11th Avenue:
Irvine Road to Joy Ranch Road

Conditional Letter of Map Revision

Prepared for:

Prepared by:

T·Y·LIN INTERNATIONAL
60 East Rio Salado Parkway, Suite 501
Tempe, Arizona 85281

Project Number TT410
Contract No. 2012-050

August 5, 2014

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DRAFT

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SECTION 1: INTRODUCTION

1.1 Purpose of Report

The purpose of this report is to obtain a Conditional Letter of Map Revision (CLOMR) for proposed changes to the floodplain and floodway of Skunk Tank Wash at a distance of approximately 11,500 feet upstream of the confluence with Skunk Creek. The basis of the CLOMR will be the 11th Avenue roadway improvement plans which are proposed by the Maricopa County Department of Transportation (MCDOT).

1.2 Authority

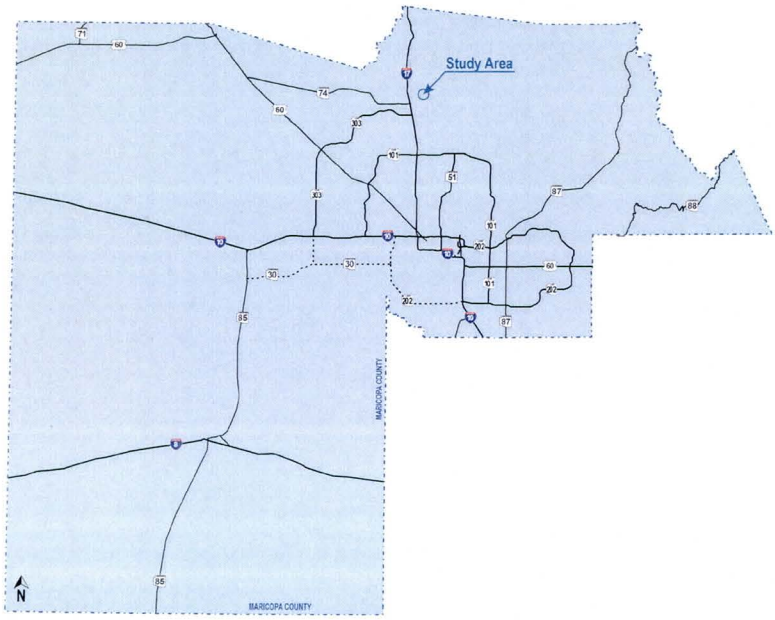
The authority for this project is:

Maricopa County Department of Transportation
2901 West Durango Street
Phoenix, Arizona 85009
Project Manager: Chuck Christensen, P.E.
Project No. TT410
Contract No. 2012-050

1.3 Project Location

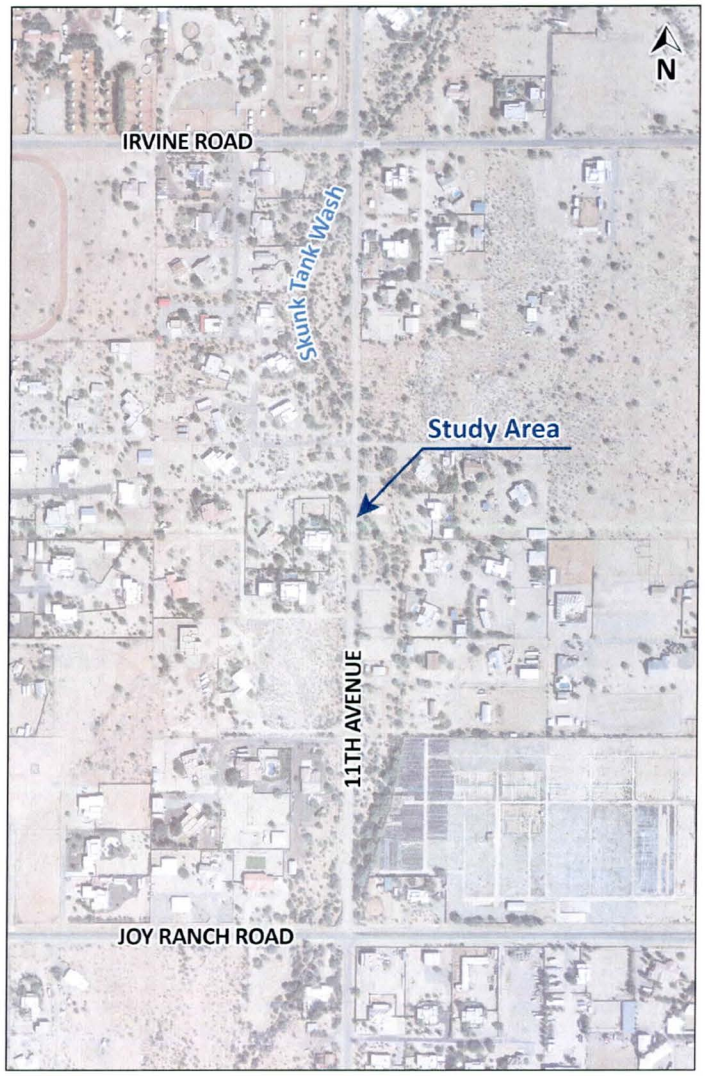
The project is located in unincorporated Maricopa County, Arizona. Furthermore, the project is located within a portion of Sections 30 & 31 of T6N, R3E of the Gila and Salt River Baseline and Meridian. The project limits is Skunk Tank Wash from the effective study cross section at river mile 2.080, upstream for approximately 4,260 feet, to the cross section at river mile 2.887.

Figure 1.2a Location Map



The following figure shows locations of various points of interest that are described in this report. Of particular note is the alignment of 11th Avenue, and the culvert crossings of 11th Avenue and Joy Ranch Road.

Figure 1.2b Vicinity Map



MCDOT is developing plans for the grading and surfacing of 11th Avenue between Irvine Road and Joy Ranch Road. The design includes dip crossings of Skunk Tank Wash at Irvine Road and at approximately 900-feet south of Irvine Road. The culvert crossings of 11th Avenue just north of Joy Ranch Road, and the crossing of Joy Ranch Road just west of Irvine Road will remain.

1.4 Methodology

1.4.1 Effective FIS

The effective Flood Insurance Study (FIS) establishing the current Skunk Tank Wash floodplain and floodway limits is based on *'Skunk Tank Wash Floodplain Delineation Study'* prepared by Environmental Engineering Consultants/McLaughlin Kmetty Engineers (EEC/MKE), in 1997, under contract to the Flood Control District of Maricopa County (District) under contract number FCD 96-05. The effective study was prepared using the Corps of Engineers' (Corps) HEC-2 hydraulic modeling program to delineate the floodplain and floodway.

1.4.2 Hydrology

The hydrology for this study is based upon 'Skunk Creek Floodplain Delineation Study' prepared, for the District, by Montgomery Watson (FCD 95-16).

1.4.3 Hydraulics

Since adoption of the effective study, specific changes to Skunk Creek within the limits of the study area for this project include:

- Construction of a concrete dip crossing at Skunk Tank Wash and Irvine Road
- Grading which widened the existing dirt road along 11th Avenue
- New residential development near and adjacent to the effective Floodplain/Floodway

For this CLOMR, the Corps newest version of HEC-RAS (River Analysis System, Version 4.1.0) will be used in conjunction with the latest mapping and survey to model the floodplain and floodway.

1.5 Acknowledgments

The following studies are acknowledged in regard to previous work on Skunk Tank Wash which contribute information regarding this CLOMR.

Table 1.5 Acknowledgments

Firm	Study	Year	Source of
Montgomery Watson	Skunk Creek Floodplain Delineation Study	1996	Hydrology
EEC/MKE	Skunk Tank Wash Floodplain Delineation Study	1997	Effective FIS
Cooper Aerial/RBF	Aerial Mapping/Horizontal Control	2002	Mapping

1.6 Description of Study Results

The intent of this CLOMR is to determine the impact of roadway improvements to 11th Avenue between Joy Ranch Road and Irvine Road. In Section 5.9.2, Verification of Results a series of hydraulic models are defined to compare the Effective FIS floodplain with that, of first, the existing conditions and then with the Post Project conditions. Due

to newer mapping supplemented by field survey collected with the roadway design project it appears that, in places, there is significant differences in the calculated water surface elevation but not in the floodplain or floodway width which is very similar to that of the effective study.

A comparison between the existing conditions and the Post Project hydraulic models shows minimal impact to the calculated water surface elevations indicating that improvements to 11th Avenue have a negligible effect on the floodplain (see the study results in Section 5.9, Table 5.9.2.3).

Section 2: FEMA FORMS

2.1 Study Documentation Abstract for FEMA Submittals

2.1.1 Study Contractor

T.Y.Lin International
60 East Rio Salado Parkway, Suite 501
Tempe, Arizona 85281
Tel: (480) 968-8814
Fax: (480) 921.0002
Contacts: Lloyd A. Vick, P.E.
Alex Herting, P.E.

T.Y.Lin Project Number: 221830.00

2.1.2 FEMA Technical Review Contractor

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

2.1.3 Local Technical Reviewer

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

2.1.4 Reach Description

Revisions to the existing FIRM maps can be found in the Map Section.

The limits of study for this revision to Skunk Tank Wash are from river mile 2.080 to river mile 2.887 a length of approximately 4,260 feet. Skunk Tank Wash crosses 11th Avenue several times between Irvine Road and Joy Ranch Road beginning at the culvert crossings of Joy Ranch Road (River Mile 2.151) and 11th Avenue (River Mile 2.180) as well as dip crossings of 11th Avenue at River Mile 2.497 and at River Mile 2.665. The effective floodplain and floodway are located on Flood Insurance Rate Map (FIRM) panel 04013C0855L.

2.2 FEMA Forms

This section contains the FEMA Forms for the revision to Skunk Tank Wash.

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

OVERVIEW & CONCURRENCE FORM

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

PAPERWORK BURDEN DISCLOSURE NOTICE

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

PRIVACY ACT STATEMENT

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

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

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

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

A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

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

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

B. OVERVIEW

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

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Example: 480301	City of Katy	TX	48473C	0005D	02/08/83
480287	Harris County	TX	48201C	0220G	09/28/90
040037	Unincorporated Maricopa County	AZ	04013C	0855L	10/16/13

2. a. Flooding Source: Skunk Tank Wash

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

3. Project Name/Identifier: Skunk Tank Wash Floodplain Delineation Study FCD 96-05

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

5. Basis for Request and Type of Revision:

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

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

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

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

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

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

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☒ Yes Fee amount: $4,400
☐ No, Attach Explanation

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

D. SIGNATURE

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

Name: Chuck Christiansen, P.E.	Company: Maricopa County Department of Transporta	
Mailing Address: 2801 West Durango Street Phoenix, Arizona 85009	Daytime Telephone No.: 602.506.4765	Fax No.:
	E-Mail Address: chuckchristiansen@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 requirements for when fill is placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. For Conditional LOMR requests, the applicant has documented Endangered Species Act (ESA) compliance to FEMA prior to FEMA's review of the Conditional LOMR application. For LOMR requests, I acknowledge that compliance with Sections 9 and 10 of the ESA has been achieved independently of FEMA's process. For actions authorized, funded, or being carried out by Federal or State agencies, documentation from the agency showing its compliance with Section 7(a)(2) of the ESA will be submitted. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title:	Community Name: Flood Control District MC	
Mailing Address: 2801 West Durango Street Phoenix, Arizona 85009	Daytime Telephone No.:	Fax No.:
	E-Mail Address:	
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 data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.2(b) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: Lloyd A. Vick, P.E.	License No.: 37890	Expiration Date: 9/30/2014	
Company Name: T.Y.Lin International	Telephone No.: 480.968.8814	Fax No.: 480.921.0002	
Signature: Lloyd A Vick	Date: 8/5/2014	E-Mail Address: lloyd.vick@tylin.com	

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

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

Seal (Optional)

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

RIVERINE HYDROLOGY & HYDRAULICS FORM

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

PAPERWORK BURDEN DISCLOSURE NOTICE

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

PRIVACY ACT STATEMENT

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

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

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

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

Flooding Source: Skunk Tank 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 B) ☐ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

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

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

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

☐ Statistical Analysis of Gage Records ☐ Precipitation/Runoff Model → Specify Model: _____
☐ Regional Regression Equations ☐ Other (please attach description)

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

4. Review/Approval of Analysis

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

5. Impacts of Sediment Transport on Hydrology

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

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation..

B. HYDRAULICS

1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevations (ft.) Effective	Proposed/Revised
Downstream Limit*	downstream of Joy Ranch Rd	RM 2.080	1815.59	1815.94
Upstream Limit*	upstream of Irvine Road	RM 2.887	1847.91	1848.26

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

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

3. Pre-Submittal Review of Hydraulic Models*

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

4.

Models Submitted	Natural Run		Floodway Run		Datum
Duplicate Effective Model*	File Name: Duplicate Eff Model	Plan Name: Plan 01	File Name: Duplicate Eff Mode	Plan Name: Plan 01	NGVD_1929_
Corrected Effective Model*	File Name: Corrected Eff Model	Plan Name: Plan 02	File Name: Corrected Eff Model	Plan Name: Plan 02	NAVD 1988_
Existing or Pre-Project Conditions Model	File Name:	Plan Name:	File Name:	Plan Name:	
Revised or Post-Project Conditions Model	File Name: Prop_Cond_Model_	Plan Name: Plan 02	File Name: Prop_Cond_Model_	Plan Name: Plan 02	NAVD 1988_
Other - (attach description)	File Name:	Plan Name:	File Name:	Plan Name:	

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

☒ Digital Models Submitted? (Required)

C. MAPPING REQUIREMENTS

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

☒ Digital Mapping (GIS/CADD) Data Submitted (preferred)

Topographic Information: Adobe Dan/Desert Hills Mapping

Source: Flood Control District of Maricopa County Date: 3/26/2002

Accuracy:

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

☒ Annotated FIRM and/or FBFM (Required)

D. COMMON REGULATORY REQUIREMENTS*

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

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

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

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

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

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

   If Yes, the community must be able to certify that the area to be removed from the special 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 established. Elements and examples of regulatory floodway revision notification can be found in the MT-2 Form 2 Instructions.)

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

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

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

DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

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

PAPERWORK BURDEN DISCLOSURE NOTICE

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, Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington, VA 20598-3005, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

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

Flooding Source: Skunk Tank 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 Modeled Structure

1. Name of Structure: Joy Ranch Road Culvert

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

   Location of Structure: Joy Ranch Road, just west of intersection with 11th Avenue

   Downstream Limit/Cross Section: RM 2.151

   Upstream Limit/Cross Section: 2.167

2. Name of Structure: 11th Avenue Culvert

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

   Location of Structure: 11th Avenue, just north of intersection with Joy Ranch Road

   Downstream Limit/Cross Section: 2.180

   Upstream Limit/Cross Section: 2.199

3. Name of Structure: _____

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

   Location of Structure: _____

   Downstream Limit/Cross Section: _____

   Upstream Limit/Cross Section: _____

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

B. CHANNELIZATION

Flooding Source: _____

Name of Structure: _____

1. Hydraulic Considerations

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

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

☐ Subcritical flow ☐ Critical flow ☐ 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): _____

2. Channel Design Plans

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

3. Accessory Structures

The channelization includes (check one):

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

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

☐ Weir ☐ Other (Describe):

4. Sediment Transport Considerations

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

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

C. BRIDGE/CULVERT

Flooding Source: Skunk Tank Wash

Name of Structure: Joy Ranch Road

1. This revision reflects (check one):

☐ Bridge/culvert not modeled in the FIS

☒ Modified bridge/culvert previously modeled in the FIS

☐ Revised 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 Version 4.1.0
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

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

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

B. CHANNELIZATION

Flooding Source: _____

Name of Structure: _____

1. Hydraulic Considerations

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

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

☐ Subcritical flow ☐ Critical flow ☐ 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): _____

2. Channel Design Plans

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

3. Accessory Structures

The channelization includes (check one):

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

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

☐ Weir ☐ Other (Describe):

4. Sediment Transport Considerations

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

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

C. BRIDGE/CULVERT

Flooding Source: Skunk Tank Wash

Name of Structure: 11th Avenue Culvert

1. This revision reflects (check one):

☐ Bridge/culvert not modeled in the FIS

☐ Modified bridge/culvert previously modeled in the FIS

☒ Revised 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 Version 4.1.0
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

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

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

SECTION 3: SURVEY AND MAPPING INFORMATION

3.1 Digital Projection Information

Existing GIS contour data was obtained from the Flood Control District of Maricopa County (District) to create the existing conditions surface encompassing the Skunk Tank Wash project limits. The metadata included the following:

- Project Name – Adobe Dam/Desert Hills Mapping
- Flight Date – 03/26/2002
- Contour Interval – 2-feet
- Vertical Datum – NAVD88
- Horizontal Datum – Stateplane NAD83, HARC, Arizona Central, International Feet

The existing surface was supplemented with additional survey from the Maricopa County Department of Transportation (MCDOT) in CAD format for 11th Ave and portions of Joy Ranch Road and Irvine Road. The metadata included the following:

- Project Name – 11th Ave – Joy Ranch to Irvine
- Date Created – 02/27/2013
- Contour Interval – 0.5 feet, including spot elevations and topo feature elevations
- Vertical Datum – NAVD88
- Horizontal Datum – NAD83, Arizona State Plane Central Zone, International Feet, "Grid", Ground Scale Factor = 0.99981658

3.2 Field Survey Information

The existing GIS contour data from the District was originally flown by Cooper Aerial for the Adobe Dam/Desert Hills ADMS/P project in 2002. The survey summary includes the following:

- RBF Consulting and A-TEAM Professional Associates performed the horizontal and vertical control surveys and the GPS positioning.
- Field surveys were completed between March and June of 2002.
- The RBF field crews worked under the direct supervision of Dan Mardock, RLS.
- A-TEAM Professional Associates field crews worked under direct supervision of Stoney Wahl, RLS.
- The RBF project number is 45-101145.002.

The original sealed survey certification stamps and survey report summaries are provided in **Appendix C**. Digital survey data will also be provided in the CD located in the back pocket of this report.

The supplemental existing conditions survey from MCDOT included digital CAD data with survey metadata. We have requested the original sealed survey report and field notes and will add them to **Appendix C** when it is received.

3.3 Mapping

The following is the survey summary from the Adobe Dam/Desert Hills mapping project.

The fieldwork for the Adobe Dam/Desert Hills mapping project was divided into two geographical sections. RBF Consulting surveyed the area south from the Tonto National Forrest to approximately Carefree Highway, and east of I-17 to Cave Creek. A-TEAM Professional Associates surveyed the area from Carefree Highway south to Adobe Dam and west of I-17.

The survey data is in the North American Datum of 1983 (NAD 83), 1992 epoch Central Zone of Arizona State Plane Coordinate System. Elevations are referenced to the North American Vertical Datum of 1988 (NAVD88).

The Adobe Dam/Desert Hills mapping project survey included a primary ground control network and "blind panel" quality control points. The primary network consisted of 47 horizontal and vertical points to be used for photogrametric control. The quality control survey consisted of 72 blind panel control points used to independently verify the mapping. This was accomplished with the use of GPS static and Real Time Kinematic techniques. The photogrammetric ground control was minimized with the use of airborne GPS techniques.

More detailed information regarding the mapping control, survey procedures and equipment from the Adobe Dam/Desert Hills mapping project is provided in **Appendix C**.

We have requested the original sealed survey report and field notes from MCDOT and will update this section when it is received.

3.4 Conversion from NGVD 1929 to NAVD 1988

Conversion from NGVD 1929 to NAVD 1988 is accomplished by adding 1.98 feet to NGVD elevation points. This conversion was obtained using the online VERTCON program at the intersection of 11th Ave and Joy Ranch Road. The VERTCON results are provided in **Appendix C**.

SECTION 4 HYDROLOGY

4.1 Method Description

No new hydrology was performed for Skunk Tank Wash. The hydrologic data used in this study comes from a report prepared by Montgomery Watson *'Skunk Creek Floodplain Delineation Study'*, prepared in 1996 for the Flood Control District of Maricopa County under contract FCD 96-15. This study used the Army Corps of Engineers' HEC-1 hydrologic modeling program to estimate peak discharges for areas contributing flow to Skunk Creek. This included an unnamed tributary wash which was later named Skunk Tank Wash.

The following year a study prepared by Environmental Engineering Consultants/McLaughlin Kmetty Engineers (EEC/MKE) used the hydrology developed with the Skunk Creek study to delineate the floodplain and floodway for Skunk Tank Wash. EEC/MKE used flow data prepared from the Montgomery Watson study which included five discharge rates at locations along Skunk Tank Wash. Through interpolation, by contributing watershed area, the number of discharge rates was expanded to increase the accuracy in mapping the floodplain. The following table contains a summary of the peak discharge rates at the noted reference points along Skunk Tank Wash.

Table 4.1 100-year Discharge Summary Table

River Mile[1]	Location	100-year Discharge
[mile]		[cfs]
0.000	Confluence of Skunk Tank Wash at Skunk Creek	5,260
0.432	Upstream entrance to Skunk Creek Tank	5,210
0.662	Skunk Tank Wash between 19th Avenue and Skunk Creek Tank	4,830
0.759	Skunk Tank Wash west of 19th Avenue	4,590
1.027	Skunk Tank Wash between 19th Avenue and 17th Avenue	4,340
1.211	Skunk Tank Wash at 17th Avenue	4,240
1.291	Skunk Tank Wash between 17th Avenue and 15th Avenue	4,190
1.359	Skunk Tank Wash at confluence of tributaries (near 15th Ave. and Quartz Rd.)	4,070
1.548	Skunk Tank Wash upstream of confluence of tributaries	2,490
1.571	Skunk Tank Wash at Quartz Road	2,440
2.151	Skunk Tank Wash between Quartz Road and Joy Ranch Road	2,310
2.180	Skunk Tank Wash at 11th Avenue	2,110
2.689	Skunk Tank Wash at Irvine Road	1,880
3.109	Skunk Tank Wash at 7th Avenue	1,570
3.327	Skunk Tank Wash at Desert Hills Drive	1,420
3.751	Skunk Tank Wash between Desert Hills Drive and Rockaway Hills Road	860
4.552	Skunk Tank Wash at Rockaway Hills Road	300

Notes: 1) River Miles is in distance along Skunk Tank Wash from confluence with Skunk Creek

4.2 Study Specific Hydrology

The limits of study for this CLOMR lie along Skunk Tank Wash between river mile 2.080 (downstream) to 2.887 (upstream) which, using Table 4-1, translates to 2,110 and 1,880 cfs respectively. The flow change location, in the hydraulic model, takes place at the cross sections located at river miles 2.460 (2,110 cfs) and 2.497 (1,810 cfs).

SECTION 5: HYDRAULICS

This section of the report describes and documents the roadway improvements to 11th Avenue which impact Skunk Tank Wash.

5.1 Method Description

The physical location of the roadway improvements is along 11th Avenue between Irvine Road and Joy Ranch Road. The improvements will improve the existing dirt road to a paved two lane, 24-foot wide roadway with a thickened roadway edge but without curb or gutter. The roadway will be typically one-way crowned from west to east at two-percent except near the intersections of Irvine and Joy Ranch roads where the one-way crown transitions to flow east to west. The roadway profile of the improved 11th Avenue generally follows the existing grade maintaining the dip crossings at river mile 2.497 and 2.689.

Skunk Tank Wash exists as a natural wash within the limits of this study. The wash has a sand and gravel bottom width which varies in width between six and twelve feet, is naturally incised for most of it's length, and is well vegetated at the banks and in the overbanks with creosote, cactus and other native southwestern desert vegetation.

For this CLOMR, the floodplain and floodway delineation was calculated using the Army Corps of Engineer's *Hydrologic Engineering Center - River Analysis System* (HEC-RAS) version 4.1.0 (January 2010).

The hydraulic model is truncated several cross sections upstream (Irvine Road) and downstream (Joy Ranch Road) of the project limits. The starting water surface was established as the calculated water surface of the downstream cross section from the effective model.

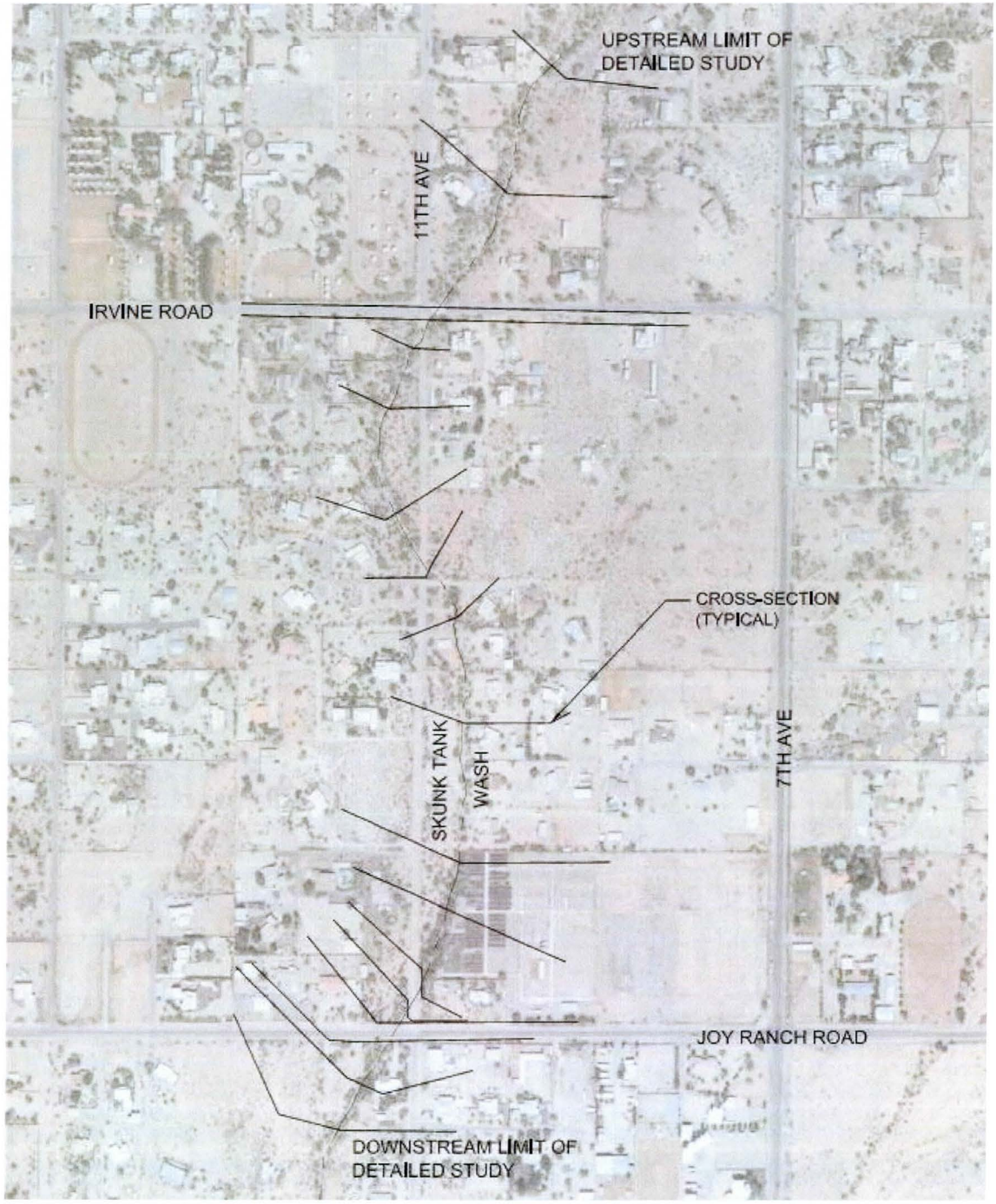
The models included in this study are: the Effective (HEC-2); Duplicate Effective (converted Effective to HEC-RAS); Corrected Effective (modified Duplicate Effective HEC-RAS to update for changes to the wash since establishment of the Effective model, modified for datum conversion from NGVD 1929 to NAVD 1988, and to resize a set of culverts which were incorrect in the effective model; Post Project Conditions (Corrected Effective HEC-RAS model updated to include the proposed roadway improvements to 11th Avenue).

5.2 Work Study Maps

The Work Study map is a comparison of the Effective and the Post Project floodplains and floodways. The map was prepared at 1" = 200' scale and cover Skunk Tank Wash from River Mile 2.080 to 2.887, a distance of approximately 4,300 feet. The cross sections shown on the Work Study Maps are for the Post Project Conditions model. The

majority of the cross sections exactly match the Effective model, however, two new cross sections were added and the alignment of a several other cross sections were adjusted to better fit the updated topography.

Figure 5.2 Project Limits



5.3 Parameter Estimation

5.3.1 Manning's Roughness Coefficients

The n-value roughness coefficients for the channel bed and the overbanks were not modified from the Effect model. The full report for the Effective model can be found on the accompanying CD located at the back of this report.

5.3.2 Contraction and Expansion Coefficients

In the Effective model the contraction and expansion coefficients are generally set at 0.1 and 0.3 respectively. At the culverts the contraction and expansion coefficients were changed to 0.6 and 0.8 reflecting abrupt transitions. These coefficients were maintained for all model updates.

5.4 Cross Section Description

In general the cross sections are cut perpendicular to the flow across the estimated floodplains. Cross section profiles are fairly consistent. The channel bottom remains mostly in its native condition except where it crosses 11th Avenue. Cross Sections were obtained as follows:

Duplicate Effective Model: Converted from the Effective HEC-2 to HEC-RAS.

Corrected Effective Model: Started with the cross section alignments from the Effective model, then cut new cross sections from the surface created from the newer topography (2002) which has been updated to include the 11th Avenue survey (2013). Several cross section alignments were adjusted to better fit the newer topography.

Post Project Conditions Model: Modified the topographic surface to account for the proposed 11th Avenue roadway improvement and then cut new cross sections using the alignments from the Corrected Effective model.

5.5 Modeling Considerations

5.5.1 Hydraulic Jump and Drop Analysis

There are no hydraulic jumps identified within the study limits.

5.5.2 Bridges and Culverts

Modeled in the Effective study, there are two sets of existing culverts modeled. Both sets are three barrel 48-inch Corrugated Metal Pipes. The first is located crossing 11th Avenue just north of Joy Ranch Road. The second is located less than 100-feet downstream of the first set, crossing Joy Ranch Road just west of 11th Avenue.

The Corrected Effective model and Post Project Conditions Model include a change in the culvert diameter of the culverts crossing under Joy Ranch Road (River Mile 2.151).

In the Effective model the culverts are defined as three barrel 5-foot in diameter. These culverts were field surveyed with this CLOMR as three barrel 4-foot in diameter. It is unknown whether this was an oversight during the Effective study or if these culverts have been replaced since the original study.

5.5.3 Levees and Dikes

There are no Levees or Dikes located within the limits of this study.

5.5.4 Islands and Flow Splits

There are no Islands or Flow Splits located within the limits of this study.

5.5.5 Ineffective Flow Areas

Within the HEC-RAS model ineffective flow limits were set up to exclude tributary washes with confluences further downstream as well as roadside channels which lie outside of the conveyance corridors.

5.5.6 Supercritical Flow

The existing terrain is relatively uniformly graded with average slopes typically less than one-percent (approximately 0.0075 ft/ft) which is indicative of low to medium velocity flows. Channel velocities range from 3.6 to 8.8 feet per second (fps). The maximum velocity in the Post Project Conditions floodplain model is 8.8 fps at River Mile 2.253. The HEC-RAS models were run with subcritical flow regimes to determine the highest water surface elevations.

5.6 Floodway Modeling

Within the study limits, Skunk Tank Wash exists as a small natural channel with relatively large overbanks. The 100-year floodplain is generally contained outside the limits of the low flow channel. The floodway, for the Effective model, was developed using the equal conveyance reduction (Floodway Method 4) and then imported into Method 1. Once within Method 1 adjustments were made to prevent any encroachment in the new channel and therefore, in some cases the floodway was set coincident with the new floodplain. The floodway target was varied to ensure floodway water surface elevations are not more than 1.0 feet higher than the 100-year floodplain water surface elevation. The Duplicate Effective model matches the Effective. The same methodology is used for the Corrected Effective and the Post Project Conditions models.

5.7 Problems encountered during the Study

5.7.1 Special Problems and Solutions

There were no special problems encountered during this study.

5.7.2 Model Warning and Error Messages

The following warning messages were encountered in the hydraulic models.

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

The first six messages relate to the hydraulics of the model and generally indicated when cross sections are too far apart. This is not the case as the sections are typically spaced about 200 to 300 feet apart and closer when in proximity to 11th Avenue.

The last message deals with divided flow. There are two cross sections which show divided flow (RM 2.544 and 2.497). These cross sections show tributaries which join the main channel downstream. Ineffective flow limits have been assigned to prevent effective flow outside of the main channel in these locations.

5.8 Calibration

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

5.9 Final Results

5.9.1 Hydraulic Analysis Results

The Post Project conditions model was run using the Corrected Effective HEC-RAS model modified to include the proposed roadway profile of 11th Avenue. Skunk Tank Wash crosses 11th Avenue in dip sections at Irvine Road, at a dip section located approximately 900-feet south of Irvine Road, and then via culvert crossings (three barrel 48-inch pipes) located approximately 100-feet north of Joy Ranch Road.

The hydraulic modeling results show that, for the limits of study, there isn't a significant increase in flow depth or velocity between the Post Project conditions and the Effective Flood Insurance Study. This indicates that the effect the proposed improvements to 11th

Avenue have on Skunk Tank Wash is negligible. The following tables summarize the results of the Post Project conditions.

Table 5.9.1a Post Project Conditions Summary of Skunk Tank Wash

River Mile	100-yr Discharge	W.S. Elev.	Critical W.S.	Channel Velocity	Top Width	Channel Depth	Froude Number	Sta. W.S. Left	Sta. W.S. Right
(ID)	(cfs)	(ft)	(ft)	(ft/s)	(ft)	(ft)		(ft)	(ft)
2.887	1880	1850.24		7.18	230.81	4.50	0.64	9831.4	10062.21
2.793	1880	1846.32	1846.32	8.73	232.71	4.42	0.80	9872.13	10104.84
2.699	1880	1841.67		3.60	331.01	3.42	0.38	9897.78	10228.79
2.689	1880	1841.54		4.51	289.71	4.04	0.45	9921.33	10211.04
2.665	1880	1840.85		6.93	236.64	4.37	0.74	9890.9	10127.54
2.618	1880	1838.65	1838.65	7.70	278.93	4.76	0.84	9816.55	10095.48
2.544	1880	1836.40	1835.88	7.01	231.12	5.62	0.56	9863.86	10094.98
2.497	1880	1833.72	1833.48	8.25	127.28	4.15	0.92	9937.52	10093.26
2.46	2110	1832.98		5.37	258.54	4.28	0.53	9938.96	10197.5
2.385	2110	1829.95	1829.95	7.58	289.12	2.71	1.05	9905.08	10194.2
2.283	2110	1826.51		5.04	387.98	4.51	0.51	9927.08	10315.07
2.253	2110	1825.05	1824.01	8.79	323.71	3.22	0.99	9971.52	10295.23
2.199	2110	1823.22	1823.22	7.26	451.09	7.20	0.57	9849.3	10300.39
2.1875	3-barrel 48-inch CMP culverts crossing 11th Avenue								
2.18	2110	1822.58	1822.58	7.16	436.41	6.10	0.59	9874.81	10311.22
2.167	2110	1822.21	1821.63	5.27	475.51	6.38	0.50	9905.33	10380.84
2.159	3-barrel 48-inch CMP culverts crossing Joy Ranch Road								
2.151	2110	1821.10		6.37	490.88	6.33	0.49	9873.38	10364.26
2.115	2110	1820.35	1820.35	8.24	576.61	6.25	0.64	9750.08	10326.69
2.08	2110	1818.23	1818.23	6.25	606.05	4.59	0.63	9762.72	10368.77

Table 5.9.1b 11th Avenue Culvert Summary

Q Culv. Group (cfs)	173.86		Culv. Full Len (ft)	87.42
# Barrels	3		Culv. Vel US (ft/s)	4.61
Q Barrel (cfs)	57.95		Culv. Vel DS (ft/s)	4.61
E.G. US. (ft)	1823.85		Culv. Inv El Up (ft)	1817.06
W.S. US. (ft)	1823.22		Culv. Inv El Dn (ft)	1816.48
E.G. DS (ft)	1823.2		Culv. Frctn Ls (ft)	0.49
W.S. DS (ft)	1822.58		Culv. Exit Loss (ft)	0
Delta EG (ft)	0.65		Culv. Entr Loss (ft)	0.17
Delta WS (ft)	0.64		Q Weir (cfs)	1936.14
E.G. IC (ft)	1823.72		Weir Sta Lft (ft)	9802.15
E.G. OC (ft)	1823.85		Weir Sta Rgt (ft)	10329.39
Culvert Control	Outlet		Weir Submerg	0.17
Culv. WS Inlet (ft)	1821.06		Weir Max Depth (ft)	2.67
Culv. WS Outlet (ft)	1820.48		Weir Avg Depth (ft)	1.19
Culv. Nml Depth (ft)			Weir Flow Area (sq ft)	628.66
Culv. Crt Depth (ft)	2.29		Min El Weir Flow (ft)	1821.96

Notes: RM 2.1875

Table 5.9.1c Joy Ranch Road Culvert Summary

Q Culv Group (cfs)	172.95		Culv. Full Len (ft)	77
# Barrels	3		Culv. Vel US (ft/s)	5.4
Q Barrel (cfs)	57.65		Culv. Vel DS (ft/s)	5.4
E.G. US. (ft)	1822.47		Culv. Inv El Up (ft)	1814.99
W.S. US. (ft)	1822.21		Culv. Inv El Dn (ft)	1813.94
E.G. DS (ft)	1821.48		Culv. Frctn Ls (ft)	0.69
W.S. DS (ft)	1821.1		Culv. Exit Loss (ft)	0.08
Delta EG (ft)	0.99		Culv. Entr Loss (ft)	0.23
Delta WS (ft)	1.11		Q Weir (cfs)	1937.05
E.G. IC (ft)	1822.41		Weir Sta Lft (ft)	9888.67
E.G. OC (ft)	1822.47		Weir Sta Rgt (ft)	10407.32
Culvert Control	Outlet		Weir Submerg	0.08
Culv. WS Inlet (ft)	1818.99		Weir Max Depth (ft)	2.39
Culv. WS Outlet (ft)	1817.94		Weir Avg Depth (ft)	1.2
Culv. Nml Depth (ft)			Weir Flow Area (sq ft)	623.74
Culv. Crt Depth (ft)	2.74		Min El Weir Flow (ft)	1821.03

Notes: River Mile: 2.159

5.9.2 Verification of Results

5.9.2.1 Duplicate Effective Model

The Flood Control District of Maricopa County provided the digital input HEC-2 model of the Effective FIS for Skunk Tank Wash. The effective model was imported into HEC-RAS, truncated to match the limits of the study area, and adjusted to account for the four cross section culvert routines. The model was run and the elevations compared with that of the effective model.

Table 5.9.2.1 Effective versus Duplicate Effective Model (NGVD 1929)

River Mile	Effective		Duplicate Effective		Floodplain {DE - D}	Floodway {DE - D}
	Floodplain [Elev.]	Floodway [Elev.]	Floodplain [Elev.]	Floodway [Elev.]	[feet]	[feet]
2.887	1847.91	1848.29	1847.92	1848.25	0.01	(0.04)
2.793	1843.12	1843.40	1843.30	1843.46	0.18	0.06
2.699	1839.73	1840.16	1839.79	1840.18	0.06	0.02
2.689	1839.07	1839.78	1839.05	1839.81	(0.02)	0.03
2.618	1836.51	1837.32	1836.53	1837.33	0.02	0.01
2.544	1833.29	1833.88	1833.37	1833.90	0.08	0.02
2.460	1830.22	1830.96	1830.29	1831.00	0.07	0.04
2.385	1827.27	1828.04	1827.29	1828.03	0.02	(0.01)
2.283	1824.13	1825.14	1824.20	1825.15	0.07	0.01
2.253	1822.76	1823.57	1822.81	1823.65	0.05	0.08
2.195	1821.97	1821.97	1822.07	1822.23	0.10	0.26
2.180	1820.50	1820.92	1820.54	1820.90	0.04	(0.02)
2.167	1819.83	1820.24	1819.87	1820.44	0.04	0.20
2.151	1819.03	1819.37	1819.02	1819.31	(0.01)	(0.06)
2.115	1817.50	1817.58	1817.65	1817.71	0.15	0.13
2.080	1815.59	1816.30	1815.71	1816.30	0.12	0.00

5.9.2.2 Duplicate and Corrected Effective Model Comparison

The Duplicate Effective model was converted to NAVD 1988 datum and updated to include changes in the watershed which have taken place within the limits of study since the establishment of the Effective model. These changes included widening of 11th Avenue (dirt road), construction of a concrete dip section at Irvine Road, and updating the diameter of culverts located at Joy Ranch Road. In addition, updated topographic mapping from 2002 supplemented with new survey along 11th Avenue was used to redefine the River Mile cross sections. New cross sections were added at River Miles 2.497 and 2.665.

Table 5.9.2.2 Duplicate Effective versus Corrected Effective Model (NAVD 1988)

River Mile Station	Duplicate Effective Floodplain (NGVD 29')	(NAVD 88')[1]	Corrected Effective (NAVD 88') Floodplain	Floodplain Comparison {CE - DE}
	[Elev.]	[Elev.]	[Elev.]	[feet]
2.887	1847.92	1849.91	1850.24	0.33
2.793	1843.30	1845.29	1846.32	1.03
2.699	1839.79	1841.78	1841.71	(0.07)
2.689	1839.05	1841.04	1841.57	0.53
2.665	N/A	N/A	1840.85	-
2.618	1836.53	1838.52	1838.71	0.19
2.544	1833.37	1835.36	1836.48	1.12
2.497	N/A	N/A	1833.78	-
2.460	1830.29	1832.28	1833.02	0.74
2.385	1827.29	1829.28	1829.92	0.64
2.283	1824.20	1826.19	1826.45	0.26
2.253	1822.81	1824.80	1825.05	0.25
2.199	1822.07	1824.06	1823.23	(0.83)
2.180	1820.54	1822.53	1822.54	0.01
2.167	1819.87	1821.86	1822.23	0.37
2.151	1819.02	1821.01	1821.14	0.13
2.115	1817.65	1819.64	1820.34	0.70
2.080	1815.71	1817.70	1817.99	0.29

Notes: NGVD 29' + 1.987' = NAVD 88'

A comparison of the "Effective Floodplain" with that of current existing conditions (demonstrated by the Corrected Effective model) shows that there are locations with significant differences in water surface elevation, however, a review of the work maps show that the floodplain boundaries have not been extensively revised. This condition results from using newer topographic mapping, adjustment of some cross sections, a correction to the diameter of the Joy Ranch Road culverts, and physical changes constructed since the establishment of the Effecting floodplain.

5.9.2.3 Corrected Effective and Post Project Conditions Model Comparison

The single significant physical differences between the existing conditions model (Corrected Effective) and the Post Project conditions model is the proposed improvement project for 11th Avenue which modifies the existing roadway width and profile. A review of the results in the following table (Floodplain {PP-CE}) shows that the roadway improvements has, in essence, a negligible effect on the floodplain.

Table 5.9.2.3 Corrective Effective versus Post Project Model (NAVD 1988)

River Mile Station	Corrected Effective Floodplain	Post Project Conditions		Floodplain {PP - CE}	Post Project Floodway {FW-FP}
		Floodplain	Floodway		
	[Elev.]	[Elev.]	[Elev.]	[feet]	[feet]
2.887	1850.24	1850.24	1851.24	0.00	1.00
2.793	1846.32	1846.32	1846.69	0.00	0.37
2.699	1841.71	1841.67	1842.12	(0.04)	0.45
2.689	1841.57	1841.54	1842.05	(0.03)	0.51
2.665	1840.85	1840.85	1841.25	0.00	0.40
2.618	1838.71	1838.65	1839.25	(0.06)	0.60
2.544	1836.48	1836.40	1836.48	(0.08)	0.08
2.497	1833.78	1833.72	1834.69	(0.06)	0.97
2.460	1833.02	1832.98	1833.93	(0.04)	0.95
2.385	1829.92	1829.95	1830.75	0.03	0.80
2.283	1826.45	1826.51	1827.42	0.06	0.91
2.253	1825.05	1825.05	1825.77	0.00	0.72
2.199	1823.23	1823.22	1824.09	(0.01)	0.87
2.180	1822.54	1822.58	1823.27	0.04	0.69
2.167	1822.23	1822.28	1823.19	0.05	0.98
2.151	1821.14	1821.11	1821.76	(0.03)	0.66
2.115	1820.34	1820.35	1820.42	0.01	0.07
2.080	1817.99	1817.92	1818.28	(0.07)	0.05

SECTION 6: Erosion, Sediment Transport, and Geomorphic Analysis

The propose improvements to Skunk Tank Wash, with this Conditional Letter of Map Revision (CLOMR), include the widening and paving of an existing dirt road, as well as revisions to the existing roadway profile. The Effective Flood Insurance Study (FIS), prepared in 1997, stated that erosion and sediment transport was not an issue. That estimation appears to be valid through site visits conducted with this CLOMR which found that the existing conditions are very similar to that described in the Effective FIS. Excessive erosion was not observed and although there was some deposition of sediment around the culverts it is considered to be normal for the region for structures which receive only periodic maintenance.

The sediment is modeled in the existing conditions (Corrected Effective) and Post Project conditions models as partial blockage within the pipe culverts (see Appendix E).

Since this section is not relevant, Appendix F covering supporting documentation for this Section has been omitted.

SECTION 7: DRAFT FIS REPORT DATA

7.1 Summary of Discharges

A table containing a summary of peak discharges can be found on the following pages. The effective Flood Insurance Study: *Skunk Creek Floodplain Delineation Study* prepared by Montgomery Watson, in 1996, is the basis of the hydrology.

7.2 Floodway Data

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

7.3 Annotated Flood Insurance Rate Maps

Since this study is a Conditional Letter of Map Revision an Annotated Flood Insurance Rate Map was prepared and is located in the map pocket at the end of the report. In addition, there is a work map which can be found in the map pockets at the end of the report which compares the Effective and Post Project floodplains.

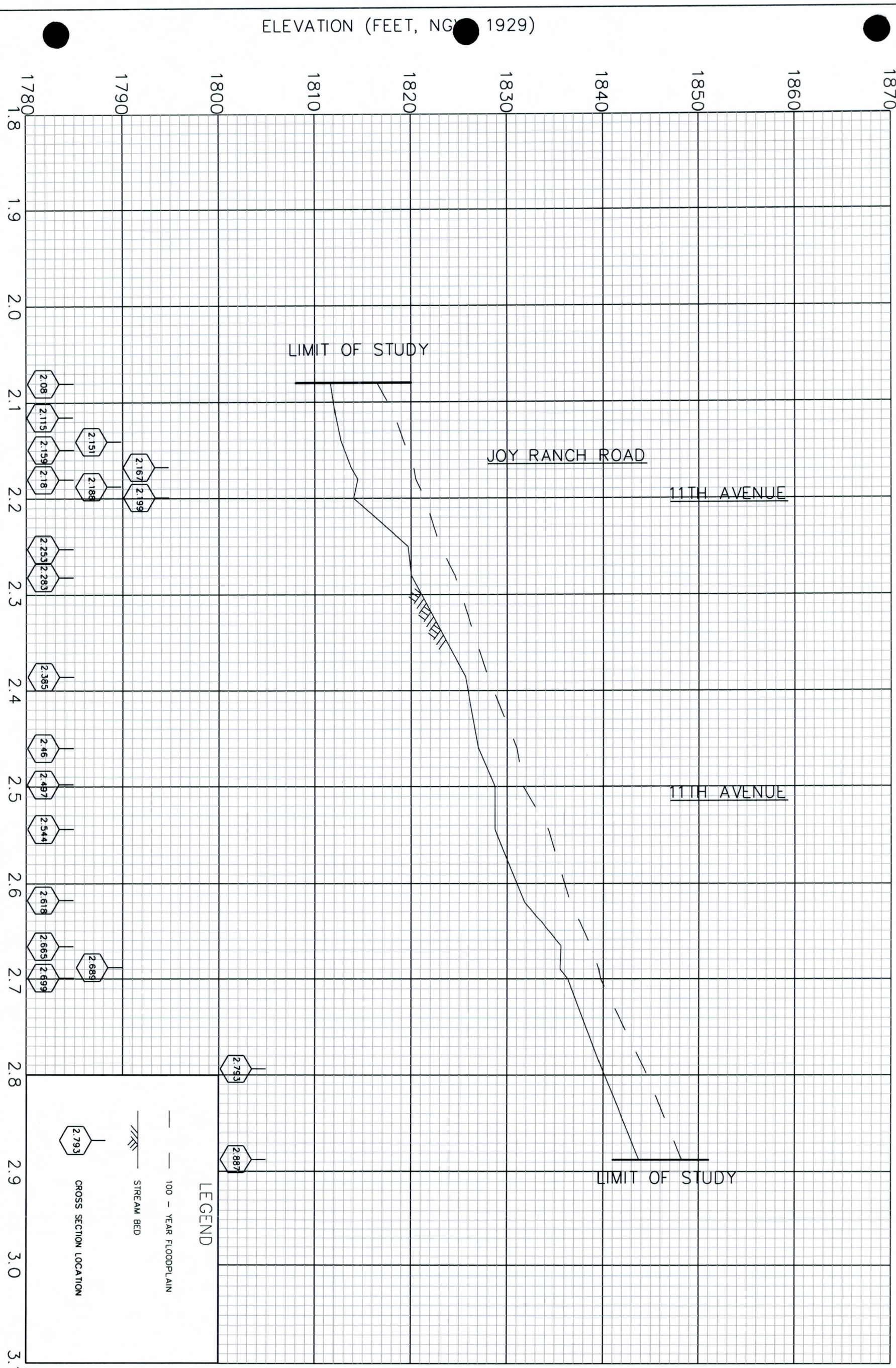
7.4 Flood Profiles

The flood profiles are located in this section following the Floodway Data Table. The flood profiles are provided for both NGVD 1929 and NAVD 1988 datum.

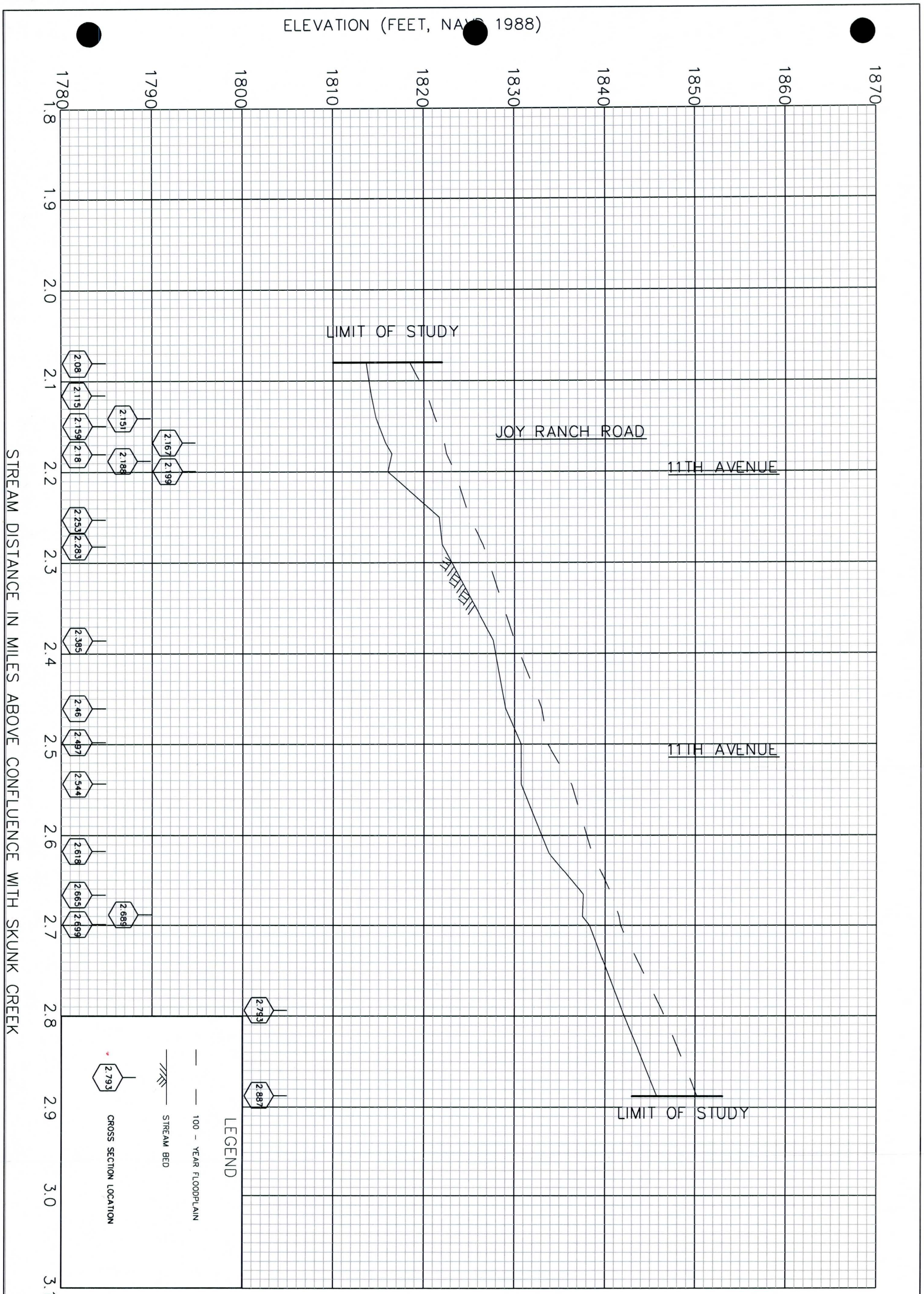
FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NAVD 1988)			
Skunk Tank Wash								
A	787	279	2,715.00	1.9	1770.64	1770.64	1770.88	0.24
B	1,795	252	1,394.00	3.8	1770.75	1770.75	1770.99	0.24
C	2,629	100	500	10.4	1772.51	1772.51	1772.75	0.24
D	3,495	128	588	8.2	1776.23	1776.23	1776.79	0.56
E	5,423	216	719	6.0	1784.56	1784.56	1785.25	0.69
F	7,181	324	815	5.0	1793.93	1793.93	1794.45	0.52
G	9,319	345	629	3.9	1806.52	1806.52	1807.48	0.96
H	10,982	70	225	9.4	1817.92	1817.92	1818.28	0.36
Revised I	12,054	150	463	4.6	1826.51	1826.51	1827.42	0.91
Data J	14,198	149	453	4.2	1841.54	1841.54	1842.05	0.51
K	15,745	102	279	6.7	1853.85	1853.85	1854.08	0.23
L	16,986	66	181	8.7	1863.00	1863.00	1862.99	-0.01
M	18,712	72	213	6.7	1877.02	1877.02	1877.59	0.57
N	20,819	32	107	8.0	1896.47	1896.47	1897.26	0.79
O	22,804	56	119	7.2	1916.84	1916.84	1916.98	0.14
P	24,035	75	73	4.1	1931.21	1931.21	1931.35	0.14

[1] Stream Distance in Feet Above Confluence with Skunk Creek

TABLE 1	FEDERAL EMERGENCY MANAGEMENT AGENCY **MARICOPA COUNTY, AZ** **AND UNINCORPORATED AREAS**	**FLOODWAY DATA** **SKUNK TANK WASH**



FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD PROFILES SKUNK TANK WASH	FLOOD PROFILES SKUNK TANK WASH



FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD PROFILES SKUNK TANK WASH	FLOOD PROFILES SKUNK TANK WASH

Appendix A: References

Appendix A.1 – Data Collection Summary

Data provided by MCDOT & FCDMC

1. Skunk Tank Floodplain Delineation Study (PDF)
2. Skunk Tank Floodplain Delineation Study – Hydraulic Models (digital files)
3. Adobe Dam/Desert Hills Area Drainage Master Plan (PDF)
4. 11th Avenue – Joy Ranch Road to Irvine Road (Project No. TT410). Pre-Final Construction Plans. Maricopa County Department of Transportation. April 9, 2014. (PDF)
5. 11th Avenue – Joy Ranch Road to Irvine Road (Project No. TT410). Survey Data. March 7, 2013. (digital files)
6. Aerial Survey for Adobe Dam/Desert Hills ADMP. Circa 2002. (digital files)
7. Aerial Photographs. April 1, 2014. (digital files)

Appendix A.2 – Referenced Documents

Previous FEMA Studies

1. Skunk Creek Floodplain Delineation Study. Prepared for the Flood Control District of Maricopa County (FCD 95-16) by Montgomery Watson. June 1996.
2. Skunk Tank Wash Floodplain Delineation Study. Prepared for the Flood Control District of Maricopa County (FCD 96-05) by Environmental Engineering Consultants/McLaughlin Kmetty Engineers. December 1997.
3. Adobe Dam/Desert Hills Area Drainage Master Plan. Prepared for the Flood Control District of Maricopa County (FCD 2002C001) by JE Fuller/Hydrology and Geomorphology, Inc. February 28, 2005.

Other Documents

1. Hydrologic Engineering Center – River Analysis System. U.S.Army Corps of Engineers. Version 4.1.0. January 2010.
2. Vertcon Orthometric Height Conversion – Online Tool. https://www.ngs.noaa.gov/cgi-bin/VERTCON
3. State Standard 1 - Instructions for Organizing and Submitting Technical Support Data Notebooks (TSDN) for Flood Studies. Arizona Department of Water Resources. August 2012.
4. Flood Insurance Rate Map – Map Number 04013C0855L. October 16, 2013.

Appendix B: General Documentation and Correspondence

Appendix B.1 – General Project Documentation and Correspondence

To date, there has been no general correspondence.

Appendix B.2 – Contract Documents

The contract scope of work for the Conditional Letter of Map Revision (CLOMR) is included following this page.

Appendix B.3 – Public Notification

No official public notification has taken place as of this time. Once the CLOMR is accepted the Maricopa County Department of Transportation will issue a project notice for the roadway improvement project. It is recommended that this notification should include a statement in regards to the effect the project will have on the effective floodplain/floodway.

Appendix B.4 – FEMA Correspondence

To date, there has been no FEMA correspondence.

Scope of Services – General Conditions

TT410 – 11TH AVENUE – JOY RANCH ROAD TO IRVINE ROAD

WORK ASSIGNMENT E

CONDITIONAL LETTER OF MAP REVISION (CLOMR)

Maricopa County
Department of Transportation
2901 W. Durango Street
Phoenix, AZ 85009

April 2014

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SECTION 100 TECHNICAL MEMORANDA AND REPORTS

100.1.1.1 Conditional Letter of Map Revisions (CLOMR)

The **Consultant** shall prepare and submit a CLOMR for projects that will modify a Federal Emergency Management Agency (FEMA) designated floodplain and/or floodway. The CLOMR must receive approval from the Flood Control District of Maricopa County (FCDMC) and be forwarded onto FEMA before any construction can take place within the floodplain.

Once construction is completed, the **Consultant** shall prepare a Letter of Map Revision (LOMR) based on as-built conditions. The LOMR must be approved by FCDMC and forward onto FEMA.

100.1.1.1.1 Identify Areas for Floodzone Revisions

The **Consultant** shall identify all project impacts to FEMA-designated floodplains. Flood-prone areas not designated by FEMA may be regulated by FCDMC; while such non-FEMA areas do not require a CLOMR, **Consultant** shall coordinate requirements with FCDMC.

100.1.1.1.2 Prepare/Revise Hydrologic and Hydraulic Analysis

The **Consultant** shall prepare hydrologic and hydraulic analyses as necessary for the CLOMR or LOMR submittal. Analyses shall follow the guidelines in the latest Arizona Department of Water Resources (ADWR) State Standards. The **Consultant** shall prepare a Technical Support Data Notebook (TSDN) in accordance with the ADWR State Standard 1.

100.1.1.1.3 Prepare and Complete Applicable Forms

The **Consultant** shall identify the necessary FEMA forms and include the most current version of those forms in the TSDN.

100.1.1.1.4 Submit to FCDMC

The **Consultant** shall submit a Draft CLOMR, including the TSDN and all applicable forms, maps and hydrologic and hydraulic analyses, to the **Project Manager**. The **Consultant** shall coordinate with the **Project Manager** regarding the CLOMR submittal to FCDMC.

100.1.1.1.5 FCDMC Review

FCDMC staff will review and provide comments on the CLOMR. The **Consultant** shall coordinate with the **Project Manager** regarding gathering all comments from FCDMC.

100.1.1.1.6 Address Comments and Resubmit

The **Consultant** shall revise the CLOMR based on comments prepared by FCDMC. The **Consultant** shall prepare a summary of comments documenting the comments gathered from FCDMC along with a response to each comment. The **Consultant** shall coordinate with the **Project Manager** regarding the resubmittal of the revised CLOMR and summary of comments to FCDMC.

100.1.1.1.7 Submit to Federal Emergency Management Agency (FEMA)

Upon FCDMC approval of the CLOMR, FCDMC shall submit the CLOMR to FEMA. As part of the submittal, FCDMC shall make payment for the FEMA review fee.

100.1.1.1.8 FEMA Review

The **Consultant** shall coordinate with the FEMA reviewer during the CLOMR review process and keep the **Project Manager** informed of progress. The **Consultant** shall include the **Project Manager** in any pertinent correspondence with the FEMA reviewer.

100.1.1.1.9 Address Comments

The **Consultant** shall revise the CLOMR based on comments provided by FEMA and/or the FCDMC. The **Consultant** shall prepare a summary of comments documenting the comments gathered from FEMA or the FCDMC along with a response to each comment. The **Consultant** shall re-submit the revised CLOMR with the summary of comments to the **Project Manager**, who shall submit to the FCDMC.

100.1.1.1.10 Resubmit to FEMA

Upon FCDMC approval of the CLOMR, FCDMC shall coordinate with the **Project Manager** regarding the CLOMR resubmittal to FEMA.

100.1.1.1.11 FEMA Review and Decisions

The **Consultant** shall coordinate with the FEMA reviewer during the CLOMR review process and keep the **Project Manager** informed of progress. The **Consultant** shall include the **Project Manager** in any pertinent correspondence with the FEMA reviewer. The **Consultant** shall coordinate resubmittals and responses to comments to FEMA and FCDMC as necessary.

100.1.1.1.12 CLOMR Approved

The **Consultant** shall continue to coordinate with FEMA, FCDMC and the **Project Manager** until approval of the CLOMR is obtained.

Scope of Services – Project Specific

11TH AVENUE – JOY RANCH ROAD TO IRVINE ROAD

CONDITIONAL LETTER OF MAP REVISION (CLOMR)

Project number: TT410
Contract No.: 2012-050
Work Assignment: E

Maricopa County
Department of Transportation
2901 W. Durango Street
Phoenix, AZ 85009

APRIL 2014

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GUIDELINES FOR DEVELOPING SCOPE OF SERVICES

This Scope of Services is presented in two parts.

The information that is common to consultant design contracts is located in the Scope of Services – General Conditions, located in the MCDOT Project Development Manual – Volume II (Project Management). Not all of the tasks described in that document are necessary on every project.

The project specific Scope of Services is presented in this section and includes information specific to this project in addition to the general information provided in the General Conditions. Any information relating to the project which is not covered fully in the General Conditions shall be included in this document. This document will be added in front of the General Conditions and the two will serve as the complete Scope of Services of a project.

Guideline for Conflicts

If conflicting criteria or procedures are presented in the scope of services or the references, the general order of precedence in resolving a conflict will be the following:

1. The Scope of Services – Project Specific;
2. The Scope of Services – General Conditions;
3. The MCDOT Roadway Design Manual;
4. MAG adopted Design Concept Guidelines for Roads of Regional Significance where applicable and reasonable;
5. Other MCDOT publications;
6. Flood Control District publications;
7. AASHTO publications; and
8. All other approved publications listed or used.

Confirm the resolution with the Project Manager. The Project Manager, in consultation with the affected parties, will make the final determination in the resolution of conflicts.

SCOPE OF SERVICES – PROJECT SPECIFIC

Project Overview

Project Location

11th Avenue paving between Joy Ranch Road and Irvine Road is a low volume road project for Maricopa County Department of Transportation (MCDOT). The project is located in northern Maricopa County and is approximately ½-mile in length.

Project Background

11th Avenue is currently an unpaved roadway between Joy Ranch Road and Irvine Road. Within the project limits, 11th Avenue crosses Skunk Tank Wash.

Project Purpose

The primary purpose of the project is to pave the existing dirt roadway with 2" of AC pavement as part of the overall MCDOT low volume road program. The roadway crossing Skunk Tank Wash will necessitate the preparation, and submittal, of a Conditional Letter of Map Revision (CLOMR).

Length of Services

The estimated contract time is 12 months (inclusive of Federal Emergency Management Agency (FEMA) review times and completion of construction/record drawings).

100.1.1.1.2 Prepare Hydrologic/Hydraulic Analysis

For this project, Consultant shall prepare the following hydraulic models required by FEMA documenting both floodplain and floodway:

- **Effective Model** – this is a copy of the effective floodplain and floodway model developed using HEC-2 with the original Letter of Map Revision (LOMR).
- **Duplicate Effective Model** – this model will be a duplicate of the effective model converted from HEC-2 to HEC-RAS v4.1.0.
- **Corrected Effective Model** – this model will be an update of the duplicate effective model corrected from changes in the floodplain which have occurred since establishment of the effective model.

Consultant shall prepare a hydraulic model of the proposed conditions which covers the full length of the proposed half-mile long project. The hydraulic model will be prepared using the HEC-RAS modeling software.

100.1.1.1.13 Letter of Map Revision (LOMR)

After construction is completed and as-built record drawings have been prepared (by others) the Consultant shall compare the record drawings with those prepared for the CLOMR amending the hydraulic model to match the as-built condition. Consultant shall prepare a LOMR and provide to FCDMC for submittal to FEMA documenting the post construction conditions.

100.2 Coordination/Project Team Meetings

Consultant shall attend up to 4 project team and/or additional coordination meetings over the duration of the project's design.

100.3 Project Submittals

Consultant shall submit all application materials and CLOMR to MCDOT and FCDMC for review prior to submittal to FEMA. FCDMC shall submit directly to FEMA. It is anticipated that only one (1) review will be performed by FEMA and that CLOMR will be approved upon re-submittal of CLOMR to FEMA.

RBF CONSULTING

ADDENDUM NO. 1 TO SURVEYOR REPORT FOR MARICOPA COUNTY FLOOD CONTROL CONTRACT FCD 2001C019.

THE INFORMATION CONTAINED HEREIN IS SUPPLEMENTARY TO THE SURVEY REPORT SUBMITTED IN JUNE, 2002. THIS INFORMATION WAS GENERATED AFTER THE INITIAL SUBMITTAL AND INCLUDES:

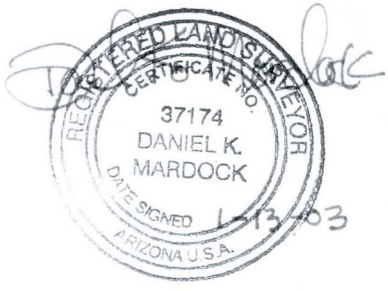
FINAL COORDINATES OF THE QA/QC BLIND PANELS

COORDINATES OF THE SURVEY OF QA/QC CROSS SECTIONS

THE CTRL.XLS DATABASE OF CONTROL POINTS

- Note that this database information was submitted directly to Cooper Aerial on forms provided by Cooper. They are not intended to match the current forms provided by MCFCD.

COMPACT DISC OF ALL PROJECT FILES FROM THE FIRST SUBMITTAL AND THIS ADDENDUM.



Daniel K. Mardock, RLS 37174

16605 N. 28th Avenue, Suite 100, Phoenix, AZ 85053-7550 ■ 602.467.2200 ■ Fax 602.467.2201
Offices located throughout California, Arizona & Nevada ■ www.RBF.com

SURVEYOR'S CERTIFICATION

The survey of the following points was conducted under my direction during the months of March 2002 and May 2002. The information in this book is correct and accurate to the best of my knowledge and belief.
2, 3, 4, 5, 6, 7, 9, 10, 34, 35, 50, 51, 52, 53, 54, 55, 56, 57, 58, 1000, 15105, 15114, 15123, 15127, 15128, 15129, 15134, 15135, 15136, 15142, 15143, 15144, 15149, 15150, 15151, 15145, 15155, 15156, 15159, 15160, 15161, 15163, 15164, 15174, 15175, 15181, 15182, 15211, 15214, 15215, 15216,

Daniel K. Mardock, RLS

6.26.02
Date

SURVEYOR'S CERIFICATION

The survey of the following points was conducted under my direction during the months of March 2002 and June 2002. The information in this book is correct and accurate to the best of my knowledge and belief.
12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 37, 38, 32, 33, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 15075, 15063, 15062, 15061, 15218, 15056, 15057, 15060, 15031, 15032, 15033, 15030, 15028, 15027, 15025, 15026, 15029, 15021, 15020, 15014, 15015, 15018, 15217, 15154, 15155, 15156, 15159, 15160, 15127, 15134.

Stone E. Wahl
Stoney Wahl, RLS

6/28/02
Date

SURVEY SUMMARY

RBF Consulting and A-TEAM Professional associates preformed horizontal and vertical control surveys as well as airborne GPS positioning for this project. Field surveys were carried out between the dates of March 2002 and May 2002. RBF field crews worked under the direct supervision of Dan Mardock, RLS. A-TEAM field crews worked under direct supervision of Stoney Wahl, RLS. The RBF project number for this project is 45-101145.002.

The fieldwork for this project was divided into two geographical sections. RBF Consulting surveyed the area south from the Tonto National Forrest to approximately Carefree Highway, and east of I-17 to Cave Creek. A-TEAM surveyed the area from Carefree Highway south to Adobe Dam and west of I-17.

The survey data in this project is presented in the North American Datum of 1983 (NAD 83), 1992 epoch Central Zone of Arizona State Plane Coordinate System. Elevations are referenced to the North American Vertical Datum of 1988 (NAVD88).

This survey included a primary ground control network and "blind panel" quality control points. The primary network consisted of 47 horizontal and vertical points to be used for photogrametric control. The quality control survey consisted of 72 blind panel control points used to independently verify the mapping. This was accomplished with the use of GPS static and Real Time Kinematic techniques. The photogrammetric ground control was minimized with the use of airborne GPS techniques.

Horizontal control

In the area encompassed by this project we recovered 10 GDACS control monuments with coordinates published by the Maricopa County Department of Transportation (MCDOT). These points were observed by MCDOT between 1998 and 2000. This was a part of their Geodetic Densification and Cadastral Survey (GDACS) project. The horizontal positions of these monuments have been accepted by the National Geodetic Survey (NGS) and given a horizontal order of B. The published values are related to NAD83 (1992)

Vertical control

The same monuments that were used for horizontal control have a vertical component provided by MCDOT. The elevations were established by determining an ellipsoidal height by GPS observation and referencing this to NAD83. The orthometric height was then determined using a high-resolution geoid model (geoid 99) with precise GPS observation and processing techniques. The NGS publishes these results as Third Order Class II ellipsoidal heights. Since this is not given a vertical order additional vertical control was used to verify vertical tolerance of minimum third order accuracy. We recovered four NGS and FEMA benchmarks to accomplish this.

Outline of survey procedures

A primary control network was designed which included 10 recovered control monuments and 37 new monuments. A GPS observation schedule was then set up to ensure strong geometric figures and redundant measurements. The resulting data was put through a least squares adjustment to analyze data and produce final positions. Additional measurements were made to

the NGS and FEMA published benchmarks to verify vertical control. This information is provided in the edge matching and control comparison chart in appendix "C"

The blind panel quality control network consisted of an additional 72 points. These were intended to cover the project uniformly. It was decided to set these points on or near the section corners within the project for approximate one mile spacing in the quality control grid. Both static and real time kinematic (RTK) GPS methods were used to obtain measurements for this network. The RTK method involves a radio link between the GPS receivers, which allows us to analyze data while in the field.

In order to obtain accurate results from the aerial photography a mix of static and continuous kinematic GPS methods were used. A static network was established on primary ground control points. This data was processed in conjunction with data collected by a receiver in the plane. The receiver in the plane collected data kinematiclly, allowing us to determine it's position at any given time. The receiver also marked the time when a photo was taken. With this information we could determine the location of the photo lens at the time of the photograph.

As an aid to the photogrammetrist several control points from previous projects surrounding this one were recovered and observed relative to this survey control. Those points are shown on the edgematch and control comparison chart with accompanying map in appendix "C" Positions measured for this project are compared with positions reported for the same points in the previous mapping projects.

Equipment

Fieldwork was preformed using Trimble 4000 series receivers (4000ssi, 4700, 4800). Compact L1/L2 antennas with ground planes were used where external antennas were needed. All antennas used collect L1/L2 and p-code. These antennas are designed to help eliminate multipath and unwanted noise from the observation data. Trimmark II radios were used for RTK work. Trimble Geomatics Office version 1.5 software was used to process field data. Star*Net-Pro Version 6.0.18 software was used to perform a least squares adjustment of the static measurements. This allowed us to analyze the quality of both the field measurements and the network.

Static procedures

Where the static survey method was used we designed procedures to eliminate errors and have confidence in our results. A GPS observation schedule was made to ensure strong geometric figures and redundant measurements. Each point was occupied twice. Each occupation was at least fifteen minutes on short baselines (under 8 kilometers) and thirty minutes on longer baselines. A minimum of three points were occupied simultaneously so that geometric closures could be performed. Fixed height tripods were used whenever possible to eliminate antenna height errors. When fixed height tripods were not used a measurement from the monument to the antenna was made before and after the session. If the next occupation scheduled for that receiver was to be on the same point it would be taken down and set up again before the next session to provide a quality check on the set up. Observation logs were filled out for each session. These included the height of the antenna, the offset from the monument to the aerial panel, the start and end time of the session, the receiver serial number, and the name of the field personnel.
The data from these sessions was then processed using Trimble Geomatics Office version 1.5. This program produced measured baselines between the points. We could then run geometric closures to check our data. We used Star*Net version 6.0.18 to perform a least squares adjustment on the baselines. This allowed us to verify the quality of our measurements and produce final positions for project control.

RTK methods

Where RTK survey methods were used we chose a field procedure that would minimize human error and account for the possibility of erroneous results the RTK method could produce. A base station receiver was set up on a fixed height tripod on a control point. A radio link was then set up to broadcast its location to a second (rover) receiver. The rover would then gain initialization "on the fly". This means that it has determined it's differential position from the base receiver. The rover receivers were set up on fixed height poles with bipods. A 90 second measurement was taken on another control point to verify that the setup is correct and that the RTK results are consistent with our static work. Each point located with RTK was then measured for ninety seconds. The receiver was then forced to physically loose lock with the satellites and then re-initialize at least 40ft. from where it gained initialization the first time. This forces it to use a different set of data to solve for its position. The monument was then measured for another ninety seconds. The results of the two measurements were then compared for quality assurance.

GPS control for photogrammetric work

Three separate flights were performed to cover the project. At least three primary base station points were selected to provide coverage of the project during the flight. For each flight, receivers were set up on these points to collect static data at a one second epoch rate. A receiver was also installed in the airplane. This receiver collected continuous kinematic data at a one second epoch rate. The difference between static and kinematic survey being that a static observation is collecting data for a precise location a stationary point and the kinematic observation is producing a new location for each epoch in a moving receiver. The receivers were run for at least fifteen minuets before the plane moved and continued until fifteen minuets after the plane was parked. The data collected while the plane was not in motion allowed us to verify that the receiver in the plane was initialized properly. During the flight an event recorder marked the time each photograph was taken. The data was then processed in the Trimble Geomatics Office v1.5. The static data from the control points was first processed and run through a minimally constrained least squares adjustment. This allowed us to verify the quality of the data and detect any setup errors that may exist. Then the data was processed between the control stations and the receiver in the plane. The baselines were first processed forward (from the control stations to the plane). Then backwards (from the plane to the control stations). This verified the software used the correct integer count to solve for the location of the plane. The data was then processed a third time allowing the software to choose which direction produced the best statistical results. The resulting coordinates from each processing session were then compared. Using the time mark taken at each photo we could then determine the location of the antenna in the plane when each photo was taken. With this we provided Cooper aerial with state plane coordinates and orthometric heights in NAD83 NAVD88 for the phase center of the GPS antenna and the exact timing of the photo events.

Appendix D: Hydrologic Analysis Supporting Documentation

Appendix D.1 – Precipitation Data

Precipitation data comes from a report prepared by Montgomery Watson *'Skunk Creek Floodplain Delineation Study'*, in 1996 for the Flood Control District of Maricopa County under contract FCD 96-15.

In 1997 a study prepared by Environmental Engineering Consultants/McLaughlin Kmetty Engineers (EEC/MKE) used the hydrology developed with the Skunk Creek study to delineate the floodplain and floodway for Skunk Tank Wash. EEC/MKE used flow data prepared from the Montgomery Watson study which included five discharge rates at locations along Skunk Tank Wash. Through interpolation, by contributing watershed area, the number of discharge rates was expanded to increase the accuracy in mapping the floodplain. The following table contains a summary of the peak discharge rates at the noted reference points along Skunk Tank Wash.

River Mile[1]	Location	100-year Discharge
[mile]		[cfs]
0.000	Confluence of Skunk Tank Wash at Skunk Creek	5,260
0.432	Upstream entrance to Skunk Creek Tank	5,210
0.662	Skunk Tank Wash between 19th Avenue and Skunk Creek Tank	4,830
0.759	Skunk Tank Wash west of 19th Avenue	4,590
1.027	Skunk Tank Wash between 19th Avenue and 17th Avenue	4,340
1.211	Skunk Tank Wash at 17th Avenue	4,240
1.291	Skunk Tank Wash between 17th Avenue and 15th Avenue	4,190
1.359	Skunk Tank Wash at confluence of tributaries (near 15th Ave. and Quartz Rd.)	4,070
1.548	Skunk Tank Wash upstream of confluence of tributaries	2,490
1.571	Skunk Tank Wash at Quartz Road	2,440
2.151	Skunk Tank Wash between Quartz Road and Joy Ranch Road	2,310
2.180	Skunk Tank Wash at 11th Avenue	2,110
2.689	Skunk Tank Wash at Irvine Road	1,880
3.109	Skunk Tank Wash at 7th Avenue	1,570
3.327	Skunk Tank Wash at Desert Hills Drive	1,420
3.751	Skunk Tank Wash between Desert Hills Drive and Rockaway Hills Road	860
4.552	Skunk Tank Wash at Rockaway Hills Road	300

Notes: 1) River Miles is in distance along Skunk Tank Wash from confluence with Skunk Creek

Appendix D.2 – Physical Parameter Calculations

The physical parameters were not modified from the original hydrologic study prepared by Montgomery Watson. Refer to the 1996 study: *'Skunk Creek Floodplain Delineation Study'*, prepared for the Flood Control District of Maricopa County under contract FCD 96-15.

Appendix D.3 – Hydrograph Routing Data

No new hydrology was prepared with the Effective floodplain delineation study (FDS), nor with this Conditional Letter of Map Revision (CLOMR). Refer to the 1996 study prepared by Montgomery Watson.

Appendix D.4 – Reservoir Routing Data

No new routing data was prepared with the Effective FDS, nor with this CLOMR. Refer to the 1996 study prepared by Montgomery Watson.

Appendix D.5 – Flow Splits and Diversions Data

There were no flow splits or diversion within the original study related to this watershed. Refer to the 1996 study prepared by Montgomery Watson.

Appendix D.6 – Hydrologic Calculations

No new hydrology was prepared with the Effective floodplain study, nor with this CLOMR. Refer to the 1996 study prepared by Montgomery Watson.

Appendix E: Hydrologic Analysis Supporting Documentation

Since this project is a revision to the Effective Flood Insurance Study (FIS) many of the hydraulic characteristics will remain the same for the Conditional Letter of Map Revision (CLOMR) so that the new segment of revised floodplain and floodway is consistent with the hydraulic model both upstream and downstream of the limits of study.

Appendix E.1 – Roughness Coefficients Estimation

The roughness coefficients are maintained from the effective model.

Appendix E.2 – Cross Section Plots

Cross section plots follow the hydraulic model output for each of the following:

- Duplicate Effective Model
- Corrected Effective Model
- Post Project Conditions Model

Appendix E.3 – Expansion and Contraction Coefficients

The expansion and contraction coefficients are maintained from the effective model. For the culverts at 11th Avenue and Joy Ranch Road, abrupt transitions coefficients of 0.6 (Contraction) and .08 (Expansion) are used.

Appendix E.4 – Analysis of Structures

The structures were analyzed within the HEC-RAS model. Record drawings of the two culverts are included in the following documentation.

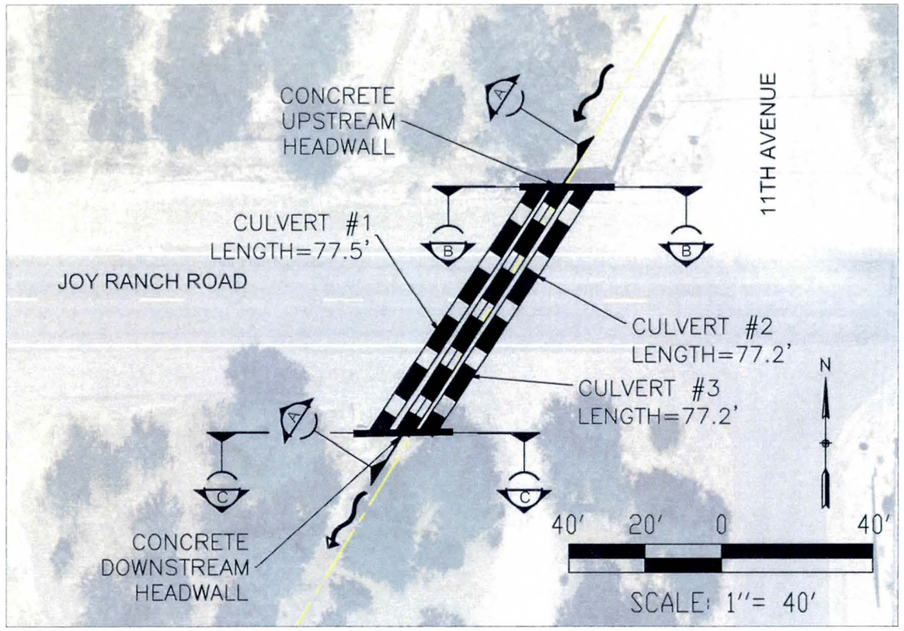
Appendix E.5 – Hydraulic Calculations

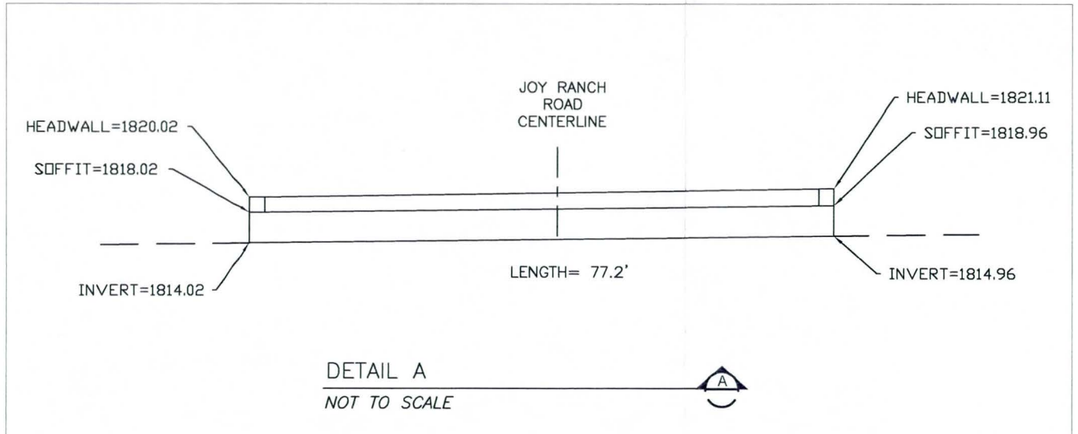
Hydraulic calculations are provided, on the following pages, for these models:

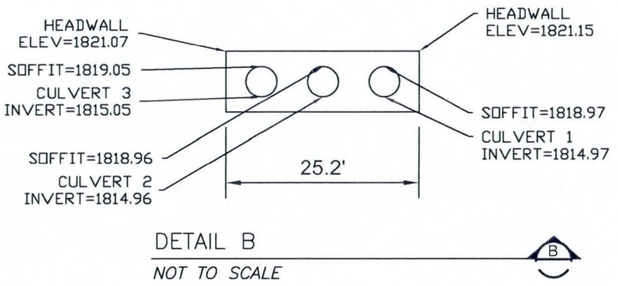
- Duplicate Effective Model (Full Model & Truncated)
- Corrected Effective Model
- Post Project Conditions Model

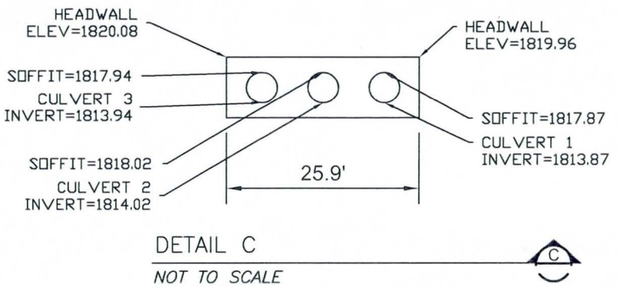
The model input files, including the Effective HEC-2 model, can be found on the accompanying CD.

Culvert Record Drawings









RECORD DRAWING

THE RECORD DRAWING INFORMATION SHOWN HEREON IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. THIS RECORD DRAWING IS FOR NOTED DIMENSIONS AND NOTED ELEVATIONS ONLY. THE ENGINEER MAKING THIS RECORD DRAWING STATEMENT DID NOT PARTICIPATE IN THE CULVERT DESIGN OR CONSTRUCTION OBSERVATION, AND HAS INVESTIGATED THIS CULVERT IN THE FIELD. INFORMATION SHOWN WAS OBTAINED FROM FIELD NOTES PREPARED AND SEALED BY THE MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION SURVEY DEPARTMENT.

Registered Professional Engineer (Civil)
CERTIFICATE NO.
37890
LLOYD A.
VICK
Date Signed 8/5/14
ARIZONA U.S.A.
Expires 09/30/14

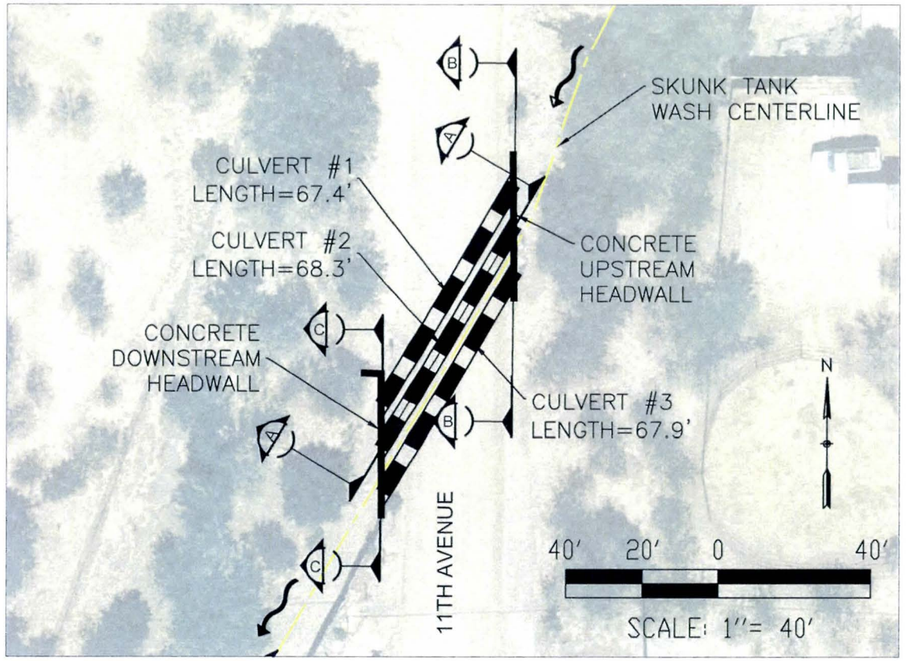
LLOYD A. VICK, P.E.
REGISTERED PROFESSIONAL ENGINEER # 37890

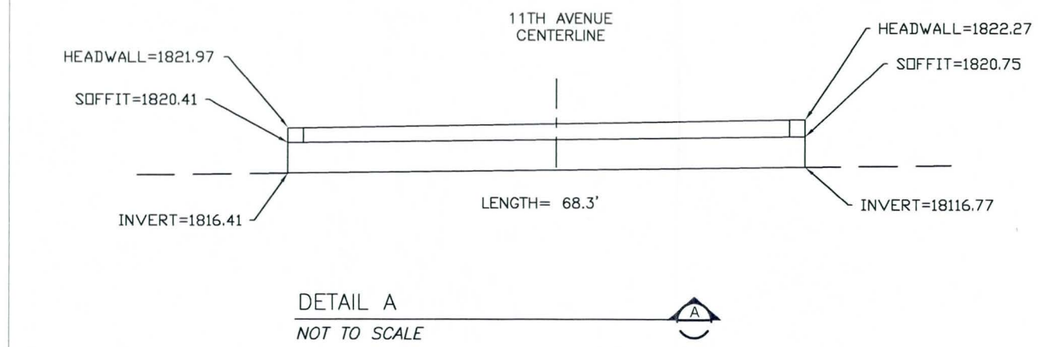
DIMENSIONS – THREE 48–INCH PIPES
SHAPE – CIRCULAR
MATERIAL – CORRUGATED METAL PIPE (CMP)
BEVELING OR ROUNDING – NONE, SQUARE EDGE
WING WALL ANGLE – PARALLEL
SKEW ANGLE – 57°59'58" FROM CENTERLINE OF JOY RANCH ROAD.
EROSION PROTECTION – NONE OBSERVED. NATURAL CHANNEL BOTTOM.

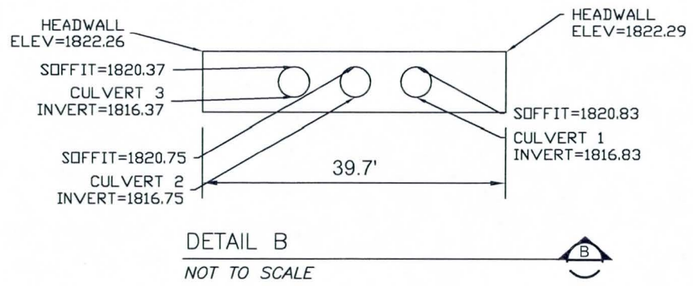
RECORD DRAWING

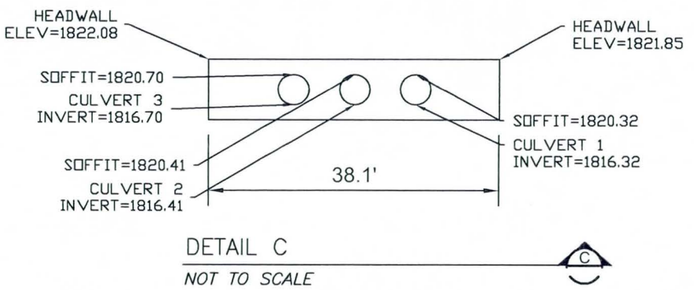
SKUNK TANK WASH AT JOY RANCH ROAD
3 - 48" CMP CULVERTS

TY LIN INTERNATIONAL
engineers | planners | scientists
60 East Rio Salado Parkway
Tempe, AZ 85281









RECORD DRAWING

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Registered Professional Engineer (Civil)
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LLOYD A.
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Date Signed 8/5/14
ARIZONA U.S.A.
Expires 09/30/14

LLOYD A. VICK, P.E.
REGISTERED PROFESSIONAL ENGINEER # 37890

DIMENSIONS – THREE 48–INCH PIPES
SHAPE – CIRCULAR
MATERIAL – CORRUGATED METAL PIPE (CMP)
BEVELING OR ROUNDING – NONE, SQUARE EDGE
WING WALL ANGLE – PARALLEL
SKEW ANGLE – 30°33'35" FROM CENTERLINE OF 11TH AVENUE.
EROSION PROTECTION – NONE OBSERVED. NATURAL CHANNEL BOTTOM.

RECORD DRAWING

SKUNK TANK WASH AT 11TH AVENUE
3 - 48" CMP CULVERTS

TY LIN INTERNATIONAL
engineers | planners | scientists
60 East Rio Salado Parkway
Tempe, AZ 85281

O:\22 830.00 11th Avenue CLOI R\CAD\Working Files\LOY RANCH ROAD CULVERT RECORD DRAWING.dwg 8/6/2014 2:45:5 PM Alan Herring Phaser Half Scale.ctb

Duplicate Effective Model (Full Model)

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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

PROJECT DATA
Project Title: Duplicate Effective Model
Project File : DuplicateEffective.prj
Run Date and Time: 8/5/2014 10:50:45 AM

Project in English units

Project Description:
* Skunk Tank Wash file:STW_FW1Y.IH2

* For: FCDMC 96-05 By: EEC / MKE FB, LV:12-10-97
*
Skunk Tank Wash Floodplain 100-yr revised:12-11-97
* GR data
taken from BOSS RMS model based on DTM data points from AMC.
* 200 scale 2
ft CI mapping flown by AMC on 12-18-96 with survey control
* by ALS.
Supplemental cross section data (GR & BT) surveyed by ALS.
*
* Source
of 100-yr flowrate from HEC-1 analysis by
* Montgomery Watson, which lists
5 concentration points. EEC/MKE used
* interpolated flow rates to increase
the number of concentration points
* to 17, for floodplain modeling
purposes.
*
* Subcritical Analysis
*
*
Starting water surface elevation came from the Skunk Creek HEC-2 study y
*
by Montgomery-Watson.
*

PLAN DATA

Plan Title: Imported Plan 01
Plan File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\2 Duplictaed Effective Model\Full Model\DuplicateEffective.p01

Geometry Title: Imported Geom 01
Geometry File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\2 Duplictaed Effective Model\Full Model\DuplicateEffective.g01

Flow Title : Imported Flow 01

Flow File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\2 Duplictaed Effective Model\Full Model\DuplicateEffective.f01

Plan Summary Information:
Number of: Cross Sections = 66 Multiple Openings = 0
Culverts = 4 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

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

Encroachment Data
Equal Conveyance = True
Left Offset = 0
Right Offset = 0

River = RIVER-1 Reach = Reach-1

RS	Profile	Method	Value1	Value2
0	PF 2	1	973010076.35	
0.027	PF 2	1	968010077.44	
0.076	PF 2	1	9903.2310251.66	
0.149	PF 2	1	9880.3610159.41	
0.238	PF 2	1	9924.09	10152
0.34	PF 2	1	9767.2510018.99	
0.432	PF 2	1	9957.4810167.04	
0.498	PF 2	1	9964.6410064.94	
0.573	PF 2	1	9975.8210100.92	
0.662	PF 2	1	9938.810066.74	
0.759	PF 2	1	9945.87 10043.2	
0.848	PF 2	1	9931.4610100.13	
0.945	PF 2	1	9948.04 10118.5	
1.027	PF 2	1	991710132.69	
1.12	PF 2	1	9938.75 10174.6	
1.184	PF 2	1	9890.2410109.45	
1.211	PF 2	1	9958.3	10210
1.291	PF 2	1	9988.8610286.71	
1.36	PF 2	1	9981.410305.41	
1.548	PF 2	1	994210387.14	
1.606	PF 2	1	9991.5110443.33	
1.665	PF 2	1	9990.1410279.41	
1.765	PF 2	1	9850	10195
1.83	PF 2	1	9973.6910205.44	
1.91	PF 2	1	9961.0310222.03	
1.982	PF 2	1	9959.3810149.08	
2.08	PF 2	1	9973.410194.76	
2.115	PF 2	1	9987.43	10192
2.151	PF 2	1	9875	10170
2.159	PF 2	0		
2.167	PF 2	1	9880	10125
2.18	PF 2	1	9961.0410173.74	
2.1875	PF 2	0		
2.195	PF 2	1	9962.3110215.52	
2.253	PF 2	1	9942.8810090.47	
2.283	PF 2	1	9987.9910164.29	
2.385	PF 2	1	9931.3710085.24	
2.46	PF 2	1	9978.6710128.57	
2.544	PF 2	1	9931.85 10012.7	
2.618	PF 2	1	9907.5810008.96	
2.689	PF 2	1	9981.5810066.78	
2.699	PF 2	1	9981.09	10050

2.793	PF 2	1	9900.7510013.95
2.887	PF 2	1	9902.6110039.41
2.982	PF 2	1	998710089.24
3.083	PF 2	1	9918.9810152.78
3.109	PF 2	1	9972.26 10239.4
3.1155	PF 2	0	
3.122	PF 2	1	9967.8810240.77
3.135	PF 2	1	9920 10200
3.217	PF 2	1	9978.53 10045
3.31	PF 2	1	9841.5910080.12
3.327	PF 2	1	9847.510087.79
3.334	PF 2	0	
3.341	PF 2	1	9660.4410152.41
3.354	PF 2	1	9664.6210103.17
3.44	PF 2	1	995510032.54
3.544	PF 2	1	9968.1910040.08
3.614	PF 2	1	9976.710023.26
3.684	PF 2	1	9966.1410013.34
3.751	PF 2	1	9946.9210035.22
3.844	PF 2	1	9984.4410034.56
3.943	PF 2	1	9982.9910014.96
4.03	PF 2	1	9973.3710019.21
4.126	PF 2	1	9957.310027.12
4.223	PF 2	1	994510012.83
4.319	PF 2	1	996010015.94
4.39	PF 2	1	9971.0610005.67
4.47	PF 2	1	9975 10020
4.552	PF 2	1	9985.26 10060

FLOW DATA

Flow Title: Imported Flow 01
Flow File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\2 Duplictaed Effective Model\Full Model\DuplicateEffective.f01

Flow Data (cfs)

River	Reach	RS	PF 1	PF 2
RIVER-1	Reach-1	4.552	300	300
RIVER-1	Reach-1	4.39	860	860
RIVER-1	Reach-1	3.684	1420	1420
RIVER-1	Reach-1	3.217	1570	1570
RIVER-1	Reach-1	2.982	1880	1880
RIVER-1	Reach-1	2.46	2110	2110
RIVER-1	Reach-1	1.83	2440	2440
RIVER-1	Reach-1	1.606	2440	2440
RIVER-1	Reach-1	1.548	2490	2490
RIVER-1	Reach-1	1.36	4070	4070
RIVER-1	Reach-1	1.291	4190	4190
RIVER-1	Reach-1	1.211	4240	4240
RIVER-1	Reach-1	1.12	4340	4340
RIVER-1	Reach-1	0.945	4590	4590
RIVER-1	Reach-1	0.662	4830	4830
RIVER-1	Reach-1	0.573	5210	5210
RIVER-1	Reach-1	0.34	5260	5260

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
RIVER-1	Reach-1	PF 1		Known WS = 1762
RIVER-1	Reach-1	PF 2		Known WS = 1763

GEOMETRY DATA

Geometry Title: Imported Geom 01
Geometry File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\2 Duplictaed Effective Model\Full Model\DuplicateEffective.g01

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 4.552

INPUT
Description: Note: Cross section 4.552 data is from ALS survey (check section 5)

Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9335.47 1934.6 9381.99 1934.3 9390.7 1934.13 9398.23 1933.81 9403.09 1933.36
9419.84 1932.8 9423.9 1932.51 9431 1931.72 9450.26 1932.82 9467.31 1934.01
9491.28 1934.6 9541.15 1934.7 9547.16 1934.65 9591.31 1934.12 9600.39 1933.98
9629.7 1933.7 9635.94 1933.91 9646.65 1932.15 9657.09 1932.89 9669.68 1933.23
9686.17 1933.1 9691.27 1933.23 9698.12 1932.94 9729.41 1931.84 9741.28 1932.19
9788.18 1932.5 9791.24 1932.55 9838.71 1931.46 9841.44 1931.36 9879.22 1930.76
9883.89 1930.7 9898.85 1930.75 9935.92 1931 9940.04 1931.01 9951.46 1930.5
9954.02 1930.4 9962.43 1930.17 9969.18 1929.85 9985.26 1929.24 9991.21 1928.86
9997.78 1927.4 10010.3 1928.4410033.03 1928.4210051.57 1928.7810052.42 1928.68
10055.3 192810076.05 1929.3410096.79 1930.3610102.64 1930.6810128.09 1931.83
10145.26 193210147.51 1932.0310183.55 1932.2110184.86 1932.310227.85 1933.52
10236.2 1933.810245.71 1934.0810276.84 1934.7210285.38 1935.15 10311 1935.62
10321.02 1935.110326.76 1935.3410369.59 1935.9610411.77 1936.310415.73 1936.37
10418.01 1936.210442.48 1936.12 10445.7 1936.1810449.42 1936.5310477.38 1936.53
10482.03 1936.610522.05 1936.9710525.39 1936.9610550.04 1937.0910551.95 1937
10564.45 193610600.02 1936.6810626.33 1936.6210642.06 1936.4310654.03 1936.46
10663.97 1936.410679.61 1936.510707.13 1936.4110728.61 1936.36 10753.1 1936.13
10773.74 1936.110827.05 1936.12 10848.7 1935.8910853.49 1935.9810863.24 1936.72

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9335.47 .045 9991.21 .035 10010.3 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9991.21 10010.3 400 431.4 400 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 4.47

INPUT
Description:
Station Elevation Data num= 38
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9796.22 1928.2 9802.81 1928.32 9805.21 1928.26 9831.26 1927.67 9858.14 1927.57
9904.41 1926.7 9912.61 1926.53 9940.91 1924.99 9955.07 1924.25 9970.55 1923.44
9983.74 1923.3 9983.96 1923.27 9992.42 1922.14 9997.56 1921.2210000.42 1921.25
10006.33 1922.910008.99 1923.7510011.41 1923.7610019.65 1923.8210024.92 1923.83
10033.62 1923.810042.09 1924.1610042.76 1924.18 10046 1923.810053.76 1922.66
10062.92 1923.210068.59 1923.3610074.62 1923.45 10118.9 1924.96 10120.3 1925
10122.35 1925.1 10128.7 1925.4410143.61 1926.2910146.94 1926.6410158.64 1927.9
10168.15 1927.910170.06 1927.9910171.66 1928.04

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9796.22 .045 9983.96 .03510008.99 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9983.9610008.99 425 422.2 400 .1 .3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 4.39

INPUT
Description:
Station Elevation Data num= 56
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9735.08 1926.4 9770.81 1925.95 9779.03 1925.89 9814.82 1925.26 9820.38 1925.08
9820.82 1925 9851.52 1923.71 9859.4 1923.59 9863.91 1923.64 9871.57 1923.66
9873.92 1923.6 9875.94 1923.67 9876.29 1923.74 9884.12 1923.17 9894.01 1922.51
9897.27 1922.1 9901.05 1921.88 9922.85 1920.33 9964.02 1917.03 9966.77 1916.84
9971.07 1916.4 9983.67 1915.27 9988.42 1915.64 9990.81 1915.78 9993.88 1915.76
9997.05 1915.710000.27 1915.6810005.66 1916.1510016.45 1917.1810019.33 1917.43
10022.54 1917.410024.58 1917.4610027.87 1917.54 10052.2 1918.4510054.05 1918.52
10058.7 1918.710062.21 191910063.61 1919.11 10075.2 1920.1210124.13 1922.64
10125.21 1922.710125.89 1922.7510126.15 1922.7610126.77 1922.810130.81 1923.04
10146.29 1924.110148.35 1924.810149.54 1924.5610150.15 1924.3110150.37 1924.31
10153.72 192410158.36 1924.0110160.02 1923.9710164.38 1924.1610197.84 1925.16
10203.94 1925.6

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9735.08 .045 9971.07 .03510005.66 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9971.0710005.66 400 378.8 425 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 4.319

INPUT
Description:
Station Elevation Data num= 50
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9823.97 1920.7 9848.79 1920.15 9870.94 1919.74 9922.66 1917.73 9922.74 1917.72
9922.81 1917.7 9922.82 1917.72 9923.04 1917.7 9923.39 1917.67 9966.68 1913.89
9971.32 1913.5 9979.47 1913.2 9980.67 1913.14 9982.02 1913.11 9991.96 1912.24
9999.91 1911.510000.02 1911.4910000.15 1911.4810008.72 1912.5810015.93 1913.39
10019.16 1913.510024.31 1913.5510036.91 1914.6910040.67 1914.9610054.64 1915.74
10054.95 1915.710055.38 1915.7910055.99 1915.8210063.43 1915.9910067.09 1916.13
10069.96 1916.210081.17 1916.4210111.94 1915.4110118.64 1915.15 10120.1 1915.11
10120.7 1915.1 10154.9 1916.6510157.36 1916.8110157.74 1916.7610158.58 1916.72
10165 1915.710168.77 1915.8110171.28 1915.7710175.58 1915.9810180.71 1916.54
10182.7 1916.910184.27 1917.0610187.62 1917.2710232.45 1919.4710248.88 1920.38

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9823.97 .045 9982.02 .03510015.93 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9982.0210015.93 525 505.7 450 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 4.223

INPUT

Description:
Station Elevation Data num= 51
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9804.97 1910.9 9815.53 1910.17 9828.03 1909.87 9833.75 1909.74 9836.39 1909.7
9870.54 1909.2 9873.36 1908.96 9889.55 1908.56 9893.35 1908.47 9893.85 1908.45
9895.84 1908.3 9898.47 1908.27 9907.72 1908.08 9908.84 1907.99 9911.5 1907.86
9920.24 1907.5 9922.23 1907.54 9922.94 1907.55 9930.77 1907.77 9933.66 1907.95
9937.09 1907.8 9939.35 1907.73 9943.49 1907.43 9952.38 1906.99 9958.8 1907.21
9964.69 1907.4 9971.13 1907.67 9973.78 1907.77 9976.59 1907.89 9986.95 1908.41
9987.52 1908.3 9999.98 1905.7710005.51 1906.8610012.82 1908.0610022.97 1909.8
10024.39 191010025.95 1910.3910026.75 1910.510042.38 1912.8710042.89 1913
10046 1912.910047.25 1913.0710075.64 1914.8310107.39 1916.8210113.24 1917.05
10118.15 1917.210161.63 1918.4710166.19 1918.7310201.55 1919.6910210.19 1919.96
10217.27 1920.1

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9804.97 .045 9986.95 .03510012.82 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9986.9510012.82 400 508.6 500 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 4.126

INPUT
Description:
Station Elevation Data num= 45
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9682.5 1910.8 9685.24 1910.59 9691.41 1910.36 9723.28 1908.19 9739.03 1907.67
9742.99 1907.4 9757.31 1907.2 9769.64 1906.86 9779.36 1906.59 9794.45 1905.91
9797.04 1905.8 9801.47 1905.7 9803.1 1905.64 9811.18 1905.6 9849.8 1905.12
9855.76 1904.9 9860.14 1904.82 9863.97 1904.75 9899.75 1904.16 9912.38 1903.98
9950.92 1903.6 9957.31 1903.57 9969 1902.54 9979.15 1901.81 9990.99 1900.94
9999.91 1900.110007.04 1902.1610010.53 1902.9810016.08 1903.4210027.11 1904.04
10027.8 1904 10037 1903.4810052.57 1904.8810052.83 1904.9110052.87 1904.91
10081.5 1906.310095.16 1906.8210105.22 1907.410121.76 1908.3110137.03 1909.06
10139.04 190910140.98 1909.1410142.57 1909.1710160.29 1909.4810211.46 1910.4

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9682.5 .045 9957.31 .03510027.11 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9957.3110027.11 525 507.5 425 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 4.03

INPUT
Description:
Station Elevation Data num= 31
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9836.29 1904.7 9860.47 1903.28 9886.86 1901.78 9890.57 1901.6 9894.5 1901.52
9914.38 1900.9 9935.81 1900.08 9965.03 1899.38 9972.72 1899.1 9973.38 1898.99
9989.62 1896.510000.25 1894.95 10015.4 1897.01 10019.2 1897.5610024.15 1897.6
10064.85 1898.8 10077.7 1898.810108.01 1898.9710115.13 1898.6910117.61 1898.76
10120.65 1898.810145.99 1899.6210158.02 1899.9810169.14 1900.2210171.09 1900.24
10191.64 1901.410207.12 1902.3610219.72 1903.0110230.23 1903.4810242.32 1903.92
10254.67 1904.2

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9836.29 .045 9973.38 .035 10019.2 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9973.38 10019.2 400 459.4 450 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.943

INPUT
Description:
Station Elevation Data num= 19
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9924.81 1900.1 9957.25 1893.74 9961.29 1892.91 9964.3 1892.83 9985.91 1892.65
9991.18 1892 9999.9 1890.5910014.32 1892.8510014.95 1892.9510015.62 1893.04
10038.4 1896.510045.99 1897.02 10049.6 1896.7310059.44 1897.210064.46 1896.84
10077.89 1898.410097.27 1898.31 10102.6 1898.1910106.83 1898.03

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9924.81 .045 9985.91 .03510014.95 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9985.9110014.95 500 526.3 500 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.844

INPUT
Description: Note:GR record deleted from Sta. 10090.65 to Sta. 10268.34
to
restrict flow to effective area without X3 record.

Station Elevation Data num= 18
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9839.38 1894.4 9855.63 1894.57 9892 1894.16 9901.82 1893.92 9917.11 1892.12
9950.85 1888.8 9974.98 1888.69 9984.45 1888.73 9998.25 1886.7910000.09 1886.47
10017.21 1888.410018.42 1888.5610019.38 1888.5710045.62 1888.5910060.39 1888.71
10068.98 1888.810088.42 1890.610090.24 1890.74

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9839.38 .045 9984.45 .03510017.21 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9984.4510017.21 475 489.4 500 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.751

INPUT
Description: Note: Cross Section 3.751 is from ALS survey (check section
4)
Note:GR record deleted from Sta. 9530.51 to Sta. 9917.7
to
restrict flow to effective area without using X3 record.

Station Elevation Data num= 51
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9917.7 1888.2 9939.67 1888.13 9945.86 1888.11 9946.93 1887.99 9969.5 1884.46
9974.94 1883.5 9990.22 1880.69 9990.58 1880.6210005.84 1881.9210008.28 1882.21
10023.47 1882.610050.13 1882.82 10071.6 1882.9910100.11 1883.2810103.97 1883.17
10116.89 1883.310124.41 1883.3810136.98 1883.8610140.65 1884.03 10149 1885.09
10152.68 1885.310164.89 1886.2710165.99 1886.3810173.14 1886.5810194.98 1886.45
10196.86 1886.510198.49 1886.510245.63 1885.6310264.82 1885.82 10281.9 1885.59
10292.3 1885.510297.93 1885.8510305.27 1885.6310308.84 1885.4910337.12 1885.66
10350.16 1885.810382.68 1886.3310402.88 1886.7410416.39 1887.1310416.62 1887.16
10418.07 1887.210429.18 1887.5210442.28 1887.8910447.23 1888.0710453.82 1888.18
10465.98 1888.310473.74 1888.7610490.74 1889.1810515.22 1889.8610537.09 1890.42
10559.02 1890.7

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9917.7 .045 9946.93 .03510008.28 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9946.9310008.28 325 353.1 350 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.684

INPUT
Description:
Station Elevation Data num= 44
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9834.42 1891.9 9841.27 1891.84 9847.4 1891.74 9880.49 1890.32 9893 1889.62
9897.06 1889.3 9929.1 1887.02 9942.25 1886.16 9949.06 1885.53 9966.15 1880.12
9977.84 1876.5 9981.87 1877.16 9986.53 1877.83 9996.62 1876.4410000.39 1876
10004.99 1877.610006.52 1878.110009.29 1878.8910019.48 1878.9810036.58 1878.89
10047.84 1879.110054.71 1879.4210090.75 1881.13 10095.9 1881.3810097.35 1881.45
10099.17 1881.5 10138.5 1882.1910152.53 1882.4810198.62 1882.7810204.82 1882.81
10207.88 1882.810216.63 1882.6810217.36 1882.6810218.81 1882.6710220.87 1882.65
10221.25 1882.610225.42 1882.5810229.88 1882.4810246.41 1881.7910246.42 1881.79
10266.19 188210276.74 1882.5110288.03 1883.0610308.63 1884.17

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9834.42 .045 9966.15 .03510009.29 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9966.1510009.29 400 371.3 375 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.614

INPUT
Description: Note:GR records delteted from Sta. 9746.21 to Sta. 9955.88 to
restrict
effective flow without X3 record.

Station Elevation Data num= 26
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9955.88 1877.9 9970.67 1876.9 9974.7 1876.5 9975.23 1876.4 9976.7 1876.2
9998.6 1873.2 9999.14 1873.410012.61 1875.610023.02 1875.710030.39 1876
10045.22 1876.310073.95 187710080.96 1876.910093.94 1876.7 10100.6 1876.8
10111.37 1876.710127.87 1877.510131.19 1877.610138.77 187810146.11 1878.5
10149.44 1878.710157.93 1879 10173.6 1879.510174.42 1879.510186.52 1879.7

10191.14 1879.8

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9955.88 .045 9976.7 .03510012.61 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9976.710012.61 400 370.3 475 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.544

INPUT
Description: Note:GR records deleted from Sta. 10151.4 to Sta. 10392.82 to
restrict
effective flow without X3 record.

Station Elevation Data num= 35
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9790.16 1880.2 9832.9 1879.42 9840.59 1879.5 9854.06 1879.58 9866.6 1879.35
9889.77 1879.1 9894.01 1879.02 9912.28 1878.99 9916.48 1878.88 9920.17 1878.57
9931.1 1877.5 9945.17 1875.74 9956.15 1874.78 9968.2 1874.44 9969.75 1874.57
9970.73 1874.4 9971.46 1874.34 9992.5 1871.6410000.24 1870.5710004.34 1871.15
10012.23 1872.410026.79 1873.1310039.72 1873.5910054.79 1873.4110084.22 1872.9
10099.34 1873.410104.91 1873.710135.25 1874.6810139.58 1874.7610143.77 1874.9
10145.74 1874.910147.25 1875.0310147.89 1875.0410148.65 1875.06 10151.4 1875.21

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9790.16 .045 9968.2 .03510012.23 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9968.210012.23 475 547.1 525 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.44

INPUT
Description: Note:return coefficients of contraction and expansion to normal

Station Elevation Data num= 33
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9639.65 1874.8 9664.72 1874.52 9690.38 1874.48 9725.96 1874.89 9741.12 1874.96
9787.14 1874 9791.83 1873.9 9814.51 1873.26 9842.64 1872.51 9848.35 1872.46
9896.17 1872 9935.1 1870.83 9946.5 1870.63 9960.6 1870 9986.43 1868.8
9990.04 1868.6 9991.85 1868.18 9997.61 1867.0410002.96 1865.9910005.69 1866.35
10015.91 1867.610024.26 1868.2610032.53 1868.9110052.23 1870.14 10080.5 1871.82
10107.01 1873.110118.38 1873.6310143.82 1874.4410161.76 1875.0610194.07 1876.08
10216.53 1876.910231.95 1877.4410266.45 1878.36

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9639.65 .045 9986.43 .03510032.53 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9986.4310032.53 400 452.2 475 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.354

INPUT
Description: Desert Hill Drive (section 4 of SC routine)
Note:GR records
deleted from Sta. 10121.31 to Sta. 10418.55 to restrict
effective
flow without X3 record.

Station Elevation Data num= 44
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9582.76 1870.4 9586.94 1870.22 9590.99 1870.04 9618.33 1869.46 9624.17 1869.63
9647.74 1869.6 9655.56 1869.61 9661.26 1869.5 9667.81 1868.06 9668.31 1867.93
9668.4 1867.9 9668.62 1867.97 9672.94 1868.6 9682.22 1868.23 9695.52 1867.9
9697.59 1868 9701.47 1868.54 9707.33 1868.53 9712.29 1868.38 9727.88 1868.48
9728.61 1868.4 9734.78 1868.39 9771.2 1868.03 9779.65 1867.95 9821.2 1867.72
9827.94 1867.6 9869.55 1867.14 9874.28 1867.06 9906 1866.81 9916.37 1866.91
9922.58 1866.7 9931.5 1866.3 9956.97 1865.48 9981.88 1865.77 9981.91 1865.77
9981.96 1865.7 9982 1865.7 9999.95 1863.5110016.09 1864.2810033.31 1864.96
10063.16 1867.210071.21 1867.86 10079.5 1868.0610121.31 1869.3

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9582.76 .045 9981.88 .03510033.31 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9981.8810033.31 75 71.4 75 .6 .8
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.341

INPUT
Description: End Reach D/ begin Reach E
Desert Hills Drive culvert BT Record
data from ALS surveyors
BT records coded per figure 3.16 (HEC-2,
Sept. 1990)
Note:Channel was adj. to match ALS survey. Sta.
9970.39 to 10040.09
Note:GR records deleted from Sta. 10163.42 to
10491.93
to restrict flow to effective area without X3 record

Station Elevation Data num= 52
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9615.35 1870.4 9634.25 1869.56 9668.6 1868.49 9674.66 1868.45 9676.91 1868.43
9693.26 1868.5 9713.06 1867.77 9720.99 1867.27 9724.78 1866.89 9727.42 1867.08
9730.78 1867.9 9735.69 1867.82 9738.65 1867.76 9745.12 1867.52 9759.04 1867.2
9763.53 1867.2 9768.94 1867.21 9774.16 1867.18 9810.14 1867.28 9823.07 1867.07
9825.22 1867 9871.36 1866.57 9874.2 1866.58 9890.12 1866.58 9892.76 1866.56
9898.72 1866.3 9914.97 1865.8 9930.72 1865.18 9934.18 1865 9950.95 1864.62
9958.9 1864 9976.16 1863.64 9981.49 1862.07 9986.89 1862.4 9993.3 1861.8
10000 1861.3 10006.6 1861.6310024.47 1864.1110025.81 1864.510026.37 1864.52
10043.86 1865.910044.91 1864.7710049.03 1864.7110063.28 1865.8610067.46 1866.3
10075.66 1867.110087.88 1868.0610092.49 1868.2510119.97 1868.6810138.09 1868.79
10141.8 1868.710163.42 1868.79

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9615.35 .045 9976.16 .03510024.47 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9976.1610024.47 75 71.4 75 .6 .8
Ineffective Flow num= 2

```
  Sta L   Sta R   Elev  Permanent
 9615.35 9976.16 1867.15      F
 10024.4710163.42 1867.15     F
 Sediment Elevation = 0

 CULVERT


 RIVER: RIVER-1
 REACH: Reach-1          RS: 3.334

 INPUT
 Description: Culvert #4 (2 5' Pipes)
 Desert Hills Drive culvert   (section 3
          of SC routine)
 2- 60" CMP's   inverts determined by averaging

 Distance from Upstream XS =5.700001
 Deck/Roadway Width      =    60
 Weir Coefficient        =  2.63
 Upstream  Deck/Roadway Coordinates
   num=     20
    Sta Hi Cord Lo Cord    Sta Hi Cord Lo Cord    Sta Hi Cord Lo Cord
  9553.6 1871.68 1860.86  9604.3 1870.55 1860.86  9654.1 1869.55 1860.86
  9704.1 1868.73 1860.86  9754.1 1868.12 1860.86  9804.1 1867.59 1860.86
  9854.1 1867.27 1860.86  9904.1 1867.15 1860.86  9954.1 1867.68 1860.86
 9976.161867.935 1860.86 9976.161867.935 1860.86   10000 1868.21 1860.86
10024.471868.242 1860.8610024.471868.242 1860.86 10053.1 1868.28 1860.86
10092.49 1868.25 1860.8610119.97 1868.68 1860.8610138.09 1868.79 1860.86
 10141.8  1868.7 1860.8610163.42 1868.79 1860.86

Upstream Bridge Cross Section Data
Station Elevation Data   num=     52
   Sta   Elev    Sta   Elev    Sta   Elev    Sta   Elev    Sta   Elev
 9615.35  1870.4 9634.25 1869.56  9668.6 1868.49 9674.66 1868.45 9676.91 1868.43
 9693.26  1868.5 9713.06 1867.77 9720.99 1867.27 9724.78 1866.89 9727.42 1867.08
 9730.78  1867.9 9735.69 1867.82 9738.65 1867.76 9745.12 1867.52 9759.04  1867.2
 9763.53  1867.2 9768.94 1867.21 9774.16 1867.18 9810.14 1867.28 9823.07 1867.07
 9825.22   1867 9871.36 1866.57  9874.2 1866.58 9890.12 1866.58 9892.76 1866.56
 9898.72  1866.3 9914.97  1865.8 9930.72 1865.18 9934.18   1865 9950.95 1864.62
  9958.9   1864 9976.16 1863.64 9981.49 1862.07 9986.89  1862.4  9993.3  1861.8
   10000  1861.3 10006.6 1861.6310024.47 1864.1110025.81  1864.510026.37 1864.52
10043.86  1865.910044.91 1864.7710049.03 1864.7110063.28 1865.8610067.46  1866.3
10075.66  1867.110087.88 1868.0610092.49 1868.2510119.97 1868.6810138.09 1868.79
 10141.8  1868.710163.42 1868.79

Manning's n Values      num=     3
   Sta  n Val    Sta  n Val    Sta  n Val
9615.35   .045 9976.16   .03510024.47   .045

Bank Sta: Left   Right    Coeff Contr.   Expan.
     9976.1610024.47          .6     .8
Ineffective Flow    num=     2
  Sta L   Sta R   Elev  Permanent
9615.35 9976.16 1867.15      F
10024.4710163.42 1867.15     F
Sediment Elevation = 0

Downstream  Deck/Roadway Coordinates
   num=     20
    Sta Hi Cord Lo Cord    Sta Hi Cord Lo Cord    Sta Hi Cord Lo Cord
  9553.6 1871.68 1860.86  9604.3 1870.55 1860.86  9654.1 1869.55 1860.86
  9704.1 1868.73 1860.86  9754.1 1868.12 1860.86  9804.1 1867.59 1860.86
  9854.1 1867.27 1860.86  9904.1 1867.15 1860.86  9954.1 1867.68 1860.86
 9995.161868.154 1860.86 9995.161868.154 1860.86   10000 1868.21 1860.86
10024.111868.242 1860.8610024.111868.242 1860.86 10053.1 1868.28 1860.86
10092.49 1868.25 1860.8610119.97 1868.68 1860.8610138.09 1868.79 1860.86
 10141.8  1868.7 1860.8610163.42 1868.79 1860.86
```

Downstream Bridge Cross Section Data
Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9670.55 1868.2 9692.91 1867.84 9698.23 1867.73 9729.89 1867.25 9735.58 1867.19
9752.59 1866.9 9789.87 1866.54 9799.11 1866.36 9802.98 1866.16 9804.43 1866.26
9838.3 1865.9 9844.99 1865.97 9853.72 1865.52 9879.1 1865.11 9881.67 1865.18
9891.17 1865.3 9905.73 1865.27 9915.2 1865.27 9922.74 1865.21 9941.14 1865.09
9942.85 1865.1 9952.63 1864.98 9955.56 1865.01 9965.41 1865.06 9968.39 1865.12
9977.76 1864.9 9981.07 1865.19 9982.93 1863 9995.16 186210000.02 1861.31
10005.39 1861.210007.35 1860.8610011.34 1863.3810014.35 1863.4710019.49 1863.89
10022.01 186410024.11 1864.3210027.66 1864.32 10036.7 1864.6310053.63 1864.99
10058.95 1865.110059.57 1865.2110067.31 1865.3610074.98 1865.4510075.63 1865.48
10084.97 1865.6 10086.3 1865.6910091.16 1866.1810093.69 1866.21 10100.7 1866.36
10104.05 1866.510108.74 1866.7910112.81 1867.1 10116.1 1867.0910123.58 1867.1
10129.36 1867.210138.11 1867.210141.31 1867.21 10147.1 1867.2510148.31 1867.2
10150.2 1867.3 10156.8 1867.21 10160.6 1867.210167.21 1867.13 10169.4 1867.09
10171.9 1867.1 10174.8 1867.0710183.46 1867.06 10200.8 1866.6110205.82 1866.55
10218.61 1866.510226.97 1866.510239.63 1866.510248.75 1866.4310257.04 1866.38
10262.7 1866.310268.72 1866.310281.51 1866.33 10290.3 1866.4510302.82 1866.66
10312.07 1866.610316.38 1866.7310319.96 1866.7210322.87 1866.7910334.07 1866.88
10358 1866.810393.12 1866.8310401.42 1866.8 10430.9 1867.1710433.07 1867.18

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9670.55 .045 9995.16 .0410024.11 .045

Bank Sta: Left Right Coeff Contr. Expan.
9995.1610024.11 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9670.55 9995.16 1864.81 F
10024.1110433.07 1864.81 F
Sediment Elevation = 0

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins = 1867.19
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
Pipe4 Circular 5 5
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 1 - Headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef Exit Loss Coef
5.700001 60 .024 .024 0 .5 1
Number of Barrels = 2
Upstream Elevation = 1861.41
Centerline Stations
Sta. Sta.
9997.81410002.81
Downstream Elevation = 1860.44
Centerline Stations
Sta. Sta.
10007.1310012.13

CULVERT OUTPUT Profile #PF 1 Culv Group: Pipe4

Q Culv Group (cfs) 353.98 Culv Full Len (ft) 60.00
Barrels 2 Culv Vel US (ft/s) 9.01
Q Barrel (cfs) 176.99 Culv Vel DS (ft/s) 9.01
E.G. US. (ft) 1868.81 Culv Inv El Up (ft) 1861.41
W.S. US. (ft) 1868.76 Culv Inv El Dn (ft) 1860.44
E.G. DS (ft) 1866.57 Culv Frctn Ls (ft) 0.94

W.S. DS (ft)	1865.97	Culv Exit Loss (ft)	0.66
Delta EG (ft)	2.23	Culv Entr Loss (ft)	0.63
Delta WS (ft)	2.79	Q Weir (cfs)	1066.02
E.G. IC (ft)	1868.77	Weir Sta Lft (ft)	9699.22
E.G. OC (ft)	1868.81	Weir Sta Rgt (ft)	10163.42
Culvert Control	Outlet	Weir Submerg	0.00
Culv WS Inlet (ft)	1866.41	Weir Max Depth (ft)	1.66
Culv WS Outlet (ft)	1865.44	Weir Avg Depth (ft)	0.84
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	389.63
Culv Crt Depth (ft)	3.81	Min El Weir Flow (ft)	1867.19

CULVERT OUTPUT Profile #PF 2 Culv Group: Pipe4

Q Culv Group (cfs)	349.39	Culv Full Len (ft)	60.00
# Barrels	2	Culv Vel US (ft/s)	8.90
Q Barrel (cfs)	174.70	Culv Vel DS (ft/s)	8.90
E.G. US. (ft)	1868.80	Culv Inv El Up (ft)	1861.41
W.S. US. (ft)	1868.75	Culv Inv El Dn (ft)	1860.44
E.G. DS (ft)	1866.56	Culv Frctn Ls (ft)	0.92
W.S. DS (ft)	1866.03	Culv Exit Loss (ft)	0.70
Delta EG (ft)	2.24	Culv Entr Loss (ft)	0.61
Delta WS (ft)	2.71	Q Weir (cfs)	1070.61
E.G. IC (ft)	1868.82	Weir Sta Lft (ft)	9699.03
E.G. OC (ft)	1868.80	Weir Sta Rgt (ft)	10152.41
Culvert Control	Outlet	Weir Submerg	0.00
Culv WS Inlet (ft)	1866.41	Weir Max Depth (ft)	1.66
Culv WS Outlet (ft)	1865.44	Weir Avg Depth (ft)	0.86
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	390.54
Culv Crt Depth (ft)	3.79	Min El Weir Flow (ft)	1867.19

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.327

INPUT
Description: Use NC record to set coefficients fo expansion and
contraction
Desert Hills Drive (section 2 of SC routine)
Note:
channel was adj. to match ALS survey. Sta. 9981.07 to 10012.97

Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9670.55	1868.2	9692.91	1867.84	9698.23	1867.73	9729.89	1867.25	9735.58	1867.19
9752.59	1866.9	9789.87	1866.54	9799.11	1866.36	9802.98	1866.16	9804.43	1866.26
9838.3	1865.9	9844.99	1865.97	9853.72	1865.52	9879.1	1865.11	9881.67	1865.18
9891.17	1865.3	9905.73	1865.27	9915.2	1865.27	9922.74	1865.21	9941.14	1865.09
9942.85	1865.1	9952.63	1864.98	9955.56	1865.01	9965.41	1865.06	9968.39	1865.12
9977.76	1864.9	9981.07	1865.19	9982.93	1863	9995.16	186210000.02	1861.31	
10005.39	1861.210007.35	1860.8610011.34	1863.3810014.35	1863.4710019.49	1863.89				
10022.01	186410024.11	1864.3210027.66	1864.32	10036.7	1864.6310053.63	1864.99			
10058.95	1865.110059.57	1865.2110067.31	1865.3610074.98	1865.4510075.63	1865.48				
10084.97	1865.6	10086.3	1865.6910091.16	1866.1810093.69	1866.21	10100.7	1866.36		
10104.05	1866.510108.74	1866.7910112.81	1867.1	10116.1	1867.0910123.58	1867.1			
10129.36	1867.210138.11	1867.210141.31	1867.21	10147.1	1867.2510148.31	1867.2			
10150.2	1867.3	10156.8	1867.21	10160.6	1867.210167.21	1867.13	10169.4	1867.09	
10171.9	1867.1	10174.8	1867.0710183.46	1867.06	10200.8	1866.6110205.82	1866.55		
10218.61	1866.510226.97	1866.510239.63	1866.510248.75	1866.4310257.04	1866.38				
10262.7	1866.310268.72	1866.310281.51	1866.33	10290.3	1866.4510302.82	1866.66			
10312.07	1866.610316.38	1866.7310319.96	1866.7210322.87	1866.7910334.07	1866.88				
10358	1866.810393.12	1866.8310401.42	1866.8	10430.9	1867.1710433.07	1867.18			

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9670.55	.045	9995.16	.0410024.11	.045	

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9995.1610024.11 100 91.5 100 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9670.55 9995.16 1864.81 F
10024.1110433.07 1864.81 F
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.31

INPUT
Description: Desert Hills Drive (section 1 of SC routine)

Station Elevation Data num= 76
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9649.83 1869.1 9668.49 1867.82 9684.51 1867.51 9690.74 1867.38 9695.95 1867.23
9740.74 1866.6 9785.39 1866.12 9790.72 1866.05 9827.87 1865.17 9835.99 1865.08
9840.31 1864.9 9854.57 1864.79 9855.89 1864.79 9857.08 1864.78 9860.35 1864.71
9866.06 1864.7 9876.57 1864.53 9878.05 1864.51 9883.94 1864.43 9888.08 1863.83
9892.43 1863.2 9895.23 1863.82 9897.86 1864.41 9901.79 1864.3 9904.94 1864.08
9906.65 1863.9 9911.76 1863.35 9913.63 1863.51 9916.14 1863.73 9919.18 1863.86
9928.98 1863.7 9932.45 1863.68 9936.81 1863.58 9940.4 1863.63 9942.02 1863.67
9943.8 1863.7 9956.14 1863.59 9968.26 1863.45 9971.04 1863.51 9975.83 1863.48
9977.39 1863.4 9991.37 1860.47 9991.92 1860.36 9992.43 1860.36 9998.32 1860.38
9999.65 1860.510019.23 1863.1410030.32 1863.2310034.03 1863.3210039.11 1863.48
10044.35 1863.610049.46 1863.7410089.45 1865.2410089.96 1865.27 10093.6 1865.42
10137.26 1866.410145.59 1866.5 10189.4 186610193.83 1865.9110240.54 1865.18
10243.71 1865.110248.77 1865.0910290.76 1865.2910328.62 1865.7810335.85 1865.94
10385.32 1865.710390.28 1865.6910393.93 1865.7210395.62 1865.7610403.15 1865.92
10406.21 186610413.48 1866.2110422.51 1866.0710426.13 186610426.59 1866
10426.84 1866

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9649.83 .045 9975.83 .0410019.23 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9975.8310019.23 500 491.8 425 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.217

INPUT
Description: return expansion and contraction coefficient to normal

Station Elevation Data num= 37
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9938.78 1868.6 9951.04 1865.91 9978.54 1859.5 9991.59 1856.46 9998.35 1856.49
10000.19 1856.410002.83 1856.510007.35 1856.6710014.91 1858.3910020.71 1859.73
10040.51 1859.810045.95 1859.8 10055.6 1859.6410058.27 1859.610062.76 1859.48
10066.18 1859.410072.51 1859.710073.88 1859.7510079.38 1859.9510088.39 1860.05
10134.82 1860.810144.94 1860.810166.35 1860.97 10184 1861.1710194.95 1861.23
10217.09 1861.4 10250.2 1861.610253.15 1861.6810254.79 1861.710260.86 1861.75
10311.98 1862.210341.14 1862.510376.36 1863.0910384.74 1863.0910388.36 1863.21
10389.97 1863.210393.91 1863.2

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9938.78 .045 9978.54 .0410020.71 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9978.5410020.71 450 429.1 325 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.135

INPUT
Description: 7th Avenue culvert (section 4 of SC routine)

Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9740.11 1862 9763.26 1861.61 9777.57 1861.49 9787.98 1860.83 9790.83 1860.8
9810.7 1860.3 9812.7 1860.37 9814.46 1860.35 9818.47 1860.32 9821.16 1860.34
9822.4 1860.3 9823.79 1860.27 9824.67 1860.27 9826.16 1860.21 9832.65 1860.2
9833.15 1860.2 9835.85 1859.98 9836.23 1859.97 9840.42 1859.77 9841.72 1859.79
9843.91 1859.7 9846.38 1859.69 9851.37 1859.23 9856.31 1859.16 9856.76 1859.15
9862.68 1859.1 9863.64 1859.1 9871.96 1858.98 9872.39 1858.98 9878.37 1858.85
9879.24 1858.8 9882.7 1858.75 9884.81 1858.7 9891 1858.45 9893.52 1858.46
9895.34 1858.4 9897.14 1858.27 9898.54 1858.18 9912.23 1858.05 9920.86 1857.87
9925.33 1857.6 9934 1857.29 9938.63 1857.07 9942.6 1856.9 9944.22 1856.97
9973.45 1856.9 9980.11 1857.42 9981.46 1857.28 9992.18 1854.69 9995.39 1854.57
10000.06 1854.410001.75 1854.5910002.17 1854.64 10006 1855.1910008.31 1855.38
10017.25 1856.310017.47 1856.3910019.79 1856.5610021.83 1856.65 10022.5 1856.66
10024.99 1856.710054.78 1857.3110057.38 1857.410061.65 1857.5510072.58 1857.94
10083.47 185810126.72 1858.1510137.03 1858.2110171.92 1858.7510210.61 1858.95
10221.29 185910233.84 1859.1710272.19 1859.52 10306 1860.1210308.34 1860.14
10323.9 1860.210328.25 1860.4110333.56 1860.4710342.38 1860.5110345.58 1860.49
10347.89 1860.510353.78 1860.6110360.94 1860.910366.14 1861.0210369.71 1861.11
10372.88 1861.310374.89 1861.42 10377.7 1861.4710379.47 1861.5310391.51 1861.95

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9740.11 .045 9980.11 .0410024.99 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9980.1110024.99 150 70 50 .6 .8
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.122

INPUT
Description: 7th Avenue culvert (section 3 of SC routine)
7th Ave culvert
BT Record data is from ALS surveyors.
Note:Channel sect. was adj.
to match ALS survey . Sta. 9989 to 10017.08

Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9585.07 1862 9603.52 1861.71 9626.83 1861.43 9653.86 1861.18 9683.88 1860.97
9706.48 1860.8 9740.02 1860.8 9753.6 1860.73 9777.29 1860.48 9801.5 1860.43
9824.49 1860.4 9868.63 1860.4 9869.39 1860.7 9879.95 1860.47 9887.21 1860.41
9893.98 1860.2 9903.52 1859.95 9920.13 1859.8 9935.56 1859.72 9942.63 1859.63
9955.34 1859.6 9961.74 1859.53 9968.37 1859.28 9975.48 1859.05 9977.92 1858.85
9980.97 1858.7 9982.98 1858.86 9989 1858.8 9991 1851.9 9996 1851.4
10000 1851.7 10003.6 1851.610004.34 1852.6 10004.8 1852.8 10012.1 1852.6
10013.55 1854.4 10015 1855.910017.08 1857.3410017.58 1857.5410020.67 1857.61
10021.9 1857.710029.62 1857.6910032.14 1857.9610035.09 1857.9510037.96 1857.86
10040.24 1858.110042.15 1858.1610045.37 1858.1110052.23 1858.1910053.39 1858.23
10059.01 1858.210067.76 1857.8910073.03 1857.5910081.92 1857.4810086.35 1857.46
10100.01 1857.410103.56 1857.45 10109.6 1857.4610116.86 1857.5310119.58 1857.53

10125.75 1857.610137.11 1857.7610142.94 185810148.28 1858.0210184.34 1858.36
10194.84 1858.410201.79 1858.5110214.98 1858.6410225.77 1858.8810230.03 1859.05
10233.87 1859.110247.01 1859.35 10252.3 1859.4910270.66 1859.7810279.54 1859.97
10287.08 186010298.93 1860.2710315.58 1860.5910321.89 1860.6110325.36 1860.68
10333.29 1860.710343.42 1860.9310348.16 186110354.36 1861.0610358.53 1861.14
10364.28 1861.310368.72 1861.35 10375.5 1861.5910379.16 1861.6910389.64 1862

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9585.07 .045 9980.97 .04 10004.8 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9989 10012.1 50 70.9 50 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9585.07 9989 1857.42 F
10012.110389.64 1857.42 F
Sediment Elevation = 0

CULVERT

RIVER: RIVER-1
REACH: Reach-1 RS: 3.1155

INPUT
Description: Culvert #3 (2 5' Pipes)
2-60" CMP's inverts determined by
averaging

Distance from Upstream XS =5.450001
Deck/Roadway Width = 60
Weir Coefficient = 2.63
Upstream Deck/Roadway Coordinates
num= 16
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
9887.21 1860.41 1851.4 9893.98 1860.2 1851.4 9903.52 1859.95 1851.4
9950.7 1859.77 1851.4 99891859.312 1851.4 99891859.312 1851.4
10000 1859.18 1851.4 10012.11858.967 1851.4 10012.11858.967 1851.4
10100.1 1857.42 1851.4 10149.7 1857.69 1851.4 10199.7 1858.34 1851.4
10250 1858.97 1851.4 10300.2 1859.67 1851.4 10349.8 1860.67 1851.4
10389.64 1862 1851.4

Upstream Bridge Cross Section Data
Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9585.07 1862 9603.52 1861.71 9626.83 1861.43 9653.86 1861.18 9683.88 1860.97
9706.48 1860.8 9740.02 1860.8 9753.6 1860.73 9777.29 1860.48 9801.5 1860.43
9824.49 1860.4 9868.63 1860.4 9869.39 1860.7 9879.95 1860.47 9887.21 1860.41
9893.98 1860.2 9903.52 1859.95 9920.13 1859.8 9935.56 1859.72 9942.63 1859.63
9955.34 1859.6 9961.74 1859.53 9968.37 1859.28 9975.48 1859.05 9977.92 1858.85
9980.97 1858.7 9982.98 1858.86 9989 1858.8 9991 1851.9 9996 1851.4
10000 1851.7 10003.6 1851.610004.34 1852.6 10004.8 1852.8 10012.1 1852.6
10013.55 1854.4 10015 1855.910017.08 1857.3410017.58 1857.5410020.67 1857.61
10021.9 1857.710029.62 1857.6910032.14 1857.9610035.09 1857.9510037.96 1857.86
10040.24 1858.110042.15 1858.1610045.37 1858.1110052.23 1858.1910053.39 1858.23
10059.01 1858.210067.76 1857.8910073.03 1857.5910081.92 1857.4810086.35 1857.46
10100.01 1857.410103.56 1857.45 10109.6 1857.4610116.86 1857.5310119.58 1857.53
10125.75 1857.610137.11 1857.7610142.94 185810148.28 1858.0210184.34 1858.36
10194.84 1858.410201.79 1858.5110214.98 1858.6410225.77 1858.8810230.03 1859.05
10233.87 1859.110247.01 1859.35 10252.3 1859.4910270.66 1859.7810279.54 1859.97
10287.08 186010298.93 1860.2710315.58 1860.5910321.89 1860.6110325.36 1860.68
10333.29 1860.710343.42 1860.9310348.16 186110354.36 1861.0610358.53 1861.14
10364.28 1861.310368.72 1861.35 10375.5 1861.5910379.16 1861.6910389.64 1862

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9585.07 .045 9980.97 .04 10004.8 .045

Bank Sta: Left Right Coeff Contr. Expan.
9989 10012.1 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9585.07 9989 1857.42 F
10012.110389.64 1857.42 F
Sediment Elevation = 0

Downstream Deck/Roadway Coordinates
num= 16
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
9887.21 1860.41 1851.4 9893.98 1860.2 1851.4 9903.52 1859.95 1851.4
9950.7 1859.77 1851.4 9998.131859.202 1851.4 9998.131859.202 1851.4
10000 1859.18 1851.410016.341858.893 1851.410016.341858.893 1851.4
10100.1 1857.42 1851.4 10149.7 1857.69 1851.4 10199.7 1858.34 1851.4
10250 1858.97 1851.4 10300.2 1859.67 1851.4 10349.8 1860.67 1851.4
10389.64 1862 1851.4

Downstream Bridge Cross Section Data
Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9879.11 1860 9879.46 1860.01 9895.83 1859.01 9901.38 1858.99 9911.79 1858.92
9914.44 1858.8 9923.15 1858.8 9930.17 1858.67 9931.01 1858.68 9939.37 1858.54
9942.24 1858.3 9950.56 1858.13 9961.84 1858 9970.2 1857.96 9973.79 1857.79
9981.54 1857.7 9985.01 1857.59 9988.87 1856.68 9993.35 1856.29 9995.3 1856.3
9998.13 185610001.63 1854.5110004.08 1854.7410006.57 1854.6610008.55 1855
10010.99 1855.110012.64 1855.9510013.42 1856.0310016.34 1855.9910019.45 1856.45
10023.45 1856.4 10028.9 1856.7710029.96 1856.7510032.84 1856.9310038.23 1856.91
10041.86 1856.910046.46 1856.7710048.85 1856.56 10055.7 1856.5710061.35 1856.32
10064.85 1855.910068.11 1855.8410069.88 1855.7110071.62 1855.7410073.23 1855.89
10076.8 1855.7 10079.1 185610086.27 1856.0210089.81 1856.310097.69 1856.2
10102.14 1856.310103.08 1856.310107.86 1856.4210109.13 1856.410122.09 1856.41
10130.19 1856.4 10136.5 1856.6510146.15 1856.8510152.81 1856.9610155.51 1857.05
10161.07 1857.110166.22 1857.2410178.25 1857.3510186.92 1857.47 10192.9 1857.51
10195.15 1857.510201.93 1857.5810208.93 1857.6210225.68 1857.610233.43 1857.72
10236.26 1857.810245.79 1857.99 10249.9 1858.0310257.27 185810265.92 1858.16
10274.26 1858.210280.36 1858.3410286.28 1858.3910298.85 1858.810301.57 1858.84
10306.95 1859.110312.71 1859.3110322.27 1859.4310323.87 1859.4710333.03 1859.58
10346.85 1859.610350.01 1859.6910359.97 1859.7610365.18 1859.8710368.61 1859.98

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9879.11 .045 9993.35 .0410019.45 .045

Bank Sta: Left Right Coeff Contr. Expan.
9998.1310016.34 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9879.11 9998.13 1856.23 F
10016.3410368.61 1856.23 F
Sediment Elevation = 0

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins = 1857.77
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
Pipe3 Circular 5 5
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 1 - Headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef Exit Loss Coef
5.450001 60 .024 .024 0 .5 1

Number of Barrels = 2
Upstream Elevation = 1851.93
Centerline Stations
Sta. Sta.
9998.0510003.05
Downstream Elevation = 1851.92
Centerline Stations
Sta. Sta.
10004.7310009.73

CULVERT OUTPUT Profile #PF 1 Culv Group: Pipe3

Q Culv Group (cfs)	283.94	Culv Full Len (ft)	60.00
# Barrels	2	Culv Vel US (ft/s)	7.23
Q Barrel (cfs)	141.97	Culv Vel DS (ft/s)	7.23
E.G. US. (ft)	1859.77	Culv Inv El Up (ft)	1851.93
W.S. US. (ft)	1859.50	Culv Inv El Dn (ft)	1851.92
E.G. DS (ft)	1858.46	Culv Frctn Ls (ft)	0.61
W.S. DS (ft)	1857.95	Culv Exit Loss (ft)	0.30
Delta EG (ft)	1.32	Culv Entr Loss (ft)	0.41
Delta WS (ft)	1.55	Q Weir (cfs)	1286.06
E.G. IC (ft)	1859.63	Weir Sta Lft (ft)	9947.82
E.G. OC (ft)	1859.77	Weir Sta Rgt (ft)	10270.71
Culvert Control	Outlet	Weir Submerg	0.07
Culv WS Inlet (ft)	1856.93	Weir Max Depth (ft)	2.36
Culv WS Outlet (ft)	1856.92	Weir Avg Depth (ft)	1.22
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	392.37
Culv Crt Depth (ft)	3.41	Min El Weir Flow (ft)	1857.77

CULVERT OUTPUT Profile #PF 2 Culv Group: Pipe3

Q Culv Group (cfs)	283.05	Culv Full Len (ft)	60.00
# Barrels	2	Culv Vel US (ft/s)	7.21
Q Barrel (cfs)	141.52	Culv Vel DS (ft/s)	7.21
E.G. US. (ft)	1859.77	Culv Inv El Up (ft)	1851.93
W.S. US. (ft)	1859.50	Culv Inv El Dn (ft)	1851.92
E.G. DS (ft)	1858.45	Culv Frctn Ls (ft)	0.60
W.S. DS (ft)	1857.95	Culv Exit Loss (ft)	0.31
Delta EG (ft)	1.32	Culv Entr Loss (ft)	0.40
Delta WS (ft)	1.54	Q Weir (cfs)	1286.95
E.G. IC (ft)	1859.68	Weir Sta Lft (ft)	9967.88
E.G. OC (ft)	1859.77	Weir Sta Rgt (ft)	10240.77
Culvert Control	Outlet	Weir Submerg	0.07
Culv WS Inlet (ft)	1856.93	Weir Max Depth (ft)	2.37
Culv WS Outlet (ft)	1856.92	Weir Avg Depth (ft)	1.41
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	385.68
Culv Crt Depth (ft)	3.41	Min El Weir Flow (ft)	1857.77

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.109

INPUT
Description: 7th avenue culvert (section 2 of SC routine)
Use the NC record
to set contraction and expansion coefficients for culvert

Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9879.11	1860	9879.46	1860.01	9895.83	1859.01	9901.38	1858.99	9911.79	1858.92
9914.44	1858.8	9923.15	1858.8	9930.17	1858.67	9931.01	1858.68	9939.37	1858.54
9942.24	1858.3	9950.56	1858.13	9961.84	1858	9970.2	1857.96	9973.79	1857.79
9981.54	1857.7	9985.01	1857.59	9988.87	1856.68	9993.35	1856.29	9995.3	1856.3
9998.13	185610001.63	1854.5110004.08	1854.7410006.57	1854.6610008.55	1855				
10010.99	1855.110012.64	1855.9510013.42	1856.0310016.34	1855.9910019.45	1856.45				

10023.45 1856.4 10028.9 1856.7710029.96 1856.7510032.84 1856.9310038.23 1856.91
10041.86 1856.910046.46 1856.7710048.85 1856.56 10055.7 1856.5710061.35 1856.32
10064.85 1855.910068.11 1855.8410069.88 1855.7110071.62 1855.7410073.23 1855.89
10076.8 1855.7 10079.1 185610086.27 1856.0210089.81 1856.310097.69 1856.2
10102.14 1856.310103.08 1856.310107.86 1856.4210109.13 1856.410122.09 1856.41
10130.19 1856.4 10136.5 1856.6510146.15 1856.8510152.81 1856.9610155.51 1857.05
10161.07 1857.110166.22 1857.2410178.25 1857.3510186.92 1857.47 10192.9 1857.51
10195.15 1857.510201.93 1857.5810208.93 1857.6210225.68 1857.610233.43 1857.72
10236.26 1857.810245.79 1857.99 10249.9 1858.0310257.27 185810265.92 1858.16
10274.26 1858.210280.36 1858.3410286.28 1858.3910298.85 1858.810301.57 1858.84
10306.95 1859.110312.71 1859.3110322.27 1859.4310323.87 1859.4710333.03 1859.58
10346.85 1859.610350.01 1859.6910359.97 1859.7610365.18 1859.8710368.61 1859.98

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9879.11 .045 9993.35 .0410019.45 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9998.1310016.34 120 137.7 160 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9879.11 9998.13 1856.23 F
10016.3410368.61 1856.23 F
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.083

INPUT
Description: 7th avenue culvert (section 1 of SC routine)

Station Elevation Data num= 54
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9869.84 1860 9890.44 1859.23 9890.91 1859.18 9918.98 1856.16 9925.93 1856.04
9934.61 1855.8 9938.76 1855.84 9940.86 1855.85 9944.32 1855.82 9959.43 1855.6
9961.1 1855.6 9966.04 1855.61 9974.09 1855.56 9979.13 1855.57 9983.32 1855.56
9988.29 1854.3 9990.67 1853.9 9993.44 1853.310000.21 1851.7510007.63 1852.89
10014.53 1853.910015.71 1854.0610022.34 1854.6610026.62 1854.5210036.62 1854.02
10046.95 1854.410055.39 1854.810057.48 1854.8910058.25 1854.9210058.69 1854.94
10059.08 1854.910059.45 1854.9710060.74 1855.01 10062.1 1855.0210063.72 1855.03
10068.92 185510099.51 1855.310104.61 1855.110111.51 1854.1310116.13 1853.57
10122.76 1854.410122.87 1854.410122.88 1854.410130.48 1854.7110133.92 1854.87
10152.78 1855.610184.01 1857.110207.51 1858.410243.23 1858.3210244.48 1858.28
10279.18 1858.510301.58 1858.810305.92 185910335.79 1860.22

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9869.84 .045 9983.32 .0410022.34 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9983.3210022.34 515 535.7 545 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.982

INPUT
Description:
Station Elevation Data num= 75
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9559.88 1858 9588.28 1857.97 9603.42 1857.79 9637.22 1857.7 9650.82 1857.56
9688.85 1857 9735.87 1856.2 9739.13 1856.1 9766.53 1855.67 9789.39 1855.3
9790.43 1855.3 9835.45 1854.71 9840.58 1854.6 9870.2 1854.1 9871.63 1854.06

9873.25 1854.1 9879.46 1854.52 9883.9 1854.77 9884.99 1854.85 9885.83 1854.84
9886.21 1854.8 9901.18 1854.74 9904.1 1854.74 9905.82 1854.75 9909.55 1854.76
9911.61 1854.7 9913.68 1854.76 9918.35 1854.76 9923.94 1854.8 9924.03 1854.8
9926.99 1854.8 9927.86 1854.8 9927.95 1854.79 9930 1854.73 9930.43 1854.7
9930.91 1854.6 9931.82 1854.57 9932.58 1854.51 9933.32 1854.44 9933.5 1854.44
9956.02 1851.9 9965.11 1851.25 9965.18 1851.24 9965.6 1851.21 9968.18 1851.01
9971.68 1850.7 9977.77 1850.48 9979.37 1850.43 9980.18 1850.41 9987.01 1849.2
9999.23 184710000.99 1847.2510012.04 1848.6410019.62 1848.9210028.04 1849.42
10028.43 1849.410028.78 1849.4710029.35 1849.510032.06 1849.5310088.02 1850.82
10106.38 1851.210125.63 1851.5210130.08 1851.4510131.97 1851.0710135.31 1850.46
10144.15 1850.710148.48 1850.910154.63 1851.0810171.08 1851.6210190.86 1852.25
10202.73 1852.610211.64 1853.0410239.52 1854.3510263.22 1855.4510284.53 1856.38

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9559.88 .045 9987.01 .0410012.04 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9987.0110012.04 450 500 475 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.887

INPUT
Description:
Station Elevation Data num= 40
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9561.71 1852.3 9577.26 1851.42 9590 1851.31 9601.51 1851.24 9630.24 1851.16
9652.35 1851 9661.65 1851.01 9693.08 1850.8 9696.97 1850.77 9703.64 1850.72
9741.74 1850.2 9754.02 1850.1 9781.63 1850.02 9783 1850.01 9784.13 1849.94
9814.63 1847.8 9852.89 1847.27 9854.64 1847.25 9898.78 1846.86 9904.92 1846.84
9933.86 1846.6 9968.79 1846.6 9972.38 1846.72 9983.49 1847.09 9988.92 1845.28
10000.01 1842.310011.22 1844.08 10013.6 1844.4810019.98 1845.310027.74 1846.51
10037.2 1845.710041.86 1845.3110047.41 1845.6710051.82 1846.1110086.44 1849.89
10109.29 1852.610116.66 1853.02 10151.6 1854.8410169.41 1856.1610173.14 1856.26

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9561.71 .045 9983.49 .0410027.74 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9983.4910027.74 400 498.3 550 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.793

INPUT
Description: Note:End Reach C, Begin Reach D

Station Elevation Data num= 62
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9530.83 1847.1 9553.99 1846.66 9580.78 1845.92 9601.44 1845.44 9617.14 1845.23
9629.73 1845.2 9636.79 1845.06 9649.05 1845.01 9657.34 1845.05 9691.12 1844.95
9704.11 1844.9 9738.81 1845.08 9754.13 1845.11 9768.31 1845.04 9804.19 1844.49
9844.31 1843.9 9846.75 1843.91 9847.43 1843.89 9858 1843.84 9893.3 1842.61
9904.32 1842.3 9917.5 1841.88 9930.51 1841.42 9942.6 1841.56 9950.71 1841.79
9958.48 1841.4 9966.36 1840.98 9976.09 1841.21 9987.47 1841.57 9993.89 1839.75
10000.12 1838.210011.16 1840.510013.94 1840.9610034.23 1841.7210050.29 1842.3
10054.41 1842.310096.51 1842.9510104.45 1843.5710116.77 1844.5410118.85 1844.61
10132.96 1844.810141.83 1845.0110145.34 1845.1110148.53 1845.0810160.97 1844.21
10176.54 1843.310194.93 1843.9410209.46 1844.37 10224.7 1844.6710234.55 1844.8

10237.07 1844.910275.16 1846.110290.98 1846.52 10313.2 1847.2610331.86 1847.88
10348.74 1848.910351.71 1849.0610351.86 1849.0810352.87 1848.82 10355.7 1848.28
10373.52 1848.710388.73 1849.45

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9530.83 .045 9987.47 .0410013.94 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9987.4710013.94 400 492.7 575 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.699

INPUT
Description: Note: data for cross section 2.699 is from ALS survey (check section 3)

Station Elevation Data num= 40
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9080 1845.9 9131 1845.98 9183 1846.17 9190 1845.69 9213 1845.73
9267 1845.5 9318 1844.99 9367 1844.26 9420 1843.2 9475 1841.96
9528 1841 9581 1840.44 9638 1840.05 9693 1840.7 9745 1840.16
9797 1840 9846 1839.97 9895 1839.81 9943 1839.03 9991 1836.27
10000 1835 10001 1835.7 10014 1835.66 10033 1835.8 10044 1836.37
10073 1837.1 10122 1835.7 10171 1838.11 10221 1838.74 10269 1840.67
10317 1842.6 10370 1844.38 10423 1845.28 10472 1846.04 10520 1846.69
10572 1847.2 10621 1847.94 10673 1848.71 10686 1848.53 10710 1848.7

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9080 .04 9991 .035 10044 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9991 10044 50 51.8 50 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.689

INPUT
Description:
Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9019.04 1845.6 9051.96 1845.76 9070.54 1845.69 9101.97 1845.46 9124.07 1845.35
9151.83 1845 9178.13 1844.42 9202 1844.95 9225.74 1844.94 9252.16 1845.11
9277.11 1845.1 9304.89 1845.09 9327.64 1844.98 9352.38 1844.9 9392.85 1845.02
9395.78 1845 9399.01 1844.92 9453.88 1842.95 9470.78 1842.6 9502.81 1841.82
9519.57 1841.4 9552.48 1840.88 9569.05 1840.54 9602.81 1840.12 9638.79 1840.2
9648.4 1840.1 9668.56 1840.63 9672.5 1840.78 9675.27 1840.56 9686.84 1839.48
9691.14 1839.8 9695.97 1840.39 9709.52 1840.48 9738.49 1840.38 9752.48 1840.32
9762.77 1840.3 9802.06 1840.62 9808.27 1840.5 9849.73 1840.51 9852.81 1840.45
9856.95 1840.5 9868.8 1840.62 9875.69 1840.59 9903.39 1840.41 9914.45 1839.51
9926.09 1839.1 9936.02 1838.57 9949.44 1837.84 9954.14 1837.51 9960.13 1838
9965.82 1838.5 9973.96 1838.22 9981.59 1837.97 9984.64 1837.54 9994.74 1835.59
10002.28 1835.710015.64 1836.25 10035.2 1836.4510039.44 1836.4810044.34 1837.25
10047.12 1837.710061.17 1837.4410065.81 1837.6710074.34 1838.1810091.52 1837.89
10093.46 1837.810120.89 1837.94 10151 1838.3710169.22 1838.7210199.32 1839.27
10204.19 1839.410212.04 1839.2410227.87 1840.5 10247.3 1840.7510253.45 1840.95
10258.15 1841.1 10307.1 1843.4210319.62 1843.94 10342.4 1844.5310385.66 1845.33
10407.82 1845.710428.44 1845.9610446.46 1846.0710531.26 1846.6610542.31 1846.79
10594.54 1847.9 10624.3 1848.35 10650 1848.5910664.48 1848.6510705.61 1848.27

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9019.04 .04 9981.59 .03510047.12 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9981.5910047.12 350 376.1 300 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.618

INPUT
Description:
Station Elevation Data num= 48
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9695.94 1838.1 9733.17 1838.7 9738.46 1838.76 9742.12 1838.58 9745.58 1838.47
9790.76 1836.9 9794.71 1836.89 9801.89 1836.8 9830 1836.21 9849.02 1836.05
9852.15 1836.1 9853.06 1835.91 9857.29 1835.32 9870.44 1835.38 9883.8 1835.45
9888.83 1835.9 9889.5 1836.05 9894.56 1835.91 9915.2 1835.68 9939.48 1835.27
9955.46 1835.5 9957.08 1835.6 9966.96 1834.43 9968.11 1834.27 9970.18 1834.31
9978.78 1834.4 9986.96 1833.17 9998.5 1831.6410003.05 1833.2310008.13 1834.88
10015.77 1834.510026.33 1834.210038.41 1834.3610054.14 1834.4110063.96 1834.46
10074.9 1834.510087.07 1835.4310098.39 1836.4410102.14 1836.6310109.61 1836.96
10117.37 1837 10124.7 1837.28 10128.9 1837.1910145.17 1837.7410172.52 1838.61
10179.19 1838.810186.18 1839.1210216.63 1840.74

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9695.94 .04 9978.78 .03510008.13 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9978.7810008.13 350 392.1 400 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.544

INPUT
Description: Note:GR records deleted from Sta. 9492.78 to Sta. 9897.84
to
restrict flow to effective area without X3 record

Station Elevation Data num= 37
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9897.84 1835.2 9899.69 1834.98 9901.66 1834.81 9917.29 1833.09 9934.3 1831.53
9941.68 1831.3 9943.33 1831.77 9954.03 1832.25 9962.02 1832.1 9966.19 1831.98
9976.8 1831.6 9981.07 1831.4 9994.03 1829.17 9999.33 1828.2510010.44 1831.2
10012.64 1831.810015.44 1831.8210033.71 1831.9110043.08 1831.5710060.94 1831.15
10063.3 1831.210082.56 1833.4910084.02 1833.5910095.17 1833.810134.77 1834.87
10135.94 1834.910136.29 1834.9310137.06 1834.9510138.21 1834.9710180.19 1836.13
10191.77 1836.3 10209.8 1836.7110238.21 1836.9810256.56 1837.2110290.01 1837.29
10295.73 1837.310313.45 1837.22

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9897.84 .04 9981.07 .03510012.64 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9981.0710012.64 400 442.1 425 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.46

INPUT
Description:
Station Elevation Data num= 82
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9788.85 1833.9 9790.76 1833.9 9809 1833.59 9816.85 1833.03 9821.47 1832.79
9831.76 1832.2 9835.31 1832.16 9840.51 1832.05 9844.34 1832.06 9849.22 1831.74
9853.83 1831.5 9858.78 1831.26 9865.44 1831.21 9872.24 1831.16 9882.66 1830.97
9921.32 1830.2 9927.74 1830.12 9935.38 1829.77 9941.69 1829.64 9963.99 1828.54
9965.72 1828.5 9968.65 1828.52 9975.41 1828.48 9976.66 1828.46 9978.68 1828.44
9986.3 1827.5 9988.71 1827.29 9994.55 1826.67 9995.35 1826.56 9996.16 1826.51
9999.41 182610009.37 1827.8510009.49 1827.8510013.83 1828.41 10014.6 1828.45
10015.86 1828.510035.76 1828.7310039.75 1828.7910041.38 1828.8110042.54 1828.8
10043.75 1828.810048.64 1828.8110101.59 1829.0510105.64 1829.0710110.43 1828.52
10119.9 1827.310132.44 1827.5 10143.1 1827.9210146.73 1828.5410147.77 1828.51
10150.84 1828.210151.11 1828.210151.55 1828.310152.48 1828.5210154.75 1829.01
10155.03 182910155.09 1829.07 10155.3 1829.07 10155.7 182910156.25 1829.05
10156.87 182910157.58 1829.0310164.77 1827.8310167.42 1827.510168.34 1827.37
10173.33 1827.110173.64 1827.1410173.95 1827.1210180.01 1827.97 10181.2 1828.11
10182.58 1828.310185.58 1828.8410194.83 1830.610198.05 1830.910202.86 1831.93
10205.04 1832.510208.65 1832.7510216.35 1833.2210219.02 1833.510221.85 1833.77
10223.35 1833.810225.84 1834.04

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9788.85 .04 9978.68 .035 10014.6 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9978.68 10014.6 450 398.2 325 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.385

INPUT
Description:
Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9560.04 1832.2 9610.09 1831.93 9622.67 1831.85 9655.86 1831.52 9673.84 1831.41
9702.96 1831 9724.16 1830.9 9746.57 1830.83 9774.66 1830.6 9786.24 1830.32
9788.97 1830.3 9795.63 1829.72 9802.75 1829.3 9810.01 1828.98 9812.6 1828.89
9813.68 1828.9 9817.84 1828.85 9818.59 1828.86 9820.81 1828.71 9821.9 1828.69
9823.51 1828.6 9829.31 1828.43 9832.43 1828.21 9836.82 1828.02 9846.41 1827.55
9849.49 1827.4 9851.56 1827.36 9855.06 1827.14 9857.65 1826.94 9868.51 1826.49
9869.67 1826.4 9880.3 1825.94 9882.39 1825.88 9885.24 1825.83 9896.35 1825.59
9907.45 1825.3 9911.21 1825.53 9914.32 1825.63 9919.79 1825.84 9924.7 1825.95
9925.78 1825.8 9927.3 1825.66 9932.69 1824.91 9936.06 1825.36 9936.98 1825.44
9940.29 1825.8 9940.74 1825.8 9947.17 1826.17 9949.74 1826.22 9954.32 1826.37
9959.07 1826.5 9961.81 1826.61 9975.97 1826.49 9981.13 1826.48 9994.24 1824.17
9999.43 1823.310002.32 1823.8510015.85 1826.2810017.26 1826.310039.66 1826.78
10048.76 1826.710052.24 1826.7210065.53 1826.5510077.75 1825.4810082.12 1825.96
10085.39 1826.3 10091.4 1826.3510102.92 1826.4110110.08 1826.5710117.74 1826.71
10131.76 1825.310132.12 1825.3510140.69 1825.910150.96 1826.610156.81 1825.8
10182.48 1826.610187.88 1826.7410188.49 1826.9210189.12 1827.03 10190 1827.1
10191.64 1827.310195.68 1827.9710219.86 1828.6310227.41 1828.82 10236 1829.12
10241.62 1829.3 10245.3 1829.4610262.33 1830.0310269.16 1830.49 10303.5 1832.99

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9560.04 .04 9981.13 .03510015.85 .04

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

9981.1310015.85 500 536.2 500 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.283

INPUT
Description: Return Coefficient of Expansion and Contraction to normal.

Station Elevation Data num= 84
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9424.04 1828.2 9463.24 1827.91 9473.95 1827.87 9510.66 1827.86 9541.54 1827.78
9562.57 1827.7 9623.49 1827.68 9661.18 1827.43 9679.79 1827.23 9716.11 1827.06
9736.57 1827 9760.53 1827 9813.69 1826.43 9824.64 1826.31 9835 1826.06
9863.23 1825.2 9902.04 1824.35 9913.24 1824.12 9924.14 1823.75 9962.34 1822.61
9973.77 1822.5 9988 1822.43 9989.13 1822.43 9990.83 1821.89 9999.91 1819.07
10009.13 1821.7 10010.7 1822.1110012.43 1822.1710015.97 1822.3310025.92 1822.66
10051.17 1822.710072.43 1822.9310075.21 1822.96 10079.2 1822.87 10079.3 1822.87
10080.3 1822.710089.37 1821.2710090.65 1821.4310096.51 182210099.49 1822.2
10101.96 1822.510106.23 1822.7410107.97 1822.9310108.22 1822.9410109.19 1822.91
10117.59 1823.210119.14 1823.3110119.66 1823.3410120.56 1823.3810121.61 1823.54
10122.96 1823.510127.94 1823.4410129.92 1823.410134.25 1822.9210139.73 1822.52
10143.02 182210143.34 1822.0410143.56 1822.0210144.84 1821.610150.38 1821.24
10163.18 1821.610175.47 1822.0710187.85 1822.4110190.14 1822.4310196.38 1822.64
10199.86 1822.610220.85 1822.8410223.07 1822.8710225.86 182310242.25 1823.09
10246.81 1823.110255.44 1822.7810264.37 1822.4110267.36 1822.5410288.91 1823.39
10337.08 1824.510343.37 1824.7810349.15 1824.9310398.53 1826.3310448.98 1827.37
10453.39 1827.410455.06 1827.4910458.89 1827.5810509.03 1828.48

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9424.04 .04 9988 .035 10010.7 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9988 10010.7 200 159.1 175 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.253

INPUT
Description: 11th Avenue culvert (section 4 of SC routine)

Station Elevation Data num= 74
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9526.29 1825 9563.53 1824.9 9580.06 1824.9 9624.94 1825.02 9635.59 1825.01
9647.07 1825 9688.63 1825.12 9712.86 1825.03 9743.5 1824.82 9752.47 1824.79
9777.52 1824.8 9791.54 1824.88 9798.84 1824.77 9828.68 1824.42 9853.93 1824.3
9866.12 1824.1 9893.6 1823.65 9904.07 1823.47 9909.21 1823.35 9942.88 1822.21
9963.37 1821.5 9980.83 1821.6 9983.47 1821.61 9994.64 1818.82 9997.79 1818.05
10008.45 1821.810009.65 1822.2710013.11 1822.32 10014.8 1822.3410015.93 1822.37
10017.53 1822.310018.59 1822.210029.85 1821.2710033.35 1820.9910042.68 1821.42
10044.72 1821.510046.79 1821.5810056.38 1822.0510070.13 1822.1910090.47 1822.57
10092.83 1822.510095.14 1821.8710097.68 1821.1210099.77 1820.5510115.42 1820.87
10133.23 1821.2 10139 1821.3410141.21 1821.4910141.36 1821.5510141.47 1821.65
10141.58 1821.710141.91 1821.810142.75 1821.8610145.21 1822.1410156.89 1822.1
10160.45 1822.110162.81 1822.0510164.93 1821.9710167.62 1821.8510182.97 1821.68
10218.4 1821.710236.42 1821.710240.56 1821.710242.02 1821.7710244.48 1821.79
10247.2 1821.610254.47 1821.1110264.85 1821.4410271.77 1821.6310276.03 1821.8
10291.58 1822.310309.63 1823.210343.71 1824.7710388.05 1826.3

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

9526.29 .04 9983.47 .03510009.65 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9983.4710009.65 400 305.4 100 .6 .8
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.195

INPUT
Description: 11th Ave Culvert BT Record data from ALS surveyors.
BT records
coded per Figure 3.16 (HEC-2 Sept. 1990)
Note:Channel was adj. to
match ALS survey between Sta. 9979.78 and 10046.38
Note:GR
records deleted from Sta. 9894.98 to Sta. 9962.31 to
restrict
effective flow without X3 record.

Station Elevation Data num= 61
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9962.31 1820.8 9964.13 1820.81 9967.29 1820.7 9968.84 1820.6 9975.69 1818.1
9977.72 1817.8 9979.34 1817.68 9981.2 1817.48 9984.45 1817.1 9992.18 1816.2
9993.02 1816.1 9993.62 1816.110000.67 1815.810002.22 1815.610009.16 1815.8
10018.44 1816.110027.83 1816.310031.71 1816.510039.07 1820.410039.93 1820.4
10041.23 1820.410047.76 1820.6110054.66 1820.4410057.39 1820.510064.44 1820.5
10074.27 1820.710077.27 1820.84 10083.9 1820.7610087.62 1820.710097.62 1820.5
10104.39 1820.410106.38 1820.410111.73 1820.3110117.03 1820.310142.58 1820.2
10149.68 1820.310151.35 1820.310154.65 1820.3110158.89 1820.210163.83 1820.3
10167.07 1820.410171.81 1820.510198.43 1820.7610204.44 1820.910206.95 1821
10210.61 1821.110215.52 1821.2910217.84 1821.2110219.65 1821.210226.38 1821.2
10248.26 1821.210251.22 1821.210258.27 1821.2510265.72 1821.210268.07 1821.2
10273.68 1821.410278.23 1821.4610280.93 1821.5610287.43 1821.610292.95 1821.7
10308.15 1821.8

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9962.31 .04 9968.84 .03510039.93 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9968.8410039.93 50 81.9 100 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9962.31 9968.84 1819.8 F
10039.9310308.15 1819.8 F
Sediment Elevation = 0

CULVERT

RIVER: RIVER-1
REACH: Reach-1 RS: 2.1875

INPUT
Description: Culvert #2 (3 4' Pipes)
11th Avenue culvert (section 3 of SC
routine)
3-48" CMP's Inverts determined by averaging

Distance from Upstream XS =6.740002
Deck/Roadway Width = 68.42
Weir Coefficient = 2.63
Upstream Deck/Roadway Coordinates
num= 12
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord

9964.13 1820.81 1814.45 9967.29 1820.7 1814.45 9968.84 1819.8 1814.45
9968.84 1819.8 1814.45 10000 1820.15 1814.4510039.93 1820.4 1814.45
10039.93 1820.4 1814.4510104.39 1820.4 1814.4510149.68 1820.3 1814.45
10198.43 1820.76 1814.4510251.22 1821.21 1814.4510308.15 1821.81 1814.45

Upstream Bridge Cross Section Data
Station Elevation Data num= 61
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9962.31 1820.8 9964.13 1820.81 9967.29 1820.7 9968.84 1820.6 9975.69 1818.1
9977.72 1817.8 9979.34 1817.68 9981.2 1817.48 9984.45 1817.1 9992.18 1816.2
9993.02 1816.1 9993.62 1816.110000.67 1815.810002.22 1815.610009.16 1815.8
10018.44 1816.110027.83 1816.310031.71 1816.510039.07 1820.410039.93 1820.4
10041.23 1820.410047.76 1820.6110054.66 1820.4410057.39 1820.510064.44 1820.5
10074.27 1820.710077.27 1820.84 10083.9 1820.7610087.62 1820.710097.62 1820.5
10104.39 1820.410106.38 1820.410111.73 1820.3110117.03 1820.310142.58 1820.2
10149.68 1820.310151.35 1820.310154.65 1820.3110158.89 1820.210163.83 1820.3
10167.07 1820.410171.81 1820.510198.43 1820.7610204.44 1820.910206.95 1821
10210.61 1821.110215.52 1821.2910217.84 1821.2110219.65 1821.210226.38 1821.2
10248.26 1821.210251.22 1821.210258.27 1821.2510265.72 1821.210268.07 1821.2
10273.68 1821.410278.23 1821.4610280.93 1821.5610287.43 1821.610292.95 1821.7
10308.15 1821.8

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9962.31 .04 9968.84 .03510039.93 .04

Bank Sta: Left Right Coeff Contr. Expan.
9968.8410039.93 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9962.31 9968.84 1819.8 F
10039.9310308.15 1819.8 F
Sediment Elevation = 0

Downstream Deck/Roadway Coordinates
num= 13
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
9963.49 1820.81 1814.45 9964.13 1820.81 1814.45 9967.29 1820.7 1814.45
9968.84 1819.8 1814.45 10000 1820.15 1814.4510033.55 1820.36 1814.45
10033.55 1820.36 1814.4510039.93 1820.4 1814.4510104.39 1820.4 1814.45
10149.68 1820.3 1814.4510198.43 1820.76 1814.4510251.22 1821.21 1814.45
10308.15 1821.81 1814.45

Downstream Bridge Cross Section Data
Station Elevation Data num= 54
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9961.04 1820 9963.49 1820.07 9969.5 1818.88 9972.91 1818.23 9979.29 1818.05
9980.5 1819.5 9988 1814.8 10000 1814.45 10015.3 1814.64 10026.9 1818.9
10032.71 1819.710033.55 1820.2510048.91 1820.33 10079.5 1819.8410081.02 1819.8
10081.51 1819.810087.73 1819.7810104.37 1819.6510105.81 1819.63 10134.6 1819.8
10146.89 182010148.14 1820.1210149.28 1820.1510149.78 1820.1510151.15 1820.1
10152.06 1820.110152.82 1820.1910154.67 1820.22 10156.7 1820.2510201.08 1820.9
10203.65 1820.910207.02 1820.910210.67 1820.910212.72 1820.9210218.77 1820.9
10225.6 1821.110226.81 1821.110261.54 1821.3810293.53 1821.3710295.97 1821.4
10299.08 1821.4 10304.8 1821.4310309.03 1821.4310311.81 1821.3610315.42 1821.3
10322.41 1821.410325.89 1821.4610328.18 1821.5110337.79 1821.5610358.09 1821.7
10361.09 1821.710366.07 1821.8110373.09 1821.8910374.79 1821.89

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9961.04 .04 9963.49 .03510033.55 .04

Bank Sta: Left Right Coeff Contr. Expan.
9963.4910033.55 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9961.04 9963.49 1818.88 F
10033.5510374.79 1818.88 F
Sediment Elevation = 0

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins = 1820.04
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
Pipe2 Circular 4 4
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 1 - Headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef Exit Loss Coef
6.740002 68.42 .024 .024 0 .5 1
Number of Barrels = 3
Upstream Elevation = 1814.71
Centerline Stations
Sta. Sta. Sta.
10000.3810004.3810008.38
Downstream Elevation = 1814.57
Centerline Stations
Sta. Sta. Sta.
9994.52 9998.5210002.52

CULVERT OUTPUT Profile #PF 1 Culv Group: Pipe2

Q Culv Group (cfs)	233.56	Culv Full Len (ft)	68.42
# Barrels	3	Culv Vel US (ft/s)	6.20
Q Barrel (cfs)	77.85	Culv Vel DS (ft/s)	6.20
E.G. US. (ft)	1822.30	Culv Inv El Up (ft)	1814.71
W.S. US. (ft)	1822.07	Culv Inv El Dn (ft)	1814.57
E.G. DS (ft)	1821.32	Culv Frctn Ls (ft)	0.69
W.S. DS (ft)	1820.54	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.98	Culv Entr Loss (ft)	0.30
Delta WS (ft)	1.53	Q Weir (cfs)	1876.44
E.G. IC (ft)	1822.17	Weir Sta Lft (ft)	9962.31
E.G. OC (ft)	1822.30	Weir Sta Rgt (ft)	10308.15
Culvert Control	Outlet	Weir Submerg	0.08
Culv WS Inlet (ft)	1818.71	Weir Max Depth (ft)	2.46
Culv WS Outlet (ft)	1818.57	Weir Avg Depth (ft)	1.58
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	546.89
Culv Crt Depth (ft)	2.67	Min El Weir Flow (ft)	1820.04

CULVERT OUTPUT Profile #PF 2 Culv Group: Pipe2

Q Culv Group (cfs)	230.65	Culv Full Len (ft)	68.42
# Barrels	3	Culv Vel US (ft/s)	6.12
Q Barrel (cfs)	76.88	Culv Vel DS (ft/s)	6.12
E.G. US. (ft)	1822.44	Culv Inv El Up (ft)	1814.71
W.S. US. (ft)	1822.23	Culv Inv El Dn (ft)	1814.57
E.G. DS (ft)	1821.44	Culv Frctn Ls (ft)	0.67
W.S. DS (ft)	1820.90	Culv Exit Loss (ft)	0.04
Delta EG (ft)	1.00	Culv Entr Loss (ft)	0.29
Delta WS (ft)	1.33	Q Weir (cfs)	1879.35
E.G. IC (ft)	1822.33	Weir Sta Lft (ft)	9962.31
E.G. OC (ft)	1822.44	Weir Sta Rgt (ft)	10215.52
Culvert Control	Outlet	Weir Submerg	0.24
Culv WS Inlet (ft)	1818.71	Weir Max Depth (ft)	2.61
Culv WS Outlet (ft)	1818.57	Weir Avg Depth (ft)	1.99
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	503.58
Culv Crt Depth (ft)	2.65	Min El Weir Flow (ft)	1820.04

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.18

INPUT
Description: x-sect 2.180 is both special culvert 4 for Joy Ranch Road
(Downstream)
and special culvert 2 for 11th Avenue
(Upstream)
Note:Channel was adj. to match ALS survey between Sta.
9979.29 and 10032.71

Station Elevation Data num= 54
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9961.04 1820 9963.49 1820.07 9969.5 1818.88 9972.91 1818.23 9979.29 1818.05
9980.5 1819.5 9988 1814.8 10000 1814.45 10015.3 1814.64 10026.9 1818.9
10032.71 1819.710033.55 1820.2510048.91 1820.33 10079.5 1819.8410081.02 1819.8
10081.51 1819.810087.73 1819.7810104.37 1819.6510105.81 1819.63 10134.6 1819.8
10146.89 182010148.14 1820.1210149.28 1820.1510149.78 1820.1510151.15 1820.1
10152.06 1820.110152.82 1820.1910154.67 1820.22 10156.7 1820.2510201.08 1820.9
10203.65 1820.910207.02 1820.910210.67 1820.910212.72 1820.9210218.77 1820.9
10225.6 1821.110226.81 1821.110261.54 1821.3810293.53 1821.3710295.97 1821.4
10299.08 1821.4 10304.8 1821.4310309.03 1821.4310311.81 1821.3610315.42 1821.3
10322.41 1821.410325.89 1821.4610328.18 1821.5110337.79 1821.5610358.09 1821.7
10361.09 1821.710366.07 1821.8110373.09 1821.8910374.79 1821.89

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9961.04 .04 9963.49 .03510033.55 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9963.4910033.55 25 68.8 275 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9961.04 9963.49 1818.88 F
10033.5510374.79 1818.88 F
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.167

INPUT
Description: x-sect 2.167 is both special culvert 3 for Joy Ranch
Road(Downstream)
and special culvert 1 for 11th Avenue
(Upstream)
Joy Ranch Road Culvert BT Record data is from ALS
surveyors.
Note:Channel was adj. to match ALS survey between STA.
9990.5 and 10013.5

Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9338.8 1822.4 9361.91 1822.65 9393.07 1822.55 9415 1822.65 9445.88 1822.61
9467.61 1822.5 9492.16 1822.54 9502.15 1822.38 9509.75 1822.33 9533.48 1822.38
9552.5 1822.6 9564.82 1822.5 9581.77 1822.5 9588.27 1822.43 9604.18 1822.45
9618.11 1822.4 9637.47 1822.27 9645.24 1822.25 9649.59 1822.19 9657.76 1822.17
9663.27 1822.1 9683.92 1822.07 9693.58 1822.04 9716.39 1822.03 9735.74 1821.94
9741.48 1821.9 9748.56 1821.97 9766.27 1821.83 9789.34 1821.71 9799.08 1821.58
9805.63 1821.5 9812.64 1821.51 9825.27 1821.5 9837.57 1821.34 9854.43 1821.21
9857.98 1821.2 9862.94 1821.04 9882.46 1820.56 9888.72 1820.3 9891.88 1820.27
9901.5 1819 9904.97 1819.98 9913.1 1819.83 9923.98 1819.7 9960.96 1819.43
9965.96 1819.3 9976.3 1819.27 9980.8 1819.46 9985.66 1818.1 9990.51 1816.77
9991.9 1814.5 10000 1814.1 10008.3 1814.7 10013.5 1819.110014.68 1818.38
10018.4 1818.610020.37 1818.910025.49 1819.3310026.85 1819.310029.58 1819.51

10031.13 1819.410033.96 1819.0610042.87 1818.3910053.09 1818.4710064.06 1818.5
10067.81 1818.410076.32 1818.45 10086.8 1818.3210088.34 1818.1710097.27 1818.05
10110.76 1817.510117.53 1817.9410120.93 1818.3810124.41 1818.4410139.42 1818.59
10186.96 1818.610221.88 1818.81 10249.1 1819.0410257.49 1819.0810268.31 1819.21
10312.46 1819.810349.72 1820.2410366.58 1820.3210386.85 1820.4610395.49 1820.57
10400.99 1820.510416.97 1820.810439.21 1821.0810471.27 1821.63 10506.9 1822.03

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9338.8 .04 9980.8 .035 10013.5 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9980.8 10013.5 75 85.2 175 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9338.8 9980.8 1817.5 F
10013.5 10506.9 1817.5 F
Sediment Elevation = 0

CULVERT

RIVER: RIVER-1
REACH: Reach-1 RS: 2.159

INPUT
Description: Culvert #1 (3 5' Pipes)
Joy Ranch Road culvert
3-60" CMP's
inverts determined by averaging.

Distance from Upstream XS = 2.98
Deck/Roadway Width = 79.24
Weir Coefficient = 2.63
Upstream Deck/Roadway Coordinates
num= 19
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
9900.7 1819.34 1813.2 9950.58 1819.12 1813.2 9980.81819.206 1813.2
9980.81819.206 1813.2 10000 1819.26 1813.2 10013.51819.094 1813.2
10013.51819.094 1813.2 10050.5 1818.64 1813.2 10100.5 1817.85 1813.2
10110.76 1817.5 1813.210120.93 1818.38 1813.210139.42 1818.59 1813.2
10221.88 1818.81 1813.2 10249.1 1819.04 1813.210268.31 1819.21 1813.2
10312.46 1819.8 1813.210349.72 1820.24 1813.210366.58 1820.32 1813.2
10386.85 1820.46 1813.2

Upstream Bridge Cross Section Data
Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9338.8 1822.4 9361.91 1822.65 9393.07 1822.55 9415 1822.65 9445.88 1822.61
9467.61 1822.5 9492.16 1822.54 9502.15 1822.38 9509.75 1822.33 9533.48 1822.38
9552.5 1822.6 9564.82 1822.5 9581.77 1822.5 9588.27 1822.43 9604.18 1822.45
9618.11 1822.4 9637.47 1822.27 9645.24 1822.25 9649.59 1822.19 9657.76 1822.17
9663.27 1822.1 9683.92 1822.07 9693.58 1822.04 9716.39 1822.03 9735.74 1821.94
9741.48 1821.9 9748.56 1821.97 9766.27 1821.83 9789.34 1821.71 9799.08 1821.58
9805.63 1821.5 9812.64 1821.51 9825.27 1821.5 9837.57 1821.34 9854.43 1821.21
9857.98 1821.2 9862.94 1821.04 9882.46 1820.56 9888.72 1820.3 9891.88 1820.27
9901.5 1819 9904.97 1819.98 9913.1 1819.83 9923.98 1819.7 9960.96 1819.43
9965.96 1819.3 9976.3 1819.27 9980.8 1819.46 9985.66 1818.1 9990.51 1816.77
9991.9 1814.5 10000 1814.1 10008.3 1814.7 10013.5 1819.110014.68 1818.38
10018.4 1818.610020.37 1818.910025.49 1819.3310026.85 1819.310029.58 1819.51
10031.13 1819.410033.96 1819.0610042.87 1818.3910053.09 1818.4710064.06 1818.5
10067.81 1818.410076.32 1818.45 10086.8 1818.3210088.34 1818.1710097.27 1818.05
10110.76 1817.510117.53 1817.9410120.93 1818.3810124.41 1818.4410139.42 1818.59
10186.96 1818.610221.88 1818.81 10249.1 1819.0410257.49 1819.0810268.31 1819.21
10312.46 1819.810349.72 1820.2410366.58 1820.3210386.85 1820.4610395.49 1820.57
10400.99 1820.510416.97 1820.810439.21 1821.0810471.27 1821.63 10506.9 1822.03

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

9338.8 .04 9980.8 .035 10013.5 .04

Bank Sta: Left Right Coeff Contr. Expan.
9980.8 10013.5 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9338.8 9980.8 1817.5 F
10013.5 10506.9 1817.5 F
Sediment Elevation = 0

Downstream Deck/Roadway Coordinates
num= 19
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
9900.7 1819.34 1813.2 9950.58 1819.12 1813.2 9959.091819.144 1813.2
9959.091819.144 1813.2 10000 1819.26 1813.210031.231818.877 1813.2
10031.231818.877 1813.2 10050.5 1818.64 1813.2 10100.5 1817.85 1813.2
10110.76 1817.5 1813.210120.93 1818.38 1813.210139.42 1818.59 1813.2
10221.88 1818.81 1813.2 10249.1 1819.04 1813.210268.31 1819.21 1813.2
10312.46 1819.8 1813.210349.72 1820.24 1813.210366.58 1820.32 1813.2
10386.85 1820.46 1813.2

Downstream Bridge Cross Section Data
Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9469.07 1821 9495.06 1821.76 9499.71 1821.7 9504.28 1821.71 9514.18 1821.69
9522.09 1821.6 9528.82 1821.6 9540.56 1821.76 9550.24 1821.67 9558.8 1821.67
9568.15 1821.6 9578.87 1821.8 9583.03 1821.82 9593.12 1821.79 9597.79 1821.79
9608.26 1821.7 9615.91 1821.63 9624.96 1821.71 9633.59 1821.69 9651.12 1821.57
9668.46 1821.5 9677.07 1821.52 9680.69 1821.48 9686.75 1821.49 9694.37 1821.45
9699.8 1821.3 9713.23 1821.3 9732.79 1821.3 9748.77 1821.2 9762.52 1821.14
9765.44 1821.1 9777.89 1821.01 9791.39 1820.79 9796.18 1820.78 9803.35 1820.73
9808.72 1820.6 9815.84 1820.47 9823.59 1820.38 9829.18 1820.28 9843.47 1820.15
9849.27 1820 9855.65 1820.31 9859.96 1820.12 9867.04 1819.93 9868.77 1819.8
9873.61 1819.6 9877.22 1819.4 9880.46 1819.02 9881.4 1818.79 9894.42 1818.93
9907.08 1819.1 9919.04 1818.61 9931.42 1818.42 9933.48 1818.45 9940.96 1818.88
9947.53 1818.9 9951.78 1818.99 9959.09 1819.29 9986.49 1818.04 9990.5 1814.25
9992.97 1814 10000 1813.8 10002 1813.6 10004.7 1813.5 10006 1813.2
10008.33 1817.810031.23 1818.0710056.28 1817.9610075.78 1817.7610108.55 1817.56
10136.15 1817.710159.05 1817.7210171.61 1817.2110172.71 1817.2810191.09 1817.79
10226.82 181810244.29 1818.3310260.01 1818.2910261.85 1818.3310279.05 1818.29
10286.35 1818.3 10301.6 1818.3310340.55 1818.4810343.05 1818.510377.17 1818.44
10413.22 1818.610483.04 1819.2910518.59 1820.0410556.48 1820.5810585.23 1820.81

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9469.07 .04 9986.49 .03510031.23 .04

Bank Sta: Left Right Coeff Contr. Expan.
9959.0910031.23 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9469.07 9959.09 1816.6 F
10031.2310585.23 1816.6 F
Sediment Elevation = 0

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins = 1818.01
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
Pipe1 Circular 5 5
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 1 - Headwall

Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef Exit Loss Coef
2.98 79.24 .024 .024 0 .5 1
Number of Barrels = 3
Upstream Elevation = 1812.87
Centerline Stations
Sta. Sta. Sta.
9992.15 9997.1510002.15
Downstream Elevation = 1811.84
Centerline Stations
Sta. Sta. Sta.
9990.16 9995.1610000.16

CULVERT OUTPUT Profile #PF 1 Culv Group: Pipe1

Q Culv Group (cfs)	336.05	Culv Full Len (ft)	79.24
# Barrels	3	Culv Vel US (ft/s)	5.70
Q Barrel (cfs)	112.02	Culv Vel DS (ft/s)	5.70
E.G. US. (ft)	1820.28	Culv Inv El Up (ft)	1812.87
W.S. US. (ft)	1819.87	Culv Inv El Dn (ft)	1811.84
E.G. DS (ft)	1819.41	Culv Frctn Ls (ft)	0.50
W.S. DS (ft)	1819.02	Culv Exit Loss (ft)	0.11
Delta EG (ft)	0.86	Culv Entr Loss (ft)	0.25
Delta WS (ft)	0.85	Q Weir (cfs)	1773.95
E.G. IC (ft)	1820.16	Weir Sta Lft (ft)	9889.61
E.G. OC (ft)	1820.28	Weir Sta Rgt (ft)	10360.61
Culvert Control	Outlet	Weir Submerg	0.21
Culv WS Inlet (ft)	1817.87	Weir Max Depth (ft)	2.79
Culv WS Outlet (ft)	1816.84	Weir Avg Depth (ft)	1.20
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	562.88
Culv Crt Depth (ft)	3.02	Min El Weir Flow (ft)	1818.01

Warning: During subcritical analysis, the water surface upstream of culvert went to critical depth.

CULVERT OUTPUT Profile #PF 2 Culv Group: Pipe1

Q Culv Group (cfs)	384.70	Culv Full Len (ft)	79.24
# Barrels	3	Culv Vel US (ft/s)	6.53
Q Barrel (cfs)	128.23	Culv Vel DS (ft/s)	6.53
E.G. US. (ft)	1820.96	Culv Inv El Up (ft)	1812.87
W.S. US. (ft)	1820.44	Culv Inv El Dn (ft)	1811.84
E.G. DS (ft)	1819.83	Culv Frctn Ls (ft)	0.65
W.S. DS (ft)	1819.31	Culv Exit Loss (ft)	0.14
Delta EG (ft)	1.13	Culv Entr Loss (ft)	0.33
Delta WS (ft)	1.13	Q Weir (cfs)	1725.30
E.G. IC (ft)	1820.74	Weir Sta Lft (ft)	9880.00
E.G. OC (ft)	1820.96	Weir Sta Rgt (ft)	10125.00
Culvert Control	Outlet	Weir Submerg	0.24
Culv WS Inlet (ft)	1817.87	Weir Max Depth (ft)	3.44
Culv WS Outlet (ft)	1816.84	Weir Avg Depth (ft)	1.87
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	457.56
Culv Crt Depth (ft)	3.24	Min El Weir Flow (ft)	1818.01

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.151

INPUT
Description: Note:GR record adjusted to match ALS between Sta. 9986.49 and
10008.33

Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9469.07 1821 9495.06 1821.76 9499.71 1821.7 9504.28 1821.71 9514.18 1821.69
9522.09 1821.6 9528.82 1821.6 9540.56 1821.76 9550.24 1821.67 9558.8 1821.67

9568.15 1821.6 9578.87 1821.8 9583.03 1821.82 9593.12 1821.79 9597.79 1821.79
9608.26 1821.7 9615.91 1821.63 9624.96 1821.71 9633.59 1821.69 9651.12 1821.57
9668.46 1821.5 9677.07 1821.52 9680.69 1821.48 9686.75 1821.49 9694.37 1821.45
9699.8 1821.3 9713.23 1821.3 9732.79 1821.3 9748.77 1821.2 9762.52 1821.14
9765.44 1821.1 9777.89 1821.01 9791.39 1820.79 9796.18 1820.78 9803.35 1820.73
9808.72 1820.6 9815.84 1820.47 9823.59 1820.38 9829.18 1820.28 9843.47 1820.15
9849.27 1820 9855.65 1820.31 9859.96 1820.12 9867.04 1819.93 9868.77 1819.8
9873.61 1819.6 9877.22 1819.4 9880.46 1819.02 9881.4 1818.79 9894.42 1818.93
9907.08 1819.1 9919.04 1818.61 9931.42 1818.42 9933.48 1818.45 9940.96 1818.88
9947.53 1818.9 9951.78 1818.99 9959.09 1819.29 9986.49 1818.04 9990.5 1814.25
9992.97 1814 10000 1813.8 10002 1813.6 10004.7 1813.5 10006 1813.2
10008.33 1817.810031.23 1818.0710056.28 1817.9610075.78 1817.7610108.55 1817.56
10136.15 1817.710159.05 1817.7210171.61 1817.2110172.71 1817.2810191.09 1817.79
10226.82 181810244.29 1818.3310260.01 1818.2910261.85 1818.3310279.05 1818.29
10286.35 1818.3 10301.6 1818.3310340.55 1818.4810343.05 1818.510377.17 1818.44
10413.22 1818.610483.04 1819.2910518.59 1820.0410556.48 1820.5810585.23 1820.81

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9469.07 .04 9986.49 .03510031.23 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9959.0910031.23 150 188 100 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9469.07 9959.09 1816.6 F
10031.2310585.23 1816.6 F
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.115

INPUT
Description: Joy Ranch Road Culvert (section 1 of SC routine)

Station Elevation Data num= 91
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9553.38 1820.3 9589.07 1819.95 9596.17 1819.87 9636.22 1819.19 9647.6 1819.04
9666.21 1818.7 9699.09 1818.35 9734.08 1817.91 9750.48 1817.79 9762.22 1817.79
9765.85 1817.8 9774.99 1817.97 9778.88 1817.5 9780.71 1817.33 9785.39 1817.24
9799.5 1817.2 9808.41 1816.92 9816.02 1815.99 9818.61 1815.82 9825.76 1817.04
9827.98 1817.3 9829.34 1817.36 9831.96 1817.4 9835.27 1817.44 9837.55 1817.46
9839.69 1817.4 9850.17 1817.44 9865.04 1817.36 9904.65 1816.97 9926.29 1816.96
9957.99 1816.8 9980.25 1816.59 9987.44 1816.45 9989.25 1816.42 9991.03 1815.83
9999.4 1812.9 9999.81 1813 10006.9 1815.1110008.61 1815.6210008.71 1815.65
10008.9 1815.610025.56 1815.1110035.93 1815.0510044.63 1815.0610044.84 1815.08
10044.9 1815 10049.8 1815.3910057.15 1815.7710060.46 1815.8310061.58 1815.85
10066.65 181610073.78 1816.2910077.05 1816.48 10078.1 1816.5410081.63 1816.66
10083.36 1816.710084.82 1816.6910085.67 1816.7210086.83 1816.7710092.86 1816.82
10137.33 1816.310154.78 1816.410172.26 1816.6510180.47 1816.7810207.67 1817.03
10225.66 181710243.56 1817.1810273.15 1817.5610283.47 1817.610289.88 1817.78
10300.45 1817.9 10306.7 181810309.15 1817.99 10324 1817.9910332.38 1818.01
10343.76 1817.910373.08 1817.9710384.67 1817.8910420.31 1818.1210437.79 1818.23
10455.22 1818.410473.18 1818.7110491.19 1819.1510525.79 1819.7110544.36 1819.88
10562.06 182010579.22 1820.210596.74 1820.3710615.21 1820.4810633.34 1820.61
10666.85 1820.8

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9553.38 .04 9987.44 .035 10008.9 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9987.44 10008.9 175 183.9 250 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.08

INPUT
Description:
Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9529.4 1818.1 9560.47 1818.01 9576 1818 9606.96 1817.61 9626 1817.35
9650.59 1817 9671.22 1816.73 9694.44 1816.54 9697.96 1816.5 9702.1 1815.87
9704.31 1815.5 9706.75 1815.51 9731.46 1815.52 9731.76 1815.56 9731.83 1815.55
9732.15 1815.5 9736.86 1815.57 9775.09 1815.69 9797 1815.62 9799.24 1815.51
9805.15 1815.4 9818.87 1815.45 9819.47 1815.46 9819.94 1815.48 9824.59 1814.39
9830.02 1812.9 9834.87 1813.62 9841.91 1814.95 9847.28 1815.05 9881.96 1814.58
9893.5 1814.5 9902.74 1814.63 9905.69 1814.68 9911.59 1814.7 9926.01 1814.9
9940.34 1815.1 9968.7 1814.73 9989.39 1814.33 9989.98 1814.33 9990.56 1814.11
9992.87 1813.3 9998.81 1811.3710000.06 1810.9410008.28 1813.3810010.07 1813.92
10020.58 1813.910029.04 1813.9410029.24 1813.910030.88 1813.9210053.33 1814
10078.44 1814.110083.64 1813.9910084.97 1813.9710088.63 1813.9210094.39 1813.82
10096.84 1813.910105.92 1814.0710126.17 1814.1910133.03 1813.910162.92 1814.08
10182.59 1814.110201.12 1814.1 10226.2 1814.0410232.98 1814.0110234.45 1814
10236.06 181410237.76 1814.0210280.02 1814.47 10290.3 1814.5910329.86 1814.89
10343.06 181510347.77 1815.0510351.06 1815.0810357.51 1815.1310402.54 1815.5
10443.89 1815.910457.43 1816.0710473.64 1816.2310500.27 1816.4610512.41 1816.61
10525.32 181710549.07 1817.5710554.71 1817.6710562.27 1817.8710568.87 1817.86
10573.63 1817.810575.88 1817.82 10615.6 1817.8210622.26 1817.8410645.62 1818.09

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9529.4 .04 9989.98 .03510010.07 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9989.9810010.07 525 515.8 550 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1.982

INPUT
Description:
Station Elevation Data num= 51
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9659.43 1813.7 9680.64 1813.96 9711.97 1814.22 9720.35 1814.34 9746.32 1814.36
9763.95 1814.2 9769.1 1814.04 9778.39 1813.86 9818.28 1813.42 9851.57 1812.52
9869.6 1811.9 9908.7 1811.49 9922.17 1811.38 9936.02 1811.44 9966.23 1811.5
9969.91 1811.1 9974.79 1810.47 9990.33 1810.83 9992.61 1810.89 9994.79 1810.25
10001.05 1808.510004.47 1809.2810015.66 1811.3310054.86 1811.0810055.37 1811.08
10055.47 181110055.66 1811.0810056.45 1811.0810114.76 1810.7710128.97 1810.83
10155.09 1810.710157.34 1810.6810163.96 1809.8910164.17 1809.8610164.33 1809.89
10169.87 1810.910174.81 1810.8910189.09 1810.8210204.63 1810.5110215.63 1810.14
10236.02 1810.8 10237.4 1810.910238.57 1810.9310255.14 1811.23 10265.5 1811.2
10289.84 181110315.96 1811.0110342.68 1810.9710394.62 1812.0410395.13 1812.05
10395.39 1812

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9659.43 .04 9992.61 .03510015.66 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9992.6110015.66 250 381.2 275 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1.91

INPUT
Description:
Station Elevation Data num= 61
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9640.5 1811.2 9665.63 1811.22 9684.85 1810.85 9715.6 1810.22 9744.81 1809.82
9766.94 1809.3 9773.65 1809.22 9784.39 1808.99 9792.77 1808.73 9798.75 1808.76
9816.68 1809 9834.57 1808.93 9865.59 1809.11 9880.33 1808.74 9902.1 1808.4
9910.53 1808.2 9930.14 1808.5 9949.38 1808.77 9951.31 1808.53 9962.42 1807.11
9966.41 1807.9 9970.03 1808.78 9976.37 1808.79 9983.76 1808.93 9989.04 1808.96
9992.53 1808.1 10000.2 1805.9710009.05 1808.5310009.53 1808.6710009.89 1808.67
10011.89 1808.610068.78 1808.5110107.05 1808.4810117.81 1808.4810121.19 1808.5
10127.7 1808.510173.64 1808.7210197.52 1808.610226.08 1808.4810237.37 1808.54
10273.36 1808.810279.24 1808.8410281.93 1808.8310330.92 1808.9510356.97 1808.9
10383.35 180910396.81 1809.0710435.82 1809.4110436.72 1809.4210439.54 1809.43
10488.18 1809.610510.59 1809.8410540.64 1809.9610587.17 1810.2210593.05 1810.27
10595.99 1810.3 10605.8 1810.4510636.04 1810.8710640.07 1810.8710653.82 1810.99
10657.91 1811

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9640.5 .04 9989.04 .03510009.89 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9989.0410009.89 375 425.5 275 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1.83

INPUT
Description: Note:GR records deleted from Sta. 9278.8 to Sta. 9697.20 to
restrict
effective flow without X3 record.

Station Elevation Data num= 65
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9709.71 1807.4 9726.15 1807.4 9749.7 1807.21 9761.65 1807.38 9791.96 1807.16
9802.3 1807.1 9807.57 1807.08 9817.97 1807.07 9845.57 1806.51 9850.04 1806.51
9853.74 1806.4 9859.97 1806.4 9863.97 1806.05 9870.46 1805.2 9900.31 1805.5
9911.11 1805.5 9917.68 1806.38 9933.78 1806.69 9948.39 1806.34 9957.46 1806.2
9959.58 1805.8 9985.28 1805.5 9999.91 1802.39 10004.2 1803.92 10011.7 1805.99
10057.84 180610089.71 1805.8410120.28 1805.4610134.58 1805.9810149.66 1806.27
10184.73 1806.610236.79 1806.5410244.46 1806.5110277.38 1806.310304.88 1806.21
10325.94 1806.110365.28 1806.2210386.85 1806.1310399.75 1806.210407.88 1806.1
10418.93 1806.510423.12 1806.67 10429.9 1807.0710433.69 1807.3310446.54 1807.56
10486.09 1807.910504.09 1808.3210529.94 1808.77 10546.5 1809.1110567.43 1809.17
10576.2 1809.1 10579.7 1809.1410598.69 1809.3310606.02 1809.3510635.82 1809.63
10667.35 1809.9 10673.2 1809.9810682.32 1810.2210726.02 1811.07 10749.8 1811.39
10752.06 1811.3 10765.8 1811.6510788.13 1812.05 10806.5 1812.0610811.05 1811.87

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9709.71 .04 9985.28 .035 10011.7 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9985.28 10011.7 400 339.4 300 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1.765

INPUT
Description: Note:GR records deleted from Sta. 9137.24 to Sta. 9476.71 to
restrict to
effective flow without X3 record.

Station Elevation Data num= 68
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9476.71 1805.3 9492.99 1804.91 9505.22 1804.33 9523.91 1804 9538.38 1803.9
9550.41 1803.5 9563.37 1803.03 9569.53 1802.92 9581.84 1802.3 9586.56 1802.2
9601.91 1802 9622.71 1801.89 9638.3 1801.89 9652.15 1802.3 9671.29 1802.3
9680.34 1802.7 9684.29 1803.06 9697.11 1803.84 9704.26 1803.7 9717.87 1803.8
9740.13 1804.2 9746.5 1804.42 9753.39 1803.72 9794.52 1803.6 9816.02 1803.6
9847.75 1803.7 9915.37 1803.52 9951.41 1803.46 9961.88 1803.3 9982.29 1803.2
9992.13 1799.8 9993.89 1800.6210000.62 1803.1610015.08 1803.410028.56 1803.5
10082.68 1804.210097.73 1804.3510125.55 1804.3210161.09 1804.210196.45 1804.3
10227 1804.310236.19 1804.3310299.34 1804.2710305.77 1804.310361.64 1804.1
10377.27 1804.610386.74 1803.4810396.42 1804.0910443.42 1805.310513.92 1806.4
10550.05 1806.810613.75 180810615.26 1807.9810632.28 1808.2 10636.3 1808
10655.06 1809.410664.05 1810.0310680.44 1810.7510688.31 1810.610690.87 1810.7
10713.56 1810.510726.21 1810.7110774.85 1811.7910786.53 1811.910813.67 1812.3
10821.96 1812.310825.14 1811.3310829.78 1811.15

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9476.71 .04 9982.29 .03510000.62 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9982.2910000.62 500 529 550 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1.665

INPUT
Description:
Station Elevation Data num= 72
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9558.14 1802.2 9586.19 1802.16 9608.4 1802 9658.66 1802 9705.54 1801.7
9724.67 1801.5 9754.38 1801.24 9761.26 1801.2 9794.89 1801.4 9818.78 1801.4
9823.63 1801.5 9846.71 1801.15 9863.93 1800.7 9905.91 1800.9 9921.1 1801
9946.45 1800.4 9965.78 1800.22 9970.57 1800 9990.15 1799.410000.22 1796.5
10002.77 1797.610008.84 1800.54 10032.5 1799.410063.94 1800.310078.76 1800.8
10086.27 1800.710128.04 1800.7910138.21 1801 10151 1800.110155.74 1799.5
10188.45 1800.310200.62 1800.3310206.28 1800.610221.11 1800.610247.48 1800.8
10255.35 1800.710268.86 1800.7710292.56 1799.610301.98 1799.510319.41 1799.9
10343.2 1800.110369.65 1800.1810401.71 1800.110424.81 1800.210454.81 1800.2
10477.65 1800.310481.45 1800.2410502.09 1800.210516.43 1800.410579.57 1800.9
10588.37 1801.110636.18 1802.0110645.62 1802.210666.09 1802.510713.14 1802.9
10749.97 1803.310754.83 1803.3110762.82 1803.4 10771 1803.610806.86 1804.2
10823.05 1804.410833.82 1804.7110896.09 1807.5 10915.6 180810939.86 1808.7
10958.61 1808.710997.63 1809.0711002.37 1809.311026.07 1809.111029.57 1809.3
11046.83 1809.111050.11 1809.06

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9558.14 .04 9990.15 .03510008.84 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9990.1510008.84 270 311.52 290 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1.606

INPUT
Description:
Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9333.43 1799.7 9347.84 1799.51 9360.99 1799.34 9372.37 1799.28 9402.35 1799.16

9442.15 1799.1 9453.03 1799.11 9468.12 1799.09 9503.66 1799.05 9528.73 1799.12
9554.3 1799.1 9589.04 1799.56 9604.92 1799.7 9649.38 1799.5 9655.57 1799.51
9660.05 1799.5 9688.09 1799.44 9703.45 1799.44 9706.35 1799.4 9748.35 1799.31
9759.61 1799.2 9807.46 1798.85 9834.55 1798.63 9858 1798.56 9878.26 1798.41
9908.73 1798.3 9921.9 1798.32 9970.77 1797.44 9971.23 1797.41 9985.01 1797.28
9991.52 1797.2 9992.56 1796.9 9998.99 1795.2410001.15 1794.3710006.47 1796.21
10009.61 1797.510011.34 1797.710036.06 1798.0110065.74 1798.5910071.27 1798.46
10074.12 1798.410078.17 1798.510080.12 1798.5410096.65 1798.8310099.19 1798.25
10106.67 1797.110113.61 1797.8810115.66 1798.4310120.84 1798.4410126.12 1798.19
10139.87 1798.410143.53 1798.410150.94 1798.5310163.12 1798.410203.36 1798.62
10224.7 1798.410243.58 1798.59 10256.6 1798.6310266.81 1798.6210292.26 1798.64
10324.64 1798.410330.23 1798.410364.73 1798.1 10393.3 1797.7610397.57 1797.69
10405.73 1797.510453.51 1796.6810463.02 1796.3310479.94 1796.6710490.24 1796.87
10504.28 1796.910519.84 1796.910527.52 1796.6810537.42 1796.5110544.61 1796.93
10547.56 179710568.55 1797.1110570.18 1797.1110575.57 1797.210584.36 1797.41
10643.6 1798.7 10647.9 1798.8810649.08 1798.910679.22 1799.1910711.42 1799.49
10719.68 1799.510730.21 1799.5410774.88 1799.5210790.87 1799.59 10811.3 1799.85

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9333.43 .04 9991.52 .03510009.61 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9991.5210009.61 295 295 370 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1.548

INPUT
Description:
Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
8985.05 1799.8 9036.38 1799.8 9039.33 1799.81 9087.95 1799.59 9139.41 1799.78
9187.87 1799.6 9191.42 1799.63 9283.72 1799 9288.86 1799.02 9336.64 1798.53
9341.45 1798.5 9385.28 1797.98 9434.45 1797.88 9442.64 1797.83 9493.07 1797.64
9533.36 1797.3 9539.58 1797.4 9546.82 1797.27 9558.83 1797.2 9570.71 1797
9584.48 1796.8 9590.63 1795.98 9594.76 1796.91 9639.62 1796.66 9655.11 1796.64
9689.66 1796.3 9722.19 1796 9739.67 1795.91 9758.23 1796.1 9790.82 1796.65
9842.6 1796.4 9878.83 1796.61 9891.08 1796.69 9932.27 1796.44 9945.06 1795.93
9955.03 1795.7 9963.36 1794.66 9967.92 1795.89 9991.38 1795.72 9994.1 1795.12
10000.03 1793.810003.89 1795.0410007.56 1796.0210033.37 1795.8910042.71 1795.8
10048.61 1795.310064.42 1796.0510073.88 1795.56 10082.1 1795.5610091.75 1796.18
10095.08 1796.410101.55 1796.6910135.75 1796.6210153.34 1796.2510176.54 1796.27
10205.14 1796.410262.43 1796.1410303.97 1796.9110305.15 1796.7510309.37 1795.59
10324.48 179610333.46 1796.1710341.56 1796.0710351.05 1795.8410353.82 1796.36
10361.16 1796.610367.26 1796.6510386.93 1796.4710421.36 1796.1910437.33 1796.18
10449.19 179610511.44 1795.7110544.56 1795.7110580.67 1794.95 10608.7 1795.26
10632.76 1795.210651.78 1795.3410673.09 1795.4510695.65 1795.3410713.35 1794.89
10736.46 1794.910755.57 1795.5310794.75 1796.110822.75 1796.2110840.91 1796.39
10924.83 1797.510953.15 1798.5610981.58 1799.7310989.37 1799.911008.93 1800.61

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
8985.05 .04 9991.38 .03510007.56 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9991.3810007.56 1100 993.1 490 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1.36

INPUT
Description:

Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9652.1 1793.2 9681.01 1793.31 9695.35 1792.9 9698.63 1793.02 9702.76 1792.64
9717 1793.4 9734.5 1793.19 9751.99 1792.88 9800.88 1792.53 9852.16 1792.12
9901.6 1791 9952.05 1789.91 9981.4 1789.84 9983.09 1788.25 9985.34 1787
9987.04 1787.6 9987.59 1788.48 9995.03 1787.9510000.24 1787.1710008.31 1787.92
10011.86 178910017.84 1790.9310025.88 1790.5510029.84 1790.0210033.98 1789.89
10036.05 1789.410040.98 1788.72 10045.8 1789.6810048.57 1790.110054.42 1789.87
10058.82 178910067.52 1789.64 10068.7 1789.7710069.26 1789.44 10069.5 1790.32
10078.23 1790.210094.33 1789.5210103.16 1789.54 10111.9 1789.6310114.63 1789.49
10129.06 1789.510139.14 1790.0510143.31 1790.0410149.91 1790.210160.24 1790.4
10167.8 1790.310176.44 1790.5210188.94 1790.4910196.05 1790.5510212.38 1790.49
10232.38 1790.510245.22 1790.71 10258.6 1790.7110261.74 1790.6110279.46 1790.84
10292.26 1790.710307.43 1790.3210325.31 1790.5810360.25 1791.0110370.44 1791.26
10387.43 1791.510395.85 1791.6410410.31 1791.510421.51 1791.6510460.06 1791.3
10472.2 1791.210536.68 1791.3410561.82 1791.3410567.65 1791.2910612.69 1791.22
10643.48 1791.110670.61 1791.6410686.97 1791.510693.84 1791.510714.45 1791.16
10738.29 1791.610750.46 1792.110755.55 1791.4610766.54 1791.710780.64 1791.96
10809.64 1792.2 10831.8 1792.4410839.48 1792.1310854.03 1792.6610857.29 1792.85
10865.06 1792.910867.08 1792.6610900.41 1793.0110917.97 1793.1810968.84 1793.73

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9652.1 .04 9981.4 .03510017.84 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9981.410017.84 330 360.4 220 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1.291

INPUT
Description:
Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9574.97 1797.3 9580.69 1797.54 9597.06 1797.79 9600.26 1797.87 9601.56 1797.75
9615.86 1797 9623.64 1796.81 9666.5 1796.28 9682.43 1796.71 9692.74 1795.99
9703.68 1795.9 9712.89 1795.64 9717.49 1795.63 9731.93 1795.85 9737.82 1795.9
9746.9 1795.5 9754.41 1795.06 9760.27 1794.8 9767.81 1794.39 9798.01 1793.59
9841.62 1792.5 9869.11 1791.82 9898.45 1790.52 9914.91 1789.64 9927.5 1789.09
9942.07 1787.2 9944.08 1787.19 9957.15 1787.47 9964.87 1787.42 9969.15 1786.83
9973.97 1787 9978.48 1787.6 9991.81 1787.94 9993.64 1787.18 9999.26 1784.46
10000.07 1784.210004.68 1784.8610005.89 1785.3410012.08 1788.1810017.32 1787.65
10021.05 1787.410028.05 1787.4210071.72 1787.6710103.21 1787.910122.36 1788.1
10148.89 1788.2 10173 1788.6310209.33 1788.810223.66 1788.7710273.79 1789.13
10286.17 1789.210324.41 1789.3210346.24 1789.3310375.02 1789.310406.29 1789.07
10425.63 178810476.25 1789.1510490.21 1789.2910498.28 1789.4210509.41 1789.91
10526.86 1789.510570.93 1789.8810577.49 1789.95 10586.5 1789.9510628.09 1790.07
10662.23 1791.110667.63 1790.5910679.27 1791.110691.73 1790.9510713.67 1791.12
10729.33 1791.310766.67 1791.5610826.75 1792.2210830.56 1792.24 10851 1792.44
10877.07 1792.710881.17 1792.7510920.79 1793.4410931.78 1793.6510964.53 1793.97
10982.4 1794.511011.25 179611018.91 1796.3711021.16 1796.5311022.24 1796.43
11033.01 1796.411083.64 1798.1411127.08 1799.4411139.46 1799.8511172.61 1800.56

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9574.97 .04 9991.81 .03510012.08 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9991.8110012.08 375 425.2 400 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1.211

INPUT
Description:
Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9474.34	1800.5	9477.44	1800.44	9514.91	1800.01	9523.14	1799.74	9529.47	1799.76
9531.79	1799.9	9558.38	1799.56	9570.33	1799.5	9584.54	1799.04	9613.45	1798.62
9649.09	1798.3	9673.97	1797.39	9687.25	1797.13	9714.41	1796.18	9730.37	1795.38
9751.84	1794.7	9773.18	1793.53	9789.09	1792.62	9816.03	1791.23	9832.44	1790.13
9853.27	1789.2	9877.12	1788	9891.21	1787.15	9912.24	1785.61	9915.7	1785.49
9919.42	1785.8	9929.73	1785.38	9945.76	1784.99	9952.04	1785.16	9959.76	1785.23
9976.42	1785.1	9979.48	1785.26	9980.04	1784.93	9997.05	1783.09	9999.23	1782.22
10001.15	1782.710002.76	1783.62	10004.7	1784.2710007.96	1784.2510029.05	1784.26			
10055.31	1784.310059.78	1784.2810096.16	1784.5510104.79	1784.5610136.37	1784.69				
10158.14	1785.110164.56	1785.0810177.87	1785.4510214.75	1785.8210224.05	1785.88				
10274.29	1786.410279.04	1786.48	10321.6	1787.1810346.62	1787.5310377.29	1788.07			
10422.49	1788.610445.57	1789.0810463.34	1788.8310470.67	1788.5410485.61	1788.94				
10504.86	1789.610507.14	1789.7710514.07	1789.9110524.41	1790.1710530.93	1790.29				
10542.23	1790.610546.46	1790.5110556.45	1790.5310565.41	1790.7710595.04	1791.77				
10598.86	1791.810643.46	1793.2110646.54	1793.3310684.91	1794.4310690.72	1794.53				
10735.03	1795.910740.97	1796.1610774.49	1796.7910775.93	1796.7710782.03	1796.87				
10812.81	1797.210818.14	1797.4110850.72	1798.0210870.71	1798.7410886.42	1799.12				
10901.81	1799.610918.76	1799.9110933.74	1799.810947.44	1800.0210949.82	1800.02				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9474.34	.04	9980.04	.035	10004.7	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9980.04	10004.7	375	140.9	400	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1.184

INPUT
Description: 1793.710620.13 1794.310643.67 1795.1310663.47
Note: The last 3
GR data pairs removed from model due to HEC-2 limitation.

Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9402.85	1802.3	9434.01	1801.63	9487.52	1800.7	9508.28	1800.31	9539.25	1799.61
9558.94	1799.2	9597.03	1798.52	9615.63	1797.95	9625.7	1797.92	9639.63	1797.42
9661.93	1796.5	9670.07	1796.23	9672.92	1795.68	9680.85	1795.62	9685.03	1795.14
9685.67	1795	9697.34	1793.44	9699.28	1793.38	9723.44	1790.85	9731.18	1790.23
9739.49	1789.9	9741.9	1789.73	9781.24	1787.96	9786.55	1787.78	9791.86	1787.54
9815.52	1786.2	9831.88	1785.49	9840.62	1785.27	9849.77	1785.23	9897.3	1784.7
9942.74	1784.8	9954	1784.71	9988.88	1785.36	9989.06	1785.34	9996.54	1781.8
10002.05	1780.110004.55	1780.7210010.82	1784.4910012.42	1784.4710035.98	1784.62				
10077.49	1784.810112.27	1784.5310118.89	1784.6110146.21	1784.9910160.29	1785.17				
10163.71	1785.210201.72	1785.8310237.25	1786.2910266.61	1786.9910305.17	1787.84				
10318.07	1788	10322.5	1788.3810330.26	1789.0910342.23	1789.5510361.39	1789.59			
10372.62	1789.510375.73	1789.5510414.29	1789.1810423.58	1789.3310468.68	1790.42				
10469.7	1790.410474.05	1790.0310478.97	1789.8210480.17	1789.710489.74	1790.17				
10494.87	1791.510502.11	1791.4410518.93	1791.43	10522.9	1791.510526.96	1791.7			
10556.08	1792.610567.38	1792.8710571.32	1792.9310591.92	1793.5810621.31	1794.61				
10624.91	1794.810671.32	1795.9210682.53	1795.9610713.16	1796.3710721.31	1796.75				
10736.99	1796.9	10767.8	1797.3	10771.3	1797.4310786.39	1797.63	10816.9	1798.07	
10821.32	1798.110842.37	1798.4410871.31	1798.6510889.59	1798.7410903.39	1798.7				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9402.85	.04	9989.06	.03510010.82	.04	

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9989.0610010.82		350	335.2	275	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1.12

INPUT
Description:
Station Elevation Data num= 95
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9606.67 1794.3 9630.46 1793.02 9635.04 1792.33 9638.24 1792.35 9642.86 1792.01
9646.39 1791.9 9667.05 1790.98 9675.52 1790.61 9693.82 1790.12 9702.01 1789.55
9705.3 1789.2 9706.29 1789.1 9709.55 1788.9 9728.77 1787.72 9733.03 1787.57
9740.48 1787.4 9742.64 1787.22 9752.81 1787.07 9753.18 1787.06 9762.42 1786.64
9765.36 1786.4 9783.06 1786.11 9791.02 1785.96 9796.3 1785.66 9844.35 1784.49
9847.66 1784.4 9852.35 1784.38 9858.4 1784.07 9884.03 1783.5 9889.02 1783.43
9891.09 1783.2 9894.53 1783.23 9901.45 1783.35 9904.32 1783.77 9906.03 1783.4
9910.45 1782.6 9920.1 1783.93 9920.23 1783.94 9920.35 1783.93 9930.58 1782.66
9935.22 1783 9941.06 1783.39 9959.23 1782.95 9966.65 1782.9 9986.16 1782.64
9992.51 1782.5 9994.39 1781.6710000.59 1778.4610002.02 1778.7810003.97 1779.22
10009.68 1782.310010.61 1782.8910018.52 1782.4310020.03 1782.410027.37 1782.53
10032.43 1782.710054.34 1783.1810067.17 1783.310106.87 1783.5510106.93 1783.55
10106.97 1783.510159.41 1783.0810186.45 1783.2610211.24 1783.42 10221.4 1784.09
10223.39 1784.110231.03 1783.8910233.57 1783.8210239.89 1784.0810258.21 1784.05
10263.29 178410264.48 1784.0510265.81 1784.0710269.94 1784.1 10317 1785.39
10339.38 1785.710369.53 1786.2410416.92 1787.8510422.07 1787.9810432.91 1788.36
10474.6 1789.410515.08 1791.1710528.63 1792.0810530.03 1792.110530.89 1791.95
10533.05 1791.910537.02 1791.6910540.09 1791.6210546.28 1791.4510549.98 1791.44
10553.49 1792.710555.26 1793.3410562.47 1793.210578.66 1792.7810586.76 1792.77

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9606.67 .04 9992.51 .03510010.61 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9992.5110010.61 500 491.1 600 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1.027

INPUT
Description:
Station Elevation Data num= 72
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9624.36 1789.8 9628.55 1789.29 9631.23 1789.05 9637.57 1789.28 9640.02 1789.35
9641.66 1789.2 9654.72 1788.89 9658.77 1788.78 9659.33 1788.77 9661.79 1788.69
9672.39 1788.4 9674.43 1788.38 9683.59 1787.65 9686.91 1787.5 9692.32 1787.07
9697.94 1786.9 9710.11 1786.56 9717.41 1786.29 9730.85 1785.98 9742.98 1784.92
9743.76 1784.8 9743.85 1784.85 9748.65 1784.59 9766.82 1783.57 9787.74 1782.9
9794.21 1782.9 9816.28 1782.35 9847.32 1781.52 9866.34 1781.05 9897.32 1780.46
9913.05 1780 9942.88 1780.63 9946.27 1780.37 9966.51 1780.34 9973.32 1780.48
9982.71 1781.5 9983.85 1781.65 9984.74 1780.93 9989.77 1776.7 9991.55 1776.33
9994.53 1775.8 9998.92 1776.27 9999.7 1776.3110000.06 1776.3810009.36 1778.96
10012.98 1779.810013.45 1779.9910040.46 1780.1210046.08 1780.110048.82 1780.09
10051.27 1780.110052.31 1780.1410062.01 1780.110102.82 1780.2810128.63 1780.64
10135.45 1780.710137.25 1780.7510155.47 1780.8810201.61 1781.0210208.12 1781.07
10213.79 1781.110221.83 1781.3210230.31 1781.5210234.29 1781.61 10260.8 1781.89
10280.31 1782.710313.45 1783.9710330.13 1784.7210366.13 1786.6910372.31 1787.11
10384.51 1787.810416.66 1790.01

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9624.36 .04 9982.71 .03510013.45 .04

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

9982.7110013.45 400 435.2 350 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 0.945

INPUT
Description: Note:End of Reach B, Begin Reach C
Note:Cross Section 0.945 data
is from ALS survey (check section 1)

Station Elevation Data num= 72

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9595	1798.3	9604	1797.28	9610	1796.69	9631	1793.79	9635	1793.22
9647	1791.7	9659	1790.11	9694	1786.77	9704	1785.77	9710	1785.25
9734	1783.6	9750	1783.46	9754	1783.3	9762	1783.03	9780	1782.47
9791	1782.2	9812	1781.75	9824	1781.58	9840	1781.2	9864	1779.99
9870	1779.8	9884	1779.81	9906	1778.82	9908	1778.72	9929	1778.08
9976	1776.8	9987	1774.69	10000	1773.6	10022	1777.27	10073	1778.69
10146	1778.7	10170	1778.73	10225	1780.1	10254	1781.52	10274	1783
10287	1784	10297	1784.73	10309	1784.08	10315	1785.34	10333	1786.67
10348	1787.3	10383	1788.71	10420	1787.32	10429	1790.61	10432	1790.72
10438	1791	10443	1791.41	10452	1792.02	10457	1792.3	10462	1792.58
10476	1792.9	10493	1793.25	10502	1793.35	10526	1792.84	10558	1792.12
10604	1790.8	10656	1798.17	10685	1788.52	10713	1788.15	10748	1788.1
10785	1788.3	10821	1788.11	10884	1787.73	10910	1787.62	10996	1788.06
11060	1788.5	11105	1789.04	11155	1790.58	11203	1792.37	11231	1792.91
11261	1792.9	11278	1792.61						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9595	.04	9987	.035	10022	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9987 10022 500 510.2 475 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 0.848

INPUT
Description:
Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9738.54	1784.6	9769.85	1782.77	9788.56	1781.62	9806.25	1780.63	9838.58	1778.76
9854.91	1778.3	9888.6	1777.04	9912.66	1776.21	9917.87	1775.99	9931.63	1775.93
9959.23	1775.9	9970.75	1776	9978.79	1775.59	9985.77	1775.22	9993.95	1772.64
9994.55	1772.3	9995.03	1772.33	10001.5	1772.02	10001.68	1772.04	10006.63	1772.29
10011	1774.2	10012.62	1774.98	10014.96	1774.99	10024.14	1774.95	10027.23	1775.03
10041.73	1775.4	10047.55	1775.61	10050	1775.66	10056.61	1775.65	10077.06	1775.91
10088.67	1776	10097.3	1776.18	10113.17	1776.28	10116.66	1776.31	10117.58	1776.3
10123.44	1776.2	10127.69	1776.61	10132.86	1776.96	10136.09	1777.09	10156.07	1778.05
10176.72	1778.9	10186.46	1779.34	10189.35	1779.55	10238.75	1784.74		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9738.54	.045	9985.77	.025	10014.96	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9985.7 10014.96 450 473.9 450 .1 .3

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 0.759

INPUT
Description:
Station Elevation Data num= 36
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9773.65 1782.6 9804.65 1780.95 9824.06 1779.73 9849.19 1778.63 9874.47 1776.99
9893.99 1776.1 9924.88 1774.7 9938.93 1773.95 9954.7 1773.26 9956.61 1773.15
9963.06 1772.7 9972.59 1773.25 9976.04 1773.47 9978.29 1773.37 9989.93 1773.1
9991.47 1771.8 9994.84 1769.4510000.06 1769.210001.41 1769.1510002.04 1769.2
10006.39 1769.610008.49 1770.5710013.32 1772.6910024.73 1772.310026.87 1772.23
10028.47 177210033.39 1771.5910037.09 1771.5110038.84 1771.610046.69 1772.89
10065.11 1775.610067.12 1775.8110076.99 1777.0110101.66 1778.9810127.98 1780.32
10144.13 1780.8

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9773.65 .045 9989.93 .02510013.32 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9989.9310013.32 525 508.1 450 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 0.662

INPUT
Description:
Station Elevation Data num= 47
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9749.81 1782.5 9804.4 1777.85 9817.2 1776.72 9837.86 1775.22 9856.31 1774.08
9858.93 1773.7 9863.23 1773.58 9889.84 1773.02 9922.06 1771.86 9936.28 1771.52
9943.19 1771.3 9949.07 1771.18 9952.58 1771.23 9962.14 1771.27 9983.2 1771.3
9988.64 1769.1 9990.73 1768.52 9992.21 1768.3 9998.29 1767.5310000.08 1767.85
10002.64 1768.310008.04 1770.1910008.91 1770.41 10019 1770.8310023.74 1770.78
10037.25 1770.110040.22 1769.31 10040.7 1769.1810043.75 1769.6110046.33 1770.04
10048.45 1770.110053.62 1770.410060.26 1769.4310061.16 1769.33 10062.1 1769.41
10067.74 1769.910079.48 1771.7810080.62 1771.9610092.64 1773.0410109.97 1773.81
10139.69 1774.910150.92 1775.2910169.88 1775.9610180.49 1776.3110182.67 1776.56
10207.12 1778.810249.14 1781.21

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9749.81 .045 9983.2 .02510008.91 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9983.210008.91 475 470.3 450 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 0.573

INPUT
Description:
Station Elevation Data num= 31
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9855.09 1775.8 9892.4 1773.98 9912.13 1772.95 9916.93 1772.74 9918.02 1772.46
9922.55 1772.1 9946.87 1770.5 9976.52 1768.59 9985.36 1768.31 9986.21 1768.26
9990.94 1765.5 9992.22 1765.01 9993.66 1764.8910000.11 1764.5510003.61 1764.43
10004.28 1764.410005.17 1765.110009.62 1767.8610018.63 1768.1110023.57 1768.23
10035.1 1768.510089.02 1768.8210096.37 1768.8510097.72 1768.8910098.41 1768.95
10100.91 176910118.45 1769.7810130.01 1770.8410155.11 1772.7910170.32 1773.86
10175.96 1774.2

Manning's n Values num= 3

Sta n Val Sta n Val Sta n Val
9855.09 .045 9986.21 .02510009.62 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9986.2110009.62 400 395.9 350 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 0.498

INPUT
Description:
Station Elevation Data num= 40
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9893.2 1775 9905.73 1773.66 9916.97 1771.93 9951.94 1767.01 9962.95 1766.54
9963.83 1766.5 9965.2 1766.48 9970.83 1766.53 9983.8 1766.54 9985.33 1765.85
9990.87 1764.1 9996.5 1763.78 9996.91 1763.77 9997 1763.72 10000.3 1763.05
10004.83 1763.610006.83 1763.8410011.58 1765.4410013.35 1766.0310013.86 1766.27
10014.9 1766.210023.99 1765.9310024.64 1765.9410034.11 1766.1210053.25 1766.93
10097.24 1769.410103.94 1769.8610104.59 1769.910105.39 1769.9210127.01 1770.63
10146.91 177110165.26 1771.1310188.65 1771.5310207.48 1771.410211.19 1771.35
10237.64 177210252.26 1772.2510275.85 1772.7710292.51 1773.4310317.26 1774.38

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9893.2 .045 9983.8 .025 10014.9 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9983.8 10014.9 300 347.7 450 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 0.432

INPUT
Description: Note: End Reach A, begin Reach B

Station Elevation Data num= 44
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9708.06 1774.4 9724.13 1773.75 9772.8 1771.1 9780.11 1770.74 9782.52 1770.57
9787.31 1770.4 9819.75 1769.28 9836.02 1768.89 9858.68 1768.72 9886.16 1768.17
9904.48 1767.7 9936.41 1766.13 9966.8 1765.26 9976.8 1764.87 9985.03 1762.96
9985.94 1762.7 9986.53 1762.74 9993.78 1762.74 9999.37 1762.76 9999.87 1762.75
10004.54 1762.810009.93 1762.8210013.38 1763.610015.22 1764.23 10033.6 1765.11
10036.8 1765.210039.12 1765.39 10086.7 1765.7410087.13 1765.7510087.83 1765.74
10092.71 1765.7 10138.6 1765.510145.74 1765.5410147.78 1765.5710151.58 1765.65
10177.38 1766.3 10183.3 1766.3510205.27 1767.0110219.11 1767.3910225.88 1768.05
10237.83 1769.110253.45 1770.0510288.07 1772.5510316.54 1774.63

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9708.06 .045 9976.8 .02510015.22 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9976.810015.22 300 489.2 500 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 0.34

INPUT
Description:
Station Elevation Data num= 52

Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9606.6 1773 9638.06 1771.55 9645.99 1771.18 9677.58 1768.92 9705.29 1767.71
9715.04 1767.1 9735.27 1766.26 9752.49 1765.49 9760.8 1765.21 9784.6 1764.8
9816.31 1764.3 9834.45 1763.94 9841.54 1763.8 9848.24 1763.65 9854.1 1763.77
9855.54 1763.7 9856.28 1763.85 9866.85 1763.82 9871.82 1763.73 9902.28 1763.58
9927.35 1763.3 9944.81 1763.14 9955.53 1763.16 9965.03 1763.13 9968.32 1762.83
9977.76 1762.3 9979.32 1762.14 9981.38 1761.99 9987.37 1761.37 9990.53 1761.01
9998.85 1760.6 9999.72 1760.5510007.64 1762.7210009.33 1763.0610010.79 1763.54
10011.5 1763.610038.36 1765.5710056.65 1767.0810068.49 1767.9210079.08 1768.85
10092.24 1770.110125.81 1771.6510136.86 1772.2210148.67 1772.3310161.32 1772.31
10161.6 1772.210168.95 1772.5710195.53 1773.5310216.53 1773.9 10230.6 1774.32
10247.47 1774.8 10283 1775.5

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9606.6 .04 9965.03 .03 10011.5 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9965.03 10011.5 500 535.2 450 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 0.238

INPUT
Description:
Station Elevation Data num= 57
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9857.63 1776.9 9913.64 1766.51 9918.37 1765.71 9924.1 1763.92 9936.93 1760.18
9948.2 1760.6 9955.23 1760.93 9960.19 1761 9961.81 1761.03 9964.17 1761.03
9982.47 1760.9 9995.86 1759.9710000.08 1759.6310004.99 1759.6110018.68 1759.52
10024.53 1759.510029.71 1759.4510034.48 1759.6110041.13 1759.7510077.73 1760.75
10079.02 1760.810082.53 1760.76 10095.1 1760.5410095.97 1760.7410101.87 1761.01
10103.4 176110114.42 1761.8110120.91 1761.9910125.34 1762.1510126.34 1762.18
10136.98 1762.710161.24 1763.3910166.76 1763.5810168.44 1763.6610174.95 1763.86
10206.32 1764.710234.42 1766.1210241.73 1766.4910249.89 1766.810268.16 1767.22
10302.81 1768.110304.95 1768.0710350.61 1769.0310352.89 1769.0810354.06 1769.11
10354.66 1769.110356.45 1769.1710394.67 1770.3310406.36 1770.57 10439.4 1771.43
10458.74 1771.810465.31 1771.7810474.36 1771.8710485.11 1771.9810488.23 1771.94
10500.71 177210500.72 1772

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9857.63 .04 9924.1 .0310125.34 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9924.110125.34 500 470 200 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 0.149

INPUT
Description:
Station Elevation Data num= 77
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9830.72 1775.4 9863.27 1767.52 9876.71 1763.98 9877.56 1763.61 9880.37 1762.33
9888.29 1758.8 9891.79 1758.22 9899.39 1757.01 9906.94 1757.41 9913.02 1757.79
9921.32 1757.9 9922.27 1757.9 9963.15 1757.46 9973.12 1757.37 9988.62 1757.03
9997.23 1756.8 9999.56 1757 10002.6 1757.2210010.69 1757.910015.46 1758.36
10019.72 1758.510048.71 1759.0610053.21 1759.2210055.05 1759.3 10069.7 1760.11
10077.37 1760.410087.87 1760.7610098.16 1760.96 10124 1761.510128.91 1761.74
10149.56 176310156.39 1763.55 10157.1 1763.5510159.08 1763.5510160.74 1763.54
10171.24 1763.610174.99 1763.6 10177.7 1763.610188.15 1764.1310194.01 1764.41
10200.94 1764.610207.73 1764.9 10216.9 1765.15 10219.9 1765.2510220.81 1765.28

10227.08 1765.610230.87 1765.6 10244.6 176610248.44 1766.110254.92 1766.24
10259.37 1766.310265.73 1766.5910295.74 1767.5310304.49 1767.710314.47 1767.95
10338.9 1768.310346.18 1768.4410375.77 1768.910385.81 1768.9410394.74 1769.24
10407.75 1769.910429.36 1770.2510466.65 1770.6610467.15 1770.6610467.23 1770.66
10467.39 1770.610467.82 1770.610496.16 1770.9510511.22 1771.1810518.34 1771.2
10536.98 1771.310548.55 1771.4510552.76 1771.5310594.94 1771.910599.03 1771.93
10599.82 1771.910641.76 1772.48

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9830.72 .04 9880.37 .0310128.91 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9880.3710128.91 200 386.2 325 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 0.076

INPUT
Description:
Station Elevation Data num= 68
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9807.25 1780.6 9854.53 1768.38 9856.95 1767.95 9862.6 1767.4 9866.27 1767.05
9874.51 1765 9878.12 1763.94 9881.03 1763.68 9890.88 1761.57 9900.95 1759.41
9903.24 1759.1 9917.05 1755.95 9919.09 1755.47 9923.62 1755.43 9942.2 1755.3
9950.59 1755.2 9954.06 1755.26 9955.76 1755.25 9958.35 1755.2 9972.2 1755.34
9997.78 1755.510005.91 1755.6110017.44 1755.9110041.89 1756.2910042.46 1756.35
10047.37 1756.710062.79 1758.1310063.93 1758.1910092.99 1760.0710094.29 1760.14
10094.77 1760.110095.83 1760.210098.77 1760.35 10114.4 1761.0610127.27 1761.88
10137.31 1762.610144.03 1762.7210149.75 1762.7910161.04 1762.96 10181.1 1763.71
10186.69 1763.710206.91 1763.5310211.36 1763.6210214.25 1763.5810226.57 1763.65
10229.31 1763.710241.94 1764.21 10242.2 1764.2210242.81 1764.25 10253.6 1764.57
10259.62 1764.510280.56 1764.8110280.91 1764.8110289.84 1764.9310310.46 1765.86
10327.57 1766.510348.08 1767.0510375.58 1767.5710426.16 1768.7410440.67 1769.18
10469.57 176910504.21 1770.4610505.79 1770.5 10513.7 1770.6510570.88 1771.74
10576.07 1771.8 10582.3 1771.9510611.58 1772.17

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9807.25 .04 9903.24 .0310094.77 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9903.2410094.77 150 261.6 125 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 0.027

INPUT
Description: Note:RM 0.027 has been modified to show the notch in the berm.

Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9549.9 1784.7 9563.33 1781.12 9599.89 1771.7 9608.96 1769.32 9612.19 1769.66
9617.78 1769.1 9622.16 1768.91 9634.08 1768.8 9643.65 1768.53 9648.38 1768.34
9660.22 1767.8 9663.41 1767.68 9665.36 1767.59 9680.11 1767.53 9683.65 1767.44
9701.24 1767.2 9701.7 1767.2 9719.94 1766.93 9721.81 1766.93 9736.58 1766.8
9736.65 1766.8 9740.73 1762.8 9741.84 1766.87 9762.6 1766.86 9773.1 1766.79
9774.51 1765.9 9777.31 1764.25 9778.88 1765.24 9782 1767.18 9783.8 1767.17
9788.13 1767 9794.2 1767.15 9797.56 1767.25 9803.33 1767.09 9805.67 1766.96
9814.42 1766.9 9822.81 1766.51 9823.39 1766.51 9837.16 1766.37 9838.99 1766.33
9853.14 1766.1 9855.21 1766.26 9872.11 1766.38 9874.83 1766.47 9876.64 1766.45
9885.03 1766.5 9890.34 1766.39 9894.18 1766.5 9896.15 1766.57 9904.93 1766.6
9911.64 1766.5 9922.32 1766.78 9931.35 1766.86 9938.17 1767.42 9946.38 1767.06

9948.48 1767 9953.54 1766.31 9959.48 1763.89 9968.23 1764.02 9999.38 1762.47
10021.87 1762.910032.46 1763.8410038.12 1764.3510052.65 1765.1310054.33 1765.22
10054.66 1765.210057.98 1765.32 10061.7 1764.8510077.43 1764.9810081.26 1765.18
10099.33 176610101.72 1766.1710105.13 1766.0310109.29 1766.2110126.41 1766.95
10142.63 1767.110152.79 1767.2810155.87 1767.3410159.45 1767.3710181.06 1767.63
10208.42 1768.110209.74 1768.1910220.57 1768.34 10232.5 1768.47 10242.3 1768.45
10244.22 1768.510245.58 1768.510252.62 1768.2710263.34 1768.610285.05 1768.99

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9549.9 .04 9938.17 .0310077.43 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9938.1710077.43 125 141.3 150 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 0

INPUT
Description: Note: Begin Reach A

Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9624.12 1773.6 9663.55 1763.36 9678.23 1759.46 9703.41 1752.44 9710.84 1752.38
9723.19 1752.3 9739.25 1750.96 9741.55 1750.74 9746.67 1751.01 9751.23 1750.33
9759.48 1750.1 9764.46 1749.8 9766.4 1749.63 9766.9 1749.8 9768.37 1749.94
9774.87 1751 9779.05 1751.31 9782.37 1751.6 9787.48 1751.61 9789.41 1751.49
9791.59 1751.4 9795.29 1751.84 9801.7 1752 9805.21 1751.07 9808.4 1752.26
9823.34 1754.8 9853.32 1756.28 9863.83 1757.03 9872.13 1757.24 9874.26 1757.33
9886.38 1758.2 9897.8 1759.07 9901.57 1759.28 9914.32 1759.64 9922.52 1760.03
9934.13 1760 9962.02 1760.45 9969.71 1760.36 9979.65 1759.98 9982.9 1759.98
9984.71 1759.910000.08 1757.8110002.92 1757.2610004.85 1757.2210009.17 1757.21
10014.83 1757.510018.54 1758.0910025.38 1759.5110027.37 1759.6810029.27 1759.65
10031.12 1759.5 10041.1 1759.110046.56 1759.0810052.04 1759.1610060.87 1758.9
10066.71 1758.710070.95 1758.8510075.78 1759.2110081.13 1759.3710084.66 1759.5
10088.78 1759.510092.68 1759.6410097.09 1759.710106.52 1759.6510115.18 1759.46
10127.22 1758.610129.85 1758.1910134.35 1758.3810149.72 1758.5210152.18 1758.57
10153.12 1758.8 10162.1 1760.1910167.75 1759.9310173.46 1760.4210181.59 1760.47
10185.89 1760.510193.83 1760.7610199.91 1760.9710208.78 1761.4110212.68 1761.66
10215.79 1761.910217.87 1761.8410223.45 1762.0210228.79 1762.0410243.23 1762.82
10243.89 1762.810258.25 1763.8610284.81 1765.4610287.27 1765.5310312.62 1766.42

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9624.12 .04 9984.71 .0310029.27 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9984.7110029.27 0 0 0 .1 .3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft/ft)	E.G. Elev (ft/s)	E.G. Slope (sq ft)	Vel Chnl (ft)	Flow Area	Top Width	Froude # Chl
Reach-1	4.552	PF 1	300.00	1927.40	1929.25	1929.25	1929.62	0.015878	6.18	70.68	89.49	0.97
Reach-1	4.552	PF 2	300.00	1927.40	1929.36	1929.28	1929.70	0.012050	5.71	72.53	74.74	0.86
Reach-1	4.47	PF 1	300.00	1921.22	1923.88	1923.88	1924.29	0.009692	5.72	74.36	115.25	0.79
Reach-1	4.47	PF 2	300.00	1921.22	1923.97	1923.97	1924.61	0.011902	6.57	50.78	45.00	0.88
Reach-1	4.39	PF 1	860.00	1915.27	1918.51	1918.29	1919.13	0.007123	7.02	165.95	108.10	0.75
Reach-1	4.39	PF 2	860.00	1915.27	1918.70	1918.44	1919.81	0.009454	8.46	101.74	34.61	0.87
Reach-1	4.319	PF 1	860.00	1911.48	1914.89	1914.89	1915.75	0.010873	8.13	134.57	84.33	0.91
Reach-1	4.319	PF 2	860.00	1911.48	1915.01	1914.94	1915.96	0.010610	8.29	118.85	55.94	0.90

Reach-1	4.223	PF 1	860.00	1905.77	1909.02	1908.91	1909.48	0.011492	7.12	182.10	145.78	0.89
Reach-1	4.223	PF 2	860.00	1905.77	1909.32	1909.18	1910.06	0.012319	8.08	132.97	67.83	0.94
Reach-1	4.126	PF 1	860.00	1900.10	1904.14	1904.00	1904.70	0.008827	6.14	158.41	143.16	0.78
Reach-1	4.126	PF 2	860.00	1900.10	1904.14	1903.86	1904.78	0.009639	6.41	134.18	69.82	0.81
Reach-1	4.03	PF 1	860.00	1894.95	1898.88	1898.74	1899.72	0.011061	7.65	139.49	131.66	0.90
Reach-1	4.03	PF 2	860.00	1894.95	1899.19	1898.85	1900.04	0.008955	7.41	116.05	45.84	0.82
Reach-1	3.943	PF 1	860.00	1890.59	1894.53	1894.34	1895.29	0.008655	7.79	139.86	72.21	0.82
Reach-1	3.943	PF 2	860.00	1890.59	1895.15		1896.22	0.007697	8.39	106.68	31.97	0.80
Reach-1	3.844	PF 1	860.00	1886.47	1889.74	1889.74	1890.32	0.010510	7.34	172.48	137.73	0.87
Reach-1	3.844	PF 2	860.00	1886.47	1890.09	1890.09	1891.17	0.012429	8.81	110.23	50.12	0.97
Reach-1	3.751	PF 1	860.00	1880.62	1883.95	1883.89	1884.39	0.008841	6.51	198.73	166.54	0.79
Reach-1	3.751	PF 2	860.00	1880.62	1884.27		1884.98	0.009939	7.36	134.55	64.63	0.85
Reach-1	3.684	PF 1	1420.00	1876.00	1880.66	1880.48	1881.47	0.007801	7.99	230.32	116.44	0.79
Reach-1	3.684	PF 2	1420.00	1876.00	1881.43		1882.42	0.006003	8.09	181.39	47.20	0.72
Reach-1	3.614	PF 1	1420.00	1873.20	1877.78	1877.78	1878.51	0.007997	8.14	268.71	176.92	0.80
Reach-1	3.614	PF 2	1420.00	1873.20	1878.32	1878.01	1879.62	0.009557	9.51	161.71	46.56	0.87
Reach-1	3.544	PF 1	1420.00	1870.57	1875.15		1875.51	0.005086	5.97	344.34	198.37	0.63
Reach-1	3.544	PF 2	1420.00	1870.57	1875.58		1876.35	0.006808	7.60	212.50	71.89	0.75
Reach-1	3.44	PF 1	1420.00	1865.99	1870.64	1870.64	1871.71	0.010023	8.85	200.13	114.44	0.90
Reach-1	3.44	PF 2	1420.00	1865.99	1870.70	1870.70	1871.86	0.010112	9.01	179.49	77.54	0.90
Reach-1	3.354	PF 1	1420.00	1863.51	1868.78		1868.88	0.000880	3.37	765.96	439.08	0.28
Reach-1	3.354	PF 2	1420.00	1863.51	1868.77		1868.87	0.000890	3.38	762.37	438.55	0.28
Reach-1	3.341	PF 1	1420.00	1861.30	1868.76	1865.33	1868.81	0.000263	2.37	1132.73	487.53	0.16
Reach-1	3.341	PF 2	1420.00	1861.30	1868.75	1865.33	1868.80	0.000265	2.37	1128.70	482.97	0.17
Reach-1	3.334		Culvert									
Reach-1	3.327	PF 1	1420.00	1860.86	1865.97	1865.97	1866.57	0.009061	7.91	307.06	257.01	0.75
Reach-1	3.327	PF 2	1420.00	1860.86	1866.03	1866.03	1866.56	0.007877	7.46	322.10	240.29	0.70
Reach-1	3.31	PF 1	1420.00	1860.36	1864.97		1865.42	0.006065	6.40	339.96	243.50	0.62
Reach-1	3.31	PF 2	1420.00	1860.36	1865.27		1865.55	0.003591	5.22	411.60	238.53	0.48
Reach-1	3.217	PF 1	1570.00	1856.40	1861.07	1861.07	1861.87	0.008785	8.05	282.58	203.15	0.75
Reach-1	3.217	PF 2	1570.00	1856.40	1861.04	1861.04	1862.38	0.012666	9.62	180.55	66.47	0.90
Reach-1	3.135	PF 1	1570.00	1854.40	1859.91		1860.00	0.001093	3.21	836.16	456.99	0.27
Reach-1	3.135	PF 2	1570.00	1854.40	1859.87		1859.98	0.001257	3.42	672.65	280.00	0.29
Reach-1	3.122	PF 1	1570.00	1851.40	1859.50	1858.79	1859.77	0.002150	5.35	523.63	290.07	0.35
Reach-1	3.122	PF 2	1570.00	1851.40	1859.50	1858.80	1859.77	0.002098	5.29	522.06	272.89	0.35
Reach-1	3.1155		Culvert									
Reach-1	3.109	PF 1	1570.00	1854.51	1857.95	1857.95	1858.46	0.014275	8.54	320.91	273.27	0.91
Reach-1	3.109	PF 2	1570.00	1854.51	1857.95	1857.95	1858.45	0.013834	8.42	322.21	267.14	0.89
Reach-1	3.083	PF 1	1570.00	1851.75	1856.41	1856.09	1856.77	0.006751	6.18	376.43	252.83	0.64
Reach-1	3.083	PF 2	1570.00	1851.75	1856.53		1856.84	0.005327	5.64	397.66	233.80	0.57
Reach-1	2.982	PF 1	1880.00	1847.00	1852.00	1851.94	1852.64	0.008481	8.60	373.78	227.73	0.75
Reach-1	2.982	PF 2	1880.00	1847.00	1852.16		1853.03	0.008975	9.08	279.19	102.24	0.78
Reach-1	2.887	PF 1	1880.00	1842.30	1847.92	1847.89	1848.54	0.008437	7.64	373.73	255.35	0.73
Reach-1	2.887	PF 2	1880.00	1842.30	1848.25	1847.98	1848.96	0.007623	7.73	318.44	136.80	0.70
Reach-1	2.793	PF 1	1880.00	1838.20	1843.30	1843.30	1843.99	0.010887	8.90	349.37	227.36	0.83
Reach-1	2.793	PF 2	1880.00	1838.20	1843.46	1843.46	1844.47	0.012524	9.83	261.71	113.20	0.90

Reach-1	2.699	PF 1	1880.00	1835.00	1839.79		1839.90	0.001002	3.38	811.18	350.76	0.30
Reach-1	2.699	PF 2	1880.00	1835.00	1840.18		1840.87	0.003768	6.98	292.05	68.91	0.59
Reach-1	2.689	PF 1	1880.00	1835.59	1839.05	1839.05	1839.72	0.008702	7.58	347.85	260.09	0.82
Reach-1	2.689	PF 2	1880.00	1835.59	1839.81		1840.62	0.006049	7.48	268.31	85.20	0.71
Reach-1	2.618	PF 1	1880.00	1831.64	1836.53	1836.33	1836.99	0.005943	7.35	422.85	285.31	0.70
Reach-1	2.618	PF 2	1880.00	1831.64	1837.33		1838.25	0.006840	9.07	276.57	101.38	0.77
Reach-1	2.544	PF 1	1880.00	1828.25	1833.37	1833.37	1834.18	0.008918	9.03	306.83	166.73	0.86
Reach-1	2.544	PF 2	1880.00	1828.25	1833.90	1833.90	1835.19	0.009568	10.29	228.05	80.85	0.91
Reach-1	2.46	PF 1	2110.00	1826.00	1830.29		1830.64	0.005091	6.26	492.89	276.56	0.64
Reach-1	2.46	PF 2	2110.00	1826.00	1831.00		1831.50	0.004727	6.95	401.15	149.90	0.64
Reach-1	2.385	PF 1	2110.00	1823.30	1827.29	1827.29	1827.84	0.011706	8.27	414.49	338.96	0.93
Reach-1	2.385	PF 2	2110.00	1823.30	1828.03	1828.03	1828.92	0.010591	9.36	313.03	153.87	0.92
Reach-1	2.283	PF 1	2110.00	1819.07	1824.20		1824.43	0.004049	5.99	628.68	414.83	0.57
Reach-1	2.283	PF 2	2110.00	1819.07	1825.15		1825.45	0.002862	5.92	506.14	176.30	0.50
Reach-1	2.253	PF 1	2110.00	1818.05	1822.81	1822.81	1823.33	0.010711	8.57	443.43	376.70	0.90
Reach-1	2.253	PF 2	2110.00	1818.05	1823.65	1823.65	1824.56	0.009889	9.78	313.58	147.59	0.90
Reach-1	2.195	PF 1	2110.00	1815.60	1822.07	1819.83	1822.30	0.001204	4.34	712.41	345.84	0.34
Reach-1	2.195	PF 2	2110.00	1815.60	1822.23	1819.84	1822.44	0.001062	4.16	689.51	253.21	0.32
Reach-1	2.1875		Culvert									
Reach-1	2.18	PF 1	2110.00	1814.45	1820.54	1819.94	1821.32	0.005210	7.31	347.67	215.18	0.66
Reach-1	2.18	PF 2	2110.00	1814.45	1820.90	1819.94	1821.44	0.003371	6.25	425.83	212.70	0.54
Reach-1	2.167	PF 1	2110.00	1814.10	1819.87	1819.87	1820.40	0.006175	7.81	495.66	416.63	0.69
Reach-1	2.167	PF 2	2110.00	1814.10	1820.44	1820.13	1820.95	0.004369	7.19	452.37	239.67	0.60
Reach-1	2.159		Culvert									
Reach-1	2.151	PF 1	2110.00	1813.20	1819.02	1819.02	1819.41	0.008197	6.78	527.50	554.55	0.83
Reach-1	2.151	PF 2	2110.00	1813.20	1819.31	1819.21	1819.83	0.007852	6.93	410.86	291.99	0.83
Reach-1	2.115	PF 1	2110.00	1812.90	1817.65	1817.65	1818.08	0.009546	8.36	507.57	507.45	0.85
Reach-1	2.115	PF 2	2110.00	1812.90	1817.71	1817.71	1818.42	0.011727	9.39	346.07	204.57	0.95
Reach-1	2.08	PF 1	2110.00	1810.94	1815.70		1815.86	0.003788	5.47	783.52	719.87	0.54
Reach-1	2.08	PF 2	2110.00	1810.94	1816.32		1816.59	0.003343	5.79	531.48	221.36	0.52
Reach-1	1.982	PF 1	2110.00	1808.50	1811.93	1811.90	1812.32	0.013655	7.91	477.17	520.71	0.97
Reach-1	1.982	PF 2	2110.00	1808.50	1812.54	1812.54	1813.30	0.013877	9.45	323.14	189.70	1.02
Reach-1	1.91	PF 1	2110.00	1805.97	1809.78		1809.93	0.005378	5.35	750.33	758.42	0.62
Reach-1	1.91	PF 2	2110.00	1805.97	1810.38		1810.69	0.005200	6.14	500.31	261.00	0.63
Reach-1	1.83	PF 1	2440.00	1802.39	1807.05	1807.05	1807.48	0.009858	8.47	598.10	610.46	0.87
Reach-1	1.83	PF 2	2440.00	1802.39	1807.59	1807.59	1808.33	0.009910	9.50	410.71	231.75	0.90
Reach-1	1.765	PF 1	2440.00	1799.80	1804.64		1804.80	0.004000	5.50	906.13	919.28	0.55
Reach-1	1.765	PF 2	2440.00	1799.80	1805.52		1805.82	0.004322	6.73	629.24	345.00	0.59
Reach-1	1.665	PF 1	2440.00	1796.50	1801.17	1801.17	1801.54	0.010679	8.68	640.08	746.62	0.89
Reach-1	1.665	PF 2	2440.00	1796.50	1801.82	1801.82	1802.44	0.009864	9.52	453.53	289.27	0.88
Reach-1	1.606	PF 1	2440.00	1794.37	1799.04	1798.57	1799.18	0.003998	5.58	937.42	882.22	0.55
Reach-1	1.606	PF 2	2440.00	1794.37	1799.79	1799.37	1800.00	0.003589	6.09	746.26	451.82	0.54
Reach-1	1.548	PF 1	2490.00	1793.80	1796.57	1796.48	1796.80	0.013177	6.83	686.28	1060.63	0.92
Reach-1	1.548	PF 2	2490.00	1793.80	1797.23	1797.23	1797.71	0.014438	8.90	495.31	445.14	1.02
Reach-1	1.36	PF 1	4070.00	1787.00	1792.04		1792.33	0.005011	7.04	1182.61	932.38	0.64

Reach-1	1.36	PF 2	4070.00	1787.00	1792.49		1792.94	0.004888	7.18	814.73	324.01	0.61
Reach-1	1.291	PF 1	4190.00	1784.20	1789.83	1789.83	1790.41	0.010285	10.25	829.09	647.49	0.91
Reach-1	1.291	PF 2	4190.00	1784.20	1790.24	1790.24	1791.11	0.010648	11.14	628.63	297.85	0.94
Reach-1	1.211	PF 1	4240.00	1782.22	1788.36		1788.52	0.001768	4.88	1389.09	531.78	0.40
Reach-1	1.211	PF 2	4240.00	1782.22	1789.03		1789.27	0.001499	4.92	1098.85	251.70	0.38
Reach-1	1.184	PF 1	4240.00	1780.10	1787.04		1787.48	0.005554	8.42	918.02	468.26	0.68
Reach-1	1.184	PF 2	4240.00	1780.10	1787.65		1788.33	0.005618	9.17	688.18	219.21	0.70
Reach-1	1.12	PF 1	4340.00	1778.46	1785.50		1785.87	0.004740	8.08	1024.98	522.18	0.63
Reach-1	1.12	PF 2	4340.00	1778.46	1786.06		1786.67	0.005016	8.91	745.96	235.85	0.66
Reach-1	1.027	PF 1	4340.00	1775.80	1782.65		1783.13	0.005245	8.34	935.52	474.80	0.67
Reach-1	1.027	PF 2	4340.00	1775.80	1783.29		1783.96	0.004815	8.68	718.83	215.69	0.65
Reach-1	0.945	PF 1	4590.00	1773.60	1780.75		1781.34	0.004007	8.61	941.21	389.45	0.63
Reach-1	0.945	PF 2	4590.00	1773.60	1781.36		1782.21	0.004048	9.25	695.76	170.46	0.64
Reach-1	0.848	PF 1	4590.00	1772.02	1779.38		1779.94	0.002073	8.91	1064.00	359.22	0.63
Reach-1	0.848	PF 2	4590.00	1772.02	1780.11		1780.84	0.001915	9.22	817.78	168.67	0.62
Reach-1	0.759	PF 1	4590.00	1769.15	1776.84	1776.84	1778.44	0.004798	13.71	631.74	197.72	0.94
Reach-1	0.759	PF 2	4590.00	1769.15	1777.00	1777.00	1779.27	0.005701	15.19	471.63	97.33	1.03
Reach-1	0.662	PF 1	4830.00	1767.53	1774.39	1774.22	1775.56	0.004753	12.50	760.70	274.60	0.94
Reach-1	0.662	PF 2	4830.00	1767.53	1774.89		1776.38	0.004464	12.83	588.09	127.94	0.92
Reach-1	0.573	PF 1	5210.00	1764.40	1772.93	1772.26	1773.89	0.002710	11.20	881.62	244.60	0.72
Reach-1	0.573	PF 2	5210.00	1764.40	1773.51	1772.46	1774.75	0.002690	11.73	692.64	125.10	0.73
Reach-1	0.498	PF 1	5210.00	1763.05	1770.60	1770.60	1772.43	0.005131	14.09	652.76	199.59	1.00
Reach-1	0.498	PF 2	5210.00	1763.05	1770.84	1770.84	1773.23	0.005511	14.98	499.83	100.30	1.04
Reach-1	0.432	PF 1	5210.00	1762.70	1769.13		1769.67	0.001857	8.41	1191.66	412.09	0.60
Reach-1	0.432	PF 2	5210.00	1762.70	1769.26		1770.02	0.002223	9.33	885.98	209.56	0.66
Reach-1	0.34	PF 1	5260.00	1760.55	1768.86		1769.06	0.000823	5.14	1670.94	400.11	0.34
Reach-1	0.34	PF 2	5260.00	1760.55	1769.04		1769.30	0.000890	5.44	1394.29	251.74	0.36
Reach-1	0.238	PF 1	5260.00	1759.45	1768.76		1768.86	0.000182	2.71	2330.59	436.08	0.17
Reach-1	0.238	PF 2	5260.00	1759.45	1768.94		1769.07	0.000209	2.94	1849.45	227.91	0.18
Reach-1	0.149	PF 1	5260.00	1756.80	1768.74		1768.80	0.000070	1.91	3218.24	507.49	0.11
Reach-1	0.149	PF 2	5260.00	1756.80	1768.93		1768.99	0.000075	2.00	2714.64	279.05	0.11
Reach-1	0.076	PF 1	5260.00	1755.20	1768.73		1768.77	0.000046	1.78	3869.21	572.57	0.09
Reach-1	0.076	PF 2	5260.00	1755.20	1768.92		1768.96	0.000047	1.83	3329.79	348.43	0.09
Reach-1	0.027	PF 1	5260.00	1762.47	1767.78	1767.78	1768.65	0.005194	8.31	897.71	529.14	0.78
Reach-1	0.027	PF 2	5260.00	1762.47	1767.85	1767.85	1768.83	0.005470	8.64	804.60	397.44	0.80
Reach-1	0	PF 1	5260.00	1757.21	1762.00	1755.56	1762.07	0.000306	2.05	2591.76	554.16	0.19
Reach-1	0	PF 2	5260.00	1757.21	1763.00	1756.24	1763.09	0.000335	2.52	2200.67	346.35	0.21

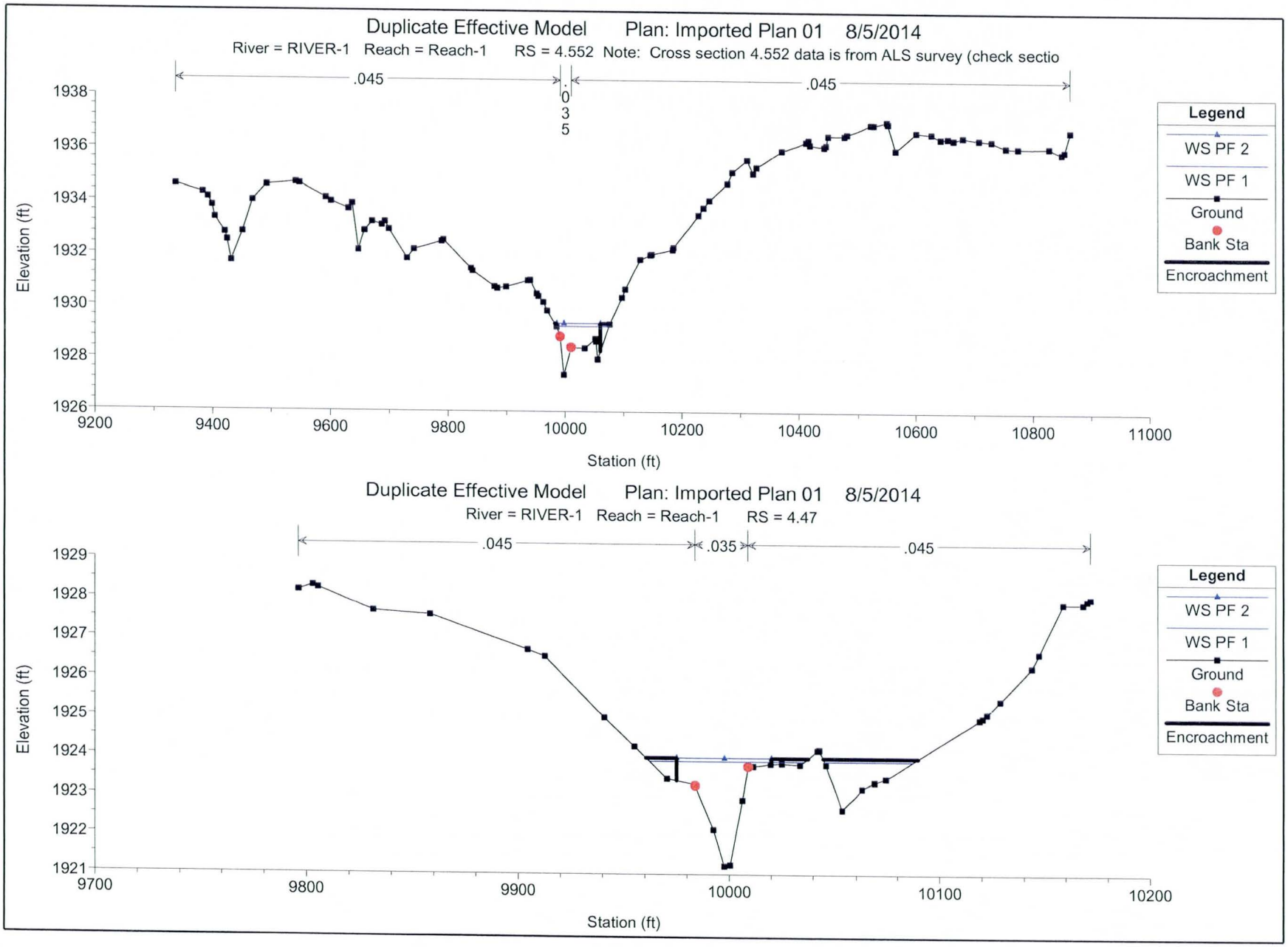
Profile Output Table - Standard Table 2

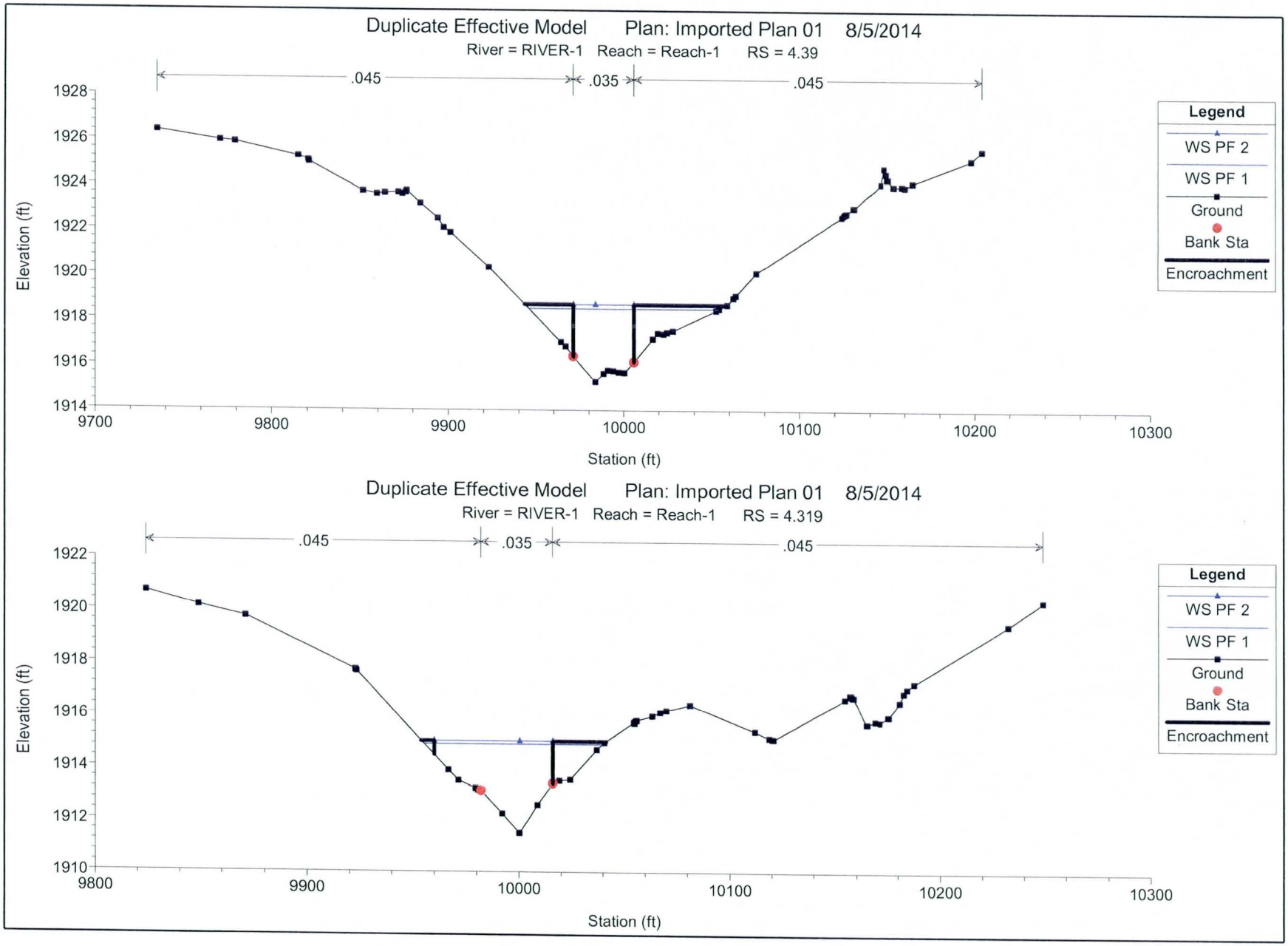
Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (cfs)	C & E Loss (cfs)	Q Left (ft)	Q Channel	Q Right	Top Width
Reach-1	4.552	PF 1	1929.62	1929.25	0.38	5.13	0.00	1.61	147.79	150.60	89.49
Reach-1	4.552	PF 2	1929.70	1929.36	0.34	5.06	0.03	3.06	149.34	147.60	74.74
Reach-1	4.47	PF 1	1924.29	1923.88	0.41	3.22	0.02	15.33	234.45	50.23	115.25
Reach-1	4.47	PF 2	1924.61	1923.97	0.64	4.23	0.05	14.07	283.57	2.36	45.00
Reach-1	4.39	PF 1	1919.13	1918.51	0.62	3.36	0.02	73.46	667.36	119.19	108.10

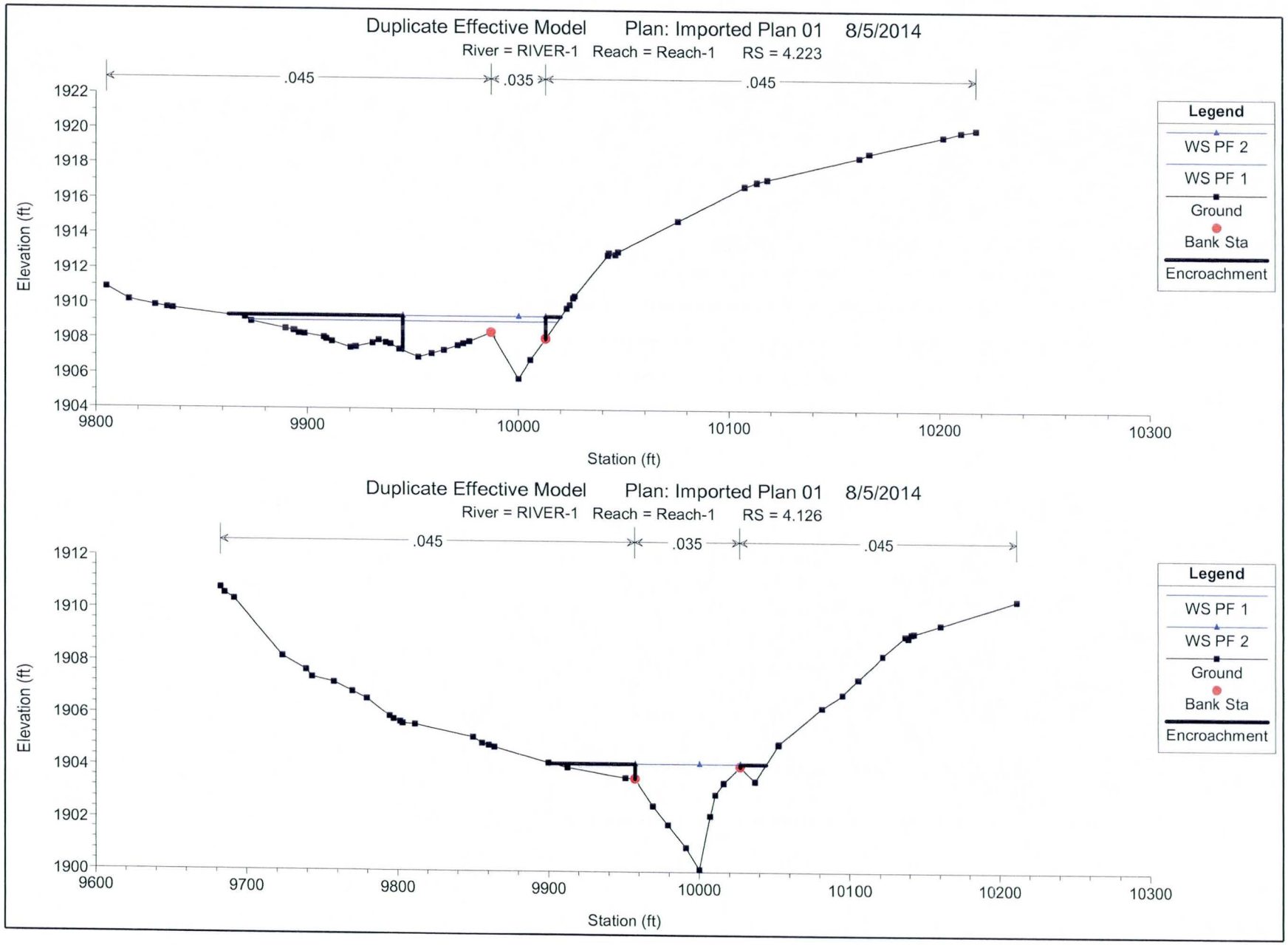
Reach-1	4.39	PF 2	1919.81	1918.70	1.11	3.81	0.05	0.00	859.99	0.00	34.61
Reach-1	4.319	PF 1	1915.75	1914.89	0.86	5.70	0.12	100.00	690.47	69.53	84.33
Reach-1	4.319	PF 2	1915.96	1915.01	0.95	5.84	0.06	122.03	737.97	0.00	55.94
Reach-1	4.223	PF 1	1909.48	1909.02	0.46	4.77	0.01	487.80	366.41	5.79	145.78
Reach-1	4.223	PF 2	1910.06	1909.32	0.75	5.26	0.03	382.38	477.62	0.00	67.83
Reach-1	4.126	PF 1	1904.70	1904.14	0.56	4.96	0.03	25.96	824.38	9.66	143.16
Reach-1	4.126	PF 2	1904.78	1904.14	0.64	4.71	0.02	0.00	860.00	0.00	69.82
Reach-1	4.03	PF 1	1899.72	1898.88	0.83	4.40	0.02		781.34	78.66	131.66
Reach-1	4.03	PF 2	1900.04	1899.19	0.85	3.80	0.02	0.00	860.00	0.00	45.84
Reach-1	3.943	PF 1	1895.29	1894.53	0.76	4.93	0.05	204.18	633.99	21.83	72.21
Reach-1	3.943	PF 2	1896.22	1895.15	1.07	5.05	0.00	25.66	834.33	0.00	31.97
Reach-1	3.844	PF 1	1890.32	1889.74	0.58	4.73	0.04	118.36	530.97	210.67	137.73
Reach-1	3.844	PF 2	1891.17	1890.09	1.08	5.45	0.11	0.00	738.84	121.16	50.12
Reach-1	3.751	PF 1	1884.39	1883.95	0.44	2.88	0.04		492.64	367.36	166.54
Reach-1	3.751	PF 2	1884.98	1884.27	0.71	2.52	0.03		641.82	218.18	64.63
Reach-1	3.684	PF 1	1881.47	1880.66	0.81	2.94	0.03	0.55	1103.75	315.70	116.44
Reach-1	3.684	PF 2	1882.42	1881.43	1.00	2.78	0.03	0.00	1384.90	35.10	47.20
Reach-1	3.614	PF 1	1878.51	1877.78	0.73	2.60	0.11	29.49	928.07	462.44	176.92
Reach-1	3.614	PF 2	1879.62	1878.32	1.30	3.11	0.16		1267.78	152.22	46.56
Reach-1	3.544	PF 1	1875.51	1875.15	0.36	3.73	0.07	10.03	735.93	674.04	198.37
Reach-1	3.544	PF 2	1876.35	1875.58	0.77	4.45	0.04	0.00	1080.39	339.60	71.89
Reach-1	3.44	PF 1	1871.71	1870.64	1.08	0.93	0.29	112.71	1236.06	71.23	114.44
Reach-1	3.44	PF 2	1871.86	1870.70	1.16	0.93	0.32	134.41	1285.58	0.00	77.54
Reach-1	3.354	PF 1	1868.88	1868.78	0.10	0.03	0.04	524.55	759.30	136.15	439.08
Reach-1	3.354	PF 2	1868.87	1868.77	0.11	0.03	0.04	522.40	761.30	136.29	438.55
Reach-1	3.341	PF 1	1868.81	1868.76	0.05			531.52	736.07	152.41	487.53
Reach-1	3.341	PF 2	1868.80	1868.75	0.05			529.99	736.98	153.03	482.97
Reach-1	3.334		Culvert								
Reach-1	3.327	PF 1	1866.57	1865.97	0.60	0.70	0.12	457.96	787.52	174.52	257.01
Reach-1	3.327	PF 2	1866.56	1866.03	0.53	0.49	0.20	478.39	757.68	183.94	240.29
Reach-1	3.31	PF 1	1865.42	1864.97	0.45	3.51	0.04	311.38	923.63	184.99	243.50
Reach-1	3.31	PF 2	1865.55	1865.27	0.28	3.06	0.11	383.53	821.21	215.26	238.53
Reach-1	3.217	PF 1	1861.87	1861.07	0.80	0.96	0.22	13.63	1212.86	343.51	203.15
Reach-1	3.217	PF 2	1862.38	1861.04	1.34	1.19	0.37	0.00	1439.68	130.31	66.47
Reach-1	3.135	PF 1	1860.00	1859.91	0.08	0.11	0.12	425.96	613.46	530.58	456.99
Reach-1	3.135	PF 2	1859.98	1859.87	0.11	0.11	0.10	369.31	646.27	554.42	280.00
Reach-1	3.122	PF 1	1859.77	1859.50	0.28			12.24	886.92	670.84	290.07
Reach-1	3.122	PF 2	1859.77	1859.50	0.27			12.57	876.52	680.92	272.89
Reach-1	3.1155		Culvert								
Reach-1	3.109	PF 1	1858.46	1857.95	0.51	1.42	0.11	86.48	427.82	1055.71	273.27
Reach-1	3.109	PF 2	1858.45	1857.95	0.50	1.22	0.15	87.38	422.66	1059.96	267.14
Reach-1	3.083	PF 1	1856.77	1856.41	0.37	4.11	0.03	84.85	707.13	778.03	252.83
Reach-1	3.083	PF 2	1856.84	1856.53	0.31	3.76	0.06	100.86	671.90	797.25	233.80
Reach-1	2.982	PF 1	1852.64	1852.00	0.65	4.10	0.01	128.43	868.13	883.43	227.73
Reach-1	2.982	PF 2	1853.03	1852.16	0.87	4.02	0.05	0.00	953.91	926.08	102.24

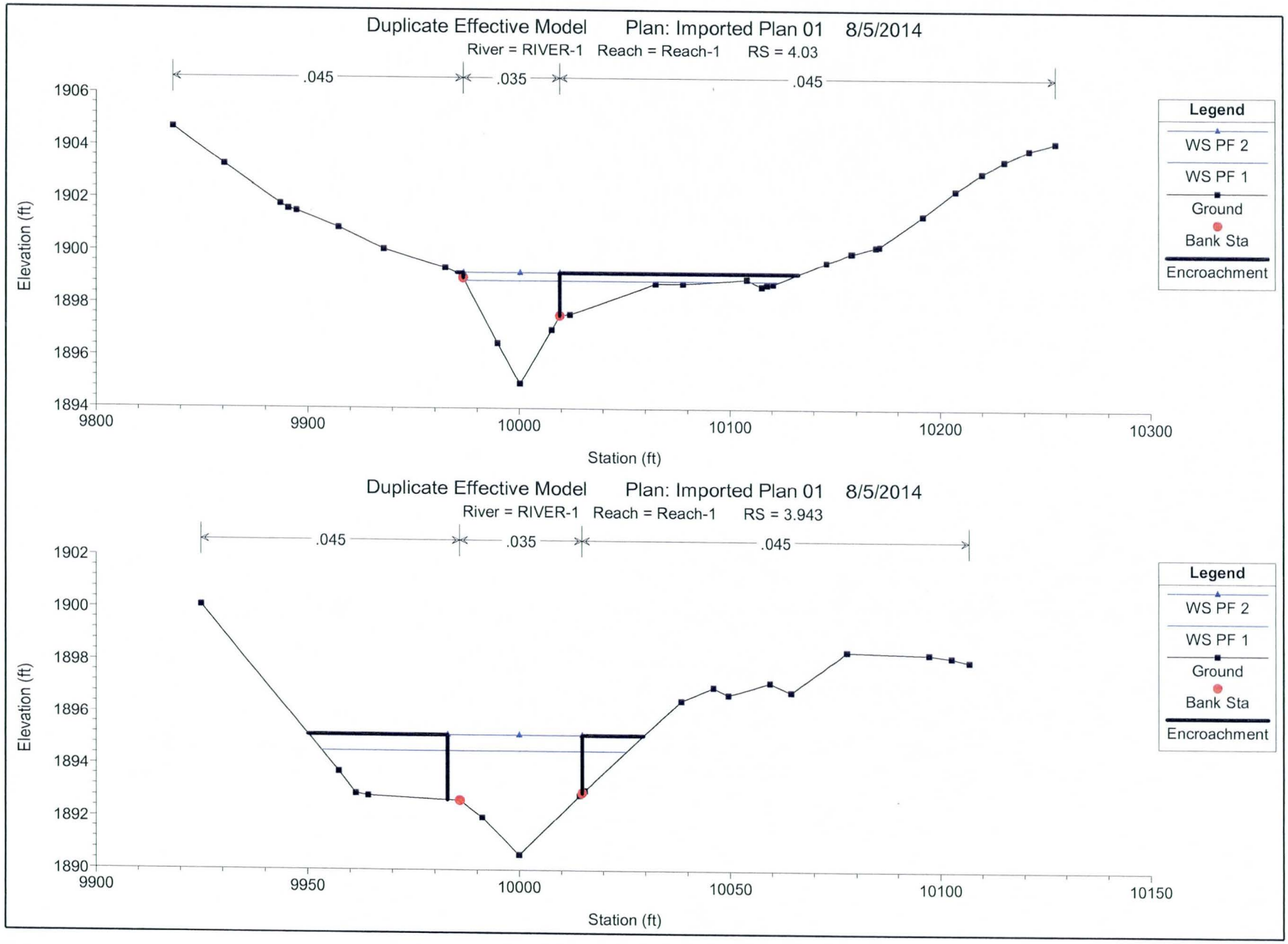
Reach-1	2.887	PF 1	1848.54	1847.92	0.63	4.55	0.01	448.04	1158.54	273.42	255.35
Reach-1	2.887	PF 2	1848.96	1848.25	0.71	4.46	0.03	481.43	1286.72	111.85	136.80
Reach-1	2.793	PF 1	1843.99	1843.30	0.70	1.18	0.18	700.67	841.38	337.95	227.36
Reach-1	2.793	PF 2	1844.47	1843.46	1.01	2.94	0.09	907.80	972.20	0.00	113.20
Reach-1	2.699	PF 1	1839.90	1839.79	0.11	0.11	0.06	165.94	720.94	993.12	350.76
Reach-1	2.699	PF 2	1840.87	1840.18	0.69	0.24	0.01	159.04	1631.49	89.47	68.91
Reach-1	2.689	PF 1	1839.72	1839.05	0.68	2.49	0.06	137.31	1323.47	419.22	260.09
Reach-1	2.689	PF 2	1840.62	1839.81	0.81	2.36	0.01	0.00	1677.07	202.93	85.20
Reach-1	2.618	PF 1	1836.99	1836.53	0.46	2.78	0.04	426.88	743.97	709.15	285.31
Reach-1	2.618	PF 2	1838.25	1837.33	0.92	3.03	0.04	743.16	1132.26	4.58	101.38
Reach-1	2.544	PF 1	1834.18	1833.37	0.82	2.79	0.14	386.10	985.39	508.51	166.73
Reach-1	2.544	PF 2	1835.19	1833.90	1.29	2.75	0.24	584.86	1295.07	0.07	80.85
Reach-1	2.46	PF 1	1830.64	1830.29	0.35	2.78	0.02	158.40	674.96	1276.65	276.56
Reach-1	2.46	PF 2	1831.50	1831.00	0.50	2.54	0.04	0.00	925.54	1184.45	149.90
Reach-1	2.385	PF 1	1827.84	1827.29	0.55	3.28	0.09	739.22	704.05	666.74	338.96
Reach-1	2.385	PF 2	1828.92	1828.03	0.89	2.55	0.17	503.17	1035.56	571.27	153.87
Reach-1	2.283	PF 1	1824.43	1824.20	0.23	1.08	0.03	213.89	467.60	1428.51	414.83
Reach-1	2.283	PF 2	1825.45	1825.15	0.31	0.83	0.06	0.00	589.08	1520.92	176.30
Reach-1	2.253	PF 1	1823.33	1822.81	0.52	0.60	0.23	174.12	638.24	1297.64	376.70
Reach-1	2.253	PF 2	1824.56	1823.65	0.91	0.61	0.56	442.48	942.92	724.60	147.59
Reach-1	2.195	PF 1	1822.30	1822.07	0.23			11.93	1594.42	503.65	345.84
Reach-1	2.195	PF 2	1822.44	1822.23	0.21			13.41	1577.20	519.39	253.21
Reach-1	2.1875		Culvert								
Reach-1	2.18	PF 1	1821.32	1820.54	0.78	0.72	0.20	1.82	1972.61	135.57	215.18
Reach-1	2.18	PF 2	1821.44	1820.90	0.54	0.47	0.02	3.39	1847.08	259.53	212.70
Reach-1	2.167	PF 1	1820.40	1819.87	0.53			39.14	1006.11	1064.75	416.63
Reach-1	2.167	PF 2	1820.95	1820.44	0.51			167.25	1061.66	881.09	239.67
Reach-1	2.159		Culvert								
Reach-1	2.151	PF 1	1819.41	1819.02	0.40	1.19	0.02	22.32	921.91	1165.76	554.55
Reach-1	2.151	PF 2	1819.83	1819.31	0.52	1.29	0.12	74.15	1080.47	955.38	291.99
Reach-1	2.115	PF 1	1818.08	1817.65	0.43	1.28	0.08	355.84	536.92	1217.24	507.45
Reach-1	2.115	PF 2	1818.42	1817.71	0.71	1.32	0.13	0.00	615.37	1494.63	204.57
Reach-1	2.08	PF 1	1815.86	1815.70	0.16	3.52	0.02	326.93	349.36	1433.72	719.87
Reach-1	2.08	PF 2	1816.59	1816.32	0.27	3.24	0.05	91.99	441.29	1576.72	221.36
Reach-1	1.982	PF 1	1812.32	1811.93	0.39	2.32	0.07	195.12	376.18	1538.70	520.71
Reach-1	1.982	PF 2	1813.30	1812.54	0.77	2.37	0.14	313.02	581.34	1215.64	189.70
Reach-1	1.91	PF 1	1809.93	1809.78	0.15	2.42	0.03	653.13	261.05	1195.82	758.42
Reach-1	1.91	PF 2	1810.69	1810.38	0.30	2.32	0.04	197.31	376.50	1536.18	261.00
Reach-1	1.83	PF 1	1807.48	1807.05	0.43	2.13	0.08	600.20	659.14	1180.66	610.46
Reach-1	1.83	PF 2	1808.33	1807.59	0.74	2.10	0.13	124.49	874.04	1441.47	231.75
Reach-1	1.765	PF 1	1804.80	1804.64	0.16	3.24	0.02	1820.48	314.72	304.80	919.28
Reach-1	1.765	PF 2	1805.82	1805.52	0.30	3.35	0.03	1028.26	493.36	918.38	345.00
Reach-1	1.665	PF 1	1801.54	1801.17	0.37	1.79	0.07	230.86	483.29	1725.85	746.62
Reach-1	1.665	PF 2	1802.44	1801.82	0.62	1.65	0.12	0.00	645.17	1794.83	289.27
Reach-1	1.606	PF 1	1799.18	1799.04	0.14	2.37	0.01	298.30	318.65	1823.06	882.22
Reach-1	1.606	PF 2	1800.00	1799.79	0.21	2.26	0.03	0.00	429.65	2010.35	451.82

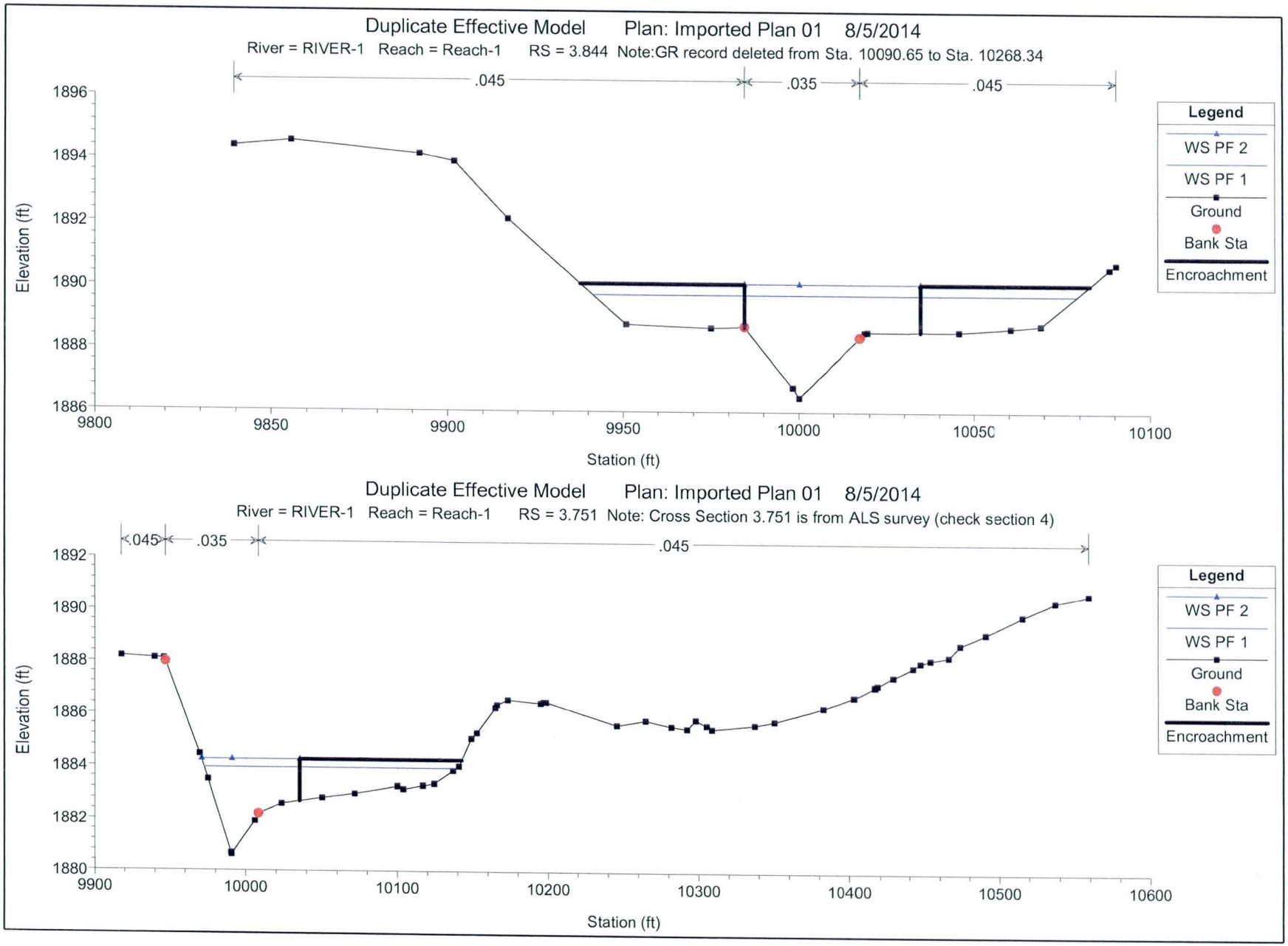
Reach-1	1.548	PF 1	1796.80	1796.57	0.24	4.48	0.01	255.74	189.11	2045.15	1060.63
Reach-1	1.548	PF 2	1797.71	1797.23	0.48	4.45	0.01	458.47	342.46	1689.07	445.14
Reach-1	1.36	PF 1	1792.33	1792.04	0.29	1.88	0.03	531.83	974.92	2563.25	932.38
Reach-1	1.36	PF 2	1792.94	1792.49	0.45	1.79	0.04		1112.46	2957.54	324.01
Reach-1	1.291	PF 1	1790.41	1789.83	0.59	1.40	0.13	866.53	821.74	2501.73	647.49
Reach-1	1.291	PF 2	1791.11	1790.24	0.87	1.27	0.19	31.32	986.02	3172.66	297.85
Reach-1	1.211	PF 1	1788.52	1788.36	0.16	1.01	0.03	732.66	559.79	2947.55	531.78
Reach-1	1.211	PF 2	1789.27	1789.03	0.24	0.89	0.04	266.38	646.20	3327.42	251.70
Reach-1	1.184	PF 1	1787.48	1787.04	0.44	1.59	0.02	1502.83	875.08	1862.09	468.26
Reach-1	1.184	PF 2	1788.33	1787.65	0.69	1.64	0.02	1496.67	1073.67	1669.66	219.21
Reach-1	1.12	PF 1	1785.87	1785.50	0.37	2.73	0.01	1299.70	747.17	2293.13	522.18
Reach-1	1.12	PF 2	1786.67	1786.06	0.61	2.70	0.01	916.30	913.42	2510.29	235.85
Reach-1	1.027	PF 1	1783.13	1782.65	0.48	1.78	0.01	1145.84	1233.26	1960.91	474.80
Reach-1	1.027	PF 2	1783.96	1783.29	0.68	1.74	0.02	926.28	1453.37	1960.35	215.69
Reach-1	0.945	PF 1	1781.34	1780.75	0.58	1.39	0.01	1315.25	1747.73	1527.03	389.45
Reach-1	0.945	PF 2	1782.21	1781.36	0.85	1.33	0.04	1089.80	2071.86	1428.34	170.46
Reach-1	0.848	PF 1	1779.94	1779.38	0.56	1.39	0.11	1104.54	1609.23	1876.23	359.22
Reach-1	0.848	PF 2	1780.84	1780.11	0.73	1.42	0.15	839.85	1861.89	1888.26	168.67
Reach-1	0.759	PF 1	1778.44	1776.84	1.61	2.34	0.13	1089.23	2108.36	1392.41	197.72
Reach-1	0.759	PF 2	1779.27	1777.00	2.27	2.46	0.24	968.40	2393.09	1228.52	97.33
Reach-1	0.662	PF 1	1775.56	1774.39	1.16	1.61	0.06	1062.13	1777.98	1989.89	274.60
Reach-1	0.662	PF 2	1776.38	1774.89	1.49	1.56	0.08	794.28	1989.44	2046.28	127.94
Reach-1	0.573	PF 1	1773.89	1772.93	0.95	1.37	0.09	599.51	1950.45	2660.04	244.60
Reach-1	0.573	PF 2	1774.75	1773.51	1.23	1.40	0.12	205.52	2201.99	2802.49	125.10
Reach-1	0.498	PF 1	1772.43	1770.60	1.83	1.11	0.39	849.86	2718.78	1641.36	199.59
Reach-1	0.498	PF 2	1773.23	1770.84	2.39	1.29	0.49	468.72	3003.44	1737.84	100.30
Reach-1	0.432	PF 1	1769.67	1769.13	0.54	0.50	0.10	547.51	1944.50	2717.99	412.09
Reach-1	0.432	PF 2	1770.02	1769.26	0.77	0.57	0.15	273.02	2204.14	2732.84	209.56
Reach-1	0.34	PF 1	1769.06	1768.86	0.21	0.17	0.03	3167.05	1664.70	428.25	400.11
Reach-1	0.34	PF 2	1769.30	1769.04	0.27	0.20	0.04	3348.75	1806.69	104.55	251.74
Reach-1	0.238	PF 1	1768.86	1768.76	0.10	0.05	0.01	40.16	4464.60	755.24	436.08
Reach-1	0.238	PF 2	1769.07	1768.94	0.13	0.05	0.02	0.00	4956.61	303.39	227.91
Reach-1	0.149	PF 1	1768.80	1768.74	0.05	0.02	0.00	38.93	4737.68	483.38	507.49
Reach-1	0.149	PF 2	1768.99	1768.93	0.06	0.02	0.00	0.00	5048.02	211.98	279.05
Reach-1	0.076	PF 1	1768.77	1768.73	0.04	0.04	0.08	157.78	4181.64	920.59	572.57
Reach-1	0.076	PF 2	1768.96	1768.92	0.05	0.04	0.09	0.00	4360.87	899.13	348.43
Reach-1	0.027	PF 1	1768.65	1767.78	0.87	0.11	0.24	765.08	4136.81	358.12	529.14
Reach-1	0.027	PF 2	1768.83	1767.85	0.99	0.11	0.27	885.87	4374.13	0.00	397.44
Reach-1	0	PF 1	1762.07	1762.00	0.07			4333.89	336.12	589.99	554.16
Reach-1	0	PF 2	1763.09	1763.00	0.09			4396.09	525.12	338.79	346.35

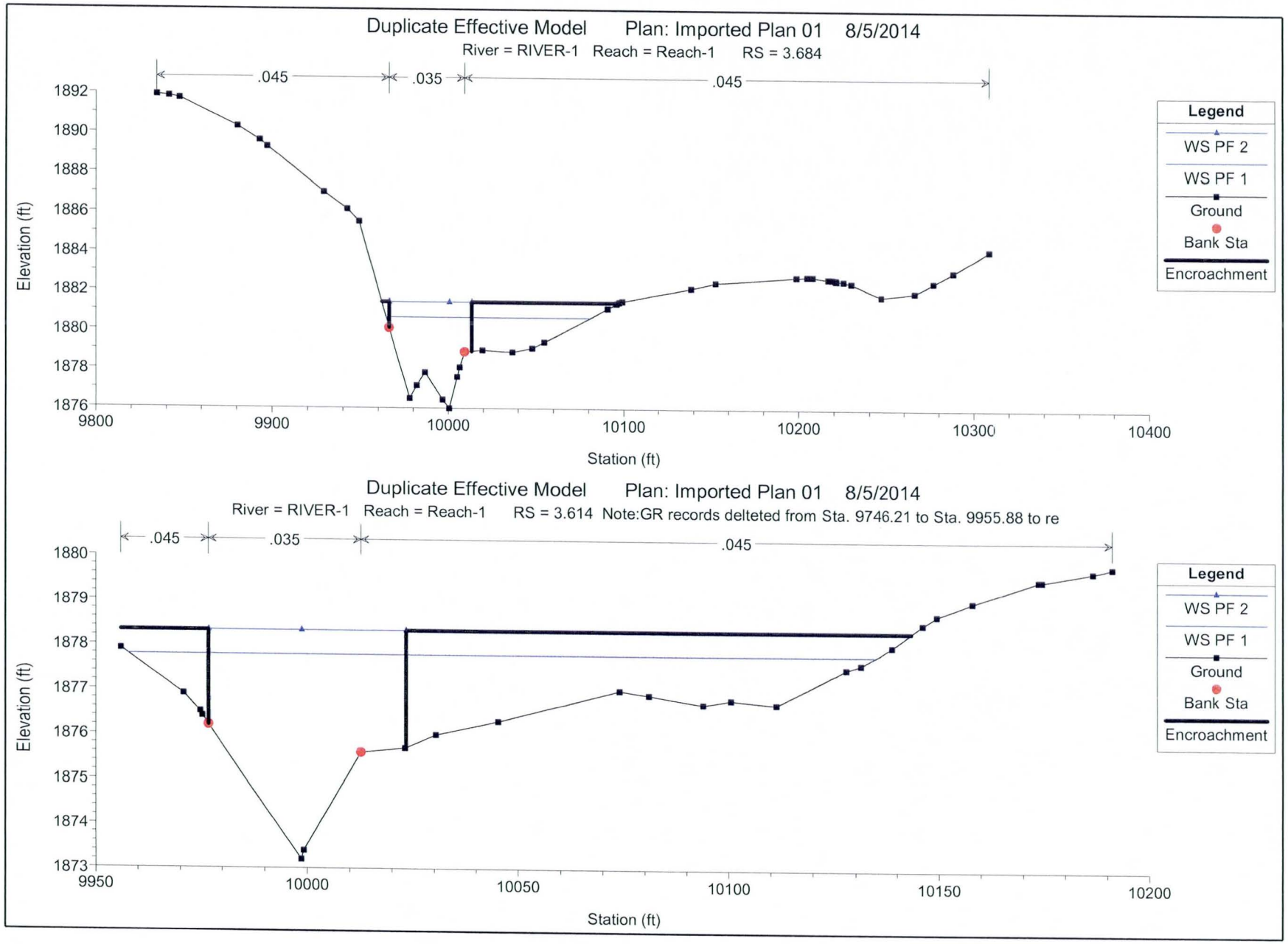

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 4.552 Note: Cross section 4.552 data is from ALS survey (check sectio
.045
.035
.045
Elevation (ft)
1938
1936
1934
1932
1930
1928
1926
9200
9400
9600
9800
10000
10200
10400
10600
10800
11000
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 4.47
.045
.035
.045
Elevation (ft)
1929
1928
1927
1926
1925
1924
1923
1922
1921
9700
9800
9900
10000
10100
10200
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

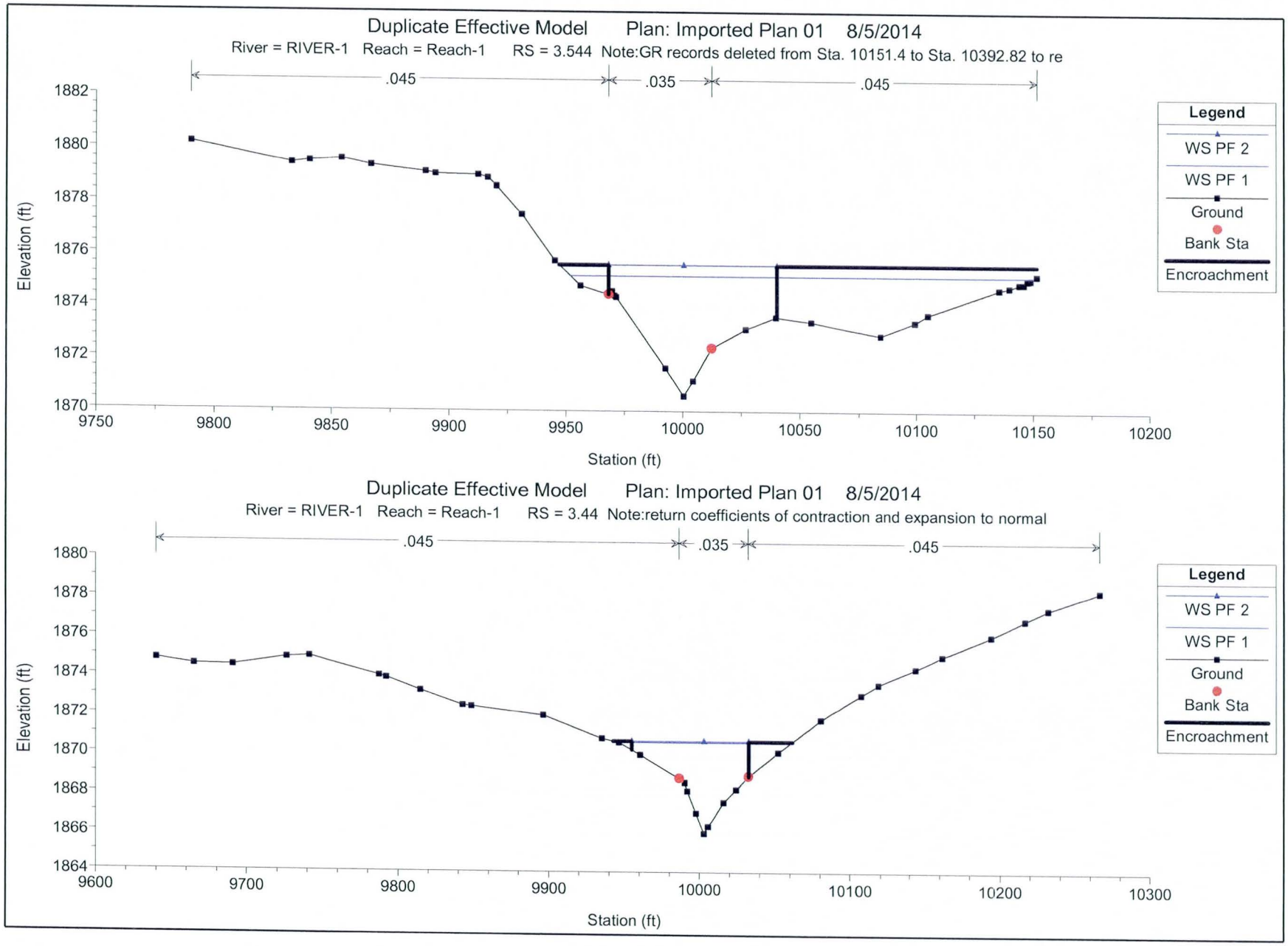

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 4.39
.045
.035
.045
Elevation (ft)
1928
1926
1924
1922
1920
1918
1916
1914
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 4.319
.045
.035
.045
Elevation (ft)
1922
1920
1918
1916
1914
1912
1910
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

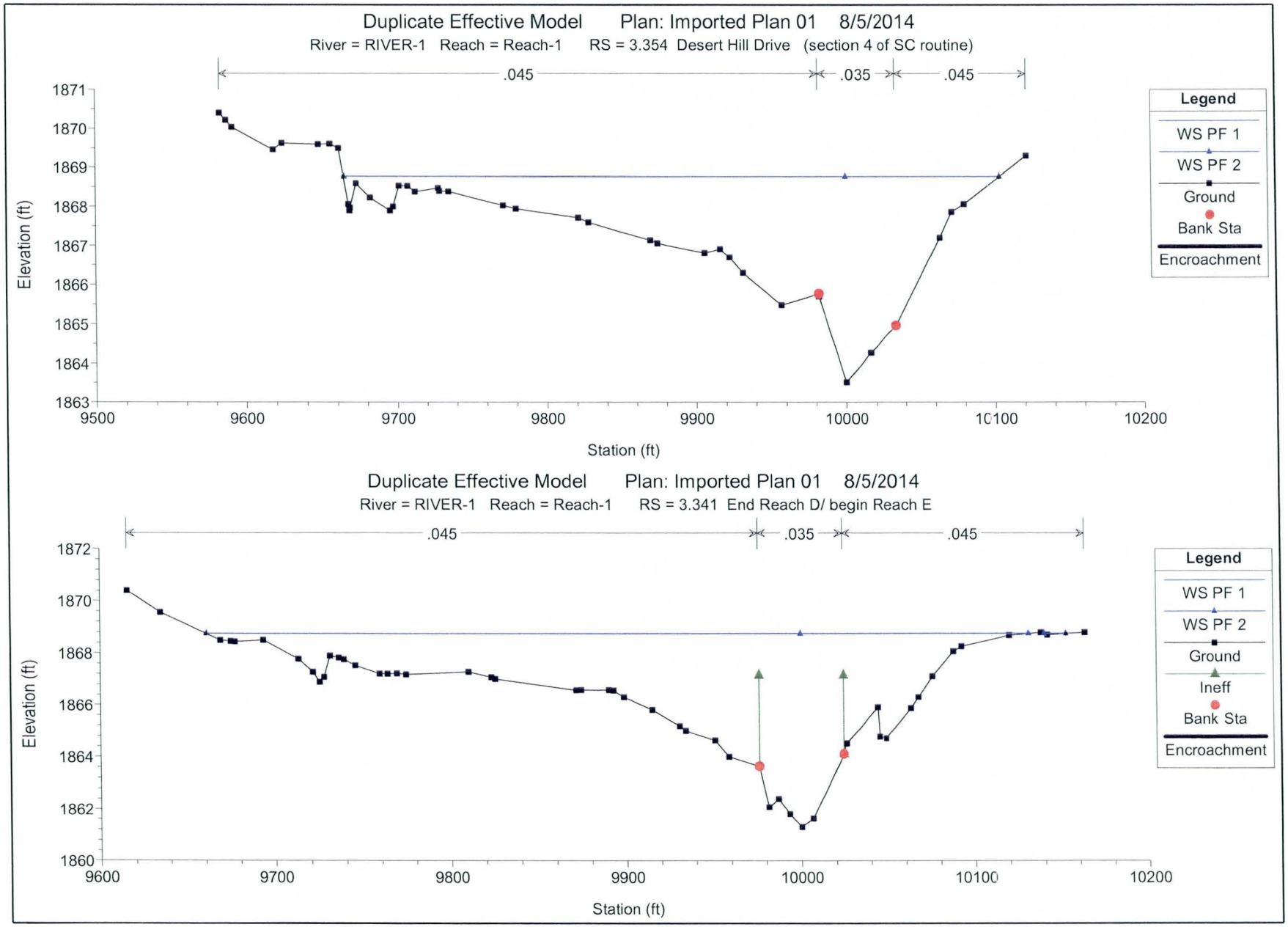

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 4.223
.045
.035
.045
Elevation (ft)
1922
1920
1918
1916
1914
1912
1910
1908
1906
1904
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 4.126
.045
.035
.045
Elevation (ft)
1912
1910
1908
1906
1904
1902
1900
9600
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Encroachment

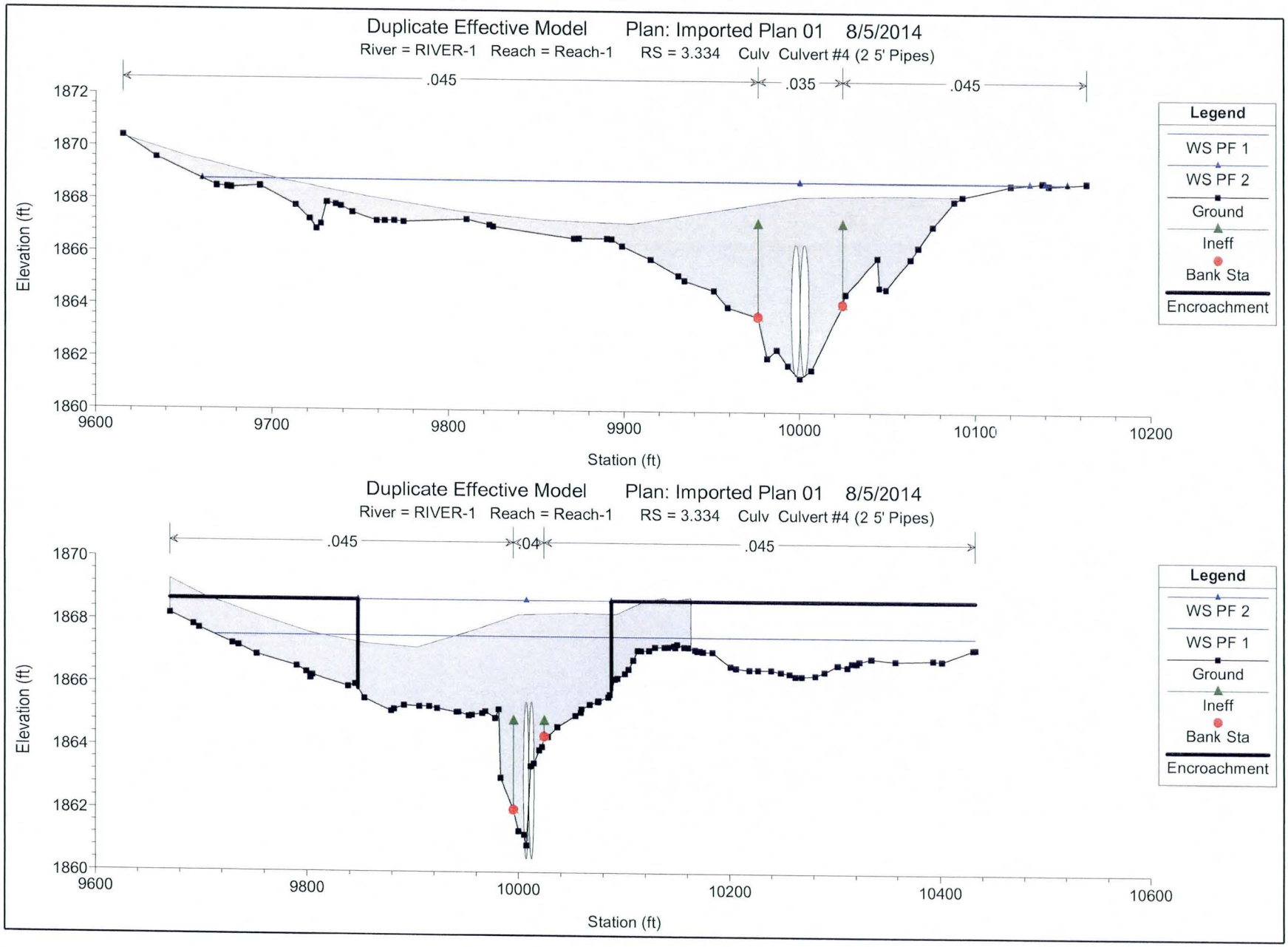

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 4.03
.045
.035
.045
Elevation (ft)
1906
1904
1902
1900
1898
1896
1894
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.943
.045
.035
.045
Elevation (ft)
1902
1900
1898
1896
1894
1892
1890
9900
9950
10000
10050
10100
10150
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

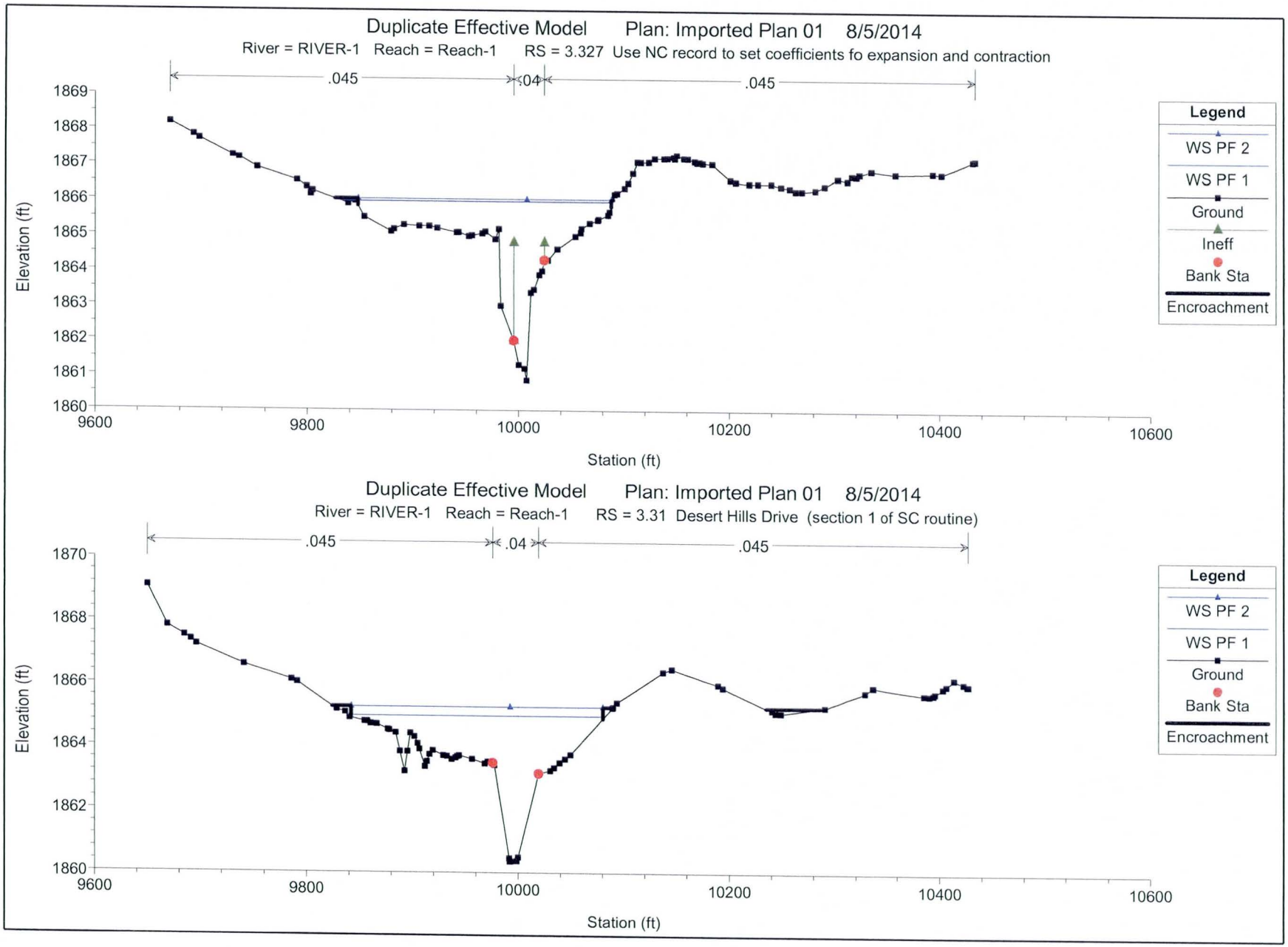

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.844 Note:GR record deleted from Sta. 10090.65 to Sta. 10268.34
.045
.035
.045
Elevation (ft)
1896
1894
1892
1890
1888
1886
9800
9850
9900
9950
10000
10050
10100
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.751 Note: Cross Section 3.751 is from ALS survey (check section 4)
.045
.035
.045
Elevation (ft)
1892
1890
1888
1886
1884
1882
1880
9900
10000
10100
10200
10300
10400
10500
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

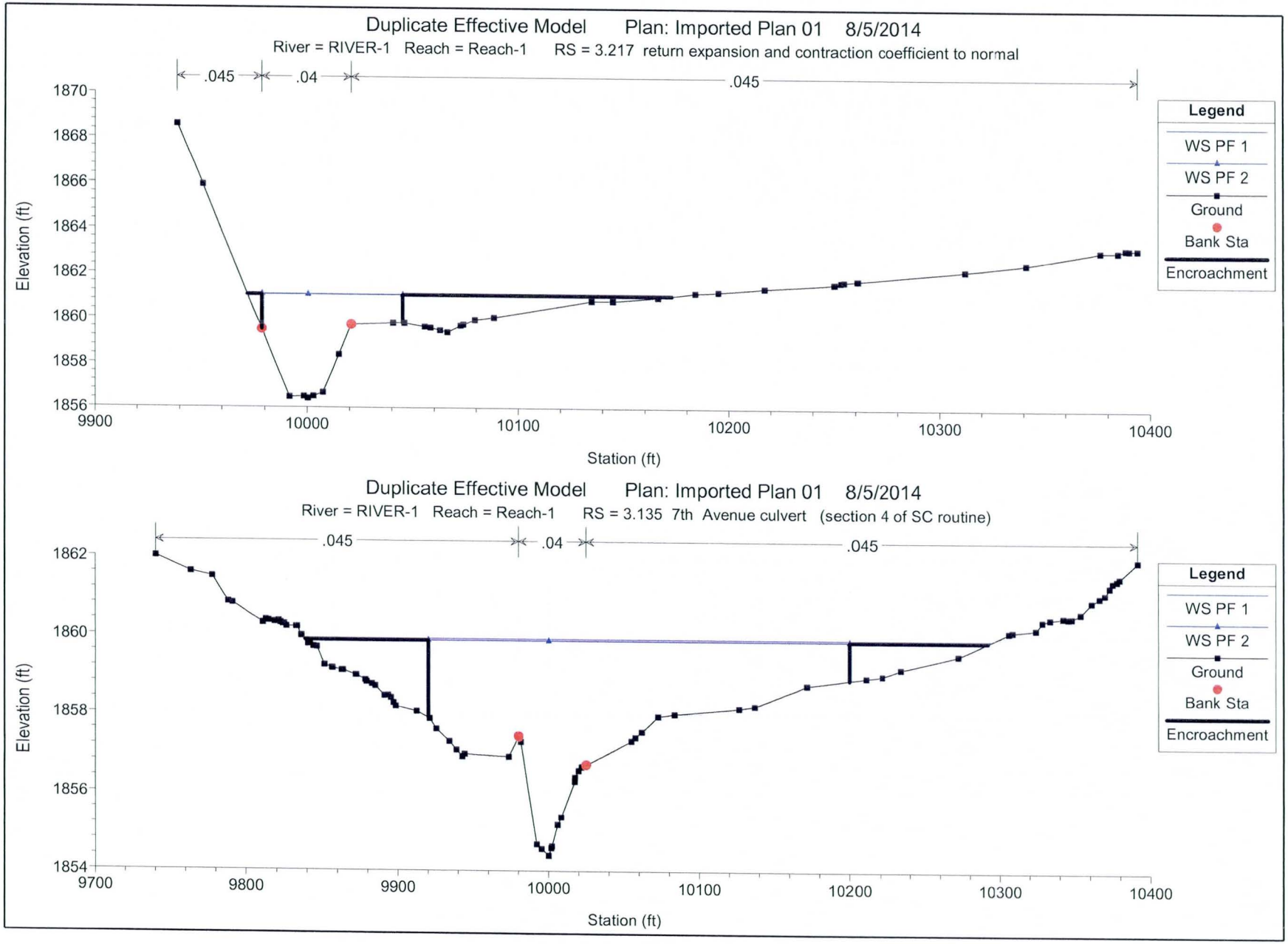

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.684
.045
.035
.045
Elevation (ft)
1892
1890
1888
1886
1884
1882
1880
1878
1876
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.614 Note:GR records delteted from Sta. 9746.21 to Sta. 9955.88 to re
.045
.035
.045
Elevation (ft)
1880
1879
1878
1877
1876
1875
1874
1873
9950
10000
10050
10100
10150
10200
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

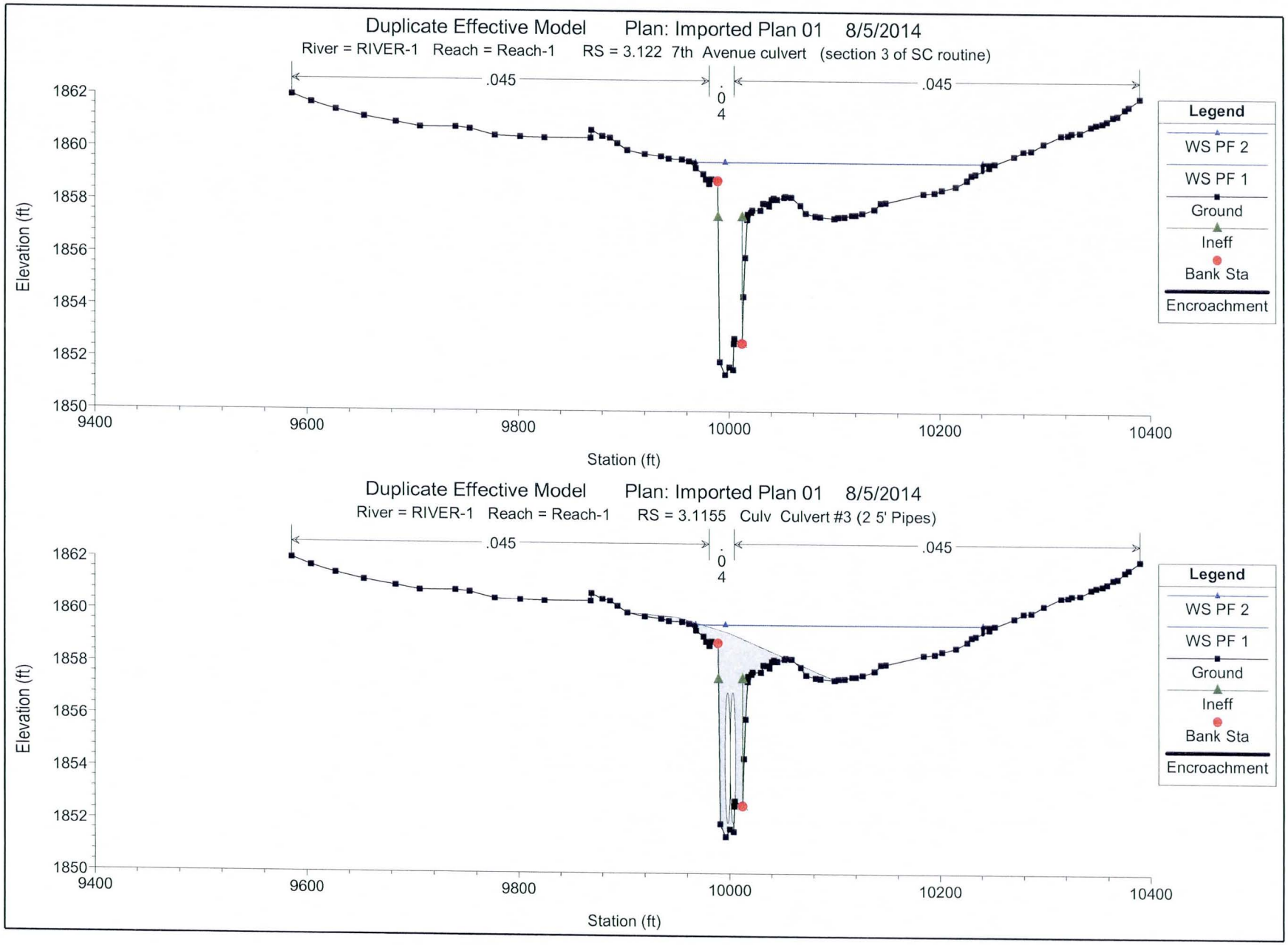

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.544 Note:GR records deleted from Sta. 10151.4 to Sta. 10392.82 to re
.045
.035
.045
Elevation (ft)
1882
1880
1878
1876
1874
1872
1870
9750
9800
9850
9900
9950
10000
10050
10100
10150
10200
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.44 Note:return coefficients of contraction and expansion to normal
.045
.035
.045
Elevation (ft)
1880
1878
1876
1874
1872
1870
1868
1866
1864
9600
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

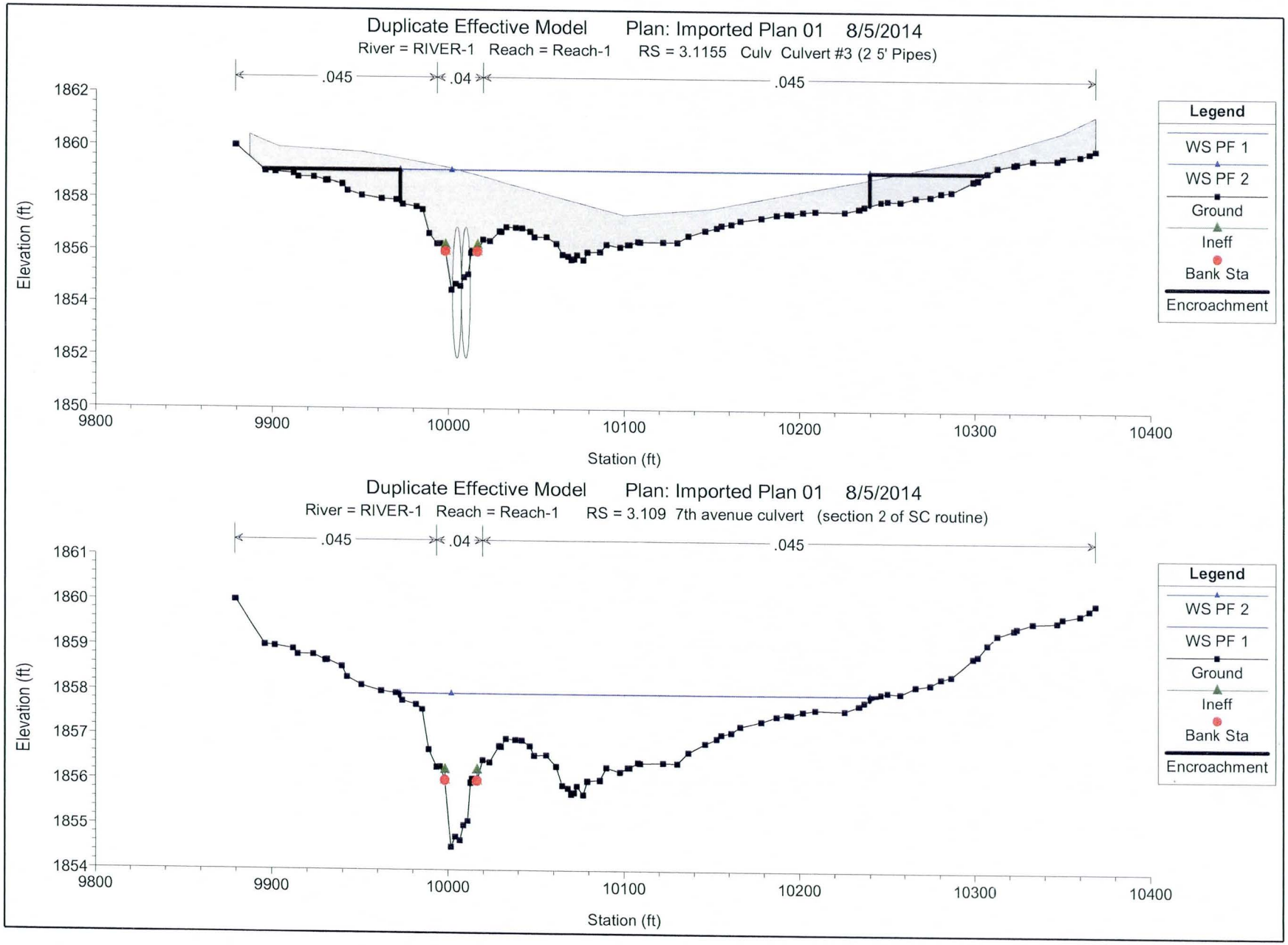

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.354 Desert Hill Drive (section 4 of SC routine)
.045
.035
.045
Elevation (ft)
1871
1870
1869
1868
1867
1866
1865
1864
1863
9500
9600
9700
9800
9900
10000
10100
10200
Station (ft)
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.341 End Reach D/ begin Reach E
.045
.035
.045
Elevation (ft)
1872
1870
1868
1866
1864
1862
1860
9600
9700
9800
9900
10000
10100
10200
Station (ft)
Legend
WS PF 1
WS PF 2
Ground
Ineff
Bank Sta
Encroachment

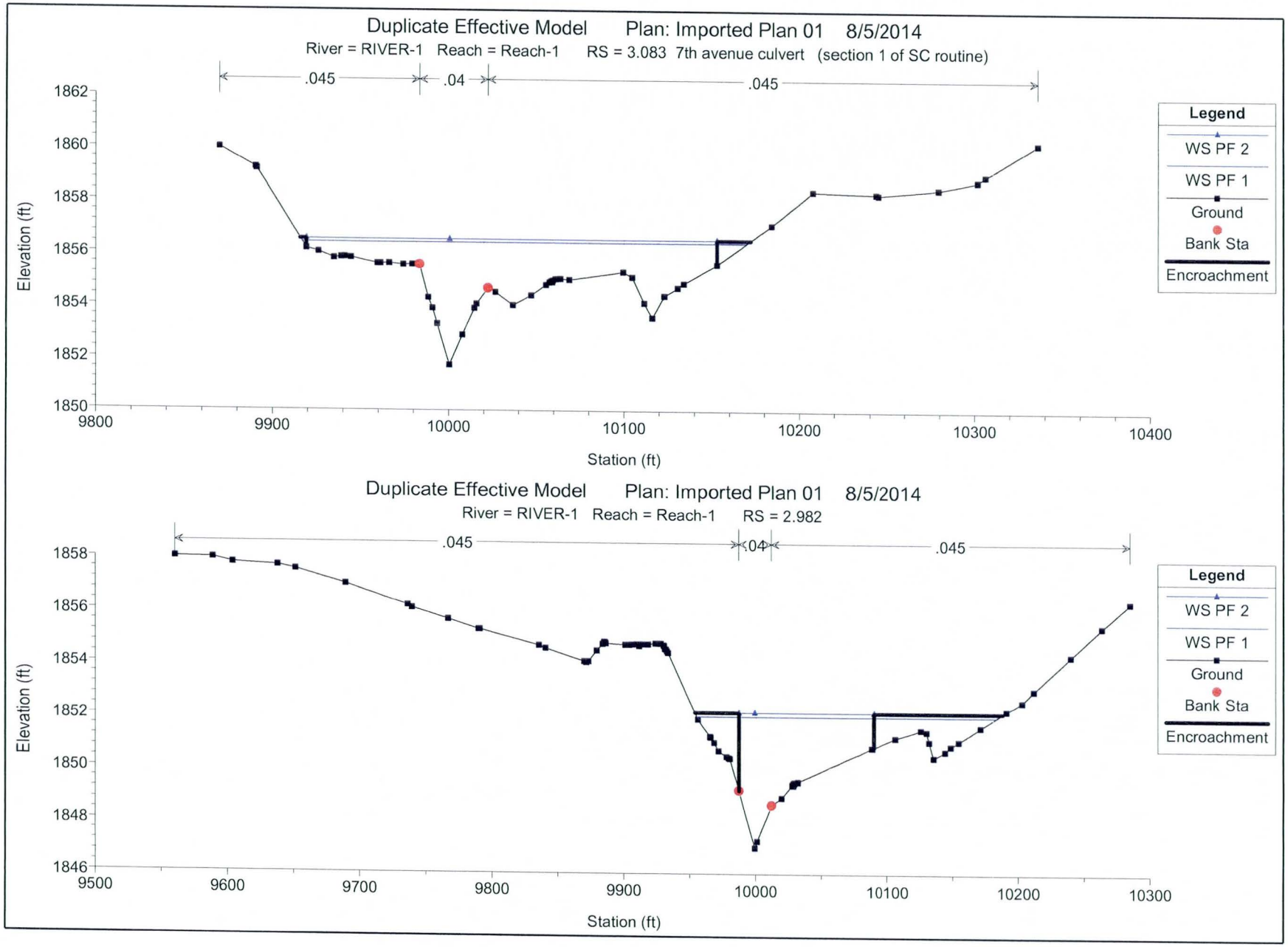

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.334 Culv Culvert #4 (2 5' Pipes)
.045
.035
.045
Elevation (ft)
1872
1870
1868
1866
1864
1862
1860
9600
9700
9800
9900
10000
10100
10200
Station (ft)
Legend
WS PF 1
WS PF 2
Ground
Ineff
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.334 Culv Culvert #4 (2 5' Pipes)
.045
.04
.045
Elevation (ft)
1870
1868
1866
1864
1862
1860
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment

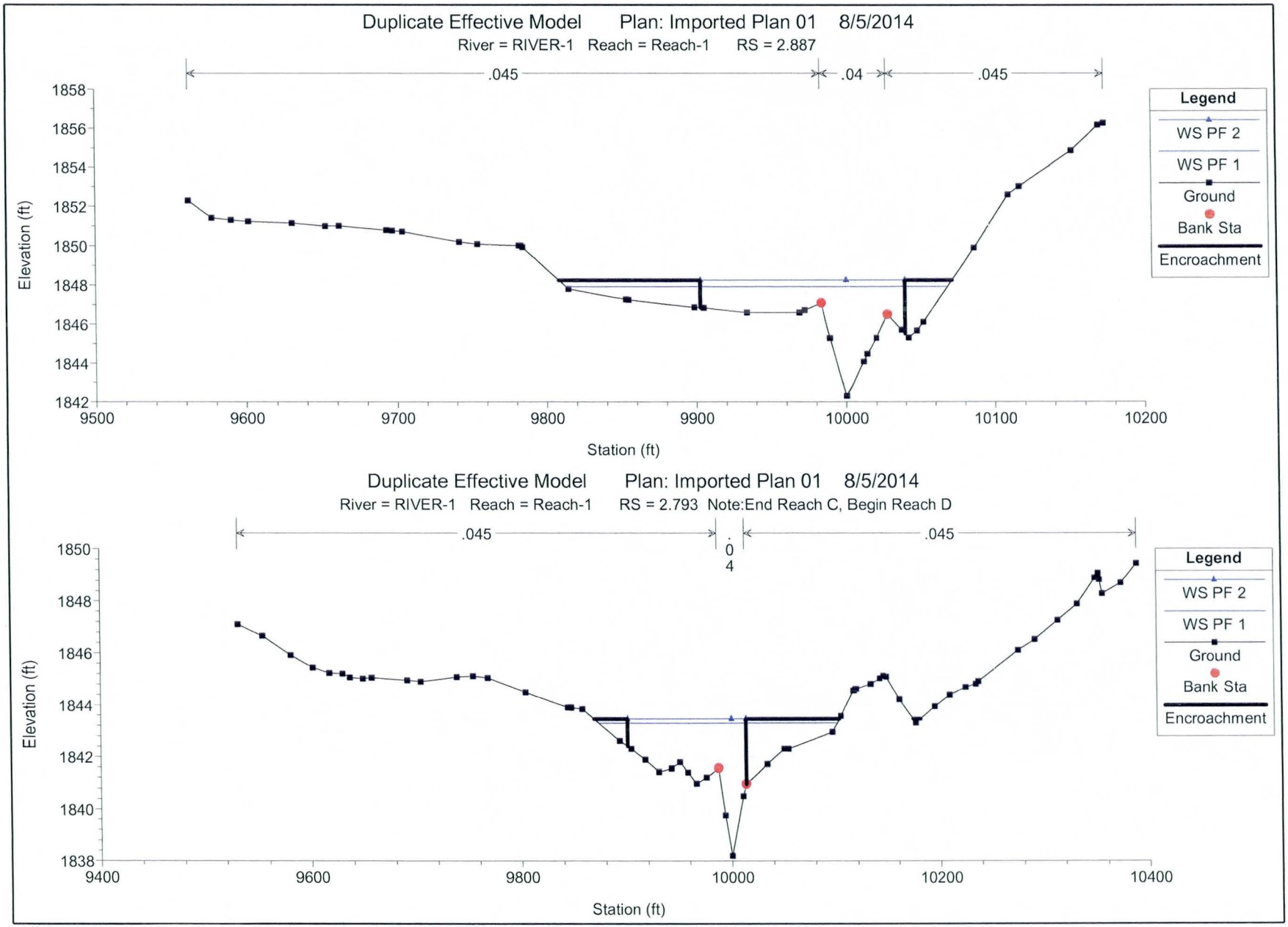

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.327 Use NC record to set coefficients fo expansion and contraction
.045
.04
.045
Elevation (ft)
1869
1868
1867
1866
1865
1864
1863
1862
1861
1860
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.31 Desert Hills Drive (section 1 of SC routine)
.045
.04
.045
Elevation (ft)
1870
1868
1866
1864
1862
1860
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

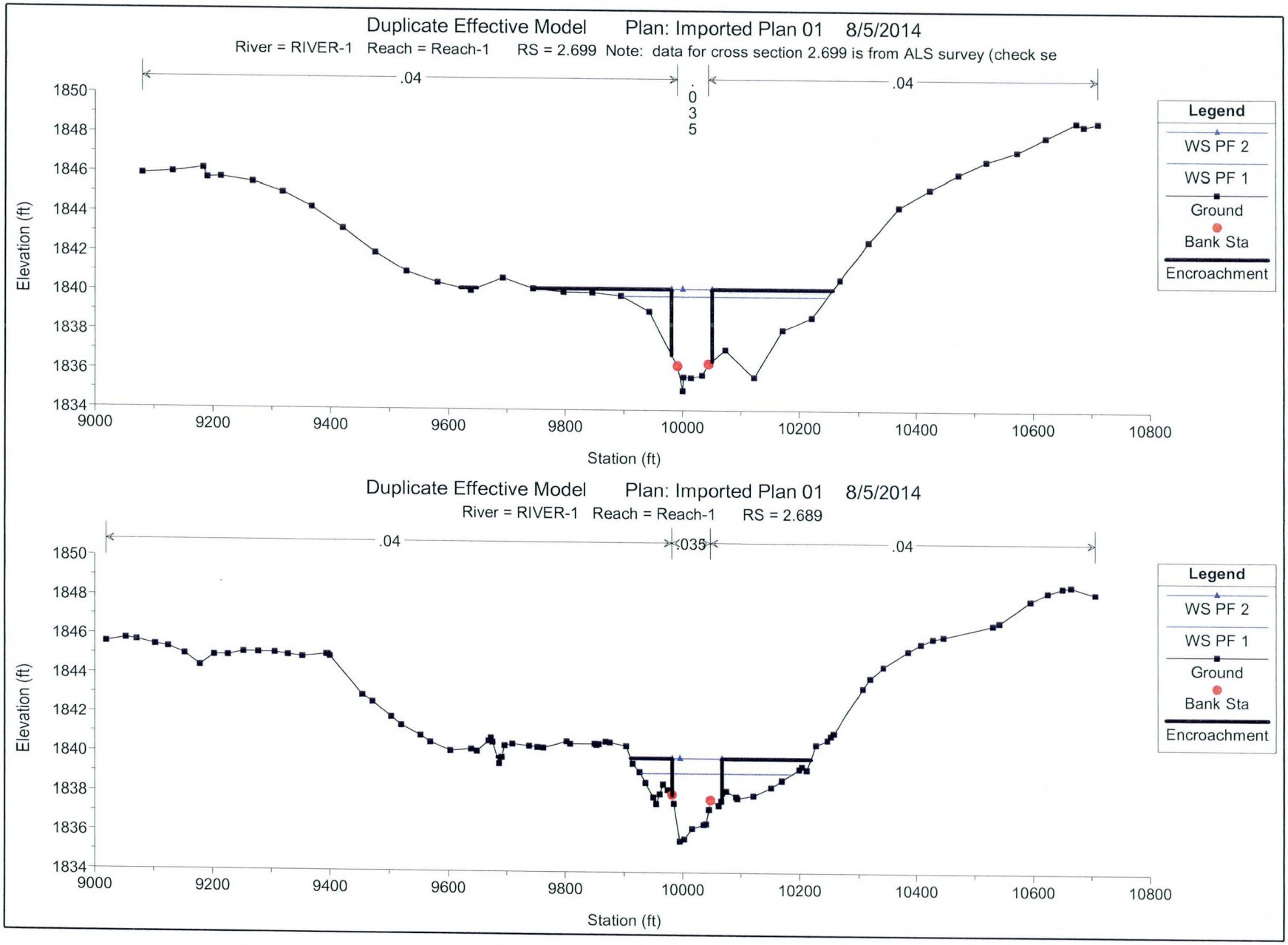

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.217 return expansion and contraction coefficient to normal
.045
.04
.045
Elevation (ft)
1870
1868
1866
1864
1862
1860
1858
1856
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.135 7th Avenue culvert (section 4 of SC routine)
.045
.04
.045
Elevation (ft)
1862
1860
1858
1856
1854
9700
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Encroachment

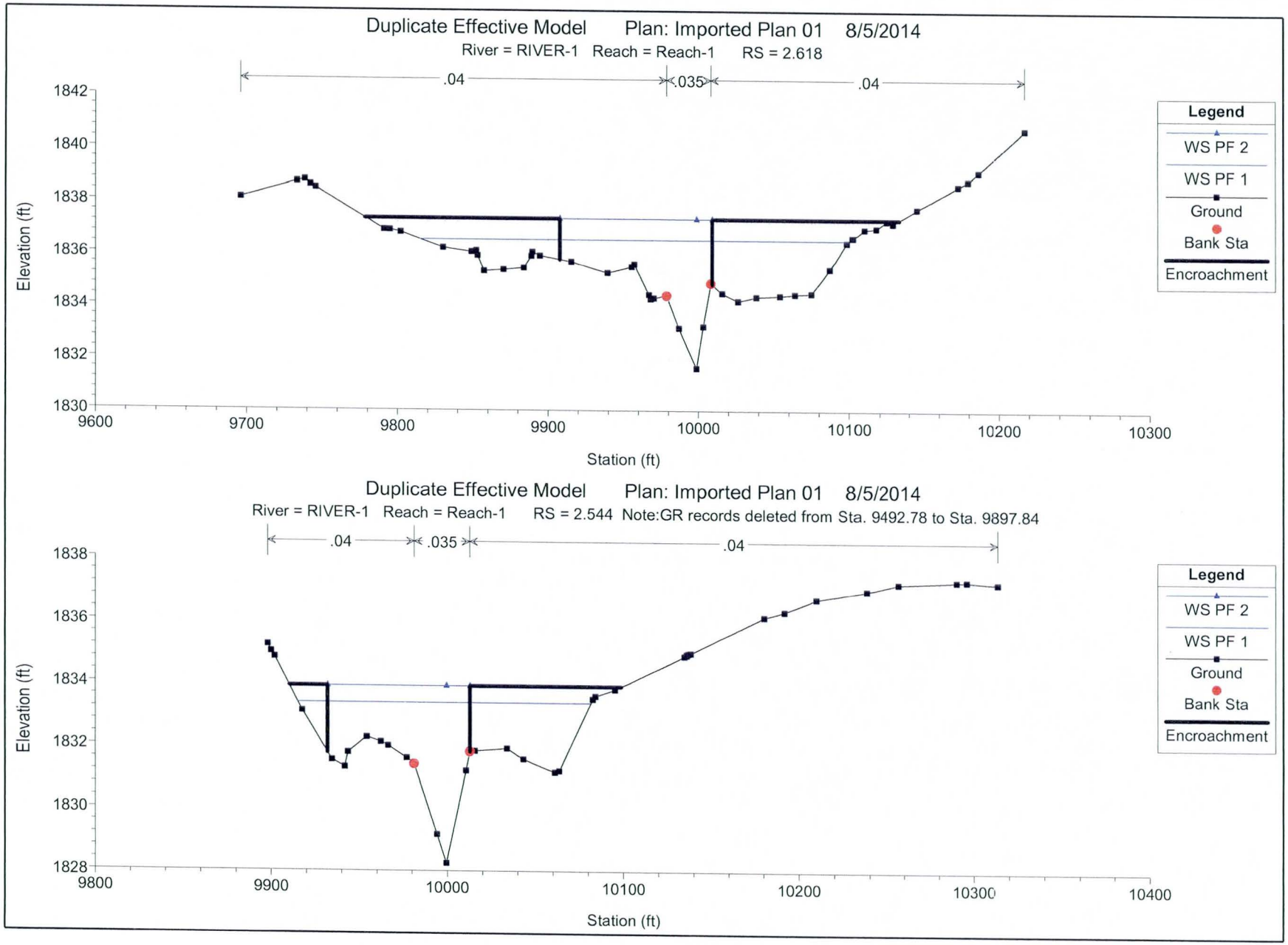

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.122 7th Avenue culvert (section 3 of SC routine)
.045
.04
.045
Elevation (ft)
1862
1860
1858
1856
1854
1852
1850
9400
9600
9800
10000
10200
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.1155 Culv Culvert #3 (2 5' Pipes)
.045
.04
.045
Elevation (ft)
1862
1860
1858
1856
1854
1852
1850
9400
9600
9800
10000
10200
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment

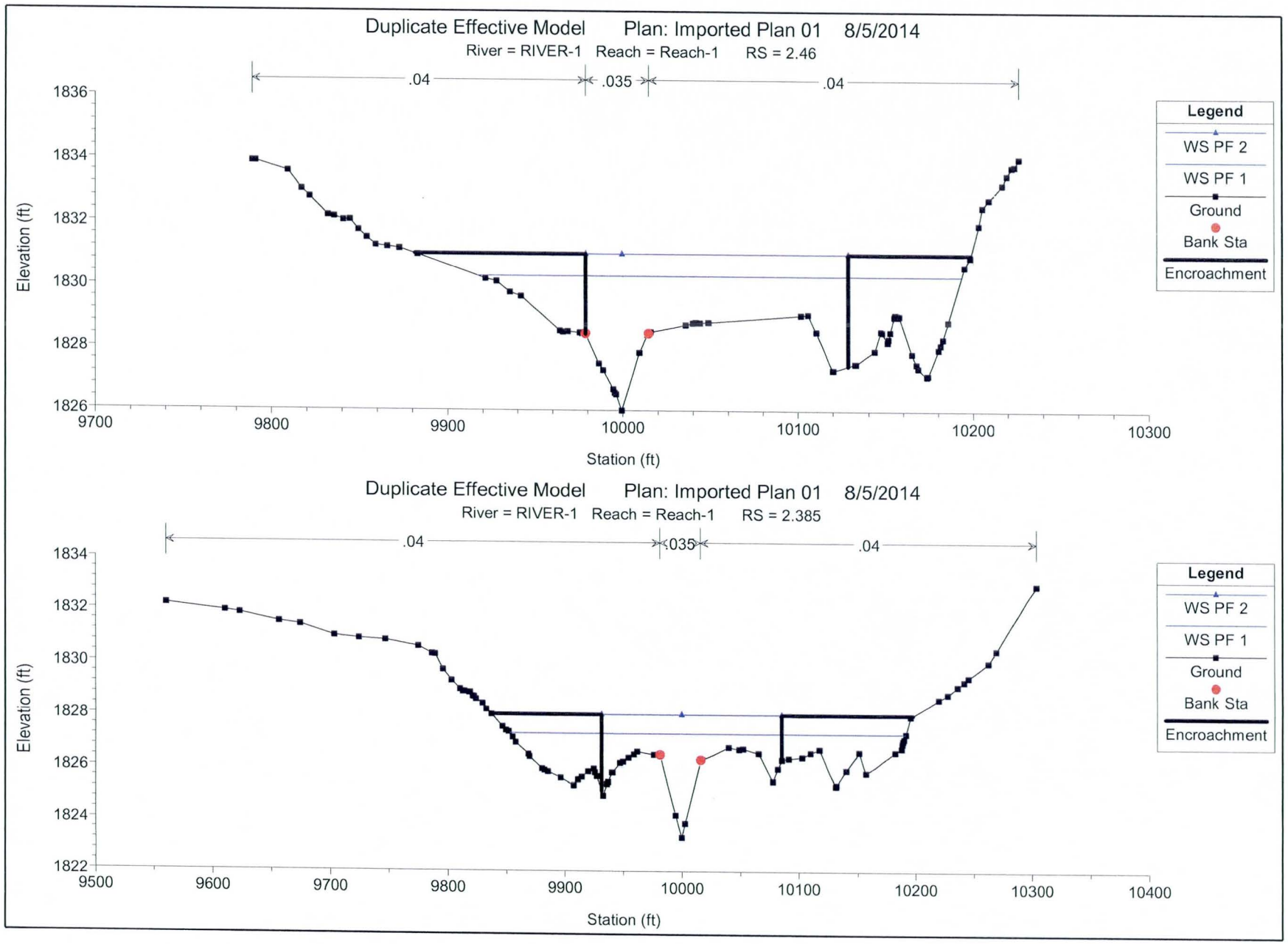

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.1155 Culv Culvert #3 (2 5' Pipes)
.045
.04
.045
Elevation (ft)
1862
1860
1858
1856
1854
1852
1850
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 1
WS PF 2
Ground
Ineff
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.109 7th avenue culvert (section 2 of SC routine)
.045
.04
.045
Elevation (ft)
1861
1860
1859
1858
1857
1856
1855
1854
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment

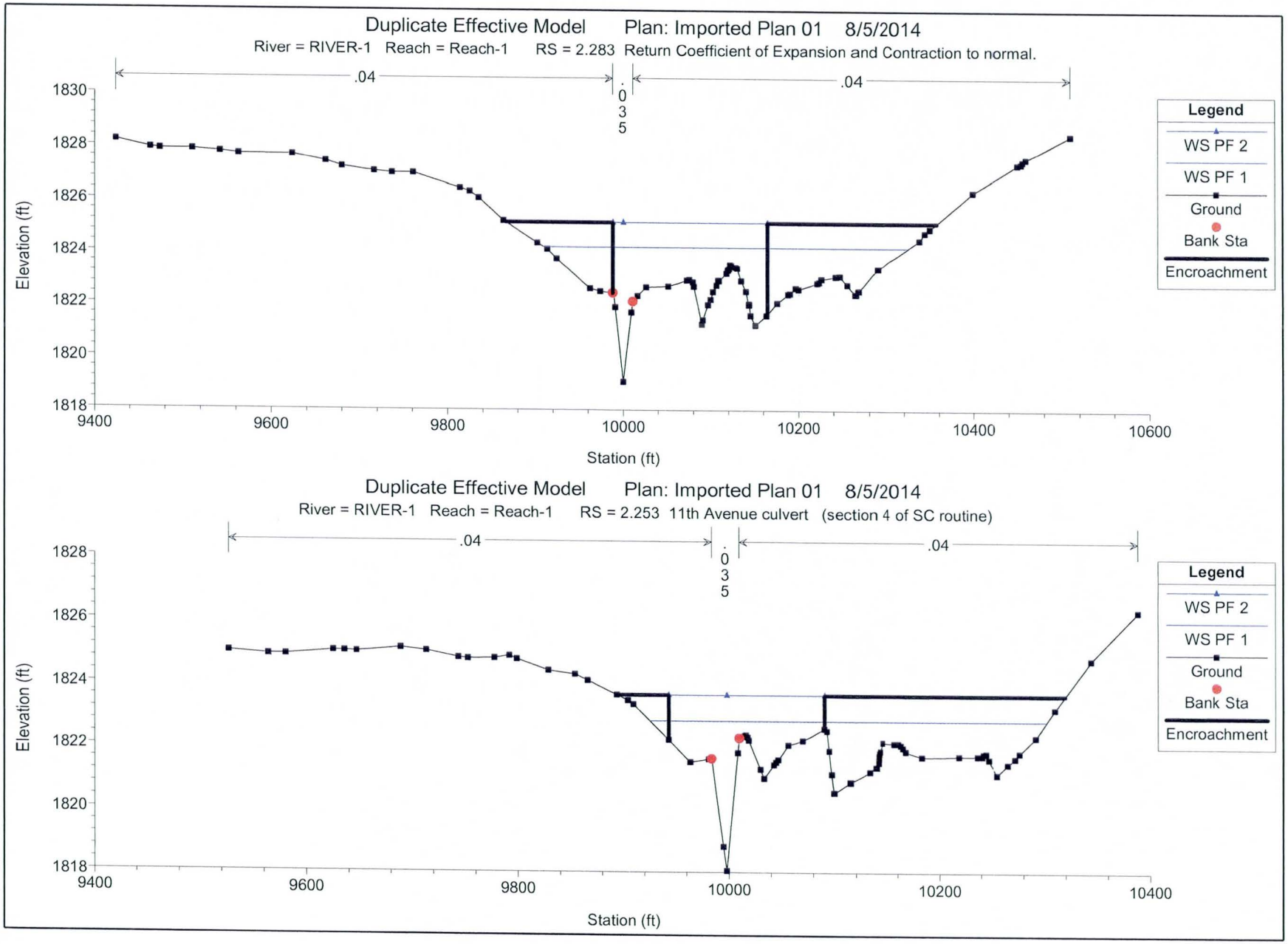

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 3.083 7th avenue culvert (section 1 of SC routine)
.045
.04
.045
Elevation (ft)
1862
1860
1858
1856
1854
1852
1850
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.982
.045
.04
.045
Elevation (ft)
1858
1856
1854
1852
1850
1848
1846
9500
9600
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

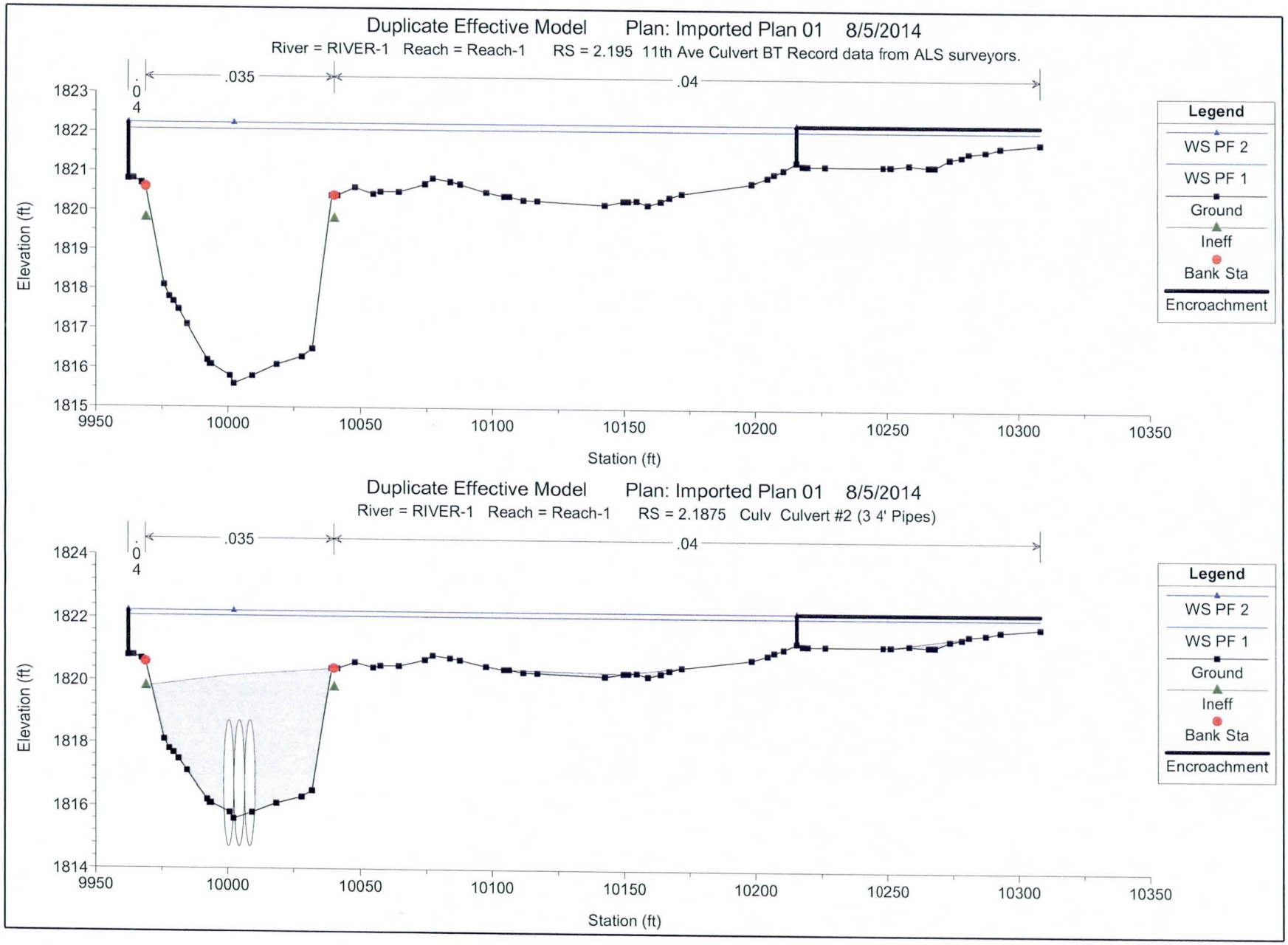

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.887
.045
.04
.045
Elevation (ft)
1858
1856
1854
1852
1850
1848
1846
1844
1842
9500
9600
9700
9800
9900
10000
10100
10200
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.793 Note:End Reach C, Begin Reach D
.045
.04
.045
Elevation (ft)
1850
1848
1846
1844
1842
1840
1838
9400
9600
9800
10000
10200
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

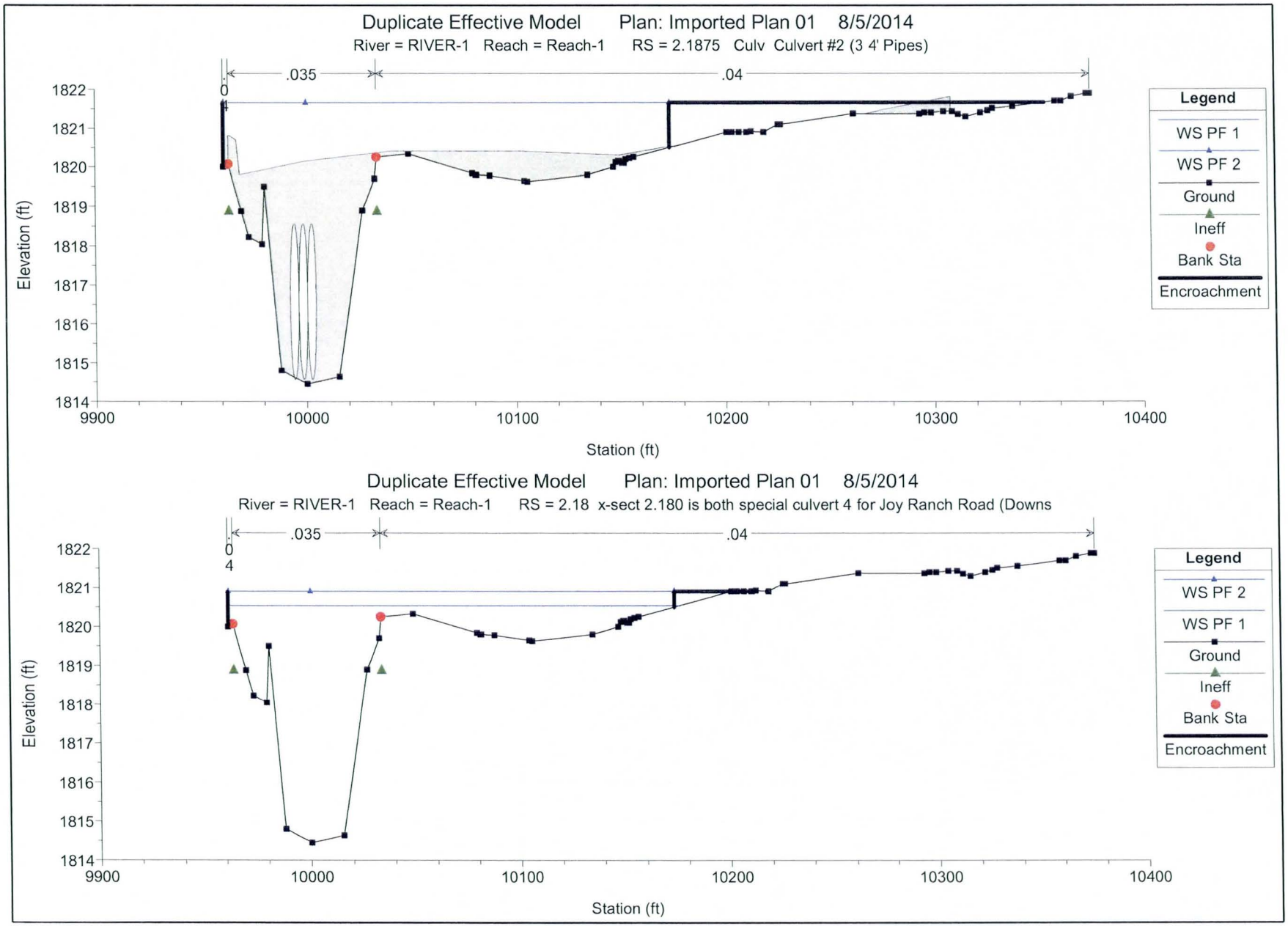

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.699 Note: data for cross section 2.699 is from ALS survey (check se
.04
.035
.04
Elevation (ft)
1850
1848
1846
1844
1842
1840
1838
1836
1834
9000
9200
9400
9600
9800
10000
10200
10400
10600
10800
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.689
.04
.035
.04
Elevation (ft)
1850
1848
1846
1844
1842
1840
1838
1836
1834
9000
9200
9400
9600
9800
10000
10200
10400
10600
10800
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

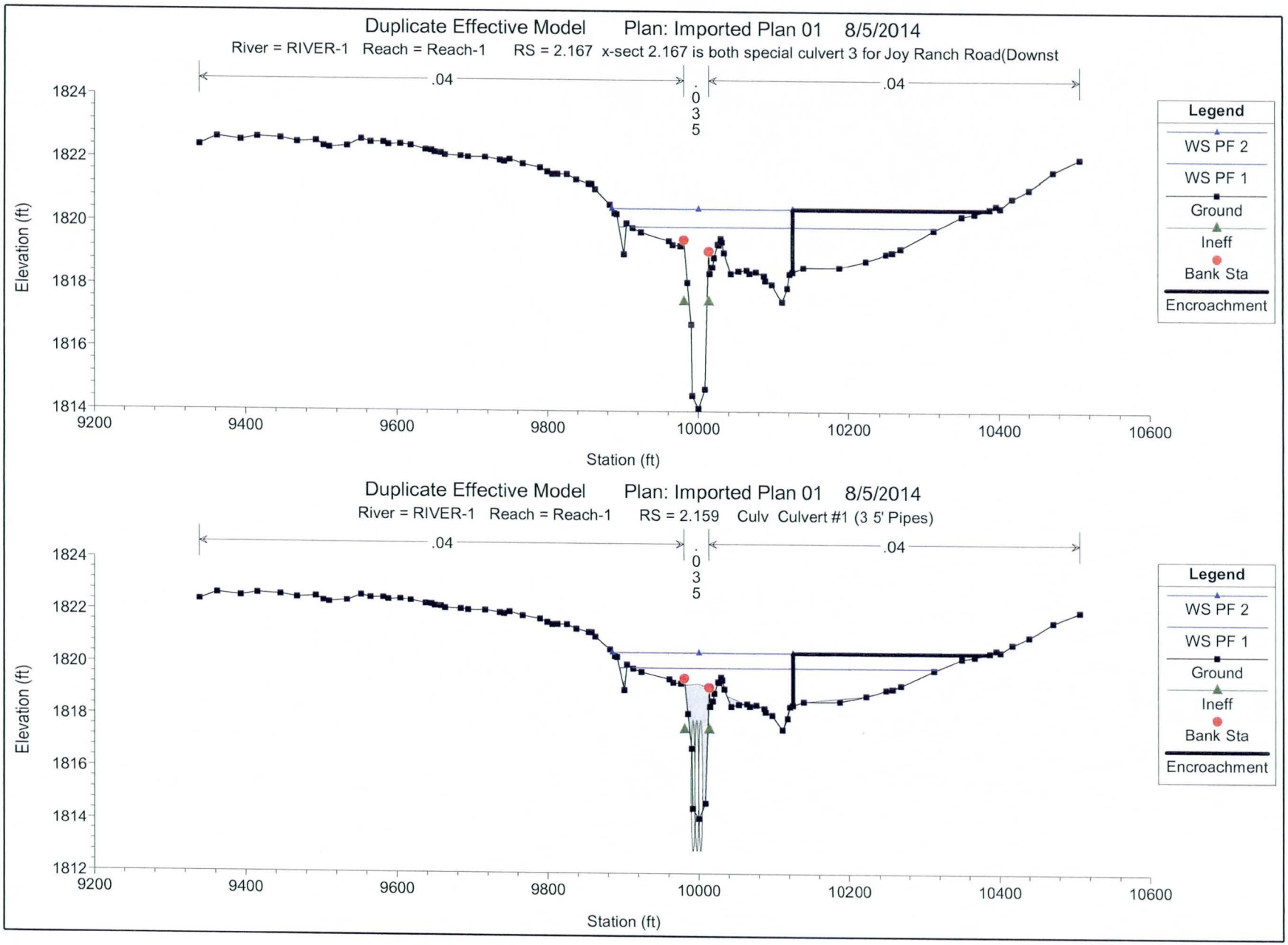

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.618
.04
.035
.04
Elevation (ft)
1842
1840
1838
1836
1834
1832
1830
9600
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.544 Note:GR records deleted from Sta. 9492.78 to Sta. 9897.84
.04
.035
.04
Elevation (ft)
1838
1836
1834
1832
1830
1828
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

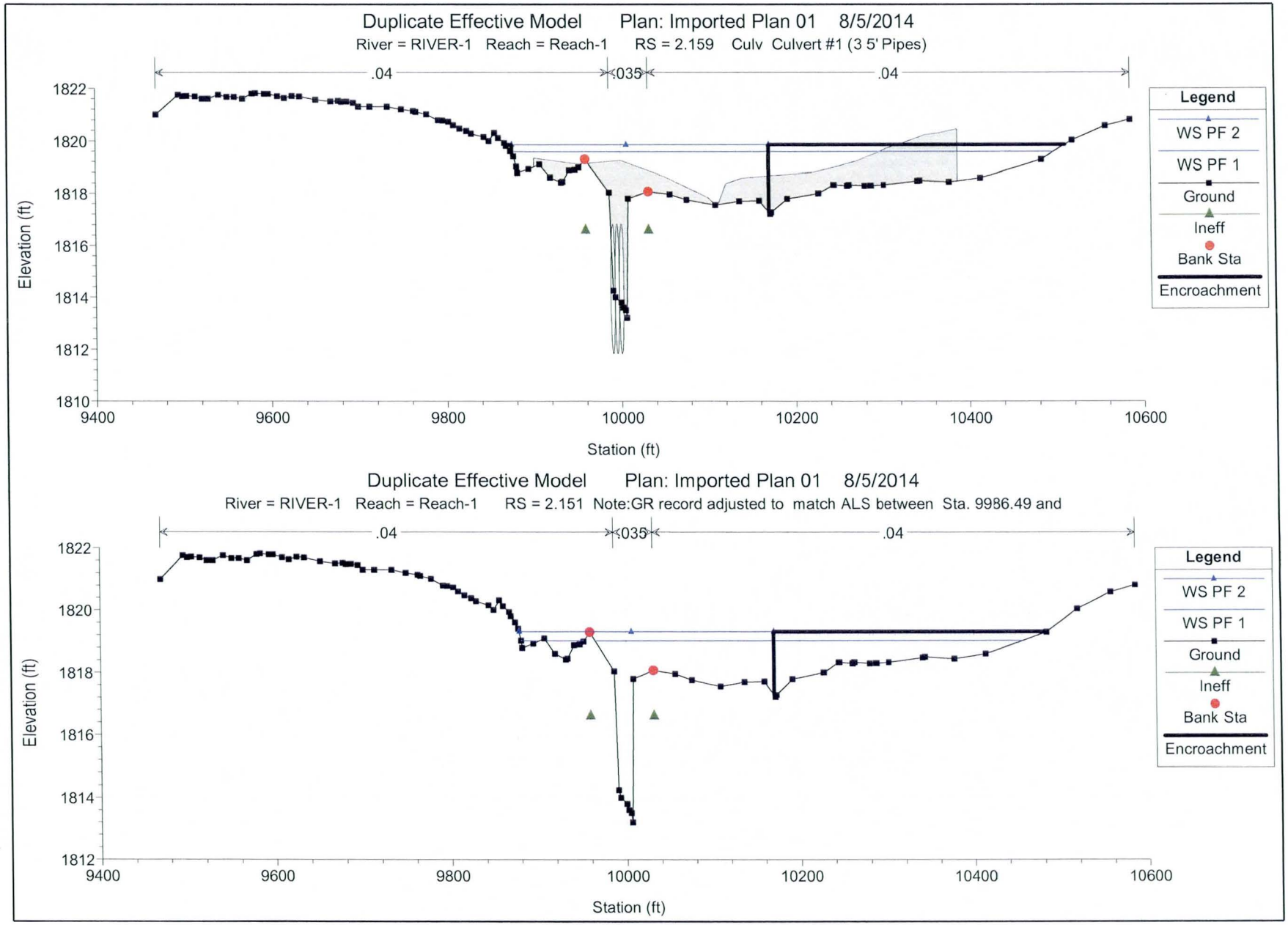

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.46
.04
.035
.04
Elevation (ft)
1836
1834
1832
1830
1828
1826
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.385
.04
.035
.04
Elevation (ft)
1834
1832
1830
1828
1826
1824
1822
9500
9600
9700
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

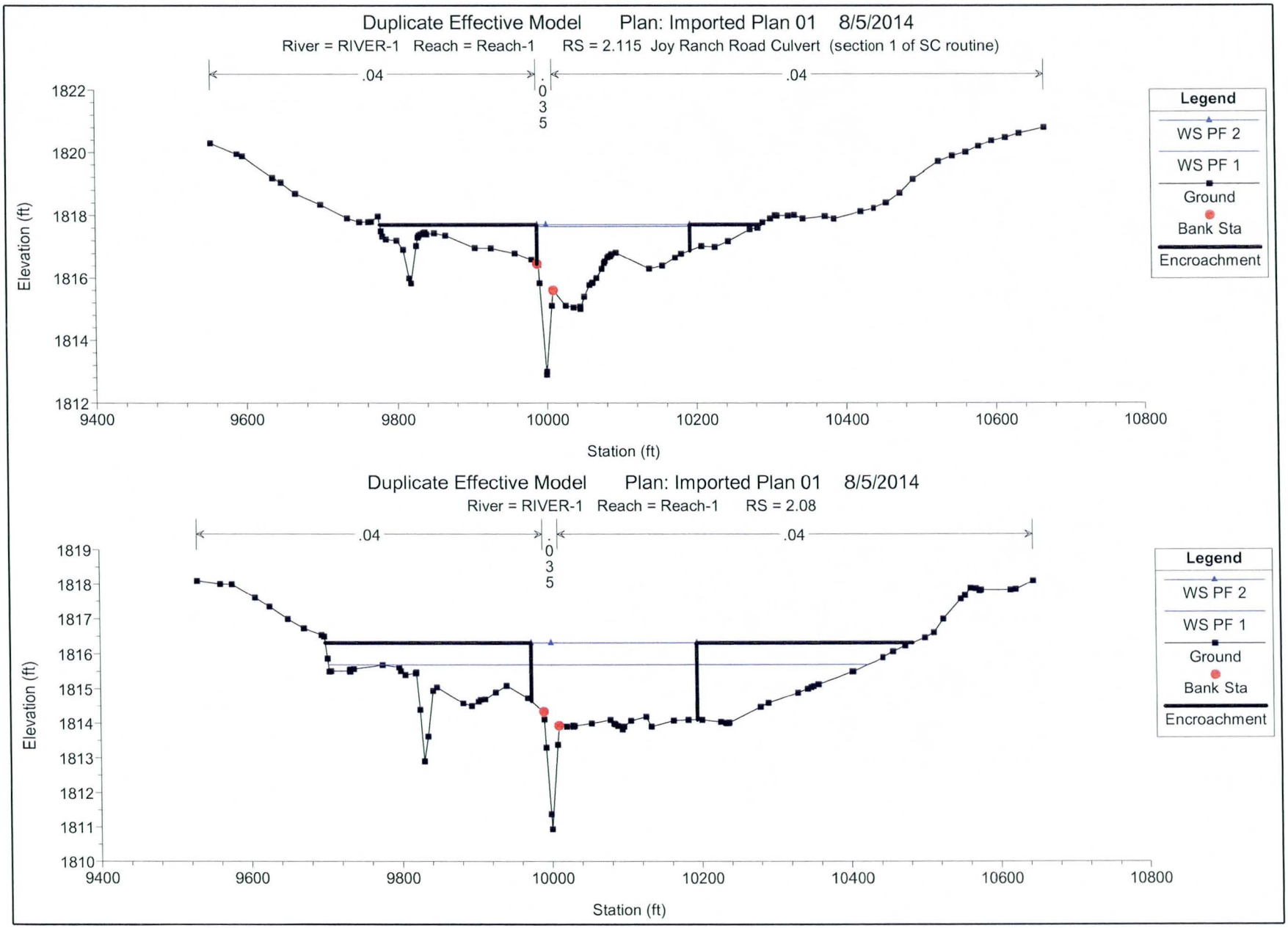

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.283 Return Coefficient of Expansion and Contraction to normal.
.04
.035
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
1830
1828
1826
1824
1822
1820
1818
9400
9600
9800
10000
10200
10400
10600
Station (ft)
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.253 11th Avenue culvert (section 4 of SC routine)
.04
.035
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
1828
1826
1824
1822
1820
1818
9400
9600
9800
10000
10200
10400
Station (ft)

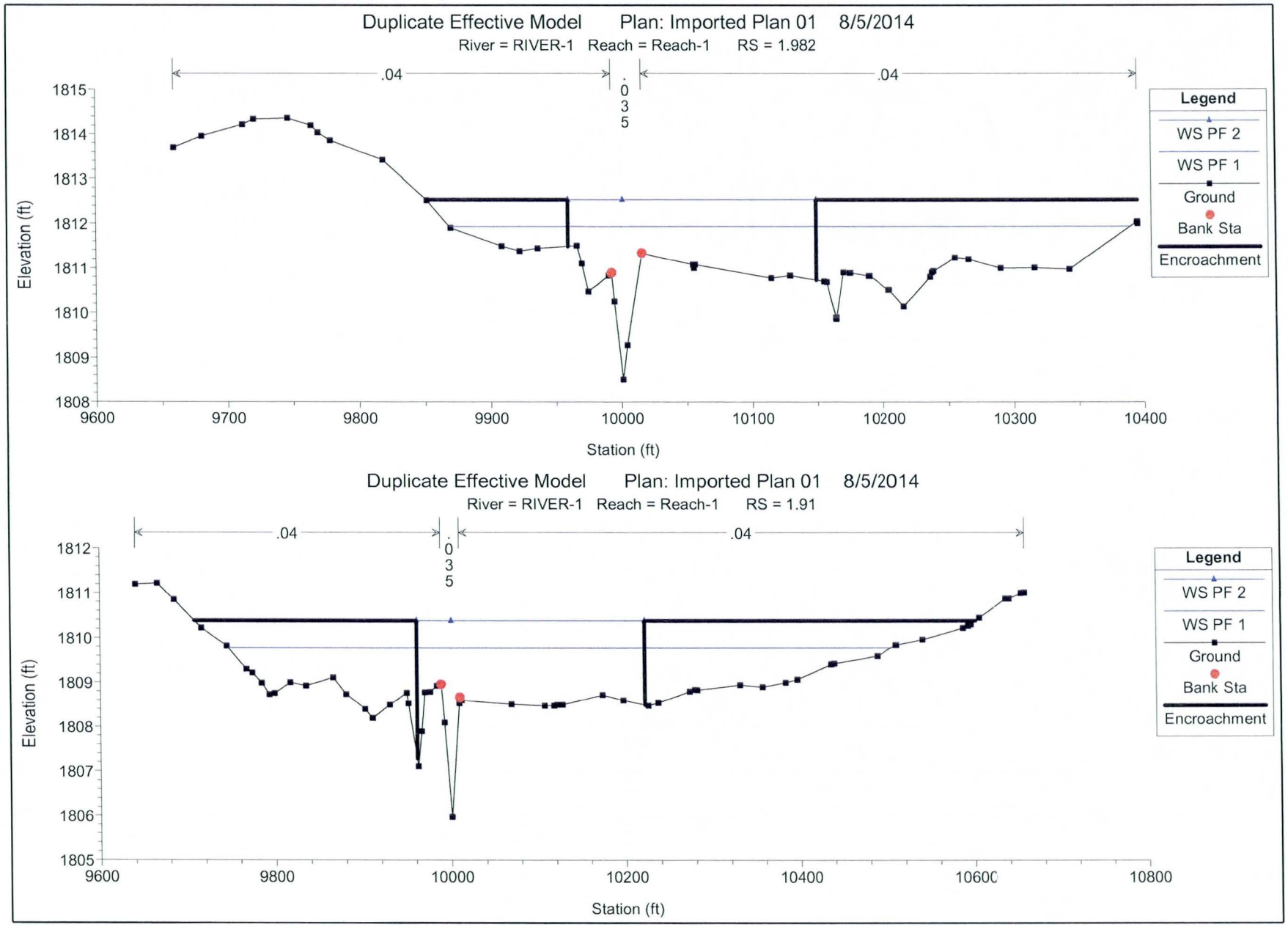

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.195 11th Ave Culvert BT Record data from ALS surveyors.
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.1875 Culv Culvert #2 (3 4' Pipes)
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment

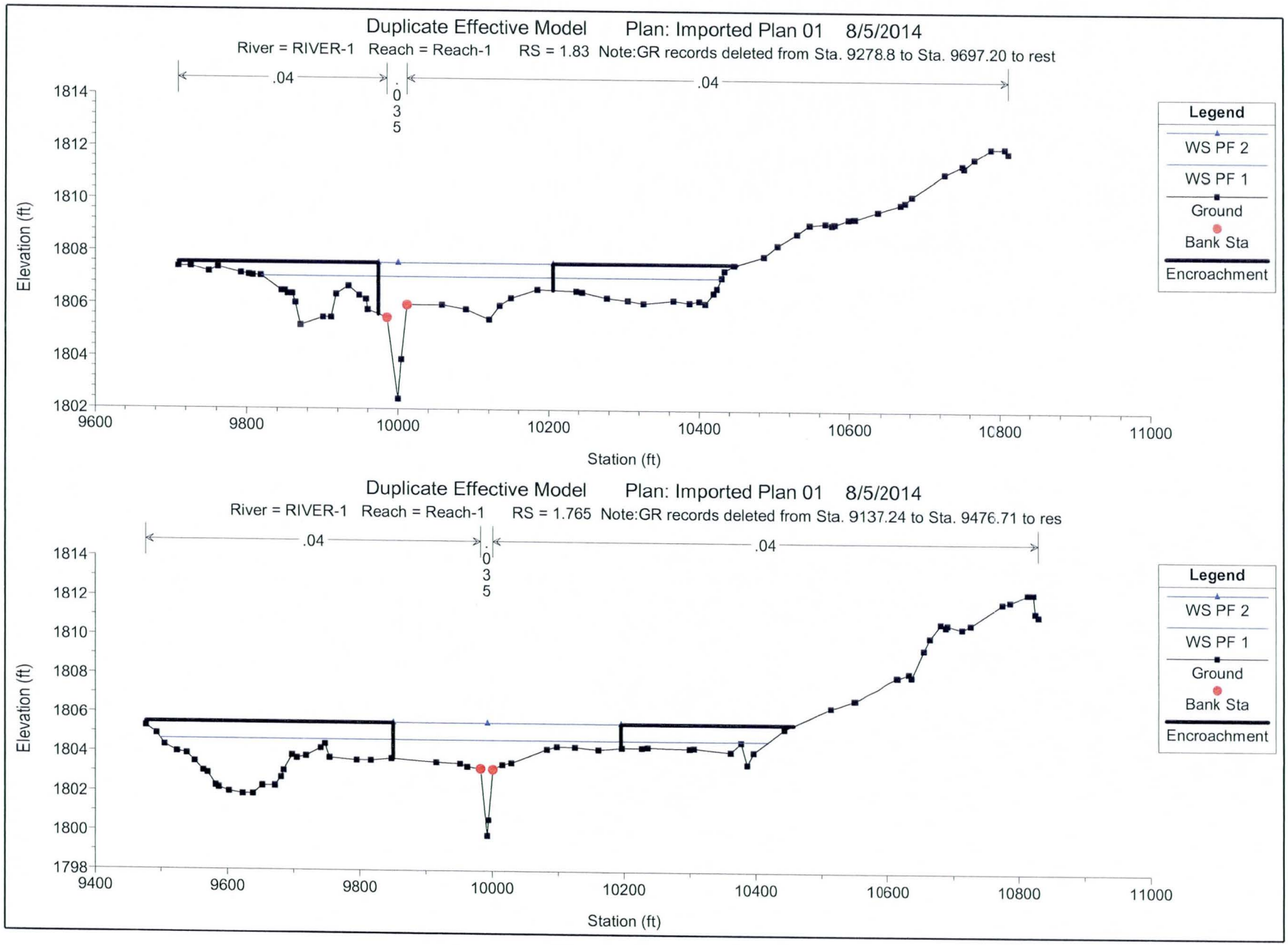

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.1875 Culv Culvert #2 (3 4' Pipes)
.035
.04
0
Elevation (ft)
1822
1821
1820
1819
1818
1817
1816
1815
1814
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 1
WS PF 2
Ground
Ineff
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.18 x-sect 2.180 is both special culvert 4 for Joy Ranch Road (Downs
.035
.04
0
4
Elevation (ft)
1822
1821
1820
1819
1818
1817
1816
1815
1814
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment

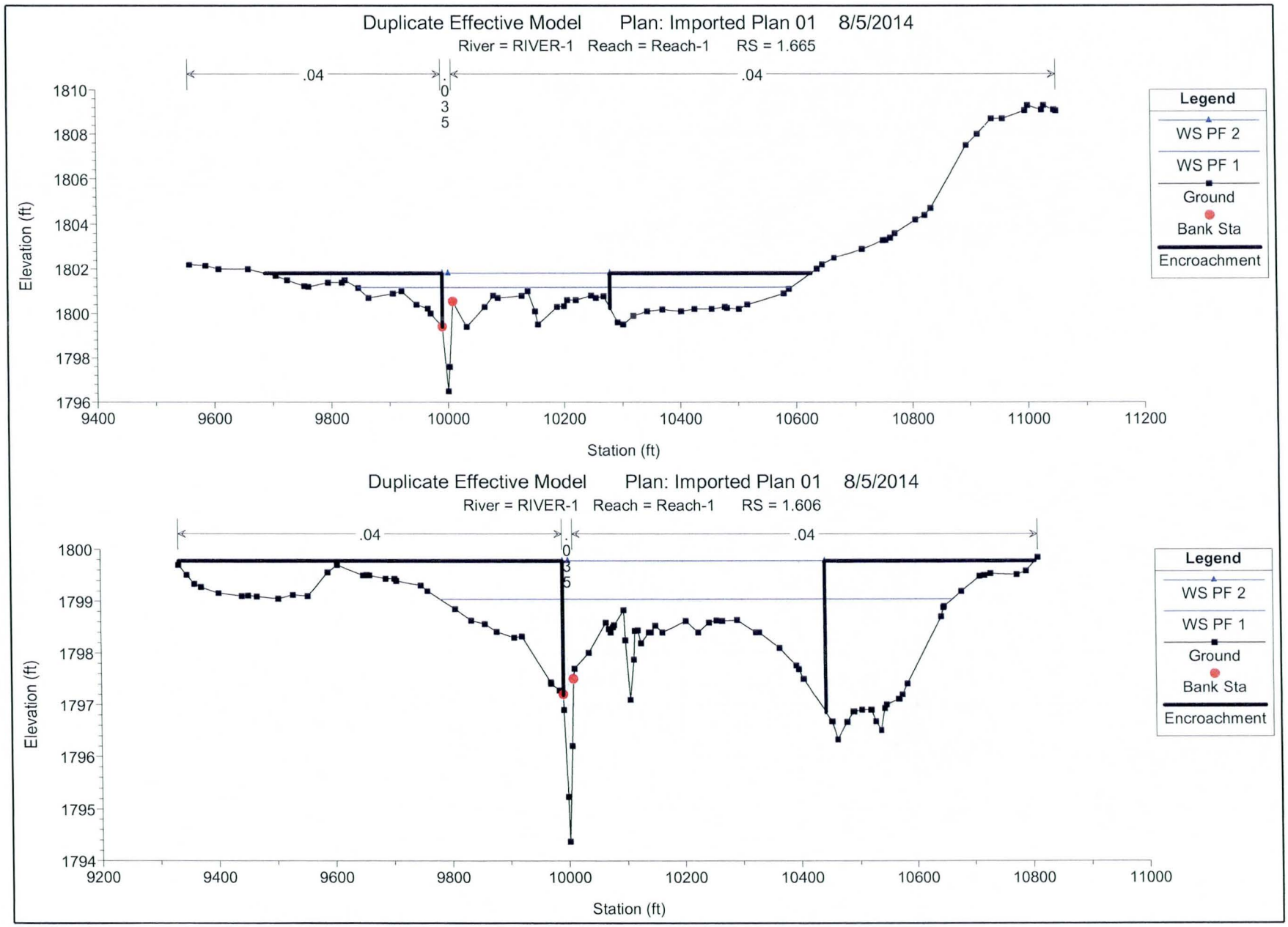

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.167 x-sect 2.167 is both special culvert 3 for Joy Ranch Road(Downst
.04
.035
.04
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.159 Culv Culvert #1 (3 5' Pipes)
.04
.035
.04
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)

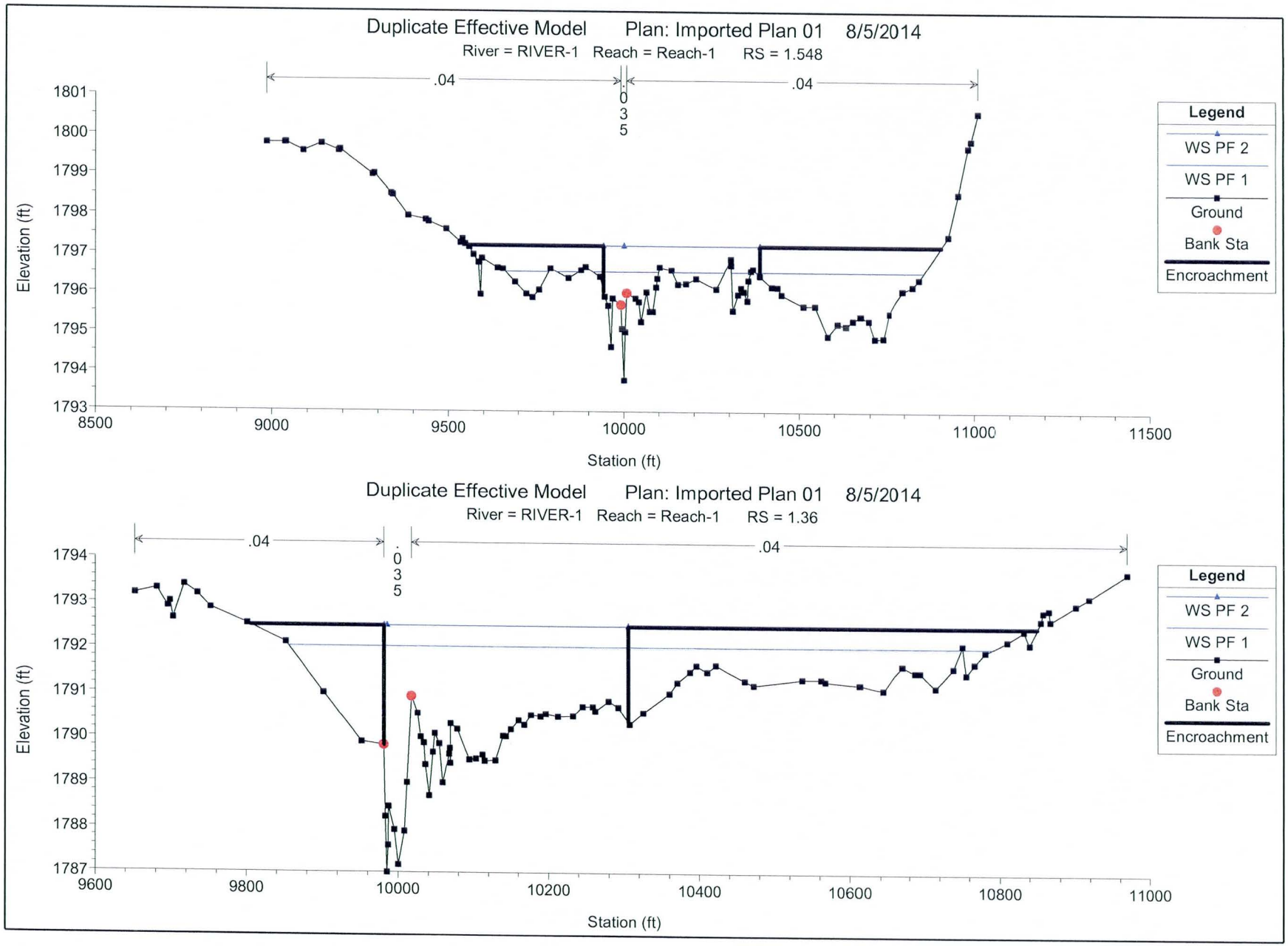

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.159 Culv Culvert #1 (3 5' Pipes)
.04
.035
.04
Elevation (ft)
1822
1820
1818
1816
1814
1812
1810
9400
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.151 Note:GR record adjusted to match ALS between Sta. 9986.49 and
.04
.035
.04
Elevation (ft)
1822
1820
1818
1816
1814
1812
9400
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment

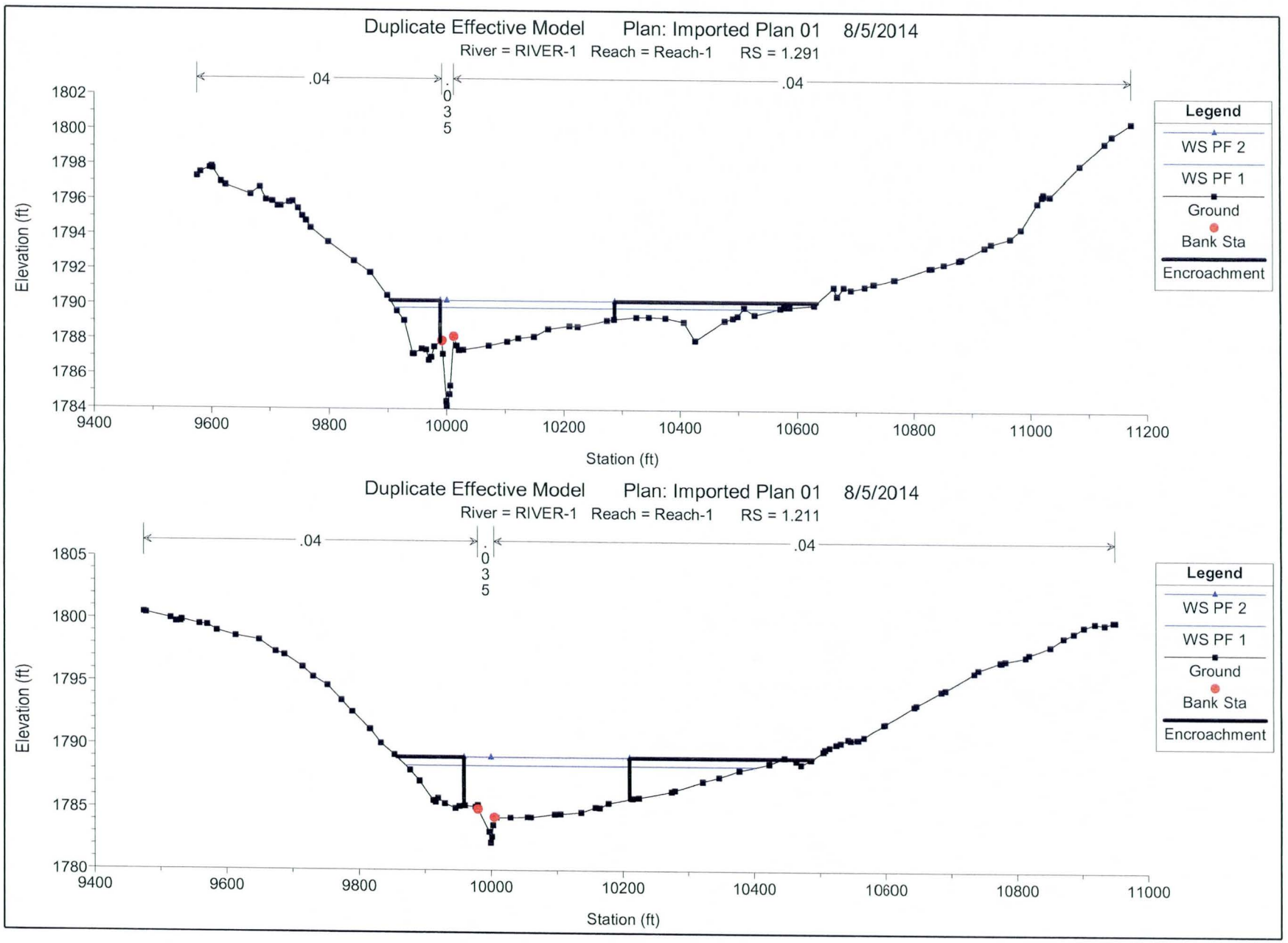

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.115 Joy Ranch Road Culvert (section 1 of SC routine)
.04
.035
.04
Elevation (ft)
1822
1820
1818
1816
1814
1812
9400
9600
9800
10000
10200
10400
10600
10800
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.08
.04
.035
.04
Elevation (ft)
1819
1818
1817
1816
1815
1814
1813
1812
1811
1810
9400
9600
9800
10000
10200
10400
10600
10800
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

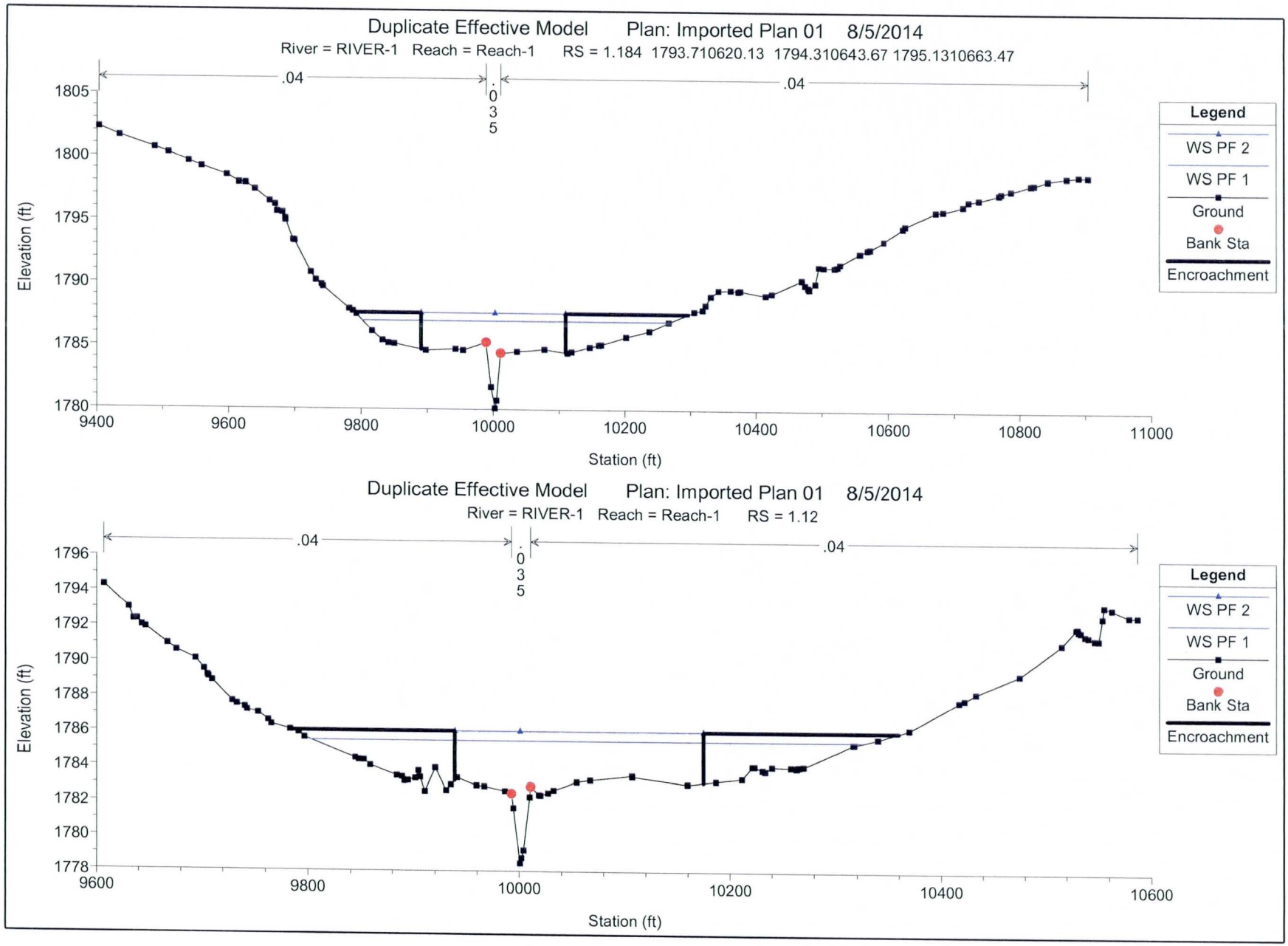

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 1.982
.04
.035
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
1815
1814
1813
1812
1811
1810
1809
1808
9600
9700
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 1.91
.04
.035
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
1812
1811
1810
1809
1808
1807
1806
1805
9600
9800
10000
10200
10400
10600
10800
Station (ft)

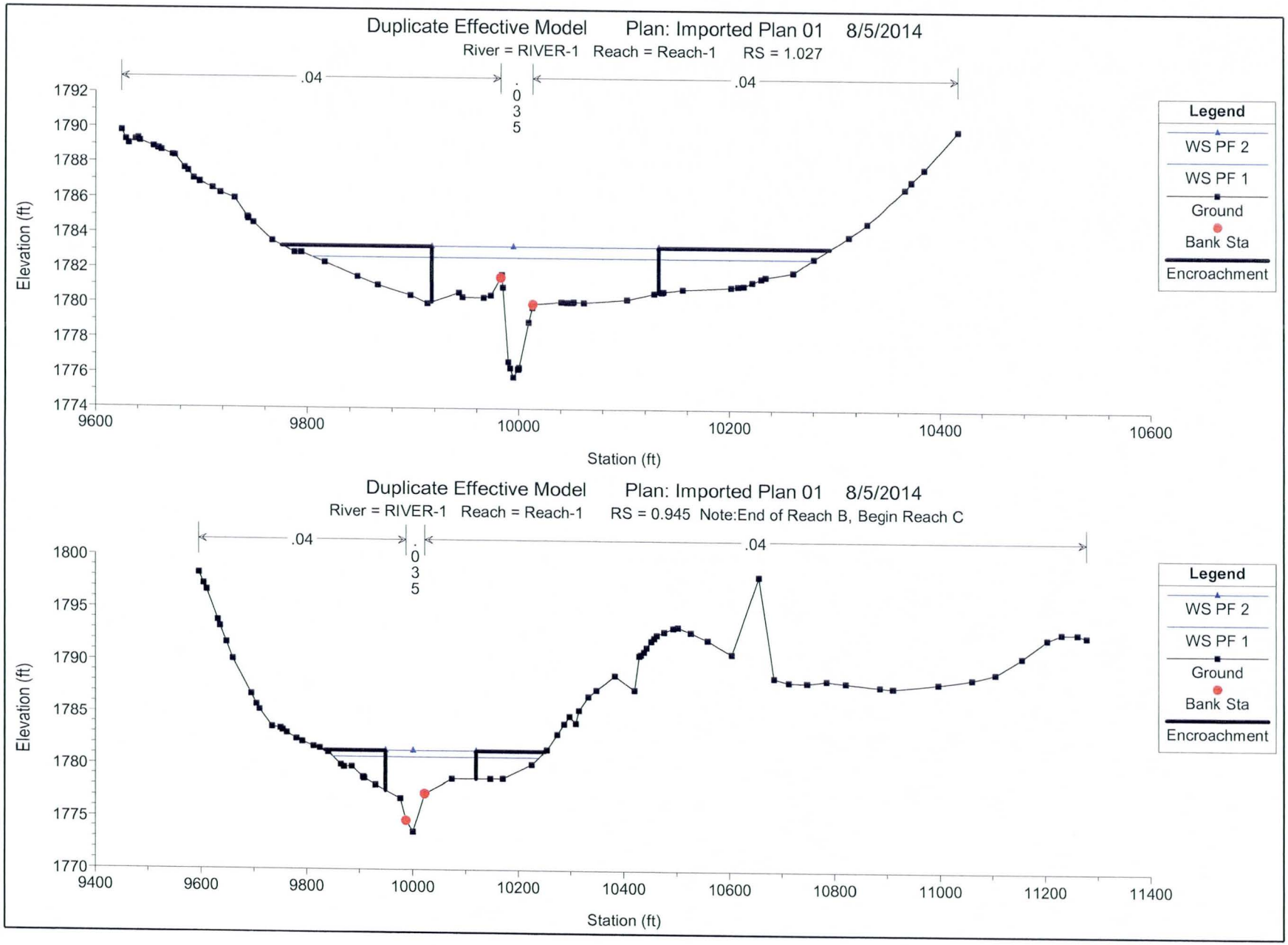

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 1.83 Note:GR records deleted from Sta. 9278.8 to Sta. 9697.20 to rest
.04
.035
.04
Elevation (ft)
1814
1812
1810
1808
1806
1804
1802
9600
9800
10000
10200
10400
10600
10800
11000
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 1.765 Note:GR records deleted from Sta. 9137.24 to Sta. 9476.71 to res
.04
.035
.04
Elevation (ft)
1814
1812
1810
1808
1806
1804
1802
1800
1798
9400
9600
9800
10000
10200
10400
10600
10800
11000
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

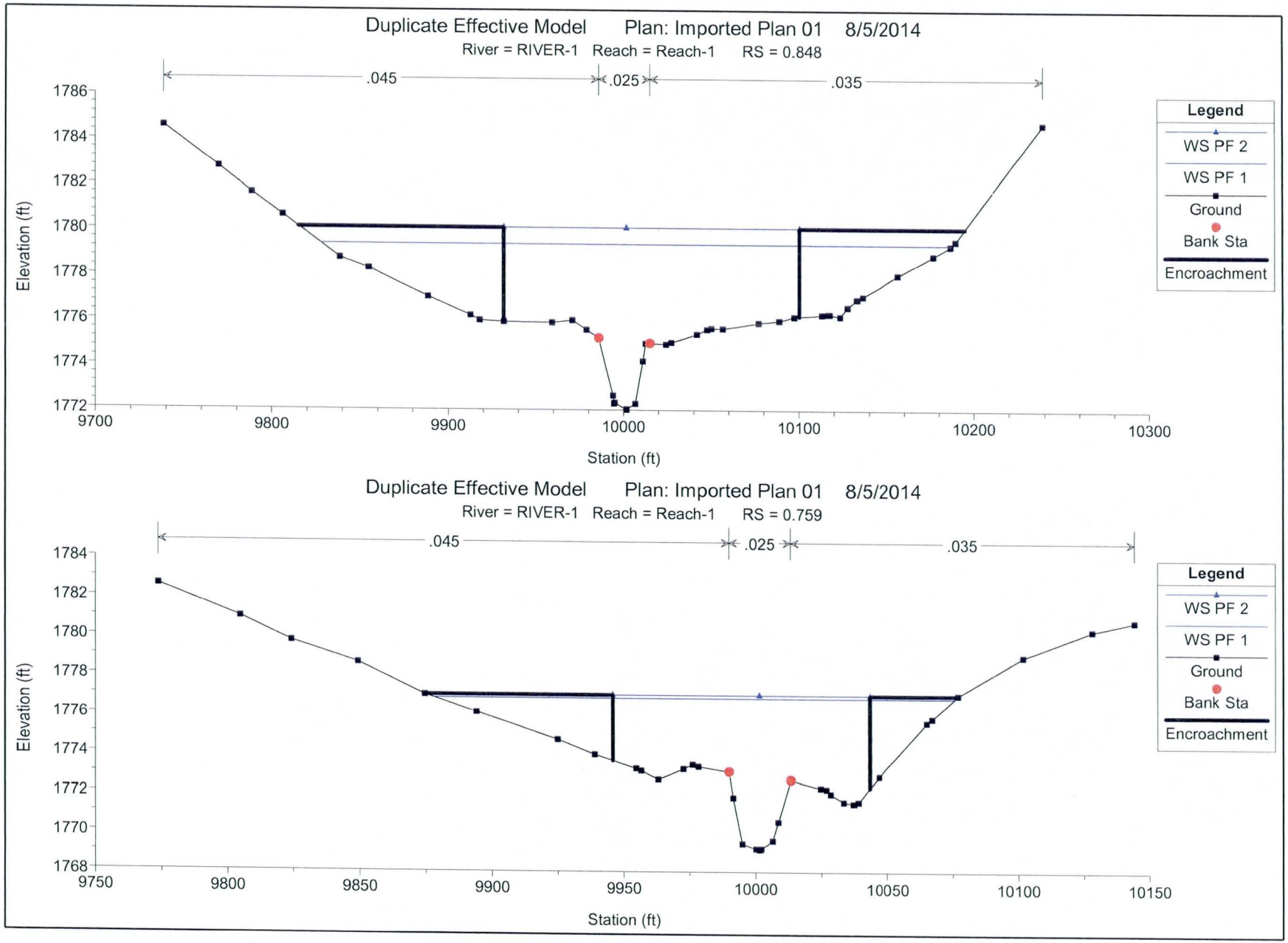

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 1.665
.04
.035
.04
Elevation (ft)
1810
1808
1806
1804
1802
1800
1798
1796
9400
9600
9800
10000
10200
10400
10600
10800
11000
11200
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 1.606
.04
.035
.04
Elevation (ft)
1800
1799
1798
1797
1796
1795
1794
9200
9400
9600
9800
10000
10200
10400
10600
10800
11000
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

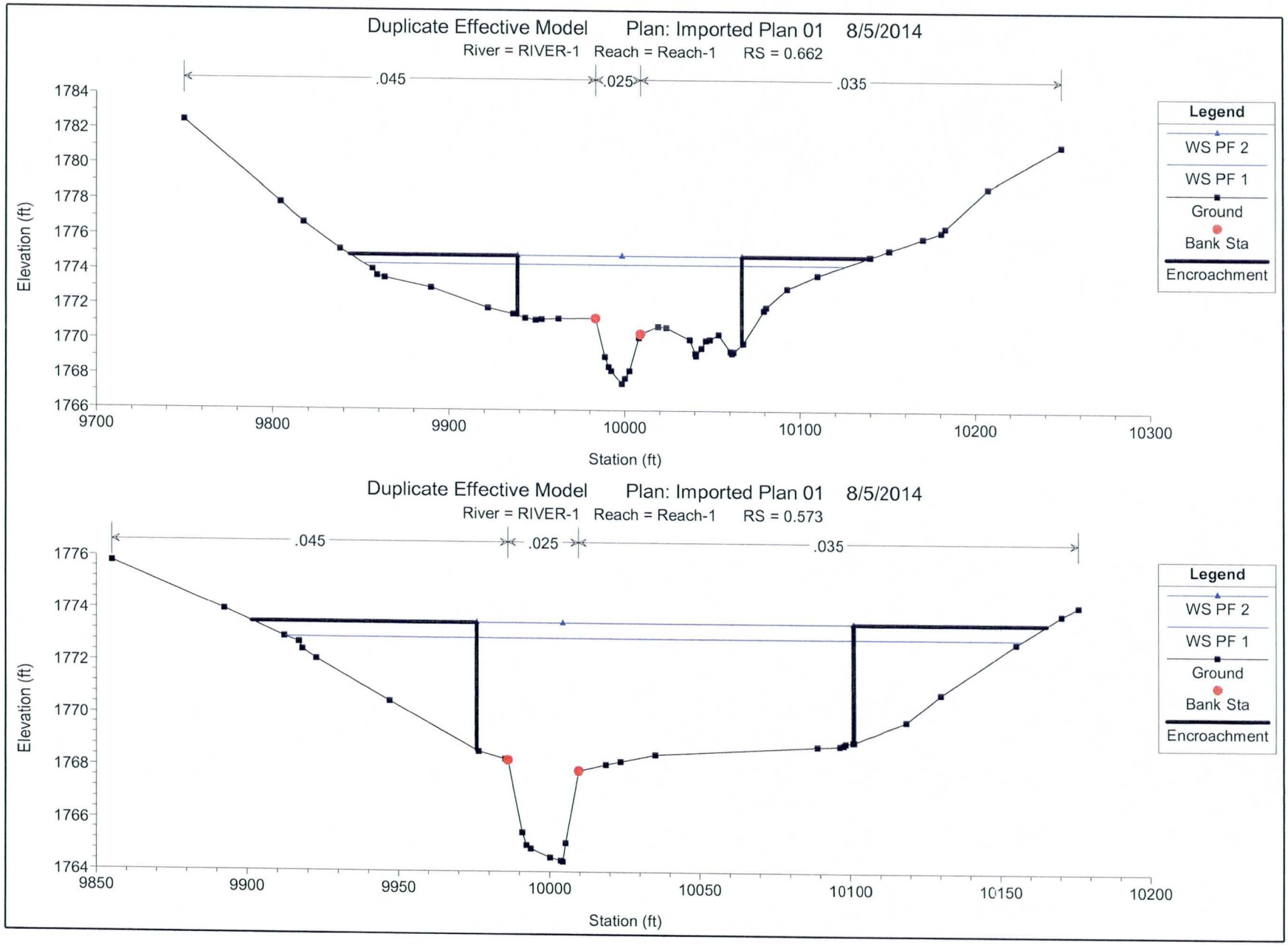

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 1.548
.04
.035
.04
Elevation (ft)
1801
1800
1799
1798
1797
1796
1795
1794
1793
8500
9000
9500
10000
10500
11000
11500
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 1.36
.04
.035
.04
Elevation (ft)
1794
1793
1792
1791
1790
1789
1788
1787
9600
9800
10000
10200
10400
10600
10800
11000
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

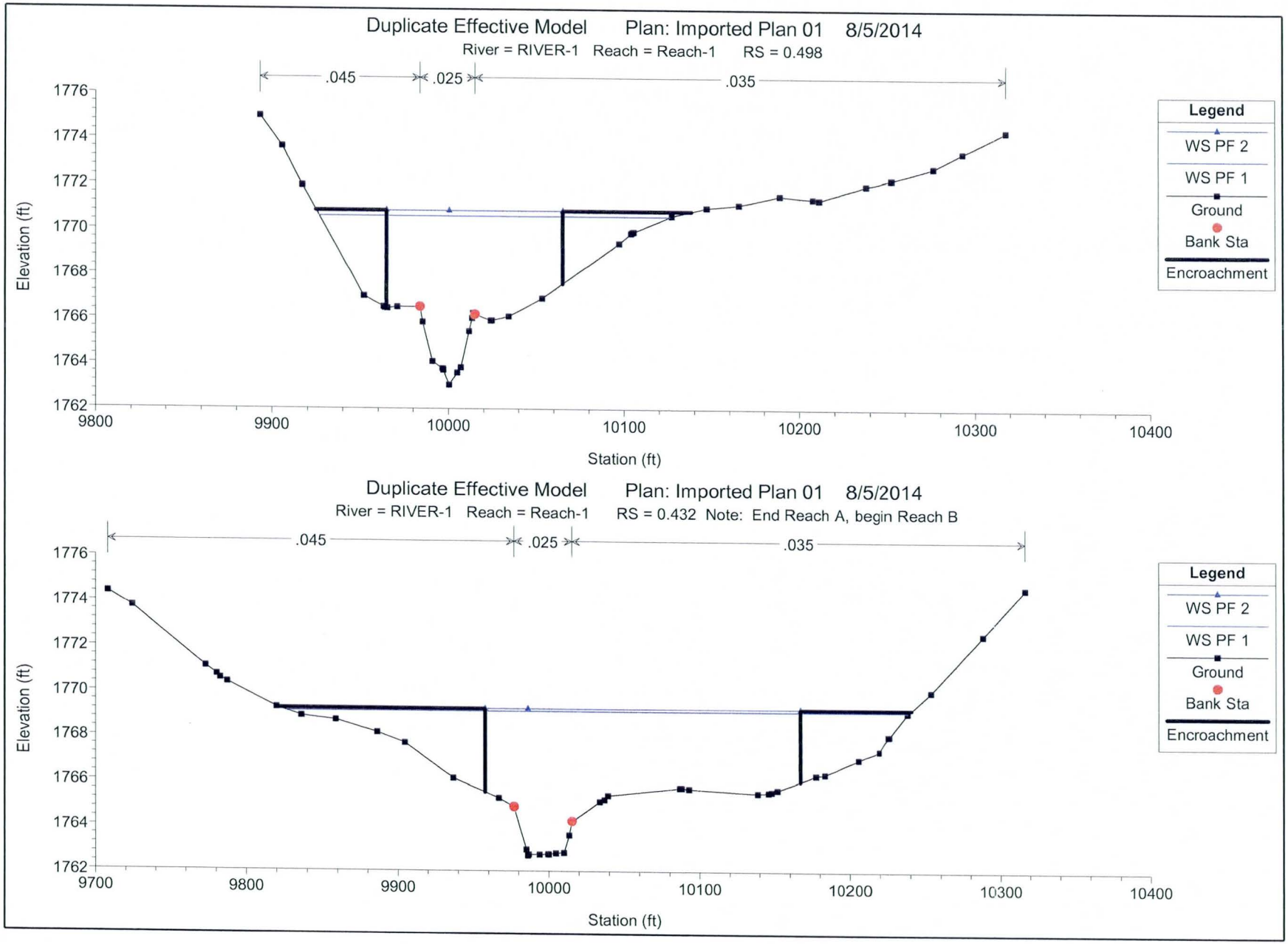

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 1.291
.04
.035
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
1802
1800
1798
1796
1794
1792
1790
1788
1786
1784
9400
9600
9800
10000
10200
10400
10600
10800
11000
11200
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 1.211
.04
.035
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
1805
1800
1795
1790
1785
1780
9400
9600
9800
10000
10200
10400
10600
10800
11000

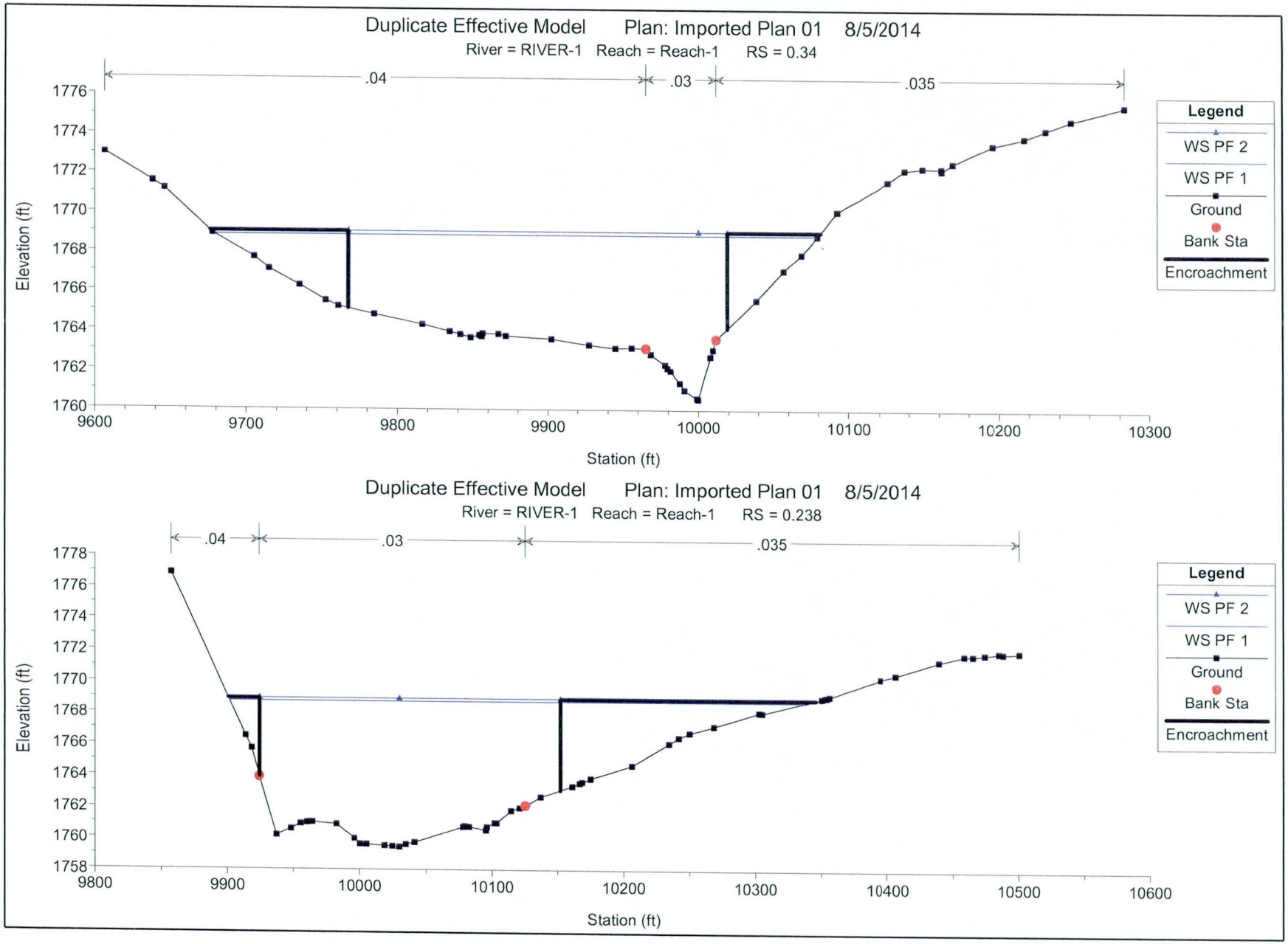

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 1.184 1793.710620.13 1794.310643.67 1795.1310663.47
.04
.035
.04
Elevation (ft)
1805
1800
1795
1790
1785
1780
9400
9600
9800
10000
10200
10400
10600
10800
11000
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 1.12
.04
.035
.04
Elevation (ft)
1796
1794
1792
1790
1788
1786
1784
1782
1780
1778
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

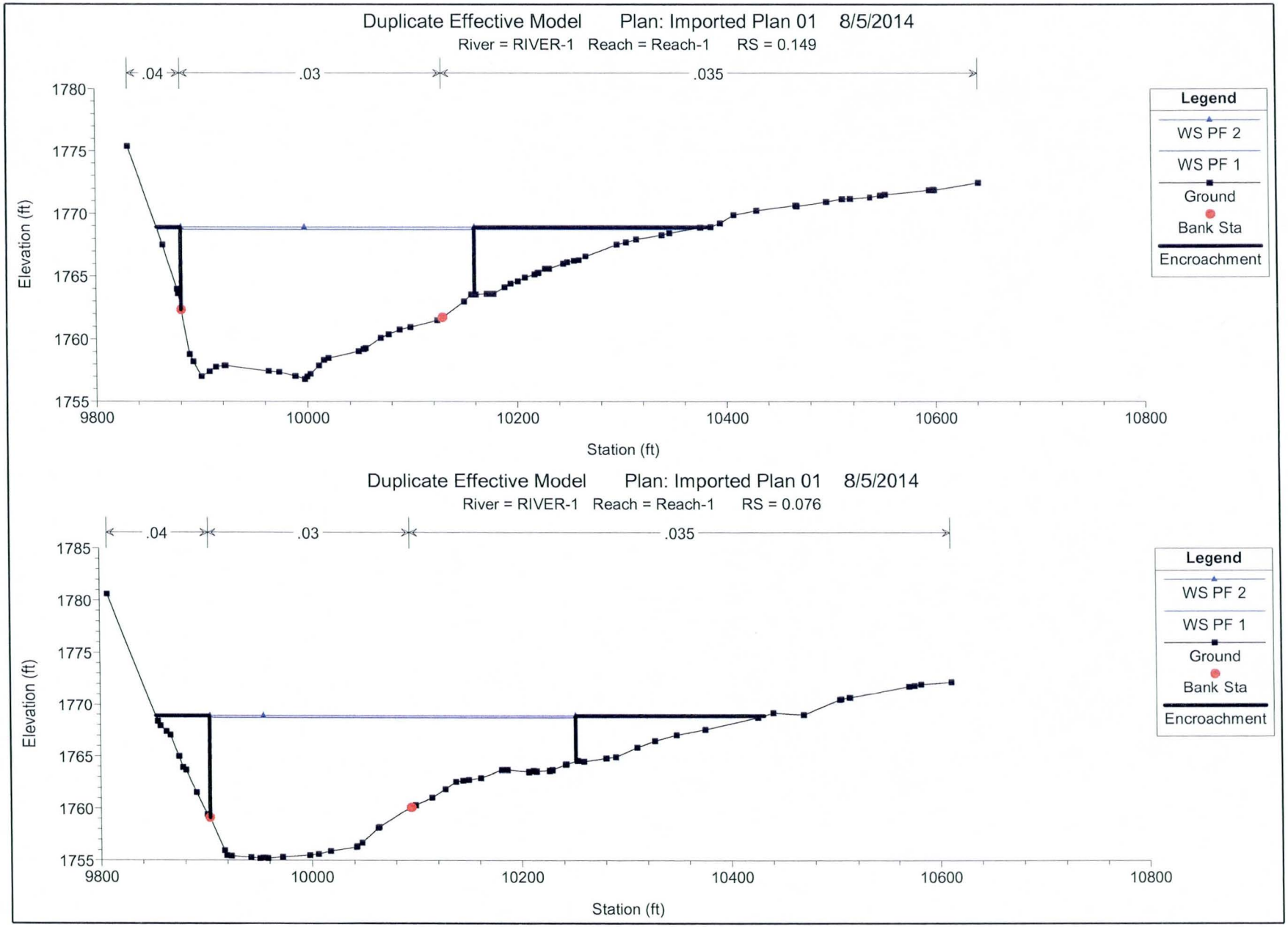

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 1.027
.04
.035
.04
Elevation (ft)
1792
1790
1788
1786
1784
1782
1780
1778
1776
1774
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 0.945 Note:End of Reach B, Begin Reach C
.04
.035
.04
Elevation (ft)
1800
1795
1790
1785
1780
1775
1770
9400
9600
9800
10000
10200
10400
10600
10800
11000
11200
11400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

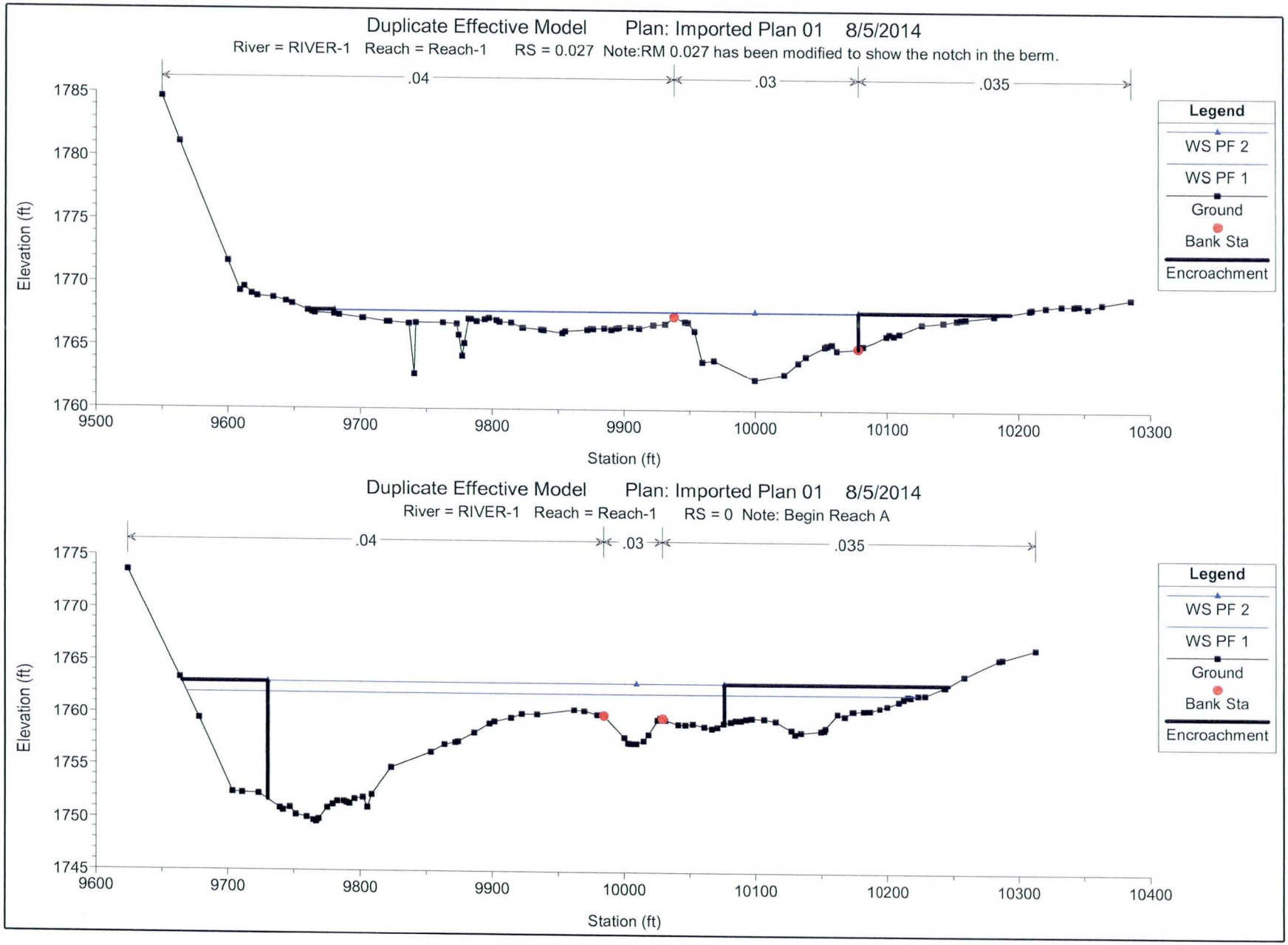

Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 0.848
.045
.025
.035
Elevation (ft)
1786
1784
1782
1780
1778
1776
1774
1772
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 0.759
.045
.025
.035
Elevation (ft)
1784
1782
1780
1778
1776
1774
1772
1770
1768
9750
9800
9850
9900
9950
10000
10050
10100
10150
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment


Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 0.662
.045
.025
.035
Elevation (ft)
1784
1782
1780
1778
1776
1774
1772
1770
1768
1766
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 0.573
.045
.025
.035
Elevation (ft)
1776
1774
1772
1770
1768
1766
1764
9850
9900
9950
10000
10050
10100
10150
10200
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment


Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 0.498
.045
.025
.035
Elevation (ft)
1776
1774
1772
1770
1768
1766
1764
1762
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 0.432 Note: End Reach A, begin Reach B
.045
.025
.035
Elevation (ft)
1776
1774
1772
1770
1768
1766
1764
1762
9700
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment


Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 0.34
.04
.03
.035
Elevation (ft)
1776
1774
1772
1770
1768
1766
1764
1762
1760
9600
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 0.238
.04
.03
.035
Elevation (ft)
1778
1776
1774
1772
1770
1768
1766
1764
1762
1760
1758
9800
9900
10000
10100
10200
10300
10400
10500
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment


Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 0.149
.04
.03
.035
1780
1775
1770
1765
1760
1755
Elevation (ft)
9800
10000
10200
10400
10600
10800
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 0.076
.04
.03
.035
1785
1780
1775
1770
1765
1760
1755
Elevation (ft)
9800
10000
10200
10400
10600
10800
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment


Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 0.027 Note:RM 0.027 has been modified to show the notch in the berm.
.04
.03
.035
Elevation (ft)
1785
1780
1775
1770
1765
1760
9500
9600
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 0 Note: Begin Reach A
.04
.03
.035
Elevation (ft)
1775
1770
1765
1760
1755
1750
1745
9600
9700
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

Duplicate Effective Model (Truncated)

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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

PROJECT DATA
Project Title: Duplicate Effective Model
Project File : DuplicateEffective.prj
Run Date and Time: 7/7/2014 1:02:27 PM

Project in English units

Project Description:
* Skunk Tank Wash
file:DuplicateEffective.prj (Truncated Model)
* For: MCDOT
By: TYLin Intl. 06-12-14
* 11th Avenue - Joy Ranch
Road to Irvine Road (TT4010)
*
* Duplicate Effective model converted
from EEC/MKE effective model (HEC-2)
* into HEC-RAS and then truncated to
study limits only.
*
* Source of 100-yr flowrate from HEC-1 analysis
by Montgomery Watson.
*
* Subcritical Analysis
*
* Starting
water surface elevation came from the Skunk Tank Wash HEC-2 study
* by
EEC/MKE (1997).

PLAN DATA

Plan Title: Imported Plan 01
Plan File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\2 Duplictaed Effective Model\Truncated Model\DuplicateEffective.p01

Geometry Title: Imported Geom 01
Geometry File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\2 Duplictaed Effective Model\Truncated Model\DuplicateEffective.g01

Flow Title : Imported Flow 01
Flow File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\2 Duplictaed Effective Model\Truncated Model\DuplicateEffective.f01

Plan Summary Information:
Number of: Cross Sections = 17 Multiple Openings = 0
Culverts = 2 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

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

Encroachment Data
Equal Conveyance = True
Left Offset = 0
Right Offset = 0

River = RIVER-1 Reach = Reach-1

RS	Profile	Method	Value1	Value2
0	PF 2	1	973010076.35	
0.027	PF 2	1	968010077.44	
0.076	PF 2	1	9903.2310251.66	
0.149	PF 2	1	9880.3610159.41	
0.238	PF 2	1	9924.09	10152
0.34	PF 2	1	9767.2510018.99	
0.432	PF 2	1	9957.4810167.04	
0.498	PF 2	1	9964.6410064.94	
0.573	PF 2	1	9975.8210100.92	
0.662	PF 2	1	9938.810066.74	
0.759	PF 2	1	9945.87 10043.2	
0.848	PF 2	1	9931.4610100.13	
0.945	PF 2	1	9948.04 10118.5	
1.027	PF 2	1	991710132.69	
1.12	PF 2	1	9938.75 10174.6	
1.184	PF 2	1	9890.2410109.45	
1.211	PF 2	1	9958.3	10210
1.291	PF 2	1	9988.8610286.71	
1.36	PF 2	1	9981.410305.41	
1.548	PF 2	1	994210387.14	
1.606	PF 2	1	9991.5110443.33	
1.665	PF 2	1	9990.1410279.41	
1.765	PF 2	1	9850	10195
1.83	PF 2	1	9973.6910205.44	
1.91	PF 2	1	9961.0310222.03	
1.982	PF 2	1	9959.3810149.08	
2.08	PF 2	1	9973.410194.76	
2.115	PF 2	1	9987.43	10192
2.151	PF 2	1	9875	10170
2.159	PF 2	0		
2.167	PF 2	1	9880	10125
2.18	PF 2	1	9961.0410173.74	
2.1875	PF 2	0		
2.195	PF 2	1	9962.3110215.52	
2.253	PF 2	1	9942.8810090.47	
2.283	PF 2	1	9987.9910164.29	
2.385	PF 2	1	9931.3710085.24	
2.46	PF 2	1	9978.6710128.57	
2.544	PF 2	1	9931.85 10012.7	
2.618	PF 2	1	9907.5810008.96	
2.689	PF 2	1	9981.5810066.78	
2.699	PF 2	1	9981.09	10050
2.793	PF 2	1	9900.7510013.95	
2.887	PF 2	1	9902.6110039.41	
2.982	PF 2	1	998710089.24	
3.083	PF 2	1	9918.9810152.78	
3.109	PF 2	1	9972.26 10239.4	
3.1155	PF 2	0		

```
3.122  PF 2          1 9967.8810240.77
3.135  PF 2          1  9920  10200
3.217  PF 2          1 9978.53  10045
3.31   PF 2          1 9841.5910080.12
3.327  PF 2          1  9847.510087.79
3.334  PF 2          0
3.341  PF 2          1 9660.4410152.41
3.354  PF 2          1 9664.6210103.17
3.44   PF 2          1  995510032.54
3.544  PF 2          1 9968.1910040.08
3.614  PF 2          1  9976.710023.26
3.684  PF 2          1 9966.1410013.34
3.751  PF 2          1 9946.9210035.22
3.844  PF 2          1 9984.4410034.56
3.943  PF 2          1 9982.9910014.96
4.03   PF 2          1 9973.3710019.21
4.126  PF 2          1  9957.310027.12
4.223  PF 2          1  994510012.83
4.319  PF 2          1  996010015.94
4.39   PF 2          1 9971.0610005.67
4.47   PF 2          1  9975  10020
4.552  PF 2          1 9985.26  10060
```

FLOW DATA

Flow Title: Imported Flow 01
Flow File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\2 Duplictaed Effective Model\Truncated Model\DuplicateEffective.f01

Flow Data (cfs)

River	Reach	RS	PF 1	PF 2
RIVER-1	Reach-1	2.887	1880	1880
RIVER-1	Reach-1	2.46	2110	2110
RIVER-1	Reach-1	1.982	2110	2110

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
RIVER-1	Reach-1	PF 1		Known WS = 1811.92
RIVER-1	Reach-1	PF 2		Known WS = 1812.56

GEOMETRY DATA

Geometry Title: Imported Geom 01
Geometry File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\2 Duplictaed Effective Model\Truncated Model\DuplicateEffective.g01

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.887

INPUT
Description:
Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9561.71	1852.3	9577.26	1851.42	9590	1851.31	9601.51	1851.24	9630.24	1851.16
9652.35	1851	9661.65	1851.01	9693.08	1850.8	9696.97	1850.77	9703.64	1850.72
9741.74	1850.2	9754.02	1850.1	9781.63	1850.02	9783	1850.01	9784.13	1849.94
9814.63	1847.8	9852.89	1847.27	9854.64	1847.25	9898.78	1846.86	9904.92	1846.84
9933.86	1846.6	9968.79	1846.6	9972.38	1846.72	9983.49	1847.09	9988.92	1845.28

10000.01 1842.310011.22 1844.08 10013.6 1844.4810019.98 1845.310027.74 1846.51
10037.2 1845.710041.86 1845.3110047.41 1845.6710051.82 1846.1110086.44 1849.89
10109.29 1852.610116.66 1853.02 10151.6 1854.8410169.41 1856.1610173.14 1856.26

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9561.71 .045 9983.49 .0410027.74 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9983.4910027.74 400 498.3 550 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.793

INPUT
Description: Note:End Reach C, Begin Reach D

Station Elevation Data num= 62
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9530.83 1847.1 9553.99 1846.66 9580.78 1845.92 9601.44 1845.44 9617.14 1845.23
9629.73 1845.2 9636.79 1845.06 9649.05 1845.01 9657.34 1845.05 9691.12 1844.95
9704.11 1844.9 9738.81 1845.08 9754.13 1845.11 9768.31 1845.04 9804.19 1844.49
9844.31 1843.9 9846.75 1843.91 9847.43 1843.89 9858 1843.84 9893.3 1842.61
9904.32 1842.3 9917.5 1841.88 9930.51 1841.42 9942.6 1841.56 9950.71 1841.79
9958.48 1841.4 9966.36 1840.98 9976.09 1841.21 9987.47 1841.57 9993.89 1839.75
10000.12 1838.210011.16 1840.510013.94 1840.9610034.23 1841.7210050.29 1842.3
10054.41 1842.310096.51 1842.9510104.45 1843.5710116.77 1844.5410118.85 1844.61
10132.96 1844.810141.83 1845.0110145.34 1845.1110148.53 1845.0810160.97 1844.21
10176.54 1843.310194.93 1843.9410209.46 1844.37 10224.7 1844.6710234.55 1844.8
10237.07 1844.910275.16 1846.110290.98 1846.52 10313.2 1847.2610331.86 1847.88
10348.74 1848.910351.71 1849.0610351.86 1849.0810352.87 1848.82 10355.7 1848.28
10373.52 1848.710388.73 1849.45

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9530.83 .045 9987.47 .0410013.94 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9987.4710013.94 400 492.7 575 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.699

INPUT
Description: Note: data for cross section 2.699 is from ALS survey (check
section 3)

Station Elevation Data num= 40
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9080 1845.9 9131 1845.98 9183 1846.17 9190 1845.69 9213 1845.73
9267 1845.5 9318 1844.99 9367 1844.26 9420 1843.2 9475 1841.96
9528 1841 9581 1840.44 9638 1840.05 9693 1840.7 9745 1840.16
9797 1840 9846 1839.97 9895 1839.81 9943 1839.03 9991 1836.27
10000 1835 10001 1835.7 10014 1835.66 10033 1835.8 10044 1836.37
10073 1837.1 10122 1835.7 10171 1838.11 10221 1838.74 10269 1840.67
10317 1842.6 10370 1844.38 10423 1845.28 10472 1846.04 10520 1846.69
10572 1847.2 10621 1847.94 10673 1848.71 10686 1848.53 10710 1848.7

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9080 .04 9991 .035 10044 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9991 10044 50 51.8 50 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.689

INPUT
Description:
Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9019.04 1845.6 9051.96 1845.76 9070.54 1845.69 9101.97 1845.46 9124.07 1845.35
9151.83 1845 9178.13 1844.42 9202 1844.95 9225.74 1844.94 9252.16 1845.11
9277.11 1845.1 9304.89 1845.09 9327.64 1844.98 9352.38 1844.9 9392.85 1845.02
9395.78 1845 9399.01 1844.92 9453.88 1842.95 9470.78 1842.6 9502.81 1841.82
9519.57 1841.4 9552.48 1840.88 9569.05 1840.54 9602.81 1840.12 9638.79 1840.2
9648.4 1840.1 9668.56 1840.63 9672.5 1840.78 9675.27 1840.56 9686.84 1839.48
9691.14 1839.8 9695.97 1840.39 9709.52 1840.48 9738.49 1840.38 9752.48 1840.32
9762.77 1840.3 9802.06 1840.62 9808.27 1840.5 9849.73 1840.51 9852.81 1840.45
9856.95 1840.5 9868.8 1840.62 9875.69 1840.59 9903.39 1840.41 9914.45 1839.51
9926.09 1839.1 9936.02 1838.57 9949.44 1837.84 9954.14 1837.51 9960.13 1838
9965.82 1838.5 9973.96 1838.22 9981.59 1837.97 9984.64 1837.54 9994.74 1835.59
10002.28 1835.710015.64 1836.25 10035.2 1836.4510039.44 1836.4810044.34 1837.25
10047.12 1837.710061.17 1837.4410065.81 1837.6710074.34 1838.1810091.52 1837.89
10093.46 1837.810120.89 1837.94 10151 1838.3710169.22 1838.7210199.32 1839.27
10204.19 1839.410212.04 1839.2410227.87 1840.5 10247.3 1840.7510253.45 1840.95
10258.15 1841.1 10307.1 1843.4210319.62 1843.94 10342.4 1844.5310385.66 1845.33
10407.82 1845.710428.44 1845.9610446.46 1846.0710531.26 1846.6610542.31 1846.79
10594.54 1847.9 10624.3 1848.35 10650 1848.5910664.48 1848.6510705.61 1848.27

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9019.04 .04 9981.59 .03510047.12 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9981.5910047.12 350 376.1 300 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.618

INPUT
Description:
Station Elevation Data num= 48
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9695.94 1838.1 9733.17 1838.7 9738.46 1838.76 9742.12 1838.58 9745.58 1838.47
9790.76 1836.9 9794.71 1836.89 9801.89 1836.8 9830 1836.21 9849.02 1836.05
9852.15 1836.1 9853.06 1835.91 9857.29 1835.32 9870.44 1835.38 9883.8 1835.45
9888.83 1835.9 9889.5 1836.05 9894.56 1835.91 9915.2 1835.68 9939.48 1835.27
9955.46 1835.5 9957.08 1835.6 9966.96 1834.43 9968.11 1834.27 9970.18 1834.31
9978.78 1834.4 9986.96 1833.17 9998.5 1831.6410003.05 1833.2310008.13 1834.88
10015.77 1834.510026.33 1834.210038.41 1834.3610054.14 1834.4110063.96 1834.46
10074.9 1834.510087.07 1835.4310098.39 1836.4410102.14 1836.6310109.61 1836.96
10117.37 1837 10124.7 1837.28 10128.9 1837.1910145.17 1837.7410172.52 1838.61
10179.19 1838.810186.18 1839.1210216.63 1840.74

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9695.94 .04 9978.78 .03510008.13 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9978.7810008.13 350 392.1 400 .1 .3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.544

INPUT
Description: Note:GR records deleted from Sta. 9492.78 to Sta. 9897.84
to
restrict flow to effective area without X3 record

Station Elevation Data num= 37
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9897.84 1835.2 9899.69 1834.98 9901.66 1834.81 9917.29 1833.09 9934.3 1831.53
9941.68 1831.3 9943.33 1831.77 9954.03 1832.25 9962.02 1832.1 9966.19 1831.98
9976.8 1831.6 9981.07 1831.4 9994.03 1829.17 9999.33 1828.2510010.44 1831.2
10012.64 1831.810015.44 1831.8210033.71 1831.9110043.08 1831.5710060.94 1831.15
10063.3 1831.210082.56 1833.4910084.02 1833.5910095.17 1833.810134.77 1834.87
10135.94 1834.910136.29 1834.9310137.06 1834.9510138.21 1834.9710180.19 1836.13
10191.77 1836.3 10209.8 1836.7110238.21 1836.9810256.56 1837.2110290.01 1837.29
10295.73 1837.310313.45 1837.22

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9897.84 .04 9981.07 .03510012.64 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9981.0710012.64 400 442.1 425 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.46

INPUT
Description:
Station Elevation Data num= 82
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9788.85 1833.9 9790.76 1833.9 9809 1833.59 9816.85 1833.03 9821.47 1832.79
9831.76 1832.2 9835.31 1832.16 9840.51 1832.05 9844.34 1832.06 9849.22 1831.74
9853.83 1831.5 9858.78 1831.26 9865.44 1831.21 9872.24 1831.16 9882.66 1830.97
9921.32 1830.2 9927.74 1830.12 9935.38 1829.77 9941.69 1829.64 9963.99 1828.54
9965.72 1828.5 9968.65 1828.52 9975.41 1828.48 9976.66 1828.46 9978.68 1828.44
9986.3 1827.5 9988.71 1827.29 9994.55 1826.67 9995.35 1826.56 9996.16 1826.51
9999.41 182610009.37 1827.8510009.49 1827.8510013.83 1828.41 10014.6 1828.45
10015.86 1828.510035.76 1828.7310039.75 1828.7910041.38 1828.8110042.54 1828.8
10043.75 1828.810048.64 1828.8110101.59 1829.0510105.64 1829.0710110.43 1828.52
10119.9 1827.310132.44 1827.5 10143.1 1827.9210146.73 1828.5410147.77 1828.51
10150.84 1828.210151.11 1828.210151.55 1828.310152.48 1828.5210154.75 1829.01
10155.03 182910155.09 1829.07 10155.3 1829.07 10155.7 182910156.25 1829.05
10156.87 182910157.58 1829.0310164.77 1827.8310167.42 1827.510168.34 1827.37
10173.33 1827.110173.64 1827.1410173.95 1827.1210180.01 1827.97 10181.2 1828.11
10182.58 1828.310185.58 1828.8410194.83 1830.610198.05 1830.910202.86 1831.93
10205.04 1832.510208.65 1832.7510216.35 1833.2210219.02 1833.510221.85 1833.77
10223.35 1833.810225.84 1834.04

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9788.85 .04 9978.68 .035 10014.6 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9978.68 10014.6 450 398.2 325 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.385

INPUT
Description:
Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9560.04 1832.2 9610.09 1831.93 9622.67 1831.85 9655.86 1831.52 9673.84 1831.41
9702.96 1831 9724.16 1830.9 9746.57 1830.83 9774.66 1830.6 9786.24 1830.32
9788.97 1830.3 9795.63 1829.72 9802.75 1829.3 9810.01 1828.98 9812.6 1828.89
9813.68 1828.9 9817.84 1828.85 9818.59 1828.86 9820.81 1828.71 9821.9 1828.69
9823.51 1828.6 9829.31 1828.43 9832.43 1828.21 9836.82 1828.02 9846.41 1827.55
9849.49 1827.4 9851.56 1827.36 9855.06 1827.14 9857.65 1826.94 9868.51 1826.49
9869.67 1826.4 9880.3 1825.94 9882.39 1825.88 9885.24 1825.83 9896.35 1825.59
9907.45 1825.3 9911.21 1825.53 9914.32 1825.63 9919.79 1825.84 9924.7 1825.95
9925.78 1825.8 9927.3 1825.66 9932.69 1824.91 9936.06 1825.36 9936.98 1825.44
9940.29 1825.8 9940.74 1825.8 9947.17 1826.17 9949.74 1826.22 9954.32 1826.37
9959.07 1826.5 9961.81 1826.61 9975.97 1826.49 9981.13 1826.48 9994.24 1824.17
9999.43 1823.310002.32 1823.8510015.85 1826.2810017.26 1826.310039.66 1826.78
10048.76 1826.710052.24 1826.7210065.53 1826.5510077.75 1825.4810082.12 1825.96
10085.39 1826.3 10091.4 1826.3510102.92 1826.4110110.08 1826.5710117.74 1826.71
10131.76 1825.310132.12 1825.3510140.69 1825.910150.96 1826.610156.81 1825.8
10182.48 1826.610187.88 1826.7410188.49 1826.9210189.12 1827.03 10190 1827.1
10191.64 1827.310195.68 1827.9710219.86 1828.6310227.41 1828.82 10236 1829.12
10241.62 1829.3 10245.3 1829.4610262.33 1830.0310269.16 1830.49 10303.5 1832.99

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9560.04 .04 9981.13 .03510015.85 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9981.1310015.85 500 536.2 500 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.283

INPUT
Description: Return Coefficient of Expansion and Contraction to normal.

Station Elevation Data num= 84
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9424.04 1828.2 9463.24 1827.91 9473.95 1827.87 9510.66 1827.86 9541.54 1827.78
9562.57 1827.7 9623.49 1827.68 9661.18 1827.43 9679.79 1827.23 9716.11 1827.06
9736.57 1827 9760.53 1827 9813.69 1826.43 9824.64 1826.31 9835 1826.06
9863.23 1825.2 9902.04 1824.35 9913.24 1824.12 9924.14 1823.75 9962.34 1822.61
9973.77 1822.5 9988 1822.43 9989.13 1822.43 9990.83 1821.89 9999.91 1819.07
10009.13 1821.7 10010.7 1822.1110012.43 1822.1710015.97 1822.3310025.92 1822.66
10051.17 1822.710072.43 1822.9310075.21 1822.96 10079.2 1822.87 10079.3 1822.87
10080.3 1822.710089.37 1821.2710090.65 1821.4310096.51 182210099.49 1822.2
10101.96 1822.510106.23 1822.7410107.97 1822.9310108.22 1822.9410109.19 1822.91
10117.59 1823.210119.14 1823.3110119.66 1823.3410120.56 1823.3810121.61 1823.54
10122.96 1823.510127.94 1823.4410129.92 1823.410134.25 1822.9210139.73 1822.52
10143.02 182210143.34 1822.0410143.56 1822.0210144.84 1821.610150.38 1821.24
10163.18 1821.610175.47 1822.0710187.85 1822.4110190.14 1822.4310196.38 1822.64
10199.86 1822.610220.85 1822.8410223.07 1822.8710225.86 182310242.25 1823.09
10246.81 1823.110255.44 1822.7810264.37 1822.4110267.36 1822.5410288.91 1823.39
10337.08 1824.510343.37 1824.7810349.15 1824.9310398.53 1826.3310448.98 1827.37
10453.39 1827.410455.06 1827.4910458.89 1827.5810509.03 1828.48

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9424.04 .04 9988 .035 10010.7 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9988 10010.7 200 159.1 175 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.253

INPUT
Description: 11th Avenue culvert (section 4 of SC routine)

Station Elevation Data num= 74
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9526.29 1825 9563.53 1824.9 9580.06 1824.9 9624.94 1825.02 9635.59 1825.01
9647.07 1825 9688.63 1825.12 9712.86 1825.03 9743.5 1824.82 9752.47 1824.79
9777.52 1824.8 9791.54 1824.88 9798.84 1824.77 9828.68 1824.42 9853.93 1824.3
9866.12 1824.1 9893.6 1823.65 9904.07 1823.47 9909.21 1823.35 9942.88 1822.21
9963.37 1821.5 9980.83 1821.6 9983.47 1821.61 9994.64 1818.82 9997.79 1818.05
10008.45 1821.810009.65 1822.2710013.11 1822.32 10014.8 1822.3410015.93 1822.37
10017.53 1822.310018.59 1822.210029.85 1821.2710033.35 1820.9910042.68 1821.42
10044.72 1821.510046.79 1821.5810056.38 1822.0510070.13 1822.1910090.47 1822.57
10092.83 1822.510095.14 1821.8710097.68 1821.1210099.77 1820.5510115.42 1820.87
10133.23 1821.2 10139 1821.3410141.21 1821.4910141.36 1821.5510141.47 1821.65
10141.58 1821.710141.91 1821.810142.75 1821.8610145.21 1822.1410156.89 1822.1
10160.45 1822.110162.81 1822.0510164.93 1821.9710167.62 1821.8510182.97 1821.68
10218.4 1821.710236.42 1821.710240.56 1821.710242.02 1821.7710244.48 1821.79
10247.2 1821.610254.47 1821.1110264.85 1821.4410271.77 1821.6310276.03 1821.8
10291.58 1822.310309.63 1823.210343.71 1824.7710388.05 1826.3

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9526.29 .04 9983.47 .03510009.65 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9983.4710009.65 400 305.4 100 .6 .8
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.195

INPUT
Description: 11th Ave Culvert BT Record data from ALS surveyors.
BT records
coded per Figure 3.16 (HEC-2 Sept. 1990)
Note:Channel was adj. to
match ALS survey between Sta. 9979.78 and 10046.38
Note:GR
records deleted from Sta. 9894.98 to Sta. 9962.31 to
restrict
effective flow without X3 record.

Station Elevation Data num= 61
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9962.31 1820.8 9964.13 1820.81 9967.29 1820.7 9968.84 1820.6 9975.69 1818.1
9977.72 1817.8 9979.34 1817.68 9981.2 1817.48 9984.45 1817.1 9992.18 1816.2
9993.02 1816.1 9993.62 1816.110000.67 1815.810002.22 1815.610009.16 1815.8
10018.44 1816.110027.83 1816.310031.71 1816.510039.07 1820.410039.93 1820.4
10041.23 1820.410047.76 1820.6110054.66 1820.4410057.39 1820.510064.44 1820.5
10074.27 1820.710077.27 1820.84 10083.9 1820.7610087.62 1820.710097.62 1820.5
10104.39 1820.410106.38 1820.410111.73 1820.3110117.03 1820.310142.58 1820.2
10149.68 1820.310151.35 1820.310154.65 1820.3110158.89 1820.210163.83 1820.3
10167.07 1820.410171.81 1820.510198.43 1820.7610204.44 1820.910206.95 1821
10210.61 1821.110215.52 1821.2910217.84 1821.2110219.65 1821.210226.38 1821.2
10248.26 1821.210251.22 1821.210258.27 1821.2510265.72 1821.210268.07 1821.2

10273.68 1821.410278.23 1821.4610280.93 1821.5610287.43 1821.610292.95 1821.7
10308.15 1821.8

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9962.31 .04 9968.84 .03510039.93 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9968.8410039.93 50 81.9 100 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9962.31 9968.84 1819.8 F
10039.9310308.15 1819.8 F
Sediment Elevation = 0

CULVERT

RIVER: RIVER-1
REACH: Reach-1 RS: 2.1875

INPUT
Description: Culvert #2 (3 4' Pipes)
11th Avenue culvert (section 3 of SC
routine)
3-48" CMP's Inverts determined by averaging

Distance from Upstream XS =6.740002
Deck/Roadway Width = 68.42
Weir Coefficient = 2.63
Upstream Deck/Roadway Coordinates
num= 12
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
9964.13 1820.81 1814.45 9967.29 1820.7 1814.45 9968.84 1819.8 1814.45
9968.84 1819.8 1814.45 10000 1820.15 1814.4510039.93 1820.4 1814.45
10039.93 1820.4 1814.4510104.39 1820.4 1814.4510149.68 1820.3 1814.45
10198.43 1820.76 1814.4510251.22 1821.21 1814.4510308.15 1821.81 1814.45

Upstream Bridge Cross Section Data
Station Elevation Data num= 61
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9962.31 1820.8 9964.13 1820.81 9967.29 1820.7 9968.84 1820.6 9975.69 1818.1
9977.72 1817.8 9979.34 1817.68 9981.2 1817.48 9984.45 1817.1 9992.18 1816.2
9993.02 1816.1 9993.62 1816.110000.67 1815.810002.22 1815.610009.16 1815.8
10018.44 1816.110027.83 1816.310031.71 1816.510039.07 1820.410039.93 1820.4
10041.23 1820.410047.76 1820.6110054.66 1820.4410057.39 1820.510064.44 1820.5
10074.27 1820.710077.27 1820.84 10083.9 1820.7610087.62 1820.710097.62 1820.5
10104.39 1820.410106.38 1820.410111.73 1820.3110117.03 1820.310142.58 1820.2
10149.68 1820.310151.35 1820.310154.65 1820.3110158.89 1820.210163.83 1820.3
10167.07 1820.410171.81 1820.510198.43 1820.7610204.44 1820.910206.95 1821
10210.61 1821.110215.52 1821.2910217.84 1821.2110219.65 1821.210226.38 1821.2
10248.26 1821.210251.22 1821.210258.27 1821.2510265.72 1821.210268.07 1821.2
10273.68 1821.410278.23 1821.4610280.93 1821.5610287.43 1821.610292.95 1821.7
10308.15 1821.8

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9962.31 .04 9968.84 .03510039.93 .04

Bank Sta: Left Right Coeff Contr. Expan.
9968.8410039.93 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9962.31 9968.84 1819.8 F
10039.9310308.15 1819.8 F
Sediment Elevation = 0

Downstream Deck/Roadway Coordinates
num= 13

```
    Sta Hi Cord Lo Cord    Sta Hi Cord Lo Cord    Sta Hi Cord Lo Cord
 9963.49 1820.81 1814.45 9964.13 1820.81 1814.45 9967.29  1820.7 1814.45
 9968.84  1819.8 1814.45  10000 1820.15 1814.4510033.55 1820.36 1814.45
10033.55 1820.36 1814.4510039.93  1820.4 1814.4510104.39  1820.4 1814.45
10149.68  1820.3 1814.4510198.43 1820.76 1814.4510251.22 1821.21 1814.45
10308.15 1821.81 1814.45

Downstream Bridge Cross Section Data
Station Elevation Data   num=     54
   Sta   Elev    Sta   Elev    Sta   Elev    Sta   Elev    Sta   Elev
 9961.04   1820 9963.49 1820.07  9969.5 1818.88 9972.91 1818.23 9979.29 1818.05
  9980.5  1819.5   9988  1814.8   10000 1814.45 10015.3 1814.64 10026.9  1818.9
10032.71  1819.710033.55 1820.2510048.91 1820.33 10079.5 1819.8410081.02  1819.8
10081.51  1819.810087.73 1819.7810104.37 1819.6510105.81 1819.63 10134.6  1819.8
10146.89   182010148.14 1820.1210149.28 1820.1510149.78 1820.1510151.15  1820.1
10152.06  1820.110152.82 1820.1910154.67 1820.22 10156.7 1820.2510201.08  1820.9
10203.65  1820.910207.02  1820.910210.67  1820.910212.72 1820.9210218.77  1820.9
 10225.6  1821.110226.81  1821.110261.54 1821.3810293.53 1821.3710295.97  1821.4
10299.08  1821.4 10304.8 1821.4310309.03 1821.4310311.81 1821.3610315.42  1821.3
10322.41  1821.410325.89 1821.4610328.18 1821.5110337.79 1821.5610358.09  1821.7
10361.09  1821.710366.07 1821.8110373.09 1821.8910374.79 1821.89

Manning's n Values      num=     3
   Sta  n Val    Sta  n Val    Sta  n Val
9961.04    .04 9963.49   .03510033.55    .04

Bank Sta: Left  Right   Coeff Contr.  Expan.
     9963.4910033.55          .6     .8
Ineffective Flow    num=     2
  Sta L  Sta R   Elev  Permanent
9961.04 9963.49 1818.88      F
10033.5510374.79 1818.88      F
Sediment Elevation = 0

Upstream Embankment side slope           =     0 horiz. to 1.0 vertical
Downstream Embankment side slope         =     0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =    .98
Elevation at which weir flow begins       = 1820.04
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
Pipe2         Circular     4     4
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 1 - Headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length   Top n  Bottom n  Depth Blocked  Entrance Loss Coef  Exit Loss Coef
       6.740002  68.42    .024    .024      0              .5            1
Number of Barrels =  3
Upstream  Elevation =  1814.71
Centerline Stations
  Sta.   Sta.   Sta.
10000.3810004.3810008.38
Downstream Elevation =  1814.57
Centerline Stations
  Sta.   Sta.   Sta.
9994.52 9998.5210002.52

CULVERT OUTPUT  Profile #PF 1  Culv Group:  Pipe2

 Q Culv Group (cfs)      233.56   Culv Full Len (ft)      68.42
 # Barrels                   3   Culv Vel US (ft/s)       6.20
 Q Barrel (cfs)          77.85   Culv Vel DS (ft/s)       6.20
 E.G. US. (ft)         1822.30   Culv Inv El Up (ft)    1814.71
 W.S. US. (ft)         1822.07   Culv Inv El Dn (ft)    1814.57
 E.G. DS (ft)          1821.32   Culv Frctn Ls (ft)       0.69
```

W.S. DS (ft)	1820.54	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.98	Culv Entr Loss (ft)	0.30
Delta WS (ft)	1.53	Q Weir (cfs)	1876.44
E.G. IC (ft)	1822.17	Weir Sta Lft (ft)	9962.31
E.G. OC (ft)	1822.30	Weir Sta Rgt (ft)	10308.15
Culvert Control	Outlet	Weir Submerg	0.08
Culv WS Inlet (ft)	1818.71	Weir Max Depth (ft)	2.46
Culv WS Outlet (ft)	1818.57	Weir Avg Depth (ft)	1.58
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	546.89
Culv Crt Depth (ft)	2.67	Min El Weir Flow (ft)	1820.04

CULVERT OUTPUT Profile #PF 2 Culv Group: Pipe2

Q Culv Group (cfs)	230.65	Culv Full Len (ft)	68.42
# Barrels	3	Culv Vel US (ft/s)	6.12
Q Barrel (cfs)	76.88	Culv Vel DS (ft/s)	6.12
E.G. US. (ft)	1822.44	Culv Inv El Up (ft)	1814.71
W.S. US. (ft)	1822.23	Culv Inv El Dn (ft)	1814.57
E.G. DS (ft)	1821.44	Culv Frctn Ls (ft)	0.67
W.S. DS (ft)	1820.90	Culv Exit Loss (ft)	0.04
Delta EG (ft)	1.00	Culv Entr Loss (ft)	0.29
Delta WS (ft)	1.33	Q Weir (cfs)	1879.35
E.G. IC (ft)	1822.33	Weir Sta Lft (ft)	9962.31
E.G. OC (ft)	1822.44	Weir Sta Rgt (ft)	10215.52
Culvert Control	Outlet	Weir Submerg	0.24
Culv WS Inlet (ft)	1818.71	Weir Max Depth (ft)	2.61
Culv WS Outlet (ft)	1818.57	Weir Avg Depth (ft)	1.99
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	503.58
Culv Crt Depth (ft)	2.65	Min El Weir Flow (ft)	1820.04

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.18

INPUT
Description: x-sect 2.180 is both special culvert 4 for Joy Ranch Road
(Downstream)
and special culvert 2 for 11th Avenue
(Upstream)
Note:Channel was adj. to match ALS survey between Sta.
9979.29 and 10032.71

Station Elevation Data num= 54

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9961.04	1820	9963.49	1820.07	9969.5	1818.88	9972.91	1818.23	9979.29	1818.05
9980.5	1819.5	9988	1814.8	10000	1814.45	10015.3	1814.64	10026.9	1818.9
10032.71	1819.7	10033.55	1820.25	10048.91	1820.33	10079.5	1819.84	10081.02	1819.8
10081.51	1819.8	10087.73	1819.78	10104.37	1819.65	10105.81	1819.63	10134.6	1819.8
10146.89	1820	10148.14	1820.12	10149.28	1820.15	10149.78	1820.15	10151.15	1820.1
10152.06	1820.1	10152.82	1820.19	10154.67	1820.22	10156.7	1820.25	10201.08	1820.9
10203.65	1820.9	10207.02	1820.91	10210.67	1820.91	10212.72	1820.92	10218.77	1820.9
10225.6	1821.1	10226.81	1821.11	10261.54	1821.38	10293.53	1821.37	10295.97	1821.4
10299.08	1821.4	10304.8	1821.43	10309.03	1821.43	10311.81	1821.36	10315.42	1821.3
10322.41	1821.4	10325.89	1821.46	10328.18	1821.51	10337.79	1821.56	10358.09	1821.7
10361.09	1821.7	10366.07	1821.81	10373.09	1821.89	10374.79	1821.89		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9961.04	.04	9963.49	.035	10033.55	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9963.49	10033.55	25	68.8	275	.6	.8

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
9961.04	9963.49	1818.88	F

10033.5510374.79 1818.88 F
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.167

INPUT
Description: x-sect 2.167 is both special culvert 3 for Joy Ranch
Road(Downstream)
and special culvert 1 for 11th Avenue
(Upstream)
Joy Ranch Road Culvert BT Record data is from ALS
surveyors.
Note:Channel was adj. to match ALS survey between STA.
9990.5 and 10013.5

Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9338.8 1822.4 9361.91 1822.65 9393.07 1822.55 9415 1822.65 9445.88 1822.61
9467.61 1822.5 9492.16 1822.54 9502.15 1822.38 9509.75 1822.33 9533.48 1822.38
9552.5 1822.6 9564.82 1822.5 9581.77 1822.5 9588.27 1822.43 9604.18 1822.45
9618.11 1822.4 9637.47 1822.27 9645.24 1822.25 9649.59 1822.19 9657.76 1822.17
9663.27 1822.1 9683.92 1822.07 9693.58 1822.04 9716.39 1822.03 9735.74 1821.94
9741.48 1821.9 9748.56 1821.97 9766.27 1821.83 9789.34 1821.71 9799.08 1821.58
9805.63 1821.5 9812.64 1821.51 9825.27 1821.5 9837.57 1821.34 9854.43 1821.21
9857.98 1821.2 9862.94 1821.04 9882.46 1820.56 9888.72 1820.3 9891.88 1820.27
9901.5 1819 9904.97 1819.98 9913.1 1819.83 9923.98 1819.7 9960.96 1819.43
9965.96 1819.3 9976.3 1819.27 9980.8 1819.46 9985.66 1818.1 9990.51 1816.77
9991.9 1814.5 10000 1814.1 10008.3 1814.7 10013.5 1819.110014.68 1818.38
10018.4 1818.610020.37 1818.910025.49 1819.3310026.85 1819.310029.58 1819.51
10031.13 1819.410033.96 1819.0610042.87 1818.3910053.09 1818.4710064.06 1818.5
10067.81 1818.410076.32 1818.45 10086.8 1818.3210088.34 1818.1710097.27 1818.05
10110.76 1817.510117.53 1817.9410120.93 1818.3810124.41 1818.4410139.42 1818.59
10186.96 1818.610221.88 1818.81 10249.1 1819.0410257.49 1819.0810268.31 1819.21
10312.46 1819.810349.72 1820.2410366.58 1820.3210386.85 1820.4610395.49 1820.57
10400.99 1820.510416.97 1820.810439.21 1821.0810471.27 1821.63 10506.9 1822.03

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9338.8 .04 9980.8 .035 10013.5 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9980.8 10013.5 75 85.2 175 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9338.8 9980.8 1817.5 F
10013.5 10506.9 1817.5 F
Sediment Elevation = 0

CULVERT

RIVER: RIVER-1
REACH: Reach-1 RS: 2.159

INPUT
Description: Culvert #1 (3 5' Pipes)
Joy Ranch Road culvert
3-60" CMP's
inverts determined by averaging.

Distance from Upstream XS = 2.98
Deck/Roadway Width = 79.24
Weir Coefficient = 2.63
Upstream Deck/Roadway Coordinates
num= 19

Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
9900.7 1819.34 1813.2 9950.58 1819.12 1813.2 9980.81819.206 1813.2
9980.81819.206 1813.2 10000 1819.26 1813.2 10013.51819.094 1813.2
10013.51819.094 1813.2 10050.5 1818.64 1813.2 10100.5 1817.85 1813.2
10110.76 1817.5 1813.210120.93 1818.38 1813.210139.42 1818.59 1813.2
10221.88 1818.81 1813.2 10249.1 1819.04 1813.210268.31 1819.21 1813.2
10312.46 1819.8 1813.210349.72 1820.24 1813.210366.58 1820.32 1813.2
10386.85 1820.46 1813.2

Upstream Bridge Cross Section Data
Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9338.8 1822.4 9361.91 1822.65 9393.07 1822.55 9415 1822.65 9445.88 1822.61
9467.61 1822.5 9492.16 1822.54 9502.15 1822.38 9509.75 1822.33 9533.48 1822.38
9552.5 1822.6 9564.82 1822.5 9581.77 1822.5 9588.27 1822.43 9604.18 1822.45
9618.11 1822.4 9637.47 1822.27 9645.24 1822.25 9649.59 1822.19 9657.76 1822.17
9663.27 1822.1 9683.92 1822.07 9693.58 1822.04 9716.39 1822.03 9735.74 1821.94
9741.48 1821.9 9748.56 1821.97 9766.27 1821.83 9789.34 1821.71 9799.08 1821.58
9805.63 1821.5 9812.64 1821.51 9825.27 1821.5 9837.57 1821.34 9854.43 1821.21
9857.98 1821.2 9862.94 1821.04 9882.46 1820.56 9888.72 1820.3 9891.88 1820.27
9901.5 1819 9904.97 1819.98 9913.1 1819.83 9923.98 1819.7 9960.96 1819.43
9965.96 1819.3 9976.3 1819.27 9980.8 1819.46 9985.66 1818.1 9990.51 1816.77
9991.9 1814.5 10000 1814.1 10008.3 1814.7 10013.5 1819.110014.68 1818.38
10018.4 1818.610020.37 1818.910025.49 1819.3310026.85 1819.310029.58 1819.51
10031.13 1819.410033.96 1819.0610042.87 1818.3910053.09 1818.4710064.06 1818.5
10067.81 1818.410076.32 1818.45 10086.8 1818.3210088.34 1818.1710097.27 1818.05
10110.76 1817.510117.53 1817.9410120.93 1818.3810124.41 1818.4410139.42 1818.59
10186.96 1818.610221.88 1818.81 10249.1 1819.0410257.49 1819.0810268.31 1819.21
10312.46 1819.810349.72 1820.2410366.58 1820.3210386.85 1820.4610395.49 1820.57
10400.99 1820.510416.97 1820.810439.21 1821.0810471.27 1821.63 10506.9 1822.03

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9338.8 .04 9980.8 .035 10013.5 .04

Bank Sta: Left Right Coeff Contr. Expan.
9980.8 10013.5 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9338.8 9980.8 1817.5 F
10013.5 10506.9 1817.5 F
Sediment Elevation = 0

Downstream Deck/Roadway Coordinates
num= 19
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
9900.7 1819.34 1813.2 9950.58 1819.12 1813.2 9959.091819.144 1813.2
9959.091819.144 1813.2 10000 1819.26 1813.210031.231818.877 1813.2
10031.231818.877 1813.2 10050.5 1818.64 1813.2 10100.5 1817.85 1813.2
10110.76 1817.5 1813.210120.93 1818.38 1813.210139.42 1818.59 1813.2
10221.88 1818.81 1813.2 10249.1 1819.04 1813.210268.31 1819.21 1813.2
10312.46 1819.8 1813.210349.72 1820.24 1813.210366.58 1820.32 1813.2
10386.85 1820.46 1813.2

Downstream Bridge Cross Section Data
Station Elevation Data num= 90
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9469.07 1821 9495.06 1821.76 9499.71 1821.7 9504.28 1821.71 9514.18 1821.69
9522.09 1821.6 9528.82 1821.6 9540.56 1821.76 9550.24 1821.67 9558.8 1821.67
9568.15 1821.6 9578.87 1821.8 9583.03 1821.82 9593.12 1821.79 9597.79 1821.79
9608.26 1821.7 9615.91 1821.63 9624.96 1821.71 9633.59 1821.69 9651.12 1821.57
9668.46 1821.5 9677.07 1821.52 9680.69 1821.48 9686.75 1821.49 9694.37 1821.45
9699.8 1821.3 9713.23 1821.3 9732.79 1821.3 9748.77 1821.2 9762.52 1821.14
9765.44 1821.1 9777.89 1821.01 9791.39 1820.79 9796.18 1820.78 9803.35 1820.73
9808.72 1820.6 9815.84 1820.47 9823.59 1820.38 9829.18 1820.28 9843.47 1820.15
9849.27 1820 9855.65 1820.31 9859.96 1820.12 9867.04 1819.93 9868.77 1819.8
9873.61 1819.6 9877.22 1819.4 9880.46 1819.02 9881.4 1818.79 9894.42 1818.93
9907.08 1819.1 9919.04 1818.61 9931.42 1818.42 9933.48 1818.45 9940.96 1818.88
9947.53 1818.9 9951.78 1818.99 9959.09 1819.29 9986.49 1818.04 9990.5 1814.25

9992.97 1814 10000 1813.8 10002 1813.6 10004.7 1813.5 10006 1813.2
10008.33 1817.810031.23 1818.0710056.28 1817.9610075.78 1817.7610108.55 1817.56
10136.15 1817.710159.05 1817.7210171.61 1817.2110172.71 1817.2810191.09 1817.79
10226.82 181810244.29 1818.3310260.01 1818.2910261.85 1818.3310279.05 1818.29
10286.35 1818.3 10301.6 1818.3310340.55 1818.4810343.05 1818.510377.17 1818.44
10413.22 1818.610483.04 1819.2910518.59 1820.0410556.48 1820.5810585.23 1820.81

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9469.07 .04 9986.49 .03510031.23 .04

Bank Sta: Left Right Coeff Contr. Expan.
9959.0910031.23 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
9469.07 9959.09 1816.6 F
10031.2310585.23 1816.6 F
Sediment Elevation = 0

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins = 1818.01
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
Pipe1 Circular 5 5
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 1 - Headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef Exit Loss Coef
2.98 79.24 .024 .024 0 .5 1
Number of Barrels = 3
Upstream Elevation = 1812.87
Centerline Stations
Sta. Sta. Sta.
9992.15 9997.1510002.15
Downstream Elevation = 1811.84
Centerline Stations
Sta. Sta. Sta.
9990.16 9995.1610000.16

CULVERT OUTPUT Profile #PF 1 Culv Group: Pipe1

Q Culv Group (cfs)	336.05	Culv Full Len (ft)	79.24
# Barrels	3	Culv Vel US (ft/s)	5.70
Q Barrel (cfs)	112.02	Culv Vel DS (ft/s)	5.70
E.G. US. (ft)	1820.28	Culv Inv El Up (ft)	1812.87
W.S. US. (ft)	1819.87	Culv Inv El Dn (ft)	1811.84
E.G. DS (ft)	1819.41	Culv Frctn Ls (ft)	0.50
W.S. DS (ft)	1819.02	Culv Exit Loss (ft)	0.11
Delta EG (ft)	0.86	Culv Entr Loss (ft)	0.25
Delta WS (ft)	0.85	Q Weir (cfs)	1773.95
E.G. IC (ft)	1820.16	Weir Sta Lft (ft)	9889.61
E.G. OC (ft)	1820.28	Weir Sta Rgt (ft)	10360.61
Culvert Control	Outlet	Weir Submerg	0.21
Culv WS Inlet (ft)	1817.87	Weir Max Depth (ft)	2.79
Culv WS Outlet (ft)	1816.84	Weir Avg Depth (ft)	1.20
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	562.88
Culv Crt Depth (ft)	3.02	Min El Weir Flow (ft)	1818.01

Warning: During subcritical analysis, the water surface upstream of culvert went to critical depth.

CULVERT OUTPUT Profile #PF 2 Culv Group: Pipe1

Q Culv Group (cfs)	384.70	Culv Full Len (ft)	79.24
# Barrels	3	Culv Vel US (ft/s)	6.53
Q Barrel (cfs)	128.23	Culv Vel DS (ft/s)	6.53
E.G. US. (ft)	1820.96	Culv Inv El Up (ft)	1812.87
W.S. US. (ft)	1820.44	Culv Inv El Dn (ft)	1811.84
E.G. DS (ft)	1819.83	Culv Frctn Ls (ft)	0.65
W.S. DS (ft)	1819.31	Culv Exit Loss (ft)	0.14
Delta EG (ft)	1.13	Culv Entr Loss (ft)	0.33
Delta WS (ft)	1.13	Q Weir (cfs)	1725.30
E.G. IC (ft)	1820.74	Weir Sta Lft (ft)	9880.00
E.G. OC (ft)	1820.96	Weir Sta Rgt (ft)	10125.00
Culvert Control	Outlet	Weir Submerg	0.24
Culv WS Inlet (ft)	1817.87	Weir Max Depth (ft)	3.44
Culv WS Outlet (ft)	1816.84	Weir Avg Depth (ft)	1.87
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	457.56
Culv Crt Depth (ft)	3.24	Min El Weir Flow (ft)	1818.01

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.151

INPUT
Description: Note:GR record adjusted to match ALS between Sta. 9986.49 and 10008.33

Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9469.07	1821	9495.06	1821.76	9499.71	1821.7	9504.28	1821.71	9514.18	1821.69
9522.09	1821.6	9528.82	1821.6	9540.56	1821.76	9550.24	1821.67	9558.8	1821.67
9568.15	1821.6	9578.87	1821.8	9583.03	1821.82	9593.12	1821.79	9597.79	1821.79
9608.26	1821.7	9615.91	1821.63	9624.96	1821.71	9633.59	1821.69	9651.12	1821.57
9668.46	1821.5	9677.07	1821.52	9680.69	1821.48	9686.75	1821.49	9694.37	1821.45
9699.8	1821.3	9713.23	1821.3	9732.79	1821.3	9748.77	1821.2	9762.52	1821.14
9765.44	1821.1	9777.89	1821.01	9791.39	1820.79	9796.18	1820.78	9803.35	1820.73
9808.72	1820.6	9815.84	1820.47	9823.59	1820.38	9829.18	1820.28	9843.47	1820.15
9849.27	1820	9855.65	1820.31	9859.96	1820.12	9867.04	1819.93	9868.77	1819.8
9873.61	1819.6	9877.22	1819.4	9880.46	1819.02	9881.4	1818.79	9894.42	1818.93
9907.08	1819.1	9919.04	1818.61	9931.42	1818.42	9933.48	1818.45	9940.96	1818.88
9947.53	1818.9	9951.78	1818.99	9959.09	1819.29	9986.49	1818.04	9990.5	1814.25
9992.97	1814	10000	1813.8	10002	1813.6	10004.7	1813.5	10006	1813.2
10008.33	1817.810031.23	1818.0710056.28	1817.9610075.78	1817.7610108.55	1817.56				
10136.15	1817.710159.05	1817.7210171.61	1817.2110172.71	1817.2810191.09	1817.79				
10226.82	181810244.29	1818.3310260.01	1818.2910261.85	1818.3310279.05	1818.29				
10286.35	1818.3	10301.6	1818.3310340.55	1818.4810343.05	1818.510377.17	1818.44			
10413.22	1818.610483.04	1819.2910518.59	1820.0410556.48	1820.5810585.23	1820.81				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9469.07	.04	9986.49	.03510031.23	.04	

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9959.0910031.23 150 188 100 .6 .8

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
9469.07	9959.09	1816.6	F
10031.2310585.23		1816.6	F

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.115

INPUT

Description: Joy Ranch Road Culvert (section 1 of SC routine)

Station Elevation Data num= 91

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9553.38	1820.3	9589.07	1819.95	9596.17	1819.87	9636.22	1819.19	9647.6	1819.04
9666.21	1818.7	9699.09	1818.35	9734.08	1817.91	9750.48	1817.79	9762.22	1817.79
9765.85	1817.8	9774.99	1817.97	9778.88	1817.5	9780.71	1817.33	9785.39	1817.24
9799.5	1817.2	9808.41	1816.92	9816.02	1815.99	9818.61	1815.82	9825.76	1817.04
9827.98	1817.3	9829.34	1817.36	9831.96	1817.4	9835.27	1817.44	9837.55	1817.46
9839.69	1817.4	9850.17	1817.44	9865.04	1817.36	9904.65	1816.97	9926.29	1816.96
9957.99	1816.8	9980.25	1816.59	9987.44	1816.45	9989.25	1816.42	9991.03	1815.83
9999.4	1812.9	9999.81	1813	10006.9	1815.1	10008.61	1815.62	10008.71	1815.65
10008.9	1815.61	10025.56	1815.11	10035.93	1815.05	10044.63	1815.06	10044.84	1815.08
10044.9	1815	10049.8	1815.39	10057.15	1815.77	10060.46	1815.83	10061.58	1815.85
10066.65	1816	10073.78	1816.29	10077.05	1816.48	10078.1	1816.54	10081.63	1816.66
10083.36	1816.71	10084.82	1816.69	10085.67	1816.72	10086.83	1816.77	10092.86	1816.82
10137.33	1816.31	10154.78	1816.41	10172.26	1816.65	10180.47	1816.78	10207.67	1817.03
10225.66	1817	10243.56	1817.18	10273.15	1817.56	10283.47	1817.61	10289.88	1817.78
10300.45	1817.9	10306.7	1818	10309.15	1817.99	10324	1817.99	10332.38	1818.01
10343.76	1817.91	10373.08	1817.97	10384.67	1817.89	10420.31	1818.12	10437.79	1818.23
10455.22	1818.41	10473.18	1818.71	10491.19	1819.15	10525.79	1819.71	10544.36	1819.88
10562.06	1820	10579.22	1820.21	10596.74	1820.37	10615.21	1820.48	10633.34	1820.61
10666.85	1820.8								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9553.38	.04	9987.44	.035	10008.9	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9987.44	10008.9	175	183.9	250	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.08

INPUT
Description:
Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9529.4	1818.1	9560.47	1818.01	9576	1818	9606.96	1817.61	9626	1817.35
9650.59	1817	9671.22	1816.73	9694.44	1816.54	9697.96	1816.5	9702.1	1815.87
9704.31	1815.5	9706.75	1815.51	9731.46	1815.52	9731.76	1815.56	9731.83	1815.55
9732.15	1815.5	9736.86	1815.57	9775.09	1815.69	9797	1815.62	9799.24	1815.51
9805.15	1815.4	9818.87	1815.45	9819.47	1815.46	9819.94	1815.48	9824.59	1814.39
9830.02	1812.9	9834.87	1813.62	9841.91	1814.95	9847.28	1815.05	9881.96	1814.58
9893.5	1814.5	9902.74	1814.63	9905.69	1814.68	9911.59	1814.7	9926.01	1814.9
9940.34	1815.1	9968.7	1814.73	9989.39	1814.33	9989.98	1814.33	9990.56	1814.11
9992.87	1813.3	9998.81	1811.37	10000.06	1810.94	10008.28	1813.38	10010.07	1813.92
10020.58	1813.91	10029.04	1813.94	10029.24	1813.91	10030.88	1813.92	10053.33	1814
10078.44	1814.11	10083.64	1813.99	10084.97	1813.97	10088.63	1813.92	10094.39	1813.82
10096.84	1813.91	10105.92	1814.07	10126.17	1814.19	10133.03	1813.91	10162.92	1814.08
10182.59	1814.11	10201.12	1814.1	10226.2	1814.04	10232.98	1814.01	10234.45	1814
10236.06	1814	10237.76	1814.02	10280.02	1814.47	10290.3	1814.59	10329.86	1814.89
10343.06	1815	10347.77	1815.05	10351.06	1815.08	10357.51	1815.13	10402.54	1815.5
10443.89	1815.91	10457.43	1816.07	10473.64	1816.23	10500.27	1816.46	10512.41	1816.61
10525.32	1817	10549.07	1817.57	10554.71	1817.67	10562.27	1817.87	10568.87	1817.86
10573.63	1817.81	10575.88	1817.82	10615.6	1817.82	10622.26	1817.84	10645.62	1818.09

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9529.4	.04	9989.98	.035	10010.07	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
9989.98	10010.07	525	515.8	550	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1.982

INPUT
Description:
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9659.43	1813.7	9680.64	1813.96	9711.97	1814.22	9720.35	1814.34	9746.32	1814.36
9763.95	1814.2	9769.1	1814.04	9778.39	1813.86	9818.28	1813.42	9851.57	1812.52
9869.6	1811.9	9908.7	1811.49	9922.17	1811.38	9936.02	1811.44	9966.23	1811.5
9969.91	1811.1	9974.79	1810.47	9990.33	1810.83	9992.61	1810.89	9994.79	1810.25
10001.05	1808.5	10004.47	1809.28	10015.66	1811.33	10054.86	1811.08	10055.37	1811.08
10055.47	1811	10055.66	1811.08	10056.45	1811.08	10114.76	1810.77	10128.97	1810.83
10155.09	1810.7	10157.34	1810.68	10163.96	1809.89	10164.17	1809.86	10164.33	1809.89
10169.87	1810.9	10174.81	1810.89	10189.09	1810.82	10204.63	1810.51	10215.63	1810.14
10236.02	1810.8	10237.4	1810.9	10238.57	1810.93	10255.14	1811.23	10265.5	1811.2
10289.84	1811	10315.96	1811.01	10342.68	1810.97	10394.62	1812.04	10395.13	1812.05
10395.39	1812								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9659.43	.04	9992.61	.035	10015.66	.04

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

Left	Right	Left	Channel	Right	Coeff Contr.	Expan.
9992.61	10015.66	0	0	0	.1	.3

Profile Output Table - Standard Table 1

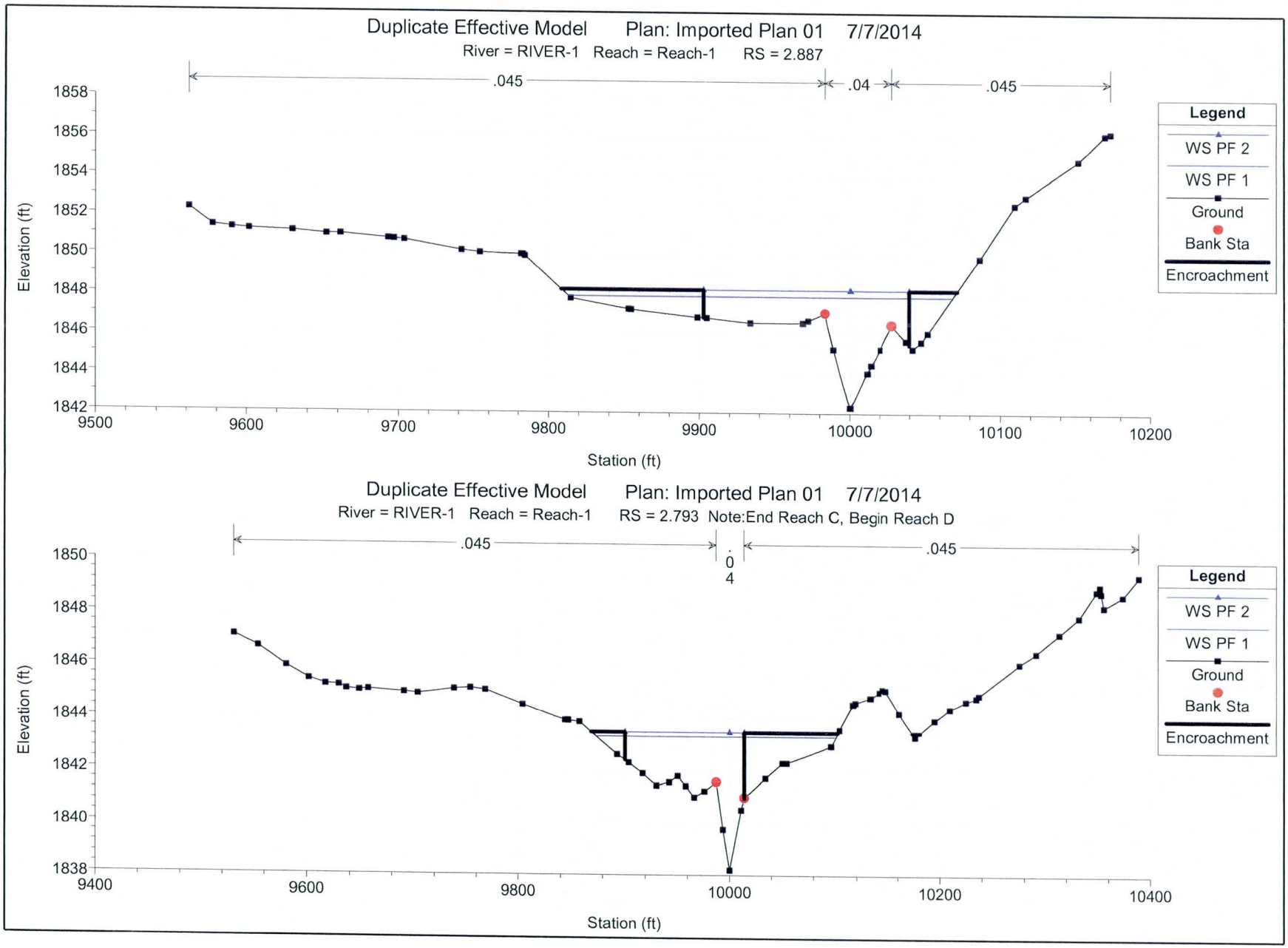
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft/ft)	E.G. Slope (ft/s)	Vel Chnl (sq ft)	Flow Area (ft)	Top Width	Froude # Chl
Reach-1	2.887	PF 1	1880.00	1842.30	1847.92	1847.89	1848.54	0.008437	7.64	373.73	255.35	0.73
Reach-1	2.887	PF 2	1880.00	1842.30	1848.25	1847.98	1848.96	0.007623	7.73	318.44	136.80	0.70
Reach-1	2.793	PF 1	1880.00	1838.20	1843.30	1843.30	1843.99	0.010887	8.90	349.37	227.36	0.83
Reach-1	2.793	PF 2	1880.00	1838.20	1843.46	1843.46	1844.47	0.012524	9.83	261.71	113.20	0.90
Reach-1	2.699	PF 1	1880.00	1835.00	1839.79		1839.90	0.001002	3.38	811.18	350.76	0.30
Reach-1	2.699	PF 2	1880.00	1835.00	1840.18		1840.87	0.003768	6.98	292.05	68.91	0.59
Reach-1	2.689	PF 1	1880.00	1835.59	1839.05	1839.05	1839.72	0.008702	7.58	347.85	260.09	0.82
Reach-1	2.689	PF 2	1880.00	1835.59	1839.81		1840.62	0.006049	7.48	268.31	85.20	0.71
Reach-1	2.618	PF 1	1880.00	1831.64	1836.53	1836.33	1836.99	0.005943	7.35	422.85	285.31	0.70
Reach-1	2.618	PF 2	1880.00	1831.64	1837.33		1838.25	0.006840	9.07	276.57	101.38	0.77
Reach-1	2.544	PF 1	1880.00	1828.25	1833.37	1833.37	1834.18	0.008918	9.03	306.83	166.73	0.86
Reach-1	2.544	PF 2	1880.00	1828.25	1833.90	1833.90	1835.19	0.009568	10.29	228.05	80.85	0.91
Reach-1	2.46	PF 1	2110.00	1826.00	1830.29		1830.64	0.005091	6.26	492.89	276.56	0.64
Reach-1	2.46	PF 2	2110.00	1826.00	1831.00		1831.50	0.004727	6.95	401.15	149.90	0.64
Reach-1	2.385	PF 1	2110.00	1823.30	1827.29	1827.29	1827.84	0.011706	8.27	414.49	338.96	0.93
Reach-1	2.385	PF 2	2110.00	1823.30	1828.03	1828.03	1828.92	0.010591	9.36	313.03	153.87	0.92
Reach-1	2.283	PF 1	2110.00	1819.07	1824.20		1824.43	0.004049	5.99	628.68	414.83	0.57
Reach-1	2.283	PF 2	2110.00	1819.07	1825.15		1825.45	0.002862	5.92	506.14	176.30	0.50
Reach-1	2.253	PF 1	2110.00	1818.05	1822.81	1822.81	1823.33	0.010711	8.57	443.43	376.70	0.90
Reach-1	2.253	PF 2	2110.00	1818.05	1823.65	1823.65	1824.56	0.009889	9.78	313.58	147.59	0.90
Reach-1	2.195	PF 1	2110.00	1815.60	1822.07	1819.83	1822.30	0.001204	4.34	712.41	345.84	0.34
Reach-1	2.195	PF 2	2110.00	1815.60	1822.23	1819.84	1822.44	0.001062	4.16	689.51	253.21	0.32
Reach-1	2.1875			Culvert								
Reach-1	2.18	PF 1	2110.00	1814.45	1820.54	1819.94	1821.32	0.005210	7.31	347.67	215.18	0.66
Reach-1	2.18	PF 2	2110.00	1814.45	1820.90	1819.94	1821.44	0.003371	6.25	425.83	212.70	0.54

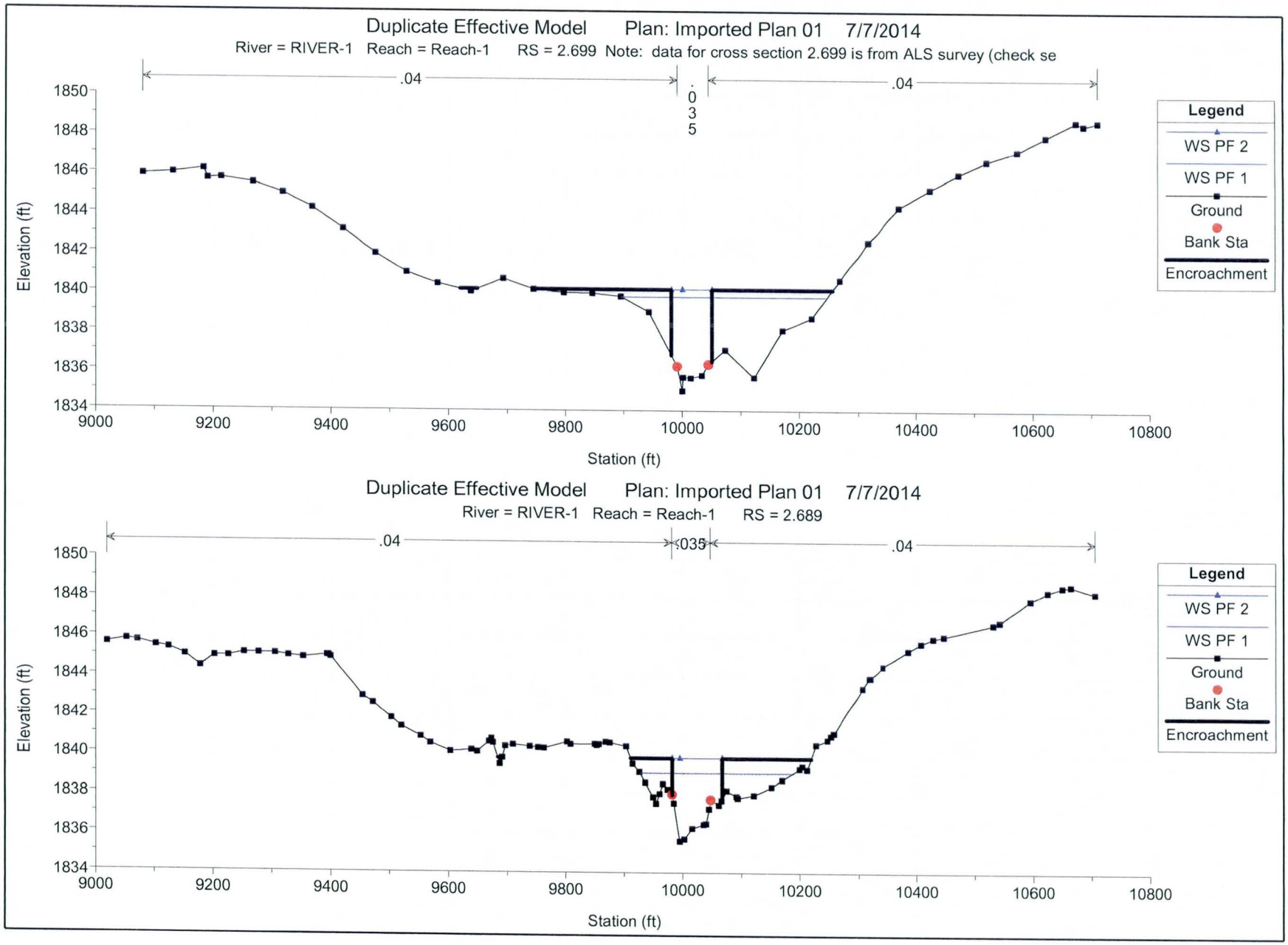
Reach-1	2.167	PF 1	2110.00	1814.10	1819.87	1819.87	1820.40	0.006175	7.81	495.66	416.63	0.69
Reach-1	2.167	PF 2	2110.00	1814.10	1820.44	1820.13	1820.95	0.004369	7.19	452.37	239.67	0.60
Reach-1	2.159		Culvert									
Reach-1	2.151	PF 1	2110.00	1813.20	1819.02	1819.02	1819.41	0.008197	6.78	527.50	554.55	0.83
Reach-1	2.151	PF 2	2110.00	1813.20	1819.31	1819.21	1819.83	0.007852	6.93	410.86	291.99	0.83
Reach-1	2.115	PF 1	2110.00	1812.90	1817.65	1817.65	1818.08	0.009546	8.36	507.57	507.45	0.85
Reach-1	2.115	PF 2	2110.00	1812.90	1817.71	1817.71	1818.42	0.011727	9.39	346.07	204.57	0.95
Reach-1	2.08	PF 1	2110.00	1810.94	1815.71	1815.28	1815.86	0.003716	5.43	789.06	720.71	0.54
Reach-1	2.08	PF 2	2110.00	1810.94	1816.30		1816.58	0.003400	5.82	528.67	221.36	0.53
Reach-1	1.982	PF 1	2110.00	1808.50	1811.92	1811.91	1812.32	0.014192	8.03	470.95	519.78	0.99
Reach-1	1.982	PF 2	2110.00	1808.50	1812.56	1812.53	1813.30	0.013249	9.30	327.86	189.70	1.00

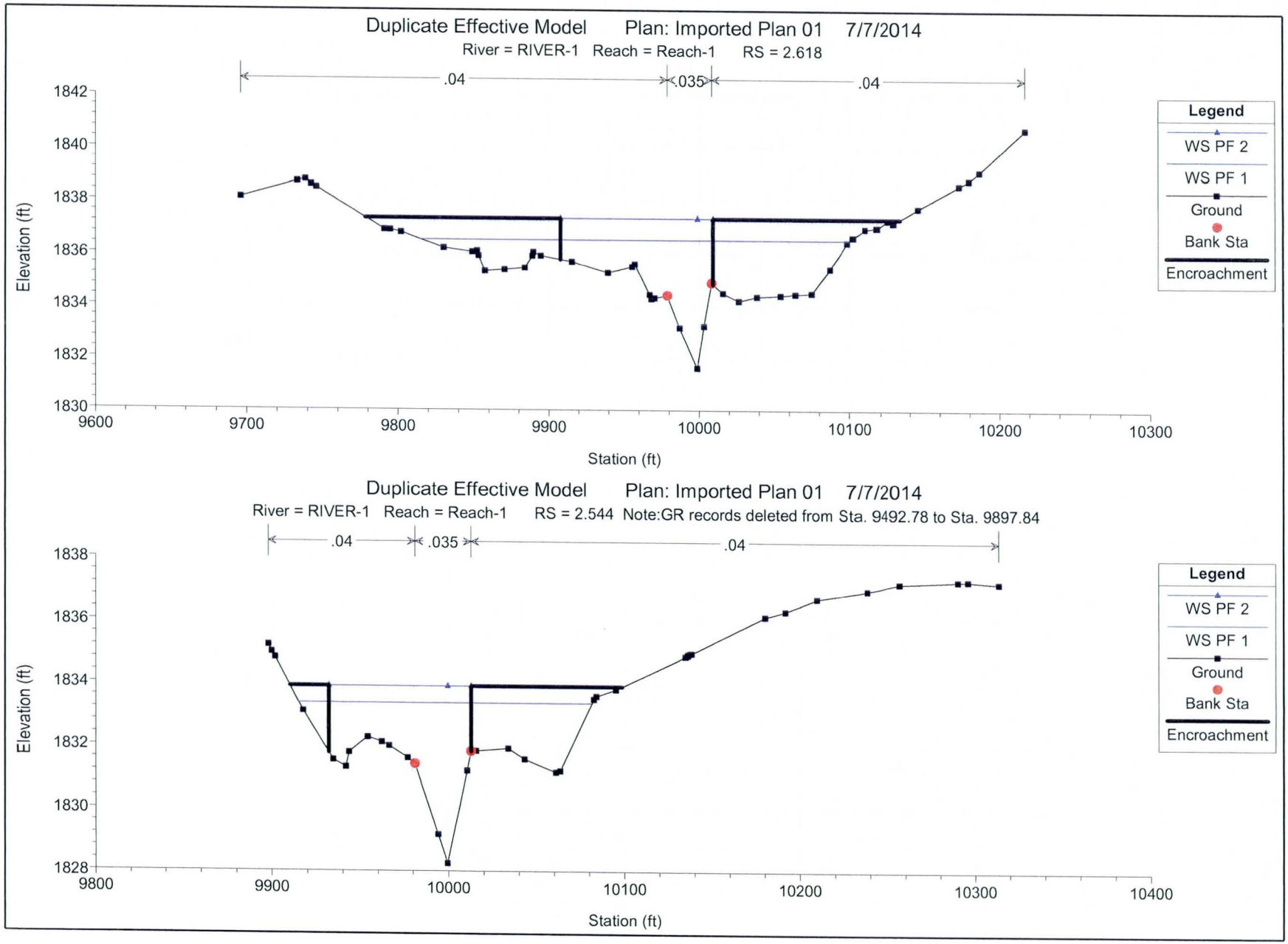
Profile Output Table - Standard Table 2

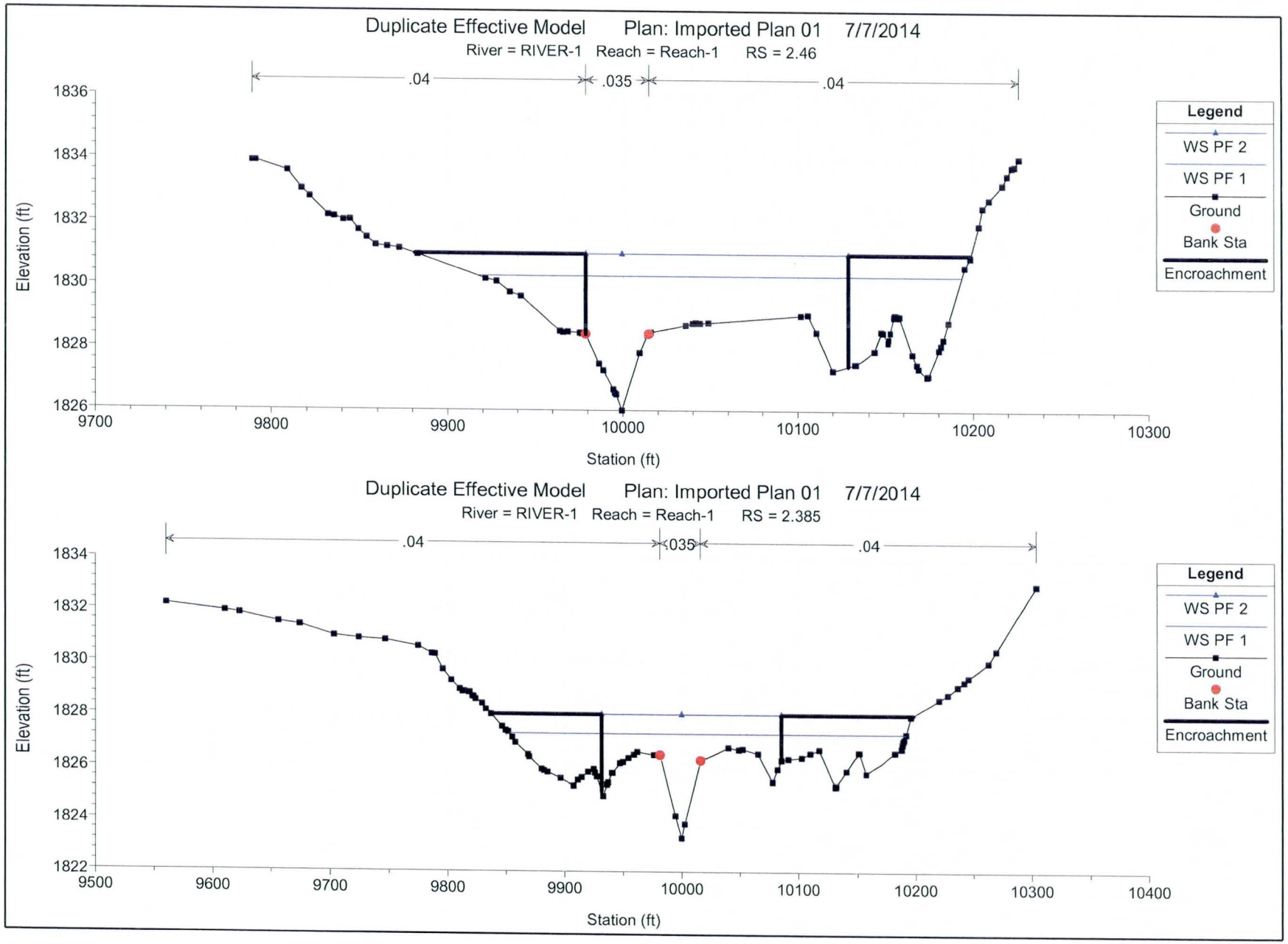
Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (cfs)	C & E Loss (cfs)	Q Left (ft)	Q Channel	Q Right	Top Width
Reach-1	2.887	PF 1	1848.54	1847.92	0.63	4.55	0.01	448.04	1158.54	273.42	255.35
Reach-1	2.887	PF 2	1848.96	1848.25	0.71	4.46	0.03	481.43	1286.72	111.85	136.80
Reach-1	2.793	PF 1	1843.99	1843.30	0.70	1.18	0.18	700.67	841.38	337.95	227.36
Reach-1	2.793	PF 2	1844.47	1843.46	1.01	2.94	0.09	907.80	972.20	0.00	113.20
Reach-1	2.699	PF 1	1839.90	1839.79	0.11	0.11	0.06	165.94	720.94	993.12	350.76
Reach-1	2.699	PF 2	1840.87	1840.18	0.69	0.24	0.01	159.04	1631.49	89.47	68.91
Reach-1	2.689	PF 1	1839.72	1839.05	0.68	2.49	0.06	137.31	1323.47	419.22	260.09
Reach-1	2.689	PF 2	1840.62	1839.81	0.81	2.36	0.01	0.00	1677.07	202.93	85.20
Reach-1	2.618	PF 1	1836.99	1836.53	0.46	2.78	0.04	426.88	743.97	709.15	285.31
Reach-1	2.618	PF 2	1838.25	1837.33	0.92	3.03	0.04	743.16	1132.26	4.58	101.38
Reach-1	2.544	PF 1	1834.18	1833.37	0.82	2.79	0.14	386.10	985.39	508.51	166.73
Reach-1	2.544	PF 2	1835.19	1833.90	1.29	2.75	0.24	584.86	1295.07	0.07	80.85
Reach-1	2.46	PF 1	1830.64	1830.29	0.35	2.78	0.02	158.40	674.96	1276.65	276.56
Reach-1	2.46	PF 2	1831.50	1831.00	0.50	2.54	0.04	0.00	925.54	1184.45	149.90
Reach-1	2.385	PF 1	1827.84	1827.29	0.55	3.28	0.09	739.22	704.05	666.74	338.96
Reach-1	2.385	PF 2	1828.92	1828.03	0.89	2.55	0.17	503.17	1035.56	571.27	153.87
Reach-1	2.283	PF 1	1824.43	1824.20	0.23	1.08	0.03	213.89	467.60	1428.51	414.83
Reach-1	2.283	PF 2	1825.45	1825.15	0.31	0.83	0.06	0.00	589.08	1520.92	176.30
Reach-1	2.253	PF 1	1823.33	1822.81	0.52	0.60	0.23	174.12	638.24	1297.64	376.70
Reach-1	2.253	PF 2	1824.56	1823.65	0.91	0.61	0.56	442.48	942.92	724.60	147.59
Reach-1	2.195	PF 1	1822.30	1822.07	0.23			11.93	1594.42	503.65	345.84
Reach-1	2.195	PF 2	1822.44	1822.23	0.21			13.41	1577.20	519.39	253.21
Reach-1	2.1875		Culvert								
Reach-1	2.18	PF 1	1821.32	1820.54	0.78	0.72	0.20	1.82	1972.61	135.57	215.18
Reach-1	2.18	PF 2	1821.44	1820.90	0.54	0.47	0.02	3.39	1847.08	259.53	212.70
Reach-1	2.167	PF 1	1820.40	1819.87	0.53			39.14	1006.11	1064.75	416.63
Reach-1	2.167	PF 2	1820.95	1820.44	0.51			167.25	1061.66	881.09	239.67
Reach-1	2.159		Culvert								
Reach-1	2.151	PF 1	1819.41	1819.02	0.40	1.19	0.02	22.32	921.91	1165.76	554.55
Reach-1	2.151	PF 2	1819.83	1819.31	0.52	1.29	0.12	74.15	1080.47	955.38	291.99

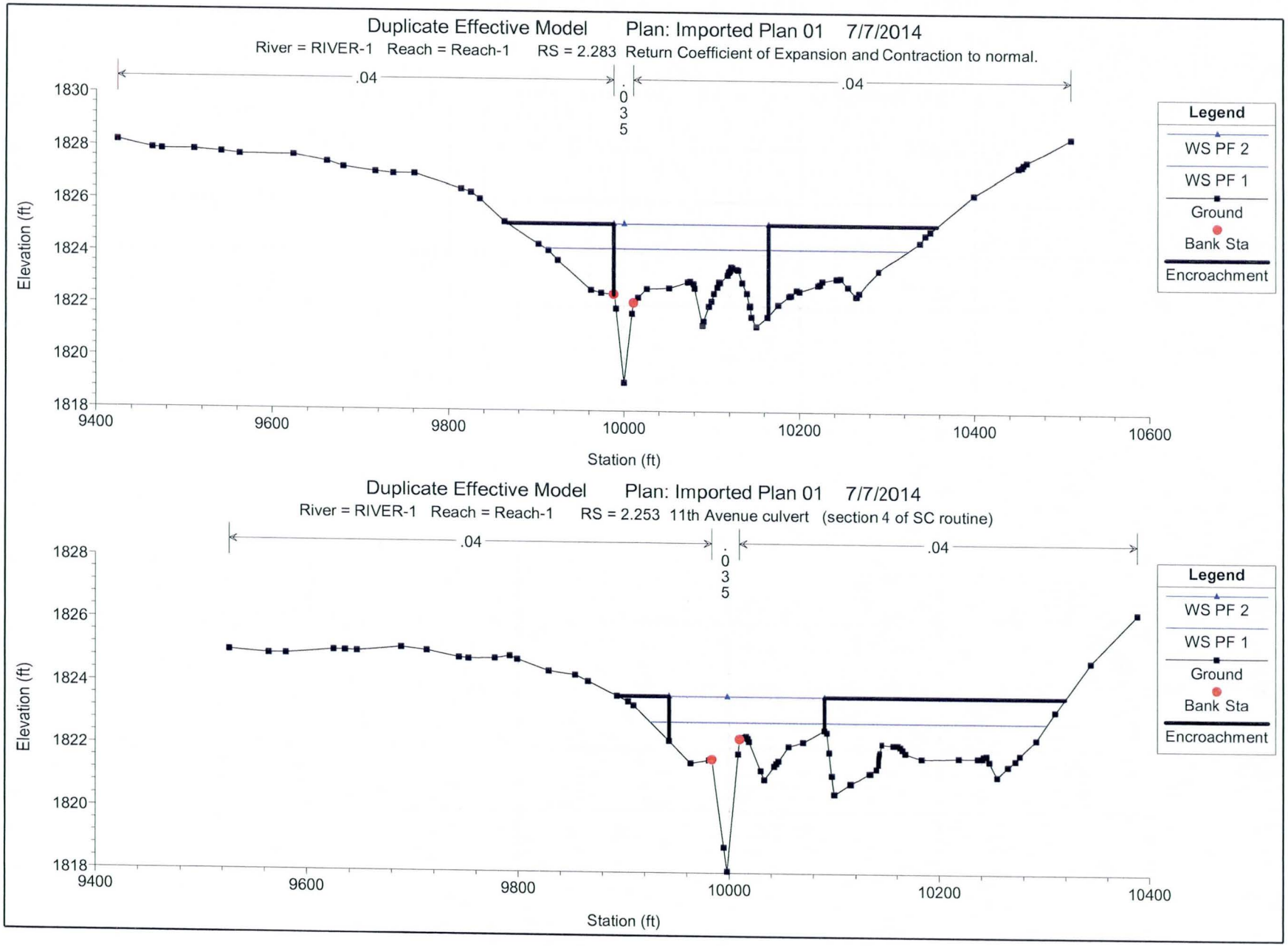
Reach-1	2.115	PF 1	1818.08	1817.65	0.43	1.26	0.08	355.84	536.92	1217.24	507.45
Reach-1	2.115	PF 2	1818.42	1817.71	0.71	1.33	0.13	0.00	615.37	1494.63	204.57
Reach-1	2.08	PF 1	1815.86	1815.71	0.16	3.52	0.02	330.11	347.43	1432.46	720.71
Reach-1	2.08	PF 2	1816.58	1816.30	0.28	3.23	0.05	91.75	442.59	1575.66	221.36
Reach-1	1.982	PF 1	1812.32	1811.92	0.40			192.05	379.81	1538.14	519.78
Reach-1	1.982	PF 2	1813.30	1812.56	0.74			313.66	576.91	1219.43	189.70

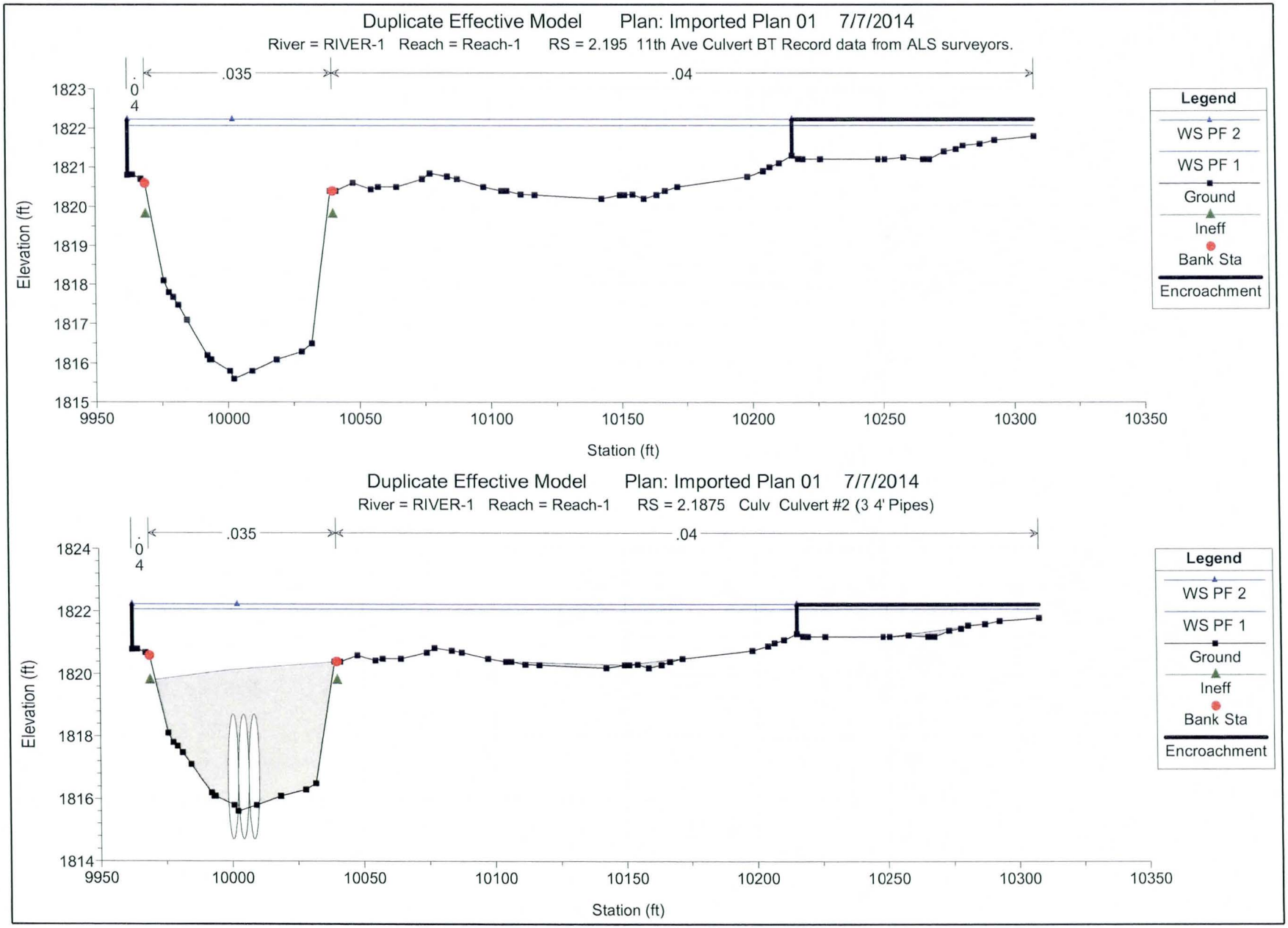

Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.887
.045
.04
.045
Elevation (ft)
1858
1856
1854
1852
1850
1848
1846
1844
1842
9500
9600
9700
9800
9900
10000
10100
10200
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.793 Note:End Reach C, Begin Reach D
.045
.04
.045
Elevation (ft)
1850
1848
1846
1844
1842
1840
1838
9400
9600
9800
10000
10200
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

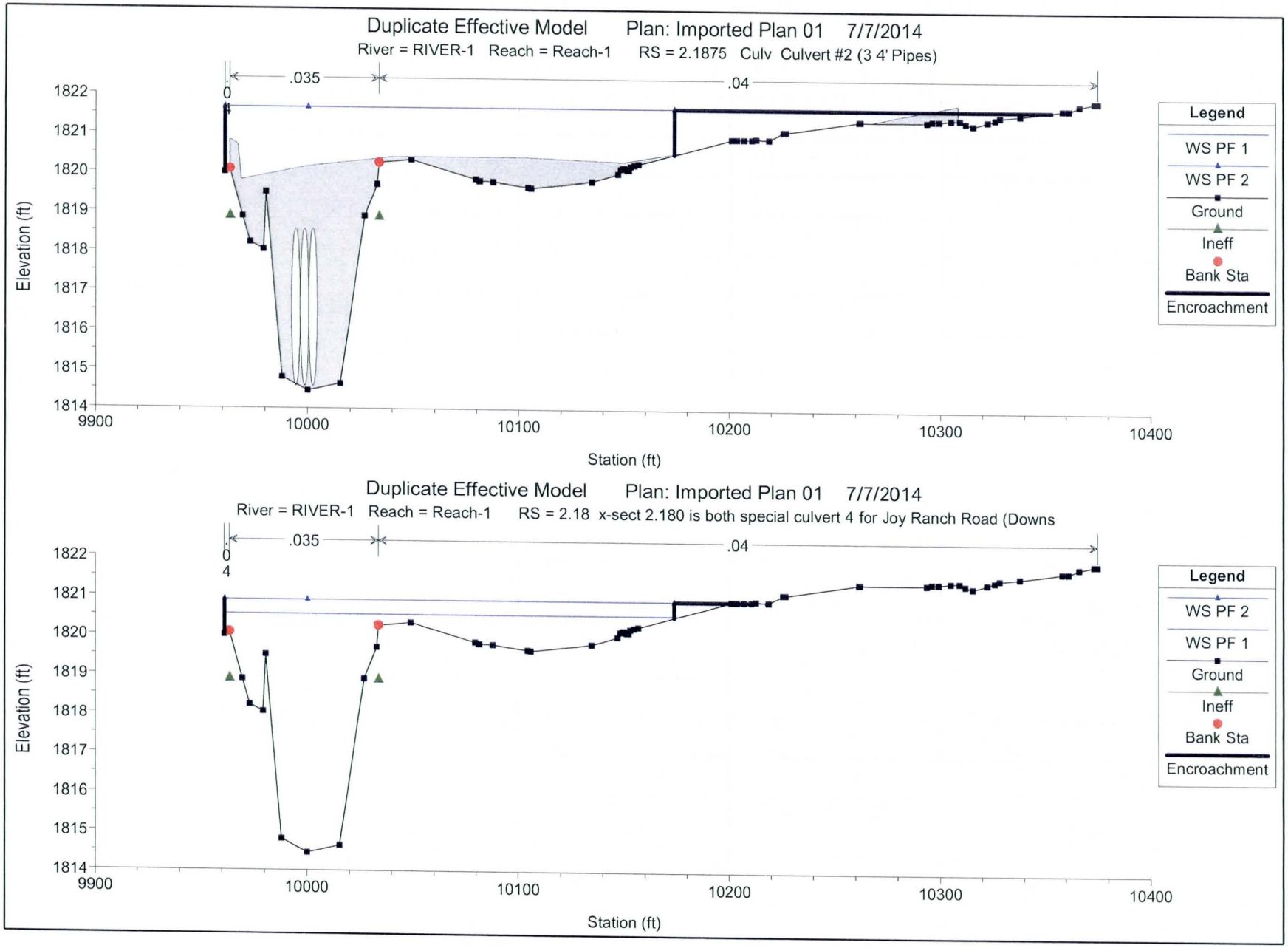

Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.699 Note: data for cross section 2.699 is from ALS survey (check se
.04
.035
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.689
.04
.035
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)

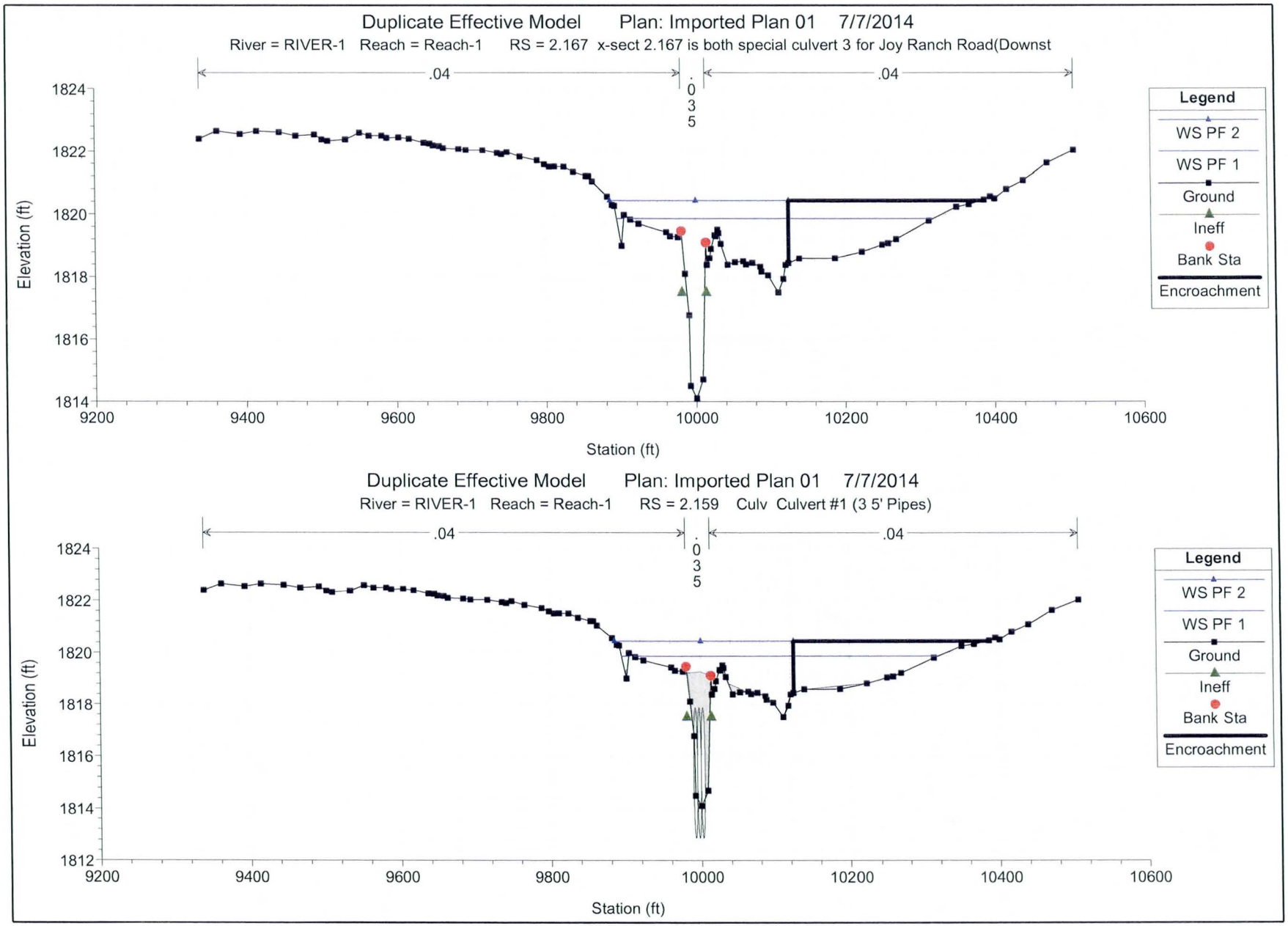

Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.618
.04
.035
.04
1842
1840
1838
1836
1834
1832
1830
Elevation (ft)
9600
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.544 Note:GR records deleted from Sta. 9492.78 to Sta. 9897.84
.04
.035
.04
1838
1836
1834
1832
1830
1828
Elevation (ft)
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

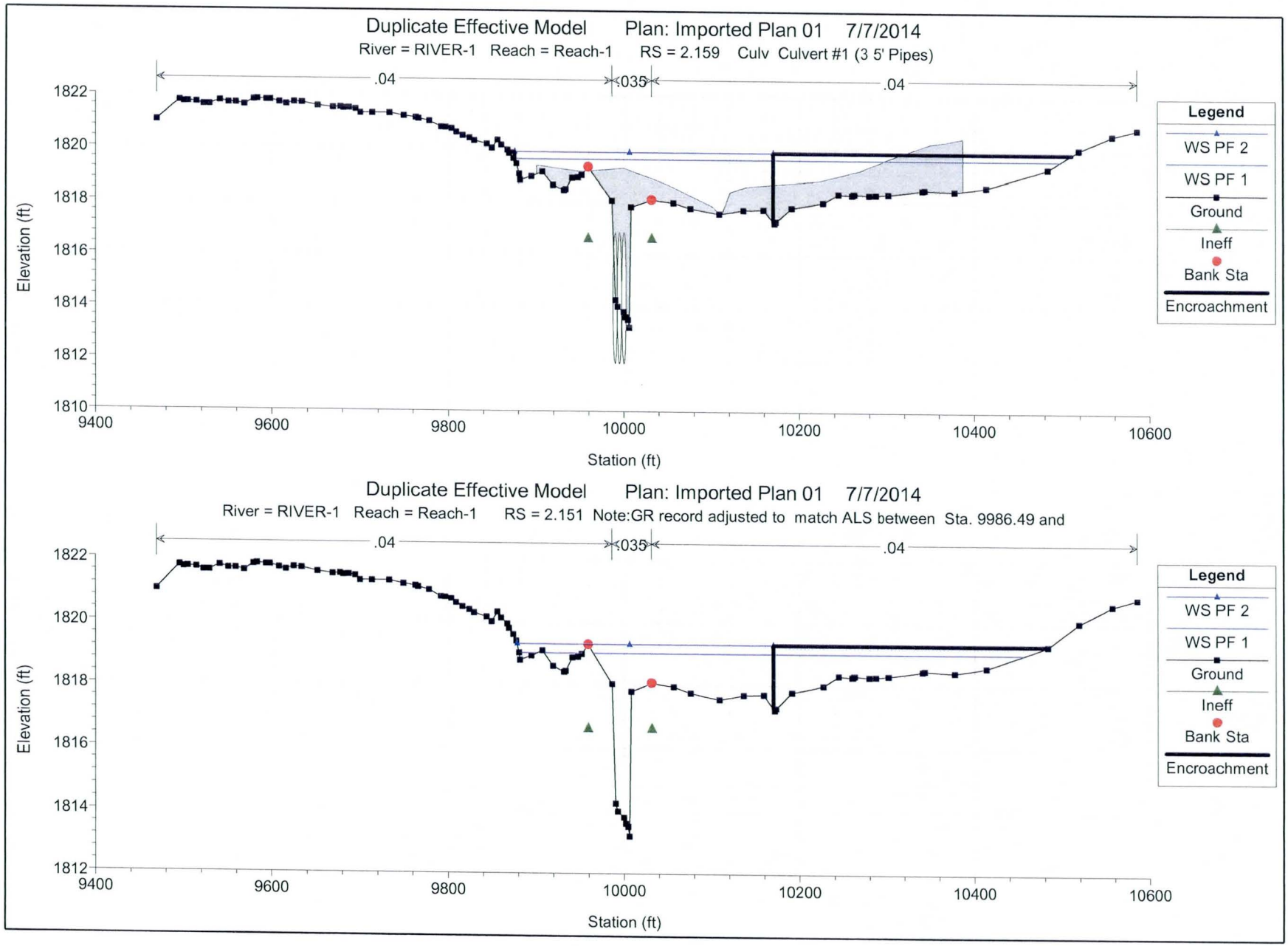

Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.46
.04
.035
.04
Elevation (ft)
1836
1834
1832
1830
1828
1826
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.385
.04
.035
.04
Elevation (ft)
1834
1832
1830
1828
1826
1824
1822
9500
9600
9700
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

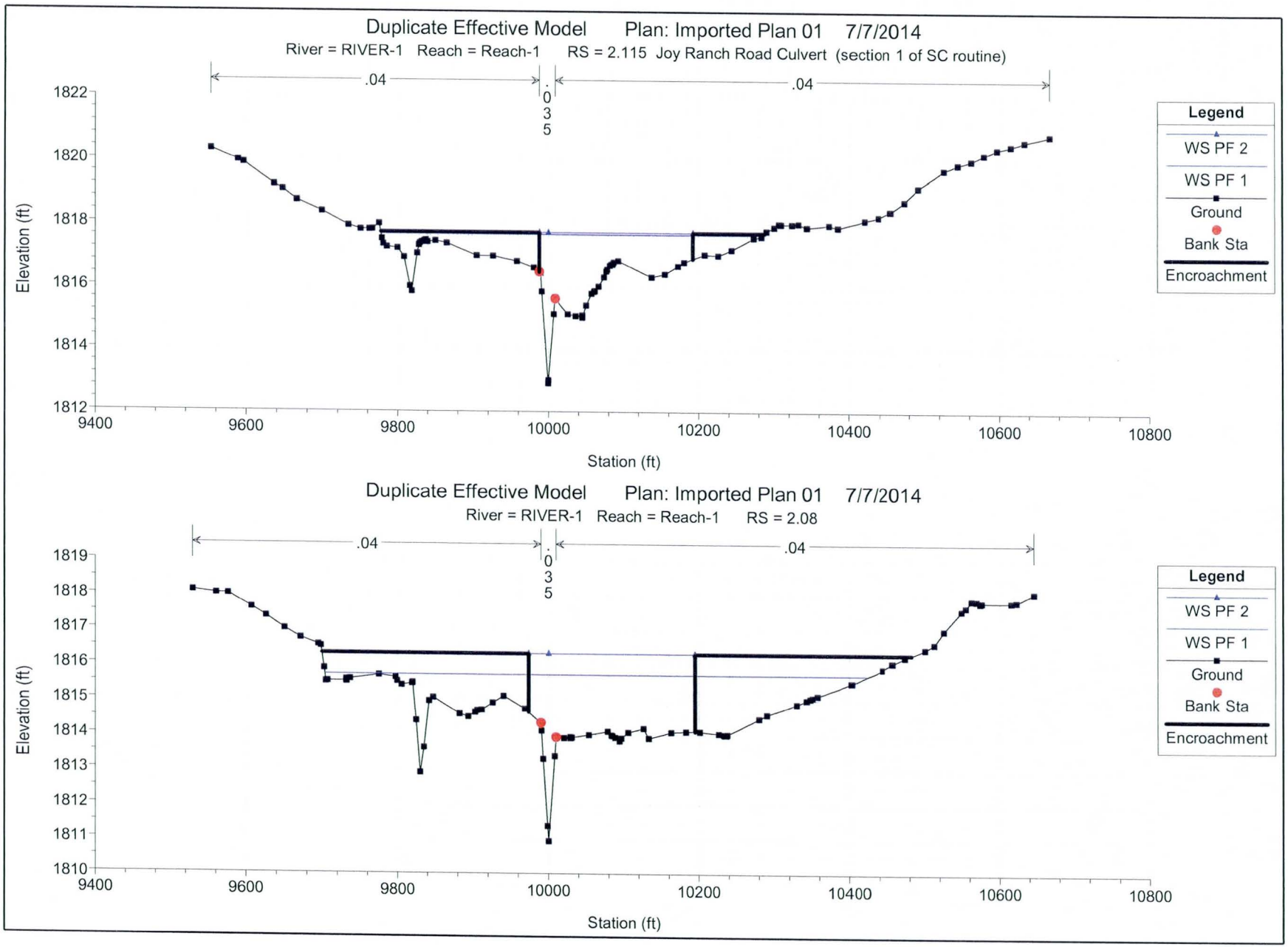

Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.283 Return Coefficient of Expansion and Contraction to normal.
.04
.035
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
1830
1828
1826
1824
1822
1820
1818
9400
9600
9800
10000
10200
10400
10600
Station (ft)
Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.253 11th Avenue culvert (section 4 of SC routine)
.04
.035
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
1828
1826
1824
1822
1820
1818
9400
9600
9800
10000
10200
10400
Station (ft)

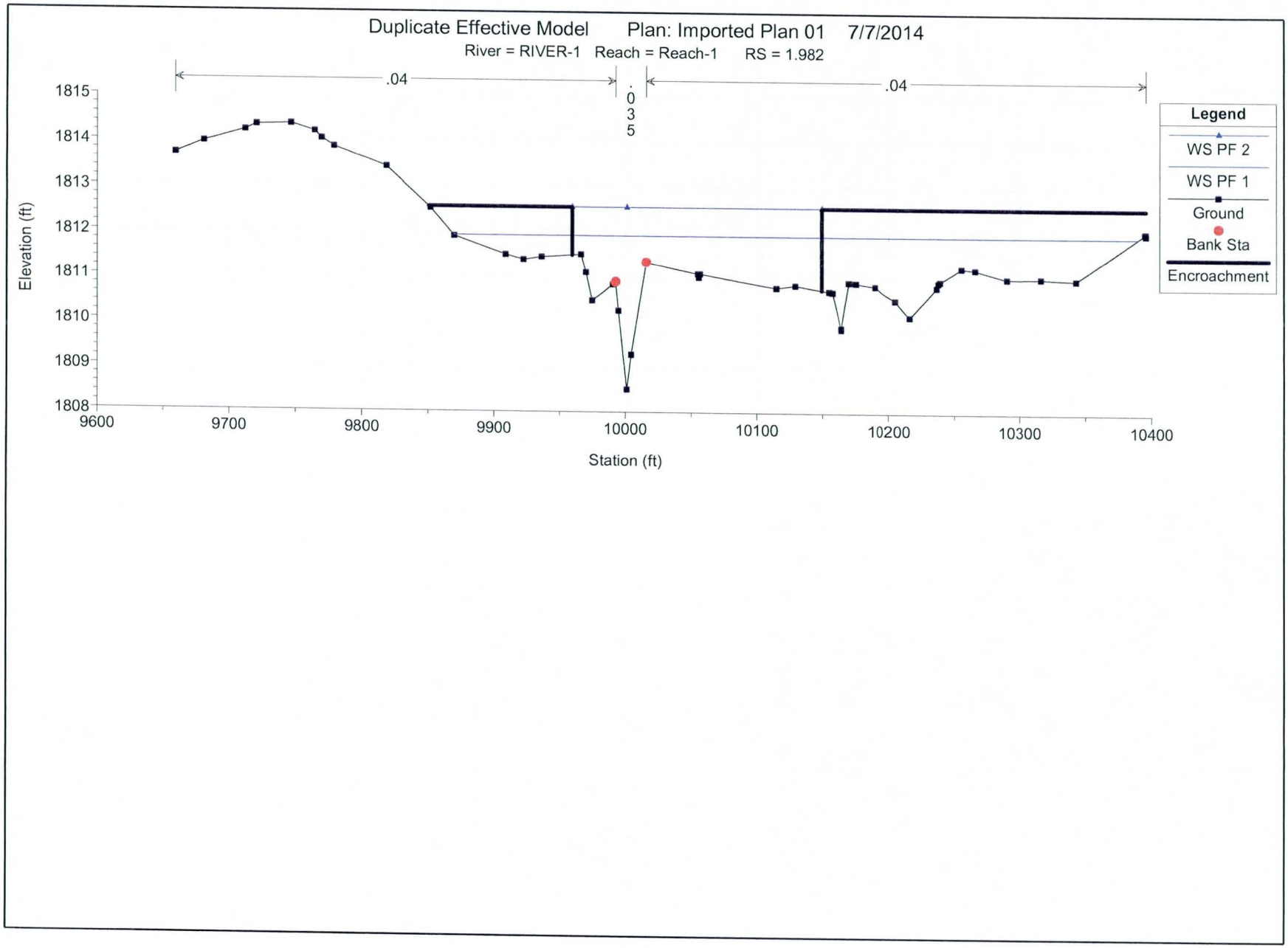

Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.195 11th Ave Culvert BT Record data from ALS surveyors.
.035
.04
Elevation (ft)
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.1875 Culv Culvert #2 (3 4' Pipes)
.035
.04
Elevation (ft)
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment


Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.1875 Culv Culvert #2 (3 4' Pipes)
.035
.04
0
Elevation (ft)
1822
1821
1820
1819
1818
1817
1816
1815
1814
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 1
WS PF 2
Ground
Ineff
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.18 x-sect 2.180 is both special culvert 4 for Joy Ranch Road (Downs
.035
.04
0
4
Elevation (ft)
1822
1821
1820
1819
1818
1817
1816
1815
1814
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment


Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.167 x-sect 2.167 is both special culvert 3 for Joy Ranch Road(Downst
.04
.035
.04
Elevation (ft)
1824
1822
1820
1818
1816
1814
9200
9400
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.159 Culv Culvert #1 (3 5' Pipes)
.04
.035
.04
Elevation (ft)
1824
1822
1820
1818
1816
1814
1812
9200
9400
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment


Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.159 Culv Culvert #1 (3 5' Pipes)
.04
.035
.04
Elevation (ft)
1822
1820
1818
1816
1814
1812
1810
9400
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.151 Note:GR record adjusted to match ALS between Sta. 9986.49 and
.04
.035
.04
Elevation (ft)
1822
1820
1818
1816
1814
1812
9400
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment


Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.115 Joy Ranch Road Culvert (section 1 of SC routine)
.04
.035
.04
Elevation (ft)
1822
1820
1818
1816
1814
1812
9400
9600
9800
10000
10200
10400
10600
10800
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Duplicate Effective Model Plan: Imported Plan 01 7/7/2014
River = RIVER-1 Reach = Reach-1 RS = 2.08
.04
.035
.04
Elevation (ft)
1819
1818
1817
1816
1815
1814
1813
1812
1811
1810
9400
9600
9800
10000
10200
10400
10600
10800
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment


Duplicate Effective Model
Plan: Imported Plan 01
7/7/2014
River = RIVER-1
Reach = Reach-1
RS = 1.982
.04
.035
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
1815
1814
1813
1812
1811
1810
1809
1808
9600
9700
9800
9900
10000
10100
10200
10300
10400
Station (ft)

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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

PROJECT DATA
Project Title: Duplicate Effective Model
Project File : DuplicateEffective.prj
Run Date and Time: 7/7/2014 1:02:27 PM

Project in English units

Project Description:
* Skunk Tank Wash
file:DuplicateEffective.prj (Truncated Model)
* For: MCDOT
By: TYLin Intl. 06-12-14
* 11th Avenue - Joy Ranch
Road to Irvine Road (TT4010)
*
* Duplicate Effective model converted
from EEC/MKE effective model (HEC-2)
* into HEC-RAS and then truncated to
study limits only.
*
* Source of 100-yr flowrate from HEC-1 analysis
by Montgomery Watson.
*
* Subcritical Analysis
*
* Starting
water surface elevation came from the Skunk Tank Wash HEC-2 study
* by
EEC/MKE (1997).

PLAN DATA

Plan Title: Imported Plan 01
Plan File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\2 Duplictaed Effective Model\Truncated Model\DuplicateEffective.p01

Geometry Title: Imported Geom 01
Geometry File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\2 Duplictaed Effective Model\Truncated Model\DuplicateEffective.g01

Flow Title : Imported Flow 01
Flow File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\2 Duplictaed Effective Model\Truncated Model\DuplicateEffective.f01

Plan Summary Information:
Number of: Cross Sections = 17 Multiple Openings = 0
Culverts = 2 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Corrected Effective Model

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X   X XXXXXX  XXXX     XXXX    XX   XXXX
X   X X     X  X    X  X  X X  X
X   X X     X       X  X  X  X  X
XXXXXXX XXXX   X    XXX XXXX  XXXXXX  XXXX
X   X X     X       X  X  X  X    X
X   X X     X  X    X  X  X  X    X
X   X XXXXXX  XXXX     X  X  X  X XXXXX
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PROJECT DATA
Project Title: Corrected Effective Model
Project File : CorrectedEffective.prj
Run Date and Time: 8/5/2014 9:02:17 AM

Project in English units

Project Description:
* Skunk Tank Wash
file:CorrectedEffective.prj
* For: MCDOT By: TYLin Intl.
07-07-14
* 11th Avenue - Joy Ranch Road to Irvine Road
(TT4010)
*
* Corrected Effective model converted from NGVD 29' to
NAVD 88' to match proposed
* conditons model. VERTCON translation is NGVD
+ 1.978 feet = NAVD.
*
* Source of 100-yr flowrate from HEC-1
analysis by Montgomery Watson.
*
* Subcritical Analysis
*
*
Starting water surface elevation came from the Skunk Tank Wash HEC-2 study

* by EEC/MKE (1997), taken from output for the starting d/s conitions at river
mile
* 2.080.

* Corrected Effective Model updated with the
following modifications:
* 1) Updated Survey from Adobe Dams/Desert Hills
Mapping, 2', 03/26/2002, NAVD 88 and
* MCDOT Survey from TT410 - 11th Ave
- Joy Ranch Rd to Irvine Rd, 12/27/2013, NAVD 88.
* 2) MCDOT survey
collected data on new Skunk Tank Wash dip crossing concrete pad at
*
Irvine Road.
* 3) MCDOT survey reported that the 11th Ave and Joy Ranch
Road culverts are 48-inch.
* Duplicate Effective model shows three
60-inch. These culverts were updated and
* modeled with sediment
blockage.

PLAN DATA

Plan Title: Plan 02
Plan File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\3 Corrected Effective Model\CorrectedEffective.p02

Geometry Title: Corrected_Effective_2
Geometry File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\3 Corrected Effective Model\CorrectedEffective.g03

Flow Title : Corrective Effective Flow
Flow File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\3 Corrected Effective Model\CorrectedEffective.f04

Plan Summary Information:
Number of: Cross Sections = 18 Multiple Openings = 0
Culverts = 2 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

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

Encroachment Data
Equal Conveyance = True
Left Offset = 0
Right Offset = 0

River = RIVER-1 Reach = Reach-1

RS	Profile	Method	Value1	Value2
2.887	PF 2	1	9960	10040
2.793	PF 2	1	9970	10030
2.699	PF 2	1	9925.36	10070
2.689	PF 2	1	9921.33	10070
2.665	PF 2	1	9950	10050
2.618	PF 2	1	9950	10050
2.544	PF 2	1	9957.51	10040.91
2.497	PF 2	1	9979.83	10065.73
2.46	PF 2	1	9965.91	10109.52
2.385	PF 2	1	9950	10080
2.283	PF 2	1	9965	10114.7
2.253	PF 2	1	9980	10115
2.199	PF 2	1	9889.29	10110
2.18	PF 2	1	9900.59	10106.9
2.167	PF 2	1	9904.22	10115
2.151	PF 2	1	9930	10110
2.115	PF 2	1	9975	10068.3
2.08	PF 2	1	9975	10045

FLOW DATA

Flow Title: Corrective Effective Flow
Flow File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\3 Corrected Effective Model\CorrectedEffective.f04

Flow Data (cfs)

River	Reach	RS	PF 1	PF 2
RIVER-1	Reach-1	2.887	1880	1880
RIVER-1	Reach-1	2.46	2110	2110

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
RIVER-1	Reach-1	PF 1		Known WS = 1817.69
RIVER-1	Reach-1	PF 2		Known WS = 1818.28

GEOMETRY DATA

Geometry Title: Corrected_Effective_2
Geometry File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\3 Corrected Effective Model\CorrectedEffective.g03

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.887

INPUT
Description: Note: Upstream tie-in to truncated model.
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9593.6	1854.03	9595.21	1854	9601.27	1853.97	9605.76	1853.99	9608.45	1853.98
9622.88	1853.95	9635.11	1853.96	9645.12	1853.96	9665.99	1853.94	9673.28	1853.93
9675.35	1853.94	9679.37	1853.93	9681.82	1853.94	9689.29	1853.94	9691.58	1853.89
9755.2	1852.62	9765.57	1852.49	9785.69	1852	9807.85	1851.07	9818.9	1850.64
9837.22	1850.05	9843.4	1850.05	9853.53	1850	9932.36	1848.74	9983.17	1848.02
9984.06	1848	9989.49	1846	9996.36	1845.8310000.63		1845.7410003.17		1845.79
10012.56	184610013.13		1846.110025.77		184810032.27		1848.1510036.26		1848.06
10040.08	184810043.41		1847.9210047.56		184810051.75		1848.5210060.84		1850
10066.56	1850.9910073.58		1852	10081.2	1852.55	10091.8	185410125.64		1855.87
10128.6	1856.0310168.21		185810184.19		1858.3410194.74		1858.5710196.27		1858.59

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9593.6	.045	9984.06	.0410025.77		.045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9984.0610025.77 400 496.3 550 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.793

INPUT
Description: Note:End Reach C, Begin Reach D
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9597.4	1848.79	9617.92	1848.54	9640.13	1848.18	9645.25	1848.12	9659.57	1848.05
9660.26	1848.04	9679.07	1848	9690.65	1848	9692.61	1847.99	9707.08	1847.99
9722.79	1848.01	9738.22	1848.02	9768.33	1848	9800.23	1847.47	9852.2	1846.65
9891.21	1846	9927.63	1845.2	9981.33	1844.03	9987.18	1844	9994.57	1842.15
9995.08	184210000.11		1841.910005.15		184210017.12		184410097.34		1845.9
10101.75	184610106.81		1846.5210121.57		184810139.24		1848.04	10158.2	1848
10163.11	1847.5710174.33		1847.9310188.91		1847.8810204.96		1847.8110213.97		1847.85
10220.95	1847.8910230.62		1847.9	10248.6	1848.0110256.97		1848.3110259.16		1848.35
10274.42	1848.7810313.77		1849.9510317.78		185010335.58		1850.7210367.73		1851.93
10372.28	1851.9410379.74		1851.9110392.23		1852.01	10407	1852.4710408.77		1852.52

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9597.4 .045 9987.18 .0410017.12 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9987.1810017.12 469.1 496.3 513 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.699

INPUT
Description: Note: Roadway grading includes new 55 foot concrete apron at dip
crossing. Manning's n value used for concrete is 0.015.
Station Elevation Data num= 49
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9085 1848.92 9109.33 1848.82 9198.88 1848.03 9274.16 1848 9363.43 1847.89
9369.92 1847.45 9381.04 1847.38 9411.42 1846 9477.49 1845.79 9488.67 1845.04
9510.4 1844 9649.77 1843.95 9687.92 1843.72 9736.82 1842.64 9740.42 1842.49
9825.71 1842.47 9836.33 1842.28 9858.72 1842.17 9925.36 1841.31 9951.46 1839.74
9974 1838.41 10025 1838.2510039.73 1838.510055.71 1839.1110071.19 1839.44
10111.57 1839.5510114.54 1839.8310147.59 1839.8810176.25 1840.1210192.89 1840.51
10254.38 1842.4910259.09 1842.5410286.63 1843.510293.01 1843.910310.42 1844.45
10363.9 1846.5810368.44 1846.8610395.46 1847.0410396.38 1847.7710411.66 1847.98
10427.96 184810478.38 1848.4510500.43 1848.5410547.17 1849.410572.29 1849.96
10635.37 185010653.81 1850.1810713.52 1850.5210720.87 1850.49

Manning's n Values num= 5
Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
9085 .04 9925.36 .035 9974 .015 10025 .03510254.38 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9951.4610114.54 52.8 52.8 52.8 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.689

INPUT
Description:
Station Elevation Data num= 50
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9055 1848.61 9096.4 1848.37 9137.34 1848.04 9361.08 1848 9373.85 1847.9
9414.41 1847.17 9442.92 1846.27 9465 1845.42 9522.57 1844.06 9552 1843.98
9585.66 1843.53 9625.07 1843.18 9662.8 1843.01 9691.56 1842.37 9701.07 1842.56
9752.3 1842.32 9777.18 1842.75 9812.69 1842.79 9836.14 1842.73 9840.79 1842.08
9895.63 1842.06 9916.65 1842 9936.62 1840.05 9948.82 1839.4 9966.5 1840
9970.56 1839.54 9977.13 1839.5 9985.29 183810000.79 1837.8510013.13 1837.57
10031.05 183810047.13 1839.6610057.38 1839.5310093.82 1839.5410113.97 1839.7
10180.54 1840.810208.85 1841.4710231.46 1842.3110268.11 1844.28 10287.6 1845.15
10302.42 1845.5210329.52 184610340.51 1846.5510375.56 1847.1810377.51 1847.87
10383.15 184810473.47 1848.0310550.84 1849.76 10567.4 185010691.04 1850.04

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9055 .04 9970.56 .03510047.13 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9970.5610047.13 144.1 126.7 105 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.665

INPUT
Description: Note: New cross-section added downstream of dip crossing along
11th Ave just south of intersection with Irvine Road.
Station Elevation Data num= 68
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9865 1842 9865.8 1841.98 9867.3 1841.95 9872.69 1841.7 9897.35 1840.55
9912.77 1839.66 9914.19 1839.62 9928.34 1839.56 9932.68 1839.52 9935.32 1839.56
9939.23 1839.56 9940.34 1839.51 9942.13 1839.5 9944.92 1839.14 9945.73 1839
9946.49 1838.74 9947.14 1838.5 9947.5 1838.37 9948.49 1838 9949.25 1837.72
9951.14 1837.5 9956.79 1837.24 9961.76 1837.11 9963.72 1837 9969.88 1836.55
9970.27 1836.56 9970.78 1836.57 9972.66 1837 9974.19 1837.35 9974.85 1837.5
9976.19 1837.81 9977.26 1838 9979.27 1838.23 9984.68 1838.5 9986.6 1838.52
9990.1 1837.94 9993.01 1837.84 9993.67 1837.69 9994.42 1837.52 9998.41 1837.76
9999.91 1837.8 10000.1 1837.8110000.13 1837.8110002.65 183810003.94 1838.08
10004.59 1838.1610005.41 1838.510006.02 1838.76 10006.6 183910008.33 1839
10008.47 1839.06 10009.2 183910011.52 1839 10011.7 183910011.83 1838.99
10015.37 1838.7710015.51 1838.7610017.99 1838.610034.03 1839.0810045.35 1839.42
10049.04 1839.5810073.17 1839.910093.24 1839.9910096.65 184010112.66 1840.44
10157.94 1841.6910167.17 184210167.56 1842.02

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9865 .04 9986.6 .035 10006.6 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9986.6 10006.6 233.8 242.3 246.9 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.618

INPUT
Description:
Station Elevation Data num= 50
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9705 1841.44 9705.53 1841.82 9706.6 1842 9712.05 1841.32 9725.44 1840
9743.92 1840 9748.12 1840.01 9756.73 1840 9762.72 1840.01 9784.18 1840.01
9791.42 1840 9802.09 1839.67 9822.54 1838.23 9848.34 1838.08 9856.68 1838
9860.98 1837.5 9864.47 1837.49 9870.34 1837.5 9876.28 1837.55 9881.46 1837.5
9886.45 1837.5 9889.57 1838.15 9893.47 1838.11 9900.6 1838 9917.25 1837.63
9933.85 1837.25 9935.33 1837.18 9969.24 1837.12 9987.6 1837.05 9995.77 1834
9998.71 1833.910001.09 1833.89 10002.5 183410009.04 1836.3710039.46 1837.4
10051.03 1837.88 10063.1 1837.9310076.34 1837.9510085.81 183810101.99 1839.09
10106.67 1839.310115.65 1839.5310124.78 1839.91 10130.7 1839.9110133.31 1839.88
10140.93 184010146.78 1840.2810182.23 184210195.35 1842.3510204.39 1842.58

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9705 .04 9987.6 .03510039.46 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9987.610039.46 400 406.9 417.2 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.544

INPUT
Description:

Station Elevation Data num= 119
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9693 1838.01 9694.86 1838 9695.12 1838 9750.22 1837.53 9787.06 1837.33
9794.77 1837.45 9801.98 1837.55 9805.94 1837.6 9819.07 1837.76 9820.31 1837.76
9821.56 1837.75 9822.62 1837.74 9831.4 1837.5 9833.03 1837.24 9843.91 1837.45
9844.2 1837.45 9848.61 1837.5 9855.36 1837.57 9855.91 1837.5 9856.54 1837.5
9856.6 1837.5 9856.67 1837.57 9857.95 1837.33 9860.83 1837 9860.87 1837
9860.89 1837 9862.22 1836.7 9863.02 1836.5 9863.34 1836.49 9866.43 1836.4
9867.07 1836.36 9868.72 1836.08 9871.98 1836.08 9873.38 1836.05 9873.79 1836.05
9876.88 1836.04 9877.69 1836 9883.34 1835.76 9887.23 1835.5 9890.08 1835.44
9890.27 1835.5 9890.41 1835.54 9891.86 1836 9893.36 1836.47 9893.45 1836.5
9893.55 1836.51 9898.8 1837 9900.62 1837.15 9901.25 1837.15 9902.88 1837
9907.51 1836.58 9908.4 1836.5 9910.89 1836.27 9913.57 1836 9914.58 1835.9
9918.46 1835.5 9922.15 1835.12 9922.76 1835.06 9923.35 1835 9927.81 1834.54
9928.24 1834.5 9928.77 1834.49 9931.38 1834.46 9934.3 1834.5 9934.45 1834.48
9948.11 1834.13 9989.76 1833.05 9989.88 1833 9990.19 1832.87 9991.21 1832.5
9992.08 1832.19 9992.61 1832 9993.74 1831.6 9994.02 1831.5 9995.23 1831.07
9995.42 183110000.39 183110000.67 1830.9910000.71 1830.99 10001.1 1831
10005.63 1830.7810006.09 183110006.67 1831.2810007.13 1831.510007.96 1831.9
10008.16 183210009.06 1832.44 10009.2 1832.510009.36 1832.5810010.23 1833
10010.54 1833.0810011.35 1833.4710029.98 1834.0110039.15 1834.3410040.91 1834.37
10081.77 1835.6910089.88 183610100.43 1836.8210110.16 1837.3310127.37 1837.9
10129.06 1837.9910129.45 183810139.34 1838.03 10180.4 1839.0510221.82 1840
10222.08 184010222.88 184010226.45 1840.0110228.94 1840.0110233.91 1840.02
10236.38 1840.0210240.72 1840.0210244.62 1840.0210249.27 1840.0310250.47 1840.03
10282.27 1840.0610302.52 1840.0810305.67 1840.0810309.83 1840.07

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9693 .04 9989.76 .03510011.35 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9989.7610011.35 348 364.4 373 .1 .3
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
9693 9900.62 1838 F
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.497

INPUT
Description: Note: New cross-section where Skunk Tank Wash crosses 11th Ave
approximately 930 feet south of Irvine Road.
Station Elevation Data num= 72
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9747 1836 9747.86 1836 9753.87 1835.9 9837.03 1834.09 9841.56 1834.08
9845.85 1834.08 9850.27 1834.07 9854.75 1834.07 9865.94 1834.05 9870.33 1834.05
9877.3 1834.04 9888.4 1834.04 9892.85 1834.03 9901.03 1834.03 9908.09 1834.02
9914.26 1834.02 9918.54 1834.01 9930.51 1834.01 9935.91 1834 9938.23 1833.59
9941.24 1833.95 9943.99 1833.93 9951.17 1833.92 9954.72 1833.89 9956.47 1833.81
9962.57 1833.77 9979.83 1833.59 9983.96 1833.04 9991.38 1832 9994.21 1831.67
9994.97 1831.3 9996.89 1830.8510005.05 1830.6610007.93 1831.4510015.76 1831
10023.93 1830.86 10024.2 1830.8510027.26 1830.510035.98 1830.4510042.36 1830.48
10044.55 1830.510045.79 1830.6910047.12 183110047.54 1831.1810056.43 1831.83
10058.69 183210060.62 1832.0110065.59 1832.01 10066.9 183210071.13 1832
10072.52 1831.8810072.93 1831.8810084.88 1832.110086.05 1832.1310087.26 1832.35
10094.24 1833.9410105.19 1834 10108.1 183410117.87 1833.92 10122.5 1833.89
10124.7 1833.9110127.93 1833.9110147.49 1833.9610152.47 1833.9410160.76 1833.92
10179.03 1833.9810186.38 183410201.88 1834.0710207.11 1834.0610210.63 1834.09
10215.06 1834.0810251.16 1835.21

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9747 .04 9991.38 .03510007.93 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9991.3810007.93 213.8 207.5 201.1 .1 .3
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
9747 9951.17 1834 F

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.46

INPUT
Description:
Station Elevation Data num= 50
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9786 1837.21 9795.09 1836.86 9813.99 1836 9815.64 1835.97 9852.1 1835.05
9858.9 1834.93 9865.82 1834.88 9885.12 1834.59 9919.49 1834 9956.12 1832.07
9965.9 1831.54 9969.74 1831.43 9986.28 1830.84 9991.4 1830.07 9999 1829
10001.05 1829.0710005.12 1829.5 10013.1 183110018.74 1831.0310025.14 1831.34
10042.02 1831.3610058.18 1831.2710067.43 1831.3110077.78 1831.310083.91 1831.25
10089.33 1831.3110097.64 1831.05 10101.1 1830.9710111.24 1830.8810116.32 1830.61
10119.96 1830.0510124.99 1829.510136.47 1829.5510144.69 1829.5510148.45 1830
10152.1 1830.510154.69 1830.5210157.74 1830.9610162.14 1830.310162.53 1830
10169.48 183010170.99 1830.0510172.49 1830.510175.77 1830.9310187.72 1831
10189.01 1831.8210189.58 183210202.66 1833.6110205.17 183410218.63 1835.37

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9786 .04 9986.28 .035 10013.1 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9986.28 10013.1 400 392.8 384 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.385

INPUT
Description:
Station Elevation Data num= 52
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9596 1835.22 9670.78 1834.46 9699.55 1834.23 9731.24 1834 9764.6 1833.44
9773.23 1833.22 9813.37 1832.12 9818.95 1831.93 9835.84 1831.08 9840.14 1831
9844.88 1830.76 9857.98 1830.57 9861.33 1830.43 9875.46 1830.05 9879.57 1830.06
9908.07 1829.95 9935 1829.3 9947.42 1828.93 9957.27 1828.67 9990.12 1828
9999.55 1827.8810009.07 182810015.57 1828.1610023.07 1828.6710029.17 1828.96
10058.59 1829.3210076.62 1829.3610096.33 1828.96 10117 1828.69 10133.5 1828.52
10136.86 1828.4410141.19 1828.4910146.66 1827.810147.16 1828.8210150.23 1828.79
10150.45 1827.510157.45 1826.9410159.93 182710161.02 1827.1810172.76 1828.18
10181.72 1828.510186.95 182910188.09 1829.2510194.58 183010200.34 1830.48
10212.68 1830.7810213.56 1830.7710225.35 1831.5510238.13 183210240.98 1832.13
10272.04 183410278.32 1834.26

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9596 .04 9947.42 .03510029.17 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9947.4210029.17 512 517.5 506 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 2.283

INPUT
Description:
Station Elevation Data num= 51
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9448 1831.3 9480.11 1831.02 9506.19 1830.81 9524.12 1830.72 9532.59 1830.73
9537.85 1830.69 9547.91 1830.71 9593.53 1830.54 9656.55 1830.25 9695.14 1829.98
9763.89 1829.32 9776.54 1829.16 9788.61 1829.04 9811.29 1828.75 9822.53 1828.63
9857.93 1828.15 9870.45 1828 9907.22 1827.1 9944.24 1826 9987.98 1824.2
9993.27 1824 9998.99 182210000.06 182210008.52 182410049.76 1824.19
10052.75 1824.1810082.97 1824.5910089.78 1824.71 10114.7 1825.6410119.83 1825.17
10140.26 1824 10146.1 1823.810154.08 1823.6710154.35 1823.510166.13 1823.5
10170.26 1823.6810185.74 1823.8810202.34 1824.8110204.03 1824.8610222.46 1825
10230.65 1825.1910257.22 1825.6710274.02 1825.9510301.37 182610325.82 1826.91
10363.64 182810406.56 1828.7710437.55 1829.5610450.71 1829.9810462.56 1830
10472.33 1830.16

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9448 .04 9987.98 .03510049.76 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9987.9810049.76 173.7 175.9 175.1 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.253

INPUT
Description:
Station Elevation Data num= 44
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9523 1827.25 9531.17 1827.28 9562.92 1827.31 9580.32 1827.37 9593.65 1827.32
9619.98 1827.31 9671.71 1827.32 9731.4 1827.32 9752.9 1827.25 9785.64 1827
9814.66 1826.82 9843.7 1826.55 9895.08 1826 9911.94 1825.95 9931.43 1826
9959.85 1826 9971.56 1825.05 9986.63 1824 9993.99 1822 9999.88 1821.83
10004.97 182210015.53 182410026.07 182410032.28 1823.8610038.57 1824
10057.76 182410071.45 1824.210088.49 1824.2710096.82 1824.2610106.33 1822.5
10110.95 1822.5 10140.7 182310143.54 1823.510154.05 1824.0510157.91 1824.01
10172.55 1824.0710215.02 1823.9910235.69 1824.0310254.38 1823.9710270.46 1824
10316.54 1825.96 10318.7 182610342.45 1826.8210372.03 1827.95

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9523 .04 9986.63 .03510015.53 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9986.6310015.53 313.4 281.3 252.9 .6 .8
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.199

INPUT
Description: Note: Relocated original cross-section 2.195 east and renamed to
2.199 to better represent the existing cross-culverts on 11th
Avenue. Culvert #2 Upstream.
Station Elevation Data num= 106
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9783 1824 9786.09 1824 9788.17 1824 9789.72 1823.99 9809.34 1823.75
9811.98 1823.72 9833.44 1823.48 9836.64 1823.35 9837.84 1823.34 9847.49 1823.24
9851.62 1823.19 9858.91 1823.12 9865.92 1823.02 9874.45 1822.93 9882.52 1822.88

9889.29 1822.84 9903.8 1822.41 9905.14 1822.38 9927.08 1822.08 9928.15 1822.08
9937.78 1822.18 9946.05 1822.26 9950.73 1822.36 9951.14 1822.1 9981.51 1822.01
9982.1 1822.01 9982.83 1822.13 9983.14 1822 9983.6 1821.8 9984.3 1821.5
9984.77 1821.3 9985.47 1821 9985.94 1820.79 9986.63 1820.5 9987.68 1820.05
9991.62 1816.6510009.94 1816.6510010.67 1818.610011.82 181910011.96 1819.05
10012.82 1819.3510014.53 181910016.83 1818.5310016.97 1818.5 10017 1818.5
10017.08 1818.510018.68 1818.62 10018.7 1818.6410019.28 181910019.72 1819.28
10020.07 1819.510020.57 1819.8110020.87 182010021.45 1820.3710021.66 1820.5
10022.42 1820.9710022.46 182110022.59 1821.0810024.51 1821.5 10026 1821.82
10027.03 1822 10027.6 182210028.77 182210029.06 182210029.34 1822
10029.49 1822 10041.7 1821.9110049.47 1822 10049.7 1822.0110054.51 1822.18
10059.24 182210061.98 1821.8410065.89 1821.510068.73 1821.1710069.61 1821
10069.81 182110076.79 1821.3410079.94 1821.510084.82 1821.7510087.19 1821.85
10105.02 1821.7210108.88 1821.78 10109.7 182210112.76 1822.4110112.98 1822.5
10119.15 1822.5610144.38 1822.9710150.91 1822.9410175.57 1822.8310189.44 1822.72
10222.72 1822.510227.91 1822.4910228.27 1822.4810252.41 1822.7210296.16 1823.13
10311.06 1823.4410316.27 1823.5610337.04 1824 10339.2 1824.0310351.41 1824.41
10374.72 1825.09 10384.1 1825.3310389.29 1825.4610409.31 1825.87 10414.9 1826
10415.05 1826

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9783 .04 9983.14 .03510027.03 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9983.1410027.03 108.8 115 113.4 .6 .8
Sediment Elevation = 0

CULVERT

RIVER: RIVER-1
REACH: Reach-1 RS: 2.1875

INPUT
Description: Culvert #2 - 3-48" CMP's Roadway is 29 feet away, which visibly
looks lower as shown below. However, the roadway is accurately
depicted due to the natural slope and banks 29 feet east at the
cross-section.
Distance from Upstream XS =6.740002
Deck/Roadway Width = 68.42
Weir Coefficient = 2.63
Upstream Deck/Roadway Coordinates
num= 4
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
9962.3 1821.94 1813.2 9974.3 1821.82 1813.2 10015.3 1821.79 1813.2
10026 1821.69 1813.2

Upstream Bridge Cross Section Data
Station Elevation Data num= 106
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9783 1824 9786.09 1824 9788.17 1824 9789.72 1823.99 9809.34 1823.75
9811.98 1823.72 9833.44 1823.48 9836.64 1823.35 9837.84 1823.34 9847.49 1823.24
9851.62 1823.19 9858.91 1823.12 9865.92 1823.02 9874.45 1822.93 9882.52 1822.88
9889.29 1822.84 9903.8 1822.41 9905.14 1822.38 9927.08 1822.08 9928.15 1822.08
9937.78 1822.18 9946.05 1822.26 9950.73 1822.36 9951.14 1822.1 9981.51 1822.01
9982.1 1822.01 9982.83 1822.13 9983.14 1822 9983.6 1821.8 9984.3 1821.5
9984.77 1821.3 9985.47 1821 9985.94 1820.79 9986.63 1820.5 9987.68 1820.05
9991.62 1816.6510009.94 1816.6510010.67 1818.610011.82 181910011.96 1819.05
10012.82 1819.3510014.53 181910016.83 1818.5310016.97 1818.5 10017 1818.5
10017.08 1818.510018.68 1818.62 10018.7 1818.6410019.28 181910019.72 1819.28
10020.07 1819.510020.57 1819.8110020.87 182010021.45 1820.3710021.66 1820.5
10022.42 1820.9710022.46 182110022.59 1821.0810024.51 1821.5 10026 1821.82
10027.03 1822 10027.6 182210028.77 182210029.06 182210029.34 1822
10029.49 1822 10041.7 1821.9110049.47 1822 10049.7 1822.0110054.51 1822.18
10059.24 182210061.98 1821.8410065.89 1821.510068.73 1821.1710069.61 1821
10069.81 182110076.79 1821.3410079.94 1821.510084.82 1821.7510087.19 1821.85
10105.02 1821.7210108.88 1821.78 10109.7 182210112.76 1822.4110112.98 1822.5
10119.15 1822.5610144.38 1822.9710150.91 1822.9410175.57 1822.8310189.44 1822.72

10222.72 1822.510227.91 1822.4910228.27 1822.4810252.41 1822.7210296.16 1823.13
10311.06 1823.4410316.27 1823.5610337.04 1824 10339.2 1824.0310351.41 1824.41
10374.72 1825.09 10384.1 1825.3310389.29 1825.4610409.31 1825.87 10414.9 1826
10415.05 1826

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9783 .04 9983.14 .03510027.03 .04

Bank Sta: Left Right Coeff Contr. Expan.
9983.1410027.03 .6 .8
Sediment Elevation = 0

Downstream Deck/Roadway Coordinates
num= 5
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
9961.04 1821.34 1813.2 9979.04 1821.15 1813.210020.04 1821.14 1813.2
10101.04 1821.75 1813.210163.04 1821.6 1813.2

Downstream Bridge Cross Section Data
Station Elevation Data num= 129
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9752 1824 9756.01 1823.99 9761.73 1823.99 9766.21 1823.99 9769.78 1823.99
9778.36 1823.75 9778.51 1823.75 9782.63 1823.76 9792.96 1823.79 9796.89 1823.73
9825.23 1823.34 9839.51 1823.07 9840.44 1823.05 9841.02 1823.05 9852.63 1823
9856.3 1822.95 9868.43 1822.68 9873.97 1822.61 9875.6 1822.55 9878.2 1822.54
9882.45 1822.5 9896.16 1822.24 9896.74 1822.23 9898.27 1822.21 9905.96 1822.01
9908.17 1822 9916.75 1821.75 9926.72 1821.51 9926.83 1821.5 9927.77 1821.44
9929.55 1821.49 9933.97 1821.47 9949.54 1821.39 9953.08 1821.35 9960.89 1821.29
9973.74 1821.27 9975.51 1821.27 9976.04 1821.26 9976.1 1821.26 9981.65 1821.41
9984.66 1821.5 9986.35 1821.71 9986.64 1821.5 9987.14 1821.15 9987.35 1821
9987.44 1820.93 9988.05 1820.5 9988.17 1820.41 9988.75 1820 9988.91 1819.89
9992.95 1816.4810007.68 1816.4810013.42 1817.4910020.35 1817.510021.02 1817.5
10022.07 1817.3510022.55 1817.510022.57 1817.510022.58 1817.510023.35 1817.75
10023.79 1817.9210024.01 181810025.15 1818.4210025.37 1818.5 10026.6 1818.95
10026.72 181910026.83 1819.0410028.76 1819.8510028.98 1819.8810029.27 1819.94
10029.43 182010030.46 1820.3810030.79 1820.510031.93 1820.9210032.14 1821
10033.29 1821.42 10033.5 1821.5 10034.8 1821.9810035.47 1821.9510036.81 1822.05
10039.19 182210045.93 1821.8110061.56 1821.7910069.39 1821.8410095.88 1821.85
10095.97 1821.9710105.27 1821.98 10105.7 182210107.99 182210108.66 1821.98
10124.3 1821.7310129.03 1821.6510129.49 1821.66 10138 1821.6510141.36 1821.67
10147.46 1821.6810153.19 1821.7210158.95 1821.7510172.85 1821.8810175.82 1821.9
10184.58 182210190.95 1821.9910200.69 182210201.14 1821.9910201.25 1821.99
10202.28 1822 10213.9 182210214.27 1822 10214.9 182210215.85 1822
10219.22 1821.9910232.97 1821.9810238.18 1821.98 10249 1821.96 10257 1821.97
10276.6 1821.9910277.35 1821.9910279.45 182210280.79 182210296.48 1822.29
10326.05 1822.8710344.31 1823.2310367.66 1823.5910376.98 1823.7510391.58 1824
10403.92 1824.2610409.22 1824.3710426.89 1824.7410440.16 1825

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9752 .04 9986.35 .035 10034.8 .04

Bank Sta: Left Right Coeff Contr. Expan.
9986.35 10034.8 .6 .8
Sediment Elevation = 0

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins = 1820.96
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
Pipe2 Circular 4 4

FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 1 - Headwall
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	29.8	68.42	.024	.024	0	.5	1

Number of Barrels = 3
Upstream Elevation = 1816.65
Centerline Stations

Sta.	Sta.	Sta.
9994.3	9999.3	10004.3

Downstream Elevation = 1816.48
Centerline Stations

Sta.	Sta.	Sta.
9996.011	10001.011	10006.01

CULVERT OUTPUT Profile #PF 1 Culv Group: Pipe2

Q Culv Group (cfs)	173.47	Culv Full Len (ft)	68.42
# Barrels	3	Culv Vel US (ft/s)	4.60
Q Barrel (cfs)	57.82	Culv Vel DS (ft/s)	4.60
E.G. US. (ft)	1823.73	Culv Inv El Up (ft)	1816.65
W.S. US. (ft)	1823.23	Culv Inv El Dn (ft)	1816.48
E.G. DS (ft)	1823.19	Culv Frctn Ls (ft)	0.38
W.S. DS (ft)	1822.54	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.54	Culv Entr Loss (ft)	0.16
Delta WS (ft)	0.69	Q Weir (cfs)	1936.53
E.G. IC (ft)	1823.60	Weir Sta Lft (ft)	9811.45
E.G. OC (ft)	1823.73	Weir Sta Rgt (ft)	10324.10
Culvert Control	Outlet	Weir Submerg	0.24
Culv WS Inlet (ft)	1820.65	Weir Max Depth (ft)	2.73
Culv WS Outlet (ft)	1820.48	Weir Avg Depth (ft)	1.20
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	615.98
Culv Crt Depth (ft)	2.29	Min El Weir Flow (ft)	1821.15

Warning: During subcritical analysis, the water surface upstream of culvert went to critical depth.

CULVERT OUTPUT Profile #PF 2 Culv Group: Pipe2

Q Culv Group (cfs)	168.85	Culv Full Len (ft)	68.42
# Barrels	3	Culv Vel US (ft/s)	4.48
Q Barrel (cfs)	56.28	Culv Vel DS (ft/s)	4.48
E.G. US. (ft)	1824.18	Culv Inv El Up (ft)	1816.65
W.S. US. (ft)	1823.86	Culv Inv El Dn (ft)	1816.48
E.G. DS (ft)	1823.67	Culv Frctn Ls (ft)	0.36
W.S. DS (ft)	1823.26	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.51	Culv Entr Loss (ft)	0.16
Delta WS (ft)	0.60	Q Weir (cfs)	1941.15
E.G. IC (ft)	1824.00	Weir Sta Lft (ft)	9889.29
E.G. OC (ft)	1824.18	Weir Sta Rgt (ft)	10110.00
Culvert Control	Outlet	Weir Submerg	0.58
Culv WS Inlet (ft)	1820.65	Weir Max Depth (ft)	3.19
Culv WS Outlet (ft)	1820.48	Weir Avg Depth (ft)	2.23
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	491.28
Culv Crt Depth (ft)	2.26	Min El Weir Flow (ft)	1821.15

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.18

INPUT
Description: Note: Cross-section 2.18 added to the left overbank to show
overtopping of Joy Ranch Road and 11th Ave. Culvert #2 Downstream.
Station Elevation Data num= 129

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9752	1824	9756.01	1823.99	9761.73	1823.99	9766.21	1823.99	9769.78	1823.99

9778.36 1823.75 9778.51 1823.75 9782.63 1823.76 9792.96 1823.79 9796.89 1823.73
9825.23 1823.34 9839.51 1823.07 9840.44 1823.05 9841.02 1823.05 9852.63 1823
9856.3 1822.95 9868.43 1822.68 9873.97 1822.61 9875.6 1822.55 9878.2 1822.54
9882.45 1822.5 9896.16 1822.24 9896.74 1822.23 9898.27 1822.21 9905.96 1822.01
9908.17 1822 9916.75 1821.75 9926.72 1821.51 9926.83 1821.5 9927.77 1821.44
9929.55 1821.49 9933.97 1821.47 9949.54 1821.39 9953.08 1821.35 9960.89 1821.29
9973.74 1821.27 9975.51 1821.27 9976.04 1821.26 9976.1 1821.26 9981.65 1821.41
9984.66 1821.5 9986.35 1821.71 9986.64 1821.5 9987.14 1821.15 9987.35 1821
9987.44 1820.93 9988.05 1820.5 9988.17 1820.41 9988.75 1820 9988.91 1819.89
9992.95 1816.4810007.68 1816.4810013.42 1817.4910020.35 1817.510021.02 1817.5
10022.07 1817.3510022.55 1817.510022.57 1817.510022.58 1817.510023.35 1817.75
10023.79 1817.9210024.01 181810025.15 1818.4210025.37 1818.5 10026.6 1818.95
10026.72 181910026.83 1819.0410028.76 1819.8510028.98 1819.8810029.27 1819.94
10029.43 182010030.46 1820.3810030.79 1820.510031.93 1820.9210032.14 1821
10033.29 1821.42 10033.5 1821.5 10034.8 1821.9810035.47 1821.9510036.81 1822.05
10039.19 182210045.93 1821.8110061.56 1821.7910069.39 1821.8410095.88 1821.85
10095.97 1821.9710105.27 1821.98 10105.7 182210107.99 182210108.66 1821.98
10124.3 1821.7310129.03 1821.6510129.49 1821.66 10138 1821.6510141.36 1821.67
10147.46 1821.6810153.19 1821.7210158.95 1821.7510172.85 1821.8810175.82 1821.9
10184.58 182210190.95 1821.9910200.69 182210201.14 1821.9910201.25 1821.99
10202.28 1822 10213.9 182210214.27 1822 10214.9 182210215.85 1822
10219.22 1821.9910232.97 1821.9810238.18 1821.98 10249 1821.96 10257 1821.97
10276.6 1821.9910277.35 1821.9910279.45 182210280.79 182210296.48 1822.29
10326.05 1822.8710344.31 1823.2310367.66 1823.5910376.98 1823.7510391.58 1824
10403.92 1824.2610409.22 1824.3710426.89 1824.7410440.16 1825

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9752 .04 9986.35 .035 10034.8 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9986.35 10034.8 35.7 53.2 83.2 .6 .8
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.167

INPUT
Description: Note: Culvert #1 Upstream
Station Elevation Data num= 47
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9350 1824.9 9374.05 1824.83 9441.51 1822.91 9462.95 1822.79 9495.79 1822.78
9505.56 1823.26 9511.11 1823.71 9549.41 1823.75 9660.59 1824 9682.53 1824.13
9704.23 1824.1 9708.63 1823.91 9716.66 1823.88 9739.13 1824.01 9769.27 1823.98
9782.04 1823.63 9803.6 1823.68 9821.58 1823.43 9840.99 1823.04 9856.78 1823
9877.78 1822.67 9881.3 1822.53 9892.99 1822.41 9900.51 1822.48 9909.14 1822
9928.71 1821.51 9968.74 1821.29 9984.18 1821.13 9988.43 1821.02 9989.58 1820.5
9994.05 1815.8310010.05 1815.9310014.98 1820.1710049.13 1820.6110066.65 1820.19
10082.95 1820.2210090.78 1820.3810092.88 1819.8910096.77 1820.2110102.66 1820
10110.67 182010330.59 182210373.22 1822.1110384.64 1822.2610439.66 1822.82
10477.93 182410493.25 1824.16

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9350 .04 9989.58 .03510049.13 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9989.5810049.13 90.8 92.7 95.2 .6 .8
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
9350 9803.6 1824 F
Sediment Elevation = 0

CULVERT

RIVER: RIVER-1
REACH: Reach-1 RS: 2.159

INPUT
Description: Culvert #1 (three 4' Pipes) (Originally modeled as 5' diameter pipes)
Joy Ranch Road culvert
3-48" CMP's inverts determined from surveyed inside soffit elevations. The average elevation was used between the three culverts upstream and downstream.

Distance from Upstream XS = 2.98
Deck/Roadway Width = 79.24
Weir Coefficient = 2.63
Upstream Deck/Roadway Coordinates
num= 4
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
9930 1821.43 1813.2 9961 1821.26 1813.2 10028 1821.35 1813.2
10087 1820.55 1813.2

Upstream Bridge Cross Section Data
Station Elevation Data num= 47
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9350 1824.9 9374.05 1824.83 9441.51 1822.91 9462.95 1822.79 9495.79 1822.78
9505.56 1823.26 9511.11 1823.71 9549.41 1823.75 9660.59 1824 9682.53 1824.13
9704.23 1824.1 9708.63 1823.91 9716.66 1823.88 9739.13 1824.01 9769.27 1823.98
9782.04 1823.63 9803.6 1823.68 9821.58 1823.43 9840.99 1823.04 9856.78 1823
9877.78 1822.67 9881.3 1822.53 9892.99 1822.41 9900.51 1822.48 9909.14 1822
9928.71 1821.51 9968.74 1821.29 9984.18 1821.13 9988.43 1821.02 9989.58 1820.5
9994.05 1815.8310010.05 1815.9310014.98 1820.1710049.13 1820.6110066.65 1820.19
10082.95 1820.2210090.78 1820.3810092.88 1819.8910096.77 1820.2110102.66 1820
10110.67 182010330.59 182210373.22 1822.1110384.64 1822.2610439.66 1822.82
10477.93 182410493.25 1824.16

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9350 .04 9989.58 .03510049.13 .04

Bank Sta: Left Right Coeff Contr. Expan.
9989.5810049.13 .6 .8
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
9350 9803.6 1824 F
Sediment Elevation = 0

Downstream Deck/Roadway Coordinates
num= 9
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
9867 1821.46 1813.2 9907 1821.09 1813.2 9945 1821.27 1813.2
9963 1821.49 1813.2 9975 1821.46 1813.2 10055 1820.32 1813.2
10110 1819.61 1813.2 10164 1819.55 1813.2 10211 1820.1 1813.2

Downstream Bridge Cross Section Data
Station Elevation Data num= 46
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9471 1823.87 9505.03 1823.9 9588.53 1823.89 9651.76 1824 9673.43 1823.91
9678.24 1823.46 9700.29 1823.37 9704.08 1823.15 9712.7 1823.26 9720.7 1823.01
9740.74 1822.99 9757.99 1822.74 9763.43 1822.97 9776.3 1822.5 9800.03 1822.48
9816.46 1822 9836.28 1821.96 9842.16 1821.64 9849.94 1821.5 9866.63 1821.47
9875.31 1821 9986 1820.1 9990.49 1814.77 10011 1814.87 10021 1820.24
10032.95 1820.0510041.98 182010062.68 1819.6610071.58 1819.4110076.79 1819.48
10094.6 1819.2610102.72 181910122.16 1818.7810132.79 1819.0110161.12 1819.01
10180.47 182010223.44 182010320.87 1820.7910362.86 1821.0810370.36 1821.21
10411.47 1821.5910434.26 1821.7210467.71 1821.9910518.75 182210566.04 1822.69
10616.1 1823.17

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9471	.04	9986	.035	10021	.04

Bank Sta: Left Right Coeff Contr. Expan.
9986 10021 .6 .8
Sediment Elevation = 0

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins = 1820
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
Pipe1 Circular 4 5
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 1 - Headwall
Solution Criteria = Highest U.S. EG

Culvert Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
9.4	77	.024	.024	.833	.5	1

Number of Barrels = 3
Upstream Elevation = 1814.99
Centerline Stations

Sta.	Sta.	Sta.
9997.05	10002.05	10007.05

Downstream Elevation = 1813.94
Centerline Stations

Sta.	Sta.	Sta.
9996.49	10001.49	10006.49

CULVERT OUTPUT Profile #PF 1 Culv Group: Pipe1

Q Culv Group (cfs)	171.04	Culv Full Len (ft)	77.00
# Barrels	3	Culv Vel US (ft/s)	5.34
Q Barrel (cfs)	57.01	Culv Vel DS (ft/s)	5.34
E.G. US. (ft)	1822.48	Culv Inv El Up (ft)	1814.99
W.S. US. (ft)	1822.23	Culv Inv El Dn (ft)	1813.94
E.G. DS (ft)	1821.49	Culv Frctn Ls (ft)	0.67
W.S. DS (ft)	1821.14	Culv Exit Loss (ft)	0.09
Delta EG (ft)	0.98	Culv Entr Loss (ft)	0.22
Delta WS (ft)	1.09	Q Weir (cfs)	1938.96
E.G. IC (ft)	1822.39	Weir Sta Lft (ft)	9886.75
E.G. OC (ft)	1822.48	Weir Sta Rgt (ft)	10405.68
Culvert Control	Outlet	Weir Submerg	0.12
Culv WS Inlet (ft)	1818.99	Weir Max Depth (ft)	2.58
Culv WS Outlet (ft)	1817.94	Weir Avg Depth (ft)	1.20
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	622.17
Culv Crt Depth (ft)	2.72	Min El Weir Flow (ft)	1820.00

CULVERT OUTPUT Profile #PF 2 Culv Group: Pipe1

Q Culv Group (cfs)	190.71	Culv Full Len (ft)	77.00
# Barrels	3	Culv Vel US (ft/s)	5.96
Q Barrel (cfs)	63.57	Culv Vel DS (ft/s)	5.96
E.G. US. (ft)	1823.42	Culv Inv El Up (ft)	1814.99
W.S. US. (ft)	1823.19	Culv Inv El Dn (ft)	1813.94
E.G. DS (ft)	1822.22	Culv Frctn Ls (ft)	0.84
W.S. DS (ft)	1821.76	Culv Exit Loss (ft)	0.08
Delta EG (ft)	1.19	Culv Entr Loss (ft)	0.28
Delta WS (ft)	1.43	Q Weir (cfs)	1919.29
E.G. IC (ft)	1823.24	Weir Sta Lft (ft)	9904.22
E.G. OC (ft)	1823.42	Weir Sta Rgt (ft)	10115.00
Culvert Control	Outlet	Weir Submerg	0.30
Culv WS Inlet (ft)	1818.99	Weir Max Depth (ft)	3.50

Culv WS Outlet (ft) 1817.94 Weir Avg Depth (ft) 2.26
Culv Nml Depth (ft) Weir Flow Area (sq ft) 476.99
Culv Crt Depth (ft) 2.85 Min El Weir Flow (ft) 1820.00

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.151

INPUT
Description: Note: Culvert #1 Downstream
Station Elevation Data num= 46
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9471 1823.87 9505.03 1823.9 9588.53 1823.89 9651.76 1824 9673.43 1823.91
9678.24 1823.46 9700.29 1823.37 9704.08 1823.15 9712.7 1823.26 9720.7 1823.01
9740.74 1822.99 9757.99 1822.74 9763.43 1822.97 9776.3 1822.5 9800.03 1822.48
9816.46 1822 9836.28 1821.96 9842.16 1821.64 9849.94 1821.5 9866.63 1821.47
9875.31 1821 9986 1820.1 9990.49 1814.77 10011 1814.87 10021 1820.24
10032.95 1820.0510041.98 182010062.68 1819.6610071.58 1819.4110076.79 1819.48
10094.6 1819.2610102.72 181910122.16 1818.7810132.79 1819.0110161.12 1819.01
10180.47 182010223.44 182010320.87 1820.7910362.86 1821.0810370.36 1821.21
10411.47 1821.5910434.26 1821.7210467.71 1821.9910518.75 182210566.04 1822.69
10616.1 1823.17

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9471 .04 9986 .035 10021 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9986 10021 181.8 173 163.9 .6 .8
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.115

INPUT
Description:
Station Elevation Data num= 50
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9579 1822.61 9636.15 1821.99 9690.65 1821.27 9722.18 1820.82 9770.98 1820
9779.39 1819 9790.85 1819.23 9801.11 1819.2 9818.12 1819 9821.36 1819.15
9824.65 1818 9825.52 1819.11 9828.06 1818.5 9831.02 1819 9835.82 1819.23
9845.16 1819.35 9854.5 1819.29 9856.69 1819.52 9858.53 1819.07 9865.45 1819.04
9888.68 1819.4 9900.85 1819.5 9918.64 1819.47 9962.37 1819.07 9975.15 1818.75
9985.62 1818.18 9990.3 1817.5 9997.6 1814.110003.47 1814.2410008.96 1817.28
10011.89 181710024.53 1817 10027.8 1816.5610037.56 181710038.69 1817.23
10052.74 1817.5910063.41 1818.8210077.19 1819.9810215.45 182010228.54 1819.92
10280.49 1820 10304.6 1820.1610333.49 1820.4110367.49 1820.7510434.65 1821.3
10498.13 1821.9910540.77 1822.0210570.06 1822.3410593.14 1822.710635.94 1823.11

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9579 .04 9990.3 .03510008.96 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9990.310008.96 175 183.9 250 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.08

INPUT

Description:
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9567	1820.31	9629.79	1820.01	9645.95	1819.99	9677.52	1819.63	9715.4	1819.02
9774.38	1818.04	9779.83	1818.03	9808	1818.02	9822.59	1818	9830.84	1817.51
9835.59	1817.68	9843.28	1818	9855.3	1818.02	9890.82	1818.05	9902.69	1818.09
9925.01	1818	9955.9	1817.86	9980.55	1817.5	9994	1813.6410008.24		1813.74
10020.62	1814.6710023.95		1815.3810055.27		1815.910064.85		1816.210070.64		1816.9
10087.42	1817.110099.92		1817.210110.48		1817.2910125.47		1817.2910140.88		1817.36
10154.85	1817.4210167.48		1817.4510203.63		1817.4710223.58		1817.5210275.19		1818
10292.14	181810296.83		1818.0110312.76		1818.0110317.23		1818.0210342.25		1818.02
10348.45	1818.0310481.11		1819.3610527.73		1819.8110551.32		182010580.63		1820.33
10584.05	1820.3810622.99		1820.8310623.37		1820.84				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9567	.04	9980.55	.03510110.48		.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9980.5510110.48		525	515.8	550	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
9567	9902.69	1819	F

Profile Output Table - Standard Table 1

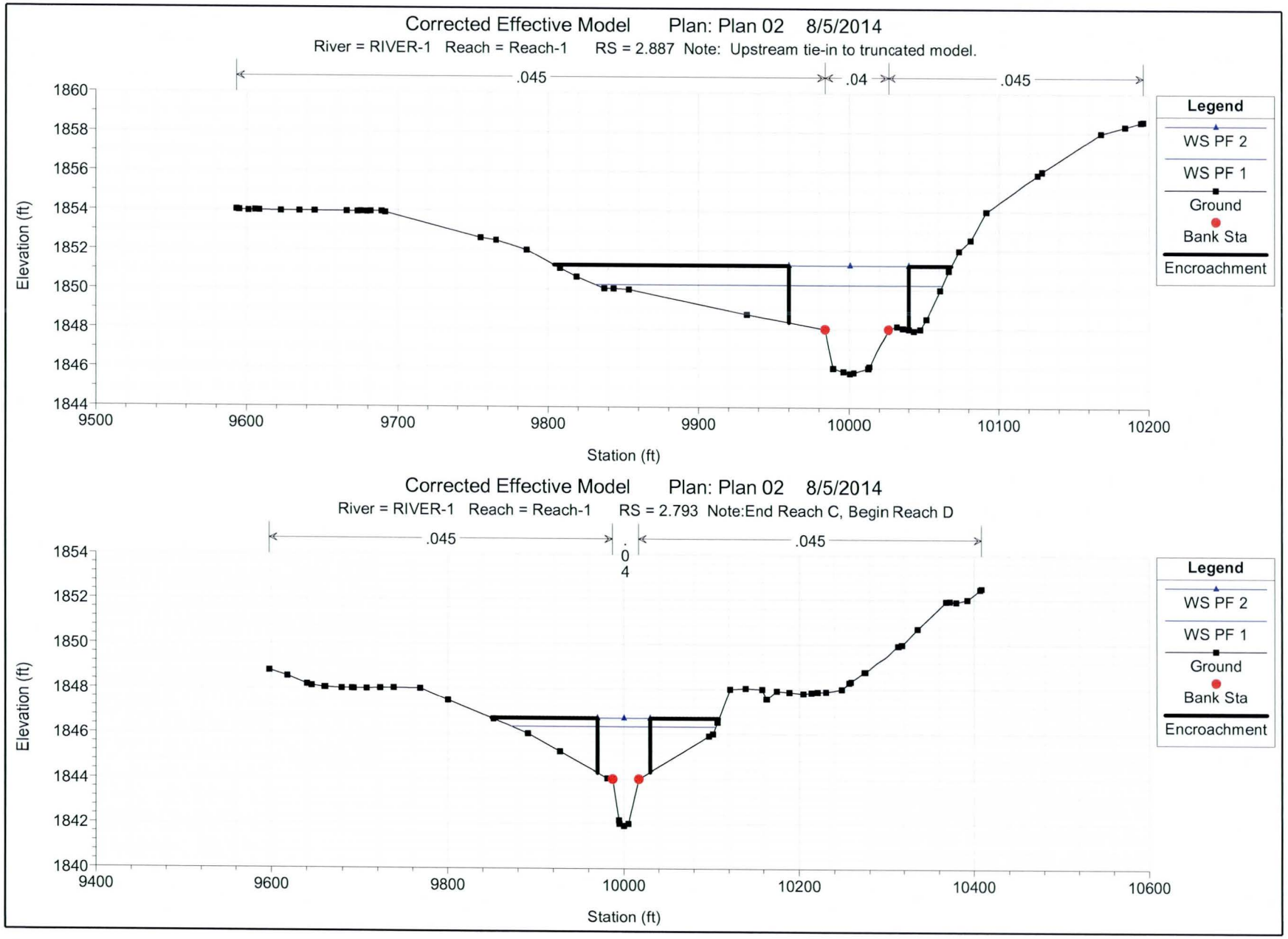
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft/ft)	E.G. Elev (ft/s)	E.G. Slope (sq ft)	Vel Chnl (ft)	Flow Area	Top Width	Froude # Chl
Reach-1	2.887	PF 1	1880.00	1845.74	1850.24		1850.79	0.006272	7.18	395.08	230.81	0.64
Reach-1	2.887	PF 2	1880.00	1845.74	1851.24		1851.85	0.004189	6.85	321.84	80.00	0.55
Reach-1	2.793	PF 1	1880.00	1841.90	1846.32	1846.32	1847.03	0.009937	8.73	355.77	232.71	0.80
Reach-1	2.793	PF 2	1880.00	1841.90	1846.69	1846.69	1848.31	0.014462	11.23	198.18	60.00	0.98
Reach-1	2.699	PF 1	1880.00	1838.25	1841.71		1841.88	0.000705	3.54	651.74	335.23	0.37
Reach-1	2.699	PF 2	1880.00	1838.25	1842.17		1842.46	0.000716	4.35	460.21	144.64	0.41
Reach-1	2.689	PF 1	1880.00	1837.57	1841.57		1841.81	0.002396	4.60	561.87	290.57	0.45
Reach-1	2.689	PF 2	1880.00	1837.57	1842.08		1842.39	0.002247	4.90	448.69	148.67	0.44
Reach-1	2.665	PF 1	1880.00	1837.52	1840.85		1841.29	0.007444	7.36	387.51	236.55	0.76
Reach-1	2.665	PF 2	1880.00	1837.52	1841.27		1841.91	0.006088	7.29	303.31	100.00	0.71
Reach-1	2.618	PF 1	1880.00	1833.89	1838.71	1838.71	1839.31	0.009130	7.65	367.59	280.72	0.83
Reach-1	2.618	PF 2	1880.00	1833.89	1839.20	1838.97	1840.13	0.008889	8.46	257.58	100.00	0.84
Reach-1	2.544	PF 1	1880.00	1830.78	1836.48	1835.85	1836.91	0.003510	7.08	430.41	217.27	0.56
Reach-1	2.544	PF 2	1880.00	1830.78	1836.59	1835.94	1837.39	0.005172	8.72	288.50	83.41	0.68
Reach-1	2.497	PF 1	1880.00	1830.66	1833.78	1833.59	1834.68	0.012273	9.07	257.83	135.89	0.97
Reach-1	2.497	PF 2	1880.00	1830.66	1834.70	1833.80	1835.37	0.005660	7.48	292.00	85.90	0.69
Reach-1	2.46	PF 1	2110.00	1829.00	1833.02		1833.29	0.003683	5.52	540.86	259.75	0.55
Reach-1	2.46	PF 2	2110.00	1829.00	1833.93	1833.06	1834.37	0.003867	6.70	425.69	143.62	0.58
Reach-1	2.385	PF 1	2110.00	1827.88	1829.92	1829.92	1830.57	0.017106	7.58	345.17	284.52	1.06
Reach-1	2.385	PF 2	2110.00	1827.88	1830.75	1830.75	1831.78	0.013032	8.67	271.66	130.00	0.98
Reach-1	2.283	PF 1	2110.00	1822.00	1826.45		1826.65	0.003407	4.71	637.40	384.28	0.51
Reach-1	2.283	PF 2	2110.00	1822.00	1827.40		1827.76	0.002993	5.41	459.37	149.70	0.50
Reach-1	2.253	PF 1	2110.00	1821.83	1825.05	1825.05	1825.60	0.012238	8.47	405.43	323.57	0.95
Reach-1	2.253	PF 2	2110.00	1821.83	1825.77	1825.77	1826.76	0.011978	9.95	290.49	135.00	0.98
Reach-1	2.199	PF 1	2110.00	1816.65	1823.23	1823.23	1823.81	0.003931	7.12	525.05	453.16	0.57
Reach-1	2.199	PF 2	2110.00	1816.65	1823.86	1823.00	1824.18	0.001981	5.49	563.61	220.71	0.42
Reach-1	2.1875	Culvert										

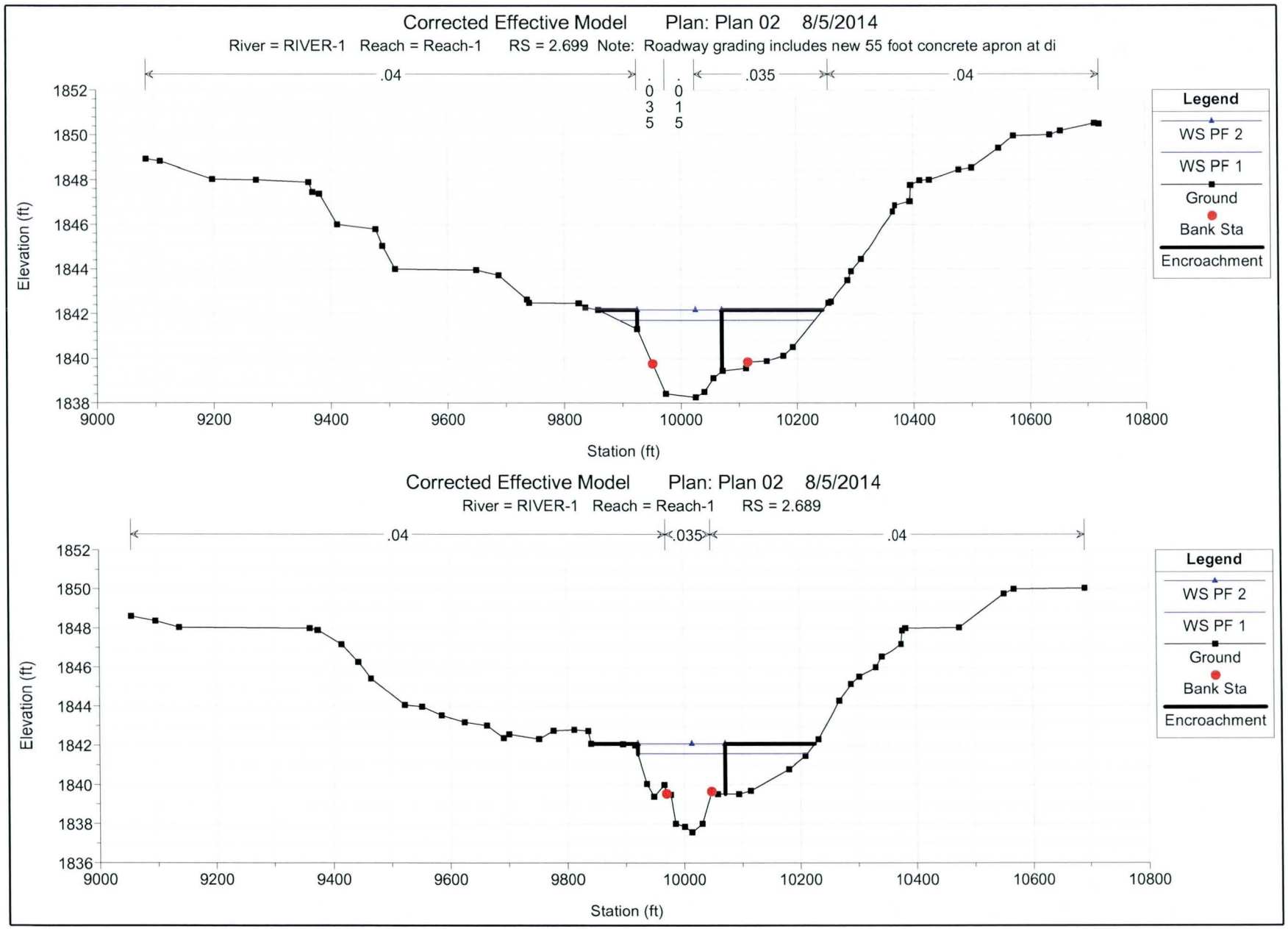
Reach-1	2.18	PF 1	2110.00	1816.48	1822.54	1822.54	1823.19	0.004082	7.25	485.05	432.01	0.59
Reach-1	2.18	PF 2	2110.00	1816.48	1823.26		1823.67	0.002211	5.88	508.37	206.31	0.45
Reach-1	2.167	PF 1	2110.00	1815.83	1822.23	1821.67	1822.48	0.003129	5.18	669.86	477.22	0.49
Reach-1	2.167	PF 2	2110.00	1815.83	1823.19	1821.87	1823.42	0.001730	4.54	602.81	210.78	0.38
Reach-1	2.159		Culvert									
Reach-1	2.151	PF 1	2110.00	1814.77	1821.14		1821.49	0.002721	6.21	657.99	493.68	0.48
Reach-1	2.151	PF 2	2110.00	1814.77	1821.76		1822.22	0.002605	6.54	474.33	180.00	0.48
Reach-1	2.115	PF 1	2110.00	1814.10	1820.34	1820.34	1820.81	0.004961	8.36	615.58	573.90	0.65
Reach-1	2.115	PF 2	2110.00	1814.10	1820.42	1819.96	1821.31	0.006223	9.46	305.19	93.30	0.74
Reach-1	2.08	PF 1	2110.00	1813.64	1817.99	1817.99	1818.65	0.009015	6.79	371.04	365.56	0.81
Reach-1	2.08	PF 2	2110.00	1813.64	1818.28	1818.12	1819.68	0.010402	9.52	224.57	70.00	0.91

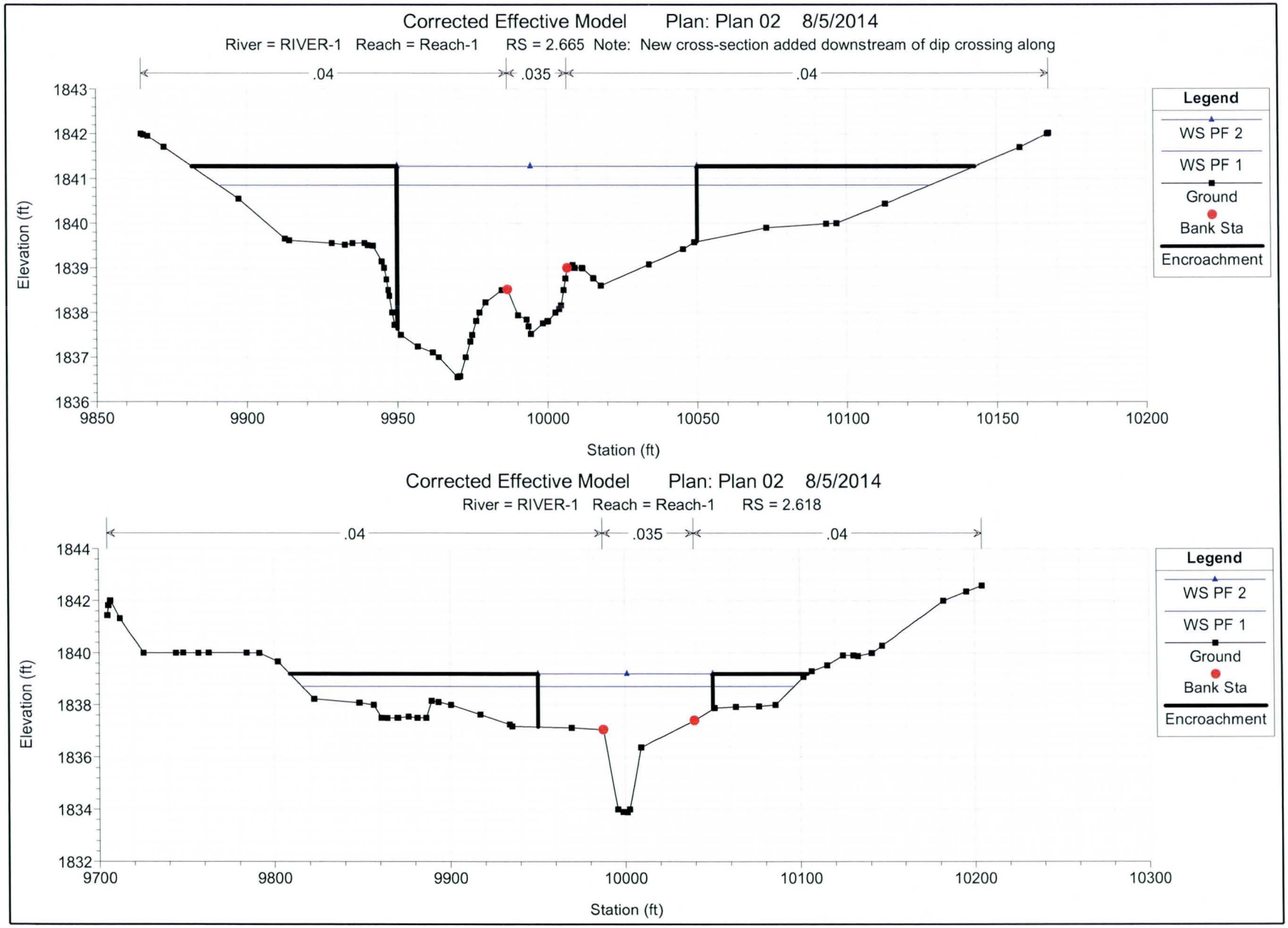
Profile Output Table - Standard Table 2

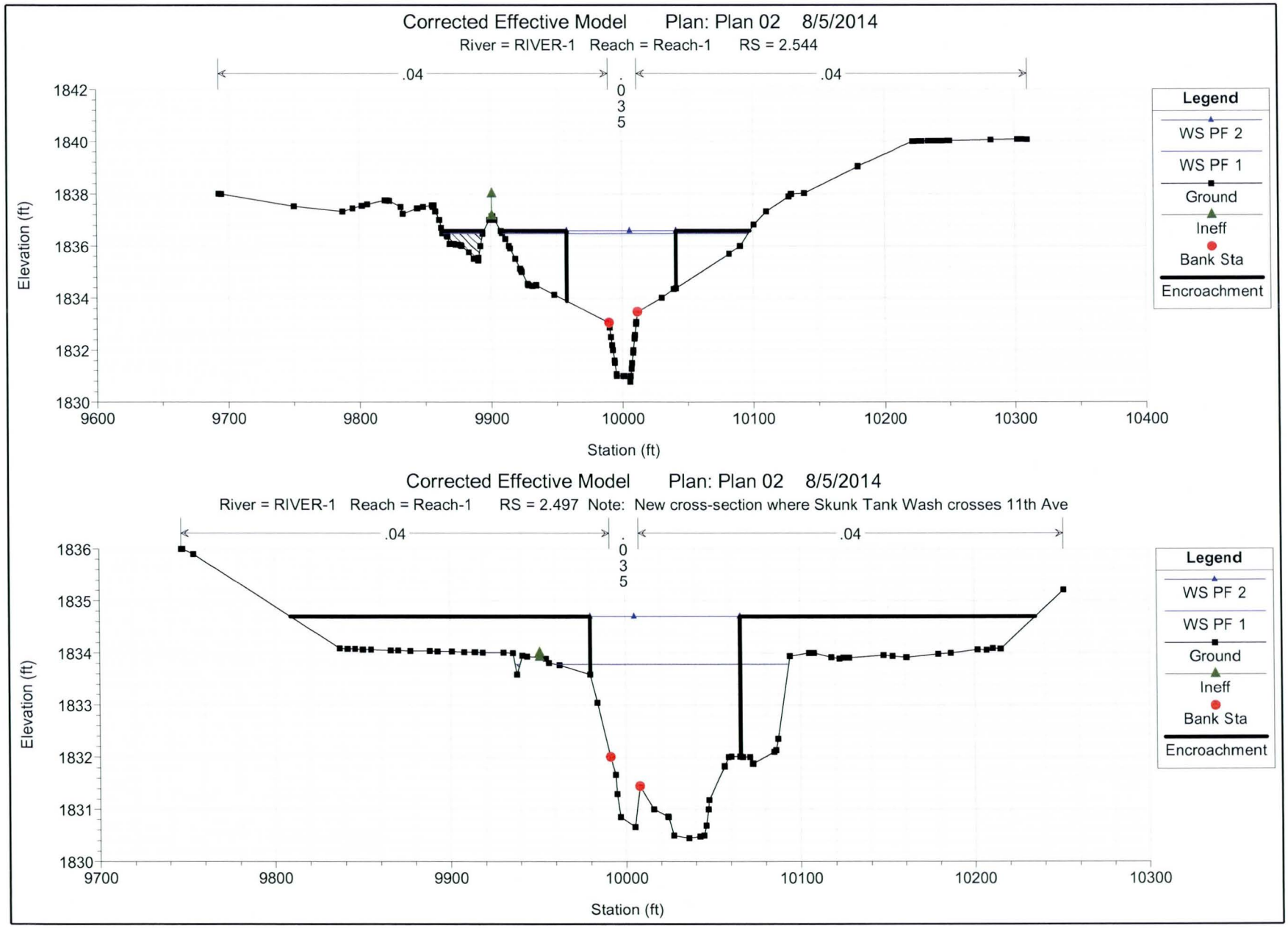
Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (cfs)	C & E Loss (cfs)	Q Left (ft)	Q Channel	Q Right	Top Width
Reach-1	2.887	PF 1	1850.79	1850.24	0.55	3.75	0.02	471.10	1157.33	251.57	230.81
Reach-1	2.887	PF 2	1851.85	1851.24	0.61	3.44	0.10	308.16	1390.38	181.46	80.00
Reach-1	2.793	PF 1	1847.03	1846.32	0.71	0.87	0.16	488.79	958.48	432.74	232.71
Reach-1	2.793	PF 2	1848.31	1846.69	1.61	0.95	0.40	304.45	1359.68	215.87	60.00
Reach-1	2.699	PF 1	1841.88	1841.71	0.17	0.06	0.01	40.74	1625.95	213.31	335.23
Reach-1	2.699	PF 2	1842.46	1842.17	0.28	0.06	0.00	66.62	1813.38		144.64
Reach-1	2.689	PF 1	1841.81	1841.57	0.23	0.49	0.02	178.81	1161.51	539.68	290.57
Reach-1	2.689	PF 2	1842.39	1842.08	0.31	0.45	0.03	278.58	1426.50	174.92	148.67
Reach-1	2.665	PF 1	1841.29	1840.85	0.44	1.97	0.02	969.43	424.48	486.09	236.55
Reach-1	2.665	PF 2	1841.91	1841.27	0.64	1.75	0.03	927.77	482.34	469.88	100.00
Reach-1	2.618	PF 1	1839.31	1838.71	0.60	2.17	0.05	704.58	1047.99	127.43	280.72
Reach-1	2.618	PF 2	1840.13	1839.20	0.93	2.71	0.04	434.46	1372.36	73.19	100.00
Reach-1	2.544	PF 1	1836.91	1836.48	0.43	2.18	0.05	684.78	754.64	440.59	217.27
Reach-1	2.544	PF 2	1837.39	1836.59	0.80	1.98	0.04	543.58	948.60	387.82	83.41
Reach-1	2.497	PF 1	1834.68	1833.78	0.90	1.21	0.19	30.43	408.64	1440.93	135.89
Reach-1	2.497	PF 2	1835.37	1834.70	0.67	0.94	0.07	87.73	450.18	1342.09	85.90
Reach-1	2.46	PF 1	1833.29	1833.02	0.27	2.67	0.04	145.62	469.66	1494.72	259.75
Reach-1	2.46	PF 2	1834.37	1833.93	0.43	2.53	0.06	233.25	733.74	1143.01	143.62
Reach-1	2.385	PF 1	1830.57	1829.92	0.65	3.33	0.13	52.68	989.71	1067.61	284.52
Reach-1	2.385	PF 2	1831.78	1830.75	1.03	2.81	0.20		1680.45	429.55	130.00
Reach-1	2.283	PF 1	1826.65	1826.45	0.21	1.02	0.03	140.55	767.64	1201.81	384.28
Reach-1	2.283	PF 2	1827.76	1827.40	0.36	0.93	0.06	233.37	1201.15	675.48	149.70
Reach-1	2.253	PF 1	1825.60	1825.05	0.55	1.73	0.02	21.10	602.84	1486.06	323.57
Reach-1	2.253	PF 2	1826.76	1825.77	0.99	1.10	0.53	49.05	915.52	1145.44	135.00
Reach-1	2.199	PF 1	1823.81	1823.23	0.57			202.97	1492.93	414.10	453.16
Reach-1	2.199	PF 2	1824.18	1823.86	0.33			348.46	1300.30	461.24	220.71
Reach-1	2.1875		Culvert								
Reach-1	2.18	PF 1	1823.19	1822.54	0.64	0.22	0.31	195.34	1624.46	290.20	432.01
Reach-1	2.18	PF 2	1823.67	1823.26	0.41	0.11	0.14	374.79	1519.58	215.63	206.31
Reach-1	2.167	PF 1	1822.48	1822.23	0.25			113.89	1051.46	944.65	477.22

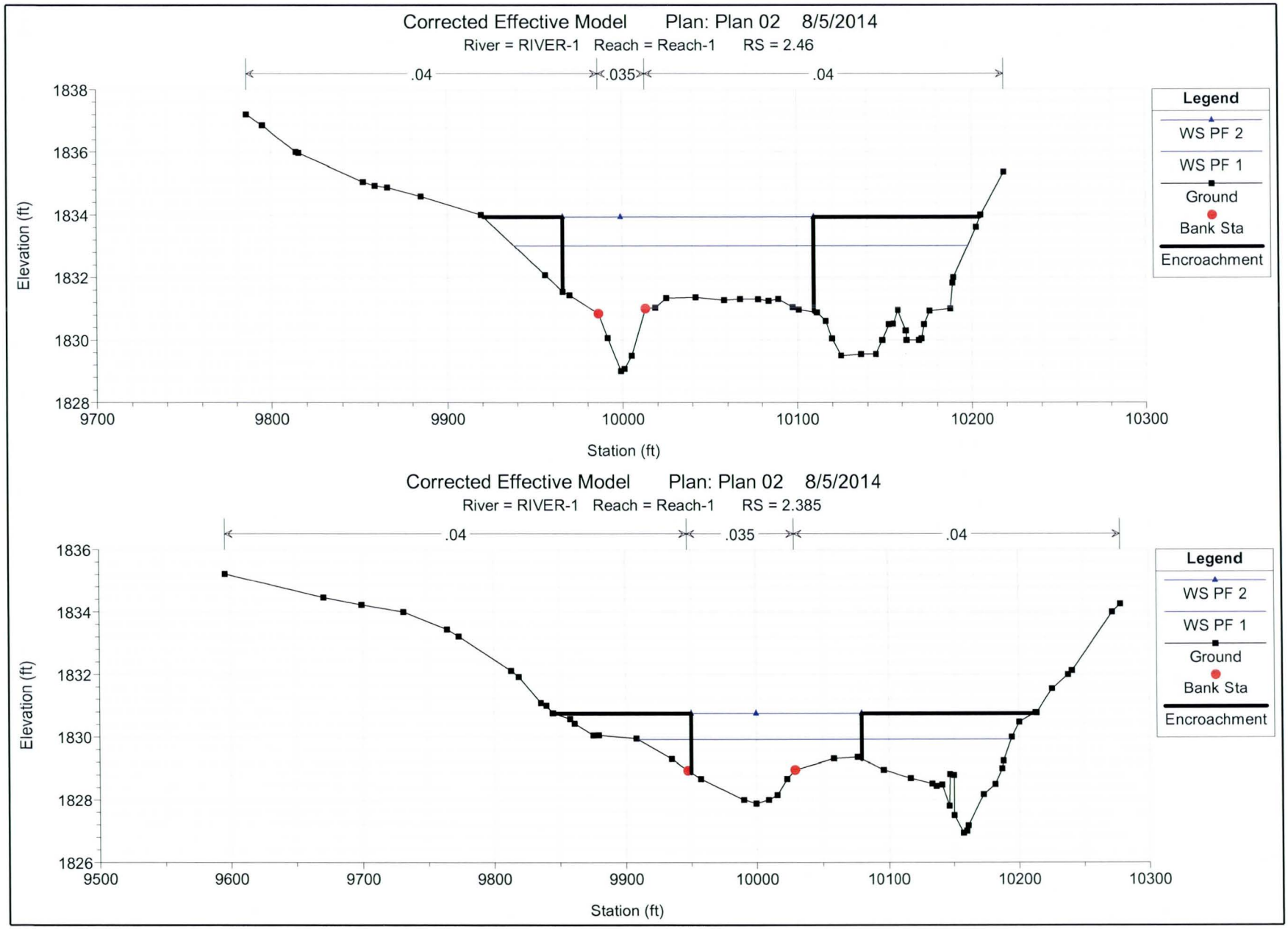
Reach-1	2.167	PF 2	1823.42	1823.19	0.23			323.11	1180.45	606.44	210.78
Reach-1	2.159		Culvert								
Reach-1	2.151	PF 1	1821.49	1821.14	0.35	0.62	0.07	88.30	1130.24	891.45	493.68
Reach-1	2.151	PF 2	1822.22	1821.76	0.47	0.65	0.26	189.55	1332.04	588.42	180.00
Reach-1	2.115	PF 1	1820.81	1820.34	0.47	1.27	0.02	729.52	789.39	591.09	573.90
Reach-1	2.115	PF 2	1821.31	1820.42	0.90	1.58	0.05	148.32	907.67	1054.01	93.30
Reach-1	2.08	PF 1	1818.65	1817.99	0.66			10.31	1937.47	162.22	365.56
Reach-1	2.08	PF 2	1819.68	1818.28	1.40			11.75	2098.25		70.00

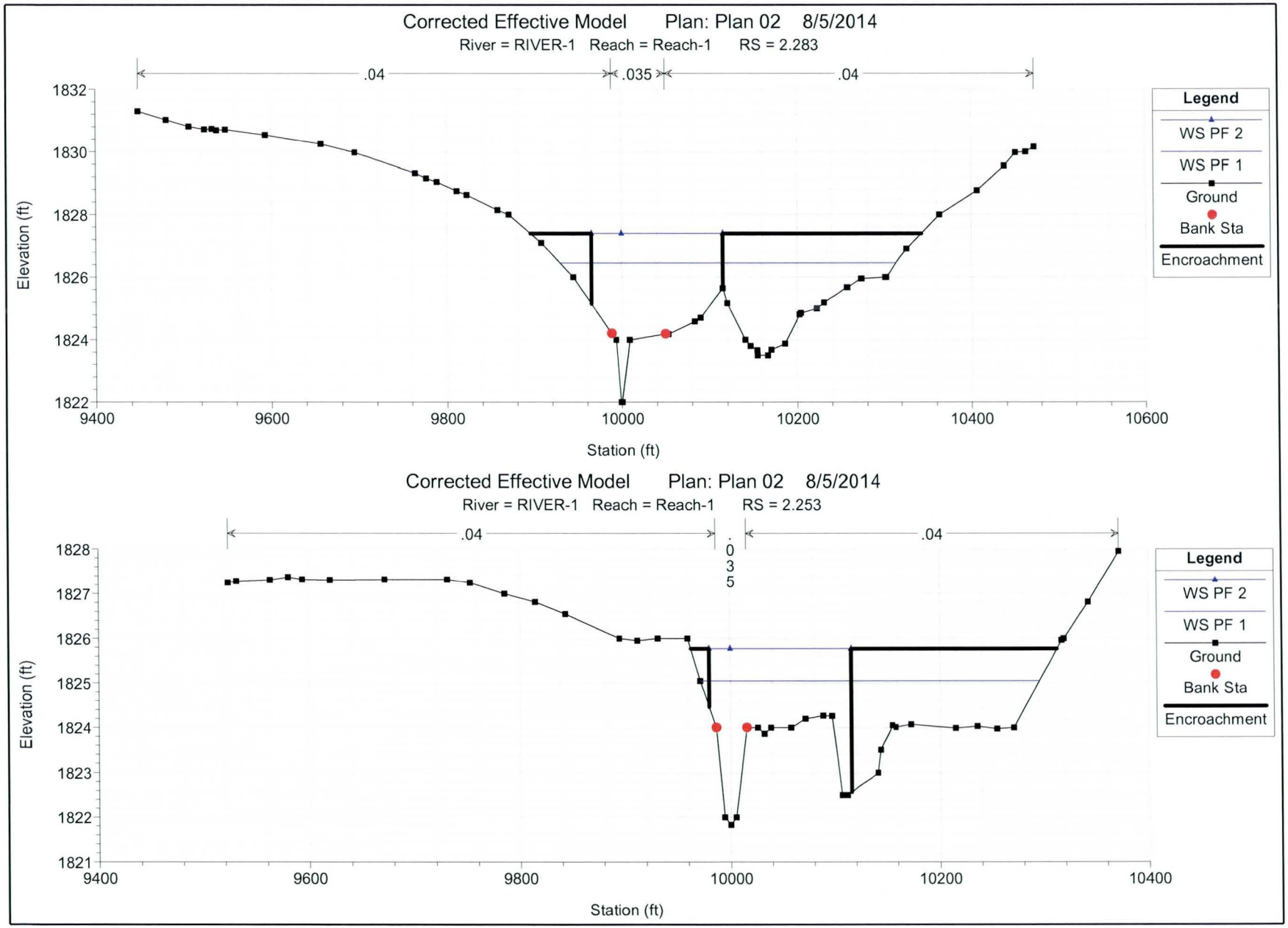

Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.887 Note: Upstream tie-in to truncated model.
.045
.04
.045
Elevation (ft)
1860
1858
1856
1854
1852
1850
1848
1846
1844
9500
9600
9700
9800
9900
10000
10100
10200
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.793 Note:End Reach C, Begin Reach D
.045
.04
.045
Elevation (ft)
1854
1852
1850
1848
1846
1844
1842
1840
9400
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

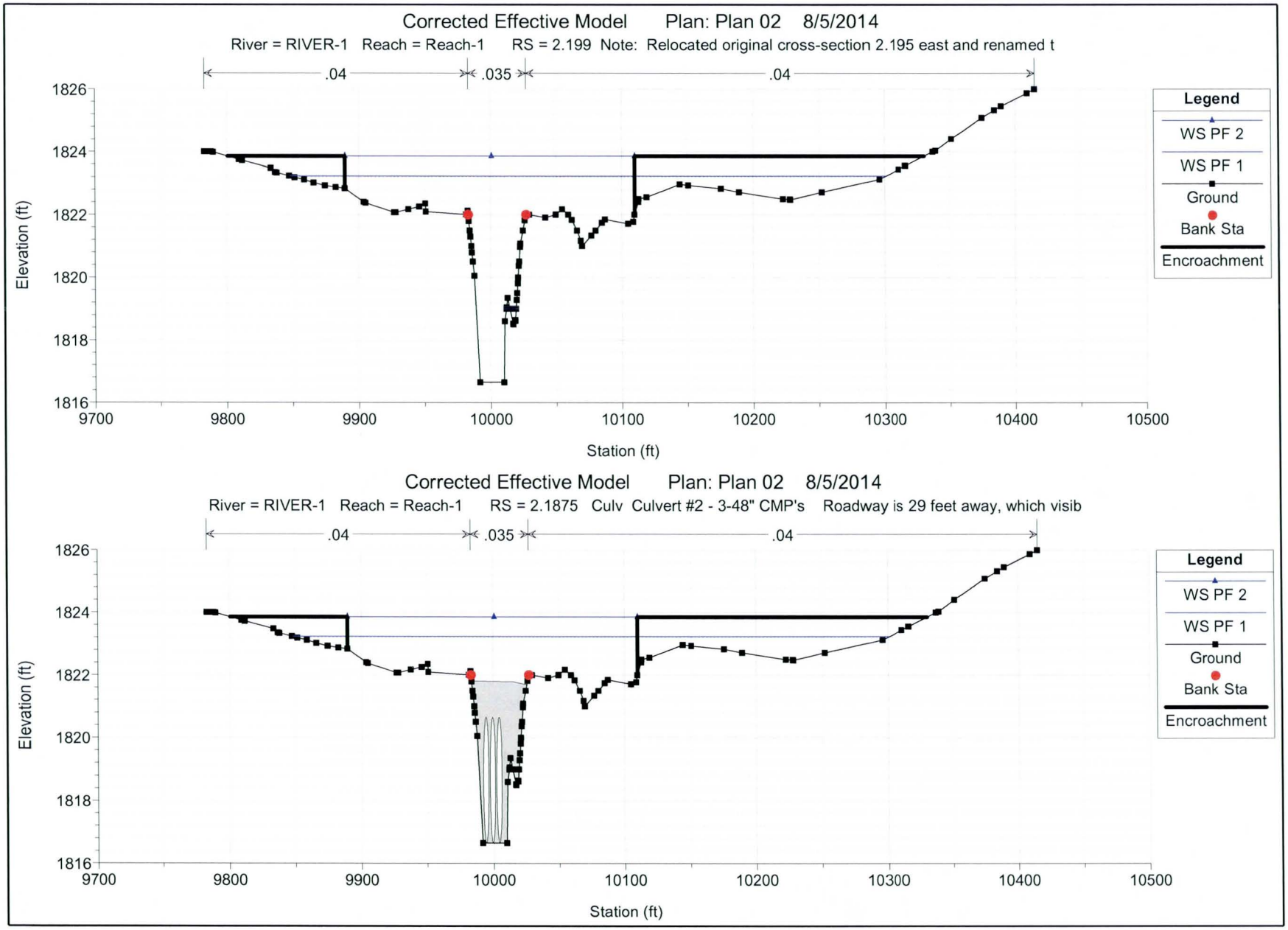

Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.699 Note: Roadway grading includes new 55 foot concrete apron at di
.04
.035
.04
.035
.015
Elevation (ft)
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.689
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

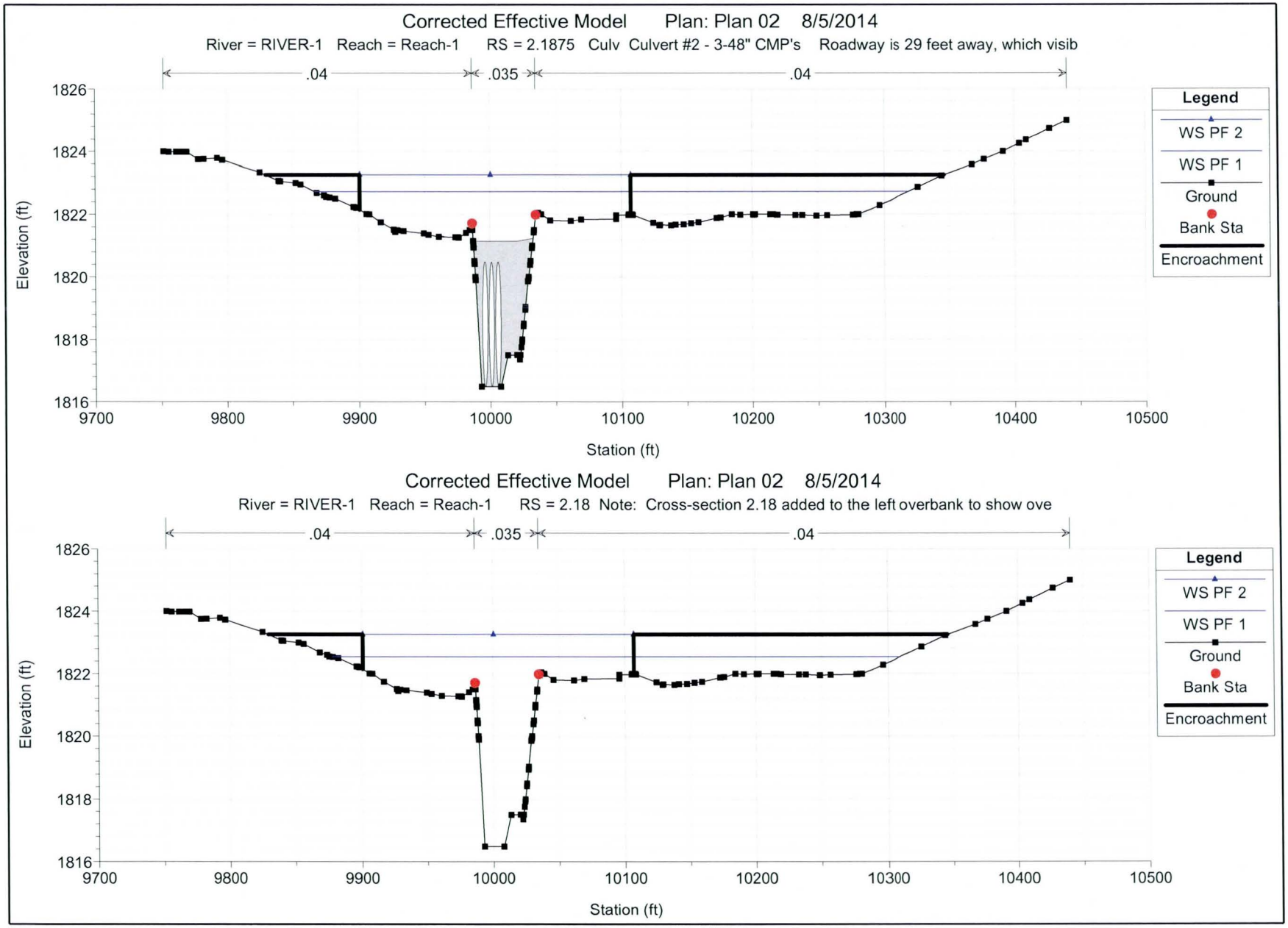

Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.665 Note: New cross-section added downstream of dip crossing along
.04
.035
.04
Elevation (ft)
1843
1842
1841
1840
1839
1838
1837
1836
9850
9900
9950
10000
10050
10100
10150
10200
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.618
.04
.035
.04
Elevation (ft)
1844
1842
1840
1838
1836
1834
1832
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

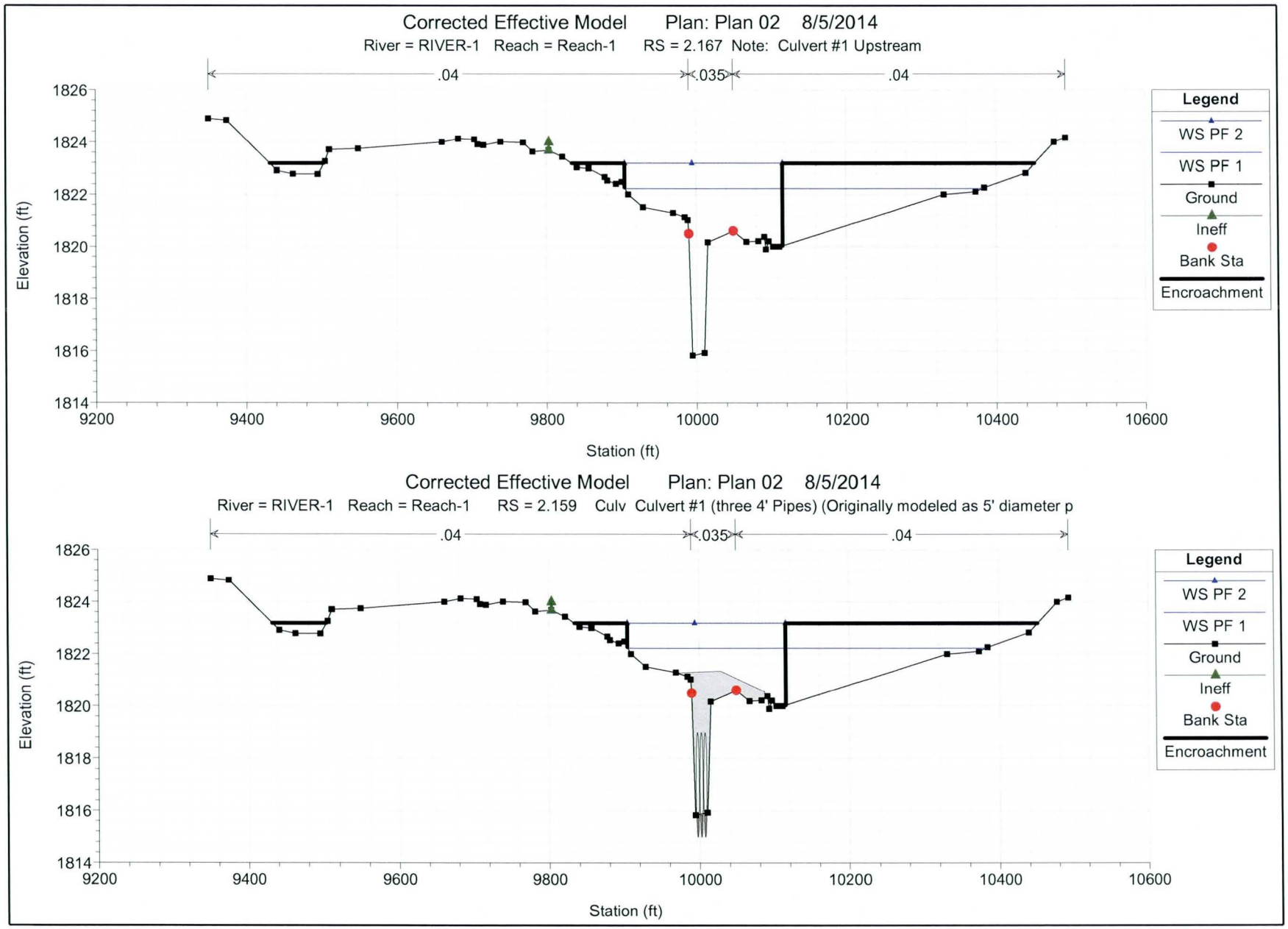

Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.544
.04
.035
.04
Elevation (ft)
1842
1840
1838
1836
1834
1832
1830
9600
9700
9800
9900
10000
10100
10200
10300
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment
Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.497 Note: New cross-section where Skunk Tank Wash crosses 11th Ave
.04
.035
.04
Elevation (ft)
1836
1835
1834
1833
1832
1831
1830
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment

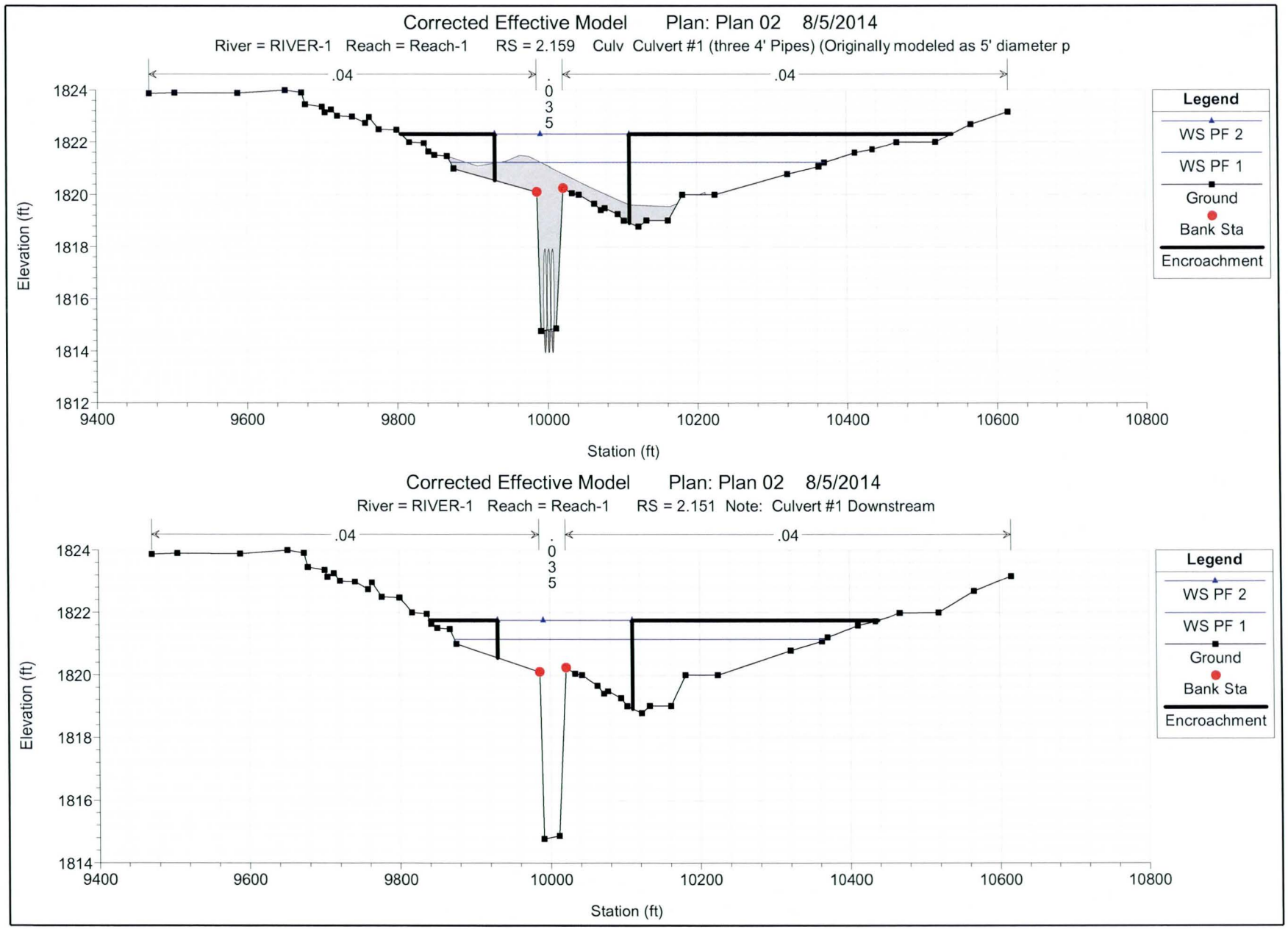

Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.46
.04
.035
.04
Elevation (ft)
1838
1836
1834
1832
1830
1828
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.385
.04
.035
.04
Elevation (ft)
1836
1834
1832
1830
1828
1826
9500
9600
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

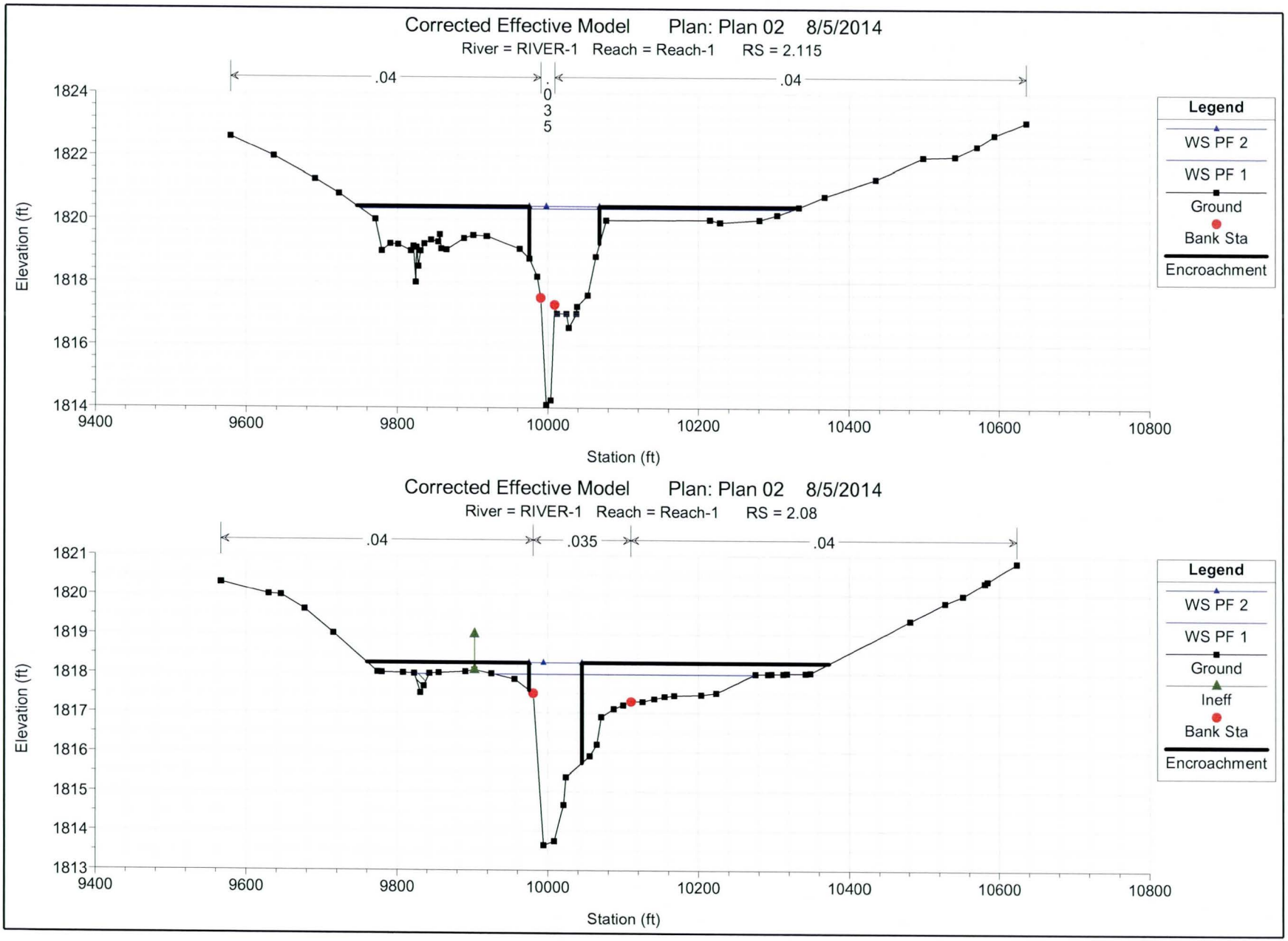

Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.283
.04
.035
.04
Elevation (ft)
1832
1830
1828
1826
1824
1822
9400
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.253
.04
.035
.04
Elevation (ft)
1828
1827
1826
1825
1824
1823
1822
1821
9400
9600
9800
10000
10200
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment


Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.199 Note: Relocated original cross-section 2.195 east and renamed t
.04
.035
.04
Elevation (ft)
1826
1824
1822
1820
1818
1816
9700
9800
9900
10000
10100
10200
10300
10400
10500
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.1875 Culv Culvert #2 - 3-48" CMP's Roadway is 29 feet away, which visib
.04
.035
.04
Elevation (ft)
1826
1824
1822
1820
1818
1816
9700
9800
9900
10000
10100
10200
10300
10400
10500
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment


Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.1875 Culv Culvert #2 - 3-48" CMP's Roadway is 29 feet away, which visib
.04
.035
.04
Elevation (ft)
1826
1824
1822
1820
1818
1816
9700
9800
9900
10000
10100
10200
10300
10400
10500
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.18 Note: Cross-section 2.18 added to the left overbank to show ove
.04
.035
.04
Elevation (ft)
1826
1824
1822
1820
1818
1816
9700
9800
9900
10000
10100
10200
10300
10400
10500
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment


Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.167 Note: Culvert #1 Upstream
.04
.035
.04
Elevation (ft)
1826
1824
1822
1820
1818
1816
1814
9200
9400
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment
Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.159 Culv Culvert #1 (three 4' Pipes) (Originally modeled as 5' diameter p
.04
.035
.04
Elevation (ft)
1826
1824
1822
1820
1818
1816
1814
9200
9400
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment


Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.159 Culv Culvert #1 (three 4' Pipes) (Originally modeled as 5' diameter p
.04
.035
.04
Elevation (ft)
1824
1822
1820
1818
1816
1814
1812
9400
9600
9800
10000
10200
10400
10600
10800
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.151 Note: Culvert #1 Downstream
.04
.035
.04
Elevation (ft)
1824
1822
1820
1818
1816
1814
9400
9600
9800
10000
10200
10400
10600
10800
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment


Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.115
.04
.035
.04
Elevation (ft)
1824
1822
1820
1818
1816
1814
9400
9600
9800
10000
10200
10400
10600
10800
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Corrected Effective Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.08
.04
.035
.04
Elevation (ft)
1821
1820
1819
1818
1817
1816
1815
1814
1813
9400
9600
9800
10000
10200
10400
10600
10800
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment

Post Project Conditions Model

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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

PROJECT DATA Post Proj
Project Title: ~~Proposed~~_Conditions_Model
Project File : PropCondModel.prj
Run Date and Time: 8/5/2014 11:04:04 AM

Project in English units

Project Description:
* Skunk Tank Wash
file:PropCondModel.prj
* For: MCDOT By: TYLin Intl.
07-07-14
* 11th Avenue - Joy Ranch Road to Irvine Road
(TT4010)
*
* Proposed Conditions Model is on the NAVD 88' vertical
datum to match the Corrective Effective
* model. VERTCON translation is
NGVD + 1.978 feet = NAVD.
*
* Source of 100-yr flowrate from HEC-1
analysis by Montgomery Watson.
*
* Subcritical Analysis
*
*
Starting water surface elevation came from the Skunk Tank Wash HEC-2 study

* by EEC/MKE (1997), taken from output for the starting d/s conitions at river
mile
* 2.080.

* Corrected Effective Model updated with the
following modifications:
* 1) Updated Survey from Adobe Dams/Desert Hills
Mapping, 2', 03/26/2002, NAVD 88 and
* MCDOT Survey from TT410 - 11th Ave
- Joy Ranch Rd to Irvine Rd, 12/27/2013, NAVD 88.
* 2) MCDOT survey
collected data on new Skunk Tank Wash dip crossing concrete pad at
*
Irvine Road.
* 3) MCDOT survey reported that the 11th Ave culverts are
48-inch. Duplicate Effective model
* shows three 60-inch. These
culverts were updated and modeled with sediment blockage.

PLAN DATA

Plan Title: Plan 02
Plan File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\4 Proposed Conditions Model\PropCondModel.p02

Geometry Title: Proposed_Conditions_2
Geometry File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\4 Proposed Conditions Model\PropCondModel.g03

Flow Title : Proposed Conditions Flow
Flow File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\4 Proposed Conditions Model\PropCondModel.f04

Plan Summary Information:
Number of: Cross Sections = 18 Multiple Openings = 0
Culverts = 2 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

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

Encroachment Data
Equal Conveyance = True
Left Offset = 0
Right Offset = 0

River = RIVER-1 Reach = Reach-1

RS	Profile	Method	Value1	Value2
2.887	PF 2	1	9960	10040
2.793	PF 2	1	9970	10030
2.699	PF 2	1	9925.36	10070
2.689	PF 2	1	9921.33	10070
2.665	PF 2	1	9950	10050
2.618	PF 2	1	9950	10050
2.544	PF 2	1	9957.51	10040.91
2.497	PF 2	1	9979.83	10065.73
2.46	PF 2	1	9965.91	10109.52
2.385	PF 2	1	9950	10080
2.283	PF 2	1	9965	10114.7
2.253	PF 2	1	9980	10115
2.199	PF 2	1	9889.29	10110
2.18	PF 2	1	9900.59	10106.9
2.167	PF 2	1	9904.22	10115
2.151	PF 2	1	9930	10110
2.115	PF 2	1	9975	10068.3
2.08	PF 2	1	9975	10045

FLOW DATA

Flow Title: Proposed Conditions Flow
Flow File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\4 Proposed Conditions Model\PropCondModel.f04

Flow Data (cfs)

River	Reach	RS	PF 1	PF 2
RIVER-1	Reach-1	2.887	1880	1880

RIVER-1 Reach-1 2.46 2110 2110

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
RIVER-1	Reach-1	PF 1		Known WS = 1817.69
RIVER-1	Reach-1	PF 2		Known WS = 1818.28

GEOMETRY DATA

Geometry Title: Proposed_Conditions_2
Geometry File : q:\221830.00 11th Avenue CLOMR\Design\Drainage\HEC-RAS\HEC-RAS\4 Proposed Conditions Model\PropCondModel.g03

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.887

INPUT
Description: Note: Upstream tie-in to truncated model.
Station Elevation Data num= 50
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9593.6 1854.03 9595.21 1854 9601.27 1853.97 9605.76 1853.99 9608.45 1853.98
9622.88 1853.95 9635.11 1853.96 9645.12 1853.96 9665.99 1853.94 9673.28 1853.93
9675.35 1853.94 9679.37 1853.93 9681.82 1853.94 9689.29 1853.94 9691.58 1853.89
9755.2 1852.62 9765.57 1852.49 9785.69 1852 9807.85 1851.07 9818.9 1850.64
9837.22 1850.05 9843.4 1850.05 9853.53 1850 9932.36 1848.74 9983.17 1848.02
9984.06 1848 9989.49 1846 9996.36 1845.8310000.63 1845.7410003.17 1845.79
10012.56 184610013.13 1846.110025.77 184810032.27 1848.1510036.26 1848.06
10040.08 184810043.41 1847.9210047.56 184810051.75 1848.5210060.84 1850
10066.56 1850.9910073.58 1852 10081.2 1852.55 10091.8 185410125.64 1855.87
10128.6 1856.0310168.21 185810184.19 1858.3410194.74 1858.5710196.27 1858.59

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9593.6 .045 9984.06 .0410025.77 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9984.0610025.77 400 496.3 550 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.793

INPUT
Description:
Station Elevation Data num= 50
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9597.4 1848.79 9617.92 1848.54 9640.13 1848.18 9645.25 1848.12 9659.57 1848.05
9660.26 1848.04 9679.07 1848 9690.65 1848 9692.61 1847.99 9707.08 1847.99
9722.79 1848.01 9738.22 1848.02 9768.33 1848 9800.23 1847.47 9852.2 1846.65
9891.21 1846 9927.63 1845.2 9981.33 1844.03 9987.18 1844 9994.57 1842.15
9995.08 184210000.11 1841.910005.15 184210017.12 184410097.34 1845.9
10101.75 184610106.81 1846.5210121.57 184810139.24 1848.04 10158.2 1848
10163.11 1847.5710174.33 1847.9310188.91 1847.8810204.96 1847.8110213.97 1847.85
10220.95 1847.8910230.62 1847.9 10248.6 1848.0110256.97 1848.3110259.16 1848.35
10274.42 1848.7810313.77 1849.9510317.78 185010335.58 1850.7210367.73 1851.93
10372.28 1851.9410379.74 1851.9110392.23 1852.01 10407 1852.4710408.77 1852.52

Manning's n Values num= 3

Sta n Val Sta n Val Sta n Val
9597.4 .045 9987.18 .0410017.12 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9987.1810017.12 469.1 496.3 513 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.699

INPUT
Description: Note: Roadway grading includes new 55 foot concrete apron at dip crossing. Manning's n value used for concrete is 0.015.
Station Elevation Data num= 49
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9085 1848.92 9109.33 1848.82 9198.88 1848.03 9274.16 1848 9363.43 1847.89
9369.92 1847.45 9381.04 1847.38 9411.42 1846 9477.49 1845.79 9488.67 1845.04
9510.4 1844 9649.77 1843.95 9687.92 1843.72 9736.82 1842.64 9740.42 1842.49
9825.71 1842.47 9836.33 1842.28 9858.72 1842.17 9925.36 1841.31 9951.46 1839.74
9974 1838.41 10025 1838.2510039.73 1838.510055.71 1839.1110071.19 1839.44
10111.57 1839.5510114.54 1839.8310147.59 1839.8810176.25 1840.1210192.89 1840.51
10254.38 1842.4910259.09 1842.5410286.63 1843.510293.01 1843.910310.42 1844.45
10363.9 1846.5810368.44 1846.8610395.46 1847.0410396.38 1847.7710411.66 1847.98
10427.96 184810478.38 1848.4510500.43 1848.5410547.17 1849.410572.29 1849.96
10635.37 185010653.81 1850.1810713.52 1850.5210720.87 1850.49

Manning's n Values num= 5
Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
9085 .04 9925.36 .035 9974 .015 10025 .03510254.38 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9951.4610114.54 52.8 52.8 52.8 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.689

INPUT
Description: Note: Proposed 11th Ave Improvements included.
Station Elevation Data num= 75
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9055 1848.61 9085.84 1848.4 9096.4 1848.37 9137.34 1848.04 9189.22 1848.01
9270.73 1848.02 9361.08 1848 9373.85 1847.9 9399.89 1847.43 9414.41 1847.17
9442.92 1846.27 9465 1845.42 9496.99 1844.68 9522.57 1844.06 9552 1843.98
9585.66 1843.53 9625.07 1843.18 9643.01 1843.07 9662.8 1843.01 9691.56 1842.37
9701.07 1842.56 9715.67 1842.52 9752.3 1842.32 9777.18 1842.75 9812.69 1842.79
9836.14 1842.73 9840.79 1842.08 9852.83 1842.06 9887.01 1842.09 9916.65 1842
9936.62 1840.05 9948.82 1839.4 9959.06 1839.7 9966.5 1840 9970.56 1839.54
9977.13 1839.5 9981.23 1838.63 9988.13 1837.56 9998.97 1837.7310006.75 1837.75
10010.81 1837.510016.77 1838.110030.05 1838.4310042.48 1838.42 10048.5 1839.7
10055.47 1839.0910061.15 1838.910064.54 1839.310073.94 1839.5510093.82 1839.54
10095.25 1839.6310113.97 1839.710180.54 1840.810208.85 1841.47 10224.8 1842
10231.46 1842.3110268.11 1844.2810274.52 1844.44 10287.6 1845.1510302.42 1845.52
10329.52 184610340.51 1846.5510346.65 1846.5110351.15 1846.710375.56 1847.18
10377.51 1847.8710383.15 184810427.55 1848 10447.1 1848.0310473.47 1848.03
10550.84 1849.76 10567.4 185010632.78 1850.0210654.05 1850.0110691.04 1850.04

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9055 .04 9966.5 .035 10048.5 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9966.5 10048.5 144.1 126.7 105 .1 .3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.665

INPUT
Description: Note: New cross-section added downstream of dip crossing along
11th Ave just south of intersection with Irvine Road.

Proposed
11th Ave Improvements included.
Station Elevation Data num= 70
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9865 1842 9865.8 1841.98 9867.3 1841.95 9872.69 1841.7 9897.35 1840.55
9912.77 1839.66 9914.19 1839.62 9928.34 1839.56 9932.68 1839.52 9935.32 1839.56
9939.23 1839.56 9940.34 1839.51 9942.13 1839.5 9944.92 1839.14 9945.73 1839
9946.49 1838.74 9947.14 1838.5 9947.5 1838.37 9948.49 1838 9949.22 1837.73
9949.35 1837.68 9949.38 1837.67 9950.53 1837.65 9955.39 1837.57 9956.86 1837.54
9967.41 1837.32 9968.21 1837.31 9979.43 1837.08 9980.21 1837 9985.44 1836.48
9986.08 1836.7 9990.35 1838.12 9990.7 1838.23 9990.81 1838.27 9990.9 1838.3
9992.09 1838.71 9992.4 1838.82 9992.54 1838.87 9992.56 1838.88 9992.6 1838.59
9994.17 1838.37 9998.41 1837.76 9999.91 1837.8 10000.1 1837.8110000.13 1837.81
10002.65 183810003.94 1838.0810004.59 1838.1610005.41 1838.510006.02 1838.76
10006.6 183910008.33 183910008.47 1839.06 10009.2 183910011.52 1839
10011.7 183910011.83 1838.9910015.37 1838.7710015.51 1838.7610017.99 1838.6
10034.03 1839.0810045.35 1839.4210049.04 1839.5810073.17 1839.910093.24 1839.99
10096.65 184010112.66 1840.4410157.94 1841.6910167.17 184210167.56 1842.02

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9865 .04 9992.54 .035 10006.6 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9992.54 10006.6 233.8 242.3 246.9 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.618

INPUT
Description: Note: Proposed 11th Ave Improvements included.
Station Elevation Data num= 75
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9705 1841.44 9705.53 1841.82 9706.6 1842 9712.05 1841.32 9725.44 1840
9743.92 1840 9748.12 1840.01 9756.73 1840 9762.72 1840.01 9784.18 1840.01
9786.34 1840 9791.42 1840 9802.09 1839.67 9822.54 1838.23 9831.52 1838.18
9848.34 1838.08 9856.68 1838 9856.93 1838 9857.37 1837.94 9860.98 1837.5
9863.12 1837.26 9863.49 1837.23 9866.45 1837.49 9869.36 1837.74 9869.5 1837.76
9880.22 1837.54 9883.06 1837.48 9893.51 1837.27 9898.04 1836.82 9899.52 1836.67
9900.52 1837 9903.33 1837.94 9904.71 1837.91 9917.25 1837.63 9933.85 1837.25
9935.33 1837.18 9969.24 1837.12 9987.6 1837.05 9988.33 1836.78 9992.08 1835.37
9993.08 1835 9995.73 1834.01 9995.77 1834 9998.71 1833.9 9999.36 1833.93
9999.89 1833.9310001.09 1833.8910001.44 1833.97 10002.5 183410003.95 1834.53
10005.32 1835.0210006.95 1835.6110008.14 183610009.04 1836.3710039.46 1837.4
10051.03 1837.8810055.31 1837.910059.63 1837.91 10063.1 1837.9310076.34 1837.95
10084.32 1837.9910085.81 183810101.99 1839.0910106.67 1839.310115.65 1839.53
10124.78 1839.9110128.07 1839.9 10130.7 1839.9110133.31 1839.8810138.31 1839.95
10140.93 184010146.78 1840.2810182.23 184210195.35 1842.3510204.39 1842.58

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9705 .04 9987.6 .03510039.46 .04

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

9987.610039.46 400 406.9 417.2 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.544

INPUT
Description: Note: Proposed 11th Ave Improvements included.
Station Elevation Data num= 137
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9693 1838.01 9694.86 1838 9695.12 1838 9750.22 1837.53 9787.06 1837.33
9794.77 1837.45 9801.99 1837.55 9805.94 1837.6 9819.07 1837.76 9820.31 1837.76
9821.56 1837.75 9822.62 1837.74 9831.4 1837.5 9833.03 1837.24 9843.91 1837.45
9844.2 1837.45 9848.61 1837.5 9855.36 1837.57 9855.91 1837.5 9856.54 1837.5
9856.6 1837.5 9856.67 1837.57 9857.95 1837.33 9860.83 1837 9860.87 1837
9860.89 1837 9862.23 1836.7 9863.02 1836.5 9863.34 1836.49 9865.07 1836.18
9865.83 1836.05 9867.95 1835.43 9870.23 1834.76 9872.66 1834.93 9873.79 1835.01
9875.31 1835.12 9877.35 1835.26 9880.13 1835.27 9881.94 1835.28 9890.54 1835.3
9891.23 1835.31 9891.37 1835.31 9891.59 1835.31 9900.51 1835.33 9905.83 1835.35
9907.55 1835.5 9909.8 1835.73 9911.58 1835.91 9912.95 1836.06 9913.12 1836
9913.35 1835.92 9913.56 1835.84 9913.75 1835.77 9913.92 1835.71 9914.07 1835.66
9914.08 1835.66 9914.21 1835.56 9914.22 1835.56 9914.34 1835.47 9914.35 1835.47
9914.46 1835.39 9914.47 1835.39 9914.57 1835.32 9914.58 1835.31 9914.67 1835.25
9914.68 1835.24 9914.76 1835.18 9914.78 1835.17 9914.84 1835.13 9914.87 1835.11
9914.91 1835.08 9915.3 1835.34 9915.36 1835.34 9918.46 1835.5 9922.15 1835.12
9922.76 1835.06 9923.35 1835 9927.81 1834.54 9928.24 1834.5 9928.77 1834.49
9931.38 1834.46 9934.3 1834.5 9934.45 1834.48 9948.11 1834.13 9989.76 1833.05
9989.88 1833 9990.19 1832.87 9991.21 1832.5 9992.08 1832.19 9992.61 1832
9993.74 1831.6 9994.02 1831.5 9995.23 1831.07 9995.42 183110000.39 1831
10000.67 1830.9910000.71 1830.99 10001.1 183110005.63 1830.7810006.09 1831
10006.67 1831.2810007.13 1831.510007.96 1831.910008.16 183210009.06 1832.44
10009.2 1832.510009.36 1832.5810010.23 183310010.54 1833.0810011.35 1833.47
10029.98 1834.0110039.15 1834.3410040.91 1834.3710081.77 1835.6910089.88 1836
10100.43 1836.8210110.16 1837.3310127.37 1837.910129.06 1837.9910129.45 1838
10139.34 1838.03 10180.4 1839.0510221.82 184010222.08 184010222.88 1840
10226.45 1840.0110228.94 1840.0110233.91 1840.0210236.38 1840.0210240.72 1840.02
10244.62 1840.0210249.27 1840.0310250.47 1840.0310282.27 1840.0610302.52 1840.08
10305.67 1840.0810309.83 1840.07

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9693 .04 9989.76 .03510011.35 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9989.7610011.35 358 364.4 373 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.497

INPUT
Description: Note: New cross-section where Skunk Tank Wash crosses 11th Ave
approximately 930 feet south of Irvine Road.

Proposed 11th
Ave Improvements included.
Station Elevation Data num= 75
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9747 1836 9747.86 1836 9753.87 1835.9 9837.03 1834.09 9841.56 1834.08
9845.85 1834.08 9850.27 1834.07 9854.75 1834.07 9865.94 1834.05 9870.33 1834.05
9877.3 1834.04 9888.4 1834.04 9892.85 1834.03 9901.03 1834.03 9908.09 1834.02
9914.26 1834.02 9918.54 1834.01 9930.51 1834.01 9935.91 1834 9938.23 1833.59
9941.24 1833.95 9943.99 1833.93 9951.17 1833.92 9954.72 1833.89 9956.47 1833.81

9962.57 1833.77 9979.83 1833.59 9983.96 1833.04 9991.38 1832 9994.21 1831.67
9994.97 1831.3 9996.89 183110000.75 183110001.35 1830.9 10002.5 1831
10005.05 183110007.93 1831.4510008.46 1831.4210012.04 1830.9410012.71 1830.77
10014.49 1831.7210014.53 1832.410014.82 1832.3410022.96 1831.57 10024.2 1831.4
10027.36 1830.3710029.73 1829.5710034.34 1830.0410035.73 1830.1710038.36 1830.23
10047.73 1830.4110059.73 1830.6610065.73 1832.4410072.52 1831.8810072.93 1831.88
10084.88 1832.110086.05 1832.1310087.26 1832.3510094.24 1833.9410105.19 1834
10108.1 183410117.87 1833.92 10122.5 1833.89 10124.7 1833.9110127.93 1833.91
10147.49 1833.9610152.47 1833.9410160.76 1833.9210179.03 1833.9810186.38 1834
10201.88 1834.0710207.11 1834.0610210.63 1834.0910215.06 1834.0810251.16 1835.21

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9747 .04 9991.38 .03510014.53 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9991.3810014.53 213.8 207.5 201.1 .1 .3
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
9747 9951.17 1835 F

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.46

INPUT
Description: Note: Proposed 11th Ave Improvements included.
Station Elevation Data num= 75
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9786 1837.21 9795.09 1836.86 9813.99 1836 9815.64 1835.97 9818.41 1835.9
9838.43 1835.39 9852.1 1835.05 9858.9 1834.93 9865.82 1834.88 9885.12 1834.59
9919.49 1834 9920.85 1833.93 9956.12 1832.07 9957.51 1831.99 9965.9 1831.54
9969.74 1831.43 9986.28 1830.84 9987.11 1830.75 9991.4 1830.07 9995.44 1829.5
9999 1829 9999.37 1828.9910000.77 182910001.05 1829.0710005.12 1829.5
10007.98 1830.0610010.39 1830.5 10013.1 183110017.47 1831.0210018.74 1831.03
10025.14 1831.3410042.02 1831.3610058.18 1831.2710067.43 1831.3110077.78 1831.3
10083.91 1831.2510089.33 1831.3110097.64 1831.0510099.43 1831 10101.1 1830.97
10109.52 1830.9110111.24 1830.8810114.65 1830.7210115.84 1830.6610115.86 1830.73
10116.24 1830.6210119.05 1829.7410122.45 1828.6910125.67 1828.9810128.93 1829.28
10132.23 1829.34 10141.9 1829.510154.87 1829.72 10158.6 1830.2610160.45 1830.52
10161.35 1830.4810163.78 1830.1510164.12 1829.9110166.72 1829.9910169.48 1830
10170.99 1830.0510172.87 1830.6210175.15 1830.8610177.06 1830.9210184.54 1830.99
10185.35 183110186.37 1830.9810186.99 183110187.72 183110189.01 1831.82
10189.58 183210202.66 1833.6110205.17 1834 10208.7 1834.3510218.63 1835.37

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9786 .04 9986.28 .035 10013.1 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9986.28 10013.1 400 392.8 384 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.385

INPUT
Description: Note: Proposed 11th Ave Improvements included.
Station Elevation Data num= 76
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9596 1835.22 9649.09 1834.68 9670.78 1834.46 9678.64 1834.39 9699.55 1834.23
9701.14 1834.22 9723.98 1834.05 9728.89 1834 9731.24 1834 9764.6 1833.44
9773.23 1833.22 9813.37 1832.12 9816.99 1832.05 9818.95 1831.93 9835.84 1831.08
9840.14 1831 9844.88 1830.76 9857.98 1830.57 9861.33 1830.43 9875.46 1830.05

9879.57 1830.06 9882.86 1830.05 9891.95 1830 9905.93 1829.95 9908.07 1829.95
9944.32 1829 9957.27 1828.67 9990.12 1828 9999.55 1827.8810003.75 1827.93
10009.07 182810015.57 1828.1610023.07 1828.6710029.17 1828.9610058.59 1829.32
10076.62 1829.3610079.57 1829.2910085.23 1829.1710096.33 1828.96 10117 1828.69
10128.79 1828.5710132.06 1828.51 10133.5 1828.5210136.86 1828.4410141.14 1828.5
10144.94 1828.0210145.89 1828.0410146.52 1828.0810146.99 1828.710146.99 1828.86
10148.8 1828.7610150.56 1828.2410151.55 1827.6410152.57 1827.4910153.08 1827.24
10153.51 1827.2510159.21 1827.9210159.88 1827.9810172.61 1828.2810175.74 1828.36
10185.34 1828.58 10190.7 1829.510191.71 1829.6810193.29 1829.8410194.58 1830
10200.34 1830.4810204.59 1830.5810212.68 1830.7810213.56 1830.7710215.29 1830.89
10222.02 1831.3410225.35 1831.5510238.13 183210240.98 1832.1310272.04 1834
10278.32 1834.26

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9596 .04 9944.32 .03510029.17 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9944.3210029.17 512 517.5 506 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.283

INPUT
Description: Note: Proposed 11th Ave Improvements included.
Station Elevation Data num= 74
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9448 1831.3 9460.55 1831.2 9470.97 1831.1 9480.11 1831.02 9497.16 1830.88
9506.19 1830.81 9514.02 1830.76 9519.14 1830.75 9524.12 1830.72 9532.59 1830.73
9537.85 1830.69 9547.91 1830.71 9593.53 1830.54 9654.67 1830.26 9656.55 1830.25
9695.14 1829.98 9763.89 1829.32 9776.54 1829.16 9788.61 1829.04 9811.29 1828.75
9822.53 1828.63 9857.93 1828.15 9870.09 1828 9870.45 1828 9907.22 1827.1
9944.24 1826 9975.67 1824.72 9991.96 1824.05 9993.27 1824 9997.23 1822.56
9998.99 182210000.06 182210005.13 1823.2310008.52 182410020.94 1824.05
10028.58 1824.0910049.76 1824.1910052.75 1824.1810082.97 1824.5910089.78 1824.71
10103.97 1825.23 10114.7 1825.6410119.83 1825.1710120.06 1825.1710125.93 1824.81
10140.26 182410141.89 1824.29 10150.7 1822.9510157.26 1823.5610162.11 1823.66
10170.38 1823.8210183.51 1824.0810186.23 1824.0510190.07 1824.1110202.34 1824.81
10204.03 1824.8610222.46 182510230.65 1825.1910257.22 1825.6710274.02 1825.95
10289.28 1825.98 10292.6 1825.9910301.37 182610325.82 1826.9110363.64 1828
10365.01 1828.01 10374.8 1828.210406.56 1828.7710437.55 1829.5610449.33 1829.91
10450.71 1829.9810454.07 1829.9810462.56 183010472.33 1830.16

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9448 .04 9991.96 .03510020.94 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9991.9610020.94 173.7 175.9 175.1 .1 .3
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.253

INPUT
Description: Note: Proposed 11th Ave Improvements included.
Station Elevation Data num= 67
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9523 1827.25 9531.17 1827.28 9549.88 1827.29 9554.91 1827.32 9562.92 1827.31
9580.32 1827.37 9593.65 1827.32 9599.49 1827.33 9619.98 1827.31 9630.3 1827.32
9645.14 1827.31 9664.79 1827.31 9692.76 1827.32 9704.39 1827.31 9710.18 1827.32
9731.4 1827.32 9740.66 1827.3 9752.9 1827.25 9766.89 1827.15 9785.64 1827

9790.42 1826.98 9797.13 1826.92 9814.66 1826.82 9843.7 1826.55 9892.03 1826.04
9895.08 1826 9911.94 1825.95 9931.43 1826 9959.85 1826 9971.56 1825.05
9986.63 1824 9990.58 1822.86 9993.99 1822 9999.88 1821.8310004.97 1822
10009.53 1822.8910015.53 182410026.07 182410032.28 1823.8610038.57 1824
10056.93 1824.0310057.76 182410071.45 1824.210081.01 1824.2410088.37 1824.32
10095.86 1824.31 10102.5 1822.2910109.05 1822.910135.23 1823.4210141.93 1823.25
10143.54 1823.510154.05 1824.0510157.91 1824.0110167.38 1824.0610172.55 1824.07
10179.82 1824.0410186.24 1824.0510207.28 182410227.16 1823.9910235.69 1824.03
10240.62 182410255.46 1823.9710270.46 182410316.54 1825.96 10318.7 1826
10342.45 1826.8210372.03 1827.95

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9523 .04 9986.63 .03510015.53 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9986.6310015.53 313.4 281.3 252.9 .6 .8
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.199

INPUT
Description: Note: Relocated original cross-section 2.195 east and renamed to
2.199 to better represent the existing cross-culverts on 11th
Avenue. Culvert #2 Upstream.

Proposed 11th Ave Improvements
included. Culvert extended 19 feet per MCDOT plans. Culvert
inlet concrete apron modeled at 1816.02. Culvert inverts modeled
at 1817.06.
Station Elevation Data num= 108
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9783 1824 9786.08 1824 9788.17 1824 9789.72 1823.99 9809.34 1823.75
9811.98 1823.72 9833.44 1823.48 9836.64 1823.35 9837.84 1823.34 9847.49 1823.24
9851.62 1823.19 9858.91 1823.12 9865.92 1823.02 9874.45 1822.93 9882.52 1822.88
9889.29 1822.84 9903.8 1822.41 9905.14 1822.38 9927.08 1822.08 9928.15 1822.08
9937.78 1822.18 9946.05 1822.26 9950.73 1822.36 9976.97 1821.57 9981.51 1822.01
9982.1 1822.01 9982.83 1822.13 9983.14 1822 9983.6 1821.8 9984.3 1821.5
9984.77 1821.3 9985.47 1821 9985.94 1820.79 9986.63 1820.5 9987.68 1820.05
9987.8 1820 9992.95 1816.0210009.94 1816.0210012.82 1819.3510016.83 1818.53
10016.97 1818.5 10017 1818.510017.08 1818.510017.16 1818.5710017.36 1818.66
10021.92 1820.6610022.46 182110022.59 1821.0810024.51 1821.5 10026 1821.82
10027.03 1822 10027.6 182210028.77 182210029.06 182210029.34 1822
10029.49 1822 10049.7 1822.3310049.81 1822.3410055.28 1822.1210055.52 1821.78
10055.53 1821.2310055.94 1821.1710056.44 1821.3910057.08 1821.6810057.92 1822.05
10058 1822.0310060.53 1821.4110065.27 1821.7710068.58 1822.0310071.44 1822.08
10072.77 1822.110076.56 1822.1610080.27 1822.2310084.69 1822.310086.79 1822.34
10087.77 1822.36 10091.9 1822.4310095.26 1822.4910097.02 1822.5210100.79 1822.58
10102.76 1822.3910108.84 1821.7710109.04 1821.82 10109.2 1821.87 10109.7 1822
10112.76 1822.4110112.98 1822.510119.15 1822.5610144.38 1822.9710150.91 1822.94
10175.57 1822.8310189.44 1822.7210222.72 1822.510227.91 1822.4910228.27 1822.48
10252.41 1822.7210296.16 1823.1310311.06 1823.4410316.27 1823.5610337.04 1824
10339.2 1824.0310351.41 1824.4110374.72 1825.09 10384.1 1825.3310389.29 1825.46
10409.31 1825.87 10414.9 182610415.05 1826

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9783 .04 9982.83 .03510027.03 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9982.8310027.03 108.8 115 113.4 .6 .8
Sediment Elevation = 0

CULVERT

RIVER: RIVER-1
REACH: Reach-1 RS: 2.1875

INPUT
Description: Culvert #2 - 3-48" CMP's

Culverts have been extended 19
feet per MCDOT Rdwy plans. The invert used was 1817.06. The
concrete inlet apron was modeled at 1816.02.
Distance from Upstream XS =6.740002
Deck/Roadway Width = 68.42
Weir Coefficient = 2.63
Upstream Deck/Roadway Coordinates
num= 5
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
9946 1822.1 1813.2 9968.8 1822.16 1813.2 9985.3 1822.11 1813.2
10004 1822.05 1813.2 10027.4 1821.96 1813.2

Upstream Bridge Cross Section Data
Station Elevation Data num= 108
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9783 1824 9786.08 1824 9788.17 1824 9789.72 1823.99 9809.34 1823.75
9811.98 1823.72 9833.44 1823.48 9836.64 1823.35 9837.84 1823.34 9847.49 1823.24
9851.62 1823.19 9858.91 1823.12 9865.92 1823.02 9874.45 1822.93 9882.52 1822.88
9889.29 1822.84 9903.8 1822.41 9905.14 1822.38 9927.08 1822.08 9928.15 1822.08
9937.78 1822.18 9946.05 1822.26 9950.73 1822.36 9976.97 1821.57 9981.51 1822.01
9982.1 1822.01 9982.83 1822.13 9983.14 1822 9983.6 1821.8 9984.3 1821.5
9984.77 1821.3 9985.47 1821 9985.94 1820.79 9986.63 1820.5 9987.68 1820.05
9987.8 1820 9992.95 1816.0210009.94 1816.0210012.82 1819.3510016.83 1818.53
10016.97 1818.5 10017 1818.510017.08 1818.510017.16 1818.5710017.36 1818.66
10021.92 1820.6610022.46 182110022.59 1821.0810024.51 1821.5 10026 1821.82
10027.03 1822 10027.6 182210028.77 182210029.06 182210029.34 1822
10029.49 1822 10049.7 1822.3310049.81 1822.3410055.28 1822.1210055.52 1821.78
10055.53 1821.2310055.94 1821.1710056.44 1821.3910057.08 1821.6810057.92 1822.05
10058 1822.0310060.53 1821.4110065.27 1821.7710068.58 1822.0310071.44 1822.08
10072.77 1822.110076.56 1822.1610080.27 1822.2310084.69 1822.310086.79 1822.34
10087.77 1822.36 10091.9 1822.4310095.26 1822.4910097.02 1822.5210100.79 1822.58
10102.76 1822.3910108.84 1821.7710109.04 1821.82 10109.2 1821.87 10109.7 1822
10112.76 1822.4110112.98 1822.510119.15 1822.5610144.38 1822.9710150.91 1822.94
10175.57 1822.8310189.44 1822.7210222.72 1822.510227.91 1822.4910228.27 1822.48
10252.41 1822.7210296.16 1823.1310311.06 1823.4410316.27 1823.5610337.04 1824
10339.2 1824.0310351.41 1824.4110374.72 1825.09 10384.1 1825.3310389.29 1825.46
10409.31 1825.87 10414.9 182610415.05 1826

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9783 .04 9982.83 .03510027.03 .04

Bank Sta: Left Right Coeff Contr. Expan.
9982.8310027.03 .6 .8
Sediment Elevation = 0

Downstream Deck/Roadway Coordinates
num= 6
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
9945.3 1821.54 1813.2 9956.7 1821.33 1813.2 9973.53 1821.37 1813.2
9994.63 1821.46 1813.210027.67 1821.57 1813.2 10040 1821.8 1813.2

Downstream Bridge Cross Section Data
Station Elevation Data num= 153
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9752 1824 9756.01 1823.99 9761.73 1823.99 9766.21 1823.99 9769.78 1823.99
9778.36 1823.75 9778.51 1823.75 9782.63 1823.76 9792.96 1823.79 9796.89 1823.73
9825.23 1823.34 9839.52 1823.07 9840.44 1823.05 9841.02 1823.05 9852.63 1823
9856.3 1822.95 9868.43 1822.68 9873.97 1822.61 9875.6 1822.55 9878.2 1822.54
9882.45 1822.5 9896.16 1822.24 9896.74 1822.23 9898.27 1822.21 9905.96 1822.01
9908.17 1822 9914.95 1821.81 9918.13 1821.72 9924.61 1821.54 9926.66 1821.49
9927.04 1821.48 9927.28 1821.47 9928.99 1821.57 9933.28 1821.8 9937.06 1821.73

9945.69 1821.55 9953.08 1821.41 9955.43 1821.38 9959.18 1821.33 9963.22 1821.02
9966.92 1820.74 9967.75 1820.96 9967.84 1820.98 9968.41 1821.13 9968.44 1821.14
9968.45 1821.14 9972.5 1821.18 9974.99 1821.22 9975.08 1821.22 9975.7 1821.23
9975.74 1821.23 9976.04 1821.26 9976.1 1821.26 9981.65 1821.41 9984.66 1821.5
9986.35 1821.71 9986.64 1821.5 9987.14 1821.15 9987.35 1821 9987.44 1820.93
9988.05 1820.5 9988.17 1820.41 9988.75 1820 9988.91 1819.89 9989.46 1819.5
9989.66 1819.35 9990.16 1819 9990.44 1818.86 9990.94 1818.5 9991.28 1818.22
9991.6 1818 9992.1 1817.74 9992.44 1817.5 9992.95 1816.4810007.68 1816.48
10010 1817.4910013.42 1817.4910020.35 1817.510021.02 1817.510022.07 1817.35
10022.55 1817.510022.57 1817.510022.58 1817.510023.35 1817.7510023.79 1817.92
10024.01 181810025.15 1818.4210025.37 1818.5 10026.6 1818.9510026.72 1819
10026.83 1819.0410028.76 1819.8510028.98 1819.8810029.27 1819.9410029.43 1820
10030.46 1820.3810030.79 1820.510031.93 1820.9210032.14 182110033.29 1821.42
10033.5 1821.5 10034.8 1821.9810035.47 1821.9510036.81 1822.0510039.19 1822
10045.93 1821.8110061.56 1821.7910069.39 1821.8410095.88 1821.8510095.97 1821.97
10105.27 1821.98 10105.7 182210107.99 182210108.66 1821.98 10124.3 1821.73
10129.03 1821.6510129.49 1821.66 10138 1821.6510141.36 1821.6710147.46 1821.68
10153.19 1821.7210158.95 1821.7510172.85 1821.8810175.82 1821.910184.58 1822
10190.95 1821.9910200.69 182210201.14 1821.9910201.25 1821.9910202.28 1822
10213.9 182210214.27 1822 10214.9 182210215.85 182210219.22 1821.99
10232.97 1821.9810238.18 1821.98 10249 1821.96 10257 1821.97 10276.6 1821.99
10277.35 1821.9910279.45 182210280.79 182210296.48 1822.2910326.05 1822.87
10344.31 1823.2310367.66 1823.5910376.98 1823.7510391.58 182410403.92 1824.26
10409.22 1824.3710426.89 1824.7410440.16 1825

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9752 .04 9986.35 .035 10034.8 .04

Bank Sta: Left Right Coeff Contr. Expan.
9986.35 10034.8 .6 .8
Sediment Elevation = 0

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins = 1821.96
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
Pipe2 Circular 4 4
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 1 - Headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef Exit Loss Coef
9 87.42 .024 .024 0 .5 1
Number of Barrels = 3
Upstream Elevation = 1817.06
Centerline Stations
Sta. Sta. Sta.
9994.3 9999.3 10004.3
Downstream Elevation = 1816.48
Centerline Stations
Sta. Sta. Sta.
9996.0110001.0110006.01

CULVERT OUTPUT Profile #PF 1 Culv Group: Pipe2

Q Culv Group (cfs)	173.86	Culv Full Len (ft)	87.42
# Barrels	3	Culv Vel US (ft/s)	4.61
Q Barrel (cfs)	57.95	Culv Vel DS (ft/s)	4.61
E.G. US. (ft)	1823.85	Culv Inv El Up (ft)	1817.06
W.S. US. (ft)	1823.22	Culv Inv El Dn (ft)	1816.48
E.G. DS (ft)	1823.20	Culv Frctn Ls (ft)	0.49
W.S. DS (ft)	1822.58	Culv Exit Loss (ft)	0.00

Delta EG (ft)	0.65	Culv Entr Loss (ft)	0.17
Delta WS (ft)	0.64	Q Weir (cfs)	1936.14
E.G. IC (ft)	1823.72	Weir Sta Lft (ft)	9802.15
E.G. OC (ft)	1823.85	Weir Sta Rgt (ft)	10329.39
Culvert Control	Outlet	Weir Submerg	0.17
Culv WS Inlet (ft)	1821.06	Weir Max Depth (ft)	2.67
Culv WS Outlet (ft)	1820.48	Weir Avg Depth (ft)	1.19
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	628.66
Culv Crt Depth (ft)	2.29	Min El Weir Flow (ft)	1821.96

Warning: During subcritical analysis, the water surface upstream of culvert went to critical depth.

CULVERT OUTPUT Profile #PF 2 Culv Group: Pipe2

Q Culv Group (cfs)	181.29	Culv Full Len (ft)	87.42
# Barrels	3	Culv Vel US (ft/s)	4.81
Q Barrel (cfs)	60.43	Culv Vel DS (ft/s)	4.81
E.G. US. (ft)	1824.39	Culv Inv El Up (ft)	1817.06
W.S. US. (ft)	1824.09	Culv Inv El Dn (ft)	1816.48
E.G. DS (ft)	1823.68	Culv Frctn Ls (ft)	0.53
W.S. DS (ft)	1823.27	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.71	Culv Entr Loss (ft)	0.18
Delta WS (ft)	0.83	Q Weir (cfs)	1928.71
E.G. IC (ft)	1824.22	Weir Sta Lft (ft)	9889.29
E.G. OC (ft)	1824.39	Weir Sta Rgt (ft)	10110.00
Culvert Control	Outlet	Weir Submerg	0.49
Culv WS Inlet (ft)	1821.06	Weir Max Depth (ft)	3.22
Culv WS Outlet (ft)	1820.48	Weir Avg Depth (ft)	2.22
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	490.39
Culv Crt Depth (ft)	2.34	Min El Weir Flow (ft)	1821.96

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.18

INPUT
Description: Note: Cross-section 2.18 added to the left overbank to show overtopping of Joy Ranch Road and 11th Ave. Culvert #2 Downstream.

Proposed 11th Ave Improvements included.
Station Elevation Data num= 153

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9752	1824	9756.01	1823.99	9761.73	1823.99	9766.21	1823.99	9769.78	1823.99
9778.36	1823.75	9778.51	1823.75	9782.63	1823.76	9792.96	1823.79	9796.89	1823.73
9825.23	1823.34	9839.52	1823.07	9840.44	1823.05	9841.02	1823.05	9852.63	1823
9856.3	1822.95	9868.43	1822.68	9873.97	1822.61	9875.6	1822.55	9878.2	1822.54
9882.45	1822.5	9896.16	1822.24	9896.74	1822.23	9898.27	1822.21	9905.96	1822.01
9908.17	1822	9914.95	1821.81	9918.13	1821.72	9924.61	1821.54	9926.66	1821.49
9927.04	1821.48	9927.28	1821.47	9928.99	1821.57	9933.28	1821.8	9937.06	1821.73
9945.69	1821.55	9953.08	1821.41	9955.43	1821.38	9959.18	1821.33	9963.22	1821.02
9966.92	1820.74	9967.75	1820.96	9967.84	1820.98	9968.41	1821.13	9968.44	1821.14
9968.45	1821.14	9972.5	1821.18	9974.99	1821.22	9975.08	1821.22	9975.7	1821.23
9975.74	1821.23	9976.04	1821.26	9976.1	1821.26	9981.65	1821.41	9984.66	1821.5
9986.35	1821.71	9986.64	1821.5	9987.14	1821.15	9987.35	1821	9987.44	1820.93
9988.05	1820.5	9988.17	1820.41	9988.75	1820	9988.91	1819.89	9989.46	1819.5
9989.66	1819.35	9990.16	1819	9990.44	1818.86	9990.94	1818.5	9991.28	1818.22
9991.6	1818	9992.1	1817.74	9992.44	1817.5	9992.95	1816.4810007.68		1816.48
10010	1817.4910013.42		1817.4910020.35		1817.510021.02		1817.510022.07		1817.35
10022.55	1817.510022.57		1817.510022.58		1817.510023.35		1817.7510023.79		1817.92
10024.01	181810025.15		1818.4210025.37		1818.5 10026.6		1818.9510026.72		1819
10026.83	1819.0410028.76		1819.8510028.98		1819.8810029.27		1819.9410029.43		1820
10030.46	1820.3810030.79		1820.510031.93		1820.9210032.14		182110033.29		1821.42
10033.5	1821.5	10034.8	1821.9810035.47		1821.9510036.81		1822.0510039.19		1822
10045.93	1821.8110061.56		1821.7910069.39		1821.8410095.88		1821.8510095.97		1821.97

10105.27 1821.98 10105.7 182210107.99 182210108.66 1821.98 10124.3 1821.73
10129.03 1821.6510129.49 1821.66 10138 1821.6510141.36 1821.6710147.46 1821.68
10153.19 1821.7210158.95 1821.7510172.85 1821.8810175.82 1821.910184.58 1822
10190.95 1821.9910200.69 182210201.14 1821.9910201.25 1821.9910202.28 1822
10213.9 182210214.27 1822 10214.9 182210215.85 182210219.22 1821.99
10232.97 1821.9810238.18 1821.98 10249 1821.96 10257 1821.97 10276.6 1821.99
10277.35 1821.9910279.45 182210280.79 182210296.48 1822.2910326.05 1822.87
10344.31 1823.2310367.66 1823.5910376.98 1823.7510391.58 182410403.92 1824.26
10409.22 1824.3710426.89 1824.7410440.16 1825

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9752 .04 9986.35 .035 10034.8 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9986.35 10034.8 35.7 53.2 83.2 .6 .8
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.167

INPUT
Description: Note: Culvert #1 Upstream.

Proposed 11th Ave Improvements
included.
Station Elevation Data num= 63
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9350 1824.9 9359.14 1824.85 9367.21 1824.88 9374.05 1824.83 9441.51 1822.91
9448.15 1822.86 9462.95 1822.79 9476.02 1822.76 9495.79 1822.78 9505.56 1823.26
9511.11 1823.71 9537.84 1823.73 9549.41 1823.75 9660.59 1824 9682.53 1824.13
9686.08 1824.11 9704.23 1824.1 9708.63 1823.91 9716.66 1823.88 9739.13 1824.01
9769.27 1823.98 9782.04 1823.63 9803.6 1823.68 9821.58 1823.43 9840.99 1823.04
9856.78 1823 9865.96 1822.81 9877.78 1822.67 9881.3 1822.53 9888.18 1822.5
9892.98 1822.41 9900.51 1822.48 9909.08 1822 9911.84 1822.04 9915.3 1821.94
9929.25 1821.46 9935.32 1821.8 9962 1821.27 9968.02 1820.67 9969.76 1821.25
9979.72 1821.17 9983.6 1821.39 9987.07 1821.38 9987.19 1821.11 9988.6 1821
9989.58 1820.5 9994.05 1815.8310010.05 1815.9310014.98 1820.1710049.13 1820.61
10066.65 1820.1910082.95 1820.2210090.78 1820.3810092.88 1819.8910096.77 1820.21
10102.66 182010110.67 182010330.59 182210373.22 1822.1110384.64 1822.26
10439.66 1822.8210477.93 182410493.25 1824.16

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9350 .04 9989.58 .03510049.13 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9989.5810049.13 90.8 92.7 95.2 .6 .8
Sediment Elevation = 0

CULVERT

RIVER: RIVER-1
REACH: Reach-1 RS: 2.159

INPUT
Description: Culvert #1 (Three 4' Pipes) (Originally modeled as 5' pipes)
Joy
Ranch Road culvert
3-48" CMP's inverts determined from
surveyed inside soffit elevations. The average elevation was used
between the three culverts upstream and downstream.

Distance from Upstream XS = 2.98
Deck/Roadway Width = 79.24
Weir Coefficient = 2.63
Upstream Deck/Roadway Coordinates
num= 8
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
9902 1821.99 1813.2 9935.3 1821.61 1813.2 9949.3 1821.43 1813.2
9961.8 1821.13 1813.2 9995.6 1821.03 1813.2 10000 1821.03 1813.2
10027.9 1821.35 1813.210149.68 1819.74 1813.2

Upstream Bridge Cross Section Data
Station Elevation Data num= 63
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9350 1824.9 9359.14 1824.85 9367.21 1824.88 9374.05 1824.83 9441.51 1822.91
9448.15 1822.86 9462.95 1822.79 9476.02 1822.76 9495.79 1822.78 9505.56 1823.26
9511.11 1823.71 9537.84 1823.73 9549.41 1823.75 9660.59 1824 9682.53 1824.13
9686.08 1824.11 9704.23 1824.1 9708.63 1823.91 9716.66 1823.88 9739.13 1824.01
9769.27 1823.98 9782.04 1823.63 9803.6 1823.68 9821.58 1823.43 9840.99 1823.04
9856.78 1823 9865.96 1822.81 9877.78 1822.67 9881.3 1822.53 9888.18 1822.5
9892.98 1822.41 9900.51 1822.48 9909.08 1822 9911.84 1822.04 9915.3 1821.94
9929.25 1821.46 9935.32 1821.8 9962 1821.27 9968.02 1820.67 9969.76 1821.25
9979.72 1821.17 9983.6 1821.39 9987.07 1821.38 9987.19 1821.11 9988.6 1821
9989.58 1820.5 9994.05 1815.8310010.05 1815.9310014.98 1820.1710049.13 1820.61
10066.65 1820.1910082.95 1820.2210090.78 1820.3810092.88 1819.8910096.77 1820.21
10102.66 182010110.67 182010330.59 182210373.22 1822.1110384.64 1822.26
10439.66 1822.8210477.93 182410493.25 1824.16

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9350 .04 9989.58 .03510049.13 .04

Bank Sta: Left Right Coeff Contr. Expan.
9989.5810049.13 .6 .8
Sediment Elevation = 0

Downstream Deck/Roadway Coordinates
num= 9
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
9867 1821.46 1813.2 9907 1821.09 1813.2 9945 1821.27 1813.2
9963 1821.49 1813.2 9975 1821.46 1813.2 10055 1820.32 1813.2
10110 1819.61 1813.2 10164 1819.55 1813.2 10211 1820.1 1813.2

Downstream Bridge Cross Section Data
Station Elevation Data num= 46
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9471 1823.87 9505.03 1823.9 9588.53 1823.89 9651.76 1824 9673.43 1823.91
9678.24 1823.46 9700.29 1823.37 9704.08 1823.15 9712.7 1823.26 9720.7 1823.01
9740.74 1822.99 9757.99 1822.74 9763.43 1822.97 9776.3 1822.5 9800.03 1822.48
9816.46 1822 9836.28 1821.96 9842.16 1821.64 9849.94 1821.5 9866.63 1821.47
9875.31 1821 9986 1820.1 9990.49 1814.77 10011 1814.87 10021 1820.24
10032.95 1820.0510041.98 182010062.68 1819.6610071.58 1819.4110076.79 1819.48
10094.6 1819.2610102.72 181910122.16 1818.7810132.79 1819.0110161.12 1819.01
10180.47 182010223.44 182010320.87 1820.7910362.86 1821.0810370.36 1821.21
10411.47 1821.5910434.26 1821.7210467.71 1821.9910518.75 182210566.04 1822.69
10616.1 1823.17

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9471 .04 9986 .035 10021 .04

Bank Sta: Left Right Coeff Contr. Expan.
9986 10021 .6 .8
Sediment Elevation = 0

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins = 1821.03
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
Pipe1 Circular 4 5
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 1 - Headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef Exit Loss Coef
9.4 77 .024 .024 .833 .5 1
Number of Barrels = 3
Upstream Elevation = 1814.99
Centerline Stations
Sta. Sta. Sta.
9997.0510002.0510007.05
Downstream Elevation = 1813.94
Centerline Stations
Sta. Sta. Sta.
9996.4910001.4910006.49

CULVERT OUTPUT Profile #PF 1 Culv Group: Pipe1

Q Culv Group (cfs)	175.58	Culv Full Len (ft)	77.00
# Barrels	3	Culv Vel US (ft/s)	5.48
Q Barrel (cfs)	58.53	Culv Vel DS (ft/s)	5.48
E.G. US. (ft)	1822.52	Culv Inv El Up (ft)	1814.99
W.S. US. (ft)	1822.28	Culv Inv El Dn (ft)	1813.94
E.G. DS (ft)	1821.48	Culv Frctn Ls (ft)	0.71
W.S. DS (ft)	1821.11	Culv Exit Loss (ft)	0.09
Delta EG (ft)	1.03	Culv Entr Loss (ft)	0.23
Delta WS (ft)	1.18	Q Weir (cfs)	1934.42
E.G. IC (ft)	1822.38	Weir Sta Lft (ft)	9888.73
E.G. OC (ft)	1822.52	Weir Sta Rgt (ft)	10407.20
Culvert Control	Outlet	Weir Submerg	0.08
Culv WS Inlet (ft)	1818.99	Weir Max Depth (ft)	2.39
Culv WS Outlet (ft)	1817.94	Weir Avg Depth (ft)	1.20
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	623.11
Culv Crt Depth (ft)	2.75	Min El Weir Flow (ft)	1821.03

CULVERT OUTPUT Profile #PF 2 Culv Group: Pipe1

Q Culv Group (cfs)	191.26	Culv Full Len (ft)	77.00
# Barrels	3	Culv Vel US (ft/s)	5.97
Q Barrel (cfs)	63.75	Culv Vel DS (ft/s)	5.97
E.G. US. (ft)	1823.43	Culv Inv El Up (ft)	1814.99
W.S. US. (ft)	1823.19	Culv Inv El Dn (ft)	1813.94
E.G. DS (ft)	1822.22	Culv Frctn Ls (ft)	0.84
W.S. DS (ft)	1821.76	Culv Exit Loss (ft)	0.09
Delta EG (ft)	1.20	Culv Entr Loss (ft)	0.28
Delta WS (ft)	1.44	Q Weir (cfs)	1918.74
E.G. IC (ft)	1823.24	Weir Sta Lft (ft)	9904.22
E.G. OC (ft)	1823.43	Weir Sta Rgt (ft)	10115.00
Culvert Control	Outlet	Weir Submerg	0.28
Culv WS Inlet (ft)	1818.99	Weir Max Depth (ft)	3.23
Culv WS Outlet (ft)	1817.94	Weir Avg Depth (ft)	2.27
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	478.55
Culv Crt Depth (ft)	2.85	Min El Weir Flow (ft)	1821.03

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.151

INPUT

Description: Note: Culvert #1 Downstream
Station Elevation Data num= 46
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9471 1823.87 9505.03 1823.9 9588.53 1823.89 9651.76 1824 9673.43 1823.91
9678.24 1823.46 9700.29 1823.37 9704.08 1823.15 9712.7 1823.26 9720.7 1823.01
9740.74 1822.99 9757.99 1822.74 9763.43 1822.97 9776.3 1822.5 9800.03 1822.48
9816.46 1822 9836.28 1821.96 9842.16 1821.64 9849.94 1821.5 9866.63 1821.47
9875.31 1821 9986 1820.1 9990.49 1814.77 10011 1814.87 10021 1820.24
10032.95 1820.0510041.98 182010062.68 1819.6610071.58 1819.4110076.79 1819.48
10094.6 1819.2610102.72 181910122.16 1818.7810132.79 1819.0110161.12 1819.01
10180.47 182010223.44 182010320.87 1820.7910362.86 1821.0810370.36 1821.21
10411.47 1821.5910434.26 1821.7210467.71 1821.9910518.75 182210566.04 1822.69
10616.1 1823.17

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9471 .04 9986 .035 10021 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9986 10021 181.8 173 163.9 .6 .8
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.115

INPUT
Description:
Station Elevation Data num= 50
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9579 1822.61 9636.15 1821.99 9690.65 1821.27 9722.18 1820.82 9770.98 1820
9779.39 1819 9790.85 1819.23 9801.11 1819.2 9818.12 1819 9821.36 1819.15
9824.65 1818 9825.52 1819.11 9828.06 1818.5 9831.02 1819 9835.82 1819.23
9845.16 1819.35 9854.5 1819.29 9856.69 1819.52 9858.53 1819.07 9865.45 1819.04
9888.68 1819.4 9900.85 1819.5 9918.64 1819.47 9962.37 1819.07 9975.15 1818.75
9985.62 1818.18 9990.3 1817.5 9997.6 1814.110003.47 1814.2410008.96 1817.28
10011.89 181710024.53 1817 10027.8 1816.5610037.56 181710038.69 1817.23
10052.74 1817.5910063.41 1818.8210077.19 1819.9810215.45 182010228.54 1819.92
10280.49 1820 10304.6 1820.1610333.49 1820.4110367.49 1820.7510434.65 1821.3
10498.13 1821.9910540.77 1822.0210570.06 1822.3410593.14 1822.710635.94 1823.11

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9579 .04 9990.3 .03510008.96 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9990.310008.96 175 183.9 250 .1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2.08

INPUT
Description:
Station Elevation Data num= 48
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
9567 1820.31 9629.79 1820.01 9645.95 1819.99 9677.52 1819.63 9715.4 1819.02
9774.38 1818.04 9779.83 1818.03 9808 1818.02 9822.59 1818 9830.84 1817.51
9835.59 1817.68 9843.28 1818 9855.3 1818.02 9890.82 1818.05 9902.69 1818.09
9925.01 1818 9955.9 1817.86 9980.55 1817.5 9994 1813.6410008.24 1813.74
10020.62 1814.6710023.95 1815.3810055.27 1815.910064.85 1816.210070.64 1816.9
10087.42 1817.110099.92 1817.210110.48 1817.2910125.47 1817.2910140.88 1817.36
10154.85 1817.4210167.48 1817.4510203.63 1817.4710223.58 1817.5210275.19 1818
10292.14 181810296.83 1818.0110312.76 1818.0110317.23 1818.0210342.25 1818.02
10348.45 1818.0310481.11 1819.3610527.73 1819.8110551.32 182010580.63 1820.33

10584.05 1820.3810622.99 1820.8310623.37 1820.84

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9567 .04 9980.55 .03510110.48 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9980.5510110.48 525 515.8 550 .1 .3

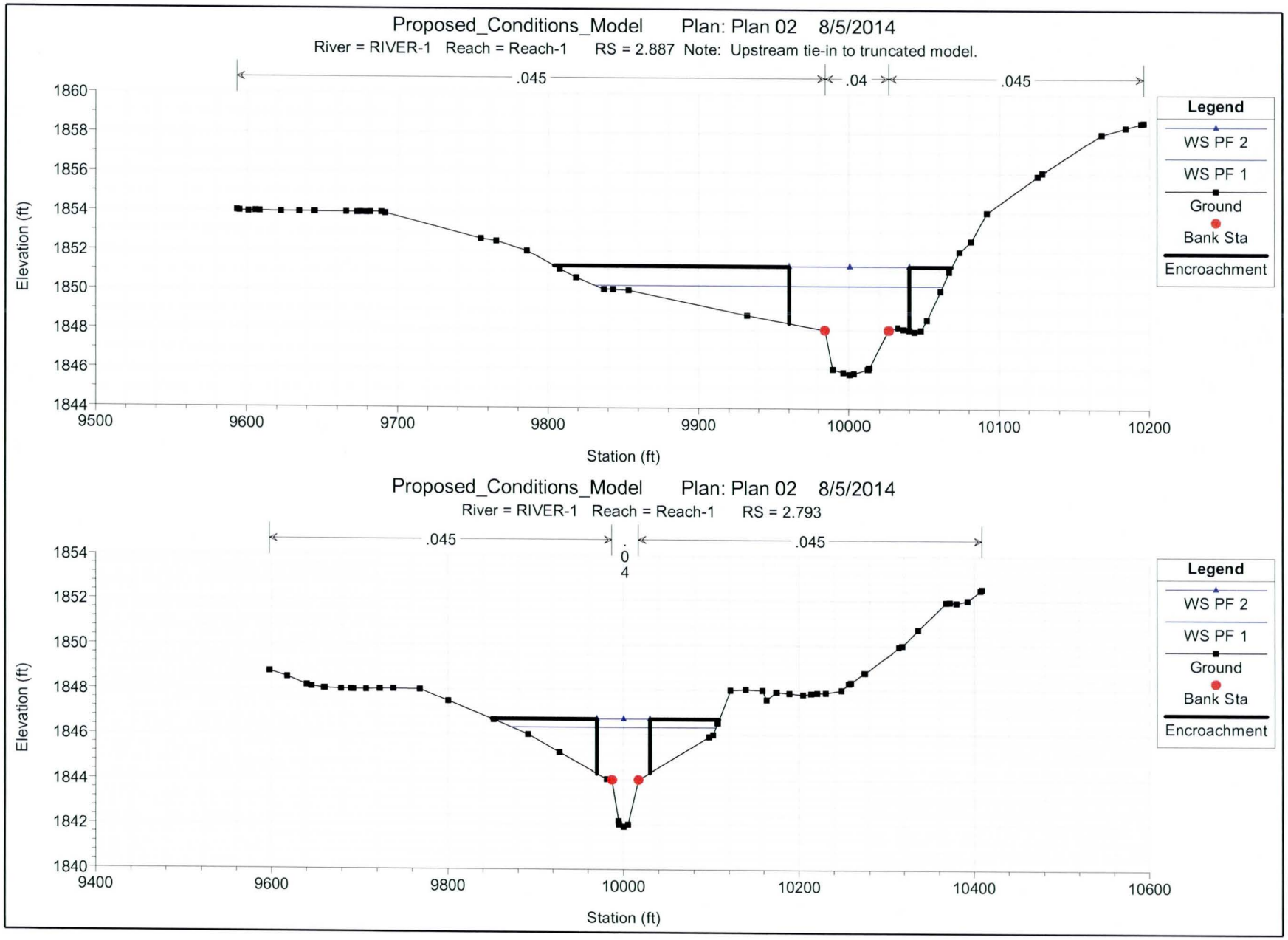
Profile Output Table - Standard Table 1

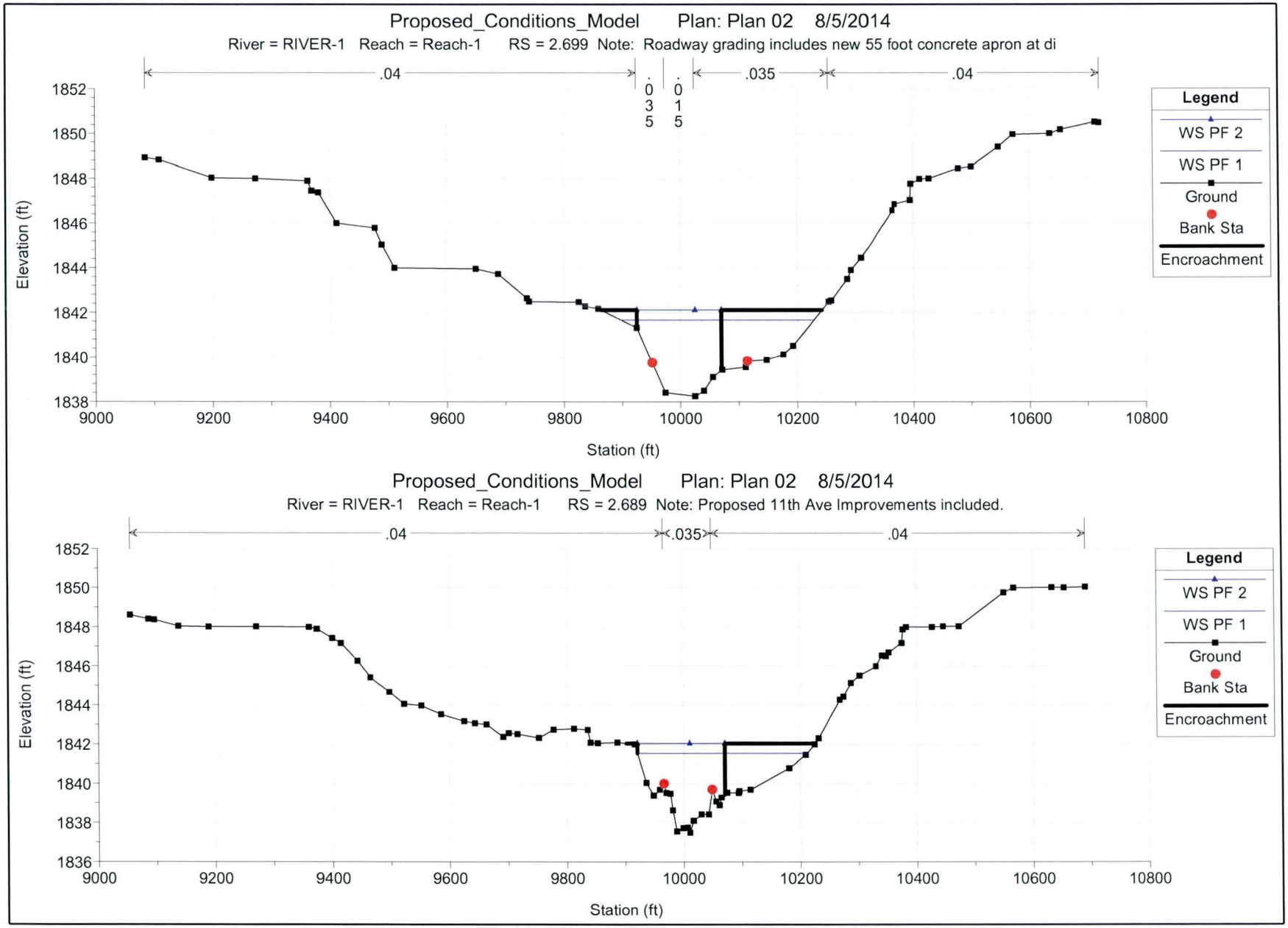
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft/ft)	E.G. Elev (ft/s)	E.G. Slope (sq ft)	Vel Chnl (ft)	Flow Area	Top Width	Froude # Chl
Reach-1	2.887	PF 1	1880.00	1845.74	1850.24		1850.79	0.006272	7.18	395.08	230.81	0.64
Reach-1	2.887	PF 2	1880.00	1845.74	1851.24		1851.85	0.004189	6.85	321.84	80.00	0.55
Reach-1	2.793	PF 1	1880.00	1841.90	1846.32	1846.32	1847.03	0.009937	8.73	355.77	232.71	0.80
Reach-1	2.793	PF 2	1880.00	1841.90	1846.69	1846.69	1848.31	0.014462	11.23	198.18	60.00	0.98
Reach-1	2.699	PF 1	1880.00	1838.25	1841.67		1841.84	0.000741	3.60	638.80	331.01	0.38
Reach-1	2.699	PF 2	1880.00	1838.25	1842.12		1842.41	0.000754	4.42	452.28	144.64	0.42
Reach-1	2.689	PF 1	1880.00	1837.50	1841.54		1841.77	0.002421	4.51	561.30	289.71	0.45
Reach-1	2.689	PF 2	1880.00	1837.50	1842.05		1842.35	0.002215	4.76	452.56	148.67	0.44
Reach-1	2.665	PF 1	1880.00	1837.76	1840.85		1841.26	0.007323	6.93	393.28	236.64	0.74
Reach-1	2.665	PF 2	1880.00	1837.76	1841.25		1841.87	0.006036	6.88	306.00	100.00	0.69
Reach-1	2.618	PF 1	1880.00	1833.89	1838.65	1838.65	1839.26	0.009533	7.70	363.16	278.93	0.84
Reach-1	2.618	PF 2	1880.00	1833.89	1839.25		1840.15	0.008444	8.32	261.85	100.00	0.82
Reach-1	2.544	PF 1	1880.00	1830.78	1836.40	1835.88	1836.79	0.003525	7.01	466.15	231.12	0.56
Reach-1	2.544	PF 2	1880.00	1830.78	1836.48		1837.34	0.005716	9.03	279.16	83.41	0.72
Reach-1	2.497	PF 1	1880.00	1830.77	1833.72	1833.48	1834.58	0.011800	8.25	259.64	127.28	0.92
Reach-1	2.497	PF 2	1880.00	1830.77	1834.69	1833.66	1835.31	0.004991	6.68	302.87	85.90	0.63
Reach-1	2.46	PF 1	2110.00	1828.99	1832.98		1833.23	0.003550	5.37	546.60	258.54	0.53
Reach-1	2.46	PF 2	2110.00	1828.99	1833.93	1833.07	1834.37	0.003872	6.70	425.54	143.62	0.58
Reach-1	2.385	PF 1	2110.00	1827.88	1829.95	1829.95	1830.61	0.016947	7.58	346.19	289.12	1.05
Reach-1	2.385	PF 2	2110.00	1827.88	1830.75	1830.75	1831.78	0.013016	8.66	271.78	130.00	0.98
Reach-1	2.283	PF 1	2110.00	1822.00	1826.51		1826.70	0.003259	5.04	659.37	387.98	0.51
Reach-1	2.283	PF 2	2110.00	1822.00	1827.42		1827.77	0.003138	5.89	462.62	149.70	0.52
Reach-1	2.253	PF 1	2110.00	1821.83	1825.05	1824.01	1825.64	0.013128	8.79	395.69	323.71	0.99
Reach-1	2.253	PF 2	2110.00	1821.83	1825.77	1825.77	1826.75	0.011836	9.90	291.44	135.00	0.98
Reach-1	2.199	PF 1	2110.00	1816.02	1823.22	1823.22	1823.85	0.003858	7.26	501.79	451.09	0.57
Reach-1	2.199	PF 2	2110.00	1816.02	1824.09	1823.05	1824.39	0.001584	5.18	599.69	220.71	0.38
Reach-1	2.1875		Culvert									
Reach-1	2.18	PF 1	2110.00	1816.48	1822.58	1822.58	1823.20	0.004028	7.16	496.16	436.41	0.59
Reach-1	2.18	PF 2	2110.00	1816.48	1823.27		1823.68	0.002276	5.91	505.64	206.31	0.45
Reach-1	2.167	PF 1	2110.00	1815.83	1822.28	1821.63	1822.51	0.002877	5.02	691.55	482.80	0.47
Reach-1	2.167	PF 2	2110.00	1815.83	1823.19	1821.85	1823.43	0.001745	4.56	600.06	210.78	0.38
Reach-1	2.159		Culvert									
Reach-1	2.151	PF 1	2110.00	1814.77	1821.11		1821.48	0.002886	6.36	640.62	490.99	0.49
Reach-1	2.151	PF 2	2110.00	1814.77	1821.76		1822.22	0.002605	6.54	474.33	180.00	0.48
Reach-1	2.115	PF 1	2110.00	1814.10	1820.35	1820.35	1820.80	0.004796	8.24	624.50	576.61	0.64
Reach-1	2.115	PF 2	2110.00	1814.10	1820.42	1819.96	1821.31	0.006223	9.46	305.19	93.30	0.74

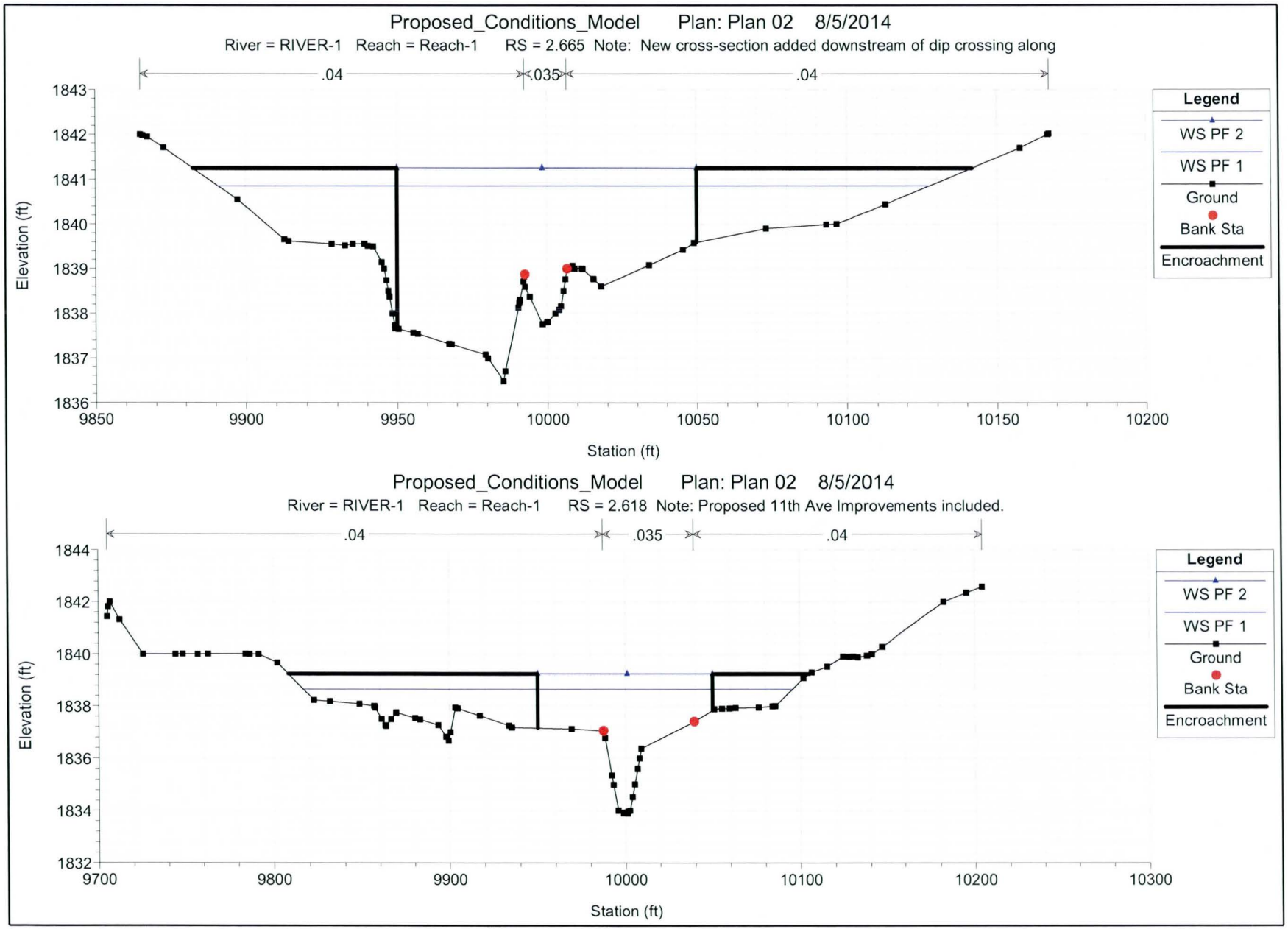
Reach-1	2.08	PF 1	2110.00	1813.64	1817.92	1817.92	1818.65	0.010115	7.05	354.13	342.85	0.85
Reach-1	2.08	PF 2	2110.00	1813.64	1818.28	1818.11	1819.68	0.010402	9.52	224.57	70.00	0.91

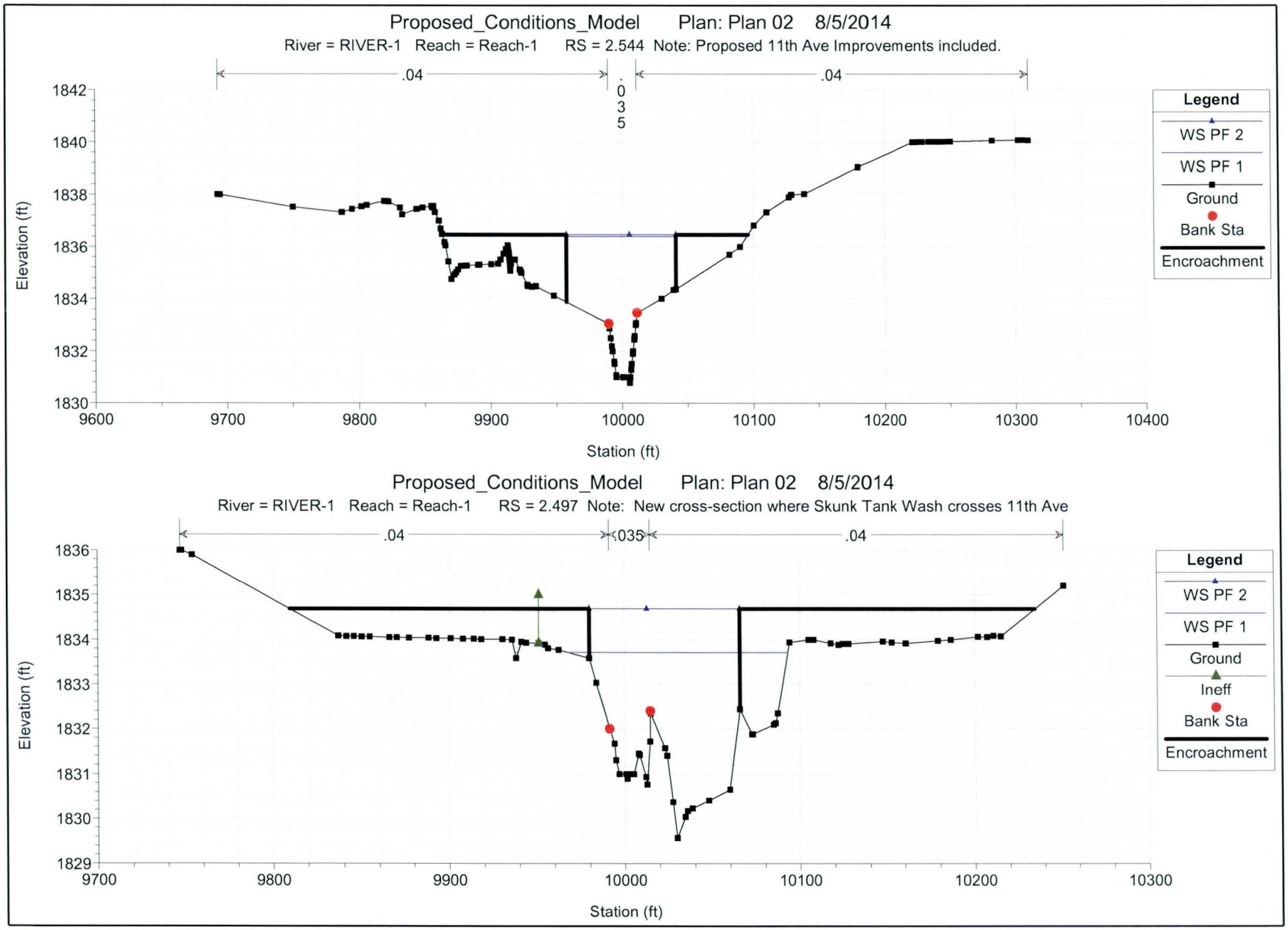
Profile Output Table - Standard Table 2

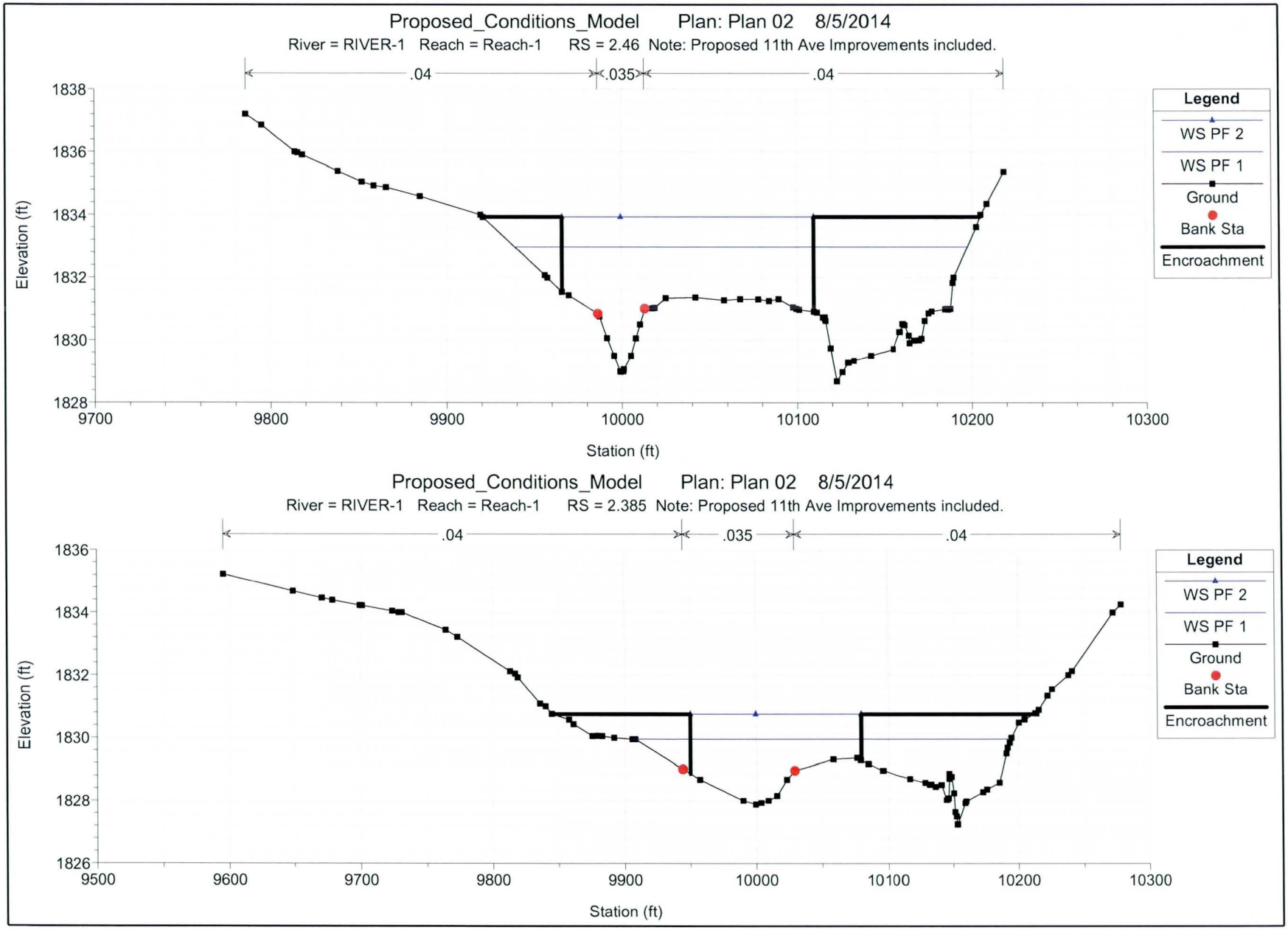
Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (cfs)	C & E Loss (cfs)	Q Left (ft)	Q Channel	Q Right	Top Width
Reach-1	2.887	PF 1	1850.79	1850.24	0.55	3.75	0.02	471.10	1157.33	251.57	230.81
Reach-1	2.887	PF 2	1851.85	1851.24	0.61	3.44	0.10	308.16	1390.38	181.46	80.00
Reach-1	2.793	PF 1	1847.03	1846.32	0.71	0.91	0.16	488.79	958.48	432.74	232.71
Reach-1	2.793	PF 2	1848.31	1846.69	1.61	0.99	0.40	304.45	1359.68	215.87	60.00
Reach-1	2.699	PF 1	1841.84	1841.67	0.18	0.06	0.01	39.11	1631.14	209.76	331.01
Reach-1	2.699	PF 2	1842.41	1842.12	0.29	0.06	0.00	64.72	1815.29		144.64
Reach-1	2.689	PF 1	1841.77	1841.54	0.23	0.49	0.02	157.41	1181.41	541.17	289.71
Reach-1	2.689	PF 2	1842.35	1842.05	0.30	0.44	0.03	243.68	1441.92	194.40	148.67
Reach-1	2.665	PF 1	1841.26	1840.85	0.41	1.99	0.02	1131.48	265.44	483.08	236.64
Reach-1	2.665	PF 2	1841.87	1841.25	0.62	1.70	0.03	1119.30	301.98	458.71	100.00
Reach-1	2.618	PF 1	1839.26	1838.65	0.60	2.21	0.06	736.35	1029.15	114.50	278.93
Reach-1	2.618	PF 2	1840.15	1839.25	0.90	2.80	0.01	437.70	1367.90	74.40	100.00
Reach-1	2.544	PF 1	1836.79	1836.40	0.39	2.16	0.05	737.22	734.46	408.31	231.12
Reach-1	2.544	PF 2	1837.34	1836.48	0.86	1.96	0.07	538.83	960.61	380.57	83.41
Reach-1	2.497	PF 1	1834.58	1833.72	0.86	1.16	0.18	27.76	478.84	1373.40	127.28
Reach-1	2.497	PF 2	1835.31	1834.69	0.62	0.89	0.06	81.67	538.23	1260.11	85.90
Reach-1	2.46	PF 1	1833.23	1832.98	0.26	2.59	0.04	136.04	449.54	1524.42	258.54
Reach-1	2.46	PF 2	1834.37	1833.93	0.43	2.53	0.06	233.40	733.00	1143.59	143.62
Reach-1	2.385	PF 1	1830.61	1829.95	0.66	3.21	0.14	48.62	1034.67	1026.71	289.12
Reach-1	2.385	PF 2	1831.78	1830.75	1.02	2.90	0.20		1680.38	429.62	130.00
Reach-1	2.283	PF 1	1826.70	1826.51	0.19	1.02	0.04	175.58	447.57	1486.84	387.98
Reach-1	2.283	PF 2	1827.77	1827.42	0.35	0.96	0.06	298.67	678.04	1133.29	149.70
Reach-1	2.253	PF 1	1825.64	1825.05	0.59	1.76	0.03	22.08	627.56	1460.36	323.71
Reach-1	2.253	PF 2	1826.75	1825.77	0.98	0.93	0.55	48.82	912.38	1148.81	135.00
Reach-1	2.199	PF 1	1823.85	1823.22	0.63			206.50	1601.01	302.49	451.09
Reach-1	2.199	PF 2	1824.39	1824.09	0.29			401.91	1343.08	365.01	220.71
Reach-1	2.1875		Culvert								
Reach-1	2.18	PF 1	1823.20	1822.58	0.62	0.21	0.31	199.05	1595.43	315.52	436.41
Reach-1	2.18	PF 2	1823.68	1823.27	0.41	0.11	0.14	376.07	1512.93	221.01	206.31
Reach-1	2.167	PF 1	1822.51	1822.28	0.23			109.42	1034.86	965.72	482.80
Reach-1	2.167	PF 2	1823.43	1823.19	0.24			310.69	1188.23	611.08	210.78
Reach-1	2.159		Culvert								
Reach-1	2.151	PF 1	1821.48	1821.11	0.38	0.63	0.05	82.24	1151.00	876.76	490.99
Reach-1	2.151	PF 2	1822.22	1821.76	0.47	0.65	0.26	189.55	1332.04	588.42	180.00
Reach-1	2.115	PF 1	1820.80	1820.35	0.45	1.30	0.03	732.41	780.13	597.46	576.61
Reach-1	2.115	PF 2	1821.31	1820.42	0.90	1.58	0.05	148.32	907.67	1054.01	93.30
Reach-1	2.08	PF 1	1818.65	1817.92	0.72			12.26	1957.39	140.35	342.85
Reach-1	2.08	PF 2	1819.68	1818.28	1.40			11.75	2098.25		70.00

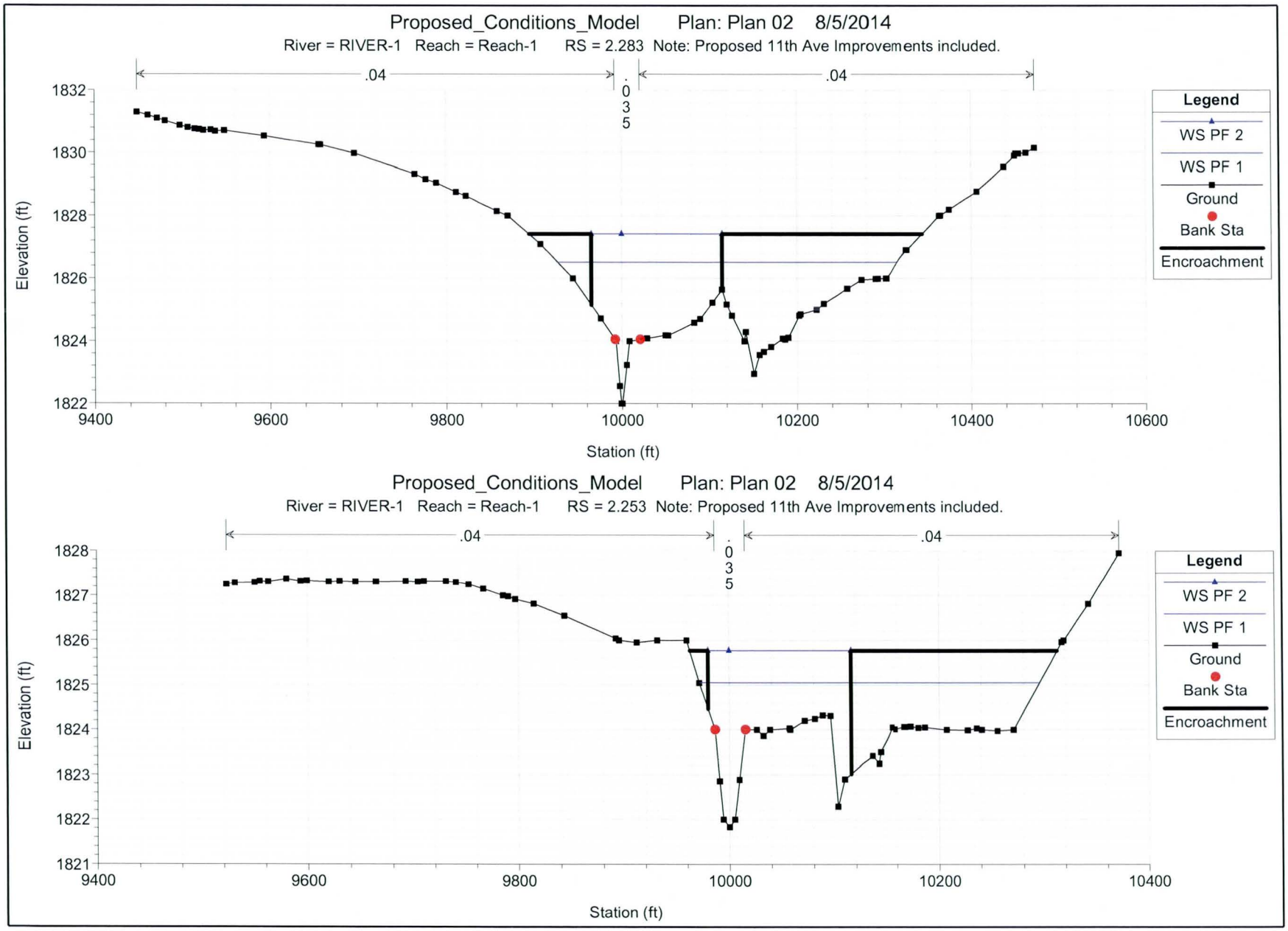

Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.887 Note: Upstream tie-in to truncated model.
.045
.04
.045
Elevation (ft)
1860
1858
1856
1854
1852
1850
1848
1846
1844
9500
9600
9700
9800
9900
10000
10100
10200
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.793
.045
.04
.045
Elevation (ft)
1854
1852
1850
1848
1846
1844
1842
1840
9400
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

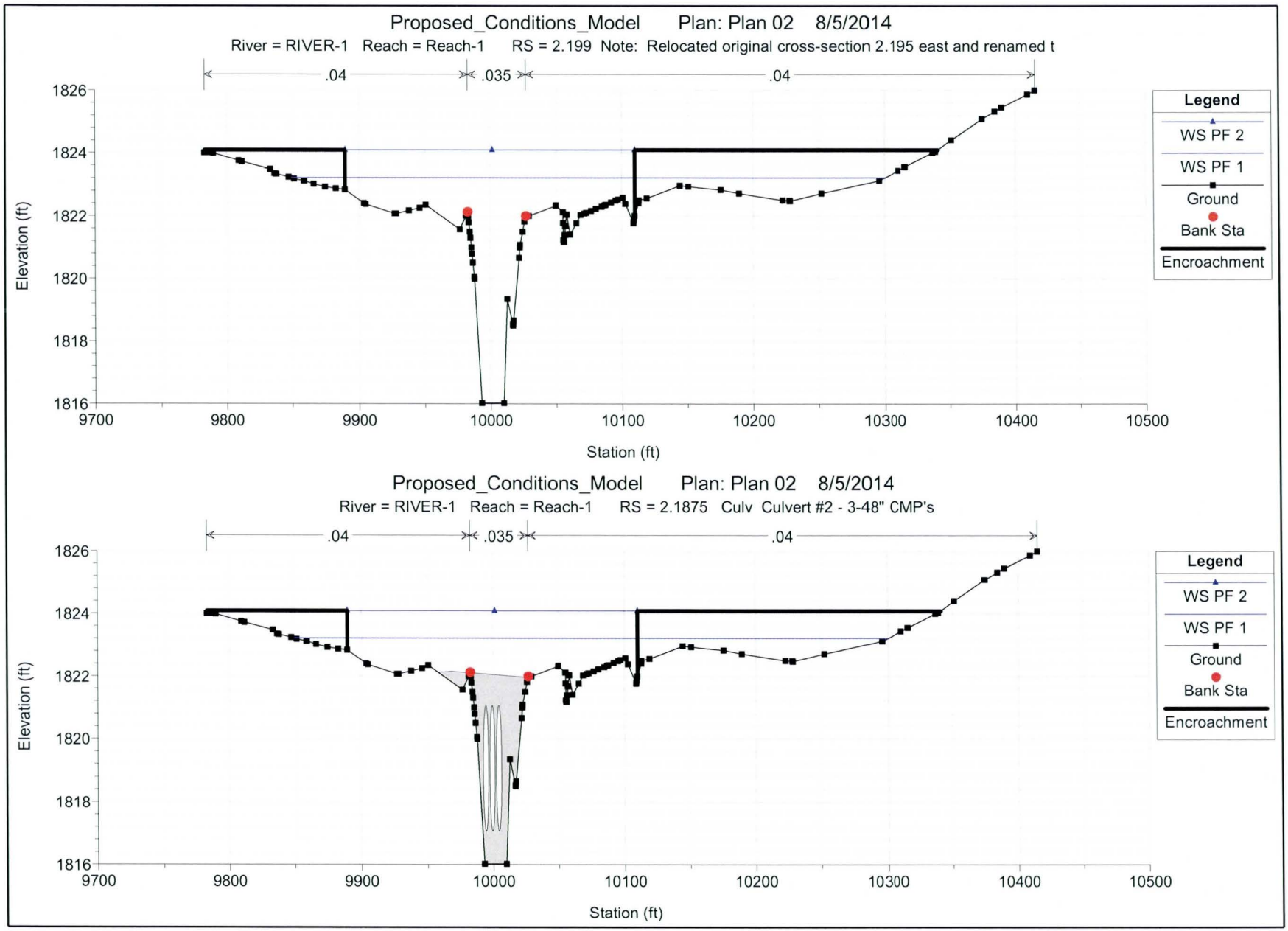

Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.699 Note: Roadway grading includes new 55 foot concrete apron at di
.04
.035
.04
.03 .01
5 5
Elevation (ft)
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.689 Note: Proposed 11th Ave Improvements included.
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

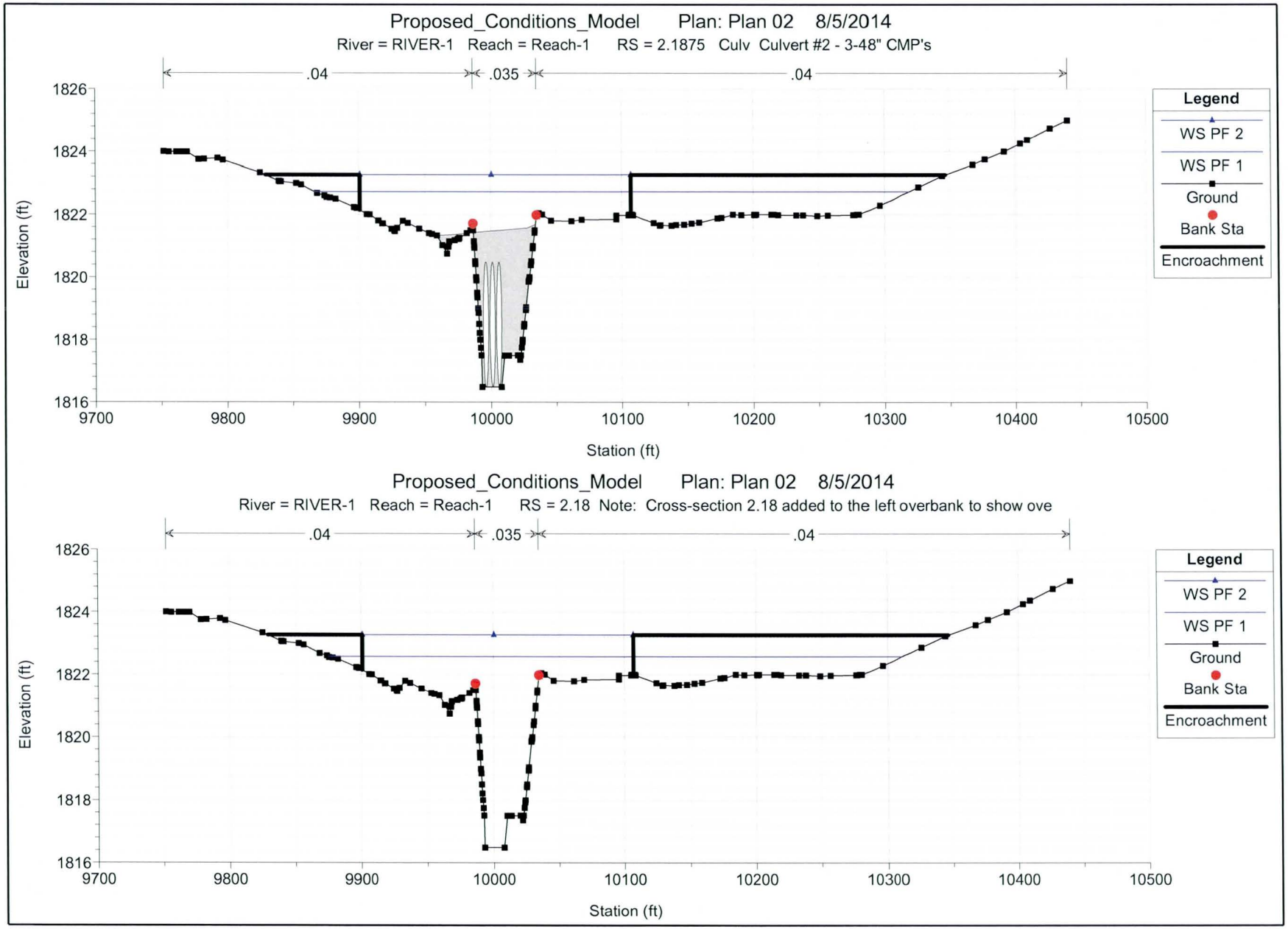

Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.665 Note: New cross-section added downstream of dip crossing along
.04
.035
.04
Elevation (ft)
1843
1842
1841
1840
1839
1838
1837
1836
9850
9900
9950
10000
10050
10100
10150
10200
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.618 Note: Proposed 11th Ave Improvements included.
.04
.035
.04
Elevation (ft)
1844
1842
1840
1838
1836
1834
1832
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

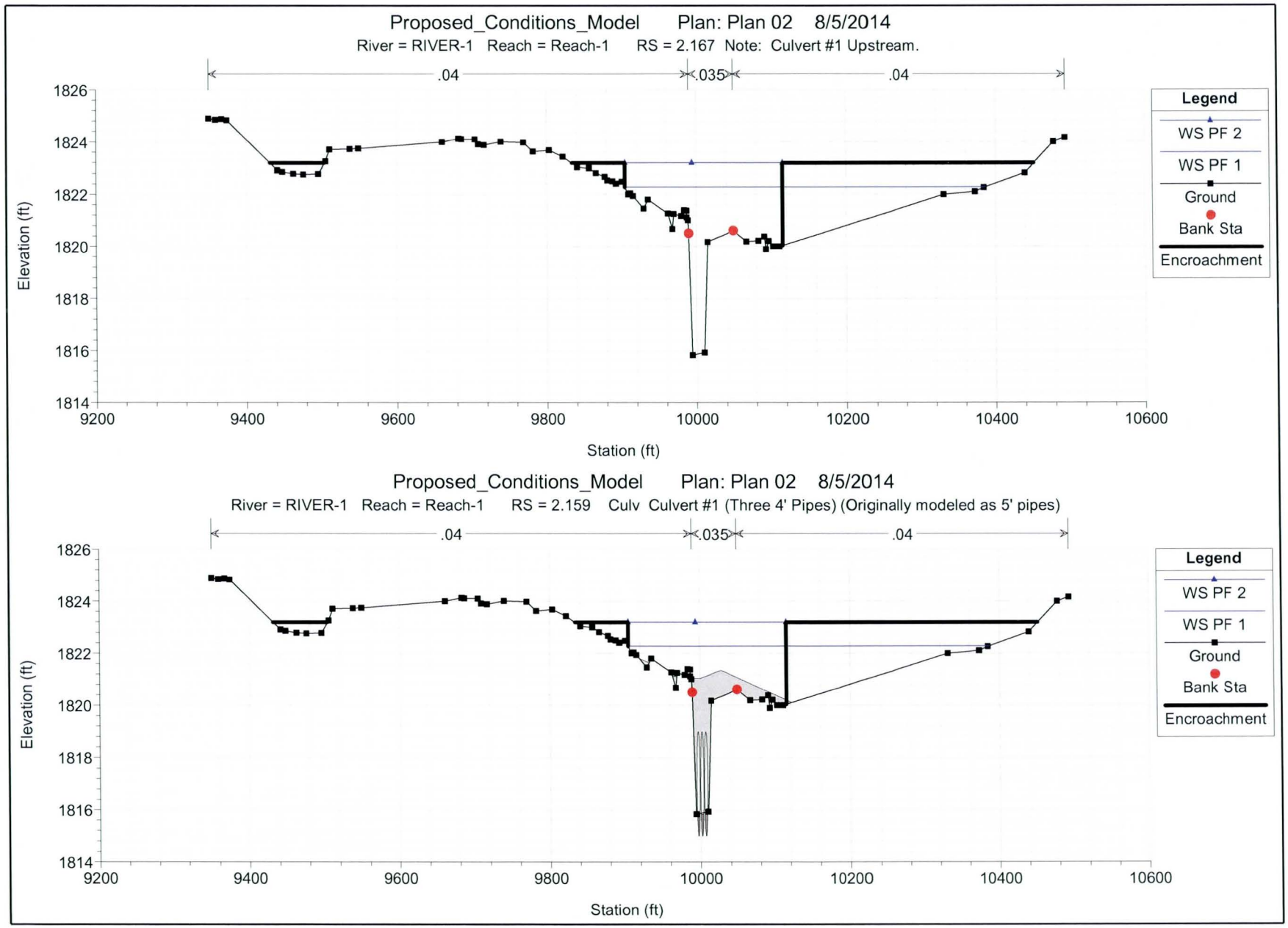

Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.544 Note: Proposed 11th Ave Improvements included.
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.497 Note: New cross-section where Skunk Tank Wash crosses 11th Ave
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment

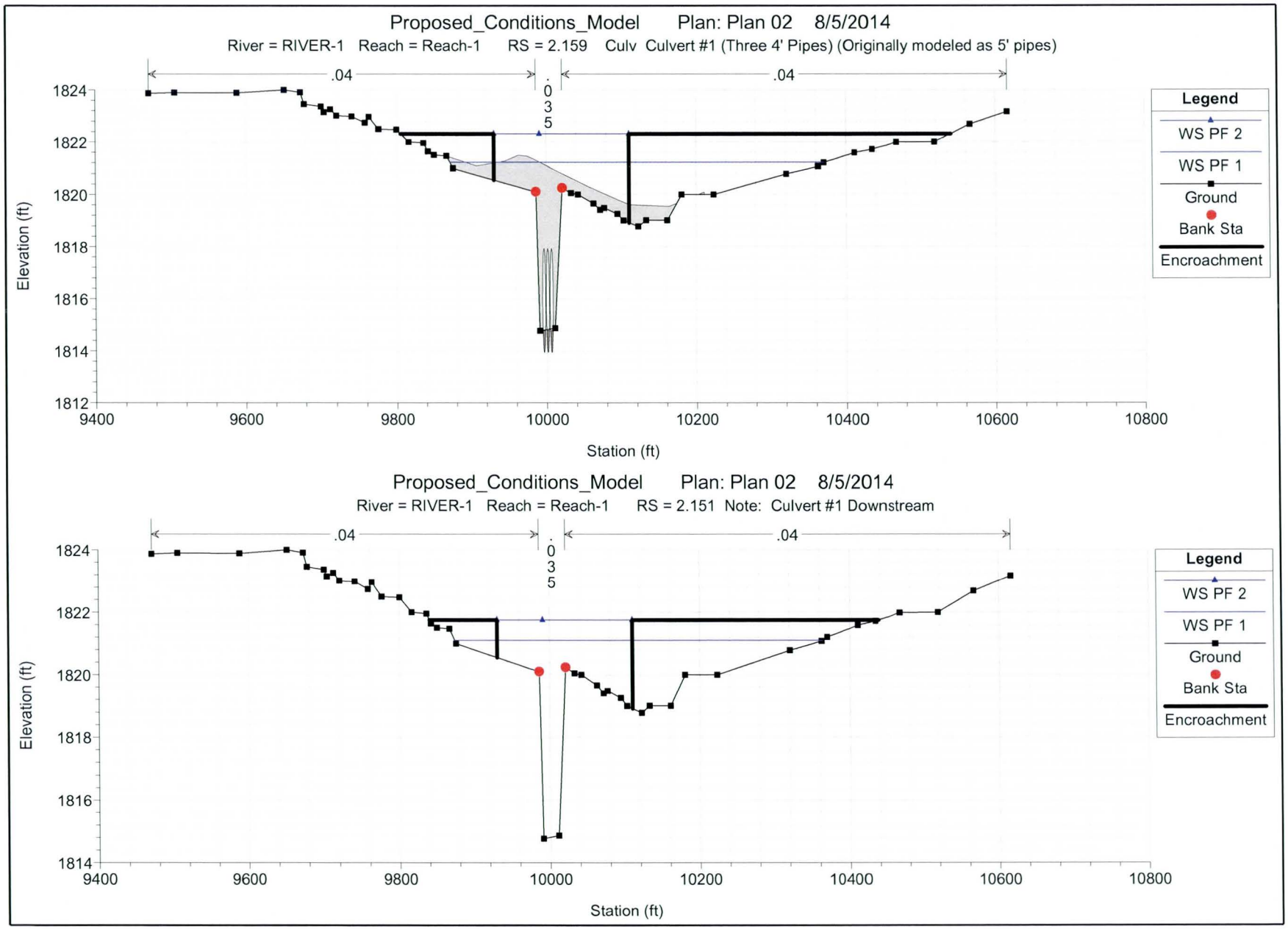

Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.46 Note: Proposed 11th Ave Improvements included.
.04
.035
.04
Elevation (ft)
1838
1836
1834
1832
1830
1828
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.385 Note: Proposed 11th Ave Improvements included.
.04
.035
.04
Elevation (ft)
1836
1834
1832
1830
1828
1826
9500
9600
9700
9800
9900
10000
10100
10200
10300
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

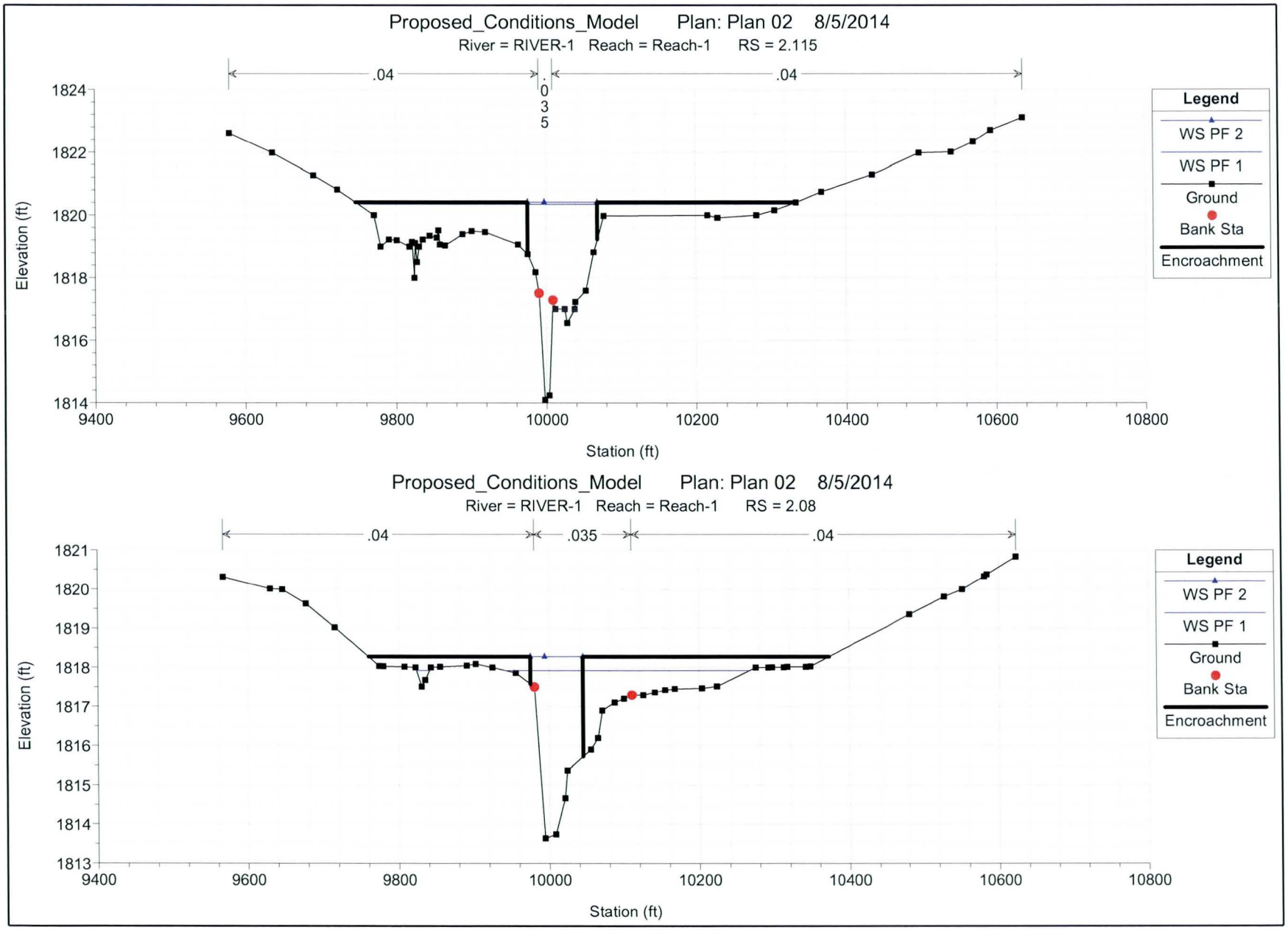

Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.283 Note: Proposed 11th Ave Improvements included.
.04
.035
.04
Elevation (ft)
1832
1830
1828
1826
1824
1822
9400
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.253 Note: Proposed 11th Ave Improvements included.
.04
.035
.04
Elevation (ft)
1828
1827
1826
1825
1824
1823
1822
1821
9400
9600
9800
10000
10200
10400
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment


Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.199 Note: Relocated original cross-section 2.195 east and renamed t
.04
.035
.04
Elevation (ft)
1826
1824
1822
1820
1818
1816
9700
9800
9900
10000
10100
10200
10300
10400
10500
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.1875 Culv Culvert #2 - 3-48" CMP's
.04
.035
.04
Elevation (ft)
1826
1824
1822
1820
1818
1816
9700
9800
9900
10000
10100
10200
10300
10400
10500
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment


Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.1875 Culv Culvert #2 - 3-48" CMP's
.04
.035
.04
Elevation (ft)
1826
1824
1822
1820
1818
1816
9700
9800
9900
10000
10100
10200
10300
10400
10500
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.18 Note: Cross-section 2.18 added to the left overbank to show ove
.04
.035
.04
Elevation (ft)
1826
1824
1822
1820
1818
1816
9700
9800
9900
10000
10100
10200
10300
10400
10500
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment


Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.167 Note: Culvert #1 Upstream.
.04
.035
.04
Elevation (ft)
1826
1824
1822
1820
1818
1816
1814
9200
9400
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.159 Culv Culvert #1 (Three 4' Pipes) (Originally modeled as 5' pipes)
.04
.035
.04
Elevation (ft)
1826
1824
1822
1820
1818
1816
1814
9200
9400
9600
9800
10000
10200
10400
10600
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment


Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.159 Culv Culvert #1 (Three 4' Pipes) (Originally modeled as 5' pipes)
.04
.035
.04
Elevation (ft)
1824
1822
1820
1818
1816
1814
1812
9400
9600
9800
10000
10200
10400
10600
10800
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.151 Note: Culvert #1 Downstream
.04
.035
.04
Elevation (ft)
1824
1822
1820
1818
1816
1814
9400
9600
9800
10000
10200
10400
10600
10800
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

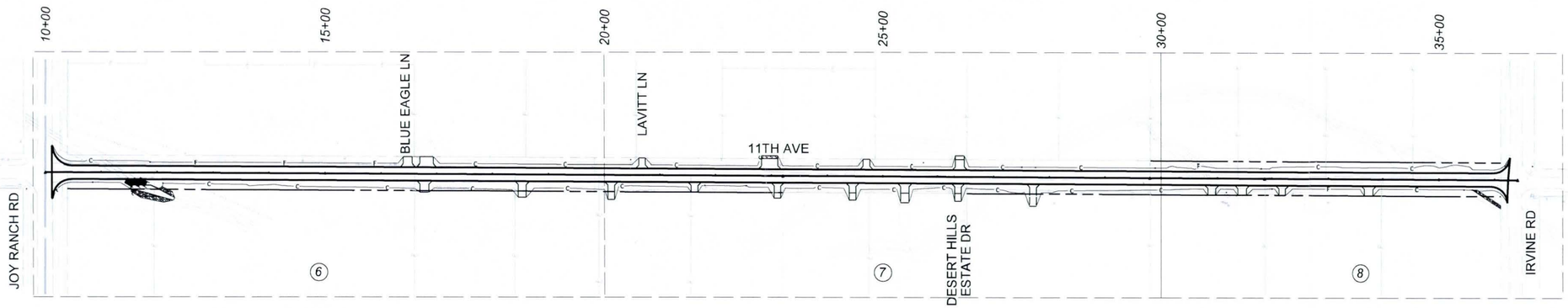

Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.115
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Proposed_Conditions_Model Plan: Plan 02 8/5/2014
River = RIVER-1 Reach = Reach-1 RS = 2.08
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ	TT410	1	10	

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

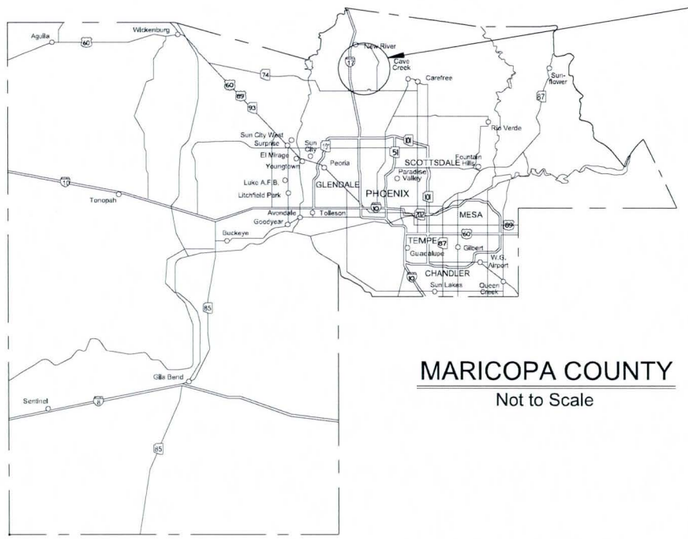
PLANS FOR THE CONSTRUCTION OF
11TH AVENUE - JOY RANCH ROAD TO IRVINE ROAD

PROJECT NO. TT410

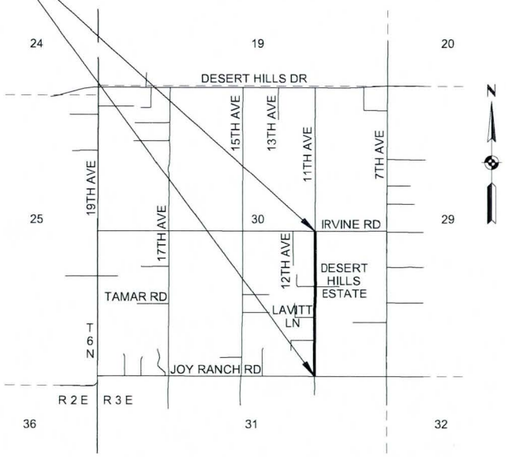


KEY MAP
Not to Scale
◯ PLAN & PROFILE SHEETS

PROJECT NO. TT410



MARICOPA COUNTY
Not to Scale



VICINITY MAP
Not to Scale

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION

RECOMMENDED FOR CONSTRUCTION:

ERIC MAYER — DATE
PROJECT MANAGER

ISSUED FOR CONSTRUCTION:

JOHN B. HAUSKINS, P.E. — DATE
COUNTY ENGINEER/
DIRECTOR OF TRANSPORTATION

COUNTY BOARD OF SUPERVISORS

DENNY BARNEY - CHAIRMAN

DISTRICT 1	DENNY BARNEY
DISTRICT 2	STEVE CHUCRI
DISTRICT 3	ANDREW W. KUNASEK
DISTRICT 4	CLINT L. HICKMAN
DISTRICT 5	MARY ROSE WILCOX

PRE-FINAL
PRELIMINARY
NOT FOR
CONSTRUCTION

TRACS NO.

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F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ	TT410	2	10	

ABBREVIATIONS *

AASHTO	American Association of State Highway and Transportation Officials
AB	Aggregate Base
AC	Asphaltic Concrete
AC	Aluminum Cap
ACBC	Asphaltic Concrete Base Course
ACFC	Asphalt Concrete Friction Course
ACI	American Concrete Institute
ACP	Asbestos Cement Pipe
ACSC	Asphalt Concrete Surface Course
ADOT	Arizona Department of Transportation
Ahd	
AISC	American Institute of Steel Construction
APS	Arizona Public Service Company
Asph	Asphalt
ASTM	American Society for Testing Materials
AWS	American Welding Society
B/C	Back of Curb
BC	Brass Cap
BCR	Begin Curb Return
BCT	Breakaway Cable Terminal
Bdy	Boundary
Bev	Bevel(ed)
BFS	Begin Full Super
Bit	Bituminous
Bk	
Bkfl	Backfill
BLM	Bureau of Land Management
BM	Bench Mark
Br	
C&G	Curb and Gutter
Cab	Cabinet
CAP	Corrugated Aluminum Pipe
CAPA	Corrugated Aluminum Pipe Arch
CB	Catch Basin
CBC	Concrete Box Culvert
CG	Cattle Guard
CIP	Cast Iron Pipe
CIPP	Cast-in-Place Pipe
Clr	Clear(ance)
CLD	Concrete Lined Ditch
CMP	Corrugated Metal Pipe
CMPA	Corrugated Metal Pipe Arch
CO	Clean Out
Conc	Concrete
Conn	Connection
Const	Construction
Cont	Continuous
Cor	Corner
Corr	Correction (VPI to VC)
CP	Concrete Pipe
CR	Crown
CSP	Corrugated Steel Pipe
CSPA	Corrugated Steel Pipe Arch
CTB	Concrete Treated Base
DA	Drainage Area
DE	Drainage Easement
Def	Deflection
Det	Detail
DIP	Ductile Iron Pipe
Drn	Drain(age)
D/W	Driveway
Dwg	Drawing
E	Electric(ity)
e	External
ECR	End Curb Return
EFS	End Full Super
El	Elevation
Emb	Embankment
EP	Edge of Pavement
Esmt	Easement
Exc	Excavation
Exist	Existing
Exp Jt	Expansion Joint
F/C	Face of Curb
FCDMC	Flood Control District of Maricopa County
FF	Finished Floor (Elevation)
FH	Fire Hydrant
Fnd	Found
Fwy	Freeway
G	Gutter (Flow Line Elevation)
ga	Gauge
GB	Grade Break
GLO	General Land Office
GM	Gas Meter
Gnd	Ground
GP	Guy Pole
Gr	Grade
GR	Guardrail
GV	Gas Valve
HDPE	High Density Polyethylene
Hdwl	Headwall
HH	Hand Hole
Hi	High
HW	High Water
ID	Inside Diameter
Inv	Invert
Irr	Irrigation
L	Length of Curve
LC	Long Chord
LS	Lump Sum
Lt	Left
MAG	Maricopa Association of Governments
Matl	Material
MC	Maricopa County
MCDOT	Maricopa County Department of Transportation
MH	Manhole
Min	Minimum
Mod	Modify
Mon	Monument
NC	Normal Crown
NPDES	National Pollutant Discharge Elimination System
NTS	Not to Scale
OC	On Center
OD	Outside Diameter
P	Pavement (Surface Elevation)
Ped	Pedestal
PC	Point of Curvature
PCC	Point of Compound Curvature
PCC	Portland Cement Concrete
PCCP	Portland Cement Concrete Pavement
PI	Point of Intersection
POB	Point of Beginning
POC	Point on Curve
POE	Point of End
POT	Point on Tangent
PP	Power Pole
PRC	Point of Reverse Curvature
Prel	Preliminary
Proj	Project
Prop	Proposed
PRVC	Point of Reverse Vertical Curvature
PT	Point of Tangency
PVC	Point of Vertical Curvature
PVC	Poly Vinyl Chloride
PVI	Point of Vertical Intersection
Pvmt	Pavement
PVT	Point of Vertical Tangency
Q	Quantity of Drainage Runoff
Qtr	Quarter
QW	Qwest Communications
R	Radius
R	Range
RCP	Reinforced Concrete Pipe
Rdwy	Roadway
Rebar	Reinforcing Bar
Reinf	Reinforced(ing)
Reloc	Relocate
Rem	Remove
Ret	Retain(ing)
RGRCP	Rubber Gasket Reinforced Concrete Pipe
RR	Railroad
Rt	Right
R/W	Right of Way
S	Slope
Sch	Schedule
SCS	Soil Conservation Service
SD	Sight Distance
SD	Storm Drain
SE	Slope Easement
Sec	Section
SG	Subgrade
Shldr	Shoulder
Shr	Shrinkage
Sht	Sheet
Sk	Skew
Specs	Specifications
SRP	Salt River Project
SS	Sanitary Sewer
Sta	Station
Std	Standard
Struc	Structural
Subdiv	Subdivision
Super	Superelevation
Sw	Swell
S/W	Sidewalk
SWG	Southwest Gas Corporation
T	Tangent Length
T	Township
TC	Top of Curb
TCE	Temporary Construction Easement
Trans	Transition
TrRk	Trash Rack
TS	Traffic Signal Pole
Typ	Typical
VC	Vertical Curve
VCP	Vitrified Clay Pipe
VG	Valley Gutter
w/	with
w/o	without
WM	Water Meter
WV	Water Valve
WWF	Welded Wire Fabric

* Standard dictionary abbreviations not included.

SYMBOLS

- Exist Rdwy Conc Items
- Exist Edge of Pvmt
- Exist R/W Line
- Property Line
- Railroad Tracks
- Top of Embankment Cut
- Toe of Filled Slope
- Trans Cut to Fill
- Exist Barb Wire Fence
- Exist Chain Link & Gate
- Exist Block Wall & Gate
- Exist Wood Fence
- Exist Guardrail
- Exist Water Line** (6"W (TYPE))
- Exist Sanitary Sewer Line** (8"SS (TYPE))
- Exist Buried Electric Line (E)
- Exist Electric Duct Bank (E (DUCT BANK))
- Exist Gas Line (Typ)** (2" G)
- Exist Irrigation Line (Typ)** (12" IRR (PVC))
- Exist Storm Drain Line (Typ)** (24" SD (CP))
- Exist Buried Cable TV Line (TV)
- Exist Buried Telephone Line (T)
- Exist Fiber Optic Tel Line (FOT)
- New Pipe

** Scale to Actual Width for Pipes > 12"

- Easement
- Forest or Reservation Boundary
- Flow Line
- Hedge Line
- Jurisdictional Boundary
- New Guardrail
- New Chain Link Fence
- New Barb Wire Fence
- New Wood Fence / ROW
- Overhead Power (OP)
- Overhead Telephone (OT)

- Angle Point
- Bench Mark
- Center Line
- Flow Line
- Monument Line
- Property Line or Plate
- Section Line
- Exist Manhole
- Exist US Mail Box
- Exist Water Valve
- Exist Meter
- Exist Gas Regulator
- Exist Power or Joint Use Pole
- Exist Steel Power Pole
- Exist Guy Wire
- Exist Street Light
- Exist Utility Ped
- Exist Stand Pipe
- Exist Fire Hydrant
- Exist Street Name Sign
- Exist Traffic Control Cab
- Exist Traffic Pull Box
- Exist Traffic Signal Pole
- Exist Slope Direction

- Tree or Hedge Line
- Palm Tree
- Deciduous Tree
- Mesquite Tree
- Pine Tree
- Saguaro Cactus
- Yucca Cactus
- Cholla Cactus
- Prickly Pear Cactus
- Barrel Cactus
- Exist Sign (1 Post)
- Exist Sign (2 Posts)
- Ground Surface
- New Bit Pvmt (Section)
- New ABC (Section)
- Riprap (Plan)
- New Bit Pvmt (Plan)
- New Conc Pvmt (Plan)
- Remove Pvmt (Plan)
- New Conc (Section)
- New Metal (Section)

GENERAL NOTES

1. All work shall conform to the Uniform Standard Specifications for Public Works Construction published by the Maricopa Association of Governments (MAG) dated 2012 with revisions through 2014, together with the MCDOT Supplement to the MAG Standard Specifications dated January 2014 and the project Special Provisions.
2. Standard Details refer to the MAG Uniform Standard Specifications and Details for Public Works Construction unless noted otherwise.
3. All existing utility lines shown on the plans are from available utility records. The Contractor shall verify the actual location before starting construction. The Contractor shall contact "Blue Stake", (602) 263-1100, prior to beginning construction.
4. Utilities interfering with construction shall be reset or relocated by the utility company concerned unless noted otherwise.
5. Disposal of all waste material, broken concrete, etc. will be the responsibility of the Contractor, subject to the approval of the Engineer.
6. All stations and call out distances left and right refer to the construction centerline unless noted otherwise.
7. All trees, bushes and obstacles inside the existing right-of-way which interfere with construction, shall be removed by the Contractor unless noted otherwise. Any fences damaged during construction shall be restored by the Contractor at no additional cost to the County.
8. All paved turnouts shall have the same asphalt and base requirements as the adjacent roadway unless noted otherwise.
9. The Contractor shall obtain all the necessary permits from local governments for work within their jurisdiction.
10. Construction activities shall not interfere with mail delivery. The Contractor shall temporarily relocate mailboxes as necessary to provide uninterrupted mail service. This is a non-pay item.

DESIGN DATA

11TH AVENUE
CLASSIFICATION.....RURAL/LOCAL
TERRAIN.....ROLLING
DESIGN SPEED.....25 MPH
(2013) AVERAGE DAILY TRAFFIC.....<400/VPD

INDEX

1..... FACE SHEET
2..... GENERAL NOTES
3..... QUANTITY SUMMARY
4..... TYPICAL SECTIONS
5..... GEOMETRIC CONTROL
6-8..... PAVING PLAN AND PROFILE SHEETS
9..... DRIVEWAY DETAILS SHEET
10..... DRAINAGE DETAILS SHEET

▲ BENCH MARK

BM #124, set Aluminum Cap
Sta 15+49.55, 30.85' LT
N 479634.584
E 648359.833
El = 1824.79 feet NAVD 88 Datum

LENGTH OF PROJECT

11TH AVENUE STA 10+00.00 TO STA 36+40.99=2640.99 ft

TOTAL=2640.99 ft

2640.99/5280=0.50 miles

PROJECT DISTURBED AREA

115,050 ft² = 2.64 Acres

NO.	REVISION	BY	DATE
1			
2			
3			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

11TH AVENUE
JOY RANCH RD TO IRVINE RD
PROJECT NO. TT410

PRE-FINAL

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	A. JONES	12/12/13
DRAWN	A. JONES	12/20/13
CHECKED	D. FRITZ	12/30/13

GENERAL NOTES

SHEET 2 OF 10

TRACS NO.

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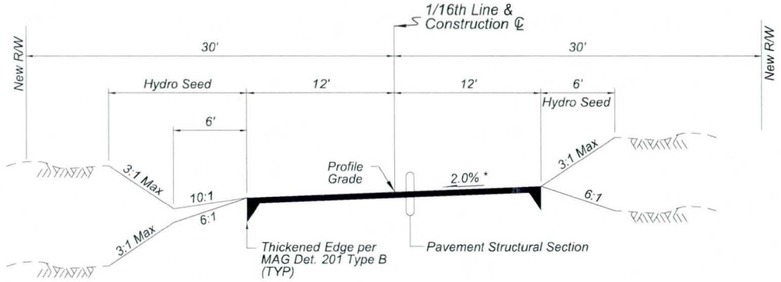
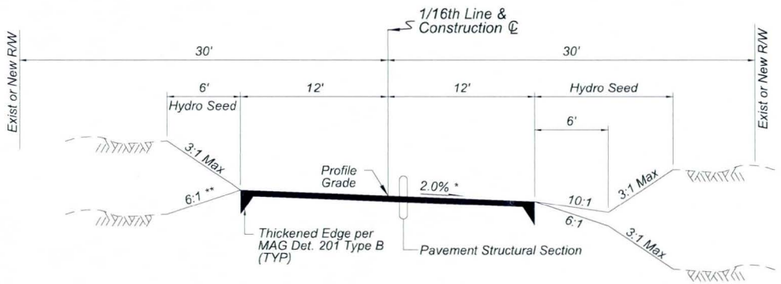
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ	TT410	3	10	



11TH AVE

(Not To Scale)

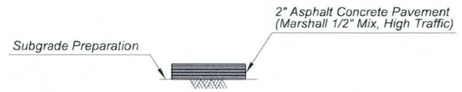
Sta 10+11.64 to Sta 11+87.50
Sta 31+80.00 to Sta 36+24.48



11TH AVE

(Not To Scale)

Sta 11+87.50 to Sta 31+80.00



Total Thickness = 2.0"

PAVEMENT STRUCTURAL SECTION

Notes:
** See superelevation diagrams on Plan & Profile sheets for further details.*

NO.	REVISION	BY	DATE
1			
2			
3			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

11TH AVENUE
JOY RANCH RD TO IRVINE RD
PROJECT NO. TT410

		BY	DATE
PRE-FINAL	DESIGNED	A. JONES	12/12/13
	DRAWN	A. JONES	12/20/13
PRELIMINARY NOT FOR CONSTRUCTION	CHECKED	D. FRITZ	12/30/13

TYPICAL SECTIONS — SHEET 3 OF 10

TRACS NO.

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SUMMARY OF ESTIMATED QUANTITIES

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ	TT410	4	10	

ITEM NUMBER	ITEM DESCRIPTION	UNIT	SHEET NUMBER															
			6	7	8													TOTAL
205.01150	Roadway Excavation	CY	255	891	289													1,435
220.10300	Riprap, D50=12"	CY	31		10													41
301.01000	Subgrade Preparation	SY	4157	4359	2632													11,148
321.00200	Asphalt Concrete Pavement (Marshall 1/2" Mix, High Traffic)	Ton	313	328	201													842
340.01465	Driveway 5" Thick Class B Concrete	SF		145														145
350.01500	Remove Headwall	EA	1															1
350.02300	Remove Concrete Driveway	SF		457														457
350.04000	Remove & Salvage Traffic Sign	EA	3	1	1													5
351.11000	Relocate Mailbox	EA	8	13	3													24
405.01000	Survey Marker, MAG Det 120, Type B	EA		2	1													3
430.01060	Relocate Tree	EA		2	1													3
430.01201	Native Hydro Seeding	Acre	0.39	0.36	0.21													0.96
523.75348	Headwall, Inlet ADOT SD 6.30 (45° Skew), 3-48" Pipes	EA	1															1
621.10480	48" CMP, 18 Gauge (0.052" Thickness), Galvanized	LF	56															56

NO.	REVISION	BY	DATE
1			
2			
3			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

11TH AVENUE
JOY RANCH RD TO IRVINE RD
PROJECT NO. TT410

PRE-FINAL

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	A. JONES	12/12/13
DRAWN	A. JONES	12/20/13
CHECKED	D. FRITZ	12/30/13

QUANTITY SUMMARY

SHEET 4 OF 10

TRACS NO.

1/29/2014

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F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ	TT410	5	10	

4552501
W ¼ Corner Sec 30, T6N R3E
3" BC Stamped "¼ SEC 10 LS14199"
N 481734.320
E 644406.772
El 1816.61'

N 0°19'31" E
175.40'

4552421
E ¼ Corner Sec 25, T6N R2E
2" MC AC Stamped
"T6N R2E ¼ R3E S25 LS 33307 2004"
N 481558.923
E 644407.468
El 1821.57'

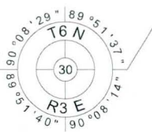
Section Line

19TH AVE

N 0°14'44" E
2466.42'

S 89°52'53" E
2610.69'

Mid Section Line



4602285
Center ¼ Corner Sec 30, T6N R3E
Fnd Iron Pipe
N 481728.916
E 647017.459
El 1853.85'

COORDINATE SYSTEM METADATA

Linear Units: *International Feet*
Ground Scale Factor: *0.99981658*

Horizontal Coordinate System / Datum:
Datum: North American Datum of 1983(NAD83) [1992 epoch]

Projection: This project is in a GROUND coordinate system however it is based on the Arizona Coordinate System, 1983 Central Zone, otherwise known as the Arizona State Plane Central Zone (ASPCZ) or "Grid."

In order to obtain ASPCZ coordinates;
· First translate the northing value by adding 550,000 ift to all northings (the Y component of the coordinates).
· Second scale (multiply) both the northings (Y component) and eastings (X component) value by the scale factor shown above.

For Example:
Given the Ground Coordinates for A 365: Northing(Y): 340986.192 ift, Easting(X):774061.733 ift and a scale factor of 0.99983908:
First add the +550,000.00 to the northing to obtain 890986.192 ift.
Second multiply the new Northing(Y) 890986.192 ift by 0.99983908 and multiply the Easting(X) 774061.733 ift by 0.99983908
Result: ASPCZ ("Grid") Coordinates: Northing(Y) 890842.815 ift, Easting(X) 773937.171 ift.

All coordinates were derived directly or indirectly from NGS B order stations or better. This includes NGS Continuously Operating Reference Stations(CORS) adjusted back to the 1992 epoch.

Distances displayed are horizontal and are not slope.

Vertical Datum:
Vertical Datum: NAVD88 (North American Vertical Datum of 1988)
Geodetic Datum: NAD83 adjustment 1992
Geoid: Geoid 1999

The following vertical adjustment is being utilized for this project which was derived by MCDOT during the GDACS project by holding 23 first order NGS benchmarks throughout the county:

Vertical Transformation of Geoid:

Origin North:	876748.214 ift
Origin East:	816963.987 ift
Constant Adjustment:	+0.1253 ift
Slope North:	-0.1908278 ppm
Slope East:	-0.0027077 ppm

IRVINE RD

A1024
Fnd RR Spike No ID
Accepted as 16th Corner
N 481726.140
E 648338.238

S 89°52'46" E
1320.78'

POE 36+40.99

S 89°51'51" E
1320.77'

Exist R/W

35+00

New R/W

A1278
Fnd 1/2" Rebar
Stamped "LS28230"
N 481270.916
E 648336.208

N 0°15'19.80" E
455.23'

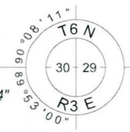
New R/W

PI 31+85.76

N 0°14'21.51" E
205.19'

30+00

PI 29+80.58



4602121
E ¼ Corner Sec 30, T6N R3E
3" MC BC Stamped
"¼ T6N R3E S30 S31 LS 33307 2004"
N 481723.009
E 649659.007
El 1851.30'

A1280
Fnd 1/2" Rebar No ID
N 481065.731
E 648335.351

N 0°15'27" E
1320.34'

Mid Section Line

N 0°15'17.41" E
660.18'

N 0°15'09" E
1320.51'

Section Line

25+00

Exist R/W

PI 23+20.39

16th Line

15TH AVE

11TH AVE

7TH AVE

6002
16th Corner
Calculated Position
N 480405.554
E 648332.415

20+00

Construction ℄
and 16th Line

N 0°15'27" E
1320.34'

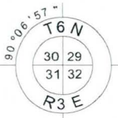
N 0°15'17.41" E
1320.39'

N 0°15'09" E
1320.51'

New R/W

15+00

Exist R/W



4600721
SE Corner Sec 30, T6N R3E
3" MC BC Stamped
"T6N R3E S30 S29 S31 S32
LS 33307 2004"
N 479082.022
E 649647.363
El 1826.08'

Section Line

JOY RANCH RD

Exist R/W

S 89°54'23" E
2608.40'

S 89°51'57" E
1320.95'

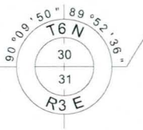
10+00

POB 10+00.00

S 89°51'48" E
1320.82'

A1289
Fnd 1/2" Rebar
Accepted as 16th Corner
N 479085.174
E 648326.542

4552301
SW Corner Sec 30, T6N R3E
3" BC Stamped
"SW SEC 30 6N 3E LS 14199"
N 479092.529
E 644397.193
El 1814.16'



4600521
S ¼ Corner Sec 30, T6N R3E
3" MC BC Stamped
"T6N R3E S30¼ S31 LS 33307 2004"
N 479088.268
E 647005.591
El 1818.23'

ALIGNMENT CONTROL POINTS

Point Name	Point Type	Station	Northing	Easting
A1289	POB	10+00.00	479085.174	648326.542
6002	PI	23+20.39	480405.554	648332.415
A1280	PI	29+80.58	481065.731	648335.351
A1278	PI	31+85.76	481270.916	648336.208
A1024	POE	36+40.99	481726.140	648338.238

PROJECT BENCHMARKS

Point #	Station	Offset	Northing	Easting	Elevation
120	N/A	-	481753.027	648313.355	1840.28'
121	31+16.15	24.92' RT	481201.199	648360.840	1837.44'
122	25+74.21	24.32' LT	480659.472	648309.228	1832.35'
123	20+47.53	26.84' LT	480132.812	648304.357	1828.16'
124	15+49.55	30.85' RT	479634.584	648359.833	1824.79'
125	N/A	-	479050.791	648356.648	1821.51'

NO.	REVISION	BY	DATE

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

11TH AVENUE
JOY RANCH RD TO IRVINE RD
PROJECT NO. TT410

PRE-FINAL

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	A. JONES	12/12/13
DRAWN	A. JONES	12/20/13
CHECKED	D. FRITZ	12/30/13

GEOMETRIC CONTROL SHEET

SHEET 5 OF 10

TRACS NO.

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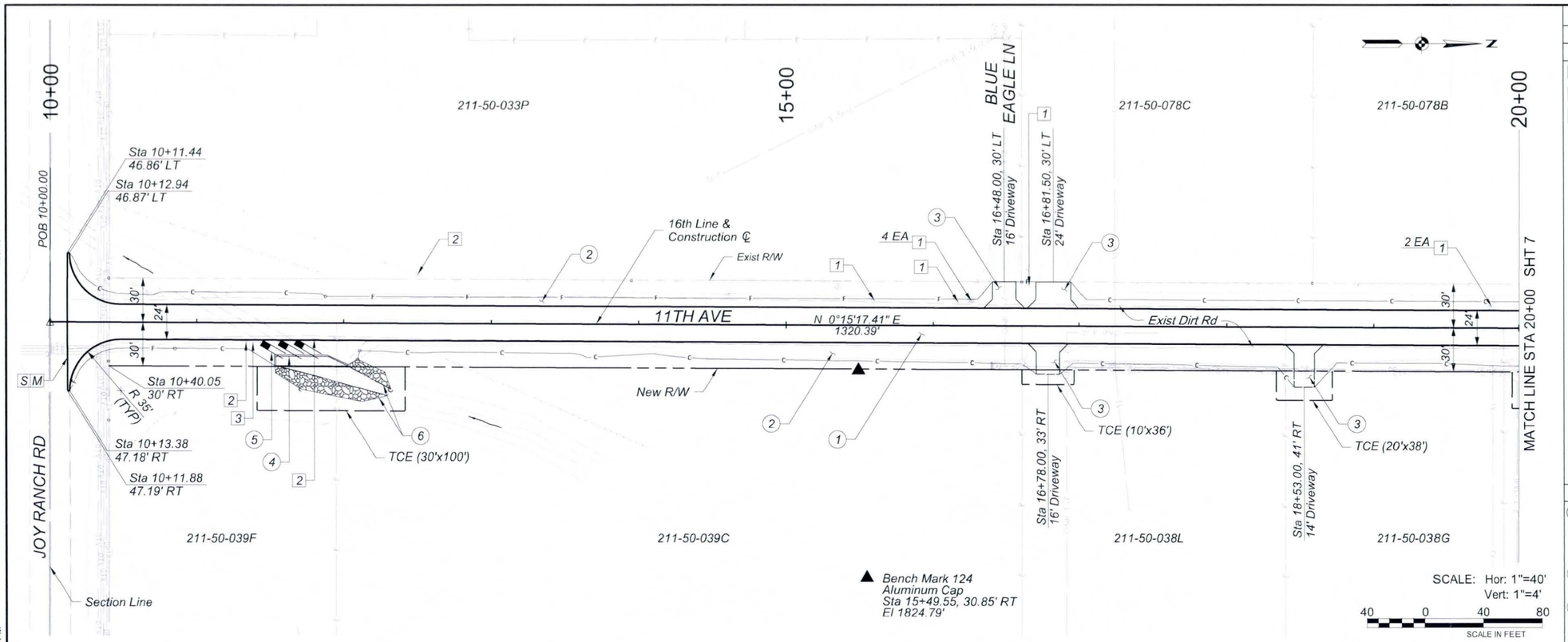
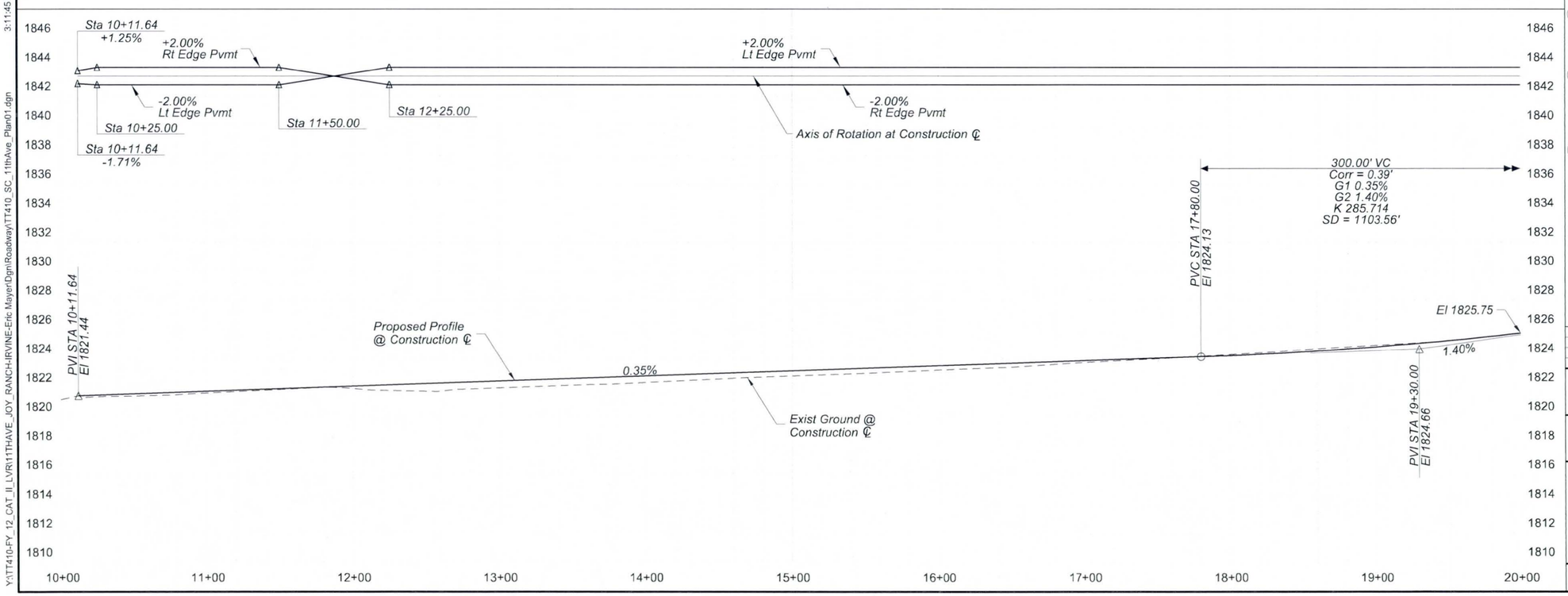
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ	TT410	6	10	





REMOVAL / RELOCATE

1	Relocate Mailbox per MCDOT Det 2066	8 EA
2	Remove & Salvage Traffic Sign Assembly	3 EA
3	Remove Headwall	1 EA

S Saw Cut Pavement

M Match Existing Grade

CONSTRUCTION

1	Construct New AC Pavement per Pvmt Structural Section on Sheet 3	
	Subgrade Preparation	3979 SY
	2" AC Pavement	296 Ton
2	Sta 10+12.94 to Sta 20+00.00 LT & RT Native Hydro Seeding	0.39 Acre
3	Construct Driveway per Sheet 9	
	Subgrade Preparation	178 SY
	2" AC Pavement	17 Ton
4	Sta 11+56.26, 13.68' RT Construct Inlet Headwall for 3-48" Pipes per ADOT SD 6.30, 45° Skew (See Sheet 10 for Details)	1 EA
5	Install 48" CMP (See Sheet 10 for Details)	
	Sta 11+44.26, 13.89' RT	18 LF
	Sta 11+56.26, 13.68' RT	18.5 LF
	Sta 11+67.07, 13.16' RT	19.5 LF
6	Install Riprap, D50=12" (See Sheet 10 for Details)	31 CY

NO.	REVISION	BY	DATE
1			
2			
3			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

11TH AVENUE
JOY RANCH RD TO IRVINE RD
PROJECT NO. TT410

		BY	DATE
PRE-FINAL	DESIGNED	A. JONES	12/12/13
	DRAWN	A. JONES	12/20/13
PRELIMINARY NOT FOR CONSTRUCTION	CHECKED	D. FRITZ	12/30/13

PLAN & PROFILE

SHEET 6 OF 10

TRACS NO.

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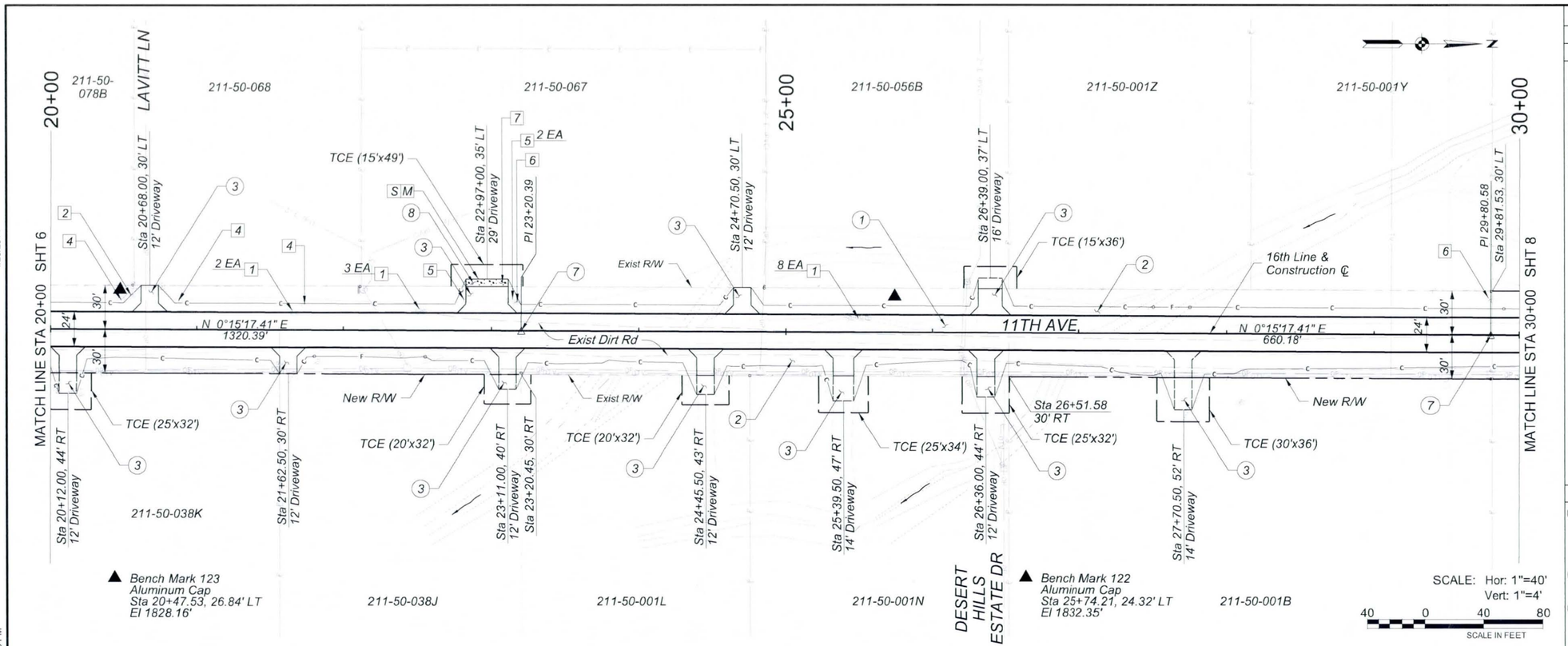

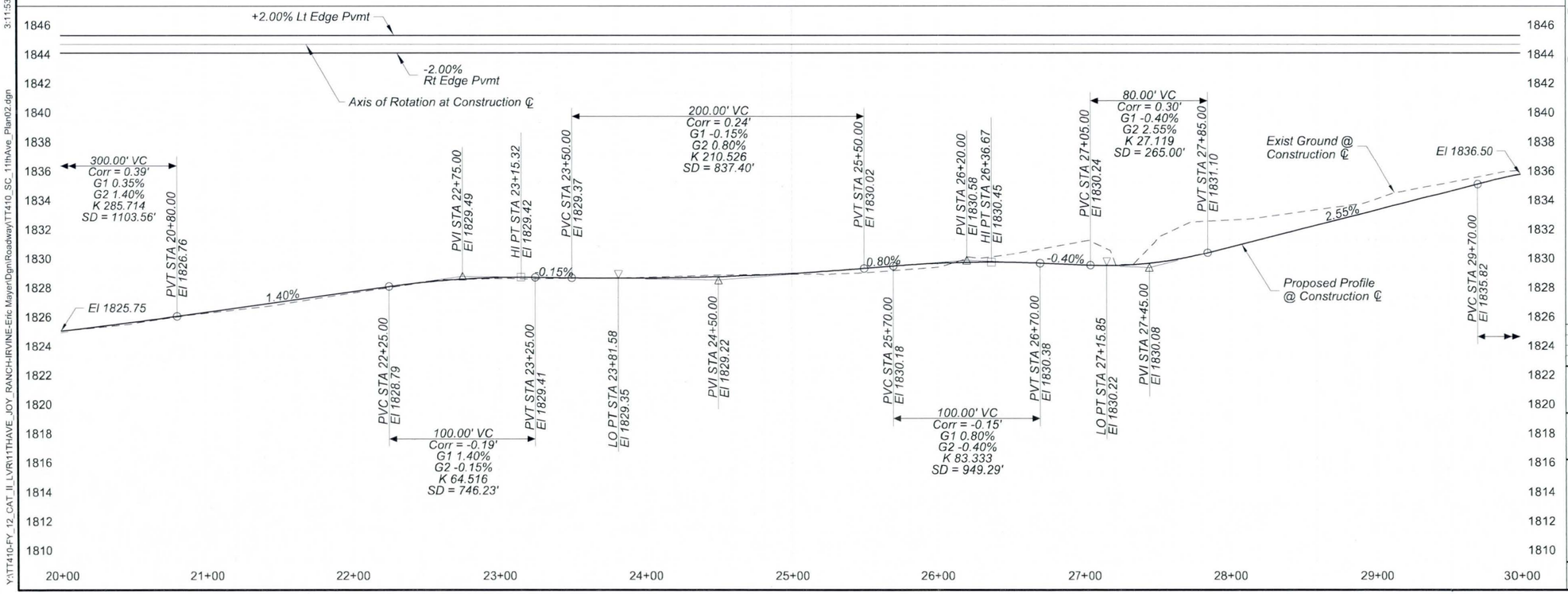

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ	TT410	7	10	

☐ REMOVAL / RELOCATE ☐

1	Relocate Mailbox per MCDOT Det 2066	13 EA
2	Remove & Salvage Traffic Sign Assembly	1 EA
4	Relocate Sprinkler Head (by Others)	3 EA
5	Relocate Lanscape Light (by Others)	3 EA
6	Relocate Tree	2 EA
7	Remove Concrete Driveway	457 SF

S	Saw Cut Pavement
M	Match Existing Grade

○ CONSTRUCTION ○

1	Construct New AC Pavement per Pvmt Structural Section on Sheet 3	
	Subgrade Preparation	3853 SY
	2" AC Pavement	292 Ton
2	Sta 20+00.00 to Sta 30+00.00 LT & RT Native Hydro Seeding	0.36 Acre
3	Construct Driveway per Sheet 9	
	Subgrade Preparation	506 SY
	2" AC Pavement	36 Ton
7	Sta 23+20.39, Sta 29+80.58 Install Survey Marker, MAG Det 120, Type B	2 EA
8	Sta 22+82.50 to Sta 23+11.50 Concrete Driveway 5" Thick Class B Concrete (See Sheet 9 for details)	145 SF

NO	REVISION	BY	DATE
1			
2			
3			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

11TH AVENUE
JOY RANCH RD TO IRVINE RD
PROJECT NO. TT410

		BY	DATE
PRE-FINAL	DESIGNED	A. JONES	12/12/13
	DRAWN	A. JONES	12/20/13
PRELIMINARY NOT FOR CONSTRUCTION	CHECKED	D. FRITZ	12/30/13

PLAN & PROFILE

SHEET 7 OF 10

TRACS NO.

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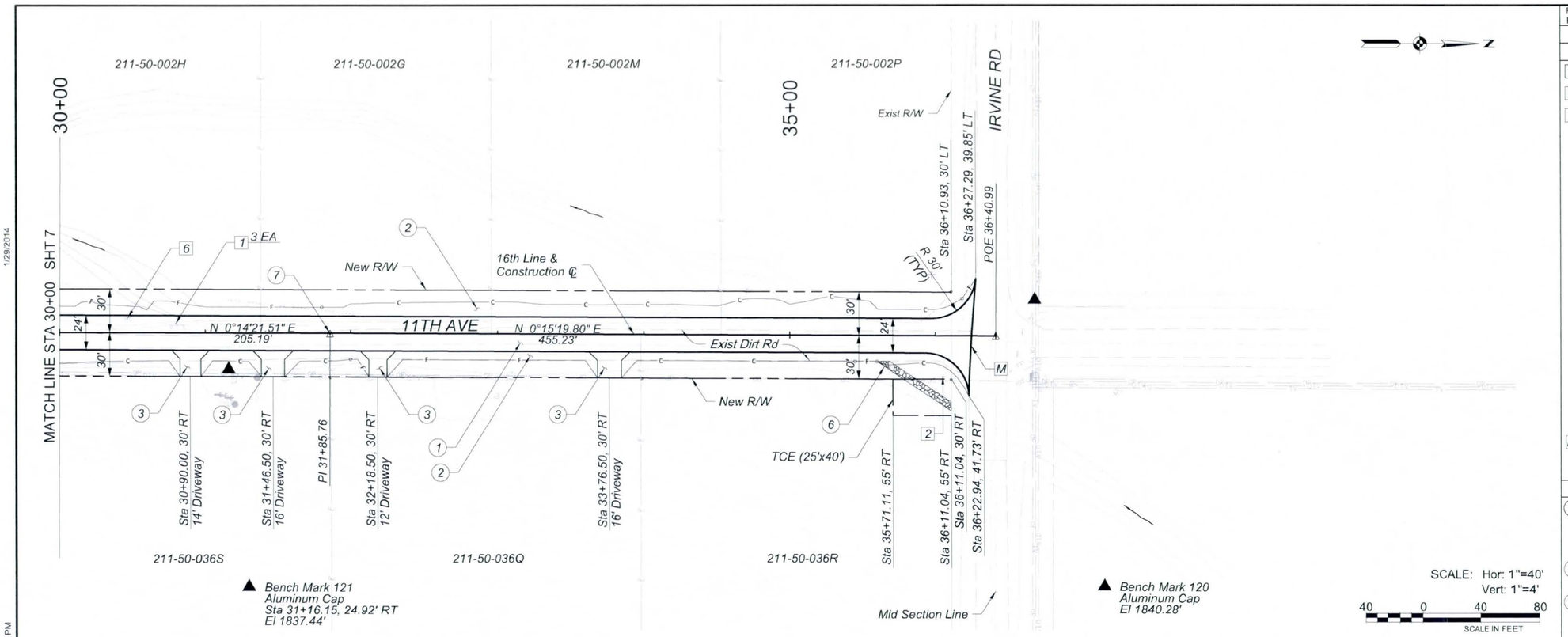
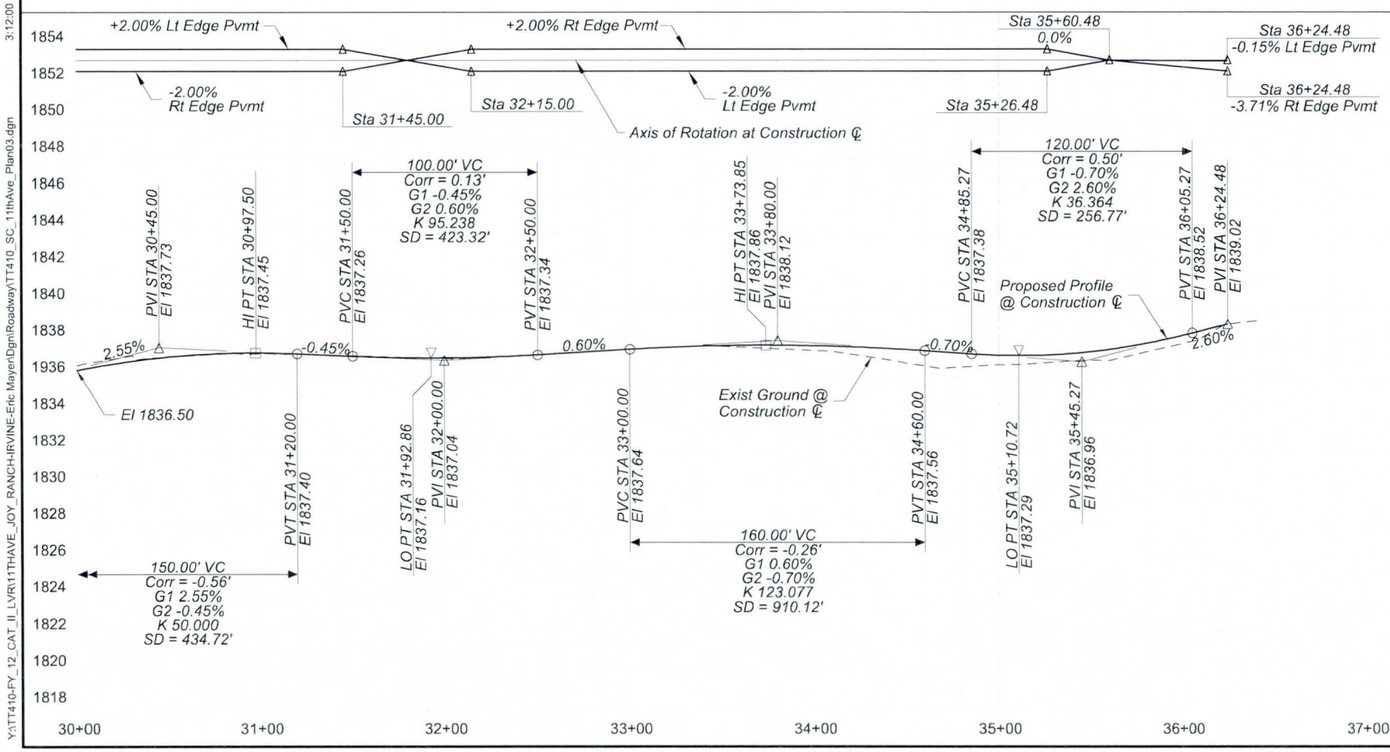
9	AZ	TT410	8	10	





REMOVAL / RELOCATE

1	Relocate Mailbox per MCDOT Det 2066	3 EA
2	Remove & Salvage Traffic Sign Assembly	1 EA
6	Relocate Tree	1 EA

M Match Existing Grade

CONSTRUCTION

1	Construct New AC Pavement per Pvmt Structural Section on Sheet 3	
	Subgrade Preparation	2500 SY
	2" AC Pavement	187 Ton
2	Sta 30+00.00 to Sta 36+27.29 LT & RT Native Hydro Seeding	0.21 Acre
3	Construct Driveway per Sheet 9	
	Subgrade Preparation	132 SY
	2" AC Pavement	14 Ton
6	Install Riprap, D50=12" (See Sheet 10 for Details)	10 CY
7	Sta 31+85.76 Install Survey Marker, MAG Det 120, Type B	1 EA

NO.	REVISION	BY	DATE
1			
2			
3			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

11TH AVENUE
JOY RANCH RD TO IRVINE RD
PROJECT NO. TT410

		BY	DATE
PRE-FINAL	DESIGNED	A. JONES	12/12/13
	DRAWN	A. JONES	12/20/13
PRELIMINARY NOT FOR CONSTRUCTION	CHECKED	D. FRITZ	12/30/13

PLAN & PROFILE

SHEET 8 OF 10

TRACS NO.

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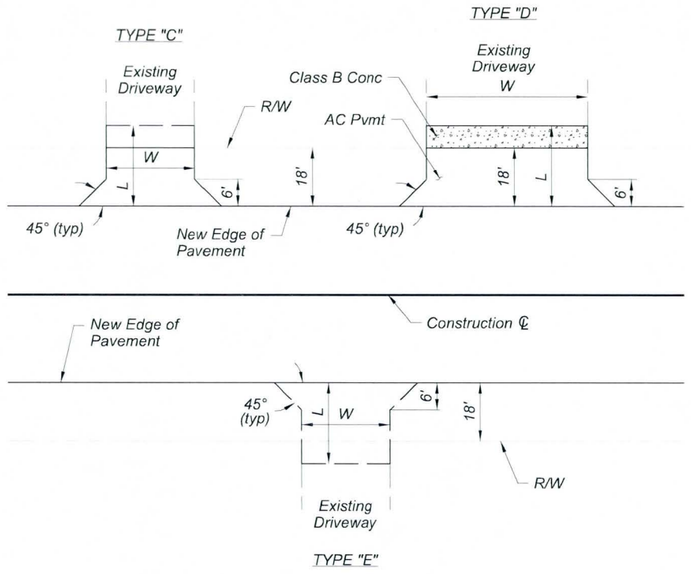
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ	TT410	9	10	

DRIVEWAY TABLE

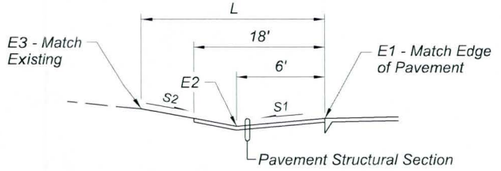
Driveway ℄ Sta	W (ft)	L (ft)	S1 (%)	S2 (%)	E1 (ft)	E2 (ft)	E3 (ft)	Type
16+48.0 LT	16.0	18.0	1.33	-	1823.91	-	1824.15	C
16+78.0 RT	16.0	21.0	-5.00	7.47	1823.53	1823.23	1824.35	C
16+81.5 LT	24.0	18.0	2.00	-	1824.03	-	1824.39	C
18+53.0 RT	14.0	29.0	-5.00	5.96	1824.24	1823.94	1825.31	C
20+12.0 RT	12.0	32.0	-5.00	7.96	1825.65	1825.35	1827.42	C
20+68.0 LT	12.0	18.0	7.28	-	1826.83	-	1828.14	C
21+62.5 RT	12.0	18.0	-5.00	5.25	1827.67	1827.37	1828.00	C
22+97.0 LT	29.0	23.0	15.00	-	1829.63	-	1833.08	D
23+11.0 RT	12.0	28.0	-5.00	6.95	1829.18	1828.88	1830.41	C
24+45.5 RT	12.0	31.0	-5.00	6.84	1829.21	1828.91	1830.62	C
24+70.5 LT	12.0	18.0	4.83	-	1829.78	-	1830.65	C
25+39.5 RT	14.0	35.0	-5.00	7.48	1829.70	1829.40	1831.57	C
26+36.0 RT	12.0	32.0	-5.00	6.96	1830.21	1829.91	1831.72	C
26+39.0 LT	16.0	25.0	7.04	-	1830.69	-	1832.45	C
27+70.5 RT	12.0	40.0	-5.00	8.74	1830.53	1830.23	1833.20	E
30+90.0 RT	14.0	18.0	-5.00	6.33	1837.20	1836.90	1837.66	C
31+46.5 RT	16.0	18.0	-5.00	7.08	1837.05	1836.75	1837.60	C
32+18.5 RT	12.0	18.0	1.89	-	1837.44	-	1837.78	C
33+76.5 RT	16.0	18.0	6.61	-	1838.10	-	1839.29	C

NOTE:

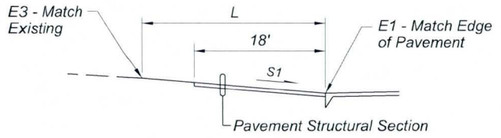
1. W - Width of Driveway (ft)
   L - Overall Length of Driveway (ft)
   S1or S2 - Slope of Driveway (%)
   E1- Elevation of Driveway Along Centerline at New Ege of Pavement (ft)
   E2- Elevation of Drivway Along Centerline at L1 (ft)
   E3- Elevation of Driveway Along Centerline at R/W (ft)
   Type - Driveway Type
   Pvmt - Driveway Pavement Structural Section
2. Driveways shall be Perpendicular to Construction Centerline Unless Noted Otherwise on the Plans
3. Any Excavation or Embankment for Driveway Entrance is Considered Incidental to the Project
4. Driveway Entrances are to be Placed Where Shown on the Plans, or as Directed by the Engineer
5. Subgrade Preparation shall be in Accordance with MAG Sec 301



PLAN VIEW



TYPICAL SECTION 1



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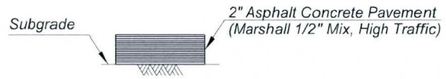

PAVEMENT STRUCTURAL SECTION

NO.	REVISION	BY	DATE
3			
2			
1			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

11TH AVENUE
JOY RANCH RD TO IRVINE RD
PROJECT NO. TT410

PRE-FINAL

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	A. JONES	12/12/13
DRAWN	A. JONES	12/20/13
CHECKED	D. FRITZ	12/30/13

DRIVEWAY DETAILS

SHEET 9 OF 10

TRACS NO.

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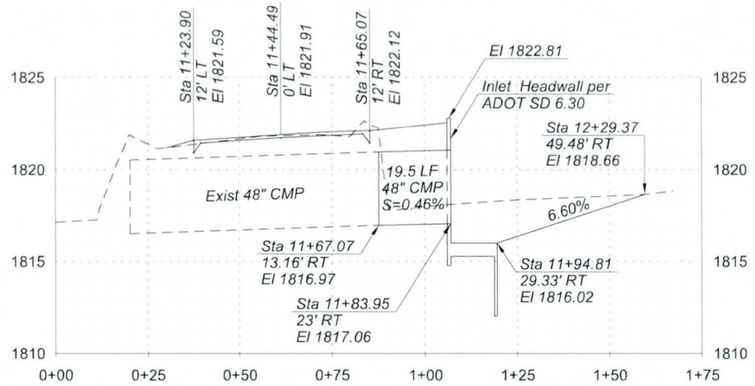
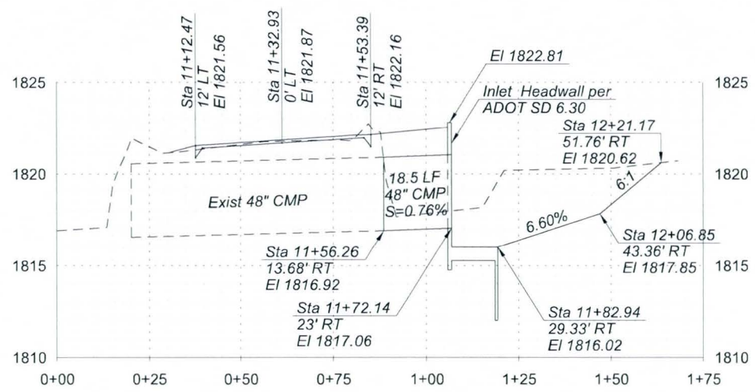
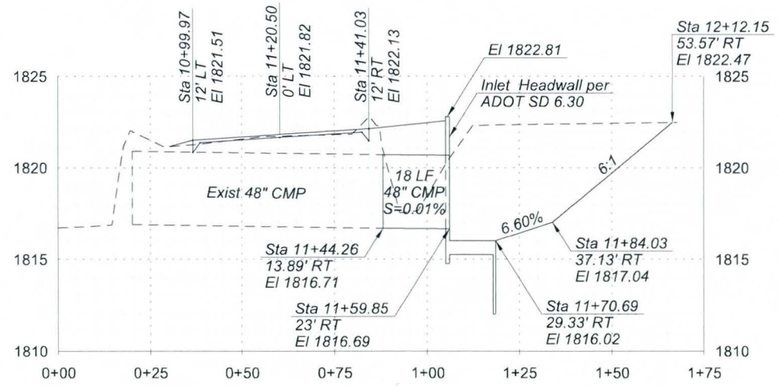
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ	TT410	10	10	



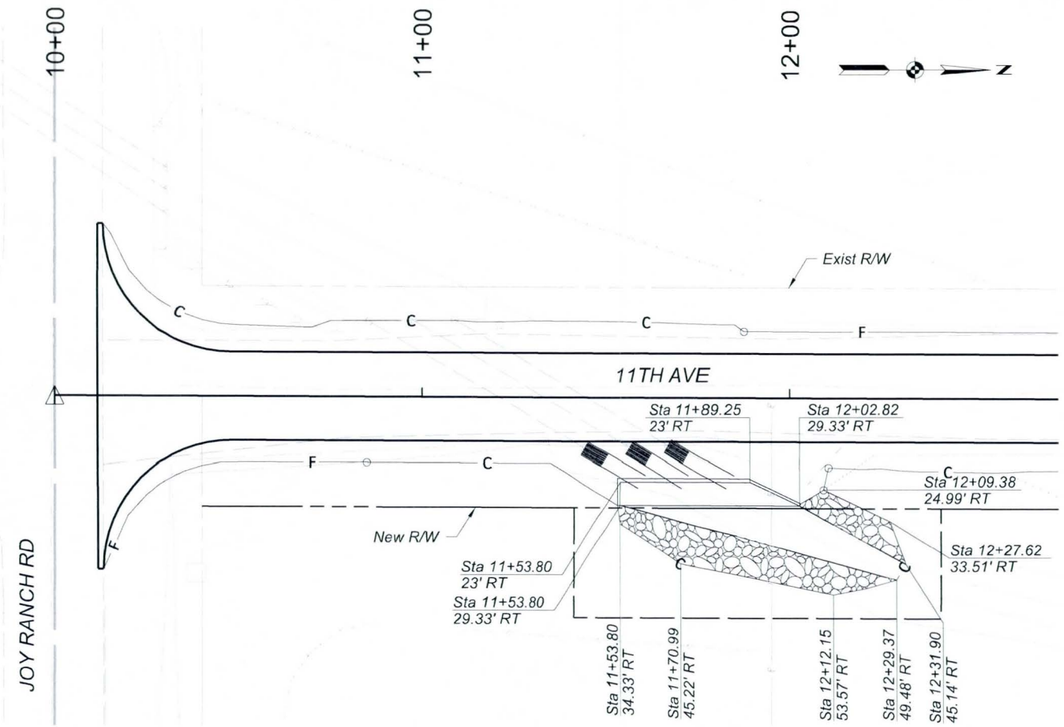
Sta 11+67.07, 13.16' RT to Sta 11+83.95, 23' RT



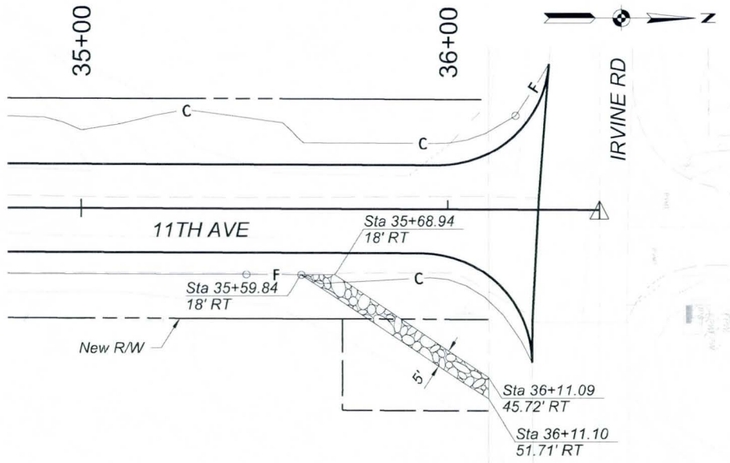
Sta 11+56.26, 13.68' RT to Sta 11+72.14, 23' RT



Sta 11+44.26, 13.89' RT to Sta 11+59.85, 23' RT



PLAN VIEW



PLAN VIEW

NO.	REVISION	BY	DATE
3			
2			
1			

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

11TH AVENUE
JOY RANCH RD TO IRVINE RD
PROJECT NO. TT410

		BY	DATE
PRE-FINAL	DESIGNED	A. JONES	12/12/13
	DRAWN	A. JONES	12/20/13
PRELIMINARY NOT FOR CONSTRUCTION	CHECKED	D. FRITZ	12/30/13

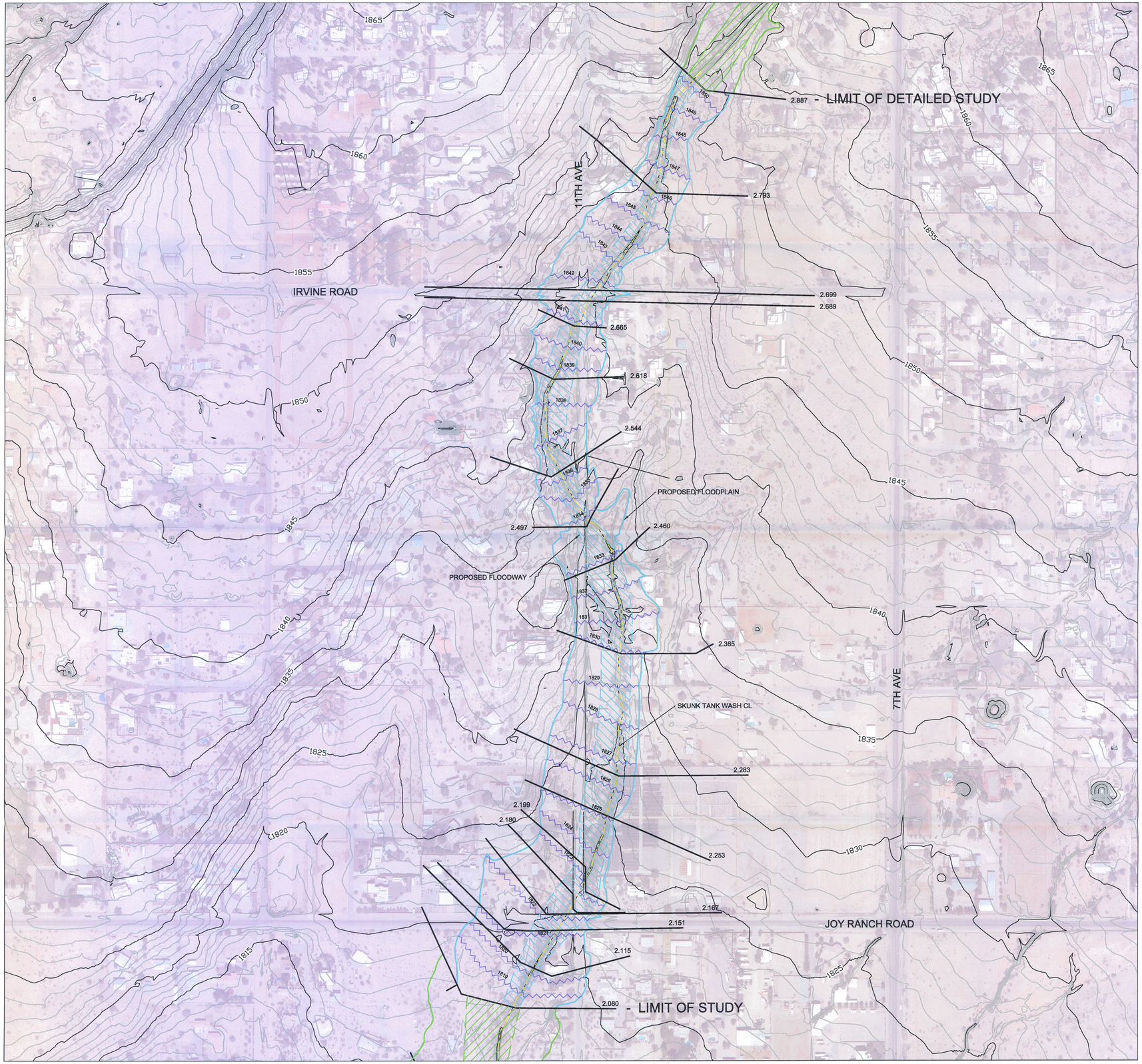
DRAINAGE DETAILS

SHEET 10 OF 10

TRACS NO.

1/29/2014 3:12:14 PM

Y:\TT410-FY_12_CAT_II_LVR\11THAVE_JOY_RANCH-IRVINE-Eric.Mayer\Dgn\Roadway\TT410_SC_11thAve_CulvertDets.dgn



LEGEND

- EXISTING CENTERLINE OF WASH
- FEMA CROSS-SECTION
- EFFECTIVE FEMA FLOODPLAIN
- POST-PROJECT FLOODPLAIN
- EFFECTIVE FEMA FLOODWAY
- POST-PROJECT FLOODWAY

Rivermile Station	Post Project Conditions	
	Post-Project Floodplain NGVD 29 [Elev.]	Post-Project Floodplain NAVD 88 [Elev.]
2.887	1848.26	1850.24
2.793	1844.34	1846.32
2.699	1839.69	1841.67
2.689 - J	1839.56	1841.54
2.665	1838.87	1840.85
2.618	1836.67	1838.65
2.544	1834.42	1836.40
2.497	1831.74	1833.72
2.460	1831.00	1832.98
2.385	1827.97	1829.95
2.283 - I	1824.53	1826.51
2.253	1823.07	1825.05
2.199	1821.24	1823.22
2.180	1820.60	1822.58
2.167	1820.30	1822.28
2.151	1819.13	1821.11
2.115	1818.37	1820.35
2.080 - H	1815.94	1817.92

Note: Datum Conversion NGVD + 1.98=NAVD

N

SCALE: Hor: 1"=200'

200 0 200 400

SCALE IN FEET

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

TT410 - 11TH AVENUE
JOY RANCH ROAD TO IRVINE ROAD
CONDITIONAL LETTER OF MAP REVISION (CLOMR)

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	AWH	07/31/14
DRAWN	PK	07/14/14
CHECKED	LAV	07/31/14

POST-PROJECT TOPOGRAPHIC WORKMAP

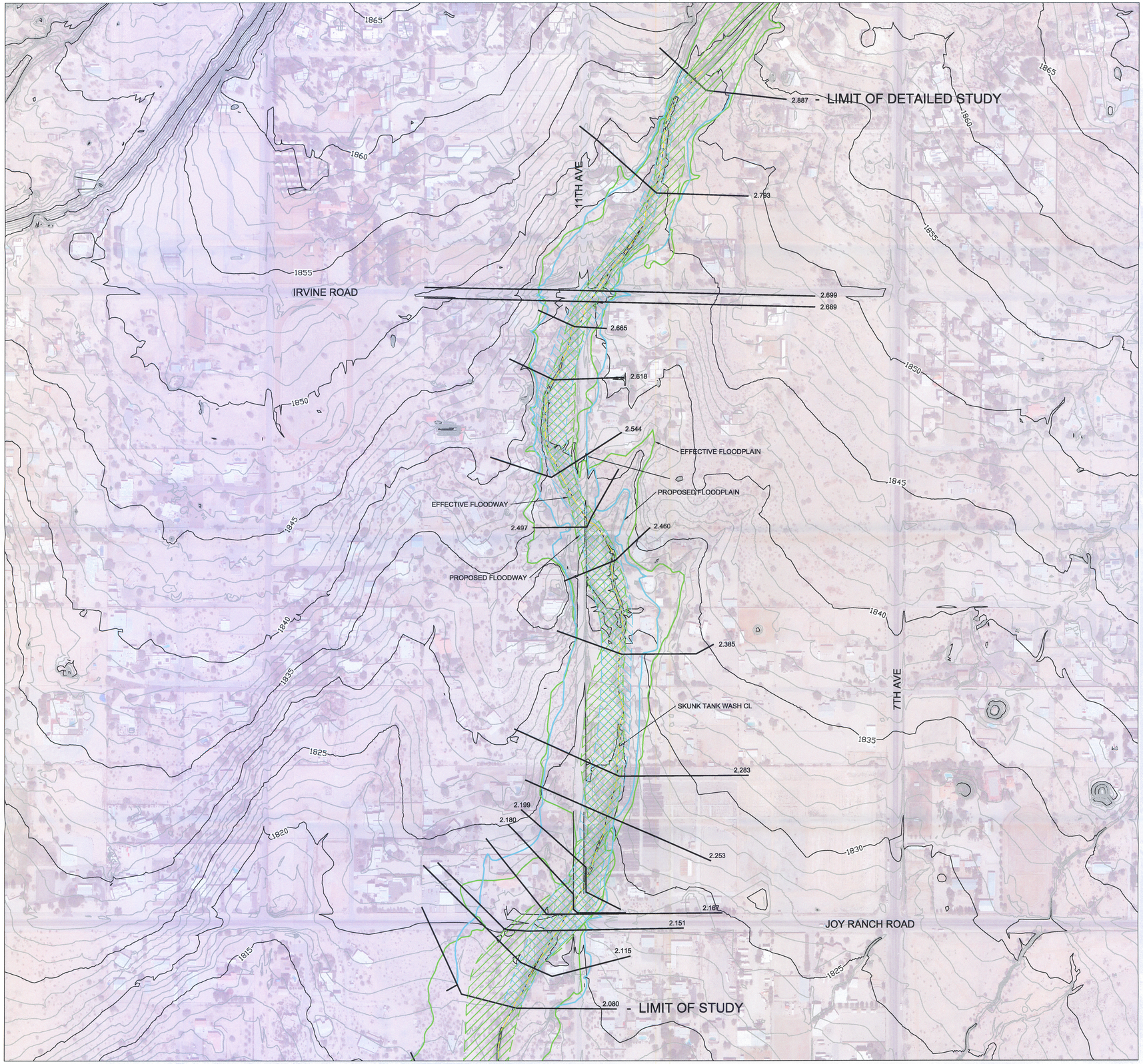
SHEET 1 OF 1

$DATE$
$TIME$
$FILE$

$DATE$

$TIME$

$FILE$



LEGEND

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N

SCALE: Hor: 1"=200'

200 0 200 400

SCALE IN FEET

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

TT410 - 11TH AVENUE
JOY RANCH ROAD TO IRVINE ROAD
CONDITIONAL LETTER OF MAP REVISION (CLOMR)

	BY	DATE
DESIGNED	AWH	07/31/14
DRAWN	PK	07/14/14
CHECKED	LAV	07/31/14

PRELIMINARY NOT FOR CONSTRUCTION

ANNOTATED TOPOGRAPHIC WORKMAP

SHEET 1 OF 1

$DATE$

$TIME$

$FILE$

NOTES TO USERS

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

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

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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

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

The **projection** used in the preparation of this map was Arizona State Plane Central zone (FIPSZONE 0202). The **horizontal datum** was NAD 83 HARN, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988 (NAVD 88). These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. Map users wishing to obtain flood elevations referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29) may use the following Maricopa County website application: http://www.fcd.maricopa.gov/Maps/gismaps/apps/gdacs/application/index.cfm

This web tool allows users to obtain point-specific datum conversion values by zooming in and hovering over a VERTCON checkbox on the layers menu on the left side of the screen. The VERTCON grid referenced in this web application was also used to convert existing flood elevations from NGVD 29 to NAVD 88.

To obtain current elevation, description, and/or location information for National Geodetic Survey bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at http://www.ngs.noaa.gov. To obtain information about Geodetic Densification and Cadastral Survey bench marks produced by the Maricopa County Department of Transportation, please visit the Flood Control District of Maricopa County website at:
http://www.fcd.maricopa.gov/Maps/gismaps/apps/gdacs/application/index.cfm.

Base map information shown on this FIRM was derived from multiple sources. Aerial imagery was provided in digital format by the Maricopa County Department of Public Works, Flood Control District. The imagery is dated October 2009 to November 2009. Additional National Agricultural Imagery Program (NAIP) imagery was provided by the Arizona State Land Department (ALRIS) and is dated 2007. The coordinate system used for the production of the digital FIRM is State Plane Arizona Central NAD83 HARN, International Feet.

The **profile baseline** depicted on this map represents the hydraulic modeling baselines that match flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

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

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

For Information on available products associated with this FIRM, visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

If you have **questions about this map,** how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/.

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0855L

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 855 OF 4425

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

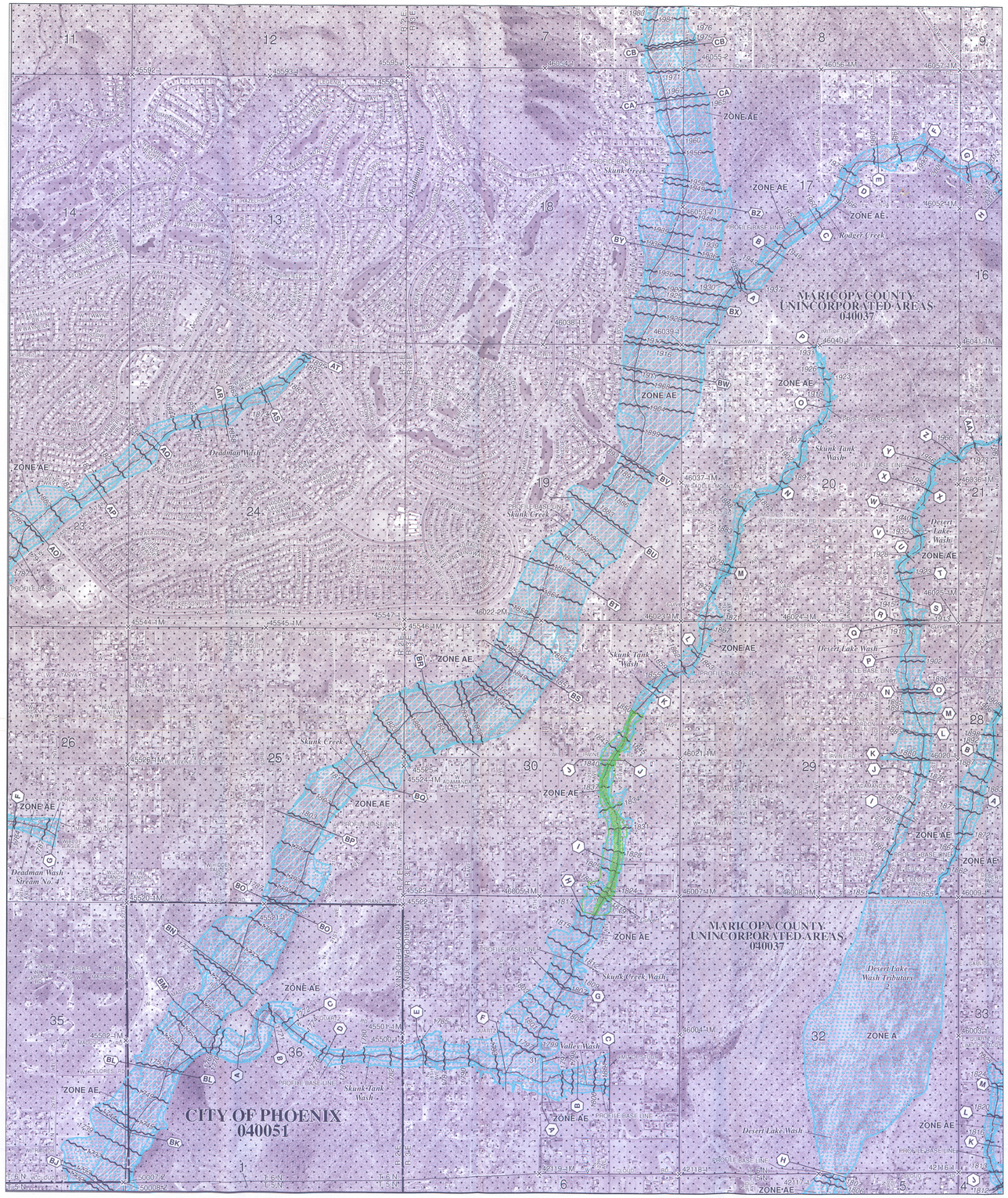
COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	0855	L
PHOENIX, CITY OF	040051	0855	L

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

MAP NUMBER
04013C0855L

MAP REVISED
OCTOBER 16, 2013

Federal Emergency Management Agency



LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A — A: Cross section line
- 23 — 23: Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000mN — 1000-meter Universal Transverse Mercator grid ticks, zone 12
- 6000000 M — 5000-foot grid ticks: Arizona State Plane coordinate system, central zone (FIPSZONE 0202), Transverse Mercator
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

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

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
December 3, 1993 September 30, 1995 July 19, 2001 September 30, 2005
October 16, 2013 –to update corporate limits, to advance suffix, to add base flood elevation, to add special flood hazard areas, to incorporate previously issued letters of map revision, to change floodway, to add roads and road names, to add floodway, and to change base flood elevations.

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

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

LEGEND

- REVISED ZONE AE FLOODPLAIN
- REVISED ZONE AE FLOODWAY

N

SCALE: Hor: 1"=800'

800 0 800 1,600

SCALE IN FEET

MARICOPA COUNTY
DEPARTMENT OF TRANSPORTATION

TT410 - 11TH AVENUE
JOY RANCH ROAD TO IRVINE ROAD
CONDITIONAL LETTER OF MAP REVISION (CLOMR)

ANNOTATED D-FIRM
MARICOPA COUNTY, ARIZONA
MAP NUMBER 04013C0855L
PANEL 855 OF 4425

SKUNK TANK WASH
CONDITIONAL LETTER OF MAP REVISION

ANNOTATED TOPOGRAPHIC WORKMAP