41.
1		0300	37	0.	1		0915	112	0.	1		1530	187	723.	1		2145	262	40.
1		0305	38	0.	1		0920	113	0.	1		1535	188	704.	1		2150	263	40.
1		0310	39	0.	1		0925	114	0.	1		1540	189	688.	1		2155	264	39.
1		0315	40	0.	1		0930	115	0.	1		1545	190	674.	1		2200	265	38.
1		0320	41	0.	1		0935	116	0.	1		1550	191	662.	1		2205	266	38.
1		0325	42	0.	1		0940	117	0.	1		1555	192	649.	1		2210	267	37.
1		0330	43	0.	1		0945	118	0.	1		1600	193	636.	1		2215	268	37.
1		0335	44	0.	1		0950	119	0.	1		1605	194	622.	1		2220	269	36.
1		0340	45	0.	1		0955	120	0.	1		1610	195	606.	1		2225	270	35.
1		0345	46	0.	1		1000	121	0.	1		1615	196	589.	1		2230	271	35.
1		0350	47	0.	1		1005	122	0.	1		1620	197	571.	1		2235	272	34.

1	0355	48	0.	*	1	1010	123	0.	*	1	1625	198	552.	*	1	2240	273	34.
1	0400	49	0.	*	1	1015	124	0.	*	1	1630	199	533.	*	1	2245	274	33.
1	0405	50	0.	*	1	1020	125	0.	*	1	1635	200	513.	*	1	2250	275	33.
1	0410	51	0.	*	1	1025	126	0.	*	1	1640	201	492.	*	1	2255	276	32.
1	0415	52	0.	*	1	1030	127	0.	*	1	1645	202	471.	*	1	2300	277	32.
1	0420	53	0.	*	1	1035	128	0.	*	1	1650	203	451.	*	1	2305	278	31.
1	0425	54	0.	*	1	1040	129	0.	*	1	1655	204	430.	*	1	2310	279	31.
1	0430	55	0.	*	1	1045	130	0.	*	1	1700	205	409.	*	1	2315	280	30.
1	0435	56	0.	*	1	1050	131	0.	*	1	1705	206	389.	*	1	2320	281	30.
1	0440	57	0.	*	1	1055	132	0.	*	1	1710	207	369.	*	1	2325	282	29.
1	0445	58	0.	*	1	1100	133	0.	*	1	1715	208	349.	*	1	2330	283	29.
1	0450	59	0.	*	1	1105	134	0.	*	1	1720	209	330.	*	1	2335	284	28.
1	0455	60	0.	*	1	1110	135	0.	*	1	1725	210	312.	*	1	2340	285	28.
1	0500	61	0.	*	1	1115	136	0.	*	1	1730	211	295.	*	1	2345	286	28.
1	0505	62	0.	*	1	1120	137	0.	*	1	1735	212	280.	*	1	2350	287	27.
1	0510	63	0.	*	1	1125	138	0.	*	1	1740	213	266.	*	1	2355	288	27.
1	0515	64	0.	*	1	1130	139	0.	*	1	1745	214	253.	*	2	0000	289	26.
1	0520	65	0.	*	1	1135	140	0.	*	1	1750	215	241.	*	2	0005	290	26.
1	0525	66	0.	*	1	1140	141	0.	*	1	1755	216	229.	*	2	0010	291	26.
1	0530	67	0.	*	1	1145	142	0.	*	1	1800	217	217.	*	2	0015	292	25.
1	0535	68	0.	*	1	1150	143	0.	*	1	1805	218	206.	*	2	0020	293	25.
1	0540	69	0.	*	1	1155	144	0.	*	1	1810	219	196.	*	2	0025	294	24.
1	0545	70	0.	*	1	1200	145	0.	*	1	1815	220	186.	*	2	0030	295	24.
1	0550	71	0.	*	1	1205	146	0.	*	1	1820	221	178.	*	2	0035	296	23.
1	0555	72	0.	*	1	1210	147	0.	*	1	1825	222	171.	*	2	0040	297	23.
1	0600	73	0.	*	1	1215	148	0.	*	1	1830	223	164.	*	2	0045	298	22.
1	0605	74	0.	*	1	1220	149	0.	*	1	1835	224	156.	*	2	0050	299	21.
1	0610	75	0.	*	1	1225	150	0.	*	1	1840	225	149.	*	2	0055	300	21.
				*					*					*				

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1092.	14.33		523.	140.	135.	135.
		(INCHES)	.187	.200	.200	.200
		(AC-FT)	259.	278.	278.	278.

CUMULATIVE AREA = 26.05 SQ MI


EL.=1051.380
PEARSVILLE RD.
186th Dr
FP=1045.2
Q100=328
1.098
LIMIT OF DETAILED STUDY
I-10 TO SPLIT
1052
1050
ZONE AE
FP=1039.6
600 cfs
1044
49.7
S SPLIT-189 AVE
1044
1040
E SPLIT-RSVLT
FP=1035.2
Q100=620
FP=1044.8
0.418
300 cfs
1035
FP=1042.3
0.366
1040
900 cfs
1032
FP=1039.8
ZONE X
BM NO. 5000
EL.=1028.88
FP=1037.8
ROOSEVELT ST.
1035
600 cfs
1032
1029
1026
RSVLT ST-RSVLT C
1500 cfs
FP=1035.9
1024
FP=1031.7
0.089
Q100=1508
FP=1023.0
0.580
1022
ZONE AE
1020
Q100=1508
FP=1020.4
0.485
1016

URS

Job Loop -303 Floodplain | Project No. | Page ____ of ____
Description I-10 Culvert Wash Hydrology | Computed by MKR | Sheet ____ of ____ | Date
Checked by RLD | Date
Reference

Flow rates are based on the latest "Existing Conditions Hydrology, Loop 303/ White Tanks ADMP" HEC-1 model provided by Rob Scrivo/URS on 12/5/2001.

Location (1)

Q at I-10 culvert = Q 1D292
= 948 cfs

Location (2)

Q at Roosevelt Street = Q j-st u/s of x-sec 9
= 1,508 cfs
= Q cp 292

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1*****************************************
*****************************************
 *                                       *                                        *
 *                                       *                                        *   U.S. ARMY CORPS OF ENGINEERS
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                        *   HYDROLOGIC ENGINEERING CENTER
 *                                       *                                        *
 *              JUN   1998               *                                        *        609 SECOND STREET
 *                                       *                                        *
 *           VERSION 4.1                 *                                        *      DAVIS, CALIFORNIA 95616
 *                                       *                                        *
 *                                       *                                        *        (916) 756-1104
 *  RUN DATE   10DEC01  TIME  09:03:10   *                                        *
 *                                       *                                        *
 *****************************************
*****************************************
```

Excerpt from

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

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

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

1 HEC-1 INPUT PAGE 1

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

   1          ID        10 - 30 - 0 1
   2          ID        **ADOT BASIN GEOMETRY REPRESENTS MOST RECENT 2' CONTOURS**
   3          ID        WHITE TANKS AREA DRAINAGE MASTER STUDY *UPDATE*
   4          ID        Original MODEL BY THE WLB Group for FCDMC AS PART OF THE WHITE
   5          ID        TANKS/AGUA FRIA ADMS, Date: October 1991
   6          ID
   7          ID        REVISED HYDROLOGY HEC-1 RUN FOR WHITE TANKS ADMS
   8          ID        100-YEAR, 24-HOUR STORM                  original file: WTADMS.24
   9          ID
  10          ID        SOME NOMENCLATURE CHANGES HAVE BEEN MADE PER REQUEST OF
  11          ID        FCDMC - 5-09-01
  12          ID
  13          ID        INCORPORATED CHANGES PROPOSED BY DAVID EVANS AND ASSOCIATES
  14          ID        AT CACTUS AND REEMS IN REGARD TO RANCHO GABRIELA AT THE
  15          ID        DIRECTION OF THE FCDMC 9-20-01
  16          ID
  17          ID                                  REVISED BY URS     DATE: 10-30-01
  18          ID                                                     FILE: L303M9I.DAT
  19          ID
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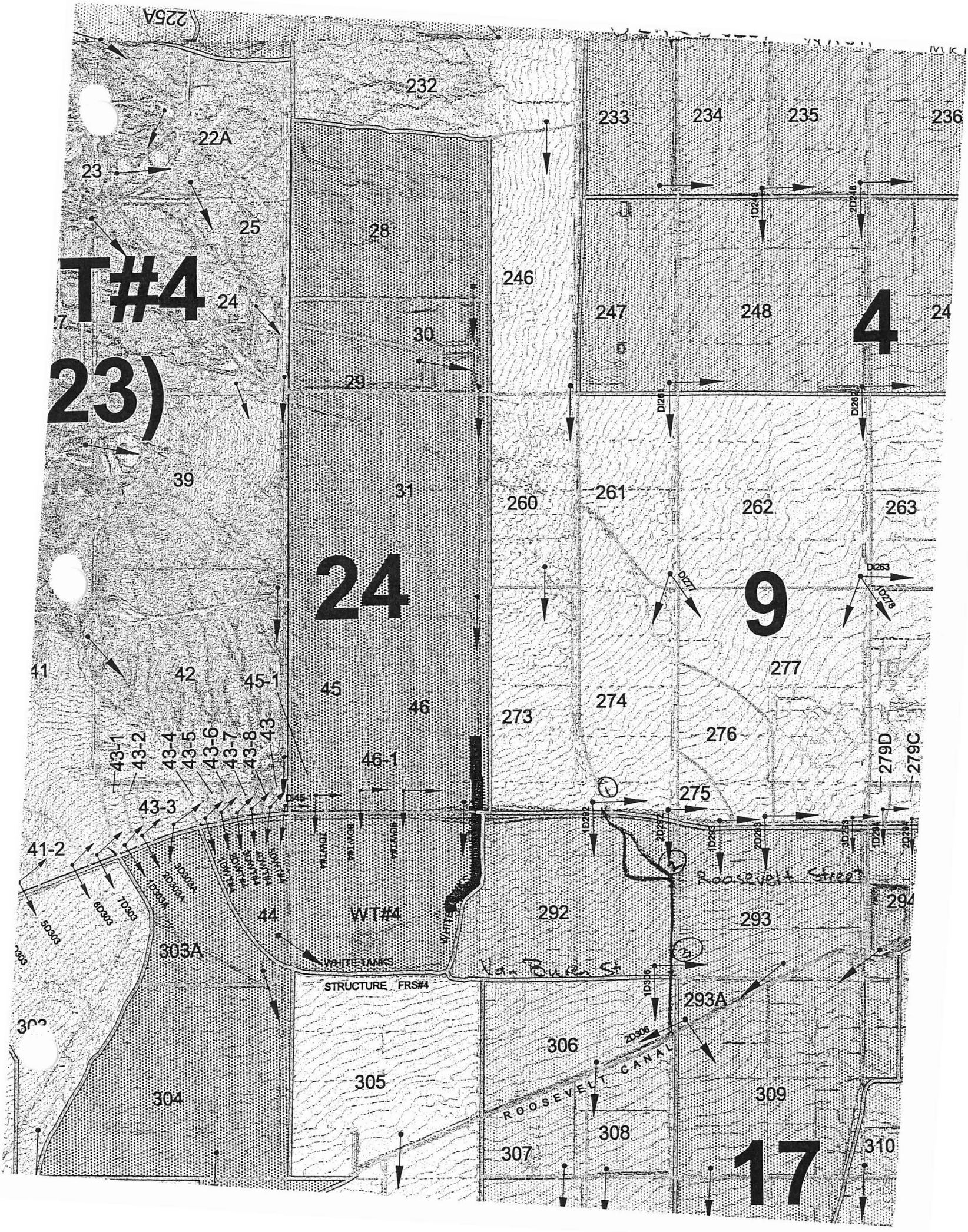
+	HYDROGRAPH AT	273	624.	12.42	69.	18.	9.	.65
+	2 COMBINED AT	CP273	1275.	12.92	298.	76.	36.	2.83
+	ROUTED TO	SR273	1267.	13.00	298.	76.	36.	2.83
+	DIVERSION TO	1D292	948.	13.00	267.	68.	33.	2.83
+	HYDROGRAPH AT	D273	319.	13.00	32.	8.	4.	2.83
+	ROUTED TO	R273	309.	13.08	32.	8.	4.	2.83
+	HYDROGRAPH AT	261	212.	13.17	49.	12.	6.	.41

+	ROUTED TO	R381	56.	16.50	21.	6.	3.	.21
+	HYDROGRAPH AT	380	199.	12.83	47.	12.	6.	.20
+	2 COMBINED AT	CP380	198.	12.83	56.	17.	8.	.41
+	2 COMBINED AT	RCP380	1951.	12.92	818.	287.	161.	158.18
+	HYDROGRAPH AT	D273	948.	13.00	267.	68.	33.	2.83
+	ROUTED TO	R273	938.	13.33	267.	68.	33.	2.83
+	HYDROGRAPH AT	292	903.	12.50	116.	31.	15.	.96
+	2 COMBINED AT	1I292	1122.	12.83	380.	98.	47.	3.79
+	HYDROGRAPH AT	D274	539.	13.25	140.	35.	17.	4.40
+	ROUTED TO	R274	530.	13.42	140.	35.	17.	4.40
+	2 COMBINED AT	CP292	1508.	13.33	518.	133.	64.	5.36


T#4
23)
4
24
9
17
WT#4
WHITE TANKS
STRUCTURE FRS#4
Roosevelt Street
Van Buren St
ROOSEVELT CANAL
232
233
234
235
236
22A
23
25
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246
247
248
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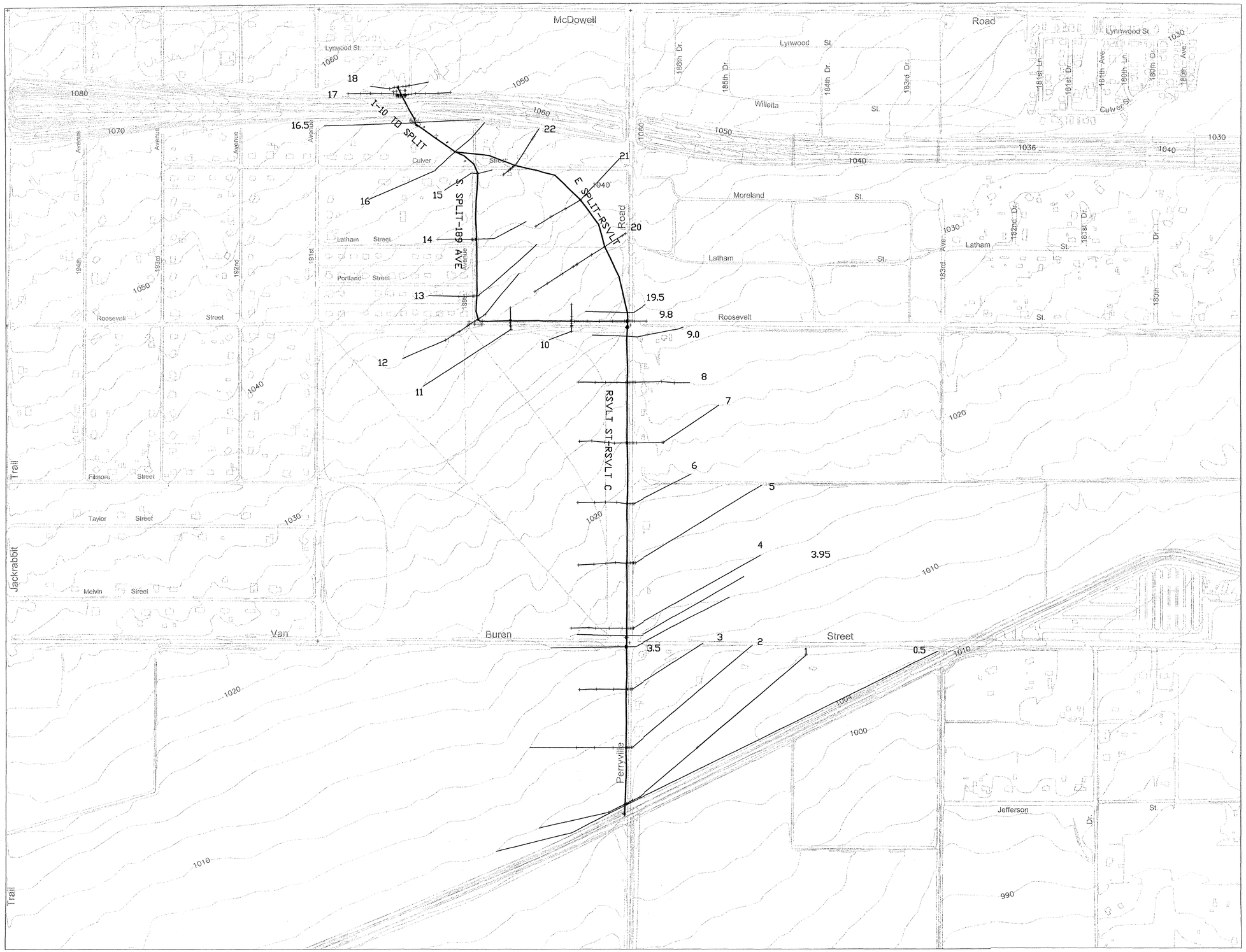
39
31
260
261
262
263
41
42
45-1
45
46
273
274
276
277
43-1
43-2
43-4
43-5
43-6
43-7
43-8
43
46-1
43-3
275
279D
279C
41-2
44
292
293
294
303A
293A
306
305
304
309
308
307
310
1D244
2D246
D261
D262
D263
D277
D45
1D242
2D243
1D236
2D306



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOODPLAIN MAP FOR
I–10 CULVERT WASH
CROSS SECTIONS

LOOP 303 ADMP UPDATE

FLOOD DELINEATION STUDY

F.C.D. CONTRACT NO. 99–40

URS

7720 N. 16th Street
Phoenix, Arizona 85020
(602) 371-1100

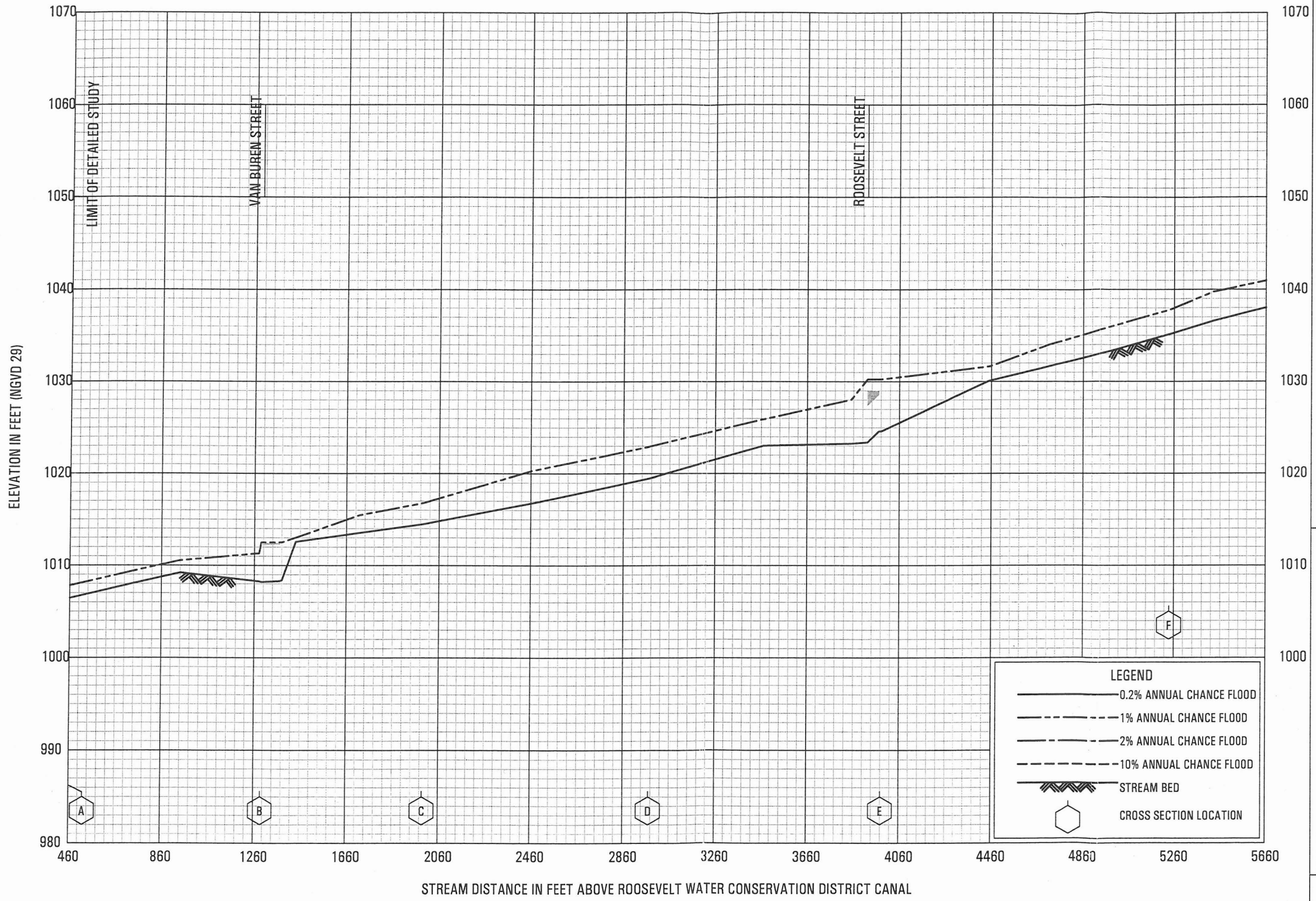
SEPTEMBER 2002

TREBOOK FIG I-10 CS.DWG 11-4-02

Table 1 Summary of Discharges

Flooding Sources and Locations	Drainage Area (mi^2)	100-Year Discharge (cfs)
I-10 CULVERT WASH		
At I-10	2.83	948
At beginning of S. split flow just North of Culver Street	_ _[1]	620
At split flow confluence just downstream of Roosevelt St. and Perryville Road	5.36	1508
At Downstream of limit of detailed study	5.36	1508
East split flow		
At beginning of E. split flow just North of Culver Street	_ _[1]	328

_ _[1] Flow based on flow split hydraulics, not drainage area.



FLOOD PROFILES

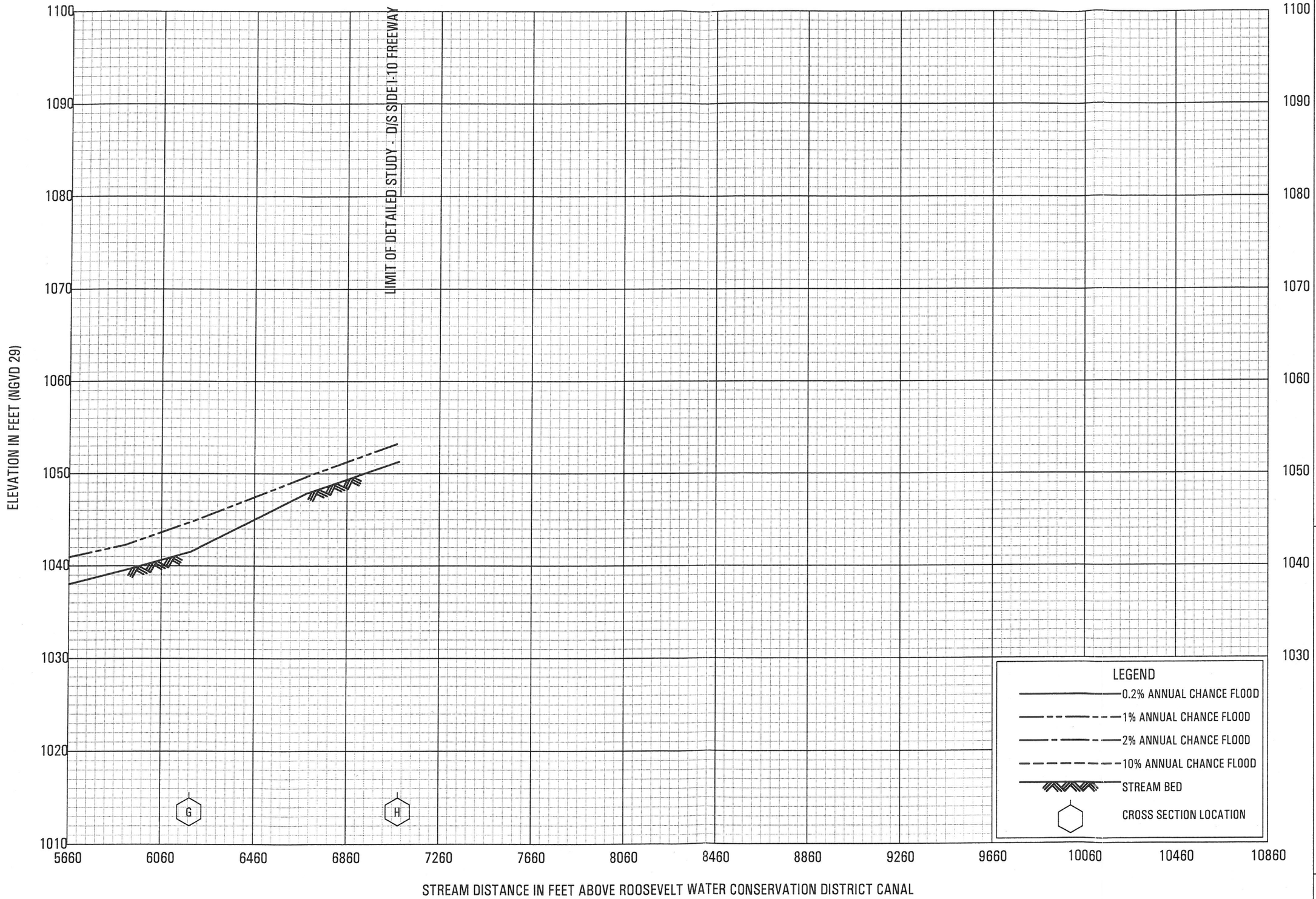
I-10 CULVERT WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY AND INCORPORATED AREAS, AZ

MARICOPA

01P



FLOOD PROFILES

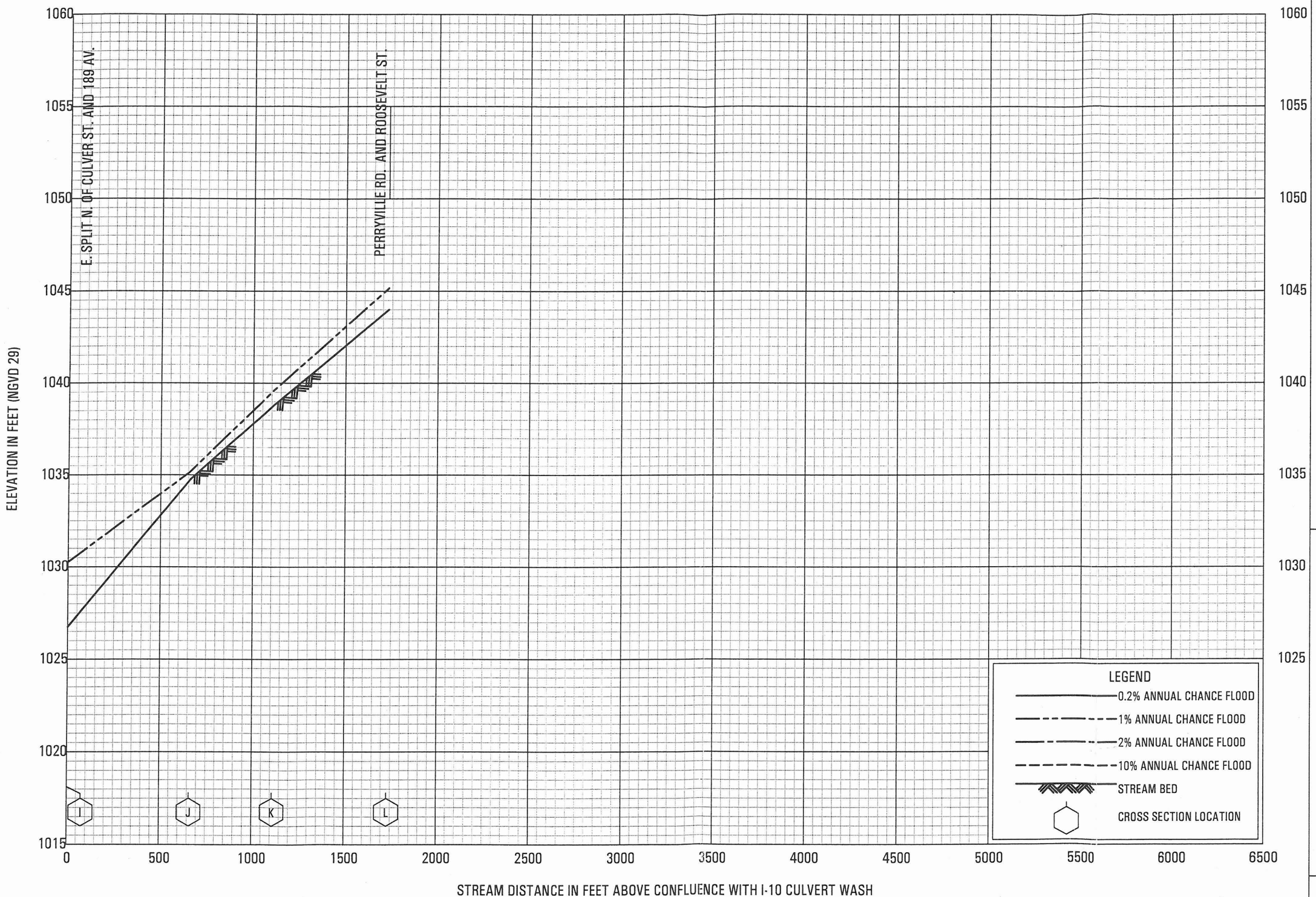
I-10 CULVERT WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY AND INCORPORATED AREAS, AZ

MARICOPA

02P



FLOOD PROFILES

I-10 CULVERT WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

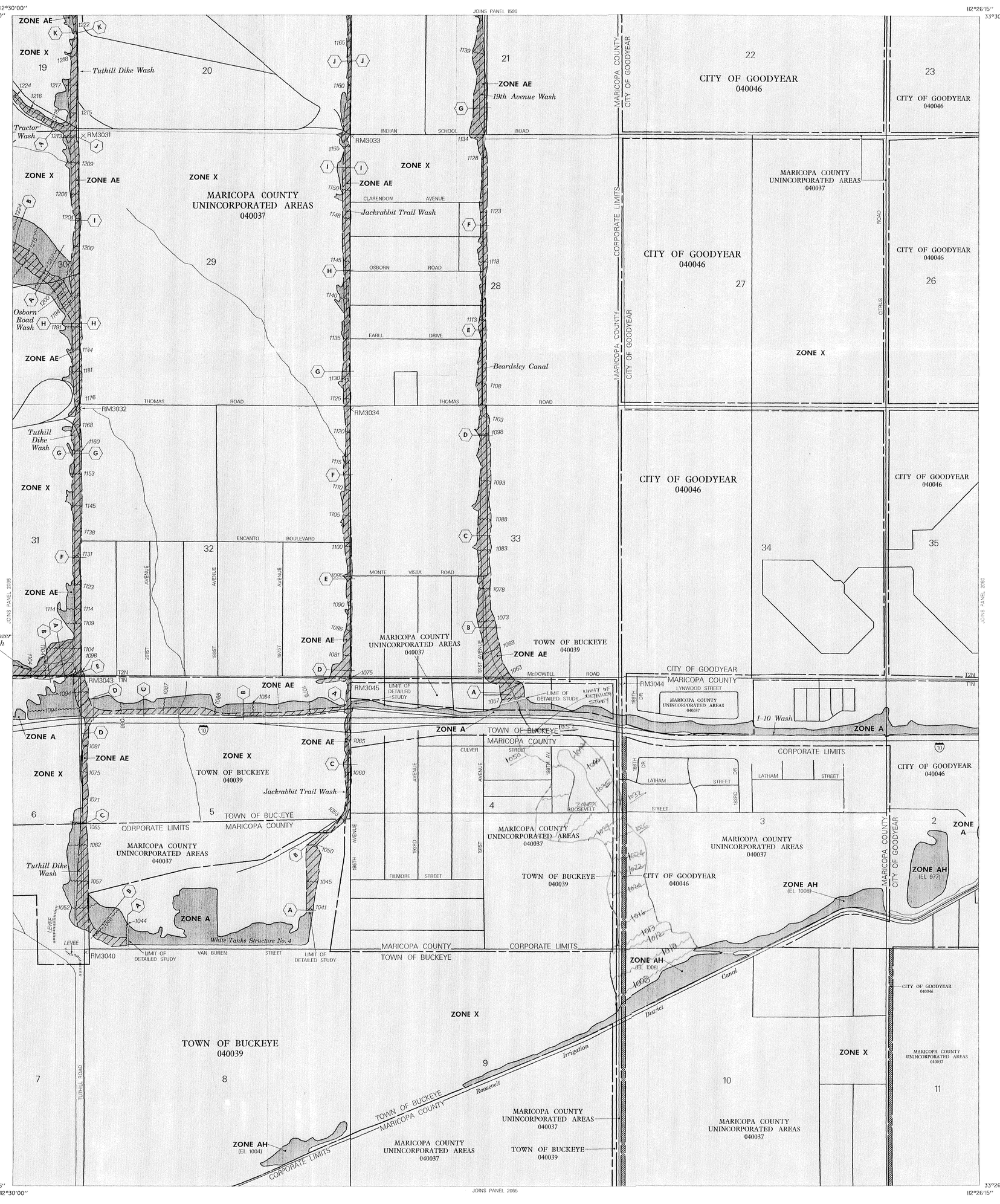
MARICOPA COUNTY AND INCORPORATED AREAS, AZ

MARICOPA

01P

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
RM3031	1218.28	3-inch aluminum cap at southeast corner of intersection of Tuthill and Indian School Roads, near southwest corner section 20, T2N, R2W.
RM3032	1176.94	3-inch aluminum cap in top of berm on west side of Tuthill Road at intersection of road to southwest q 200 feet south of northwest corner section 32, T2N, R2W.
RM3033	1160.26	Brass cap in handhole, Jackrabbit Trail and Indian School Road, southeast corner section 20, T2N, R2W.
RM3034	1125.07	40d nail in southwest face of power pole (PS 1771/1) at northeast corner of intersection of Jackrabbit Trail and Thomas Road, near southeast corner section 29, T2N, R2W.
RM3040	1044.61	Cotton picker spindle in power pole southeast corner of intersection of Tuthill Road and Van Buren Street, near southeast corner section 6, T1N, R2W.
RM3043	1100.43	3-inch iron pipe at center of pavement on McDowell Road q 25 feet east of barricade at flood control channel, southwest corner section 31, T2N, R2W.
RM3044	1051.34	Brass cap in handhole, Perryville and McDowell Roads.
RM3045	1079.43	Brass cap in handhole at centerline intersection of McDowell Road and Jackrabbit Trail, southwest corner section 33, T2N, R2W.



LEGEND

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 and Floodway Data 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 and therefore may not exactly reflect the flood elevation data presented in the FIS. BFEs shown on the FIRM 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 should be utilized in conjunction with the FIRM for purposes of construction and /or floodplain management.

FIRM elevations listed on this map were obtained and/or developed to establish vertical control for determination of flood elevations and floodplain boundaries portrayed on this map. Users should be aware that these FIRM elevations may have changed since the publication of this map. To obtain up-to-date elevation information on National Geodetic Survey (NGS) FIRMs shown on this map, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit their website at www.ngs.noaa.gov. Map users should seek verification of non-NGS FIRM monument elevations when using these elevations for construction or floodplain management purposes.

Coastal BFE's shown on this map may apply only landward of 0.0' NGVD. 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 community. 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.

LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR 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 A99** To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
- **ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- **ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- **ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

- **ZONE X** Areas determined to be outside 500-year floodplain.
- **ZONE D** Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

Identified 1983 | Identified 1990 | Otherwise Protected Areas

Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 — Base Flood Elevation Line; Elevation in Feet; See Map Index for Elevation Datum

D — Cross Section Line

(EL 987) — Base Flood Elevation in Feet Where Uniform Within Zone; See Map Index for Elevation Datum

RM7 — Elevation Reference Mark

M2 — River Mile

97°07'30", 32°22'30" — Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

NOTES

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, or all planimetric features outside Special Flood Hazard Areas. The community map repository should be consulted for more detailed data on BFEs, and for any information on floodway delineations, prior to use of this map for property purchase or construction purposes.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, A1-A30, AH, AO, A99, V, VE and V1-V30.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

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 Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Refer to Floodway Data Table where floodway width is shown at 1/20 inch.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

This map may incorporate approximate boundaries of Coastal Barrier Resource System Units and /or Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1990 (PL 101-591).

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For adjoining map panels and base map source see separately printed Map Index.

MAP REPOSITORY
Refer to Repository Listing on Map Index

EFFECTIVE DATE OF
COUNTYWIDE FLOOD INSURANCE RATE MAP:
APRIL 15, 1988

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
SEPTEMBER 30, 1996

May, revised July 19, 2001 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 update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE IN FEET
1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 2055 OF 4350

(SEE MAP INDEX FOR PANELS NOT PRINTED)

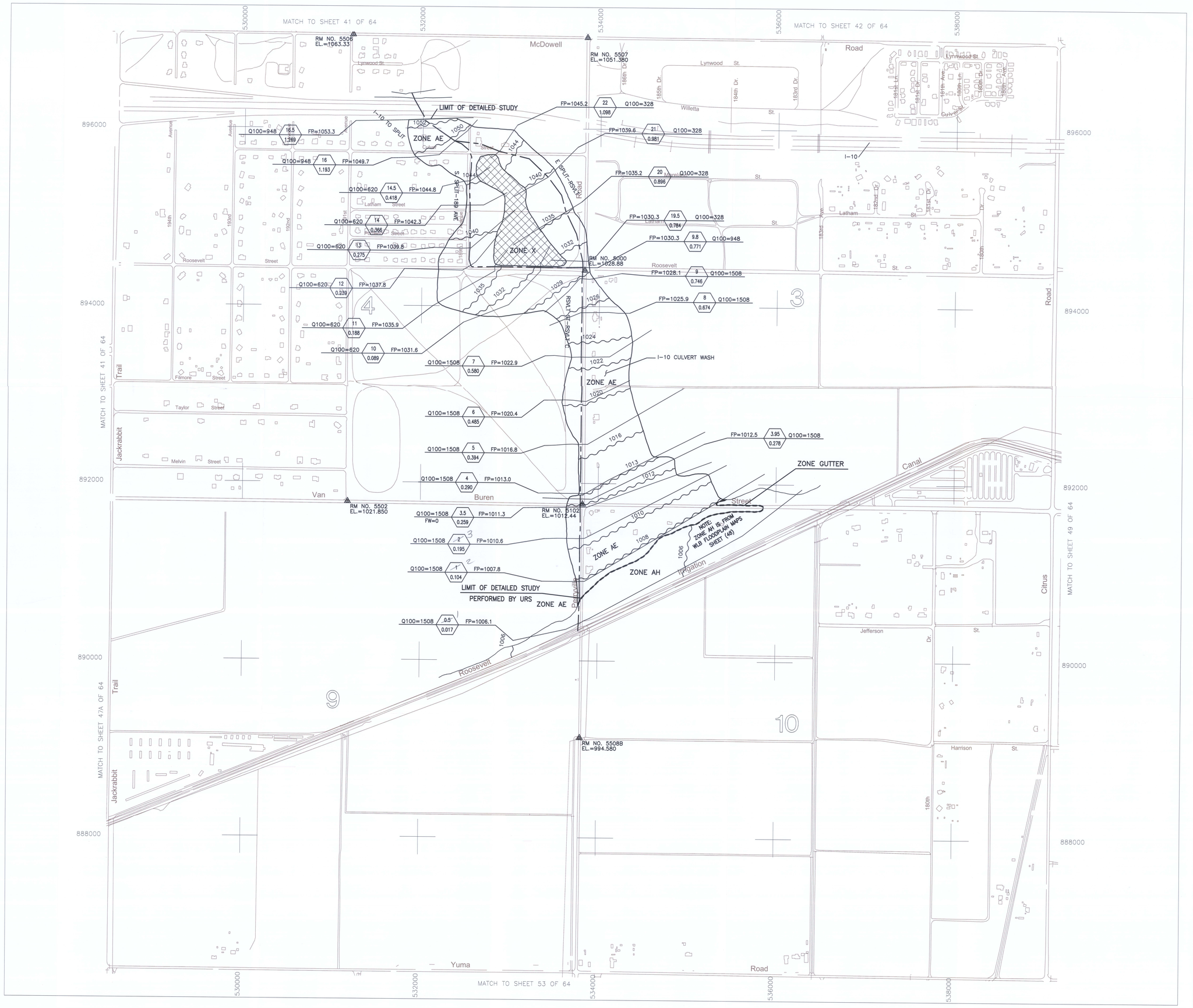
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BUCKEYE, TOWN OF	040039	2055	F
GOODYEAR, CITY OF	040046	2055	F
MARICOPA COUNTY, UNINCORPORATED AREAS	040037	2055	F

MAP NUMBER
04013C2055 F

MAP REVISED:
JULY 19, 2001

Federal Emergency Management Agency



LEGEND

100-YR FLOODPLAIN BOUNDARY	
FLOODWAY BOUNDARY	
HYDRAULIC BASE LINE WITH RIVER MILE	
EROSION SETBACK (WHEN APPLICABLE)	
CROSS SECTION	13 / 4.563 — FP= 1888.74 (FLOODPLAIN WATER SURFACE ELEVATION); FW= 1889.54 (ENCROACHED WATER SURFACE ELEVATION); Q = CFS (100 YEAR DISCHARGE); SEC=SEC CROSS SECTION NUMBER; CROSS SECTION DRAWING NO. DESIGNATION
BASE FLOOD ELEVATIONS	1221
ZONE DESIGNATIONS	ZONE AE
CORPORATE LIMITS	Corporate Limits
COUNTY, PARISH, STATE OR INTERNATIONAL BOUNDARY	County Boundary
ZONE GUTTER	

NOTES: ALL ELEVATIONS ARE BASED ON, **"NATIONAL GEODETIC VERTICAL DATUM OF 1929"**

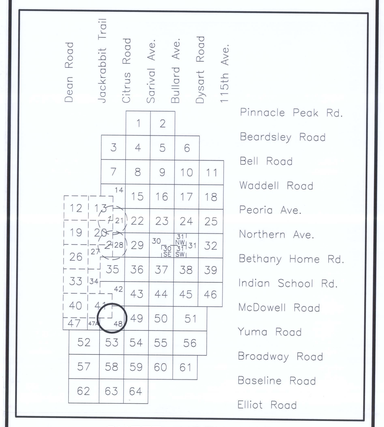
ALL FLOODPLAINS BY URS ARE BASED ON CROSS SECTIONS FIELD-SURVEYED BY URS.

ELEVATION REFERENCE FOR HYDRAULIC CROSS SECTIONS BY URS, 2001

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
5102	1012.440	MARICOPA COUNTY HIGHWAY DEPT. BRASS CAP IN HAND HOLE, AT INTERSECTION OF VAN BUREN ST. AND PERRYVILLE RD.
5502	1021.850	1/2" REBAR IN POTHOLE AT INTERSECTION OF VAN BUREN ST. AND 191ST AVE.
5506	1063.330	1" I.P. IN HAND HOLE AT INTERSECTION OF McDOWELL RD. AND 191ST AVE.
5507	1051.380	MARICOPA COUNTY HIGHWAY DEPT. BRASS CAP IN HAND HOLE, AT INTERSECTION OF McDOWELL RD. AND PERRYVILLE RD.
5000	1028.880	MARICOPA COUNTY HIGHWAY DEPT. BRASS CAP IN HAND HOLE, AT INTERSECTION OF PERRYVILLE RD. AND ROOSEVELT ST.
5508B	994.580	1/2" REBAR IN POTHOLE OF SOUTH BOUND LANE OF PERRYVILLE RD. , ±0.5 MI. SOUTH OF VAN BUREN ST.

NOTES

1- THE HYDRAULIC BASE LINE IS CROSS SECTION STATION 10,000 UNLESS NOTED OTHERWISE



SHEET INDEX MAP

400' 0' 400' 800'

SCALE: 1" = 400'
HORIZONTAL DATUM: NAD 1983
STATEPLANE PROJECTION

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

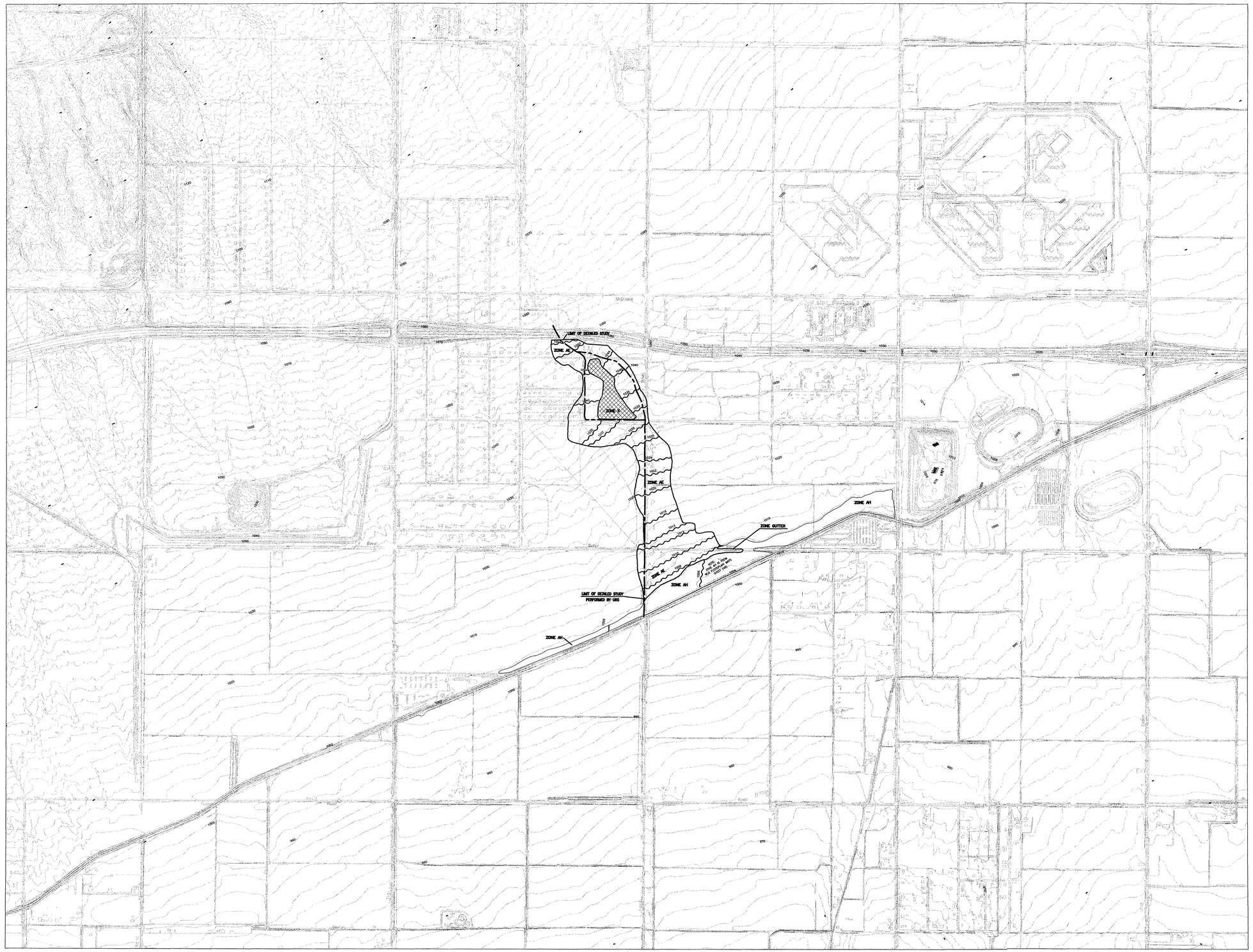
LOOP 303 CORRIDOR/WHITE TANKS
ADMP UPDATE
FLOOD DELINEATION STUDY
F.C.D. CONTRACT NO. 99-40

URS
7720 N. 16th Street
Phoenix, Arizona 85020
(602) 371-1100

	BY	DATE
DESIGN	MKN	10-02
DESIGN CHK.	RLN	10-02
PLANS	MH	10-02
PLANS CHK.	RID	10-02

SHEET 41SE/48 OF 64

P:\FCDMC\E152800\CADD\MAP SHEETS\FDSDWG-RBL.DWG LATEST REV: 2-4-03
XREF: P:\FCDMC\E152800\CADD\MAP SHEETS\XREF\ FEATURE: HYDR1, TOPO_MOD



1000' 0' 1000' 2000'

SCALE: 1"= 1000'

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOODPLAIN MAP FOR I-10 CULVERT WASH

LOOP 303 ADMP UPDATE

FLOOD DELINEATION STUDY

F.C.D. CONTRACT NO. 99-40

URS

7720 N. 16th Street
Phoenix, Arizona 85020
(602) 371-1100

SEPTEMBER 2002

\22\E1\00001526\NOTEBOOK FIG1.DWG 11-4-02