FLOOD CONTROL DISTRICT
OF
MARICOPA COUNTY

2801 WEST DURANGO STREET
PHOENIX, ARIZONA 85009

FLOODPLAIN DELINEATION OF THE TOLLESON AREA

FINAL REPORT

AND

TECHNICAL DATA NOTEBOOK

FCDMC CONTRACT NO. 95-26

May, 1999

Registered Professional Engineer (Civil)
CERTIFICATE NO.
21684
BRIAN J.
FRY
Date Signed 5-24-99
ARIZONA, U.S.A.

PREPARED BY:

DIBBLE & ASSOCIATES
2633 East Indian School Rd., Suite 401
Phoenix, AZ 85016-6763
(602) 957-1155

JE Fuller/ Hydrology & Geomorphology, Inc.
5235 South Kyrene, Suite 205
Tempe, AZ 85283
(602) 752-2124

Registered Professional Engineer (Civil)
CERTIFICATE NO.
29325
BRIAN R.
ISERMAN
Date Signed 5/24/99
ARIZONA, U.S.A.

FLOOD CONTROL DISTRICT
OF
MARICOPA COUNTY
2801 WEST DURANGO STREET
PHOENIX, ARIZONA 85009

Property of
Flood Control District of MC Library
Please Return to
2801 W. Durango
Phoenix, AZ 85009

FLOODPLAIN DELINEATION OF THE TOLLESON AREA

FINAL REPORT

AND

TECHNICAL DATA NOTEBOOK

FCDMC CONTRACT NO. 95-26

May, 1999

Registered Professional Engineer (Civil)
CERTIFICATE NO.
21684
BRIAN J.
FRY
Date Signed 5-24-99
ARIZONA, U.S.A.

PREPARED BY:

DIBBLE & ASSOCIATES
2633 East Indian School Rd., Suite 401
Phoenix, AZ 85016-6763
(602) 957-1155

JE Fuller/ Hydrology & Geomorphology, Inc.
5235 South Kyrene, Suite 205
Tempe, AZ 85283
(602) 752-2124

Registered Professional Engineer (Civil)
CERTIFICATE NO.
29325
BRIAN R.
ISERMAN
Date Signed 5/24/99
ARIZONA, U.S.A.

Flood Control District of Maricopa County
Tolleson Area Floodplain Delineation Study

Table of Contents

Section 1.0: Introduction
1.1 Purpose of Study
1.2 Authority for Study
1.3 Location of Study
1.4 Summary of Methodology
1.5 Coordination and Acknowledgments
1.6 Study Results

Section 2.0: FEMA Forms & ADWR Abstracts

Section 3.0: Survey & Mapping Information
3.1 Field Survey Information
3.2 Mapping

Section 4.0: Hydrology
4.1 Method Description

Section 5.0: Hydraulics
5.1 Method Description
5.1.1 Ponding Areas
5.1.1.1 Stage-Volume Curves
5.1.1.2 Stage-Discharge Curves
5.1.2 Riverine Floodplains - Flow Between Adjacent Ponding Areas
5.1.3 Coordination of Hydrologic Analyses with Hydraulic Analyses
5.2 Work Study Maps
5.3 Parameter Estimation
5.3.1 Roughness Coefficients
5.3.2 Expansion & Contraction Coefficients
5.4 Cross Section Description
5.5 Modeling Considerations
5.5.1 Hydraulic Jump and Drop Analysis
5.5.2 Bridges & Culverts
5.5.3 Levees & Dikes
5.5.4 Islands & Flow Splits
5.5.5 Ineffective Flow Areas
5.5.6 Supercritical Flow
5.5.7 Flow in Canals
5.6 Floodway Modeling
5.7 Problems Encountered During the Study
5.7.1 Special Problems & Solutions

Table of Contents (continued)

Exhibit Maps (bound separately)

Hydraulics Work Study Map Index
Hydraulics Work Study Maps

Registered Professional Engineer (Civil)
CERTIFICATE NO.
21684
BRIAN J.
FRY
Date Signed 5-24-99
ARIZONA, U.S.A.

Registered Professional Engineer (Civil)
CERTIFICATE NO.
29325
BRIAN R.
ISERMAN
Date Signed 5/24/99
ARIZONA, U.S.A.

Tolleson Area Floodplain Delineation Study

Section 1.0: Introduction

1.1 Purpose of Study

This Flood Delineation Study revises and updates information on the existence and severity of flood hazards by using detailed methods for the ponding areas upstream of the Roosevelt Irrigation District canal (RID) and the Southern Pacific Railroad (SPRR) in west-central Maricopa County, Arizona. The floodplains along the RID and SPRR were previously studied by approximate methods. Since the time of the original study, the methodology for hydrologic modeling has been revised by Maricopa County and new topographic mapping has been developed. This re-study includes new hydrologic modeling of the watershed, as well as detailed mapping of ponding areas upstream of the RID and portions of the SPRR. The study area includes portions of the City of Tolleson, the City of Phoenix, the City of Avondale, and unincorporated Maricopa County.

The City of Tolleson, the City of Phoenix, the City of Avondale and Maricopa County will use the information in this floodplain delineation study to regulate floodplain development, to promote sound land use practices, and for floodplain management.

1.2 Authority for Study

The hydrologic and hydraulic analyses for this study were performed by Dibble & Associates, in association with their subcontractors, JE Fuller/ Hydrology & Geomorphology, Inc. (JEF), and Urban Engineering (UE), for the Flood Control District of Maricopa County (FCDMC), under contract #FCD 95-26. The project managers for the Tolleson Area Floodplain Delineation Study were Tim Murphy/ FCDMC and Brian Fry/ Dibble. This study was completed in March 1999.

1.3 Location of Study

The Tolleson Area FDS study area is located within portions of the City of Phoenix, the City of Tolleson, the City of Avondale, and unincorporated Maricopa County (Figure 1.1). The flooding areas studied are generally located in Township 1 North, Range 1 East (T1N, R1E) and Township 1 North, Range 2 East (T1N, R2E). The Tolleson Area Floodplain Delineation study area includes reaches of ponded urban and agricultural runoff, as well as riverine-like flow upstream of, and parallel to, the SPRR and RID.

Two types of flood-prone areas were identified for the Tolleson Area FDS: (1) ponding

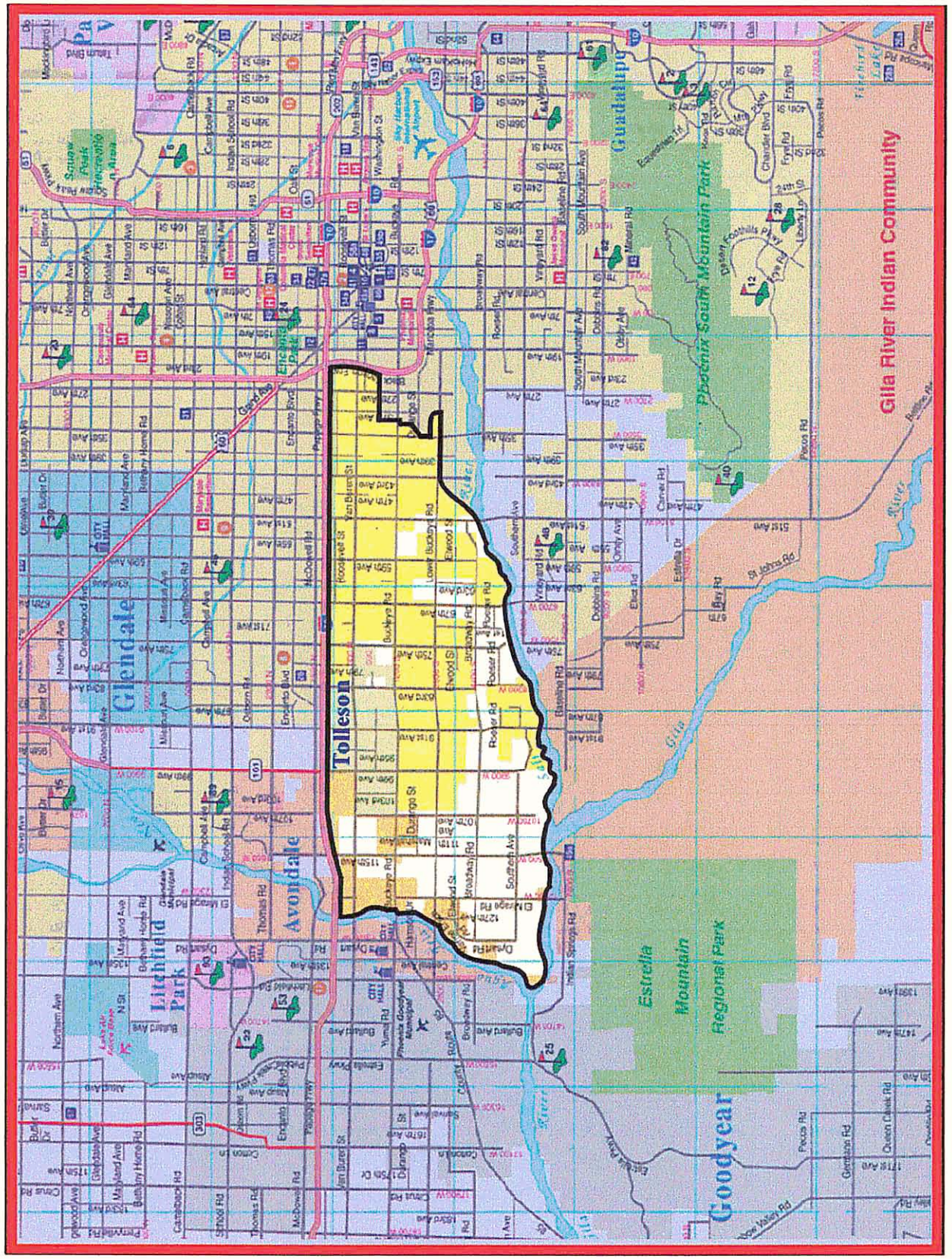

Tolleson
Glendale
Litchfield Park
Avondale
Guadalupe
Phoenix South Mountain Park
Gila River Indian Community
Estrella Mountain Regional Park
Goodyear

Figure 1.1

reaches, and (2) riverine-like floodplain reaches. Two main obstructions cause ponding within the study area: the RID canal and the SPRR grade (Figure 1.2). The RID flows due west from 35th Avenue to about 59th Avenue, before turning to the northwest along an irregular alignment until it passes under I-10 near 91st Avenue and leaves the study area. The SPRR crosses the study area along an east-west alignment from I-17 to the Agua Fria River. Ponding area reaches mapped using detailed methods for this study include the area upstream of the RID canal between 35th Avenue and I-10, and the area upstream of the SPRR between 69th Avenue and the Agua Fria River. Local ponding areas east of 69th Avenue along the SPRR were identified for hydrologic modeling purposes, but were not mapped as part of this study.

Riverine-type floodplains also occur in the study area. These floodplains are not defined rivers or streams, but consist of unconfined flow between adjacent ponding areas. These riverine-type floodplains occur where storm water runoff flows over the hydraulic control from one ponding area, and flows parallel to the SPRR or the RID, and enters the next downstream ponding area. These floodplains were modeled using the HEC-RAS hydraulic model along the RID/SPRR alignment from 69th Avenue to 83rd Avenue, and along the SPRR alignment from 75th Avenue to the El Mirage Road alignment.

1.4 Summary of Methodology

Floodplain areas are delineated using HEC-1 and HEC-RAS computer models. Ponding areas upstream of the SPRR and RID are modeled using HEC-1 routing subroutines. Hydrographs generated in the HEC-1 model are routed through ponding areas. Storage-elevation relationships for each ponding area are estimated using the FCDMC digital terrain model (DTM). Outflow from ponding areas is modeled using an irregular weir program and surveyed profiles of weirs that contained the ponding areas. Where outflow from the ponding areas is not controlled by weir flow, water surface elevations are modeled using the HEC-RAS model.

For two portions of the study area, from 69th Avenue to 83rd Avenue along the RID/SPRR, and from 75th Avenue to El Mirage Road along the SPRR, riverine-type flow between adjacent ponding areas is modeled using HEC-RAS. Flow between ponding areas consists of low velocity discharge, urban sheet flow, and ineffective flow. Therefore, no floodways are delineated in the flood-prone areas modeled using HEC-RAS. Topographic data for HEC-RAS modeling was obtained from the FCDMC DTM.

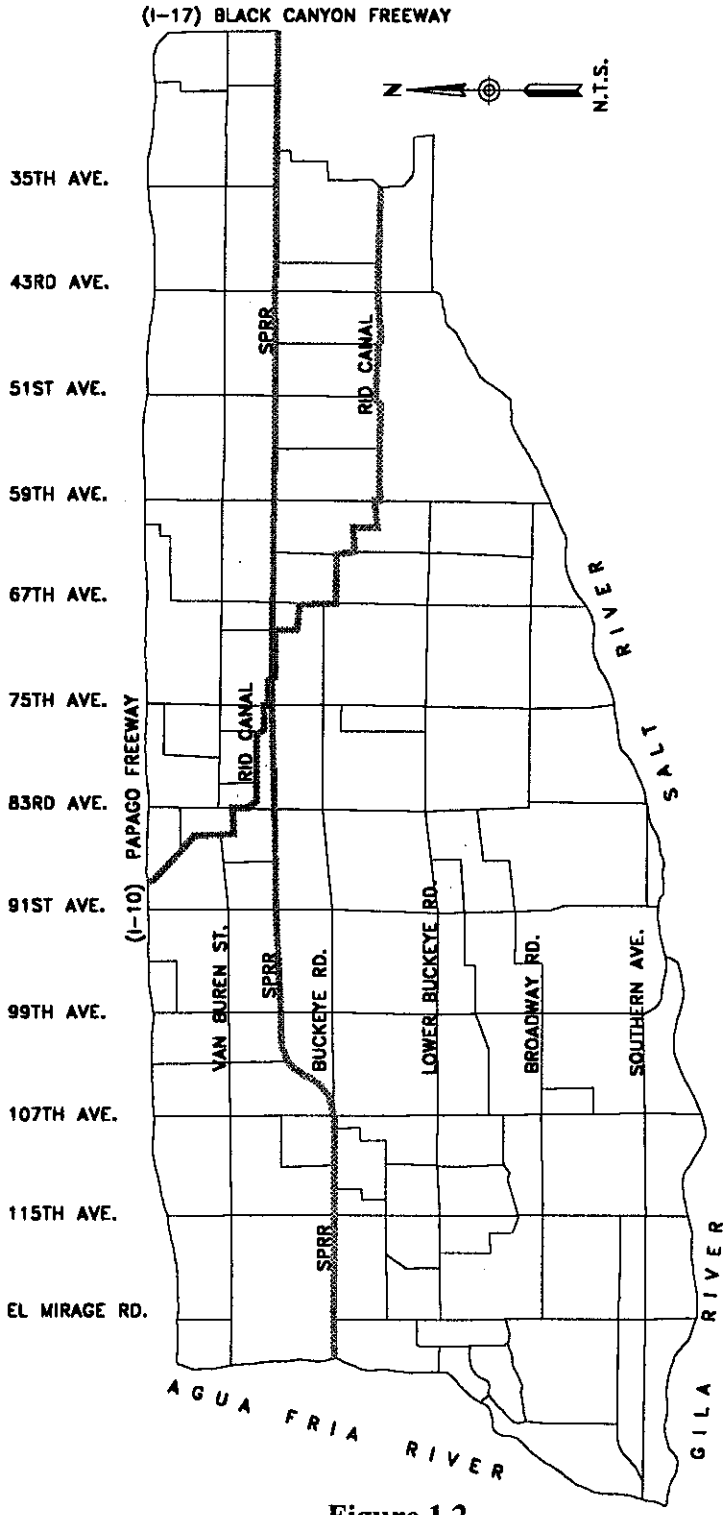

(I-17) BLACK CANYON FREEWAY
N
N.T.S.
35TH AVE.
43RD AVE.
51ST AVE.
59TH AVE.
67TH AVE.
75TH AVE.
83RD AVE.
91ST AVE.
99TH AVE.
107TH AVE.
115TH AVE.
EL MIRAGE RD.
(I-10) PAPAGO FREEWAY
VAN BUREN ST.
SPRR
RID CANAL
BUCKEYE RD.
LOWER BUCKEYE RD.
BROADWAY RD.
SOUTHERN AVE.
SALT RIVER
GILA RIVER
AGUA FRIA RIVER

Figure 1.2

The following agencies were contacted for information, published reports and manuals, and comments during the study:

- Arizona Department of Transportation (ADOT)
- Arizona Department of Water Resources (ADWR)
- Roosevelt Irrigation District (RID)
- Federal Emergency Management Agency (FEMA)
- Flood Control District of Maricopa County (FCDMC)
- Southern Pacific Railroad (SPRR)
- City of Tolleson
- City of Phoenix
- City of Avondale
- U.S. Army Corps of Engineers (COE)
- U.S. Geological Survey (USGS)
- U.S.D.A. Natural Resource Conservation Service (NRCS)

Vertical control data, used to establish the network of elevation reference marks, was obtained from the U.S. Department of Commerce, Coast and Geodetic Survey.

The study was publicized in local newspapers, and subsequent responses from the public were noted or discussed. Letters concerning right-of-entry for surveying purposes were sent to all property owners along the RID and the SPRR. Intermediate review meetings were conducted between the personnel of Dibble & Associates, JEF, UE, and FCDMC.

1.6 Study Results

This study indicates that flooding occurs in areas located upstream of the SPRR and RID embankments in the City of Phoenix, the City of Tolleson, the City of Avondale and unincorporated Maricopa County. Flood Insurance Rate Panels (FIRM) were revised for ponding and riverine-type reaches based on HEC-1 and HEC-RAS modeling.

Section 2.0: FEMA Forms & ADWR Abstracts

The FEMA forms (MT-2 Form 1, 3, 4 and 5) are included at the end of the report text.

STUDY DOCUMENTATION ABSTRACT									
INITIAL STUDY		RESTUDY	x	LOMR		CLOMR		OTHER	

Section 2.1. Study Documentation Abstract for FEMA Submittals		
2.1.1	Date Study Accepted	
2.1.2	Study Contractor: Contacts Address Phone Internal Reference No. Subconsultants	Dibble & Associates Brian Fry, P.E. 2633 East Indian School Rd., Suite 401 Phoenix, AZ 85016-6763 (602)957-1155 Dibble Job No. 9532 JEFuller/ Hydrology & Geomorphology, Inc. Urban Engineering
2.1.3	FEMA Technical Review Contractor Address Phone Internal Reference Number	 Michael Baker, Jr., Inc. Alexandria, Virginia (703)960-8800 00-09-009P
2.1.4	FEMA Regional Reviewer Phone	Michael K. Buckley, P.E., Chief FEMA Hazard Identification Branch (202)646-3932
2.1.5	State Technical Reviewer Phone	Brian T. Cosson Arizona Department of Water Resources (602)417-4100
2.1.6	Local Technical Reviewer Phone	Timothy M. Murphy Flood Control District of Maricopa County (602)506-1501

2.1.7	Reach Description	a. Roosevelt Irrigation District Canal 35th Avenue to Interstate 10 Approximately 9 miles *FIRM Panels*: 04013C2120 E; 04013C2115 E; 04013C2105 D a. Southern Pacific Railroad 69th Avenue to Agua Fria River near El Mirage Road Approximately 6 miles *FIRM Panels*: 04013C2105 D; 04013C2080 G; 04013C2085 E; 04013C2090 F; 04013C2095 D
2.1.8	USGS Quadrangle Sheets	Fowler, Arizona, 7.5 minute, 10' C.I. Photo Date: 1951 Latest Photo Revision: 1982 Tolleson, Arizona, 7.5 minute, 5' C.I. Photo Date: 1954 Latest Photo Revision: 1982
2.1.9	Unique Conditions and Problems	Ponding, urban sheet flow (non-riverine)
2.1.10	Coordination of Discharges (Agency, Date, Comments)	Local agency approval - See 2.1.6 above

Study Documentation Abstract for Local Government and ADWR Submittals		
Section 2.1: General Information		
2.1.1	Community	Tolleson, Arizona Phoenix, Arizona Avondale, Arizona Maricopa County (Unincorporated), Arizona
2.1.2	Community Number(s)	#040037 (Unincorporated Maricopa County) #040038 (City of Avondale) #040051 (City of Phoenix) #040055 (City of Tolleson)
2.1.3	County	Maricopa
2.1.4	State	Arizona
2.1.5	Date Study Accepted	LOMR Dated February 23, 2000
2.1.6	Study Contractor: Contacts Address Phone Internal Reference No. Subconsultants:	Dibble & Associates Brian Fry, P.E. 2633 East Indian School Rd., Suite 401 Phoenix, AZ 85016-6763 (602)957-1155 Dibble Job No: 9532 JEFuller/ Hydrology & Geomorphology, Inc. Urban Engineering
2.1.7	State Technical Reviewer Phone	Brian T. Cosson Arizona Department of Water Resources (602)417-4100
2.1.8	Local Technical Reviewer Phone	Timothy M. Murphy Flood Control District of Maricopa County (602)506-1501
2.1.9	River or Stream Name	Tolleson Area - ponding upstream of: a. Roosevelt Irrigation District Canal b. Southern Pacific Railroad

2.1.10	Reach Description	a. Roosevelt Irrigation District Canal 35th Avenue to Interstate 10 Approximately 9 miles *FIRM Panels*: 04013C2120 E; 04013C2115 E; 04013C2105 D a. Southern Pacific Railroad 69th Avenue to Agua Fria River near El Mirage Road Approximately 6 miles *FIRM Panels*: 04013C2105 D; 04013C2080 G; 04013C2085 E; 04013C2090 F; 04013C2095 D
2.1.11	Study Type	Detailed Study of Ponding Areas and Riverine analysis
Section 2.2: Mapping Information		
2.2.1	USGS Quadrangle Sheets	Fowler, Arizona, 7.5 minute, 10' C.I. Photo Date: 1951 Latest Photo Revision: 1982 Tolleson, Arizona, 7.5 minute, 5' C.I. Photo Date: 1954 Latest Photo Revision: 1982
2.2.2	Mapping for Hydrologic Study Type/Source: Scale: Date:	FCDMC Aerial Photography - Kenney Aerial Mapping, Inc. Maryvale ADMS Project Maps 1" = 200', 2 ft. Contour interval March 28, 1994 (Flight Date)
2.2.3	Mapping for Hydraulic Study 1. Type/Source: Scale: Date: 2. Type/Source: Date:	FCDMC Aerial Photography - Kenney Aerial Mapping, Inc. Maryvale ADMS Project Maps 1" = 200', 2 ft. Contour interval March 28, 1994 (Flight Date) Ground survey data along RID & SPRR Urban Engineering April 1996; September 1997; August 1998

Section 2.3: Hydrology		
2.3.1	Model or Method Used	U.S. Army Corps of Engineers' HEC-1 Model, Version 4.1, July 1997 and FCDMC Hydrologic Design Manual.
2.3.2	Storm Duration	24 Hours
2.3.3	Hyetograph Type	SCS Type II
2.3.4	Frequencies Determined	100-year (24-hr)
2.3.5	List of Gages Used in Frequency Analysis or Calibration	No stream gages in study area
2.3.6	Rainfall Amounts and Reference	3.99 inches (24-hr, 100-yr, D.A.=55 mi.^{2}) NOAA Atlas II, Volume III, presented in Hydrologic Design Manual for Maricopa County, Arizona (FCDMC, 1991)
2.3.7	Unique Conditions and Problems	None
2.3.8	Coordination of Discharge Estimates	Peak flows reviewed by FCDMC & ADWR
Section 2.4: Hydraulics		
2.4.1	Model or Method Used HEC-1: Version 4.1 (July 1997) HEC-RAS Version 2.1 (Oct. 1997) Irregular Weir, Ohio DWR (1987)	<u>Ponding Areas</u>: • Irregular weir (broad-crested) program for embankment overtopping rating curves • AutoCAD/EaglePoint™ software interpolation of Digital Terrain Model for ponding volume estimates, • HEC-1 storage routing to estimate pool elevations in ponding areas <u>Flow Between Ponding Areas</u> • HEC-RAS for flow along SPRR and RID between adjacent ponding areas
2.4.2	Regime	Subcritical in ponding areas and conveyance reaches.
2.4.3	Frequencies for Which Flood Limits Computed	100-year
2.4.4	Method of Floodway Calculation	No floodway delineated
2.4.5	Unique Conditions and Problems	See special problem reports

Section 3.0: Survey & Mapping Information

3.1 Field Survey Information

Horizontal control survey was conducted in April of 1996 by Urban Engineering Inc.(UE), under the direct supervision of Louis P. DePrisco, R.L.S. In addition to surveying for horizontal control, UE also collected data for profiles of the canal and railroad. Appendix C contains copies of UE's field books and cross section tests results for this project. During the floodplain delineation work, additional surveys were required for the canal and railroad profile between 75th and 83rd Avenues. That survey was conducted under the direct supervision of Arthur A. Witzell, R.L.S., and the survey notes are contained at the end of Appendix A.

3.2 Mapping

Topographic mapping was provided to the District by Kenney Aerial Mapping Inc. at 1"=200' scale and with 2-foot contours. This mapping was based on survey data provided by Kaminski-Hubbard Engineers and Project Engineering Consultants Inc. Vertical elevations are based on the National Geodetic Vertical Datum of 1929. Horizontal control uses Arizona State Plane Coordinates based on the 1927 North American Datum. The flight date for the mapping was March 28, 1994.

Section 4.0: Hydrology

The primary purpose of the hydrologic analysis is to provide runoff data for delineation of flood hazard areas upstream from the SPRR and the RID Canal. Runoff is computed for the 100-year, 24-hour storm. The hydrology model is extended in the downstream direction beyond the SPRR and RID Canal to provide a complete model to the Salt River or Gila River on the south and the Agua Fria river on the west. The resulting model will be used as a tool for managing the development of the watershed.

4.1 Method Description

Hydrology for the Tolleson area is developed using the U.S. Army Corps of Engineers, *HEC-1 Flood Hydrograph Package* (HEC-1) computer program. Guidance is given in the *Drainage Design Manual for Maricopa County, Arizona, Volume I, Hydrology* (DDM1) for application of the HEC-1 program within Maricopa County. Additionally, the computer program *Drainage Design Menu System* (DDMS) has been developed by the Flood Control District of Maricopa County to aid in the application of the methods described in DDM1. Features within the DDMS used for this study include *Computation of Precipitation Frequency-Duration Values in the Western United States* (PREFRE) and *Maricopa County Unit Hydrograph Procedure 2* (MCUHP2). The application of these tools is more specifically described in the companion volume *Floodplain Delineation of the Tolleson Area, Hydrology Report* and will not be repeated here.

Section 5.0: Hydraulics

5.1 Method Description

Two types of flood hazards along the upstream side of the embankments of the RID and the SPRR were studied by detailed methods for the Tolleson Area Floodplain Delineation Study: (1) ponding areas, and (2) riverine and/or sheet flow along the SPRR and RID between adjacent ponding areas. Storm water runoff in the study area generally flows toward the southwest, following the natural topography of the watershed. The RID and SPRR embankments are generally aligned east-west, creating obstructions to the southerly component of the natural runoff pattern. These obstructions divert the runoff to the west parallel to the RID and SPRR embankments. North-south aligned roadways, canal laterals, and other topographic features interrupt the diverted westerly component of flow along the embankments and create ponding areas. Within each subbasin upstream of the RID and SPRR, the depth of floodwater ponding is a function of the elevation of the RID and/or SPRR embankment on the south, the elevation of a roadway (or other type of) embankment to the west, the volume of floodwater delivered to the ponding area, and the rate of overflow for each embankment.

Different hydraulic modeling techniques are used for the two types of flood hazards. For ponding areas, flow hydraulics are modeled using an irregular weir rating program (ODWR, 1987) and HEC-1 (Version 4.1, July 1997) level-pool reservoir routing. Riverine and sheet flow between adjacent ponding areas is modeled using HEC-RAS (Version 2.1, October 1997).

The starting water surface elevation is discussed in Section 5.1.2 subsequently.

5.1.1 Ponding Areas. Much of the flooding in the study area occurs as the result of ponding upstream of the raised RID and SPRR embankments. The level-pool reservoir routing routine of HEC-1 (USCOE, 1990) is used to estimate ponding water surface elevations and to estimate flow rates between adjacent subbasins, based upon stage-storage-discharge data for each subbasin where ponding occurs. Stage-storage-discharge curves are developed in two basic steps:

(1) Estimation of stage-volume relationships from digital terrain models and detailed topographic mapping of the ponding areas.
(2) Estimation of stage-discharge relationships developed using detailed survey data and broad-crested weir flow equations for irregular weirs.

5.1.1.1 Stage-Volume Curves. Stage-volume curves for each subbasin are generated from the digital terrain model (DTM) provided by the FCDMC. The EaglePoint™ three-dimensional terrain modeling software package is used to estimate storage volumes for each reference contour within a potential ponding area for the areas of detailed ponding floodplain delineation.

5.1.1.2. Stage-Discharge Curves. Canal and railroad embankment overtopping was initially modeled as flow over irregular broad-crested weirs. Topographic data supplementing the FCDMC topographic mapping were obtained for each embankment profile from detailed field survey. For the RID canal, the top of the north and south canal embankments, and the top of the canal lining elevations were surveyed. The highest elevation for each surface surveyed was used to define the weir profile (control elevations). For the SPRR, the weir profile was defined by the highest top of rail elevation. For the north-south roadways, the centerline and curb elevations, or the highest continuous adjacent topographic feature was surveyed (e.g., an irrigation lateral) to define the overtopping weir profile.

The weir profiles are used in an irregular weir equation program developed by the U.S. Army Corps of Engineers (Ohio Dept. of Water Resources, 1987) to develop rating curves for each weir segment. Each ponding area typically has two controlling weirs:

(1) the east-west weir that controls runoff to the south (the RID or SPRR), and
(2) the north-south weir that controls runoff to the west.

These overtopping weir rating curves are then combined to generate the stage-discharge rating curve for the ponding area. The HEC-1 divert subroutine was used to split the overtopping flow to the south or west, according to the flow distribution determined for the overtopping weirs, as described in the hydrologic modeling section of this report.

5.1.2 Riverine Floodplains - Flow Between Adjacent Ponding Areas. The preliminary HEC-1 modeling results indicated that the ponding areas typically did not extend upstream to the next adjacent ponding area. HEC-1 routing further indicated that during the 100-year event, significant peak flows pass between adjacent ponding areas that would not be depicted by mapping only the ponding limits. Therefore, detailed mapping of the riverine and sheet flow between adjacent ponding areas is performed using the HEC-RAS model. Topographic data for HEC-RAS cross sections are obtained from the FCDMC digital terrain model using EaglePoint™ software. Supplemental ground elevation points, primarily for weirs or other hydraulic controls, are obtained from detailed field survey of the SPRR, RID, and roads conducted for this study or from the FCDMC topographic mapping.

The starting water surface elevation for the HEC-RAS profile is obtained from a storage routing at the ponding area adjacent to the Agua Fria flood control levee west of the El Mirage Avenue alignment performed by a private Study Contractor. The results of that storage routing is presented in Flood Insurance Rate Map Panel 2080, in a LOMR dated August 5, 1997. The starting water surface is at elevation 964.00.

5.1.3 Coordination of Hydrologic Analyses with Hydraulic Analyses. Initial HEC-RAS modeling results did not fully support the following assumptions made for the preliminary HEC-1 modeling at several of the ponding areas along the SPRR and RID:

- *Flow over the north-south drainage divides at the SPRR and RID ponding areas occurs as weir flow.* Flow over the north-south weir was found to be submerged, or controlled by backwater, at several of the ponding areas modeled by detailed methods.
- *Flow between adjacent ponding areas is contained by the SPRR and RID embankments.* HEC-RAS profiles indicated that overflow to the south occurs at several points between a few of the ponding areas modeled by detailed methods.

Therefore, to address these potential discrepancies, it was necessary to coordinate the results of the hydrologic analyses (HEC-1 modeling) with the hydraulic analyses (HEC-RAS and weir calculations) in several ways. Due to the interconnectedness of the HEC-1 and HEC-RAS models, it was necessary to iterate between the two models in a step-wise manner, from the upstream to downstream end of the study reach, to correctly estimate the 100-year discharge and account for storage and diversion losses at each node in the reaches studied by detailed method. The following iterative adjustments were made to the HEC-1 and HEC-RAS models.

First, weir calculations were used to establish the stage-storage-discharge relationships for each ponding area to be modeled in the preliminary HEC-1 models. Then, the outflow and diversion discharge rates estimated from the preliminary HEC-1 level pool routing through ponding areas were used for the preliminary HEC-RAS models. Second, where the HEC-RAS modeling indicated that the flow over the north-south roadways was submerged, the weir relationships used in the HEC-1 were replaced with rating curves based on HEC-RAS results. Then, the HEC-1 model was re-run to obtain revised discharge rates for use in the HEC-RAS models of the flow reaches between adjacent ponding areas. Where the HEC-RAS model indicated that flow over the weirs was not submerged, known water surface elevations based on the irregular weir calculations were entered into the HEC-RAS model. Third, where the HEC-RAS model indicated that the SPRR or RID could not contain flow along the embankment between the ponding areas (due to obstructions or lack of conveyance area), additional divert routines were added to the HEC-1 model to account for flow over the embankment between the ponding areas mapped by detailed methods.

Finally, for the purposes of floodplain delineation, where 100-year ponding elevations determined from the HEC-1 model are different than 100-year water surface profiles determined from the HEC-RAS model, the more conservative elevation is used.

5.2 Work Study Maps

Floodplain delineations based on HEC-1 and HEC-RAS modeling are shown on work study floodplain maps for the ponding and conveyance areas located along the SPRR and RID between 35th Avenue and theAgua Fria River near the El Mirage Avenue alignment (See Floodplain Delineation Maps). The 100-year ponding limits based primarily on HEC-1 modeling are shown for ponding areas along the upstream side of the RID between 35th Avenue and Interstate 10. The 100-year floodplain limits based on HEC-RAS modeling are depicted between 69th Avenue and

83rd Avenue along the RID, and between 69th Avenue and the Agua Fria River near the El Mirage Avenue alignment along the SPRR.

The downstream end of the modeling reach is located at the Agua Fria flood control levee west of the El Mirage Avenue alignment, and was designated River Mile 0.0. No continuous watercourse or defined flow path exists along the SPRR or RID modeling reach. Therefore, river mile stationing is based on the distance from River Mile 0.0 measured along the SPRR. In addition, channel cross section stationing is measured from the SPRR railroad grade, with the top of rail established as Station 5000.

No specific stream reaches are designated for the purposes of this study, although discharges and flow characteristics tended to vary at each cross section due to tributary inflows, diversions, obstructions, ponding, and impacts by development. Appendix G contains are reduced scale work maps showing cross section location, flow path alignment and 100-year floodplain limits.

5.3 Parameter Estimation

5.3.1 Roughness Coefficients. Manning's roughness coefficients, or "n" values, are determined using procedures adopted by the FCDMC. In addition, the following materials are used to support the analysis:

- Aerial Photographs: 1994 1:2,400 contact prints by Kenney Aerial Mapping, Inc. used for base mapping of study area.
- Ground Photographs: Color photographs taken during field reconnaissance trips.
- Field Data: Hydraulic information and geomorphic data gathered during field reconnaissance trips.

The typical FCDMC procedure consists of selection of a base "n" value and addition of several adjustment factors to determine a composite roughness coefficient for hydraulic modeling. The base "n" value accounts for roughness due to the bed material (Thomsen, 1991, Table 1). Adjustments to the base "n" value include factors for the degree of channel irregularity, obstructions, vegetation, variations in cross section geometry, and degree of meandering (Thomsen, 1991, Table 2). However, because the floodplains along the RID and SPRR are significantly different from typical riverine floodplains, an alternative methodology to select "n" values is used, as described below.

The 100-year flooding along the SPRR and RID to be modeled using HEC-RAS generally occurs as broad, unconfined, low-velocity runoff. Typical continuous riverine channels do not exist, and channel/overbank relationships probably do not apply within the HEC-RAS modeling reaches. Flow characteristics in these reaches may be more analogous to overbank flooding conditions than to channelized flow. Therefore, Manning's n values for the study reach reflect the land uses and cover types upstream of the SPRR and RID; and the FCDMC (Thomsen, 1991; Table 3) tables for floodplain "n" values are used to estimate Manning's n, as shown in Table 5.3.1.1 below.

Table 5.3.1.1. Tolleson Area Floodplain Delineation Study Typical "N" Values for HEC-RAS Modeling		
Description	**Average Value**	**Range**
Agricultural Areas		
Row Crops	0.035	0.025-0.045
Field Crops	0.040	0.030-0.050
Dense Trees & Brush	0.080	0.065-0.110
Vacant Land	0.030	0.025-0.035
Developed Areas		
Residential	0.075	0.024-0.150
Commercial/Industrial	0.080	0.024-0.150

In practice, "n" values were selected for each cross section based on features observed in the field and on the aerial photographs, using the typical values shown in Table 5.3.1.1 above. A composite "n" value is computed by the HEC-RAS model.

5.3.2 Expansion & Contraction Coefficients.

The default values of expansion and contraction coefficients, 0.1 and 0.3, respectively, are used in the HEC-RAS modeling. Significant and rapid changes in flow width occur in numerous places within the reaches mapped by detailed methods. However, rather than vary expansion and contraction coefficient in these low velocity zones and in ponding areas, ineffective flow boundaries are used to model flow expansion (4:1) and contraction (1:1) and to better simulate one-dimensional flow between ponding areas along the SPRR and RID.

5.4 Cross Section Description

HEC-RAS cross sections were spaced at 500 foot intervals, except where HEC-RAS rating curves were used to replace irregular weir ratings at the north-south control sections. In the latter locations, additional cross sections were added to the model immediately upstream and downstream of the north-south control feature to better model flow over the submerged obstruction. In general, cross sections are oriented north-south perpendicular to the SPRR and RID canal.

Due to the lack of a defined channel, the cross section "centerline" is located at the southernmost point of each cross section, at the SPRR or RID embankment. Cross section stationing is also controlled (Station = 5000) at the SPRR or RID embankment. Cross section data are obtained from the FCDMC digital terrain model using EaglePoint™ software, and are checked against the surveyed topographic data and the printed FCDMC topographic mapping for the study area.

5.5 Modeling Considerations

5.5.1 Hydraulic Jump and Drop Analysis. No hydraulic jumps were modeled in the study area. No drop structures exist in the areas mapped by detailed methods.

5.5.2 Bridges & Culverts. There are only four hydraulic structures that were identified within the

floodplain delineation study limits. First, there is a 24-inch R.C.P. culvert with a headwall located just east of Evergreen Vegetable, Inc. west of 91st Avenue. This culvert is partially blocked with sediment, but appears to adequately convey small nuisance flows under the SPRR. Second, there are two 24-inch R.C.P. culverts located east of 107th Avenue south of an active agricultural area. Both of the latter two culverts are partially blocked with sediment and debris, and probably convey only a insignificant amount of flood flow under the SPRR. Third, there are 2-24" CSP under a newly constructed railroad spur located east of 107th Avenue. This spur was constructed between the time of the original field reconnaissance visits and the most recent field visits. Fourth, there are 2-24" CSP under a railroad spur located west of 83rd Avenue. No as-built plans for any of the culverts were available, as noted in the Data Collection Report. Due to the small diameter of the culverts, low capacity relative to the regulatory discharge, high potential for debris clogging, and orientation perpendicular to the modeled flow direction, the culverts are not included in the HEC-1 routing calculations or HEC-RAS profiles.

There are no hydraulic structures that convey flow under the RID canal, nor are there any bridges located in the areas mapped by detailed methods.

5.5.3 Levees & Dikes. Hydrologic and hydraulic modeling of the RID and SPRR embankments, as well as other structures oriented perpendicular to the primary flow direction is described in Section 5.1 above. No levees or dikes oriented parallel to flow were identified within the reaches modeled by detailed methods. The flood elevations shown on the floodplain maps are considered valid only if the canal and railroad embankments do not fail during a 100-year flood event.

5.5.4 Islands & Flow Splits. Flow splits, or diversions, occur at most subbasin locations along the SPRR and RID, as described in Section 5.1 above. Flow diverted at the SPRR and RID embankments between 75th Avenue and 83rd Avenue is modeled as an island using the HEC-RAS reach definition option. The 100-year discharge is distributed between the two parallel flow paths based on the conveyance distribution at the upstream cross section. The two flow paths rejoin after the flow branch north of the RID ponds at 83rd Avenue and is diverted to the south toward the SPRR ponding area. The "island" separating the two flow paths consists only of the RID canal embankments, which are perched above the 100-year water surface elevation for most of this reach.

5.5.5 Ineffective Flow Areas. Ineffective flow areas comprise a significant portion of the mapped floodplain. Several types of ineffective flow areas are defined. First, the ponding areas mapped using HEC-1 are essentially areas of ineffective flow, since runoff must back up and weir flow over the SPRR, RID, or the north-south road weir. Second, structures such as chain link fences, densely packed storage areas, or buildings create ineffective flow areas in both the upstream and downstream direction. In general, 4:1 expansion boundaries are used to define ineffective flow immediately downstream of obstructions, and 1:1 contraction boundaries are used immediately upstream of obstructions. Third, several excavated areas are modeled as ineffective for conveyance. These excavated areas included local retention basins and closed topographic depressions (natural or man-made), particularly low areas located away from the main flow area. The latter two types of ineffective flow are coded as blocked obstructions in the HEC-RAS model where they are not located at the floodplain margins.

5.5.6 Supercritical Flow. No supercritical flow occurs in the reaches mapped using detailed methods. Froude numbers computed by the HEC-RAS indicate that flow is strongly subcritical, except where flow crosses the north-south obstructions as weir flow or as weakly submerged weirs. No floodway was delineated. Therefore, the criteria established for State Standard 3-94 "State Standard for Supercritical Flow" does not apply.

5.5.7 Flow in Canals. The RID canal itself was not considered a hydraulic feature (i.e., conveyance of flood water within the canal) for purposes of HEC-1 or HEC-RAS modeling or floodplain delineation for several reasons. First, while the open channel portions of the RID canal appear to have some available freeboard and excess capacity during normal flow conditions, most of the roadway crossings (culverts and bridges) do not. Many roadway and laterals cross the RID canal with less than 0.5 foot of freeboard. Several crossings appear to act as flumes or have inlet headwater pools. Therefore, it was assumed that overflow into the canal would tend to pond rather than be effectively conveyed downstream in the canal. Second, flood overflow from the watershed into the canal would probably load the canal with debris and further reduce capacity at roadway and lateral crossings. Third, given the length of the downstream control weirs along the RID canal, the capacity available in the canal above the normal flow is minimal, as shown in Table 5.5.7.1. That is, the weir inflow rate into the canal, even at low head, would be greater than the conveyance capacity (outflow) of the canal given the limited capacity at the roadway crossings.

Table 5.5.7.1. Tolleson Area FDS. Estimated Excess RID Canal Capacity vs. Possible Weir Inflow to Canal		
Feature	**Condition**	**Estimated Flow Rate**
Canal[1]	Normal Flow Rate (y = 6 ft.)	300 cfs
Canal[1]	Canal Full (y = 10 ft.)	800 cfs
Canal[2]	Excess Canal Capacity Available	500 cfs
Crossing	Bridge With Tailwater = Canal Full	0 cfs
Weir[3]	Subreach Segment (L = 0.5 mi., H = 2 in.)	500 cfs
Weir[3]	Entire RID (L = 9 mi., H = 1 in.)	3,100 cfs

Notes:
1. Canal rating estimated using Manning, assuming 1:1 side slopes, 10 ft. depth, 0.03% slope, n=.02.
2. Canal full rating neglects limited capacity at roadway and lateral crossings.
3. Weir flow assumes C = 2.7

5.6 Floodway Modeling

No floodway is recommended for the ponding areas or for the flow between adjacent ponding areas along the SPRR and RID. Encroachment in these areas would adversely affect the floodplain.

5.7 Problems Encountered During the Study

At the study onset, it was expected that all of the flooding occurring against the railroad or canal embankments would be ponded flow, and would be modeled as reservoir routes in the HEC-1 program. During the study, it was discovered that some areas are flooded due to flow conveyance between ponded areas. The HEC-RAS model was added to the study hydraulic computations in order to properly model these conveyance areas.

5.7.1 Special Problems & Solutions.

In one area, the Southern Pacific Railroad and RID canal are near each other, and excess runoff overtops the canal and flows to railroad. This area received special consideration due to the hydraulic complexity of flow. Canal overtopping is modeled using the uneven weir program, with input data taken from a field survey along the canal road. The resultant floodplain at this special problem area is depicted on Sheet 10 of the floodplain maps, near River Mile 6.0.

Upstream and downstream of the cross section at River Mile 1.582, there is a berm about 300 feet north of the railroad that is high enough to contain the 100-year flow. However, at River Mile 1.582, the berm is not high enough, and will allow backwater to flood the upstream and downstream areas. At River Mile 1.487, there is a large building that may or may not be out of the floodplain, depending upon its finished floor elevation. It is mapped within the floodplain. Both of these special problem areas are depicted on Floodplain Map Sheet 4.

Other special problems include overtopping the canal embankment, or the top of rail along the railroad. The uneven weir program is used to determine the overtopping discharge rate, which is

then reported on the floodplain maps using a large arrow and the words "Overflow Q=xxx cfs."

5.7.2 Modeling Warning & Error Messages.

Messages printed in the HEC-RAS output file include:
- critical depth warnings at north-south road crossings.
- vertical extensions at cross-section end points.

The critical depth warnings are normal for the flow conditions encountered in this study, and occur at roadways. The vertical cross-section extensions occur where runoff overtops the canal and flows to the railroad, and where runoff overtops the railroad and flows southerly.

5.8 Calibration

No known water surface elevations, historical flood records, or previous detailed studies are available from which to calibrate the hydraulic models or 100-year floodplain limits.

5.9 Final Results

5.9.1 Hydraulic Analysis Results.

The table presented in Appendix E.3 summarizes the results of the hydraulic analyses, for the areas modeled in the HEC-RAS computer program. For the ponding areas, the results of the reservoir routing is contained in the HEC-1 summary table presented in the companion volume *Floodplain Delineation of the Tolleson Area, Hydrology Report.* The final water surface elevations for ponding areas are reported on floodplain delineation maps.

5.9.2 Verification of Results. Limited verification of results was possible by comparing the results of HEC-RAS modeling of north-south roadway overflow with the results of the irregular or uneven weir program. In general, the HEC-RAS results were within 0.5 foot of the uneven weir program results, well within the accuracy of the mapping used. Additional verification was achieved through the iterative modeling procedure used to coordinate HEC-1 and HEC-RAS results.

Section 6: Erosion and Sediment Transport

No detailed erosion and sediment transport analyses were included in the Tolleson Area Floodplain Delineation Study. In general, the flood hazards considered in the study area included ponding, urban sheet flow, and low velocity flow between adjacent ponding areas. Therefore, the probable impact of scour and sedimentation on the flood hazards mapped for this study is insignificant.

Section 7: Draft FIS Report Data

7.1 Summary of Discharges

The following table presents the 100-year peak flow at selected locations within the study area. It should be observed that as the runoff proceeds downstream, there are discharge overflow areas that reduce the flowrate within the flooding source. The discharge overflow areas are shown on the Floodplain Delineation Maps.

Flooding Source and Location	Drainage Area (Square Miles)	100-year Peak Flow (cfs)
Roosevelt Irrigation District Canal		
at 51st Ave.	4.65	1,755
east of 59th Ave.	0.50	690
at 83rd Ave.	9.54	200
at Van Buren St., west of 83rd Ave	0.76	429
Southern Pacific Railroad		
at 75th Ave. (RM 6.532)	8.46	1,490
at 83rd Ave. (RM 5.539)	9.68	980
at 99th Ave. (RM 3.568)	12.12	850
at 107th Ave. (RM 2.352)	13.55	930
at Agua Fria River	15.90	220

7.2 Floodway Data

No floodway is recommended for the ponding areas or for the flow between adjacent ponding areas along the SPRR and RID. Encroachment in these areas would adversely affect the floodplain.

7.3 Annotated Flood Insurance Rate Map

The reduced-scale floodplain delineation maps are presented in Appendix G. Full size maps are bound separately. Overlay maps showing the revised floodplain delineation maps (work maps) reduced to the scale of the current effective FIRM maps have been submitted to FEMA.

7.4 Flood Profiles

The flood profiles are included on the lower portion of the floodplain delineation maps. A reduced-scale set is presented in Appendix G.

FEMA Forms for the Southern Pacific Railroad Embankment

MT-2 FORM 1	**Revision Requestor and Community Official Form**
MT-2 FORM 3	**Hydrologic Analysis Form**
MT-2 FORM 4	**Riverine Hydraulic Analysis Form**
MT-2 FORM 5	**Riverine / Coastal Mapping Form**

FEDERAL EMERGENCY MANAGEMENT AGENCY **REVISION REQUESTER AND COMMUNITY OFFICIAL FORM**	O.M.B No. 3067-0148 Expires April 30, 2001

Public reporting burden for this form is estimated to average 2.13 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

1. REQUESTED RESPONSE FROM FEMA

This request is for a:

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

☒ LOMR A letter from FEMA officially revising the current NFIP map to show the changes to floodplains, floodway or flood elevations. LOMRs typically decrease flood hazards. (See 44 CFR Ch. 1 Parts 60 & 65.)

☐ Other Describe:

2. OVERVIEW

1. The basis for this revision request is (are): (check all that apply)

☒ Physical Change ☐ Improved Methodology/Data ☐ Floodway Revision

☐ Other Describe:
Note: A photograph is not required, but is very helpful during review.

2. Flooding Source: Southern Pacific Railroad embankment

3. Project Name/Identifier: Floodplain Delineation of the Tolleson Area, Flood Control District of Maricopa County FCD No. 95-26

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

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

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Ex: 480301 480287	Katy, City Harris County	TX TX	480301 48201C	0005D 0220G	02/08/83 09/28/90
	See Attached Table				

6. The area of revision encompasses the following types of flooding and structures. Check all that apply.

Types of Flooding	Structures
☒ Riverine	☐ Channelization
☐ Coastal	☐ Levee/Floodwall
☐ Alluvial fan	☐ Bridge/Culvert
☒ Shallow Flooding (e.g. Zones AO and AH)	☐ Dam
☐ Lakes	☐ Fill
☐ Other (describe)	☐ Other (describe)

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

4. ENCROACHMENT INFORMATION

1. Does the State have jurisdiction over the floodway or its adoption by communities participating in the NFIP?
   ☐ Yes ☒ No

If Yes, attach a copy of a letter notifying the appropriate State agency of the floodway revision and documentation of the approval of the revised floodway by the appropriate State agency.

2. Does the development in the floodway cause the 1% annual chance (base) elevation to increase at any location by more than 0.000 feet? ☐ Yes ☐ No ☒ N/A

3. Does the cumulative effect of all development that has occurred since the effective SFHA was originally identified cause the base flood elevation to increase at any location by more than one foot (or other increase limit if community or state has adopted more stringent criteria - even if a floodway has not been delineated by FEMA)? ☐ Yes ☒ No

If the answer to either items is Yes, please attach documentation that all requirements of Section 65.12 of the NFIP regulations have been met, regarding evaluation of alternatives, notice to individual legal property owners, concurrence of CEO, and certification that no insurable structures are impacted.

5. MAINTENANCE RESPONSIBILITY

The community is willing to assume responsibility for ☐ performing ☐ overseeing compliance with the maintenance and operation plans of the
(Name)
flood control structure. If not performed promptly by an owner other than the community, the community will provide the necessary services without cost to the Federal government.

Operation and maintenance plans are attached. ☐ **Yes** ☐ **No** ☒ **N/A**

6. REVIEW FEE

The review fee for the appropriate request category has been included. ☐ Yes Fee amount: $

OR

This request is based on a federally sponsored flood-control project where 50 percent or more of the project's cost is federally sponsored, or the request is based on detailed hydrologic and hydraulic studies conducted by Federal, State, or local agencies to replace approximate studies conducted by FEMA and shown on the effective FIRM; thus the project is fee exempt.
☒ Yes

Please see Instructions for Fee Amounts

7. SIGNATURE

Note: **I understand that my signature indicates that all information submitted in support of this request is correct.**

Tim Murphy

Signature of Revision Requester

Tim Murphy, Project Manager
Printed Name and Title of Revision Requester

Flood Control District of Maricopa County
Company Name

Telephone No.: (602) 506-1501 Date: 9-20-99

Note: **Signature indicates that the community understands, from the revision requester, the impacts of the revision on flooding conditions in the community.**

Woodrow C. Scoutten

Signature of Community Official

Woodrow C. Scoutten, City Engineer
Printed Name and Title of Community Official

City of Tolleson
Community Name

Telephone No.: 623-386-4691 Date: 8-18-99

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is in accordance with 44 CFR Ch. 1, Sect 65.2

Brian J. Fry

Signature

Brian J. Fry, P.E., Project Manager
Printed Name and Title of Revision Requester

Reg. No. 21684 Expires (Date) 12/31/99 State AZ

Type of License/Expertise: Civil Engineer

Check which forms have been included with this request

Form Name and (Number)	Required if .....
☒ **Hydrologic** (3)	new or revised discharges
☒ **Hydraulic** (4)	new or revised water-surface elevations
☒ **Mapping** (5)	floodplain/floodway changes
☐ **Channelization** (6)	channel is modified
☐ **Bridge/Culvert** (7)	addition/revision of bridge/culvert
☐ **Levee/Floodwall** (8)	addition/revision of levee/floodwall
☐ **Coastal** (9)	new or revised coastal elevations
☐ **Coastal Structures** (10)	addition/revision of coastal structure
☐ **Dam** (11)	addition/revision of dam
☐ **Alluvial Fan** (12)	structures proposed on alluvial fan

City of Phoenix
STREET TRANSPORTATION DEPARTMENT

FLOOD CONTROL DISTRICT
RECEIVED
JUN 28 1999
P & PM
PROJ MGT
CONTRACT
FILE
REMARKS TMM

June 25, 1999

Mr. Timothy M. Murphy
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

Dear Tim:

RE: TOLLESON AREA FLOODPLAIN DELINEATION STUDY
(MCFCD NUMBER 95-26)

The City of Phoenix supports the submittal of the Tolleson Area Floodplain Delineation Study prepared by the Flood Control District of Maricopa County, to the Federal Emergency Management Agency (FEMA) for their review and approval. A portion of this study is within the boundary of the City of Phoenix. As part of the submittal, please show the current City boundaries on the maps submitted to FEMA, per the attached sketches.

We understand that the Flood Control District will act as the lead agency in this submittal, and that FEMA's approval of the study will result in a revision to the Flood Insurance Rate Maps. Upon approval by FEMA, please provide the City with a copy of all reports, reproducible plans and public information documentation.

If you have any questions, please contact me at 262-4026.

Sincerely,

Thomas E. Callow, P.E.
Interim Street Transportation Director

Cindy D White

Cindy D. White, P.E.
Floodplain Manager

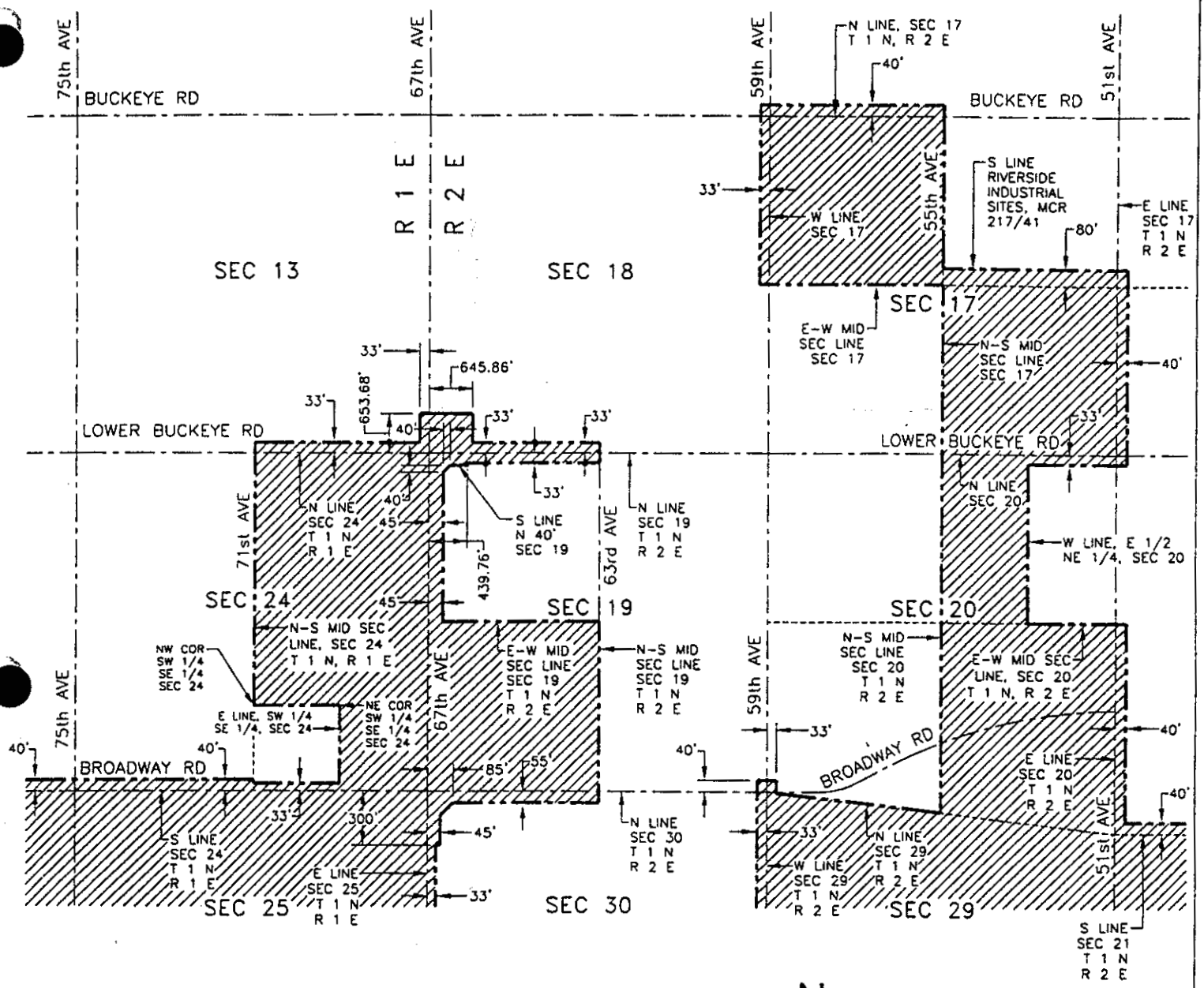
TEC/CDW/aff/990625a.wpd

Attachment

c: Mr. Matthews

200 West Washington Street, Fifth Floor, Phoenix, Arizona 85003-1611 602-262-6284 FAX: 602-495-2016

Recycled Paper



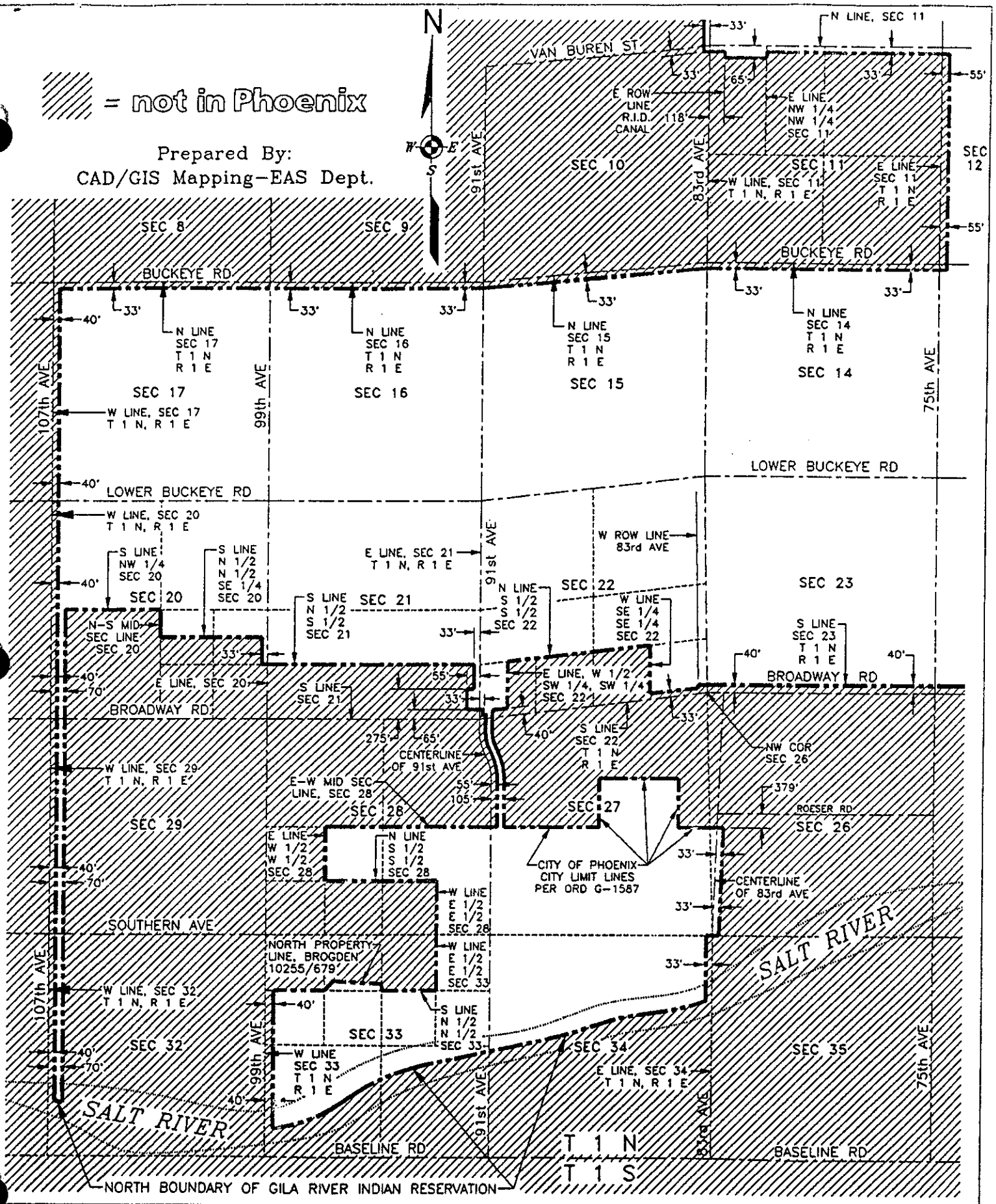
= not in Phoenix

Prepared By:
Geographic Technology-EAS Dept.

City of Phoenix
City Limits

ORD NO	LAST EFF ANNEX DATE	REV BY	ORD NO	LAST EFF ANNEX DATE	REV BY
G-3698	11-27-93	JWM	G-4180	6-12-99	JWM
G-4103	7-18-98	JWM			
G-4115	10-3-98	JWM			
G-4149	1-16-99	JWM			

PG NO
18



City of Phoenix
City Limits

ORD NO	LAST EFF ANNEX DATE	REV BY	ORD NO	LAST EFF ANNEX DATE	REV BY
G-3532	7-4-92	JWM			
G-3918	6-6-96	JWM			

PG NO
19

CITY OF AVONDALE

INCORPORATED 1946

COMMUNITY DEVELOPMENT DEPARTMENT ♦ 1225 SOUTH 4TH STREET
AVONDALE, ARIZONA 85323 ♦ PHONE (623) 932-6088 ♦ FAX (623) 932-6119

September 17, 1999

FLOOD CONTROL DISTRICT
RECEIVED
SEP 21 1999

CHENG		P & PM	
PIO			
ADMIN			
FINANCE		PWLMGT	
O & M		CONTRL	
ENGR		FILE	
REMARKS			

Mr. Timothy M. Murphy
Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ
85009

Dear Mr. Murphy:

RE: TOLLESON AREA FLOODPLAIN DELINEATION STUDY
(MCFCD NUMBER 95-26)

The City of Avondale Public Works Department and Community Development Department has reviewed the Tolleson Area Floodplain Delineation Study and supports the submittal of the study to the Federal Emergency Management Agency (FEMA) for their review and approval.

We understand that the Flood Control District will act as the lead agency in this submittal and that the approval of the study will result in a revision to the Flood Insurance Rate Maps. Presently there are many proposed projects within the City that may be affected by such revisions. Upon approval by FEMA, please provide the City with a copy of all reports, reproducible plans and public information documentation.

Sincerely,

Desmond McGeough
Community Development Planner

FEDERAL EMERGENCY MANAGEMENT AGENCY **HYDROLOGIC ANALYSIS FORM**	O.M.B No. 3067-0148 Expires April 30, 2001

Public reporting burden for this form is estimated to average **3.67** hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Note: Fill out one form for each flooding source studied

Community Name: Maricopa County, Incorporated and Unincorporated Areas

Flooding Source: Southern Pacific Railroad Embankment

Project Name/Identifier: Floodplain Delineation of the Tolleson Area, Flood Control District of Maricopa County, FCD No. 95-26

1. REASON FOR NEW HYDROLOGIC ANALYSIS

☐ No existing analysis ☒ Improved data ☐ Changed physical condition of watershed

☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Other

For the reason stated above, please attach a detailed explanation. If a computer program/model was used in revising the hydrologic analysis, **please provide a diskette with the input files** for the same flood recurrence intervals contained in the FIS for that stream; and at least for the 1% annual chance (base) flood where no detailed study exists.

Explanation provided: ☒ Yes ☐ No **Diskettes provided:** ☒ Yes ☐ No

2. METHODOLOGY FOR NEW ANALYSIS

Indicate Method	Required Data	Data Included
☐ Statistical Analysis of Gage Records	Form 3 - Attachment A	☐ Yes ☐ No
☐ Regional Regression Equations	Form 3 - Attachment C	☐ Yes ☐ No
☒ Precipitation/Runoff Model	Form 3 - Attachment D	☒ Yes ☐ No
☐ Other	Back-up computations and supporting data	☐ Yes ☐ No

3. APPROVAL OF ANALYSIS

The hydrologic analysis has already been approved by a local, state, or Federal Agency. ☒ Yes ☐ No ☐ Not Required

If Yes, attach evidence of approval. ☒ **Approval attached.** If No, attach explanation. ☐ **Explanation attached.**

4. COMPARISON OF BASE FLOOD DISCHARGES

Location:	Drainage Area (SqMi)	FIS(cfs)	Revised (cfs)
Flow rates not reported in effective Flood Insurance Study - see attached explanation.			

Note: When revised discharges are not significantly different than the FIS discharges, FEMA may require a confidence limits analysis (see attachment B) at a later date to complete the review.

If only a portion of a detailed study area was revised please attach an explanation describing the transition from the proposed discharges to the effective discharges. ☒ **Explanation Included** ☐ **Explanation Not Required**

5. HISTORICAL FLOODING INFORMATION

If historical data are available for the flooding source please provide: Location, peak discharges/water-surface elevations and dates, and source of information. ☐ **Data Attached** ☒ **Data Not Available**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

ATTACHMENT A: STATISTICAL ANALYSIS OF GAGE RECORDS

Gaging Station: N / A

Gage Location (latitude and longitude):

		FIS:		Revised:	
1.	Number of years of data				
	Systematic				
	Historical				
2.	Homogeneous data	☐ Yes	☐ No	☐ Yes	☐ No
3.	Data adjustments	☐ Yes	☐ No	☐ Yes	☐ No
4.	Number of high outliers				
	Low outliers				
	Zero events				
5.	Generalized skew				
6.	Station skew				
7.	Adopted skew				
8.	Probability distribution used (justify if log-Pearson III was not used)				
9.	Transfer equations to ungaged sites			☐ Yes	☐ No
	If Yes, specify method				
10.	Expected probability*			☐ Yes	☐ No
11.	Comparison of results with other analyses			☐ Yes	☐ No
	If Yes, describe comparison				
12.	**Attach analysis including plot of flood-frequency curve.**	**Analysis Attached?**		☐ Yes	☐ No

*FEMA does not accept expected probability analyses for the purpose of reflecting flood hazard information in a FIS.

If any data are not available, indicate by N/A.

ATTACHMENT B: CONFIDENCE LIMITS EVALUATION

Stream: N / A

Select one location for Confidence Limits Evaluation (*describe location*):

1. Discharges for selected location:

Exceedence Probability		FIS:	Revised:
10%	(10-year)	_____ cfs	_____ cfs
2%	(50-year)	_____ cfs	_____ cfs
1%	(100-year)	_____ cfs	_____ cfs
0.2%	(500-year)	_____ cfs	_____ cfs

2. 1% Annual Chance (Base) Flood Confidence Intervals

90% Confidence Interval:	5% limit	_____ cfs
	95% limit	_____ cfs
50% Confidence Interval:	25% limit	_____ cfs
	75% limit	_____ cfs

3. If the discharge of the base flood in the FIS is beyond the 50% confidence interval but within the 90% confidence interval, does the base flood elevation change by 1.0 foot or more? ☐ Yes ☐ No

An example of confidence limits analysis can be found in Appendix 9 of Bulletin 17B.

4. **Confidence Limits Analysis Attached?** ☐ Yes ☐ No

ATTACHMENT C: REGIONAL REGRESSION EQUATIONS

1. Bibliographical Reference:

   N /A

   (Attach a copy of title page, table of contents, and pertinent pages including equations.)

2. Gaged or ungaged stream:

3. Hydrologic region(s):
   Attach backup map.

4. Provide parameters, values, and source of data used to define parameters.

		FIS:		Revised:	
5.	Urbanized conditions calculations	☐ Yes	☐ No	☐ Yes	☐ No
6.	Percent of watershed urbanization				
7.	Is the watershed controlled?	☐ Yes	☐ No	☐ Yes	☐ No
8.	Comparison with other analyses	☐ Yes	☐ No	☐ Yes	☐ No

If the answer to 5, 7, or 8 is Yes, explain methdology below. If data are not available, indicate with N/A.

Comments

9. **Attach computation and supporting maps, delineating the watershed boundary and drainage area divides.**

   Computation and Supporting Maps provided? ☐ Yes ☐ No

ATTACHMENT D: PRECIPITATION/RUNOFF MODEL

		FIS:		Revised:	
1.	Method or model used:	Not Reported		HEC-1 Flood Hydrograph Pkg.	
	Version:			4.1	
	Date:			July 1997	
2.	Source of rainfall depth:	Not Reported		NOAA Atlas II, Volume III	
3.	Source of rainfall distribution:	Not Reported		SCS Type II	
4.	Rainfall duration:	24-hour		24-Hour	
5.	Areal adjustment to precipitation (%):	Not Reported		0.940	
6.	Maximum overland flow length	Not Reported		2.65 miles	
7.	Hydrograph development method:	Not Reported		Agricult. S-graph per FCDMC	
8.	Loss rate method:	Not Reported		Green and Ampt Infiltration Eq.	
	Source of soils information:			USDA SCS Soil Survey	
	Source of land use information:			Salt River Project and FCDMC	
9.	Channel routing method:	Not Reported		Normal Depth w/ Manning's	
10.	Reservoir routing:	☐ Yes	☒ No	☒ Yes	☐ No
11.	Baseflow considerations: **If Yes, explain below how baseflow was determined:**	☐ Yes	☒ No	☐ Yes	☒ No
12.	Snowmelt considerations:	☐ Yes	☒ No	☐ Yes	☒ No
13.	Model calibration: **If Yes, explain below how calibration was performed**	☐ Yes	☒ No	☐ Yes	☒ No
14.	Future land use condition: **If Yes, explain why below**	☐ Yes	☒ No	☐ Yes	☒ No

15. **Attach precipitation/runoff model, hydrologic model schematic, curve number calculations, time of concentration calculations, and supporting maps, delineating the watershed boundary and drainage area divides.**

Information and Maps provided? ☒ Yes ☐ No

NOTE: FEMA policy is to base flooding on existing conditions.

To Be Attached to MT-2 FORM 3 for Southern Pacific Railroad

In response to Item 1, Reason for New Hydrologic Analysis:
and in response to Item 4, Comparison of Base Flood Discharges:

A new hydrologic analysis is warranted because the review draft version of the Flood Insurance Study, City of Tolleson, prepared by Harris-Toups in August 1978, does not report flow rates. A full copy of that report is included with the Hydraulic Technical Notebook. The Harris-Toups study does report the volume of runoff in two locations. The study area has undergone significant development in the last twenty years, and a new hydrologic study is warranted.

Furthermore, the Flood Control District of Maricopa has prepared and adopted a hydrology design manual, which was not available at the time of the Harris-Toups study. The new manual updates and revises the hydologic calculation methods for the County. For this and the above reasons, a new hydrologic analysis is warranted.

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE HYDRAULIC ANALYSIS FORM**	O.M.B No. 3067-0148 Expires April 30, 2001

Public reporting burden for this form is estimated to average 2.25 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Note: Fill out one form for each flooding source studied

Community Name: Maricopa County, Incorporated and Unincorporated Areas

Flooding Source: Southern Pacific Railroad Embankment

Project Name/Identifier: Floodplain Delineation of the Tolleson Area, Flood Control District of Maricopa County, FCD No. 95-26

1. REACH TO BE REVISED

Describe the limits of the revision OR submit a copy of the FIRM with the revision area clearly highlighted.
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? ☐ Yes

Downstream Limit: Agua Fria River near El Mirage Rd.

Upstream Limit: 69th Avenue

2. MODELS SUBMITTED

Requirements: for areas which have detailed flooding:	**for areas which do not have detailed flooding**:
Full input and output listings along with files on diskette for each of the models listed below (items 1-4) and a summary of the source of input parameters used in the models must be provided. The summary must include a description of any changes made from model to model (e.g., Duplicate Effective model to Corrected Effective model). At a minimum, the Duplicate Effective (item 1) and the Revised or Post-Project Conditions (item 4) models must be submitted. See instructions for directions on when other models may be required.	Only the 100-year (Base) flood profile is required. A hydraulic model is not required for areas which do not have detailed flooding; however, BFEs may not be added to the revised FIRM. If a hydraulic model is developed for the area, items 3 and 4 described below must be submitted.

If hydraulic models are not developed, hydraulic analyses (including all calculations) for existing or pre-project conditions and revised or post-project conditions must be submitted.

1. Duplicate Effective Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name**
Copies of the hydraulic analysis used in the effective FIS, referred to as the effective models (10-, 50-, 100-, and 500-year multi-profile runs and the floodway run) must be obtained and then reproduced on the requester's equipment to produce the Duplicate Effective model. This is required to assure that the effective models input data has been transferred correctly to the requester's equipment and to assure that the revised data will be integrated into the effective data to provide a continuous FIS model upstream and downstream of the revised reach.

2. Corrected Effective Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name**
The Corrected Effective model is the model that corrects any errors that occur in the Duplicate Effective model, adds any additional cross sections to the Duplicate Effective model, or incorporates more detailed topographic information than that used in the currently effective model. The Correctly Effective model must not reflect any man-made physical changes since the date of the effective model. An error could be a technical error in the modeling procedures, or any construction in the floodplain that occurred prior to the date of the effective model but was not incorporated into the effective model.

3. Existing or Pre-Project Conditions Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name**
The Duplicate Effective model or Corrective Effective model is modified to produce the Existing or Pre-Project Conditions model to reflect any modifications that have occurred within the floodplain since the date of the Effective model but prior to the construction of the project for which the revision is being requested. If no modification has occurred since the date of the effective model, then this model would be identical to the Corrected Effective model or Duplicate Effective model.

4. Revised or Post-Project Conditions Model ☒ **Natural** **File Name** TOL_RAS.prj ☐ **Floodway** **File Name**
The Existing or Pre-Project Conditions model (or Duplicate Effective model or Corrected Effective model, as appropriate) is revised to reflect revised or post-project conditions. This model must incorporate any physical changes to the floodplain since the effective model was produced as well as the effects of the project. When the request is for the proposed project this model must reflect proposed conditions.

5. Other – Please attach a sheet describing all other models submitted along with the file names. ☐ **Natural** ☐ **Floodway**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. STARTING WATER-SURFACE ELEVATIONS

Explain how they were determined. Explanation Attached? ☒ Yes ☐ No

NOTE: If the effective study is an approximate study, the slope/area method is recommended.
For detailed analysis studies, using a known water-surface elevation is recommended.

4. RESULTS (from the model used to revise the 100-year water surface elevations)

If the results indicate any of the following, attach an explanation - to this form, or to the hydraulic model printout- as to the reasonableness of the situation.

☐ Supercritial depth ☒ Critical Depth ☐ Drawdowns ☐ Negative Floodway Surcharges

☐ Floodway Surcharges Greater Than Maximum Allowed by Community/State

☒ Water surface elevations higher than the end points of cross sections.

☐ Floodway discharge is different than the Natural 100-year (base) flood discharge.

☐ Project causes 100-year floodplain or floodway elevations to increase (state if increases are located off the requester's property)

Explanation attached with Form ☒ **Explanation provided on attached printout** ☐

If Hydraulic model used is HEC-2, has it been checked with FEMA'S CHECK-2 computer program ☐ **Yes** ☐ **No**
(see instructions for information on how to obtain CHECK-2)

5. REVISED FIRM/FBFM AND FLOOD PROFILES

1. Profile Transition

a. 100-Year Water-Surface Elevations - indicate the difference in water surface elevations where the project 100-year elevations tie into the existing 100-year water surface elevations at each end of the project.

Downstream End _____ within _____ (feet) Upstream End _____ within _____ (feet)
Cross-Section # *Cross-Section #*

b. Floodway Elevations - indicate the difference in water surface elevations where the project floodway elevations tie into the existing floodway water surface elevations at each end of the project.

Downstream End _____ within _____ (feet) Upstream End _____ within _____ (feet)
Cross-Section # *Cross-Section #*

c. Floodway widths - indicate the difference in floodway widths where the project floodway widths tie into the existing floodway width at each end of the project.

Downstream End _____ within _____ (feet) Upstream End _____ within _____ (feet)
Cross-Section # *Cross-Section #*

2. Profile Checklist (check box if information has been provided on profile)

The following information (unless in parentheses) must be included at the same scale as the existing profiles for this project:

☒ Stream Name ☐ Community Name ☐ Corporate Limits labeled ☒ Study limits labeled

☐ Confluences labeled ☒ Channel Stationing ☒ Streambed profiled ☒ Cross Sections labeled

☒ Horizontal/Vertical Scales indicated ☒ 100-year elevs profiled*

☒ Road Crossings ☒ Labeled ☐ Low Chord Elevations ☒ Top of Road Elevations

*All recurrence intervals in the effective study must also be profiled.

Floodway Data Table

Attach a Floodway Data Table for each cross section listed in the published Floodway Data table in the FIS report.

Floodway Data Table Attached ☐ **Yes** ☒ **Not Required**

To Be Attached to MT-2 FORM 4 For Southern Pacific Railroad

Response for Item 3. Starting Water Surface Elevations:

The starting water surface elevation for the HEC-RAS model is taken from the ponded water surface elevation from the effective Flood Insurance Rate Map, Panel 2080, revised to reflect LOMR Dated August 5, 1997. This elevation is 964.0, which occurs in a Zone AH floodplain.

Response for Item 4. Results (from the model used to revise the 100-year water surface elevations):

Water surface elevations higher than the end points of cross-sections:

At River Mile 1.138, 1.203 and 1.298, the water surface is above the top of rail for the railroad. This results in an overflow of 120 cubic feet per second to the south, which is identified on the floodplain maps (See Sheet 3 of the Floodplain Maps).

At River Mile 1.771, 1.856, 1.863, 1.870, 1.961 and 2.056, the railroad embankment is overtopped. This results in an overflow of 190 cubic feet per second to the south, which is identified on the floodplain maps (See Sheet 4 of the Floodplain Maps).

At River Mile 3.568, 3.583 and 3.665, the water surface is above the top of rail for the railroad. This results in an overflow of 360 cubic feet per second to the south, which is identified on the floodplain maps (See Sheets 6 and 7 of the Floodplain Maps).

At River Mile 5.319 and 5.370, the railroad embankment is overtopped. This results in an overflow of 240 cubic feet per second to the south, which is identified on the floodplain maps (See Sheet 8 of the Floodplain Maps).

At River Mile 5.539, the railroad embankment is overtopped. This results in an overflow of 350 cubic feet per second to the south, which is identified on the floodplain maps (See Sheet 10 of the Floodplain Maps).

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE / COASTAL MAPPING FORM**	O.M.B No. 3067-0148 Expires April 30, 2001

Public reporting burden for this form is estimated to average 1.5 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Note: Fill out one form for each flooding source studied

Community Name: Maricopa County, Incorporated and Unincorporated Areas

Flooding Source: Southern Pacific Railroad

Project Name/Identifier: Floodplain Delineation of the Tolleson Area, Flood Control District of Maricopa County, FCD No. 95-26

This is a ☒ Manual ☐ Digital submission. *Digital map submissions may be used to update digital FIRMs (DFIRMs). For updating DFIRMs, these submissions must be coordinated with FEMA Headquarters as far in advance as possible.*

1. MAPPING CHANGES

1. A topographic workmap must be submitted showing the following information (check N/A when not applicable):

a. Revised approximate 100-year floodplain boundaries (Zone A)	☐ Yes	☒ No	☐ N/A
b. Revised detailed 100- and 500-year floodplain boundaries.	☒ Yes	☐ No	☐ N/A
c. Revised floodway boundaries	☐ Yes	☐ No	☒ N/A
d. Location and alignment of all cross sections with stationing control indicated.	☒ Yes	☐ No	☐ N/A
e. Stream alignments, road alignments and dam alignments.	☒ Yes	☐ No	☐ N/A
f. Current community boundaries.	☐ Yes	☒ No	☐ N/A
g. Effective 100- year floodplain and floodway boundaries from FIRM/FBFM reduced or enlarged to the scale of the topographic workmap	☒ Yes	☐ No	☐ N/A
h. Tie-ins between the effective and revised 100-, 500-year and floodway boundaries	☐ Yes	☐ No	☒ N/A
i. The requester's property boundaries and community easements	☐ Yes	☒ No	☐ N/A
j. The signed certification of a registered professional engineer	☒ Yes	☐ No	☐ N/A
k. Location and description of reference marks	☒ Yes	☐ No	☐ N/A
l. Vertical datum (example: NGVD, NAVD)	☒ Yes	☐ No	☐ N/A
m. Coastal zone designations tie into adjacent areas not being revised	☐ Yes	☐ No	☒ N/A
n. Location and alignment of all coastal transects used to revise the coastal analyze	☐ Yes	☐ No	☒ N/A
o. V-zone has been delineated to extend landward to the heel of the primary frontal dune	☐ Yes	☐ No	☒ N/A

If any items are marked No or N/A please attach an explanation.

2. What is the source and date of the updated topographic information (example: orthophoto maps, July 1985; filed survey, May 1979, beach profile, June 1987 etc.)? aerial photography and photogrammetric methods using ground control survey, flight date 03/28/94.

3. What is the scale and contour interval of the following workmaps?

Effective FIS Scale 1 inch = 1000 feet Contour Interval N / A (only the FIRM is available).

Revision Request Scale 1 inch = 200 feet Contour Interval 2 feet

NOTE: Revised topographic information must be of equal or greater detail than effective.

4. Attach an annotated FIRM/FBFM at the scale of the effective FIRM/FBFM showing the revised 100- and 500-year floodplain and the floodway boundaries and how they tie into those shown on the effective FIRM/FBFM downstream and upstream of the revisions or adjacent to the area of revision for coastal studies. **FIRM/FBFM attached?** ☒ **Yes** ☐ **No**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. EARTH FILL PLACEMENT

1. The fill is: ☐ Existing ☐ Proposed

2. Has fill been/will be placed in the regulatory floodway? ☐ Yes ☐ No
If Yes, please attach completed Riverine Hydraulic Analysis Form (Form 4).

3. Has fill been/will be placed in floodway fringe (*area between the floodway and 100-year floodplain boundaries*)? ☐ Yes ☐ No

If Yes, then complete A, B, C, and D below.

a. Are fill slopes for granular materials steeper than one vertical on one-and-one-half horizontal? ☐ Yes ☐ No

If Yes, justify steeper slopes

b. Is adequate erosion protection provided for fill slopes exposed to moving flood waters? (*Slopes exposed to flows with velocities of up to 5 feet per second (fps) during the 100-year flood must, at a minimum, be protected by a cover of grass, vines, weeds, or similar vegetation; slopes exposed to flows with velocities greater than 5 fps during the 100-year flood must, at a minimum, be protected by stone or rock riprap.)*

☐ Yes ☐ No

If No, describe erosion protection provided

c. Has all fill placed in revised 100-year floodplain been compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test Method or acceptable equivalent method? ☐ Yes ☐ No

d. Can structures conceivably be constructed on the fill at any time in the future? ☐ Yes ☐ No

If Yes, attach certification of fill compaction (item 3c. above) by the community's NFIP permit official, a registered professional engineer, or an accredited soils engineer in accordance with Subparagraph 65.5(a)(6) of the NFIP regulations.

Fill certification attached ☐ **Yes** ☐ **No**

4. Has fill been/will be placed in a V zone? ☐ Yes ☐ No

If Yes, is the fill protected from erosion by a flood control structure such as a revetment or seawall?

☐ Yes ☐ No

If Yes, attach the Coastal Structures Form (Form 10).

FEMA Forms for the Roosevelt Irrigation District Canal Embankment

MT-2 FORM 1	**Revision Requestor and Community Official Form**
MT-2 FORM 3	**Hydrologic Analysis Form**
MT-2 FORM 4	**Riverine Hydraulic Analysis Form**
MT-2 FORM 5	**Riverine / Coastal Mapping Form**

FEDERAL EMERGENCY MANAGEMENT AGENCY **REVISION REQUESTER AND COMMUNITY OFFICIAL FORM**	O.M.B No. 3067-0148 Expires April 30, 2001

Public reporting burden for this form is estimated to average 2.13 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

1. REQUESTED RESPONSE FROM FEMA

This request is for a:

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

☒ LOMR A letter from FEMA officially revising the current NFIP map to show the changes to floodplains, floodway or flood elevations. LOMRs typically decrease flood hazards. (See 44 CFR Ch. 1 Parts 60 & 65.)

☐ Other Describe:

2. OVERVIEW

1. The basis for this revision request is (are): (check all that apply)

☒ Physical Change ☐ Improved Methodology/Data ☐ Floodway Revision

☐ Other Describe:

Note: A photograph is not required, but is very helpful during review.

2. Flooding Source: Roosevelt Irrigation District Canal embankment

3. Project Name/Identifier: Floodplain Delineation of the Tolleson Area, Flood Control District of Maricopa County, FCD No. 95-26

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

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

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Ex: 480301 480287	Katy, City Harris County	TX TX	480301 48201C	0005D 0220G	02/08/83 09/28/90
	See Attached Sheet				

6. The area of revision encompasses the following types of flooding and structures. Check all that apply.

Types of Flooding	Structures
☒ Riverine	☐ Channelization
☐ Coastal	☐ Levee/Floodwall
☐ Alluvial fan	☐ Bridge/Culvert
☒ Shallow Flooding (e.g. Zones AO and AH)	☐ Dam
☐ Lakes	☐ Fill
☐ Other (describe)	☐ Other (describe)

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

4. ENCROACHMENT INFORMATION

1. Does the State have jurisdiction over the floodway or its adoption by communities participating in the NFIP?
   ☐ Yes ☒ No

If Yes, attach a copy of a letter notifying the appropriate State agency of the floodway revision and documentation of the approval of the revised floodway by the appropriate State agency.

2. Does the development in the floodway cause the 1% annual chance (base) elevation to increase at any location by more than 0.000 feet? ☐ Yes ☐ No ☒ N/A

3. Does the cumulative effect of all development that has occurred since the effective SFHA was originally identified cause the base flood elevation to increase at any location by more than one foot (or other increase limit if community or state has adopted more stringent criteria - even if a floodway has not been delineated by FEMA)? ☐ Yes ☒ No

If the answer to either items is Yes, please attach documentation that all requirements of Section 65.12 of the NFIP regulations have been met, regarding evaluation of alternatives, notice to individual legal property owners, concurrence of CEO, and certification that no insurable structures are impacted.

5. MAINTENANCE RESPONSIBILITY

The community is willing to assume responsibility for ☐ performing ☐ overseeing compliance with the maintenance and operation plans of the
(Name)
flood control structure. If not performed promptly by an owner other than the community, the community will provide the necessary services without cost to the Federal government.

Operation and maintenance plans are attached. ☐ **Yes** ☐ **No** ☒ **N/A**

6. REVIEW FEE

The review fee for the appropriate request category has been included. ☐ Yes Fee amount: $

OR

This request is based on a federally sponsored flood-control project where 50 percent or more of the project's cost is federally sponsored, or the request is based on detailed hydrologic and hydraulic studies conducted by Federal, State, or local agencies to replace approximate studies conducted by FEMA and shown on the effective FIRM; thus the project is fee exempt.
☒ Yes

Please see Instructions for Fee Amounts

7. SIGNATURE

Note: **I understand that my signature indicates that all information submitted in support of this request is correct.**

Tim Murphy

Signature of Revision Requester

Tim Murphy, Project Manager
Printed Name and Title of Revision Requester

Flood Control District of Maricopa County
Company Name

Telephone No.: (602) 506-1501 Date: 9-20-99

Note: **Signature indicates that the community understands, from the revision requester, the impacts of the revision on flooding conditions in the community.**

Woodrow C. Scoutten

Signature of Community Official

Woodrow C. Scoutten, City Engineer
Printed Name and Title of Community Official

City of Tolleson
Community Name

Telephone No.: 623-386-4691 Date: 8-18-99

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is in accordance with 44 CFR Ch. 1, Sect 65.2

Brian J. Fry

Signature

Brian J. Fry, P.E., Project Manager
Printed Name and Title of Revision Requester

Registr No. 21684 Expires (Date) 12/31/99 State AZ

Type of License/Expertise: Civil Engineer

Check which forms have been included with this request

Form Name and (Number)	Required if .....
☒ **Hydrologic** (3)	new or revised discharges
☒ **Hydraulic** (4)	new or revised water-surface elevations
☒ **Mapping** (5)	floodplain/floodway changes
☐ **Channelization** (6)	channel is modified
☐ **Bridge/Culvert** (7)	addition/revision of bridge/culvert
☐ **Levee/Floodwall** (8)	addition/revision of levee/floodwall
☐ **Coastal** (9)	new or revised coastal elevations
☐ **Coastal Structures** (10)	addition/revision of coastal structure
☐ **Dam** (11)	addition/revision of dam
☐ **Alluvial Fan** (12)	structures proposed on alluvial fan

City of Phoenix
STREET TRANSPORTATION DEPARTMENT

FLOOD CONTROL DISTRICT
RECEIVED
JUN 28 1999
P & PM
FCD
PUBLIC INFO
CONTRACT
FILE
REMARKS TMM

June 25, 1999

Mr. Timothy M. Murphy
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

Dear Tim:

RE: TOLLESON AREA FLOODPLAIN DELINEATION STUDY
(MCFCD NUMBER 95-26)

The City of Phoenix supports the submittal of the Tolleson Area Floodplain Delineation Study prepared by the Flood Control District of Maricopa County, to the Federal Emergency Management Agency (FEMA) for their review and approval. A portion of this study is within the boundary of the City of Phoenix. As part of the submittal, please show the current City boundaries on the maps submitted to FEMA, per the attached sketches.

We understand that the Flood Control District will act as the lead agency in this submittal, and that FEMA's approval of the study will result in a revision to the Flood Insurance Rate Maps. Upon approval by FEMA, please provide the City with a copy of all reports, reproducible plans and public information documentation.

If you have any questions, please contact me at 262-4026.

Sincerely,

Thomas E. Callow, P.E.
Interim Street Transportation Director

Cindy D White

Cindy D. White, P.E.
Floodplain Manager

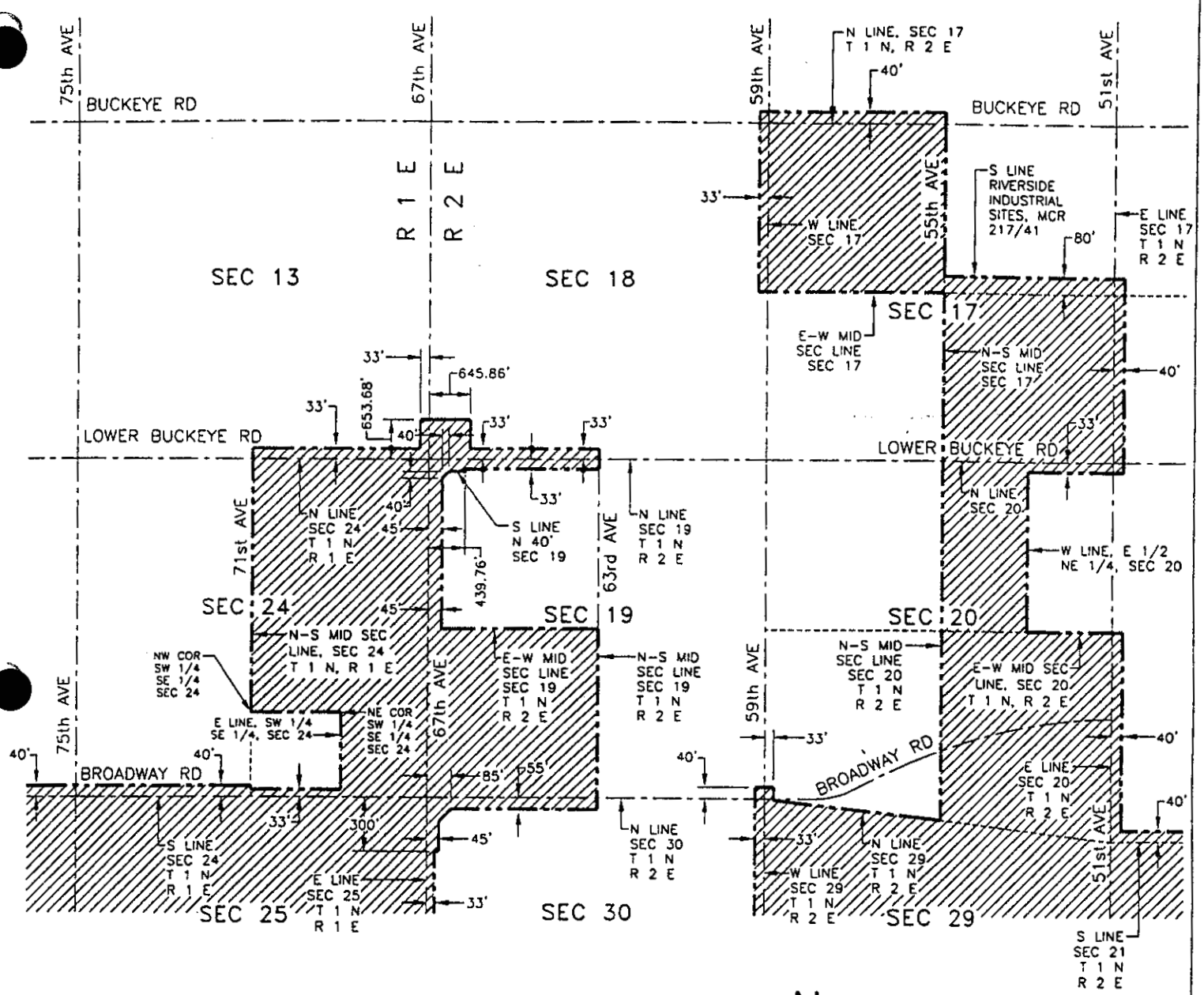
TEC/CDW/aff/990625a.wpd

Attachment

c: Mr. Matthews

200 West Washington Street, Fifth Floor, Phoenix, Arizona 85003-1611 602-262-6284 FAX: 602-495-2016

Recycled Paper



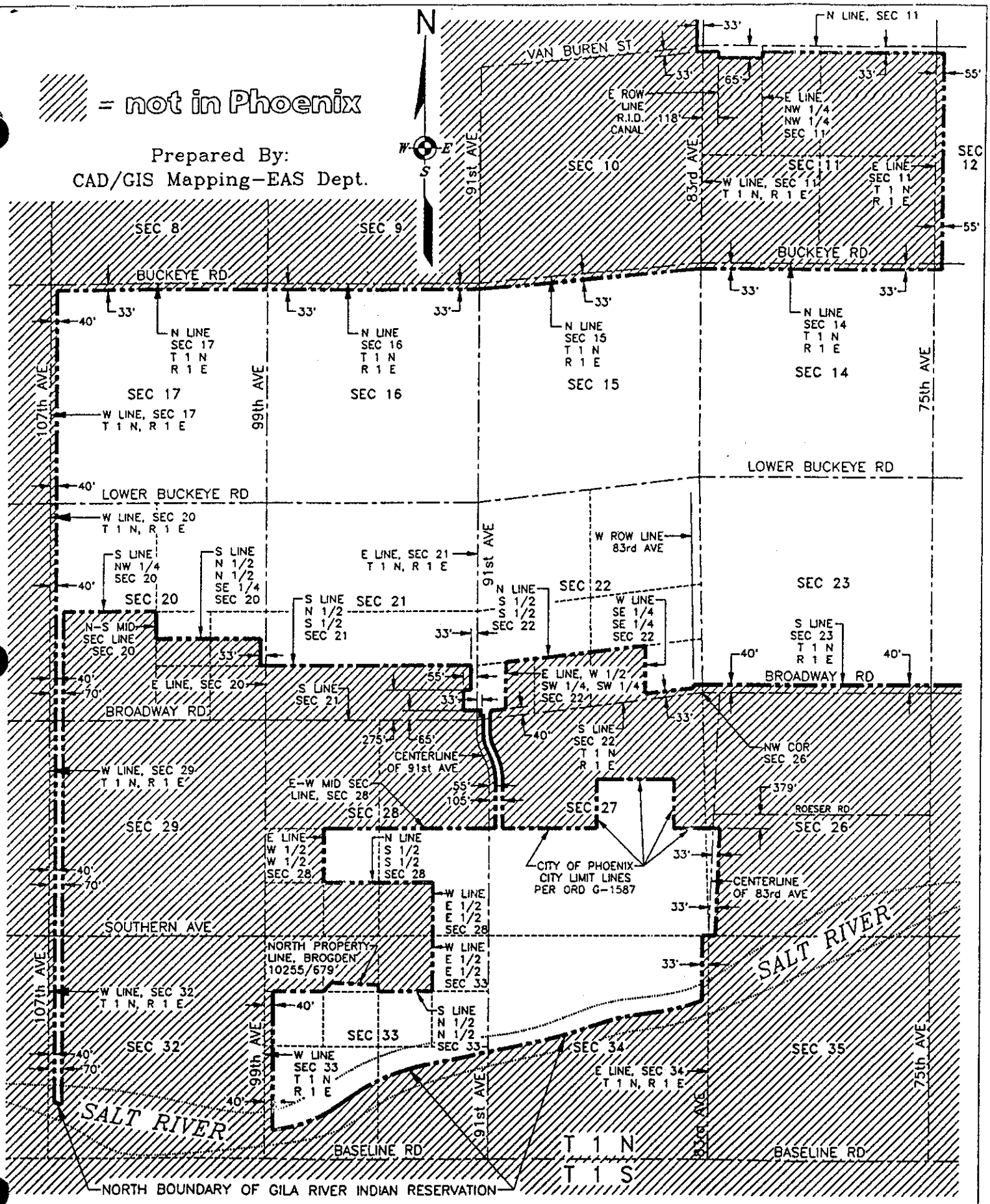
= not in Phoenix

Prepared By:
Geographic Technology–EAS Dept.

City of Phoenix
City Limits

ORD NO	LAST EFF ANNEX DATE	REV BY	ORD NO	LAST EFF ANNEX DATE	REV BY
G-3698	11-27-93	JWM	G-4180	6-12-99	JWM
G-4103	7-18-98	JWM			
G-4115	10-3-98	JWM			
G-4149	1-16-99	JWM			

PG NO
18



City of Phoenix
City Limits

ORD NO	LAST EFF ANNEX DATE	REV BY	ORD NO	LAST EFF ANNEX DATE	REV BY
G-3532	7-4-92	JWM			
G-3918	6-6-96	JWM			

PG NO
19

CITY OF AVONDALE

INCORPORATED 1946

COMMUNITY DEVELOPMENT DEPARTMENT ♦ 1225 SOUTH 4TH STREET
AVONDALE, ARIZONA 85323 ♦ PHONE (623) 932-6088 ♦ FAX (623) 932-6119

September 17, 1999

FLOOD CONTROL DISTRICT
RECEIVED
SEP 21 1999
CHENG
PIO
ADMIN
FINANCE
O & M
ENGR
REMARKS
P & PM
FILE

Mr. Timothy M. Murphy
Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ
85009

Dear Mr. Murphy:

RE: TOLLESON AREA FLOODPLAIN DELINEATION STUDY
(MCFCD NUMBER 95-26)

The City of Avondale Public Works Department and Community Development Department has reviewed the Tolleson Area Floodplain Delineation Study and supports the submittal of the study to the Federal Emergency Management Agency (FEMA) for their review and approval.

We understand that the Flood Control District will act as the lead agency in this submittal and that the approval of the study will result in a revision to the Flood Insurance Rate Maps. Presently there are many proposed projects within the City that may be affected by such revisions. Upon approval by FEMA, please provide the City with a copy of all reports, reproducible plans and public information documentation.

Sincerely,

Desmond McGeough
Community Development Planner

FEDERAL EMERGENCY MANAGEMENT AGENCY **HYDROLOGIC ANALYSIS FORM**	O.M.B No. 3067-0148 Expires April 30, 2001

Public reporting burden for this form is estimated to average **3.67** hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Note: Fill out one form for each flooding source studied

Community Name: Maricopa County, Incorporated and Unincorporated Areas

Flooding Source: Roosevelt Irrigation Canal Embankment

Project Name/Identifier: Floodplain Delineation of the Tolleson Area, Flood Control District of Maricopa County, FCD No. 95-26

1. REASON FOR NEW HYDROLOGIC ANALYSIS

☐ No existing analysis ☒ Improved data ☐ Changed physical condition of watershed

☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Other

For the reason stated above, please attach a detailed explanation. If a computer program/model was used in revising the hydrologic analysis, **please provide a diskette with the input files** for the same flood recurrence intervals contained in the FIS for that stream; and at least for the 1% annual chance (base) flood where no detailed study exists.

Explanation provided: ☒ Yes ☐ No **Diskettes provided:** ☒ Yes ☐ No

2. METHODOLOGY FOR NEW ANALYSIS

Indicate Method	Required Data	Data Included
☐ Statistical Analysis of Gage Records	Form 3 - Attachment A	☐ Yes ☐ No
☐ Regional Regression Equations	Form 3 - Attachment C	☐ Yes ☐ No
☒ Precipitation/Runoff Model	Form 3 - Attachment D	☒ Yes ☐ No
☐ Other	Back-up computations and supporting data	☐ Yes ☐ No

3. APPROVAL OF ANALYSIS

The hydrologic analysis has already been approved by a local, state, or Federal Agency. ☒ Yes ☐ No ☐ Not Required

If Yes, attach evidence of approval. ☒ **Approval attached.** If No, attach explanation. ☐ **Explanation attached.**

4. COMPARISON OF BASE FLOOD DISCHARGES

Location:	Drainage Area (SqMi)	FIS(cfs)	Revised (cfs)
Flow rates not reported in effective Flood Insurance Study - see attached explanation.			

Note: When revised discharges are not significantly different than the FIS discharges, FEMA may require a confidence limits analysis (see attachment B) at a later date to complete the review.

If only a portion of a detailed study area was revised please attach an explanation describing the transition from the proposed discharges to the effective discharges. ☒ **Explanation Included** ☐ **Explanation Not Required**

5. HISTORICAL FLOODING INFORMATION

If historical data are available for the flooding source please provide: Location, peak discharges/water-surface elevations and dates, and source of information. ☐ **Data Attached** ☒ **Data Not Available**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

ATTACHMENT A: STATISTICAL ANALYSIS OF GAGE RECORDS

Gaging Station: N / A

Gage Location (latitude and longitude):

		FIS:		Revised:	
1.	Number of years of data				
	Systematic				
	Historical				
2.	Homogeneous data	☐ Yes	☐ No	☐ Yes	☐ No
3.	Data adjustments	☐ Yes	☐ No	☐ Yes	☐ No
4.	Number of high outliers				
	Low outliers				
	Zero events				
5.	Generalized skew				
6.	Station skew				
7.	Adopted skew				
8.	Probability distribution used (justify if log-Pearson III was not used)				
9.	Transfer equations to ungaged sites			☐ Yes	☐ No
	If Yes, specify method				
10.	Expected probability*			☐ Yes	☐ No
11.	Comparison of results with other analyses			☐ Yes	☐ No
	If Yes, describe comparison				

12. **Attach analysis including plot of flood-frequency curve. Analysis Attached?** ☐ Yes ☐ No

*FEMA does not accept expected probability analyses for the purpose of reflecting flood hazard information in a FIS.

If any data are not available, indicate by N/A.

ATTACHMENT B: CONFIDENCE LIMITS EVALUATION

Stream: N / A

Select one location for Confidence Limits Evaluation (*describe location*):

1. Discharges for selected location:

Exceedence Probability		FIS:	Revised:
10%	(10-year)	_____ cfs	_____ cfs
2%	(50-year)	_____ cfs	_____ cfs
1%	(100-year)	_____ cfs	_____ cfs
0.2%	(500-year)	_____ cfs	_____ cfs

2. 1% Annual Chance (Base) Flood Confidence Intervals

90% Confidence Interval:	5% limit	_____ cfs
	95% limit	_____ cfs
50% Confidence Interval:	25% limit	_____ cfs
	75% limit	_____ cfs

3. If the discharge of the base flood in the FIS is beyond the 50% confidence interval but within the 90% confidence interval, does the base flood elevation change by 1.0 foot or more? ☐ Yes ☐ No

An example of confidence limits analysis can be found in Appendix 9 of Bulletin 17B.

4. **Confidence Limits Analysis Attached?** ☐ Yes ☐ No

ATTACHMENT C: REGIONAL REGRESSION EQUATIONS

1. Bibliographical Reference:

   N / A

   (Attach a copy of title page, table of contents, and pertinent pages including equations.)

2. Gaged or ungaged stream:

3. Hydrologic region(s):
   Attach backup map.

4. Provide parameters, values, and source of data used to define parameters.

		FIS:		Revised:	
5.	Urbanized conditions calculations	☐ Yes	☐ No	☐ Yes	☐ No
6.	Percent of watershed urbanization				
7.	Is the watershed controlled?	☐ Yes	☐ No	☐ Yes	☐ No
8.	Comparison with other analyses	☐ Yes	☐ No	☐ Yes	☐ No

If the answer to 5, 7, or 8 is Yes, explain methdology below. If data are not available, indicate with N/A.

Comments

9. **Attach computation and supporting maps, delineating the watershed boundary and drainage area divides.**

   Computation and Supporting Maps provided? ☐ Yes ☐ No

ATTACHMENT D: PRECIPITATION/RUNOFF MODEL

		FIS:		Revised:	
1.	Method or model used:	Not Reported		HEC-1 Flood Hydrograph Pkg.	
	Version:			4.1	
	Date:			July 1997	
2.	Source of rainfall depth:	Not Reported		NOAA Atlas II, Volume III	
3.	Source of rainfall distribution:	Not Reported		SCS Type II	
4.	Rainfall duration:	24-hour		24-Hour	
5.	Areal adjustment to precipitation (%):	Not Reported		0.940	
6.	Maximum overland flow length	Not Reported		2.65 miles	
7.	Hydrograph development method:	Not Reported		Agricult. S-graph per FCDMC	
8.	Loss rate method:	Not Reported		Green and Ampt Infiltration Eq.	
	Source of soils information:			USDA SCS Soil Survey	
	Source of land use information:			Salt River Project and FCDMC	
9.	Channel routing method:	Not Reported		Normal Depth w/ Manning's	
10.	Reservoir routing:	☐ Yes	☒ No	☒ Yes	☐ No
11.	Baseflow considerations: **If Yes, explain below how baseflow was determined:**	☐ Yes	☒ No	☐ Yes	☒ No
12.	Snowmelt considerations:	☐ Yes	☒ No	☐ Yes	☒ No
13.	Model calibration: **If Yes, explain below how calibration was performed**	☐ Yes	☒ No	☐ Yes	☒ No
14.	Future land use condition: **If Yes, explain why below**	☐ Yes	☒ No	☐ Yes	☒ No

15. **Attach precipitation/runoff model, hydrologic model schematic, curve number calculations, time of concentration calculations, and supporting maps, delineating the watershed boundary and drainage area divides.**

Information and Maps provided? ☒ Yes ☐ No

NOTE: FEMA policy is to base flooding on existing conditions.

To Be Attached to MT-2 FORM 3 for Roosevelt Irrigation District Canal

In response to Item 1, Reason for New Hydrologic Analysis:
and in response to Item 4, Comparison of Base Flood Discharges:

A new hydrologic analysis is warranted because the review draft version of the Flood Insurance Study, City of Tolleson, prepared by Harris-Toups in August 1978, does not report flow rates. A full copy of that report is included with the Hydraulic Technical Notebook. The Harris-Toups study does report the volume of runoff in two locations. The study area has undergone significant development in the last twenty years, and a new hydrologic study is warranted.

In addition, Interstate 10 was not constructed at the time of the Harris-Toups study, but has now been constructed. The effect of this interstate is that it intercepts some of the runoff that flowed previously to the Harris-Toups study area, resulting in a changed hydrologic condition.

Furthermore, the Flood Control District of Maricopa has prepared and adopted a hydrology design manual, which was not available at the time of the Harris-Toups study. The new manual updates and revises the hydologic calculation methods for the County. For this and the above reasons, a new hydrologic analysis is warranted.

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE HYDRAULIC ANALYSIS FORM**	O.M.B No. 3067-0148 Expires April 30, 2001

Public reporting burden for this form is estimated to average 2.25 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Note: Fill out one form for each flooding source studied

Community Name: Maricopa County, Incorporated and Unincorporated Areas

Flooding Source: Roosevelt Irrigation Canal Embankment

Project Name/Identifier: Floodplain Delineation of the Tolleson Area, Flood Control District of Maricopa County, FCD No. 95-26

1. REACH TO BE REVISED

Describe the limits of the revision OR submit a copy of the FIRM with the revision area clearly highlighted.
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? ☐ Yes

Downstream Limit: Interstate 10

Upstream Limit: 35th Avenue

2. MODELS SUBMITTED

Requirements: for areas which have detailed flooding:	**for areas which do not have detailed flooding:**
Full input and output listings along with files on diskette for each of the models listed below (items 1-4) and a summary of the source of input parameters used in the models must be provided. The summary must include a description of any changes made from model to model (e.g., Duplicate Effective model to Corrected Effective model). At a minimum, the Duplicate Effective (item 1) and the Revised or Post-Project Conditions (item 4) models must be submitted. See instructions for directions on when other models may be required.	Only the 100-year (Base) flood profile is required. A hydraulic model is not required for areas which do not have detailed flooding; however, BFEs may not be added to the revised FIRM. If a hydraulic model is developed for the area, items 3 and 4 described below must be submitted.

If hydraulic models are not developed, hydraulic analyses (including all calculations) for existing or pre-project conditions and revised or post-project conditions must be submitted.

1. Duplicate Effective Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name**
Copies of the hydraulic analysis used in the effective FIS, referred to as the effective models (10-, 50-, 100-, and 500-year multi-profile runs and the floodway run) must be obtained and then reproduced on the requester's equipment to produce the Duplicate Effective model. This is required to assure that the effective models input data has been transferred correctly to the requester's equipment and to assure that the revised data will be integrated into the effective data to provide a continuous FIS model upstream and downstream of the revised reach.

2. Corrected Effective Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name**
The Corrected Effective model is the model that corrects any errors that occur in the Duplicate Effective model, adds any additional cross sections to the Duplicate Effective model, or incorporates more detailed topographic information than that used in the currently effective model. The Correctly Effective model must not reflect any man-made physical changes since the date of the effective model. An error could be a technical error in the modeling procedures, or any construction in the floodplain that occurred prior to the date of the effective model but was not incorporated into the effective model.

3. Existing or Pre-Project Conditions Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name**
The Duplicate Effective model or Corrective Effective model is modified to produce the Existing or Pre-Project Conditions model to reflect any modifications that have occurred within the floodplain since the date of the Effective model but prior to the construction of the project for which the revision is being requested. If no modification has occurred since the date of the effective model, then this model would be identical to the Corrected Effective model or Duplicate Effective model.

4. Revised or Post-Project Conditions Model ☒ **Natural** **File Name** TOL_RAS.prj ☐ **Floodway** **File Name**
The Existing or Pre-Project Conditions model (or Duplicate Effective model or Corrected Effective model, as appropriate) is revised to reflect revised or post-project conditions. This model must incorporate any physical changes to the floodplain since the effective model was produced as well as the effects of the project. When the request is for the proposed project this model must reflect proposed conditions.

5. Other – Please attach a sheet describing all other models submitted along with the file names. ☐ **Natural** ☐ **Floodway**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. STARTING WATER-SURFACE ELEVATIONS

Explain how they were determined. Explanation Attached? ☒ Yes ☐ No

NOTE: If the effective study is an approximate study, the slope/area method is recommended.
For detailed analysis studies, using a known water-surface elevation is recommended.

4. RESULTS (from the model used to revise the 100-year water surface elevations)

If the results indicate any of the following, attach an explanation - to this form, or to the hydraulic model printout- as to the reasonableness of the situation.

☐ Supercritial depth ☒ Critical Depth ☐ Drawdowns ☐ Negative Floodway Surcharges

☐ Floodway Surcharges Greater Than Maximum Allowed by Community/State

☒ Water surface elevations higher than the end points of cross sections.

☐ Floodway discharge is different than the Natural 100-year (base) flood discharge.

☐ Project causes 100-year floodplain or floodway elevations to increase (state if increases are located off the requester's property)

Explanation attached with Form ☒ **Explanation provided on attached printout** ☐

If Hydraulic model used is HEC-2, has it been checked with FEMA'S CHECK-2 computer program ☐ **Yes** ☐ **No**
(see instructions for information on how to obtain CHECK-2)

5. REVISED FIRM/FBFM AND FLOOD PROFILES

1. Profile Transition

a. 100-Year Water-Surface Elevations - indicate the difference in water surface elevations where the project 100-year elevations tie into the existing 100-year water surface elevations at each end of the project.

Downstream End _____ within _____ (feet) Upstream End _____ within _____ (feet)
Cross-Section # *Cross-Section #*

b. Floodway Elevations - indicate the difference in water surface elevations where the project floodway elevations tie into the existing floodway water surface elevations at each end of the project.

Downstream End _____ within _____ (feet) Upstream End _____ within _____ (feet)
Cross-Section # *Cross-Section #*

c. Floodway widths - indicate the difference in floodway widths where the project floodway widths tie into the existing floodway width at each end of the project.

Downstream End _____ within _____ (feet) Upstream End _____ within _____ (feet)
Cross-Section # *Cross-Section #*

2. Profile Checklist (check box if information has been provided on profile)

The following information (unless in parentheses) must be included at the same scale as the existing profiles for this project:

☒ Stream Name ☐ Community Name ☐ Corporate Limits labeled ☒ Study limits labeled

☐ Confluences labeled ☒ Channel Stationing ☒ Streambed profiled ☒ Cross Sections labeled

☒ Horizontal/Vertical Scales indicated ☒ 100-year elevs profiled*

☐ Road Crossings ☒ Labeled ☐ Low Chord Elevations ☐ Top of Road Elevations

*All recurrence intervals in the effective study must also be profiled.

Floodway Data Table

Attach a Floodway Data Table for each cross section listed in the published Floodway Data table in the FIS report.

Floodway Data Table Attached ☐ **Yes** ☒ **Not Required**

To Be Attached to MT-2 FORM 4 For Roosevelt Irrigation District Canal

Response for Item 3. Starting Water Surface Elevations:

The HEC-RAS model is run only for appropriate portions of the Roosevelt Irrigation District Canal (RID). The majority of the flooding along the RID is due to ponding against the canal embankment. In these locations, the HEC-1 reservoir routing is utilized. Where a RAS model is used, the starting water surface elevation for the HEC-RAS model is taken from the ponded water surface elevation derived in the HEC-1 model.

Response for Item 4. Results (from the model used to revise the 100-year water surface elevations):

Water surface elevations higher than the end points of cross-sections:

At River Mile 5.798 and 6.285, the water surface is above the top of canal road. These cross sections abut the Zone X floodplain delineation for the Southern Pacific Railroad. Please refer to Sheet 3 of the Floodplain Maps.

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE / COASTAL MAPPING FORM**	O.M.B No. 3067-0148 Expires April 30, 2001

Public reporting burden for this form is estimated to average 1.5 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Note: Fill out one form for each flooding source studied

Community Name: Maricopa County, Incorporated and Unincorporated Areas

Flooding Source: Roosevelt Irrigation Canal Embankment

Project Name/Identifier: Floodplain Delineation of the Tolleson Area, Flood Control District of Maricopa County, FCD No. 95-26

This is a ☒ Manual ☐ Digital submission. *Digital map submissions may be used to update digital FIRMs (DFIRMs). For updating DFIRMs, these submissions must be coordinated with FEMA Headquarters as far in advance as possible.*

1. MAPPING CHANGES

1. A topographic workmap must be submitted showing the following information (check N/A when not applicable):

a. Revised approximate 100-year floodplain boundaries (Zone A)	☐ Yes	☒ No	☐ N/A
b. Revised detailed 100- and 500-year floodplain boundaries.	☒ Yes	☐ No	☐ N/A
c. Revised floodway boundaries	☐ Yes	☐ No	☒ N/A
d. Location and alignment of all cross sections with stationing control indicated.	☒ Yes	☐ No	☐ N/A
e. Stream alignments, road alignments and dam alignments.	☒ Yes	☐ No	☐ N/A
f. Current community boundaries.	☐ Yes	☒ No	☐ N/A
g. Effective 100- year floodplain and floodway boundaries from FIRM/FBFM reduced or enlarged to the scale of the topographic workmap	☒ Yes	☐ No	☐ N/A
h. Tie-ins between the effective and revised 100-, 500-year and floodway boundaries	☐ Yes	☐ No	☒ N/A
i. The requester's property boundaries and community easements	☐ Yes	☒ No	☐ N/A
j. The signed certification of a registered professional engineer	☒ Yes	☐ No	☐ N/A
k. Location and description of reference marks	☒ Yes	☐ No	☐ N/A
l. Vertical datum (example: NGVD, NAVD)	☒ Yes	☐ No	☐ N/A
m. Coastal zone designations tie into adjacent areas not being revised	☐ Yes	☐ No	☒ N/A
n. Location and alignment of all coastal transects used to revise the coastal analyze	☐ Yes	☐ No	☒ N/A
o. V-zone has been delineated to extend landward to the heel of the primary frontal dune	☐ Yes	☐ No	☒ N/A

If any items are marked No or N/A please attach an explanation.

2. What is the source and date of the updated topographic information (example: orthophoto maps, July 1985; filed survey, May 1979, beach profile, June 1987 etc.)? aerial photography and photogrammetric methods using ground control survey, flight date 03/28/94.

3. What is the scale and contour interval of the following workmaps?

Effective FIS Scale 1 inch = 1000 feet Contour Interval N / A (only the FIRM is available).

Revision Request Scale 1 inch = 200 feet Contour Interval 2 feet

NOTE: Revised topographic information must be of equal or greater detail than effective.

4. Attach an annotated FIRM/FBFM at the scale of the effective FIRM/FBFM showing the revised 100- and 500-year floodplain and the floodway boundaries and how they tie into those shown on the effective FIRM/FBFM downstream and upstream of the revisions or adjacent to the area of revision for coastal studies. **FIRM/FBFM attached?** ☒ **Yes** ☐ **No**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. EARTH FILL PLACEMENT

1. The fill is: ☐ Existing ☐ Proposed

2. Has fill been/will be placed in the regulatory floodway? ☐ Yes ☐ No
If Yes, please attach completed Riverine Hydraulic Analysis Form (Form 4).

3. Has fill been/will be placed in floodway fringe (*area between the floodway and 100-year floodplain boundaries*)? ☐ Yes ☐ No

If Yes, then complete A, B, C, and D below.

a. Are fill slopes for granular materials steeper than one vertical on one-and-one-half horizontal? ☐ Yes ☐ No

If Yes, justify steeper slopes

b. Is adequate erosion protection provided for fill slopes exposed to moving flood waters? (*Slopes exposed to flows with velocities of up to 5 feet per second (fps) during the 100-year flood must, at a minimum, be protected by a cover of grass, vines, weeds, or similar vegetation; slopes exposed to flows with velocities greater than 5 fps during the 100-year flood must, at a minimum, be protected by stone or rock riprap.)*

☐ Yes ☐ No

If No, describe erosion protection provided

c. Has all fill placed in revised 100-year floodplain been compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test Method or acceptable equivalent method? ☐ Yes ☐ No

d. Can structures conceivably be constructed on the fill at any time in the future? ☐ Yes ☐ No

If Yes, attach certification of fill compaction (item 3c. above) by the community's NFIP permit official, a registered professional engineer, or an accredited soils engineer in accordance with Subparagraph 65.5(a)(6) of the NFIP regulations.

Fill certification attached ☐ **Yes** ☐ **No**

4. Has fill been/will be placed in a V zone? ☐ Yes ☐ No

If Yes, is the fill protected from erosion by a flood control structure such as a revetment or seawall?

☐ Yes ☐ No

If Yes, attach the Coastal Structures Form (Form 10).

To Be Attached to MT-2 FORM 5 for the Roosevelt Irrigation District Canal

In response to Item 1, for items marked "No" or "N/A" :

The effective FIS only delineates an approximate 100-year floodplain, designated as Zone A. This revised study contains detailed floodplains, designated as either Zone AE or Zone AH.

A.1 Data Collection Study

9532

DIBBLE & ASSOCIATES
CONSULTING ENGINEERS
Since 1962

2633 East Indian School Road, Suite 401
Phoenix, Arizona 85016-6763
Tel. (602) 957-1155
Fax (602) 957-2838

CIVIL ENGINEERING ■ Transportation ■ Airports ■ Drainage/Flood Control ■ Water Resources ■ Land Development ■ Surveying

September 16, 1996

Mr. Timothy M. Murphy
Hydrologist
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
2801 W. Durango Street
Phoenix, AZ 85009

Re: FCD 95-26, Floodplain Delineation of the Tolleson Area
Data Collection Report

Dear Mr. Murphy:

We have completed the data collection for the above referenced project. Following is a summary of the data collected.

We received the data requested from Michael Baker, Jr. on June 28, 1996. Of the information provided, the following items are within our study limit.

- CLOMR and LOMR request and supporting documentation for the Anglo American Auto Auction facility located at 83rd Avenue south of Van Buren Street.
- FBFM, FIRM work sheets prepared by Harris-Toups Associates FIRM panel 1220, City of Tolleson
- Flood Insurance Study, City of Tolleson, Maricopa County, Arizona, report by Harris-Toups, August 1978.

We received the following from the Flood Control District of Maricopa County:

- City of Phoenix Exchange District Project S-901081, Roosevelt Irrigation District, Hydraulic Capacity Analysis, sheets 11-34 of 34, HDR Engineering, July 1992.
- Topographic mapping at a scale of 1"=200', with a two foot contour interval. Provided in a digital and printed format.
- Draft Tolleson-Fowler Area, A Hydrologic Study, Flood Control District of Maricopa County, March 1995. Diskette with hydrologic model included.

If you have any questions please don't hesitate to call at (602) 957-1155.

Very truly yours,

DIBBLE & ASSOCIATES

Brian J. Fry, P.E.
Project Manager

A.2 Referenced Documents

Appendix A: References

A.1 Data Collection Summary

1. Harris-Toups Associates 1978, *Flood Insurance Study, City of Tolleson, Maricopa County, Arizona.*

A.2 Referenced Documents

1. Dibble & Associates, 1997, Field Reconnaissance Report for the Floodplain Delineation for the Tolleson Area.

2. FEMA, 1991, Flood Insurance Study for Maricopa County, Arizona and Incorporated Areas, 7 Volumes.

3. FEMA, 1995, FEMA 37: Flood Insurance Study Guidelines and Specifications for Study Contractors.

4. Flood Control District of Maricopa County, 1995, Drainage Design Manual for Maricopa County, Arizona - Volume I: Hydrology.

5. Gervasio & Associates, Inc., 1997, Continental P.E.T. Technologies, 415 South 104th Avenue, Tolleson, Arizona, Revised Drainage Report.

6. Kenney Aerial Mapping, 1994, Topographic Maps for Maryvale Area Drainage Master Plan, March 28, 1994. FCDMC Contract 93-33.

7. Ohio Department of Natural Resources, October 1987, Uneven Weir Program, Fortran Version.

8. Thomsen, B.W., and Hjalmarson, H.W., 1991, Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona. Report prepared by the U.S. Geological Survey for the Flood Control District of Maricopa County.

9. U.S. Army Corps of Engineers Hydrologic Engineering Center, 1990, HEC-1 Flood Hydrograph Package User's Manual.

10. U.S. Army Corps of Engineers Hydrologic Engineering Center, 1997, HEC-RAS River Analysis System - Hydraulic Reference Manual, Version 2.0.

11. U.S. Army Corps of Engineers Hydrologic Engineering Center, October 1997, HEC-RAS River Analysis System , Software Version 2.1.

A.3 Harris-Toups Flood Insurance Study

FLOOD INSURANCE STUDY
CITY OF TOLLESON
MARICOPA COUNTY, ARIZONA

Prepared by

Harris-Toups Associates
4131 North 24th Street
Phoenix, Arizona

August, 1978

REVIEW DRAFT

PROPERTY OF HUD
FEDERAL INS. ADM.
Prep. By: HARRIS TOUPS

For

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

SEP 20 1978

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Purpose of Study 1

1.2 Authority and Acknowledgements 1

1.3 Coordination 1

2.0 AREA STUDIED

2.1 Scope of Study 2

2.2 Community Description 4

2.3 Principal Flood Problems 4

2.4 Flood Protection Measures 5

3.0 ENGINEERING METHODS

3.1 Hydrologic Analyses 6

3.2 Hydraulic Analyses 7

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

4.1 Flood Boundaries 9

4.2 Floodways 9

5.0 INSURANCE APPLICATIONS

5.1 Reach Determinations 10

5.2 Flood Insurance Zones 10

5.3 Flood Insurance Rate Map Description 11

6.0 OTHER STUDIES 11

7.0 LOCATION OF DATA 12

TABLE OF CONTENTS-continued

PAGE

8.0 BIBLIOGRAPHY AND REFERENCES

FIGURES

Figure 1 - Vicinity Map 3

TABLES

Table 1 - Summary of Discharges 7

EXHIBITS

Exhibit 1 - Elevation Reference Marks Panel 01E

PUBLISHED SEPARATELY:

Flood Boundary and Floodway Map and Flood Insurance Rate Map Panels 01-02 F&R

FLOOD INSURANCE STUDY
TOWN OF TOLLESON, ARIZONA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Tolleson, Maricopa County, Arizona, and aids in the administration of the Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert Tolleson to the regular program of flood insurance by the Federal Insurance Administration (FIA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

1.2 Authority and Acknowledgements

The source of authority of this Flood Insurance Study is the National Flood Insurance Act of 1968, and the Flood Disaster Protection Act of 1973. The hydrologic and hydraulic analyses for this study were performed by Harris-Toups Associates for the Federal Insurance Administration, under Contract No. H-4008. This work was completed in July, 1978.

1.3 Coordination

An initial meeting was held on April 8, 1976 with the Federal Insurance Administration Consultation Coordination Officer, city officials and Harris-Toups Associates. During this meeting the flood insurance program, flood insurance guidelines and the scope of this study were reviewed.

Effecitve coordination efforts were established with the community and the Maricopa County Flood Control District. These and other federal and state agencies and private consultants were contacted in an effort to locate all existing hydrologic and hydraulic data. Several meetings were held or telephone conversations took place with the agencies referred to above throughout the course of this study for the purpose of data collection and to relay and review data development regarding hydrology, flood elevations and flood boundaries.

2.0 AREA STUDIED

2.1 Scope of Study

This Federal Insurance Study covers the area under jurisdiction of the City of Tolleson as shown on the Vicinity Map (Figure 1).

The flooding sources to be studied were selected by city officials during the initial meeting. However, due to a delay in the construction of Interstate Highway 10 north of Tolleson and due to recent annexations to the city, the areas to be studied were altered as a result of a meeting between the study contractor, FIA, and city officials.

A detailed flood hazard investigation was made for the Southern Pacific Railroad and the Roosevelt Canal.

It should be noted that in the initial meeting it was decided that Van Buren Street and 91st Avenue would be studied in detail. However, as the study progressed it was determined that the type of flooding along these two streets is adequately described as shallow flooding less than one foot in depth. Therefore Van Buren Street and 91st Avenue do not appear as areas of special flood hazards in this report.

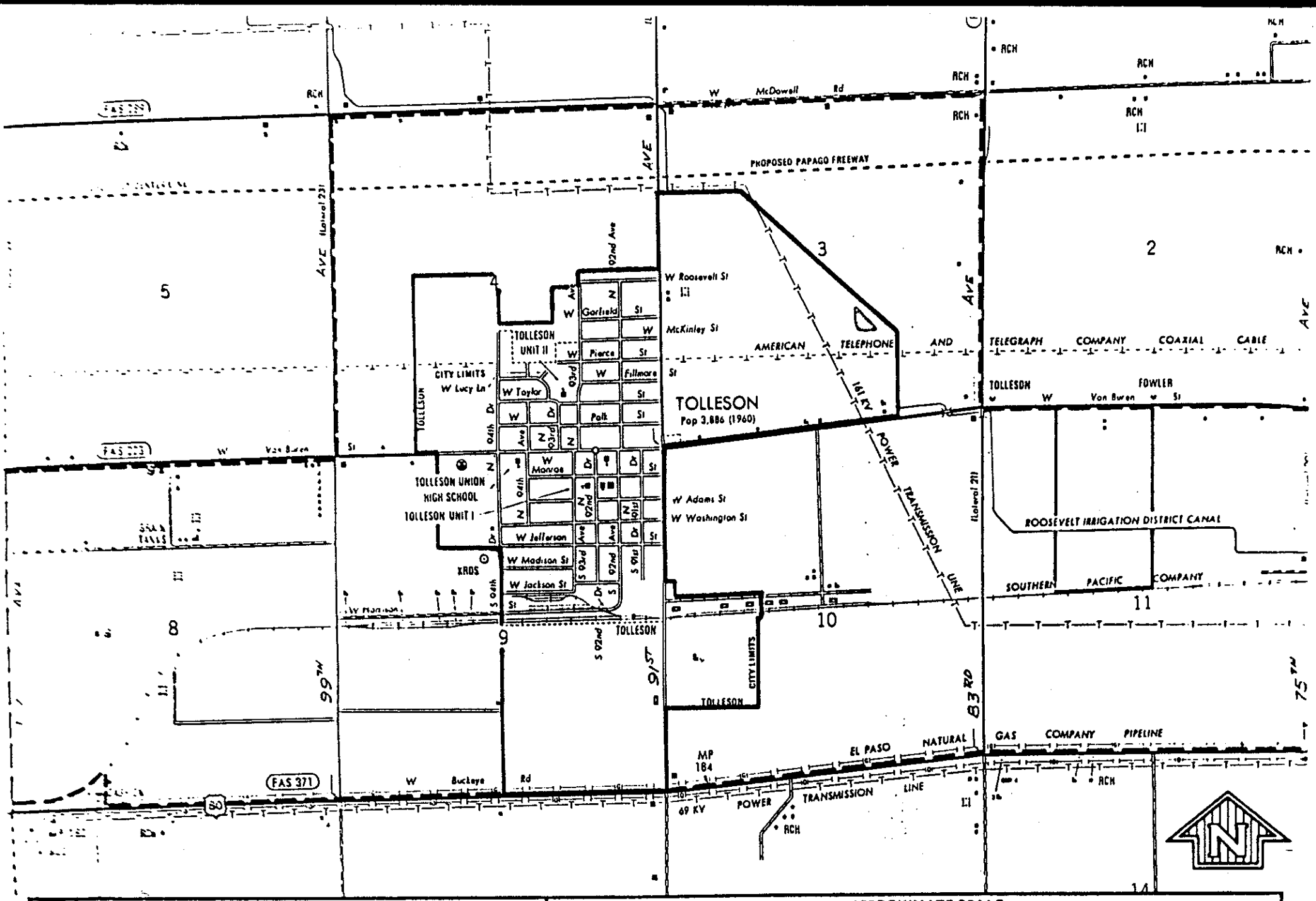


FIGURE 1

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF TOLLESON, AZ.
(MARICOPA CO.)

APPROXIMATE SCALE
1000 0 1000 2000 3000 4000 5000
FEET

VICINITY MAP

2.2 Community Description

The City of Tolleson is located in Central Maricopa County, South Central Arizona, approximately 10 miles west of the City of Phoenix. City boundaries including strip annexations are illustrated on the Vicinity Map (Figure 1) and on the Community Base Map (published separately). The population of Tolleson is 3,881 according to the 1970 census. The city encompassed 1.6 square miles in 1977 (Reference 1). Since then the city has encompassed 6.0 square miles including the area enclosed by strip annexations.

The City of Tolleson is located in agricultural land with a general slope to the southwest of about three percent. The major land use is agricultural but Tolleson also harbors some processing and manufacturing industries. The community is serviced by the Southern Pacific Railroad and the Roosevelt Irrigation Canal.

The average annual rainfall is approximately seven inches and the temperature ranges from 30°F to 70°F in the winter months and 80°F to 115°F in the summer months (Reference 2).

The majority of the special flood hazard areas in Tolleson are being used for agricultural purposes, however some of these areas are being used by the industrial concerns in the community.

2.3 Principal Flood Problems

The City of Tolleson has experienced sheet flooding along

91st Avenue and Van Buren Street as a result of the overflow of irrigation canals. This type of flooding is expected to occur for storms of relatively low frequency. The greatest flood hazard results from the ponding of floodwaters behind the embankments of the Roosevelt Canal and the Southern Pacific Railroad. The volume of runoff produced by the 100-year, 24-hour storm is sufficient to overtop the canal and railroad embankments.

2.4 Flood Protection Measures

As shown on the Vicinity Map (Figure 1) the I-10 Freeway is proposed across the northern portion of the city. The freeway will be constructed on fill material with drainage provisions to contain and/or divert the 100-year runoff. However, according to officials of the Arizona Department of Transportation, the construction of this portion of the freeway will not take place for several years.

3.0 ENGINEERING METHODS

For the flooding sources studied in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10, 50, 100, or 500 year period (recurrence interval), have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10, 50, 100, and 500 year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one percent chance of annual occurrence) in any 50 year period is about 40 percent (four in 10), and for any 90 year period, the risk increases to about 60 percent (six in 10). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Analyses were carried out to establish elevation and/or depth relationships for the 100-year flood at each flooding source studied in the community.

The ponding at the Roosevelt Canal and the Southern Pacific Railroad was analysed carefully to determine its impact on the surrounding land. The most up-dated hydrologic methods of the National Oceanic and Atmospheric Administration and the USDA Soil Conservation Service were used to determine the runoff charistics of the watershed as well as the volume of runoff to accumulate at the study site for the selected design storm. Effects of the berms and ditches of the agricultural watershed were also taken into account. The volumes of runoff at the locations of the flooding sources are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE	DRAINAGE AREA (Square Miles)	VOLUME OF RUNOFF* (Acre-Feet)
Roosevelt Canal	16.0	845
Southern Pacific Railroad	18.5	977

* 100-year, 24-hour storm

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of each of the flooding sources studied in the community were carried out to provide estimates of the elevations and/or depths of flooding along each of the flooding sources.

At both the Roosevelt Canal and the Southern Pacific Railroad the flooding is carried by overland flow being ponded behind the embankments. To ascertain the magnitude and limits of the ponding, surveyed cross sections were obtained at close enough intervals to determine the hydraulic characteristics

of the flooding areas.

At the Roosevelt Canal the floodwaters pond to a uniform elevation as shown on the Flood Hazard and Flood Boundary Map (FHBM). But the ponding behind the Southern Pacific Railroad does not seek a uniform elevation; therefore the average depth of shallow flooding is indicated on the FHBM.

All elevations used in this study are referenced to the National Geodetic Vertical Datum of 1929. Locations of the elevation reference marks used in this study are shown on the maps.

The flatness of the land causes local rainfall to runoff in sheet flow fashion and it becomes ponded to depths of less than one foot behind manmade features and in local depressions.

FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist the communities in developing sound floodplain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by FIA as the base flood for purposes of floodplain management measures. For each flooding source studied the 100-year flood has been delineated using the elevations determined from the cross sections shown on the flood boundary maps; between cross sections, the boundaries were interpolated using topographic maps at a scale of one inch equals 400 feet with a contour interval of four feet (Reference 3) supplemented by USGS 7 1/2 minute quadrangle maps (Reference 4).

The boundaries of the 100-year flood is shown on the Flood Boundary and Floodway Map. Small areas within the flood boundaries may lie above the flood elevations, and therefore, may not be subject to flooding. Owing to limitations of the map scale and/or lack of detailed topographic data, such areas are not shown.

4.2 Floodways

Due to the type of flood potential problems, sheet flow and ponding, no floodway was computed for this study.

5.0 INSURANCE APPLICATIONS

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of flood insurance zone designations for each flooding source affecting the City of Tolleson.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses or water bodies having relatively the same flood hazard. In the City of Tolleson three reaches were required for the flooding sources. The locations of these reaches are shown on the Flood Insurance Rate Map.

5.2 Flood Insurance Zones

After the determination of reaches the entire incorporated area of the City of Tolleson was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone B	Areas subject to 100-year shallow flooding where average depths are less then one (1) foot, or where the contributing drainage area is less than 1 square mile.
Zone AO	Areas subject to 100-year shallow flooding where average depths are between one (1) and three (3) feet. Average depths of inundation are determined and shown on Flood Insurance Rate Maps.
Zone AH	Areas subject to 100-year shallow flooding where average depths are between one (1) and three (3) feet. Base Flood Elevations are determined and shown on Flood Insurance Rate Maps.

5.3 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of Tolleson is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

6.0 OTHER STUDIES

A Flood Insurance Study (Reference 5) is being finalized which covers the unincorporated areas of Maricopa County. However, there are no other studies dealing with flood problems in the study area.

The Federal Insurance Administration is in the process of completing Flood Insurance Studies for the nearby communities of Phoenix, Glendale, Goodyear and Avondale, Arizona.

This Flood Insurance Study for the City of Tolleson is authoritative for purposes of the Flood Insurance Program and date presented here either supercedes or is compatible with previous determinations.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the office of the Federal Insurance Administration, Regional Director, 450 Golden Gate Ave., P.O. Box 36003, San Francisco, California, 94102.

8.0 BIBLIOGRAPHY AND REFERENCES

1. Arizona Association of Counties and League of Arizona Cities and Towns, Local Government Directory, March 1977.

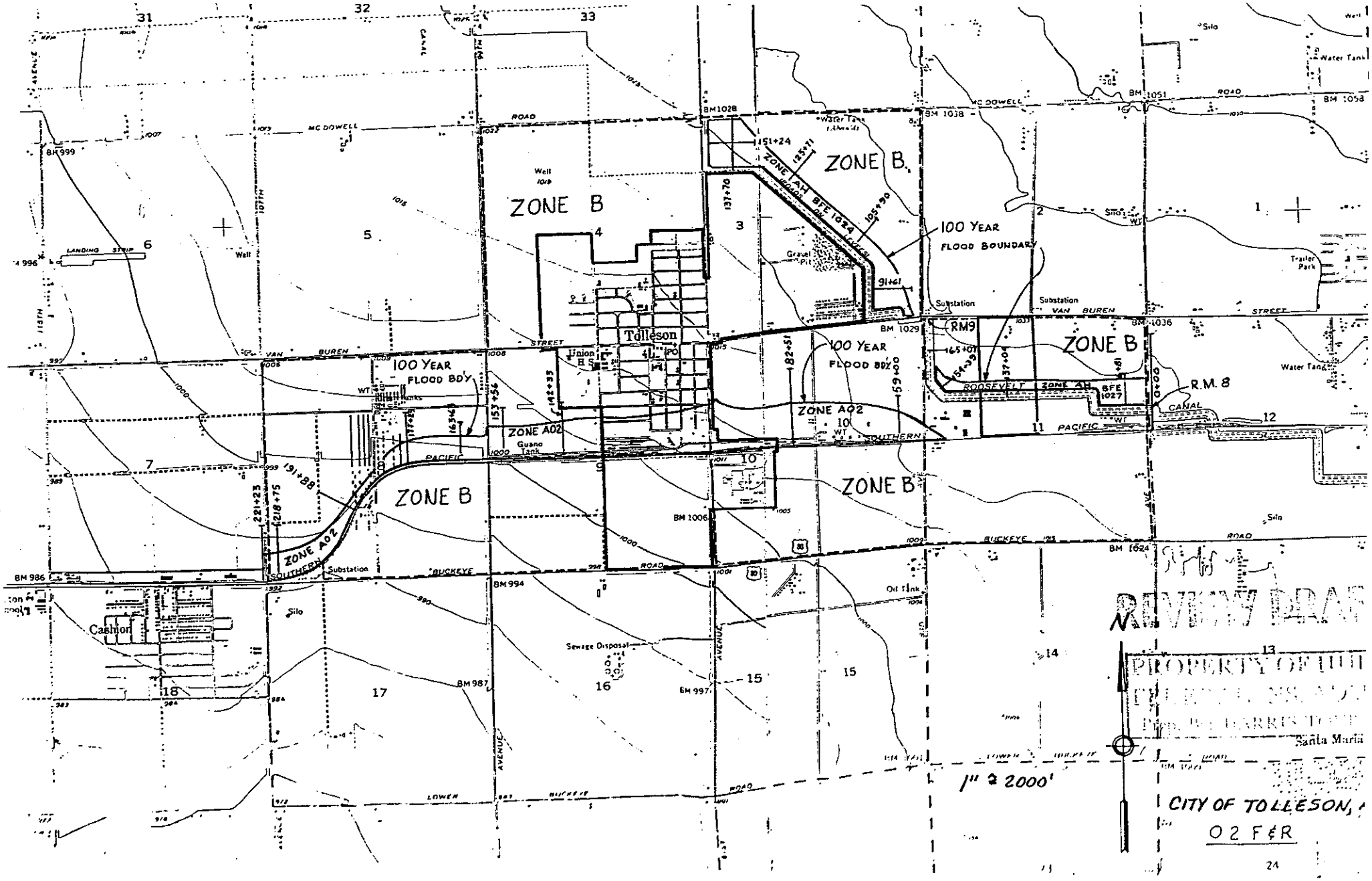
2. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Local Climatalogical Data, Annual Summaries for 1975, Phoenix, Arizona, 1976.

3. Harris-Toups Associates, Topographic Maps, Scale 1:4800, Contour Interval 4 feet: Tolleson, Arizona, 1976.

4. U.S. Geologic Survey, Topographic Map, scale 1:24000, Contour interval 10 feet: Tolleson, Arizona, 1957, photorevised 1971.

5. U.S. Geologic Survey, Topographic Map, scale 1:24000, Contour interval feet: Fowler, Arizona, 1952, photorevised 1967 and 1973.

6. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Maricopa County Arizona, Unincorporated Areas, 1977, unpublished.


ZONE B
ZONE B
ZONE B
ZONE B
ZONE B
ZONE AH BFE 1024
100 YEAR FLOOD BOUNDARY
100 YEAR FLOOD BDY
100 YEAR FLOOD BDY
ZONE A02
ZONE A02
ZONE A02
ZONE AH BFE 1027
RM9
R.M. 8
Tolleson
Union H S
Cashion
Substation
Substation
Substation
Silo
Sewage Disposal
Oil Tank
Guano Tank
Gravel Pit
Trailer Park
Water Tank
Well
MC DOWELL ROAD
VAN BUREN STREET
BUCKEYE ROAD
LOWER BUCKEYE ROAD
ROOSEVELT
CANAL
SOUTHERN PACIFIC
LANDING STRIP
AVENUE
BM 999
BM 1028
BM 1038
BM 1051
BM 1058
BM 1029
BM 1036
BM 1006
BM 1024
BM 986
BM 994
BM 987
BM 997
1" = 2000'
CITY OF TOLLESON,
O2 F&R
Santa Maria

ELEVATION REFERENCE MARKS

REFERENCE MARK NUMBER	ELEVATION	DESCRIPTION		REFERENCE MARK NUMBER	ELEVATION	DESRIPTION
RM-1	997.128	U.S.G.S. Aluminum Cap in N.E. Corner of Conc. catch basin 0.5 Mi. South of U.S. Rt. 80 on East side of 91st Ave.				
RM-2	1000.79	"X" on East side of headwall at S.W. Corner of U.S. Rt. 80 and 91st Ave.				
RM-3	1014.82	Rim of handhole at centerline intersection of 91st Ave. and Van Buren St.				
RM-4	1025.39	Rim of handhole at centerline intersection of 91st Ave. and McDowell Rd.				
RM-5	1021.09	Rim of handhole at centerline intersection of 99th Ave. and McDowell Rd.				
RM-6	1008.13	Rim of handhole at centerline intersection of 99th Ave. and Van Buren St.				
RM-7	994.46	Rim of handhole at centerline intersection of 99th Ave. and U.S. Rt. 80.				
RM-8	1029.58	North edge bridge at top deck ℄ of 75th Ave.				
RM-9	1028.11	Top headwall south end - 100' E. and 50' south of intersection of 83rd Ave. and Van Buren.				

TOLLESON

Sheet 1 of 1

B.1 Special Problem Reports

Memorandum JE Fuller/ Hydrology & Geomorphology, Inc.

DATE: May 28, 1996

TO: Tim Murphy/FCDMC

FROM: Jon Fuller, P.E.

RE: Tolleson Area FIS -Special Problem Report #1
Conveyance in RID Canals

CC: Brian Fry, P.E./Dibble & Associates

For the purposes of the Tolleson Area FIS, it was assumed that the RID canal does not convey any storm water. This assumption is based on the following:

- **Lack of Freeboard.** While the open channel portions of the RID canal appear to have adequate freeboard and additional available capacity during normal flow conditions, the roadway crossings do not. Roadway crossings over the RID are located at the section line streets, in one mile increments, and consist of bridges or culverts. These crossings typically have less than 0.5 foot of freeboard at bridges. Some culvert crossings had inlet headwater pools above the soffit, or appear to act as flumes. In addition, low freeboard occurs at the numerous lateral crossings. An HY-8 rating of an typical RID crossing indicates that the crossings probably operate under outlet control, and that a four foot increase in headwater would result in only a 350 cfs increase in culvert flow. Therefore, while addition water could be stored in canal above the normal water surface elevation, actual downstream conveyance in the canals would be limited by the hydraulic capacity at the crossings.

- **Debris Accumulation.** Overflow from the ponding areas into the canal would probably load the canal with debris and further reduce capacity at roadway and lateral crossings.

- **Capacity vs. Inflow.** The rate of potential inflow to the RID canal is much greater than the additional open channel conveyance available, even if the limited conveyance at the roadway crossings is neglected. The results of hypothetical ratings are shown in Table 1. If the flow depth increases from six feet (typical flow depth) to ten feet (flowing full), the flow rate increases about 500 cfs.[1] However, a weir overflow depth of only 2 inches over a 0.5 mile segment would provide about 500 cfs to the canal. Overflow of only 1 inch over the length of the canal would provide about 3,100 cfs into the canal. The rate of possible conveyance (even without considering limitation at the bridge crossings) is not significant relative to the potential inflow rate to the canal.

[1] Neglecting conveyance restrictions at roadway and other crossings.

Table 1. Tolleson Area FIS - Special Problem Report #1.
Estimated Excess RID Canal Capacity vs. Possible Weir Inflow to Canal

Feature	Condition	Estimated Flow Rate
Canal	Normal Flow Rate (y = 6 ft.)	300 cfs
Canal	Canal Full (y = 10 ft.)	800 cfs
Canal	Excess Canal Capacity Available	500 cfs
Crossing	Maximum Inlet Depth (y=10 ft.)	650 cfs
Weir	Subreach Segment (L = 0.5 mi., H = 2 in.)	500 cfs
Weir	Entire RID (L = 9 mi., H = 1 in.)	3,100 cfs

Notes:
1. Canal rating estimated using Manning, assuming 1:1 sideslopes, 10 ft. depth, 0.03% slope, n=.02.
2. Canal full rating neglects limited capacity at roadway and lateral crossings.
3. Weir flow assumes C = 2.7
4. Culvert crossing outlet controlled, HY-8 rating, debris blockage not considered.

Memorandum JE Fuller/ Hydrology & Geomorphology, Inc.

DATE: May 28, 1996

TO: Tim Murphy/FCDMC

FROM: Jon Fuller, P.E.

RE: Tolleson Area FIS -Special Problem Report # 2
Ponding Area Outflow Rating Curves

CC: Brian Fry, P.E./Dibble & Associates

Introduction

This memorandum describes the methodology and assumptions used to develop outflow rating curves for ponding areas in the Tolleson Area FIS study area. The ponding areas to be studied by detailed methods are located upstream of the Roosevelt Irrigation District (RID) canal between 35th Avenue and 107th Avenue, and the Southern Pacific Railroad (SPRR) between 75th Avenue and 107th Avenue. Outflow rating curves were also developed for hydrologic routing in the HEC-1 model for the area upstream of the SPRR between 27th Avenue and 75th Avenue.

Selection of Rating Curve Methodology

Ouflow from ponding areas can estimated using weir, culvert or conveyance equations[1]. The type of equation most appropriate for use depends on the physical conditions of the outlet, the downstream area, and the ponding depth. In the Tolleson Area FIS study area, weir and culvert outflow from ponding areas were identified.

Weir Flow

A weir is defined as a notch of regular form through which water flows. The type of weir identified in the Tolleson Area FIS area is a broad crested weir, based on results of the field investigation and review of detailed topographic mapping provided by the District. A broad-crested weir has a horizontal (or nearly horizontal) surface sufficiently long in the direction of flow, so that the nappe is supported and hydrostatic pressures will be developed for at least a short distance.

The weir coefficient (C) for broad-crested weirs ranges from 2.63 to 3.087, depending on the condition of the overflow surface, the tailwater depth (submergence), and the shape of the weir. Weir coefficients were selected using guidelines published in Highways in the River Environment (Federal Highway Administration, 1990; Figure 2.10.1) for roadway

[1] Infiltration and evaporation are assumed to be negligible for the purposes of the FIS. No pumps were identified in the study area. Irrigation canals and laterals were assumed to be flowing full during the 100-year event, and unable to provide any conveyance of outflow from ponding areas (See Special Problem Report #1).

overtopping. The submergence factor was assumed to be negligible (= 1.0) due to low overtopping depths relative to the fall (vertical difference in elevation) on the downstream side of the overtopping surfaces. Supporting documentation for all overtopping flow calculations is provided in the Technical Documentation Notebook.

Culvert Flow

Several small culverts were identified under the SPRR between 91st Avenue and 107th Avenue. These culverts were modeled using HY-8. The outflow rating curves were added to the ponding area outflow rating curve for the appropriate subwatershed in the HEC-1 model.

Table 1. Tolleson Area FIS - Special Problem Report #2
Ponding Area Overfall Rating Curve Methodology

Subreach	Downstream Control	Methodology Used	West Control	Methodology Used
QE	RID	Weir Equation	41st Ave.[1]	Weir Equation
QD	RID	Weir Equation	43rd Ave.	Weir Equation
QB	RID	Weir Equation	47th Ave.[1]	Weir Equation
QA	RID	Weir Equation	51st Ave.	Weir Equation
PF	RID	Weir Equation	55th Ave.	Weir Equation
PE	RID	Weir Equation	59th Ave.	Weir Equation
PD	RID	Weir Equation	63rd Ave.[1]	Weir Equation
PC	RID	Weir Equation	67th Ave.	Weir Equation
UB	RID[2]	Weir Equation	69th Ave.	Weir Equation
SF	RID	Weir Equation	75th Ave.	Weir Equation
SH	RID	Weir Equation	77th Ave.[1]	Weir Equation
SG	RID	Weir Equation	81st Ave.[1]	Weir Equation
SE	RID	Weir Equation	83rd Ave.	Weir Equation
SD	RID	Weir Equation	85th Ave.[1]	Weir Equation
SB	RID	Weir Equation	I-10 ROW	Weir Equation
XA	SPRR	Weir Equation	27th Ave.	Weir Equation
WC	SPRR	Weir Equation	35th Ave.	Weir Equation
WA	SPRR	Weir Equation	43rd Ave.	Weir Equation
VC	SPRR	Weir Equation	51st. Ave.	Weir Equation
VA	SPRR	Weir Equation	59th Ave.	Weir Equation
UC	SPRR	Weir Equation	67th Ave.	Weir Equation
UB	SPRR	See RID UB	See RID UB	See RID UB
SF	SPRR	Weir Equation	75th Ave.	Weir Equation
RF	SPRR	Weir Equation	83th Ave.	Weir Equation
RI	SPRR	Weir Equation	87th Ave.[1]	Weir Equation
RH	SPRR	Weir & Culvert Equation	91st Ave.	Weir Equation
RG	SPRR	Weir Equation	99th Ave.	Weir Equation
OF	SPRR	Weir & Culvert Equation	103rd Ave.[1]	Weir Equation
OB	SPRR	Weir & Culvert Equation	107th Ave.	Weir Equation

Notes: [1] Alignment only [2] Downstream control provided by SPRR, not RID

References Cited

Bradley, J.N., 1953, *Discharge Coefficients for Irregular Overfall Spillways*, U.S. Bureau of Reclamation Engineering Monograph No. 9, Denver.

Brater, E.F., and King, H.W., 1982, *Handbook of Hydraulics, 6th Edition*, McGraw Hill Book Company, New York.

Federal Highway Administration, 1990, *Highways in the River Environment*, Publication No. FHWA-HI-90-016. February.

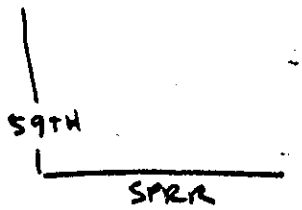
Merritt, F.S., 1983, *Standard Handbook for Civil Engineers, 3rd Edition*, McGraw Hill Book Company, New York.

Ohio Department of Natural Resources, 1987, *Uneven Weir Program, Fortran Version.* October.

UC
67TH
SPRR

Tolleson FIS		Subwatershed:	UC
Weir Rating Curves			
	Q over	Q over	Total Q
Elevation	SPRR	67th Ave	(cfs)
1036.2	0	0	0
1036.3	0	5	5
1036.4	0	28	28
1036.5	0	77	77
1036.6	0	154	154
1036.7	0	262	262
1036.8	0	404	404
1036.9	0	579	579
1037.0	0	789	789
1037.1	0	1035	1035
1037.2	0	1316	1316
1037.3	0	1632	1632
1037.4	0	1983	1983
1037.5	0	2369	2369
1037.6	0	2788	2788
1037.7	0	3238	3238
1037.8	0	3719	3719
1037.9	0	4232	4232
1038.0	0	4778	4778
1038.1	0	5369	5369
1038.2	0	6006	6006
1038.3	0	6685	6685
1038.4	0	7403	7403
1038.5	0	8161	8161
1038.6	0	8957	8957
1038.7	0	9790	9790
1038.8	0	10661	10661
1038.9	0	11569	11569
1039.0	0	12516	12516
1039.1	0	13511	13511
1039.2	0	14564	14564
1039.3	0	15669	15669
1039.4	0	16826	16826
1039.5	0	18033	18033
1039.6	0	19288	19288
1039.7	0	20592	20592
1039.8	0	21945	21945
1039.9	29	23349	23378

VA



Tolleson FIS		Subwatershed:	VA
Weir Rating Curves			
	Q over	Q over	Total Q
Elevation	SPRR	59th Ave	(cfs)
1044.2	0	0	0
1044.3	0	4	4
1044.4	0	27	27
1044.5	0	70	70
1044.6	0	134	134
1044.7	0	218	218
1044.8	0	323	323
1044.9	0	448	448
1045.0	0	593	593
1045.1	0	759	759
1045.2	0	944	944
1045.3	0	1149	1149
1045.4	0	1373	1373
1045.5	0	1618	1618
1045.6	0	1883	1883
1045.7	0	2169	2169
1045.8	0	2480	2480
1045.9	0	2819	2819
1046.0	0	3189	3189
1046.1	87	3601	3688
1046.2	253	4069	4322
1046.3	477	4582	5059
1046.4	752	5136	5888
1046.5	1077	5732	6809
1046.6	1443	6366	7809
1046.7	1854	7040	8894
1046.8	2309	7753	10062
1046.9	2808	8502	11310
1047.0	3351	9289	12640
1047.1	3927	10113	14040
1047.2	4545	10973	15518
1047.3	5204	11872	17076
1047.4	5905	12808	18713
1047.5	6649	13783	20432
1047.6	7422	14799	22221
1047.7	8236	15858	24094
1047.8	9091	16964	26055

VC

51st

SPRR

Tolleson FIS		Subwatershed:	VC
Weir Rating Curves			
	Q over	Q over	Total Q
Elevation	SPRR	51st Ave	(cfs)
1050.9	0	0	0
1051.0	5	4	9
1051.1	27	23	50
1051.2	76	53	129
1051.3	157	94	251
1051.4	277	148	425
1051.5	440	214	654
1051.6	651	293	944
1051.7	916	385	1301
1051.8	1238	491	1729
1051.9	1623	613	2236
1052.0	2069	753	2822
1052.1	2594	918	3512
1052.2	3185	1106	4291
1052.3	3841	1318	5159
1052.4	4563	1554	6117
1052.5	5345	1814	7159
1052.6	6184	2103	8287
1052.7	7087	2425	9512
1052.8	8056	2776	10832
1052.9	9092	3154	12246
1053.0	10187	3560	13747
1053.1	11337	3993	15330
1053.2	12553	4452	17005
1053.3	13836	4938	18774
1053.4	15187	5452	20639
1053.5	16615	5994	22609
1053.6	18141	6564	24705
1053.7	19795	7163	26958
1053.8	21590	7795	29385
1053.9	23536	8471	32007

WA

Tolleson FIS		Subwatershed:	WA
Weir Rating Curves			
	Q over	Q over	Total Q
Elevation	SPRR	43rd Ave	(cfs)
1050.7	0	0	0
1050.8	0	1	1
1050.9	0	6	6
1051.0	0	17	17
1051.1	0	35	35
1051.2	0	66	66
1051.3	0	111	111
1051.4	0	167	167
1051.5	0	242	242
1051.6	0	347	347
1051.7	0	478	478
1051.8	0	633	633
1051.9	0	810	810
1052.0	0	1010	1010
1052.1	0	1231	1231
1052.2	0	1473	1473
1052.3	0	1738	1738
1052.4	0	2025	2025
1052.5	0	2336	2336
1052.6	0	2671	2671
1052.7	0	3030	3030
1052.8	0	3412	3412
1052.9	0	3817	3817
1053.0	0	4245	4245
1053.1	0	4696	4696
1053.2	0	5170	5170
1053.3	0	5669	5669
1053.4	0	6199	6199
1053.5	0	6755	6755
1053.6	0	7337	7337
1053.7	0	7944	7944
1053.8	0	8576	8576
1053.9	0	9237	9237
1054.0	0	9928	9928
1054.1	63	10647	10710
1054.2	191	11394	11585
1054.3	373	12165	12538
1054.4	609	12960	13569
1054.5	899	13777	14676
1054.6	1242	14616	15858

Wc

Tolleson FIS		Subwatershed:	Wc
Weir Rating Curves			
	Q over	Q over	Total Q
Elevation	SPRR	35th Ave	(cfs)
1057.1	0	0	0
1057.2	0	2	2
1057.3	0	11	11
1057.4	0	32	32
1057.5	0	66	66
1057.6	0	115	115
1057.7	0	179	179
1057.8	0	260	260
1057.9	0	357	357
1058.0	0	473	473
1058.1	0	608	608
1058.2	0	762	762
1058.3	0	936	936
1058.4	0	1130	1130
1058.5	0	1344	1344
1058.6	0	1579	1579
1058.7	0	1836	1836
1058.8	0	2116	2116
1058.9	0	2416	2416
1059.0	0	2740	2740
1059.1	0	3086	3086
1059.2	0	3456	3456
1059.3	0	3852	3852
1059.4	0	4278	4278
1059.5	7	4732	4739
1059.6	40	5213	5253
1059.7	111	5720	5831
1059.8	229	6253	6482
1059.9	403	6813	7216
1060.0	641	7402	8043
1060.1	951	8021	8972
1060.2	1322	8675	9997
1060.3	1745	9369	11114
1060.4	2224	10099	12323
1060.5	2759	10865	13624
1060.6	3350	11674	15024
1060.7	3997	12546	16543
1060.8	4691	13481	18172
1060.9	5439	14479	19918
1061.0	6243	15534	21777
1061.1	7104	16641	23745
1061.2	8022	17795	25817
1061.3	8982	18997	27979
1061.4	9993	20246	30239
1061.5	11058	21542	32600
1061.6	12173	22884	35057
1061.7	13340	24269	37609
1061.8	14544	25699	40243
1061.9	15797	27172	42969
1062.0	17101	28689	45790
1062.1	18458	30248	48706

XA

27th

SPRR

Tolleson FIS		Subwatershed:	XA
Weir Rating Curves			
	Q over	Q over	Total Q
Elevation	SPRR	27th Ave	(cfs)
1063.3	0	0	0
1063.4	0	2	2
1063.5	0	15	15
1063.6	0	43	43
1063.7	0	85	85
1063.8	0	140	140
1063.9	0	211	211
1064.0	0	307	307
1064.1	0	455	455
1064.2	0	644	644
1064.3	0	869	869
1064.4	0	1129	1129
1064.5	0	1423	1423
1064.6	0	1751	1751
1064.7	0	2111	2111
1064.8	0	2505	2505
1064.9	0	2930	2930
1065.0	0	3387	3387
1065.1	0	3879	3879
1065.2	0	4416	4416
1065.3	0	5000	5000
1065.4	0	5624	5624
1065.5	0	6291	6291
1065.6	0	6999	6999
1065.7	0	7748	7748
1065.8	0	8538	8538
1065.9	0	9368	9368
1066.0	0	10238	10238
1066.1	44	11148	11192
1066.2	137	12099	12236
1066.3	273	13090	13363
1066.4	455	14117	14572
1066.5	684	15179	15863
1066.6	960	16276	17236
1066.7	1287	17405	18692
1066.8	1668	18568	20236
1066.9	2108	19762	21870
1067.0	2600	20986	23586
1067.1	3141	22241	25382

B.2 General Correspondence

CHANGES ARE MADE IN DETERMINATIONS OF BASE FLOOD ELEVATIONS FOR THE CITIES OF AVONDALE, PHOENIX, AND TOLLESON AND THE UNINCORPORATED AREAS OF *MARICOPA COUNTY*, ARIZONA, UNDER THE NATIONAL FLOOD INSURANCE PROGRAM

On September 30, 1995, the Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in the Cities of Avondale, Phoenix, and Tolleson and the unincorporated areas of Maricopa County, Arizona, through issuance of a Flood Insurance Rate Map (FIRM). The Mitigation Directorate has determined that modification of the elevations of the flood having a 1 percent chance of being equaled or *exceeded in any given year* (base flood) for certain locations in these communities is appropriate. The modified base flood elevations (BFEs) revise the FIRM for the communities.

The changes are being made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are in accordance with the National Flood Insurance Act of 1968, as amended

(Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65.

A detailed hydrologic and hydraulic analysis was performed and has resulted in increases and decreases in SFHA width andincreâ7~edâiid decreased BFEs along the Roosevelt Irrigation District Canal in~I Southern Pacific Railroad. *The table below indicates existing and modified BFEs for* selected locations along the affected lengths of the flooding source(s) cited above.

Location	Existing BFE (feet)	Modified BFE (feet)[6]
Along Roosevelt Irrigation District Canal:		
[3]Approximately 200 feet east of 83rd Avenue	None	1,026
[4]Approximately 2,600 feet west of 75th Avenue	None	1,027
[4]Approximately 100 feet west of 75th Avenue	None	1,029
[2,3]At 75th Avenue	None	1,029
[2]*Approximately 4,000 feet east of 75th Avenue*	None	1,036
[2]Just west of 59th Avenue	None	1,031
[4]Just east of 59th Avenue	None	1,033
[2,4]At 51st Avenue	None	1,033
[2]Just west of 35th Avenue	None	1,041
Along Southern Pacific Railroad:		
[1]At El Mirage Road	None	964
[4]Approximately 2,700 feet east of El Mirage Road	None	983
[4]Just west of 115th Avenue	None	986
[1]Approximately *150 feet west of 107th Avenue*	None	994
[4]Approximately 150 feet east of 107th Avenue	2[5]	994
[3]Approximately 1,000 feet east of 107th Avenue	2[5]	994
[3]Approximately 100 feet west of 99th Avenue	2[5]	999
[3]Just east of 99th Avenue	2[5]	1,003
[4]Approximately 100 feet east of *95th Avenue*	2[5]	1,016
[3,4]At 83rd Avenue	2[5]	1,024
[3]Approximately 1,300 feet east of 83rd Avenue	None	1,025
[3]Approximately 4,000 feet east of 83rd Avenue	None	1,026
[4]Approximately 100 feet west of 75th Avenue	None	1,029
[2]Roosevelt Irrigation District Canal	None	1,041

[1]City of Avondale
[2]City of Phoenix
[3]City of Tolleson
[4]Unincorporated areas of Maricopa County
[5]Referenced to the National Geodetic Vertical Datum, rounded to the nearest whole foot
[6]Depth in feet above ground, rounded to the nearest whole foot

Under the above-mentioned Acts of 1968 and 1973, the Mitigation Directorate must develop criteria for floodplain management. To participate in the National Flood Insurance Program (NFIP), the community must use the modified BEES to administer the floodplain management measures of the NEW. These modified BFEs will also be used to calculate the appropriate flood insurance premium rates for new buildings and their contents and for the second layer of insurance on existing buildings and contents.

Upon the second publication of notice of these changes in this newspaper, any person has 90 days in which he or she can request, through the Chief Executive Officer of the community, that the Mitigation Directorate reconsider the determination. Any request for reconsideration must be based on knowledge of changed conditions or new scientific or technical data. All interested parties are on notice that until the 90-day period elapses, the Mitigation Directorate's determination to modify the BEES may itself be changed.

Any person having knowledge or wishing to comment on these changes should immediately notify:

The Honorable Thomas F. Morales, Jr.
Mayor, City of Avondale
525 North Central Avenue
Avondale, Arizona 85323

OR

The Honorable Skip Rimsza
Mayor, City of Phoenix
200 West Washington, 11th Floor
Phoenix, Arizona *85003*

OR

The Honorable Adolfo Gamez
Mayor, City of Tolleson
9555 West Van Buren
Tolleson, Arizona 85353

OR

The Honorable Fulton Brock
Chairman, Maricopa County
Board of Supervisors
301 West Jefferson, 10th Floor
Phoenix, Arizona 85003

000181-March 24, 31, 2000

Federal Emergency Management Agency

Washington, D.C. 20472

RECEIVED

FEB 2 8 2000

DIBBLE & ASSOC.

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 00-09-009P

The Honorable Thomas F. Morales, Jr.
Mayor, City of Avondale
525 North Central Avenue
Avondale, AZ 85323

Community: City of Avondale, Arizona
Community No.: 040038
Panels Affected: 04013C2080 G, 2085 E, 2090 F, and 2095 D
Effective Date of This Revision: FEB 23 2000

102-I-A-C

Dear Mayor Morales:

This responds to a request that the Federal Emergency Management Agency (FEMA) revise the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for Maricopa County, Arizona and Incorporated Areas (the effective FIRM and FIS report for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated September 23, 1999, Mr. Timothy M. Murphy, Project Manager, Engineering Division, Flood Control District of Maricopa County, requested that FEMA revise the FIRM and FIS report to show the effects of a detailed hydrologic and hydraulic analysis along the Roosevelt Irrigation District Canal from 83rd Avenue to 35th Avenue and along the Southern Pacific Railroad (SPRR) from El Mirage Road to the intersection with the Roosevelt Irrigation District Canal approximately 1,400 feet west of 67th Avenue.

All data required to complete our review of this request were submitted with letters from Mr. Murphy.

Because this Letter of Map Revision (LOMR) is based on a detailed hydrologic or hydraulic study conducted by a Federal, State, or local agency to replace an approximate study conducted by FEMA, fees were not assessed for the review.

We have completed our review of the submitted data and the flood data shown on the effective FIRM and FIS report. We have revised the FIRM and FIS report to modify the elevations, floodplain boundary delineations, and zone designations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along the SPRR from just east of El Mirage road to just west of 107th Avenue. As a result of the modifications, the base flood elevations (BFEs) and the width of the Special Flood Hazard Area (SFHA), the area that would be inundated by the base flood, along the SPRR increased in some areas and decreased in other areas. The modifications are shown on the enclosed annotated copies of FIRM Panel(s) 04013C2080 G, 04013C2085 E, 04013C2090 F, and 04013C2095 D; Profile Panel(s) 1043P;

and affected portions of the Summary of Discharges Table. This LOMR hereby revises effective FIRM Panels 04013C2080 G and 04013C2090 F dated September 30, 1995; FIRM Panel 04013C2085 E dated September 4, 1991; FIRM Panel 04013C2095 D dated April 15, 1988; and the affected portions of the FIS report dated September 30, 1995.

Please note that roads and corporate limits were updated according to information submitted by your community.

Because this revision request also affects the Cities of Phoenix and Tolleson and the unincorporated areas of Maricopa County, separate LOMRs for those communities were issued on the same date as this LOMR.

The modifications are effective as of the date shown above. The map panel(s) as listed above and as modified by this letter will be used for all flood insurance policies and renewals issued for your community.

The following table is a partial listing of existing and modified BFEs:

Location	Existing BFE (feet)*	Modified BFE (feet)*
Along the SPRR:		
At El Mirage Road	None	964
Approximately 150 feet west of 107th Avenue	None	994

*Referenced to the National Geodetic Vertical Datum, rounded to the nearest whole foot

Public notification of the proposed modified BFEs will be given in the *Arizona Republic* on or about March 24 and March 31, 2000. A copy of this notification is enclosed. In addition, a notice of changes will be published in the *Federal Register*. Within 90 days of the second publication in the *Arizona Republic*, a citizen may request that FEMA reconsider the determination made by this LOMR. Any request for reconsideration must be based on scientific or technical data. All interested parties are on notice that, until the 90-day period elapses, the determination to modify the BFEs presented in this LOMR may itself be modified.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare a related article for publication in your community's local newspaper. This article should describe the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

We are processing a revised FIRM and FIS report for Maricopa County; therefore, we will not physically revise and republish the FIRM and FIS report for your community to incorporate the modifications made by this LOMR at this time. Preliminary copies of the revised FIRM and FIS report were submitted to your community for review on December 23, 1997, and May 29, 1998. We will incorporate the modifications made by this LOMR into the revised FIRM and FIS report before they become effective.

This LOMR is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development, and for ensuring all necessary permits required by Federal or State law have been received. State, county, and community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed minimum NFIP criteria. These criteria are the minimum and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM to which the regulations apply and the modifications described in this LOMR. Our records show that your community has met this requirement.

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

Ms. Sally Ziolkowski
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
The Presidio of San Francisco, Building 105
San Francisco, California 94129-1250
(415) 923-7177

FEMA makes flood insurance available in participating communities; in addition, we encourage communities to develop their own loss reduction and prevention programs. Through the *Project Impact: Building Disaster Resistant Communities* initiative, launched by FEMA Director James Lee Witt in 1997, we seek to focus the energy of businesses, citizens, and communities in the United States on the importance of reducing their susceptibility to the impact of all natural disasters, including floods, hurricanes, severe storms, earthquakes, and wildfires. Natural hazard mitigation is most effective when it is planned for and implemented at the local level, by the entities who are most knowledgeable of local conditions and whose economic stability and safety are at stake. For your information, we are enclosing a copy of a pamphlet describing this nationwide initiative. For additional information on *Project Impact*, please visit our Web site at **www.fema.gov/impact**.

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the CCO for your community at the telephone number cited above. If you have

any technical questions regarding this LOMR, please contact the FEMA Map Assistance Center, toll free, at 1-877-336-2627 (1-877-FEMA MAP).

Sincerely,

Max H. Yuan, P.E., Project Engineer
Hazards Study Branch
Mitigation Directorate

For: Matthew B. Miller, P.E., Chief
Hazards Study Branch
Mitigation Directorate

Enclosure(s)

cc: The Honorable Skip Rimsza
Mayor, City of Phoenix

The Honorable Adolfo Gamez
Mayor, City of Tolleson

The Honorable Andrew Kunasek
Chairman, Maricopa County
Board of Supervisors

Mr. Timothy M. Murphy
Project Manager
Engineering Division
Flood Control District
of Maricopa County

Mr. Desmond McGeough
Community Development Planner
City of Avondale

Mr. Brian J. Fry, P.E.
Project Manager
Dibble & Associates

CHANGES ARE MADE IN DETERMINATIONS OF BASE FLOOD ELEVATIONS FOR THE CITIES OF AVONDALE, PHOENIX, AND TOLLESON AND THE UNINCORPORATED AREAS OF MARICOPA COUNTY, ARIZONA, UNDER THE NATIONAL FLOOD INSURANCE PROGRAM

On September 30, 1995, the Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in the Cities of Avondale, Phoenix, and Tolleson and the unincorporated areas of Maricopa County, Arizona, through issuance of a Flood Insurance Rate Map (FIRM). The Mitigation Directorate has determined that modification of the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) for certain locations in these communities is appropriate. The modified base flood elevations (BFEs) revise the FIRM for the communities.

The changes are being made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65.

A detailed hydrologic and hydraulic analysis was performed and has resulted in increases and decreases in SFHA width and increased and decreased BFEs along the Roosevelt Irrigation District Canal and Southern Pacific Railroad. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source(s) cited above.

Location	Existing BFE (feet)	Modified BFE (feet)[5]
Along Roosevelt Irrigation District Canal:		
[3]Approximately 200 feet east of 83rd Avenue	None	1,026
[4]Approximately 2,600 feet west of 75th Avenue	None	1,027
[4]Approximately 100 feet west of 75th Avenue	None	1,029
[2,3]At 75th Avenue	None	1,029
[2]Approximately 4,000 feet east of 75th Avenue	None	1,036
[2]Just west of 59th Avenue	None	1,031
[4]Just east of 59th Avenue	None	1,033
[2,4]At 51st Avenue	None	1,033
[2]Just west of 35th Avenue	None	1,041
Along Southern Pacific Railroad:		
[1]At El Mirage Road	None	964
[4]Approximately 2,700 feet east of El Mirage Road	None	983
[4]Just west of 115th Avenue	None	986
[1]Approximately 150 feet west of 107th Avenue	None	994
[4]Approximately 150 feet east of 107th Avenue	2[6]	994
[3]Approximately 1,000 feet east of 107th Avenue	2[6]	994
[3]Approximately 100 feet west of 99th Avenue	2[6]	999
[3]Just east of 99th Avenue	2[6]	1,003
[4]Approximately 100 feet east of 95th Avenue	2[6]	1,016
[3,4]At 83rd Avenue	2[6]	1,024
[3]Approximately 1,300 feet east of 83rd Avenue	None	1,025
[3]Approximately 4,000 feet east of 83rd Avenue	None	1,026
[4]Approximately 100 feet west of 75th Avenue	None	1,029
[2]At Roosevelt Irrigation District Canal	None	1,041

[1]City of Avondale
[2]City of Phoenix
[3]City of Tolleson
[4]Unincorporated areas of Maricopa County
[5]Referenced to the National Geodetic Vertical Datum, rounded to the nearest whole foot
[6]Depth in feet above ground, rounded to the nearest whole foot

Under the above-mentioned Acts of 1968 and 1973, the Mitigation Directorate must develop criteria for floodplain management. To participate in the National Flood Insurance Program (NFIP), the community must use the modified BFEs to administer the floodplain management measures of the NFIP. These modified BFEs will also be used to calculate the appropriate flood insurance premium rates for new buildings and their contents and for the second layer of insurance on existing buildings and contents.

Upon the second publication of notice of these changes in this newspaper, any person has 90 days in which he or she can request, through the Chief Executive Officer of the community, that the Mitigation Directorate reconsider the determination. Any request for reconsideration must be based on knowledge of changed conditions or new scientific or technical data. All interested parties are on notice that until the 90-day period elapses, the Mitigation Directorate's determination to modify the BFEs may itself be changed.

Any person having knowledge or wishing to comment on these changes should immediately notify:

The Honorable Thomas F. Morales, Jr.
Mayor, City of Avondale
525 North Central Avenue
Avondale, Arizona 85323

OR

The Honorable Skip Rimsza
Mayor, City of Phoenix
200 West Washington, 11th Floor
Phoenix, Arizona 85003

OR

The Honorable Adolfo Gamez
Mayor, City of Tolleson
9555 West Van Buren
Tolleson, Arizona 85353

OR

The Honorable Fulton Brock
Chairman, Maricopa County
Board of Supervisors
301 West Jefferson, 10th Floor
Phoenix, Arizona 85003

Federal Emergency
Management Agency

FACT SHEET

Office of Emergency Information and Media Affairs, Washington, D.C. 20472 (202) 646-4600

PROJECT IMPACT
Building a Disaster Resistant Community

BACKGROUND

PROJECT IMPACT is an initiative developed by FEMA Director James Lee Witt to challenge the country to undertake actions that protect families, businesses and communities by reducing the effects of natural disasters. This initiative includes a national awareness campaign, the selection of pilot communities that demonstrate the benefits of hazard mitigation through a partnership approach, and an outreach effort to businesses and communities using a new guidebook that offers a formula for a community or business to follow to become disaster resistant.

RATIONALE

The increasing number and severity of natural disasters the past decade demands that action be taken to reduce the threat that hurricanes, severe storms, earthquakes, floods and wildfires impose upon the economic stability, economic future and safety of the citizens of the U.S. As the federal agency responsible for emergency management, FEMA is committed to reducing disaster losses by focusing the energy of businesses, citizens, and communities in the U.S. on the importance of reducing their susceptibility to the impact of natural disasters.

There are three primary tenets of the PROJECT IMPACT initiative:

- *Mitigation is a local issue.* It is best addressed by a local partnership that involves government, businesses and private citizens.

- *Private sector participation is essential.* Disasters threaten the economic and commercial growth of our cities, towns, villages and counties. Without the participation of the private sector, comprehensive solutions will not be developed.

- *Mitigation is a long-term effort that requires long-term investment.* Disaster losses will not be eliminated overnight.

PILOT COMMUNITIES

Director Witt and FEMA have worked closely with seven communities throughout the U.S. to develop a PROJECT IMPACT plan that localities, businesses and citizens can follow to build disaster resistant communities where they live and work. Director Witt will participate in events in each of these communities to congratulate them on their foresight, commitment, and contribution to a disaster resistant nation.

PROJECT IMPACT GUIDEBOOK

The guidebook presents that steps a community can take to become disaster resistant. It also provides examples of the actions and resources available to accomplish this goal.

Need Information on
FEMA FLOOD HAZARD MAPS?

National Flood Insurance Program
Administered by FEMA

CONTACT 1-877-FEMA MAP
(Toll Free 1-877-336-2627)

This release is intended to acquaint the public with the Federal Emergency Management Agency's new toll-free number established to respond to questions regarding National Flood Insurance Program (NFIP) Flood Hazard maps, including:

- How do I go about getting a Letter of Map Amendment (LOMA)? A Letter of Map Revision Based on Fill (LOMR-F)? A Letter of Map Revision (LOMR)?
- What is the status of my request for a LOMA? LOMR-F? Study?
- How long does it take to get the map revised?
- Did FEMA receive my request for a Letter of Map Amendment?
- I was just told by my lender that my house is in a floodplain and I need flood insurance, what are my options?
- Was a LOMA ever issued for my property?
- Has the National Flood Insurance Program Flood Hazard map for my community been revised?

The following procedures have been established by FEMA for changing and correcting the NFIP Flood Hazard maps. They are: Letters of Map Amendment (LOMAs), Letters of Map Revision(LOMRs), Letters of Map Revision Based on Fill (LOMR-Fs), and Physical Map Revisions.

As a result of numerous requests for revisions or corrections to the NFIP Flood Hazard maps, FEMA has assigned a dedicated staff of trained professionals to respond to the public's requests for information on the procedures to revise or correct the NFIP Flood Hazard maps.

If you have any questions regarding the NFIP Flood Hazard maps or need current information and facts on FEMA Mapping Procedures, call 1-877-FEMA-MAP.

Below are additional Toll-Free numbers that can be used to obtain other information regarding the NFIP and its products.

- For information about the NFIP's Preferred Risk Policy, ask your insurance agent or company, or call the NFIP's toll-free number at 1-800-427-9662.

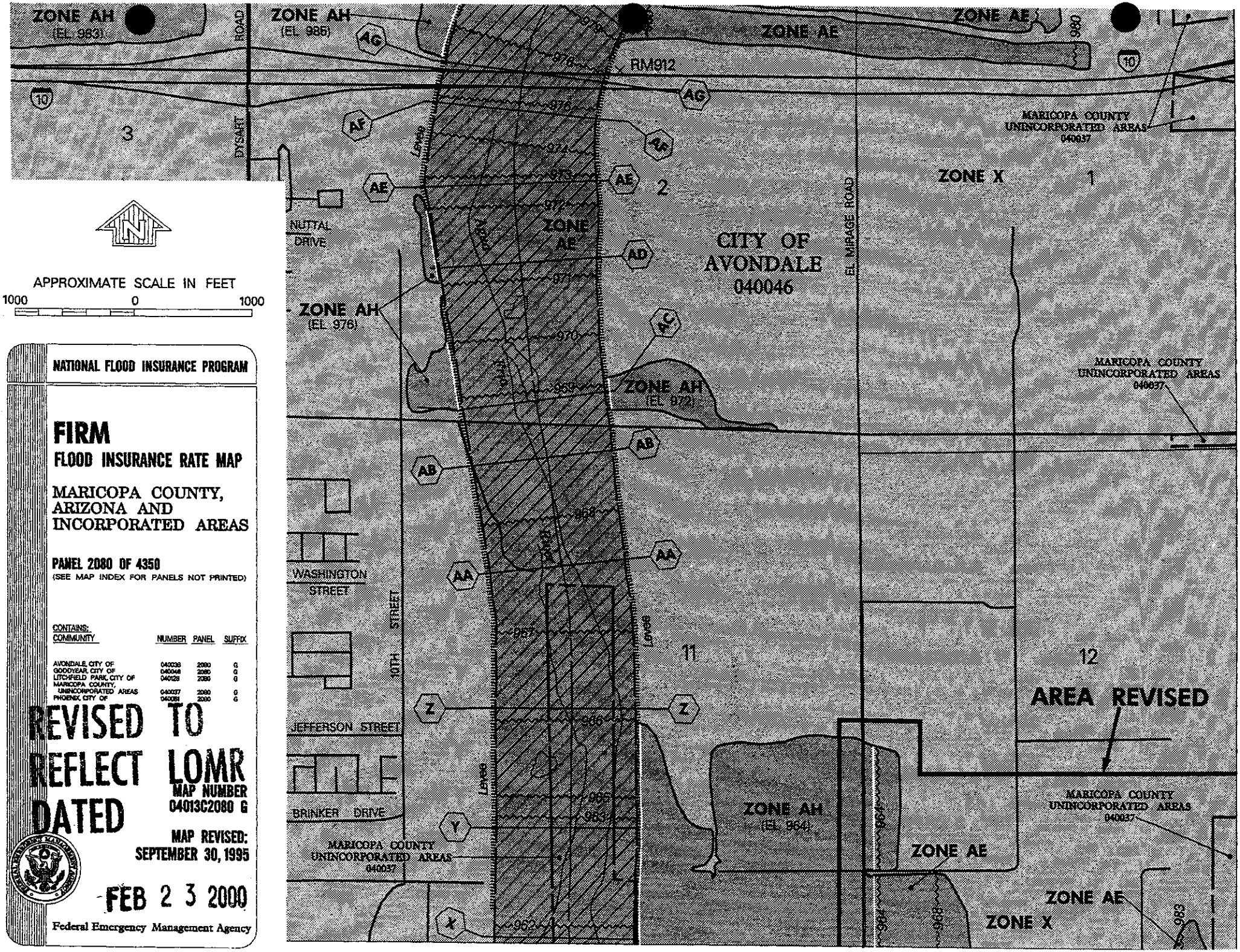
- For any current FEMA publications, call FEMA's Publication Center at 1-800-480-2520.

- For answers to flood insurance related questions, call the National Flood Insurance Telephone Response Center at 1-800-427-4661.

- For ordering printed copies of effective NFIP Flood Hazard maps and related documents, call the FEMA Map Service Center at 1-800-358-9616.

Additional information on flood insurance and other FEMA programs and activities is available on the FEMA World Wide Web Site (http://www.FEMA.gov) and from FEMA's 24-hour-FAX-on-Demand system at (202) 646-FEMA. TDD# 1-800-427-5593.

Edition 1.0 2/25/99



APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 2080 OF 4350

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
AVONDALE, CITY OF	040038	2080	G
GOODYEAR, CITY OF	040046	2080	G
LITCHFIELD PARK, CITY OF	040129	2080	G
MARICOPA COUNTY, UNINCORPORATED AREAS	040037	2080	G
PHOENIX, CITY OF	040051	2080	G

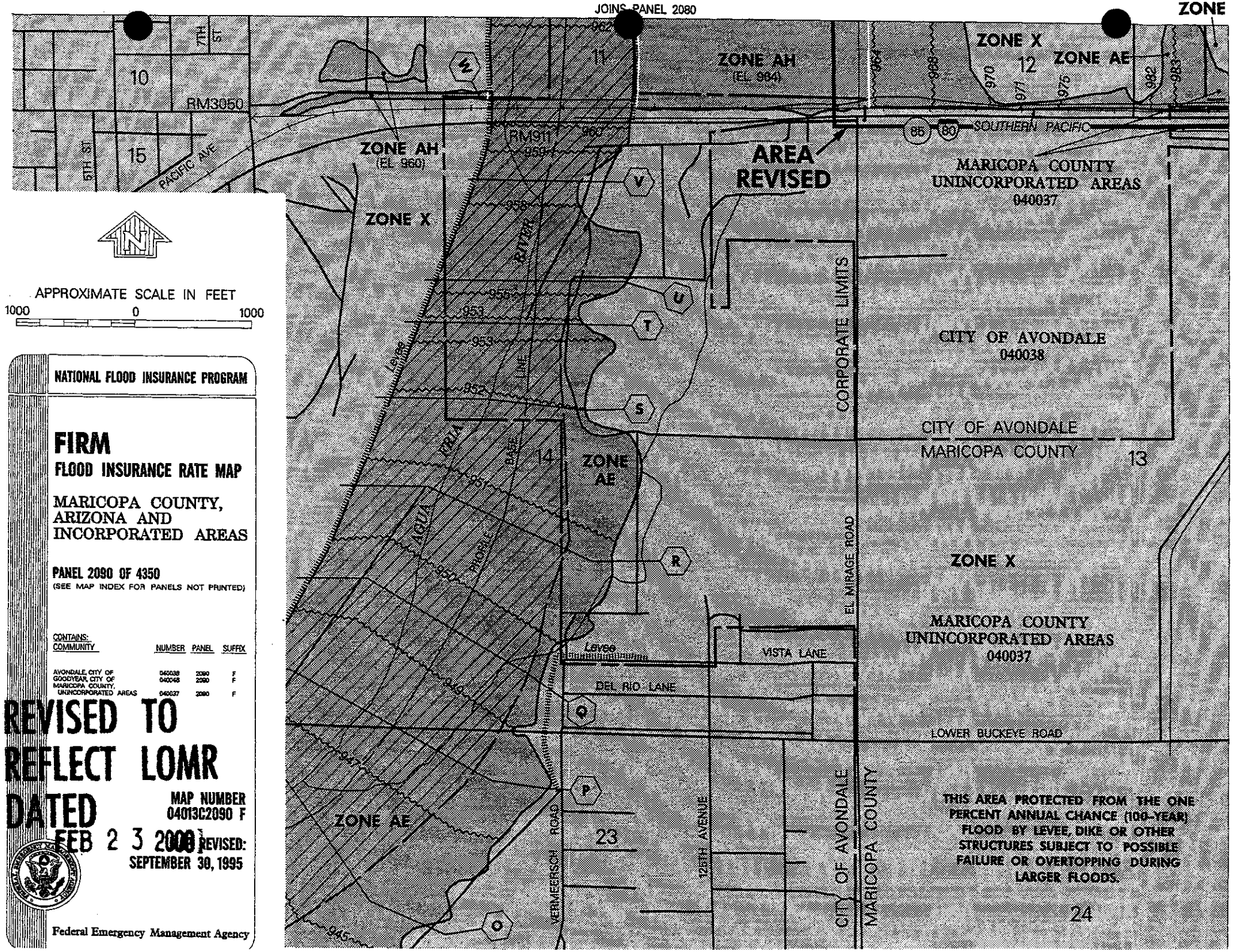
REVISED TO REFLECT LOMR DATED

MAP NUMBER 04013C2080 G

MAP REVISED: SEPTEMBER 30, 1995

FEB 2 3 2000

Federal Emergency Management Agency


JOINS PANEL 2080
ZONE X
ZONE AH
(EL 984)
ZONE X
12
ZONE AE
10
RM3050
7TH ST
15
5TH ST
PACIFIC AVE
ZONE AH
(EL 960)
RM911
AREA
REVISED
SOUTHERN PACIFIC
MARICOPA COUNTY
UNINCORPORATED AREAS
040037
ZONE X
CITY OF AVONDALE
040038
CORPORATE LIMITS
CITY OF AVONDALE
MARICOPA COUNTY
13
ZONE
AE
14
Levee
EL MIRAGE ROAD
ZONE X
MARICOPA COUNTY
UNINCORPORATED AREAS
040037
VISTA LANE
DEL RIO LANE
LOWER BUCKEYE ROAD
ZONE AE
23
VERMEERSCH ROAD
126TH AVENUE
CITY OF AVONDALE
MARICOPA COUNTY
THIS AREA PROTECTED FROM THE ONE PERCENT ANNUAL CHANCE (100-YEAR) FLOOD BY LEVEE, DIKE OR OTHER STRUCTURES SUBJECT TO POSSIBLE FAILURE OR OVERTOPPING DURING LARGER FLOODS.
24
JOINS PANEL 2095
APPROXIMATE SCALE IN FEET
1000 0 1000
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS
PANEL 2090 OF 4350
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
AVONDALE, CITY OF 040038 2090 F
GOODYEAR, CITY OF 040046 2090 F
MARICOPA COUNTY, UNINCORPORATED AREAS 040037 2090 F
REVISED TO REFLECT LOMR DATED FEB 23 2000
MAP NUMBER 04013C2090 F
REVISED: SEPTEMBER 30, 1995
Federal Emergency Management Agency

Federal Emergency Management Agency

Washington, D.C. 20472

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 00-09-009P

The Honorable Skip Rimsza
Mayor, City of Phoenix
200 West Washington, 11th floor
Phoenix, AZ 85003

Community: City of Phoenix, Arizona
Community No.: 040051
Panels Affected: 04013C2105 D, 2115 E, and 2120 E
Effective Date of This Revision: FEB 23 2000

102-I-A-C

Dear Mayor Rimsza:

This responds to a request that the Federal Emergency Management Agency (FEMA) revise the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for Maricopa County, Arizona and Incorporated Areas (the effective FIRM and FIS report for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated September 23, 1999, Mr. Timothy M. Murphy, Project Manager, Engineering Division, Flood Control District of Maricopa County, requested that FEMA revise the FIRM and FIS report to show the effects of a detailed hydrologic and hydraulic analysis along the Roosevelt Irrigation District Canal from 83rd Avenue to 35th Avenue and along the Southern Pacific Railroad (SPRR) from El Mirage Road to the intersection with the Roosevelt Irrigation District Canal approximately 1,400 feet west of 67th Avenue.

All data required to complete our review of this request were submitted with letters from Mr. Murphy.

Because this Letter of Map Revision (LOMR) is based on a detailed hydrologic or hydraulic study conducted by a Federal, State, or local agency to replace an approximate study conducted by FEMA, fees were not assessed for the review.

We have completed our review of the submitted data and the flood data shown on the effective FIRM and FIS report. We have revised the FIRM and FIS report to modify the elevations, floodplain boundary delineations, and zone designations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along the Roosevelt Irrigation District Canal from just east of 75th Avenue to just west of 59th Avenue and from approximately 2,600 feet west of 51st Avenue to 36th Avenue and along the SPRR from approximately 4,000 feet west to just west of 35th Avenue. As a result of the modifications, the base flood elevations (BFEs) and the widths of the Special Flood Hazard Areas (SFHAs), the areas that would be inundated by the base flood, along the Roosevelt Irrigation District Canal and along the SPRR increased in some areas and decreased in other areas. The modifications are shown on the enclosed annotated copies of FIRM Panel(s) 04013C2105 D, 04013C2115 E, and 04013C2120 E; Profile Panel(s) 1045P; and affected portions of the Summary of Discharges Table. This LOMR hereby revises effective FIRM Panel 04013C2105 D dated April 15, 1988; FIRM Panels 04013C2115 E and 04013C2120 E dated September 4, 1991; and the affected portions of the FIS report dated September 30, 1995.

Please note that roads and corporate limits were updated according to information submitted by your community.

Because this revision request also affects the Cities of Avondale and Tolleson and the unincorporated areas of Maricopa County, separate LOMRs for those communities were issued on the same date as this LOMR.

The modifications are effective as of the date shown above. The map panel(s) as listed above and as modified by this letter will be used for all flood insurance policies and renewals issued for your community.

The following table is a partial listing of existing and modified BFEs:

Location	Existing BFE (feet)*	Modified BFE (feet)*
Along Roosevelt Irrigation District Canal:		
At 75th Avenue	None	1,029
Approximately 4,000 feet east of 75th Avenue	None	1,036
Just west of 59th Avenue	None	1,031
At 51st Avenue	None	1,033
Just west of 35th Avenue	None	1,041
Along the SPRR:		
At Roosevelt Irrigation District Canal	None	1,041

*Referenced to the National Geodetic Vertical Datum, rounded to the nearest whole foot

Public notification of the proposed modified BFEs will be given in the *Arizona Republic* on or about March 24 and March 31, 2000. A copy of this notification is enclosed. In addition, a notice of changes will be published in the *Federal Register*. Within 90 days of the second publication in the *Arizona Republic*, a citizen may request that FEMA reconsider the determination made by this LOMR. Any request for reconsideration must be based on scientific or technical data. All interested parties are on notice that, until the 90-day period elapses, the determination to modify the BFEs presented in this LOMR may itself be modified.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare a related article for publication in your community's local newspaper. This article should describe the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

We are processing a revised FIRM and FIS report for Maricopa County; therefore, we will not physically revise and republish the FIRM and FIS report for your community to incorporate the modifications made by this LOMR at this time. Preliminary copies of the revised FIRM and FIS report were submitted to your community for review on May 29, 1998. We will incorporate the modifications made by this LOMR into the revised FIRM and FIS report before they become effective.

This LOMR is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development, and for ensuring all necessary permits required by Federal or State law have been received. State, county, and community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed minimum NFIP criteria. These criteria are the minimum and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM to which the regulations apply and the modifications described in this LOMR. Our records show that your community has met this requirement.

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

Ms. Sally Ziolkowski
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
The Presidio of San Francisco, Building 105
San Francisco, California 94129-1250
(415) 923-7177

FEMA makes flood insurance available in participating communities; in addition, we encourage communities to develop their own loss reduction and prevention programs. Through the *Project Impact: Building Disaster Resistant Communities* initiative, launched by FEMA Director James Lee Witt in 1997, we seek to focus the energy of businesses, citizens, and communities in the United States on the importance of reducing their susceptibility to the impact of all natural disasters, including floods, hurricanes, severe storms, earthquakes, and wildfires. Natural hazard mitigation is most effective when it is planned for and implemented at the local level, by the entities who are most knowledgeable of local conditions and whose economic stability and safety are at stake. For your information, we are enclosing a copy of a pamphlet describing this nationwide initiative. For additional information on *Project Impact*, please visit our Web site at **www.fema.gov/impact**.

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the CCO for your community at the telephone number cited above. If you have any technical questions regarding this LOMR, please contact the FEMA Map Assistance Center, toll free, at 1-877-336-2627 (1-877-FEMA MAP).

Sincerely,

Max H. Yuan, P.E., Project Engineer
Hazards Study Branch
Mitigation Directorate

For: Matthew B. Miller, P.E., Chief
Hazards Study Branch
Mitigation Directorate

Enclosure(s)

cc: The Honorable Thomas F. Morales, Jr.
Mayor, City of Avondale

The Honorable Adolfo Gamez
Mayor, City of Tolleson

The Honorable Andrew Kunasek
Chairman, Maricopa County
Board of Supervisors

Mr. Timothy M. Murphy
Project Manager
Engineering Division
Flood Control District
of Maricopa County

Ms. Cindy D. White, P.E.
Floodplain Manager
Street Transportation Department
City of Phoenix

Mr. Brian J. Fry, P.E.
Project Manager
Dibble & Associates

Federal Emergency Management Agency

Washington, D.C. 20472

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 00-09-009P

The Honorable Adolfo Gamez
Mayor, City of Tolleson
9555 West Van Buren
Tolleson, AZ 85353

Community: City of Tolleson, Arizona
Community No.: 040055
Panels Affected: 04013C2085 E, 2095 D, and 2105 D
Effective Date of This Revision: FEB 23 2000

102-I-A-C

Dear Mayor Gamez:

This responds to a request that the Federal Emergency Management Agency (FEMA) revise the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for Maricopa County, Arizona and Incorporated Areas (the effective FIRM and FIS report for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated September 23, 1999, Mr. Timothy M. Murphy, Project Manager, Engineering Division, Flood Control District of Maricopa County, requested that FEMA revise the FIRM and FIS report to show the effects of a detailed hydrologic and hydraulic analysis along the Roosevelt Irrigation District Canal from 83rd Avenue to 35th Avenue and along the Southern Pacific Railroad (SPRR) from El Mirage Road to the intersection with the Roosevelt Irrigation District Canal approximately 1,400 feet west of 67th Avenue.

All data required to complete our review of this request were submitted with letters from Mr. Murphy.

Because this Letter of Map Revision (LOMR) is based on a detailed hydrologic or hydraulic study conducted by a Federal, State, or local agency to replace an approximate study conducted by FEMA, fees were not assessed for the review.

We have completed our review of the submitted data and the flood data shown on the effective FIRM and FIS report. We have revised the FIRM and FIS report to modify the elevations, floodplain boundary delineations, and zone designations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along the Roosevelt Irrigation District Canal from approximately 200 feet east of 83rd Avenue to 75th Avenue and along the SPRR from approximately 100 feet east to approximately 1,600 feet east of 107th Avenue; from approximately 1,000 feet west to approximately 100 feet west of 99th Avenue; from just east of 99th Avenue to approximately 600 feet west of 87th Avenue; and from approximately 1,300 feet east to approximately 4,000 feet east of 83rd Avenue. As a result of the modifications, the base flood elevations (BFEs) and the widths of the Special Flood Hazard Areas (SFHAs), the areas that would be inundated by the base flood, along Roosevelt Irrigation District Canal and along the SPRR increased in some areas and decreased in other areas. The modifications are shown on the enclosed annotated copies of FIRM Panel(s) 04013C2085 E, 04013C2095 D, and 04013C2105 D; Profile

Panel(s) 1044P, 1045P, and 1046P; and affected portions of the Summary of Discharges Table. This LOMR hereby revises effective FIRM Panel 04013C2085 E dated September 4, 1991; FIRM Panels 04013C2095 D and 04013C2105 D dated April 15, 1988; and the affected portions of the FIS report dated September 30, 1995.

Please note that roads and corporate limits were updated according to information submitted by your community.

Because this revision request also affects the Cities of Avondale and Phoenix and the unincorporated areas of Maricopa County, separate LOMRs for those communities were issued on the same date as this LOMR.

The modifications are effective as of the date shown above. The map panel(s) as listed above and as modified by this letter will be used for all flood insurance policies and renewals issued for your community.

The following table is a partial listing of existing and modified BFEs:

Location	Existing BFE (feet)	Modified BFE (feet)[1]
Along Roosevelt Irrigation District Canal:		
Approximately 200 feet east of 83rd Avenue	None	1,026
At 75th Avenue	None	1,029
Along the SPRR:		
Approximately 1,000 feet east of 107th Avenue	2[2]	994
Approximately 100 feet west of 99th Avenue	2[2]	999
Just east of 99th Avenue	2[2]	1,003
Approximately 600 feet west of 87th Avenue	2[2]	1,014
Approximately 1,300 feet east of 83rd Avenue	None	1,025
Approximately 4,000 feet east of 83rd Avenue	None	1,026

[1]Referenced to the National Geodetic Vertical Datum, rounded to the nearest whole foot
[2]Depth in feet above ground, rounded to the nearest whole foot

Public notification of the proposed modified BFEs will be given in the *Arizona Republic* on or about March 24 and March 31, 2000. A copy of this notification is enclosed. In addition, a notice of changes will be published in the *Federal Register*. Within 90 days of the second publication in the *Arizona Republic*, a citizen may request that FEMA reconsider the determination made by this LOMR. Any request for reconsideration must be based on scientific or technical data. All interested parties are on notice that, until the 90-day period elapses, the determination to modify the BFEs presented in this LOMR may itself be modified.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare a related article for publication in your community's local newspaper. This article should describe the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

We are processing a revised FIRM and FIS report for Maricopa County; therefore, we will not physically revise and republish the FIRM and FIS report for your community to incorporate the modifications made by this LOMR at this time. Preliminary copies of the revised FIRM and FIS report were submitted to your community for review on December 23, 1997, and May 29, 1998. We will incorporate the modifications made by this LOMR into the revised FIRM and FIS report before they become effective.

This LOMR is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development, and for ensuring all necessary permits required by Federal or State law have been received. State, county, and community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed minimum NFIP criteria. These criteria are the minimum and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM to which the regulations apply and the modifications described in this LOMR. Our records show that your community has met this requirement.

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

Ms. Sally Ziolkowski
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
The Presidio of San Francisco, Building 105
San Francisco, California 94129-1250
(415) 923-7177

FEMA makes flood insurance available in participating communities; in addition, we encourage communities to develop their own loss reduction and prevention programs. Through the *Project Impact: Building Disaster Resistant Communities* initiative, launched by FEMA Director James Lee Witt in 1997, we seek to focus the energy of businesses, citizens, and communities in the United States on the importance of reducing their susceptibility to the impact of all natural disasters, including floods, hurricanes, severe storms, earthquakes, and wildfires. Natural hazard mitigation is most effective when it is planned for and implemented at the local level, by the entities who are most knowledgeable of local conditions and whose economic stability and safety are at stake. For your information, we are enclosing a copy of a pamphlet describing this nationwide initiative. For additional information on *Project Impact*, please visit our Web site at **www.fema.gov/impact**.

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the CCO for your community at the telephone number cited above. If you have any technical questions regarding this LOMR, please contact the FEMA Map Assistance Center, toll free, at 1-877-336-2627 (1-877-FEMA MAP).

Sincerely,

Max H. Yuan, P.E., Project Engineer
Hazards Study Branch
Mitigation Directorate

For: Matthew B. Miller, P.E., Chief
Hazards Study Branch
Mitigation Directorate

Enclosure(s)

cc: The Honorable Thomas F. Morales, Jr.
Mayor, City of Avondale

The Honorable Skip Rimsza
Mayor, City of Phoenix

The Honorable Andrew Kunasek
Chairman, Maricopa County
Board of Supervisors

Mr. Timothy M. Murphy
Project Manager
Engineering Division
Flood Control District
of Maricopa County

Mr. Woodrow C. Scoutten, P.E.
City Engineer
City of Tolleson

Mr. Brian J. Fry, P.E.
Project Manager
Dibble & Associates

Federal Emergency Management Agency

Washington, D.C. 20472

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 00-09-009P

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

Community: Maricopa County, Arizona
Community No.: 040037
Panels Affected: 04013C2085 E, 2090 F, 2095 D, 2105 D, and 2120 E
Effective Date of This Revision: FEB 23 2000

102-I-A-C

Dear Mr. Kunasek:

This responds to a request that the Federal Emergency Management Agency (FEMA) revise the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for Maricopa County, Arizona and Incorporated Areas (the effective FIRM and FIS report for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated September 23, 1999, Mr. Timothy M. Murphy, Project Manager, Engineering Division, Flood Control District of Maricopa County, requested that FEMA revise the FIRM and FIS report to show the effects of a detailed hydrologic and hydraulic analysis along the Roosevelt Irrigation District Canal from 83rd Avenue to 35th Avenue and along the Southern Pacific Railroad (SPRR) from El Mirage Road to the intersection with the Roosevelt Irrigation District Canal approximately 1,400 feet west of 67th Avenue.

All data required to complete our review of this request were submitted with letters from Mr. Murphy.

Because this Letter of Map Revision (LOMR) is based on a detailed hydrologic or hydraulic study conducted by a Federal, State, or local agency to replace an approximate study conducted by FEMA, fees were not assessed for the review.

We have completed our review of the submitted data and the flood data shown on the effective FIRM and FIS report. We have revised the FIRM and FIS report to modify the elevations, floodplain boundary delineations, and zone designations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along the Roosevelt Irrigation District Canal from just east of 59th Avenue to just east of 51st Avenue and from approximately 2,600 feet west to approximately 100 feet west of 75th Avenue and along the SPRR from approximately 3,000 feet east of El Mirage Road to just west of 115th Avenue; from approximately 150 feet east of 107th Avenue to approximately 100 feet east of 95th Avenue; and from 91st Avenue to approximately 100 feet west of 75th Avenue. As a result of the modifications, the base flood elevations (BFEs) and the widths of the Special Flood Hazard Areas (SFHAs), the areas that would be inundated by the base flood, along the Roosevelt Irrigation District Canal and along the SPRR increased in some areas and decreased in other areas. The modifications are shown on the enclosed annotated copies of FIRM Panel(s) 04013C2085 E, 04013C2090 F, 04013C2095 D,

04013C2105 D, and 04013C2120 E; Profile Panel(s) 1043P through 1046P; and affected portions of the Summary of Discharges Table. This LOMR hereby revises effective FIRM Panel 04013C2090 F dated September 30, 1995; FIRM Panels 04013C2085 E and 04013C2120 E dated September 4, 1991; FIRM Panels 04013C2095 D and 04013C2105 D dated April 15, 1988; and the affected portions of the FIS report dated September 30, 1995.

Please note that roads and corporate limits were updated according to information submitted by your community.

Because this revision request also affects the Cities of Avondale, Phoenix, and Tolleson, separate LOMRs for those communities were issued on the same date as this LOMR.

The modifications are effective as of the date shown above. The map panel(s) as listed above and as modified by this letter will be used for all flood insurance policies and renewals issued for your community.

The following table is a partial listing of existing and modified BFEs:

Location	Existing BFE (feet)	Modified BFE (feet)[1]
Along Roosevelt Irrigation District Canal:		
Approximately 2,600 feet west of 75th Avenue	None	1,027
Approximately 100 feet west of 75th Avenue	None	1,029
Just east of 59th Avenue	None	1,033
At 51st Avenue	None	1,033
Along the SPRR:		
Approximately 2,700 feet east of El Mirage Road	None	983
Just west of 115th Avenue	None	986
Approximately 150 feet east of 107th Avenue	2[2]	994
Approximately 100 feet east of 95th Avenue	2[2]	1,016
At 91st Avenue	2[2]	1,010
Approximately 100 feet west of 75th Avenue	None	1,029

[1]Referenced to the National Geodetic Vertical Datum, rounded to the nearest whole foot
[2]Depth in feet above ground, rounded to the nearest whole foot

Public notification of the proposed modified BFEs will be given in the *Arizona Republic* on or about March 24 and March 31, 2000. A copy of this notification is enclosed. In addition, a notice of changes will be published in the *Federal Register*. Within 90 days of the second publication in the *Arizona Republic*, a citizen may request that FEMA reconsider the determination made by this LOMR. Any request for reconsideration must be based on scientific or technical data. All interested parties are on notice that, until the 90-day period elapses, the determination to modify the BFEs presented in this LOMR may itself be modified.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information.

We also encourage you to prepare a related article for publication in your community's local newspaper. This article should describe the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

We are processing a revised FIRM and FIS report for Maricopa County; therefore, we will not physically revise and republish the FIRM and FIS report for your community to incorporate the modifications made by this LOMR at this time. Preliminary copies of the revised FIRM and FIS report were submitted to your community for review on December 23, 1997, and May 29, 1998. We will incorporate the modifications made by this LOMR into the revised FIRM and FIS report before they become effective.

This LOMR is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development, and for ensuring all necessary permits required by Federal or State law have been received. State, county, and community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed minimum NFIP criteria. These criteria are the minimum and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM to which the regulations apply and the modifications described in this LOMR. Our records show that your community has met this requirement.

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

Ms. Sally Ziolkowski
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
The Presidio of San Francisco, Building 105
San Francisco, California 94129-1250
(415) 923-7177

FEMA makes flood insurance available in participating communities; in addition, we encourage communities to develop their own loss reduction and prevention programs. Through the *Project Impact: Building Disaster Resistant Communities* initiative, launched by FEMA Director James Lee Witt in 1997, we seek to focus the energy of businesses, citizens, and communities in the United States on the importance of reducing their susceptibility to the impact of all natural disasters, including floods, hurricanes, severe storms, earthquakes, and wildfires. Natural hazard mitigation is most effective when it is planned for and implemented at the local level, by the entities who are most knowledgeable of local conditions and whose economic stability and safety are at stake. For your information, we are enclosing a copy of a pamphlet describing this nationwide initiative. For additional information on *Project Impact*, please visit our Web site at **www.fema.gov/impact**.

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the CCO for your community at the telephone number cited above. If you have any technical questions regarding this LOMR, please contact the FEMA Map Assistance Center, toll free, at 1-877-336-2627 (1-877-FEMA MAP).

Sincerely,

Max H. Yuan, P.E., Project Engineer
Hazards Study Branch
Mitigation Directorate

For: Matthew B. Miller, P.E., Chief
Hazards Study Branch
Mitigation Directorate

Enclosure(s)

cc: The Honorable Thomas F. Morales, Jr.
Mayor, City of Avondale

The Honorable Skip Rimsza
Mayor, City of Phoenix

The Honorable Adolfo Gamez
Mayor, City of Tolleson

Mr. Timothy M. Murphy
Project Manager
Engineering Division
Flood Control District
of Maricopa County

Mr. Brian J. Fry, P.E.
Project Manager
Dibble & Associates

CHANGES ARE MADE IN DETERMINATIONS OF BASE FLOOD ELEVATIONS FOR THE CITIES OF AVONDALE, PHOENIX, AND TOLLESON AND THE UNINCORPORATED AREAS OF MARICOPA COUNTY, ARIZONA, UNDER THE NATIONAL FLOOD INSURANCE PROGRAM

On September 30, 1995, the Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in the Cities of Avondale, Phoenix, and Tolleson and the unincorporated areas of Maricopa County, Arizona, through issuance of a Flood Insurance Rate Map (FIRM). The Mitigation Directorate has determined that modification of the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) for certain locations in these communities is appropriate. The modified base flood elevations (BFEs) revise the FIRM for the communities.

The changes are being made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65.

A detailed hydrologic and hydraulic analysis was performed and has resulted in increases and decreases in SFHA width and increased and decreased BFEs along the Roosevelt Irrigation District Canal and Southern Pacific Railroad. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source(s) cited above.

Location	Existing BFE (feet)	Modified BFE (feet)[5]
Along Roosevelt Irrigation District Canal:		
[3]Approximately 200 feet east of 83rd Avenue	None	1,026
[4]Approximately 2,600 feet west of 75th Avenue	None	1,027
[4]Approximately 100 feet west of 75th Avenue	None	1,029
[2,3]At 75th Avenue	None	1,029
[2]Approximately 4,000 feet east of 75th Avenue	None	1,036
[2]Just west of 59th Avenue	None	1,031
[4]Just east of 59th Avenue	None	1,033
[2,4]At 51st Avenue	None	1,033
[2]Just west of 35th Avenue	None	1,041
Along Southern Pacific Railroad:		
[1]At El Mirage Road	None	964
[4]Approximately 2,700 feet east of El Mirage Road	None	983
[4]Just west of 115th Avenue	None	986
[1]Approximately 150 feet west of 107th Avenue	None	994
[4]Approximately 150 feet east of 107th Avenue	2[6]	994
[3]Approximately 1,000 feet east of 107th Avenue	2[6]	994
[3]Approximately 100 feet west of 99th Avenue	2[6]	999
[3]Just east of 99th Avenue	2[6]	1,003
[4]Approximately 100 feet east of 95th Avenue	2[6]	1,016
[3,4]At 83rd Avenue	2[6]	1,024
[3]Approximately 1,300 feet east of 83rd Avenue	None	1,025
[3]Approximately 4,000 feet east of 83rd Avenue	None	1,026
[4]Approximately 100 feet west of 75th Avenue	None	1,029
[2]At Roosevelt Irrigation District Canal	None	1,041

[1]City of Avondale
[2]City of Phoenix
[3]City of Tolleson
[4]Unincorporated areas of Maricopa County
[5]Referenced to the National Geodetic Vertical Datum, rounded to the nearest whole foot
[6]Depth in feet above ground, rounded to the nearest whole foot

Under the above-mentioned Acts of 1968 and 1973, the Mitigation Directorate must develop criteria for floodplain management. To participate in the National Flood Insurance Program (NFIP), the community must use the modified BFEs to administer the floodplain management measures of the NFIP. These modified BFEs will also be used to calculate the appropriate flood insurance premium rates for new buildings and their contents and for the second layer of insurance on existing buildings and contents.

Upon the second publication of notice of these changes in this newspaper, any person has 90 days in which he or she can request, through the Chief Executive Officer of the community, that the Mitigation Directorate reconsider the determination. Any request for reconsideration must be based on knowledge of changed conditions or new scientific or technical data. All interested parties are on notice that until the 90-day period elapses, the Mitigation Directorate's determination to modify the BFEs may itself be changed.

Any person having knowledge or wishing to comment on these changes should immediately notify:

The Honorable Thomas F. Morales, Jr.
Mayor, City of Avondale
525 North Central Avenue
Avondale, Arizona 85323

OR

The Honorable Skip Rimsza
Mayor, City of Phoenix
200 West Washington, 11th Floor
Phoenix, Arizona 85003

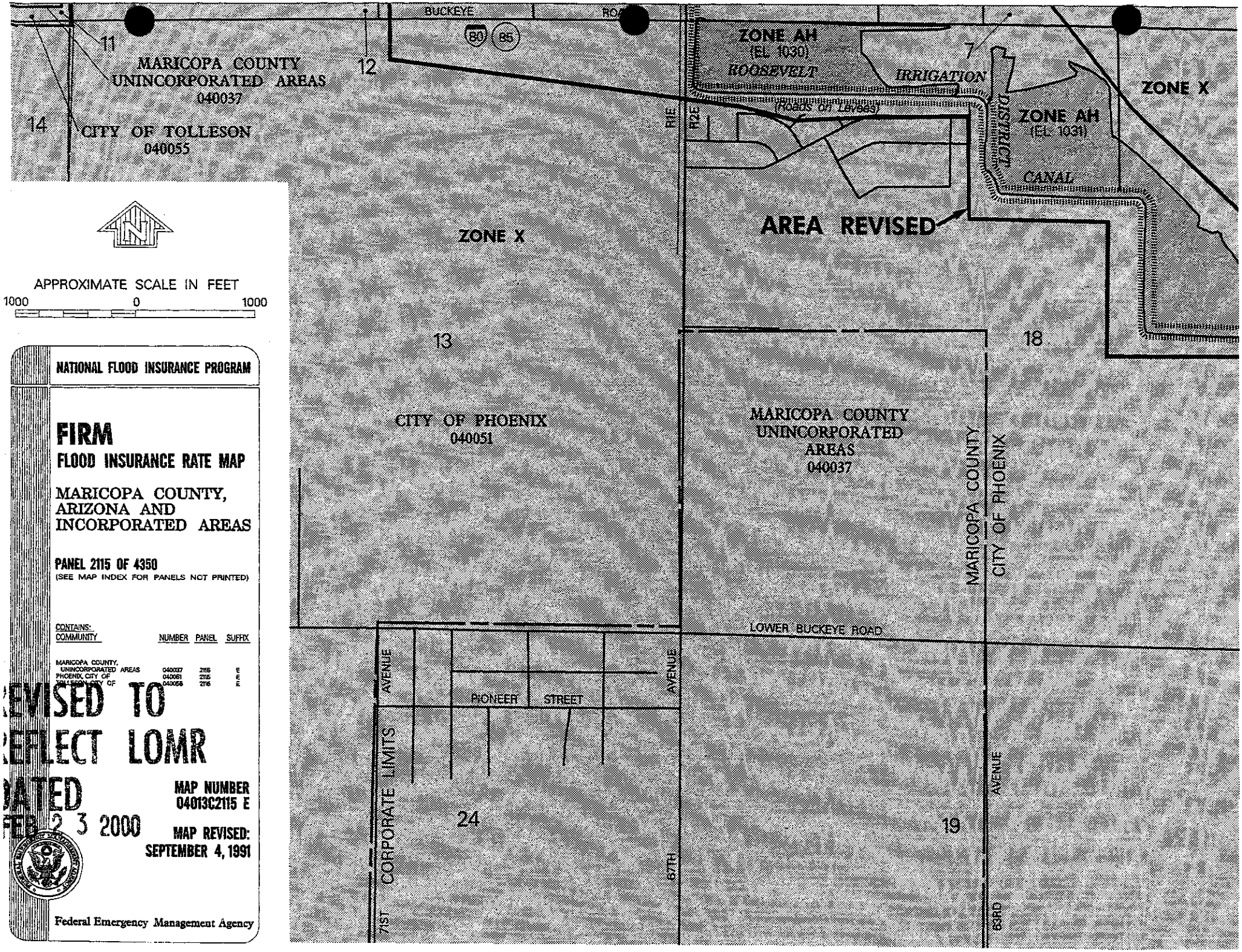
OR

The Honorable Adolfo Gamez
Mayor, City of Tolleson
9555 West Van Buren
Tolleson, Arizona 85353

OR

The Honorable Fulton Brock
Chairman, Maricopa County
Board of Supervisors
301 West Jefferson, 10th Floor
Phoenix, Arizona 85003

JOINS PANEL 2105



APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 2115 OF 4350

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY, UNINCORPORATED AREAS	040037	2115	E
PHOENIX, CITY OF	040051	2115	E
TOLLESON, CITY OF	040055	2115	E

REVISED TO REFLECT LOMR DATED FEB 23 2000

MAP NUMBER
04013C2115 E

MAP REVISED:
SEPTEMBER 4, 1991

Federal Emergency Management Agency

JOINS PANEL 2120

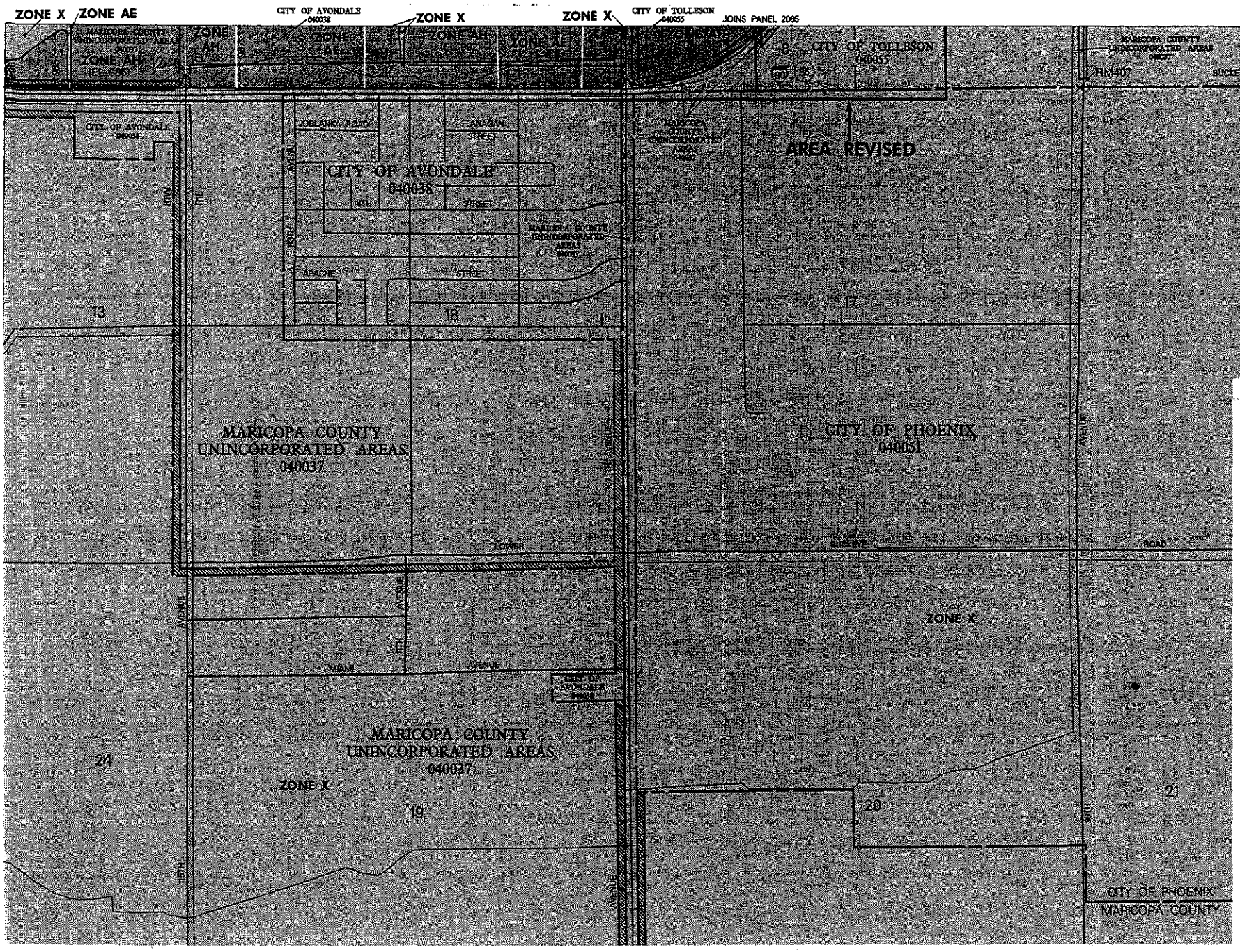
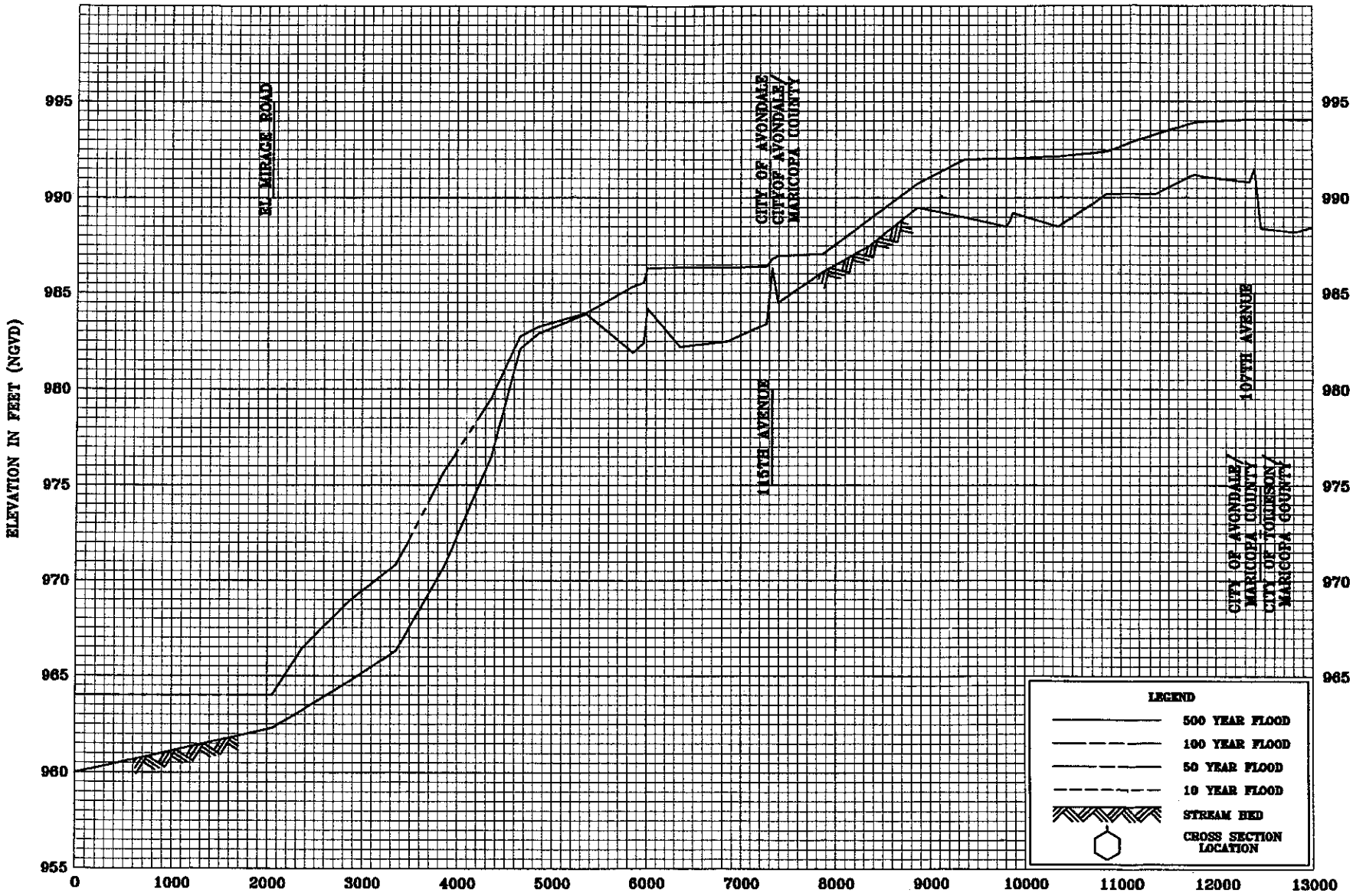

ZONE X
ZONE AE
CITY OF AVONDALE 040038
ZONE X
ZONE X
CITY OF TOLLESON 040055
JOINS PANEL 2095
ZONE AH
ZONE AE
CITY OF TOLLESON 040055
MARICOPA COUNTY UNINCORPORATED AREAS 040037
RIM407
BUCKEYE
ROAD
CITY OF AVONDALE 040038
JOBLANKA ROAD
FLANAGAN STREET
CITY OF AVONDALE 040038
AREA REVISED
APACHE
STREET
MARICOPA COUNTY UNINCORPORATED AREAS 040037
MARICOPA COUNTY UNINCORPORATED AREAS 040037
CITY OF PHOENIX 040051
ZONE X
MIAMI
AVENUE
CITY OF AVONDALE 040038
MARICOPA COUNTY UNINCORPORATED AREAS 040037
ZONE X
CITY OF PHOENIX
MARICOPA COUNTY
13
18
17
16
24
19
20
21
APPROXIMATE SCALE IN FEET
1000
0
1000
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS
PANEL 2095 OF 4350
(SEE MAP INDEX FOR PANELS NOT PRINTED)
COMMUNITY
NUMBER
PANEL
SUFFIX
REVISED TO REFLECT LOMR DATED FEB 23 2000
MAP NUMBER 04013C2095 D
MAP REVISED: APRIL 15, 1988
Federal Emergency Management Agency

Table 3. Summary of Discharges (Cont'd)

Flooding Source Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
Southern Pacific Railroad Ditch					
At 115th Avenue	14.52	--[1]	--[1]	440[2]	--[1]
At 107th Avenue	13.55	--[1]	--[1]	930[2]	--[1]
At 99th Avenue	12.12	--[1]	--[1]	850[2]	--[1]
At 91st Avenue	10.24	--[1]	--[1]	760[2]	--[1]
At 83rd Avenue	9.68	--[1]	--[1]	980[2]	--[1]
At 69th Avenue	7.24	--[1]	--[1]	1,020[2]	--[1]
At 67th Avenue	2.46	--[1]	--[1]	1,280[2]	--[1]
Roosevelt Irrigation District Canal					
At 51st Avenue	4.65	--[1]	--[1]	1,755[2]	--[1]
East of 59th Avenue	0.50	--[1]	--[1]	650[2]	--[1]
At 83rd Avenue	9.54	--[1]	--[1]	160[2]	--[1]
At Van Buren Street, West of 83rd Avenue	0.76	--[1]	--[1]	429[2]	--[1]

[1]Not Computed
[2]Decreases Due to Diversions along Southern Pacific Railroad

REVISED TO
REFLECT LOMR
DATED FEB 2 3 2000



FLOOD PROFILES

SOUTHERN PACIFIC RAILROAD DITCH

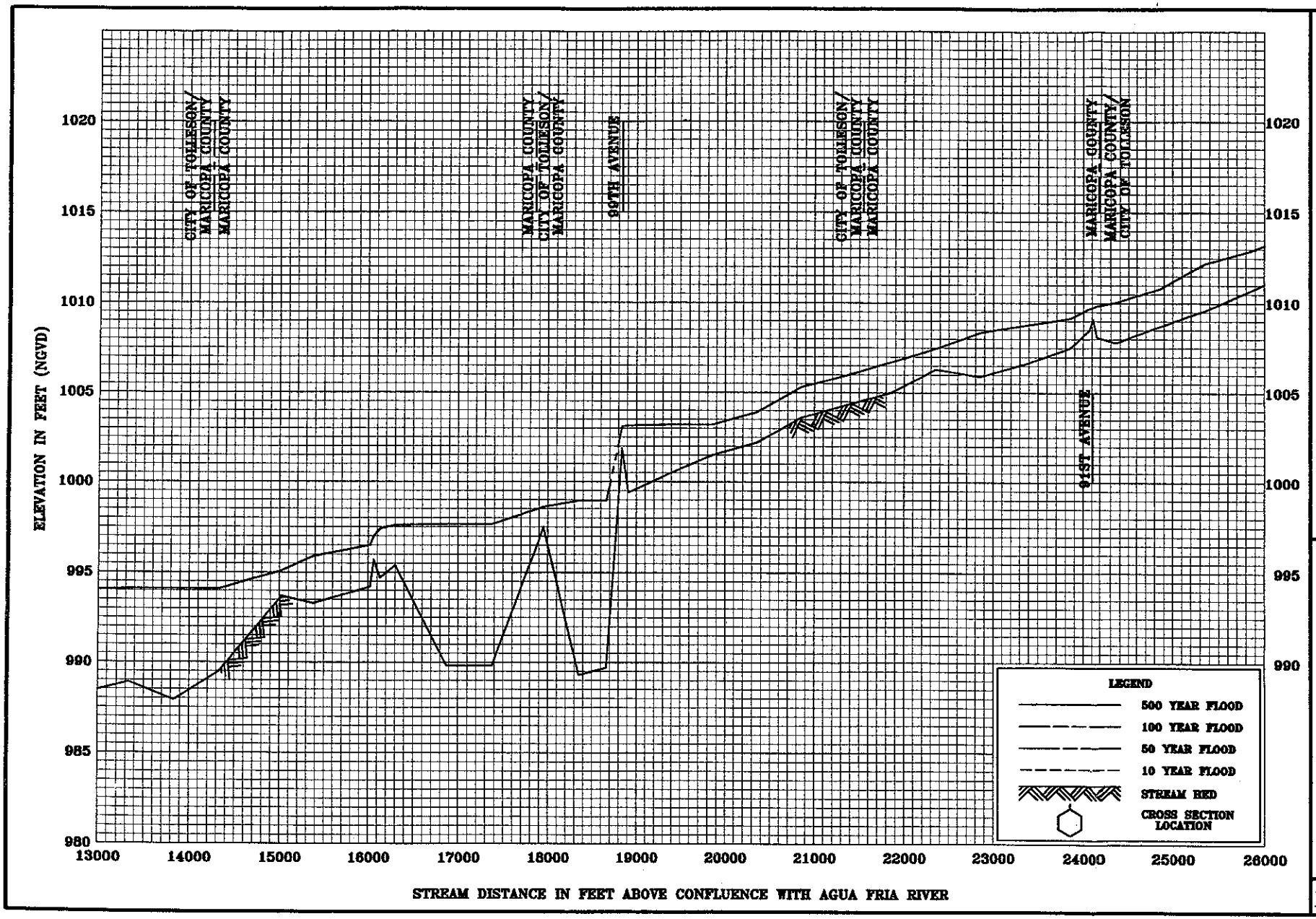
FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND INCORPORATED AREAS

REVISED TO REFLECT LOMR DATED FEB 2 3 2000

1043P



FLOOD PROFILES

SOUTHERN PACIFIC RAILROAD DITCH

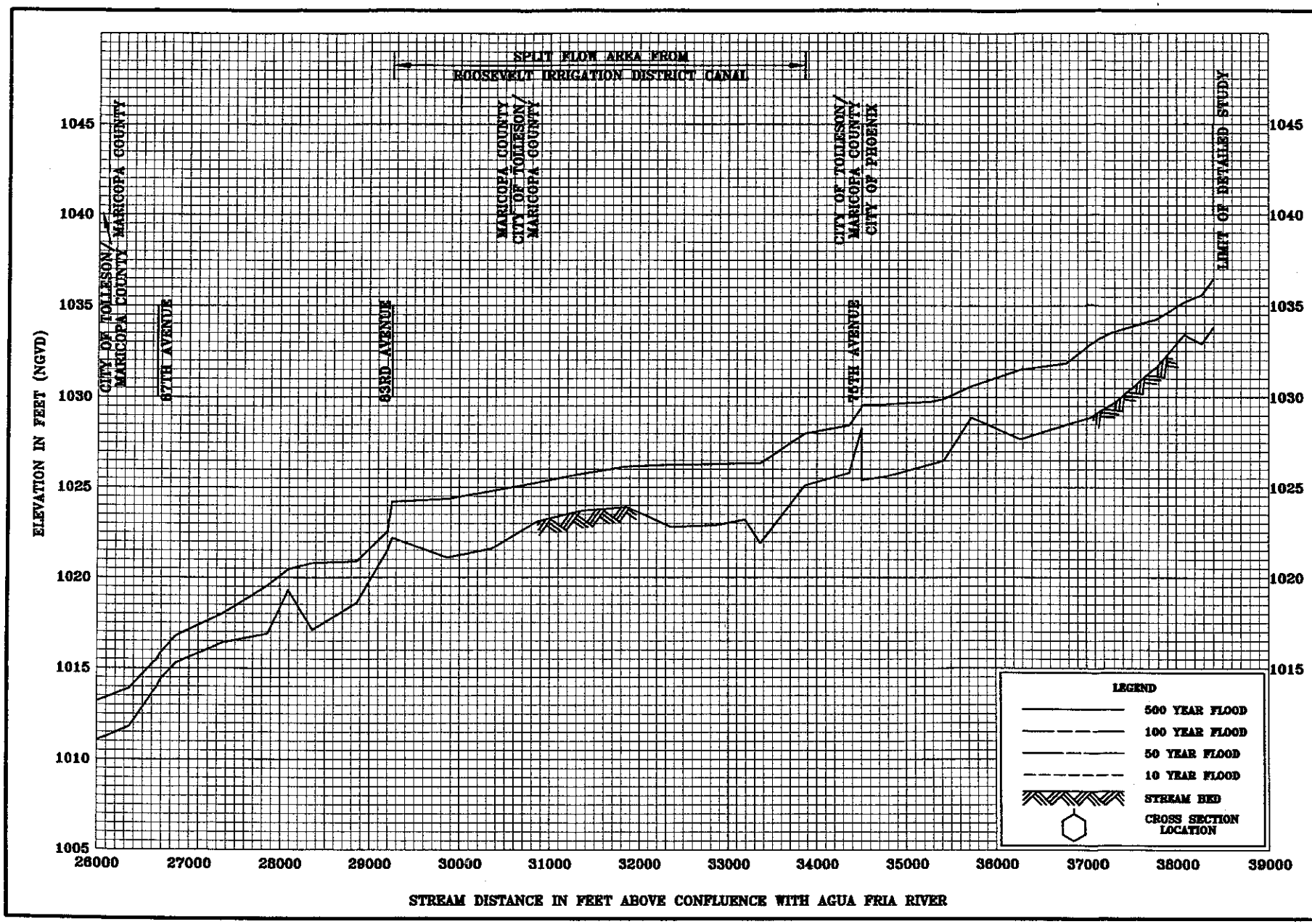
FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ

AND INCORPORATED AREAS

REVISED TO REFLECT LOMR DATED FEB 23 2000

1044P



FLOOD PROFILES

FEDERAL EMERGENCY MANAGEMENT AGENCY

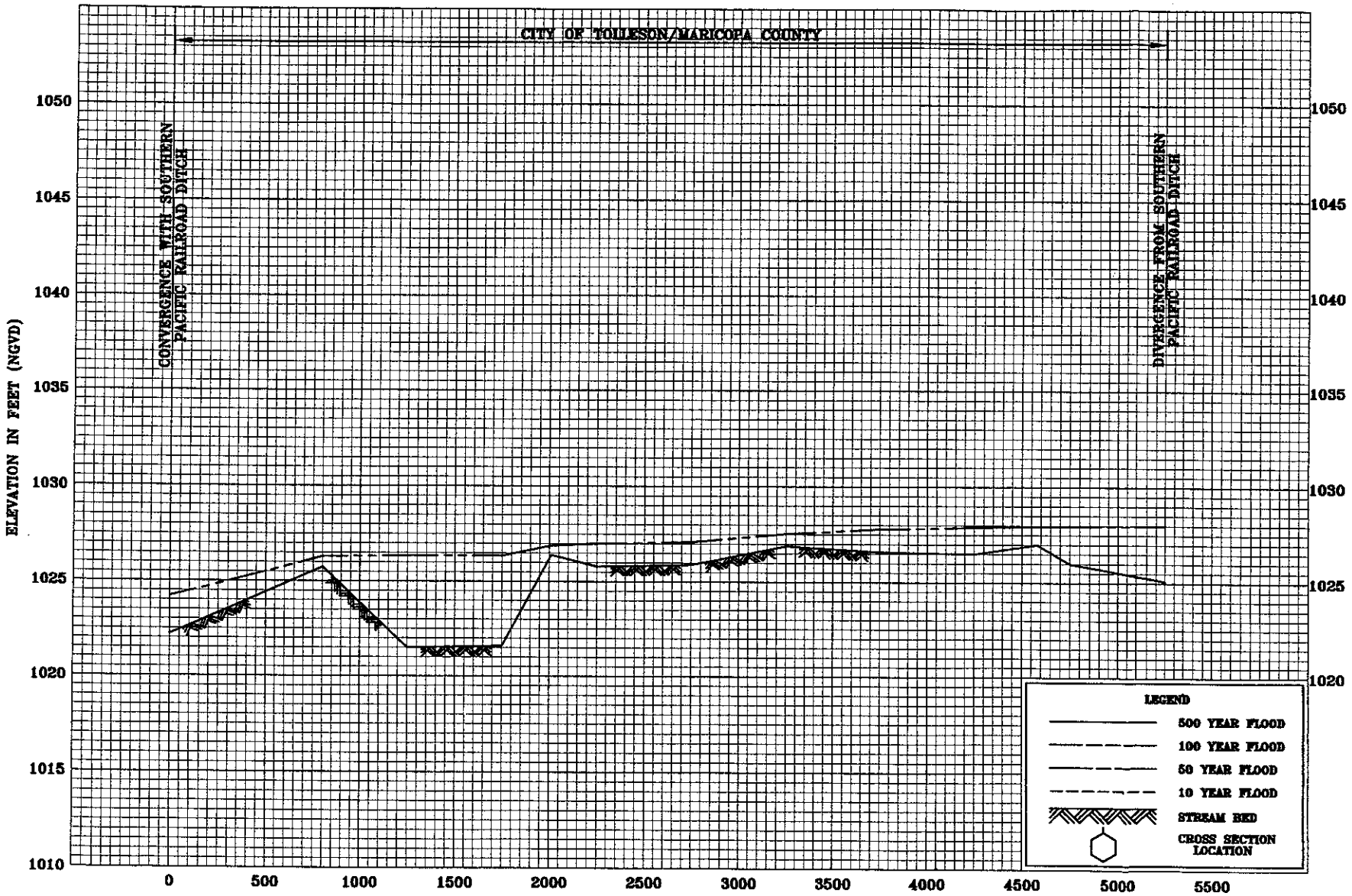
MARICOPA COUNTY, AZ

AND INCORPORATED AREAS

SOUTHERN PACIFIC RAILROAD DITCH

REVISED TO REFLECT LOMR DATED FEB 2 3 2000

1045P



FLOOD PROFILES

ROOSEVELT IRRIGATION DISTRICT CANAL SPLIT FLOW

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

REVISED TO REFLECT LOMR DATED FEB 2 3 2000

1046P

9552

Federal Emergency Management Agency

Washington, D.C. 20472

RECEIVED

OCT 15 1999

DIBBLE & ASSOC

October 12, 1999

Mr. Timothy M. Murphy
Engineering Division
Maricopa County
Flood Control District
2801 West Durango Street
Phoenix, AZ 85009

IN REPLY REFER TO:
Case No.: 00-09-009P
Communities: Cities of Avondale, Phoenix and Tolleson and Maricopa County, Arizona
Community Nos.: 040038, 040051, 040055 and 040037

316-ACK.FEX

Dear Mr. Murphy:

This responds to your request dated September 23, 1999, that the Federal Emergency Management Agency (FEMA) issue a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. Pertinent information about the request is listed below.

Identifier:	Floodplain Delineation of the Tolleson Area
Flooding Source:	Roosevelt Irrigation District Canal Embankment and Southern Pacific Railroad Embankment
FIRM Panel(s) Affected:	04013C2080 G, 2085 E, 2090 F, 2095 D, 2105 D, 2115 E, and 2120 E

As you may know, FEMA has implemented a procedure to recover costs associated with reviewing and processing requests for modifications to published flood information and maps. However, because your request is based on a detailed hydrologic or hydraulic study conducted by a Federal, State, or local agency to replace an approximate study conducted by FEMA, no fees will be assessed for our review.

We have completed an inventory of the items you submitted. We have received the required data to begin a detailed technical review of your request. If additional data are required, we will inform you within 30 days of the date of this letter.

Please direct all questions concerning your request to our Technical Evaluation Contractor at the following address:

Michael Baker Jr., Inc.
3601 Eisenhower Avenue, Suite 600
Alexandria, Virginia 22304

Attention: Ms. Pernille Buch-Pedersen
(703) 317-6224

When you write us about your request, you must include the case number referenced above in your letter.

If you have any questions concerning FEMA policy, or the National Flood Insurance Program in general, please contact Mr. Max Yuan of our staff in Washington, DC, either by telephone at (202) 646-3843 or by facsimile at (202) 646-4596.

Sincerely,

Matthew B. Miller

Matthew B. Miller, P.E., Chief
Hazards Study Branch
Mitigation Directorate

cc: Mr. Bill Jenkins
State Coordinator, NFIP
Arizona Department of Water Resources

Mr. Desmond McGeough
Community Development Planner
City of Avondale

Ms. Cindy D. White, P.E.
Floodplain Manager
City of Phoenix
Street Transportation Department

Mr. Woodrow C. Scoutten
City Engineer
City of Tolleson
W.C. Scoutten, Inc

Mr. Brian J. Fry, P.E.
Project Manager
Dibble & Associates

CITY OF AVONDALE

INCORPORATED 1946

COMMUNITY DEVELOPMENT DEPARTMENT ♦ 1225 SOUTH 4TH STREET
AVONDALE, ARIZONA 85323 ♦ PHONE (623) 932-6088 ♦ FAX (623) 932-6119

September 17, 1999

FLOOD CONTROL DISTRICT
RECEIVED
SEP 21 1999
CHENG
PIO
ADMIN
FINANCE
O & M
ENGR
REMARKS
P & PM
PWLMR
CONTRA
FILE

Mr. Timothy M. Murphy
Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ
85009

Dear Mr. Murphy:

RE: TOLLESON AREA FLOODPLAIN DELINEATION STUDY
(MCFCD NUMBER 95-26)

The City of Avondale Public Works Department and Community Development Department has reviewed the Tolleson Area Floodplain Delineation Study and supports the submittal of the study to the Federal Emergency Management Agency (FEMA) for their review and approval.

We understand that the Flood Control District will act as the lead agency in this submittal and that the approval of the study will result in a revision to the Flood Insurance Rate Maps. Presently there are many proposed projects within the City that may be affected by such revisions. Upon approval by FEMA, please provide the City with a copy of all reports, reproducible plans and public information documentation.

Sincerely,

Desmond McGeough
Community Development Planner

Tolleson Council Briefing Minutes Mtg. 07-27-1999, 6:30 PM

Subject: To Brief The City of Tolleson City Council on Flood Control District Of Maricopa County (District) Projects in the Tolleson Area – The Durango Area Drainage Master Plan, The Floodplain Delineation of the Tolleson Area, and the Tolleson Candidate Assessment Report.

District personal in attendance:

Gregory Jones,	FCD	506-5537
Nick Sciarro,	FCD	506-7137
Tim Murphy,	FCD	506-4605

District consultant personal:

Brian Fry,	Dibble	957-1155
Shi-en Shiau	Prinatech	952-2828
Ahauia Tang	Prinatech	952-2828
David Dust	Prinatech	952-2828

The working Council session of meeting began with introductions of the District and the District's Consultants at 6:30 PM by Mr. Sciarro.

Mr. Gregory Jones of the District continued the meeting by giving an overview of the District's projects in the area. He indicated that the District was proceeding the process to obtain the services of a consultant to perform the study with a notice to proceed in late October to November. He also indicated that the study would incorporate the recommendation from the Tolleson Candidate Assessment Report.

Mr. Jones then directed the council to review a floodplain map, which showed the existing and proposed changes derived from the Floodplain Delineation of the Tolleson Area study. He indicated that Tolleson needed to formally provide contents accepting or rejecting the changed floodplain delineation in a letter to the District. He indicated that the letter only needed to be authored by the city engineer and did not need to adopted by the Council.

Mr. Jones then reintroduce Nick Sciarro, who then continued the presentation by giving an over view of the Tolleson Candidate Assessment Report and introduced Mr. Shi-en Shiau of Primatech. Mr. Shiau gave a detailed briefing of the study. After the briefing, the Council had only a few questions, all of which were directed to the cost and options issues discussed in the Tolleson Candidate Assessment Report study briefing.

The Briefing concluded at 6:55 PM and the Council adjourned for a 5 minute recess.

City of Phoenix
STREET TRANSPORTATION DEPARTMENT

FLOOD CONTROL DISTRICT
RECEIVED
JUN 28 1999
P & PM
P.M./MGT
CONTRACT
FILE
REMARKS TMM

June 25, 1999

Mr. Timothy M. Murphy
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

Dear Tim:

RE: TOLLESON AREA FLOODPLAIN DELINEATION STUDY
(MCFCD NUMBER 95-26)

The City of Phoenix supports the submittal of the Tolleson Area Floodplain Delineation Study prepared by the Flood Control District of Maricopa County, to the Federal Emergency Management Agency (FEMA) for their review and approval. A portion of this study is within the boundary of the City of Phoenix. As part of the submittal, please show the current City boundaries on the maps submitted to FEMA, per the attached sketches.

We understand that the Flood Control District will act as the lead agency in this submittal, and that FEMA's approval of the study will result in a revision to the Flood Insurance Rate Maps. Upon approval by FEMA, please provide the City with a copy of all reports, reproducible plans and public information documentation.

If you have any questions, please contact me at 262-4026.

Sincerely,

Thomas E. Callow, P.E.
Interim Street Transportation Director

Cindy D White

Cindy D. White, P.E.
Floodplain Manager

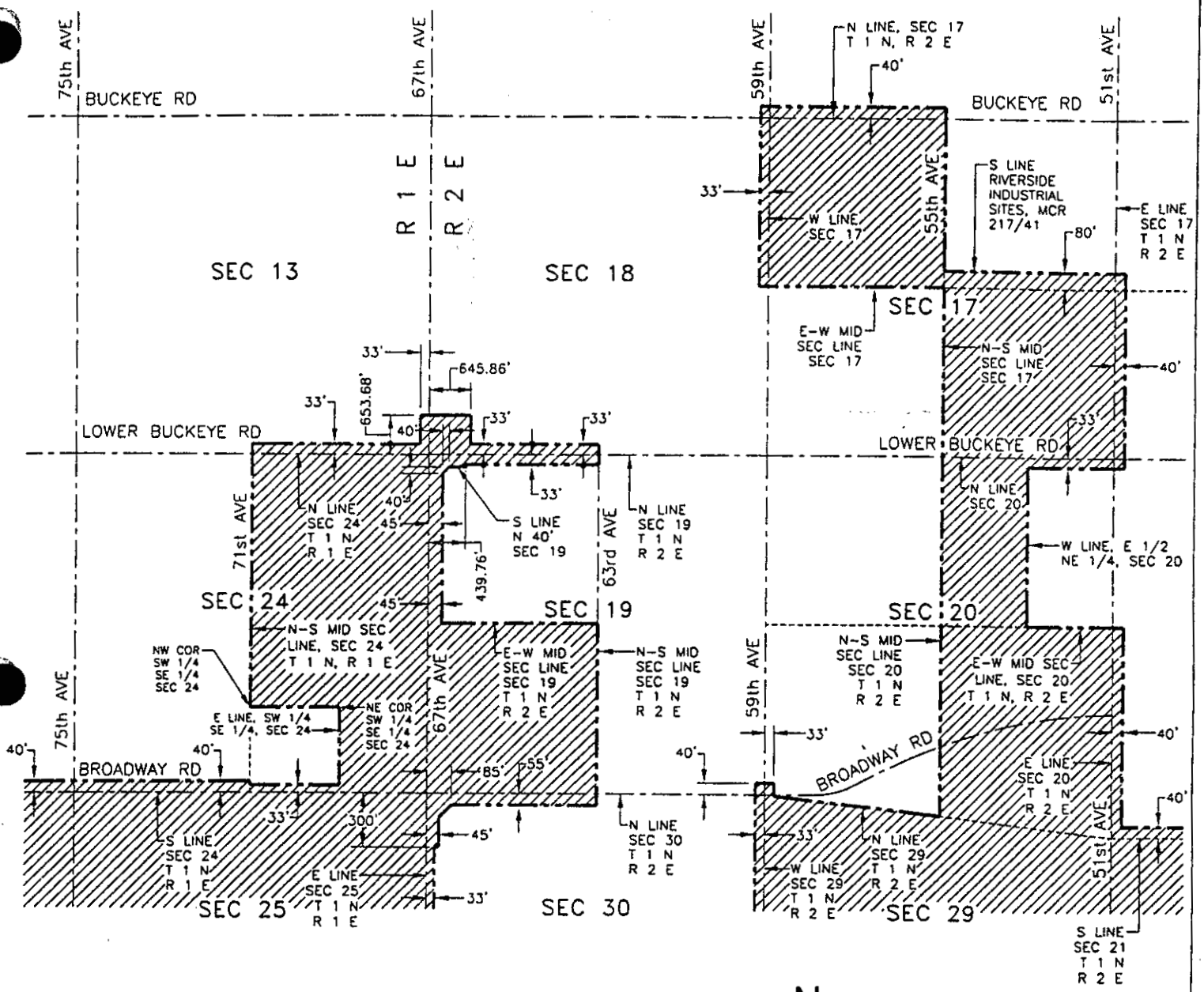
TEC/CDW/aff/990625a.wpd

Attachment

c: Mr. Matthews

200 West Washington Street, Fifth Floor, Phoenix, Arizona 85003-1611 602-262-6284 FAX: 602-495-2016

Recycled Paper



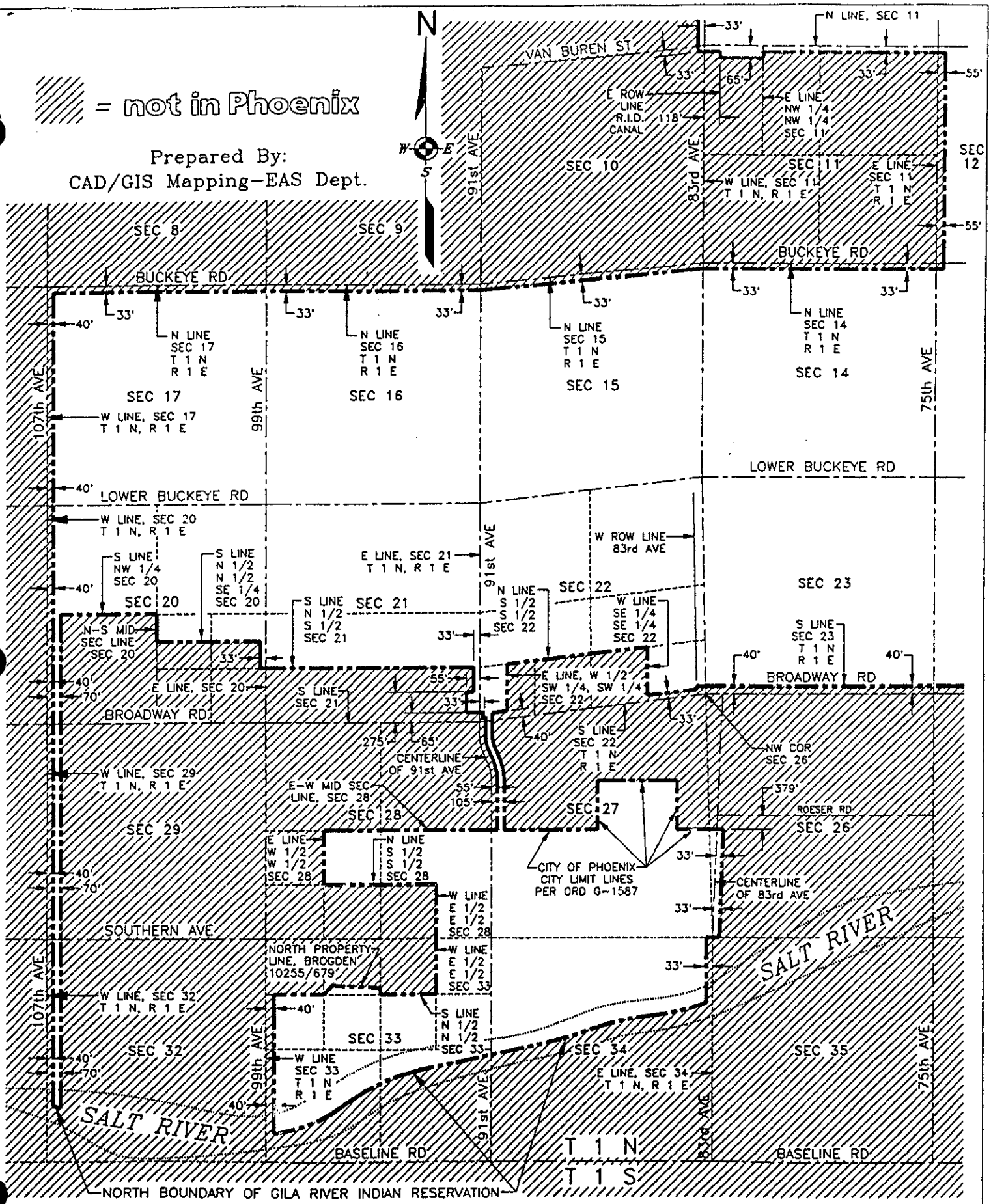
= not in Phoenix

Prepared By:
Geographic Technology-EAS Dept.

City of Phoenix
City Limits

ORD NO	LAST EFF ANNEX DATE	REV BY	ORD NO	LAST EFF ANNEX DATE	REV BY
G-3698	11-27-93	JWM	G-4180	6-12-99	JWM
G-4103	7-18-98	JWM			
G-4115	10-3-98	JWM			
G-4149	1-16-99	JWM			

PG NO
18



City of Phoenix
City Limits

ORD NO	LAST EFF ANNEX DATE	REV BY	ORD NO	LAST EFF ANNEX DATE	REV BY
G-3532	7-4-92	JWM			
G-3918	6-6-96	JWM			

PG NO
19

C A T E L L U S

RECEIVED
MAY 13 1996
DIBBLE & ASSOC.

May 10, 1996

GAZ01312

Mr. Brian J. Fry
Vice President - Project Manager
Dobble & Associates
2633 E. Indian School Road, Suite 401
Phoenix, Arizona 85016

Re: Parcel Nos. 10410005, 10410004A, 10409044, 10410002

Dear Mr. Fry:

In response to your letter dated April 22, 1996 regarding the Flood Control District project, enclosed are duplicate originals of the Right of Entry Agreement covering your entry to the above referenced properties owned by Catellus Development Corporation. Please execute and return these documents to me. Should you have any questions, please do not hesitate to call me at 714-237-7315.

Sincerely,

Sandra J. Vaughan
Asset Manager

CATELLUS DEVELOPMENT CORPORATION
1065 NORTH PACIFICENTER DRIVE, SUITE 200 · ANAHEIM, CALIFORNIA 92806 · TEL 714 630-8100 FAX 714 237-7416

CATELLUS ORIGINAL

RIGHT OF ENTRY AGREEMENT

Dibble & Associates Consulting Engineers, Inc. ("Permittee"), acting by and through its authorized employees, agents and/or representatives (collectively, "Permittee's Representatives") desires to enter upon certain real property owned by Catellus Development Corporation, a Delaware corporation ("CDC"), located in Phoenix, Arizona, as generally shown on Exhibit "A" attached hereto (the "Property"), for the purpose of conducting a flood insurance study for the Tolleson Area to determine the flood related hazard zones and delineate areas that may be subject to inundation during a "100-year flood" event. CDC hereby grants Permittee a non-exclusive right to enter upon the Property for such purpose. Permittee acknowledges and agrees that the entry and presence of Permittee and/or Permittee's Representatives on the Property shall be subject to the terms and conditions set forth herein.

Permittee understands and acknowledges that such entry and presence on the Property involves certain danger and risk to Permittee's Representatives, including, without limitation, injury or death and/or damage to personal property. Permittee further understands and acknowledges that the presence of Permittee's Representatives on the Property may cause injury or death to other persons and/or damage to the Property and the personal property of other persons.

In consideration of CDC permitting Permittee and Permittee's Representatives to enter the Property for the purposes stated above and all activities related or incidental thereto, Permittee, for itself and Permittee's Representatives, hereby waives all claims against and releases CDC, its partners, officers, directors, employees, agents, contractors, representatives, and each of their respective successors and assigns (collectively, "CDC's Parties") from any claim (including, without limitation, claims for personal injury or death and damage to property), demand, damage, action, cause of action, loss, judgment, liability, cost and expense (including, without limitation, attorneys' fees and court costs) (collectively, a "Claim") arising from or in connection with the entry or presence of Permittee and/or Permittee's Representatives on the Property, except to the extent any Claim is caused by the sole negligence or wilful misconduct of CDC.

Permittee agrees to indemnify, defend and hold harmless CDC and CDC's Parties from and against any Claim arising from or in connection with the entry or presence of Permittee and/or Permittee's Representatives on the Property, except to the extent any Claim is caused by the sole negligence or wilful misconduct of CDC.

During the term of this Agreement, Permittee, at its sole cost and expense, shall procure and maintain in effect the insurance coverage set forth in Exhibit "B" attached hereto.

This Agreement shall commence on the date set forth below and shall automatically expire, without further notice, on October 31, 1996; provided, however, that the expiration of this Agreement shall not relieve Permittee from any obligation, of indemnity or otherwise, arising out of any act, omission, or fact occurring prior to the date of expiration. Upon expiration of this Agreement, Permittee shall restore the surface of the Property and any improvement thereon to substantially the same condition as originally found.

Dated: _____, 1996

Dibble & Associates Consulting Engineers, Inc.

By:_____
Its:_____

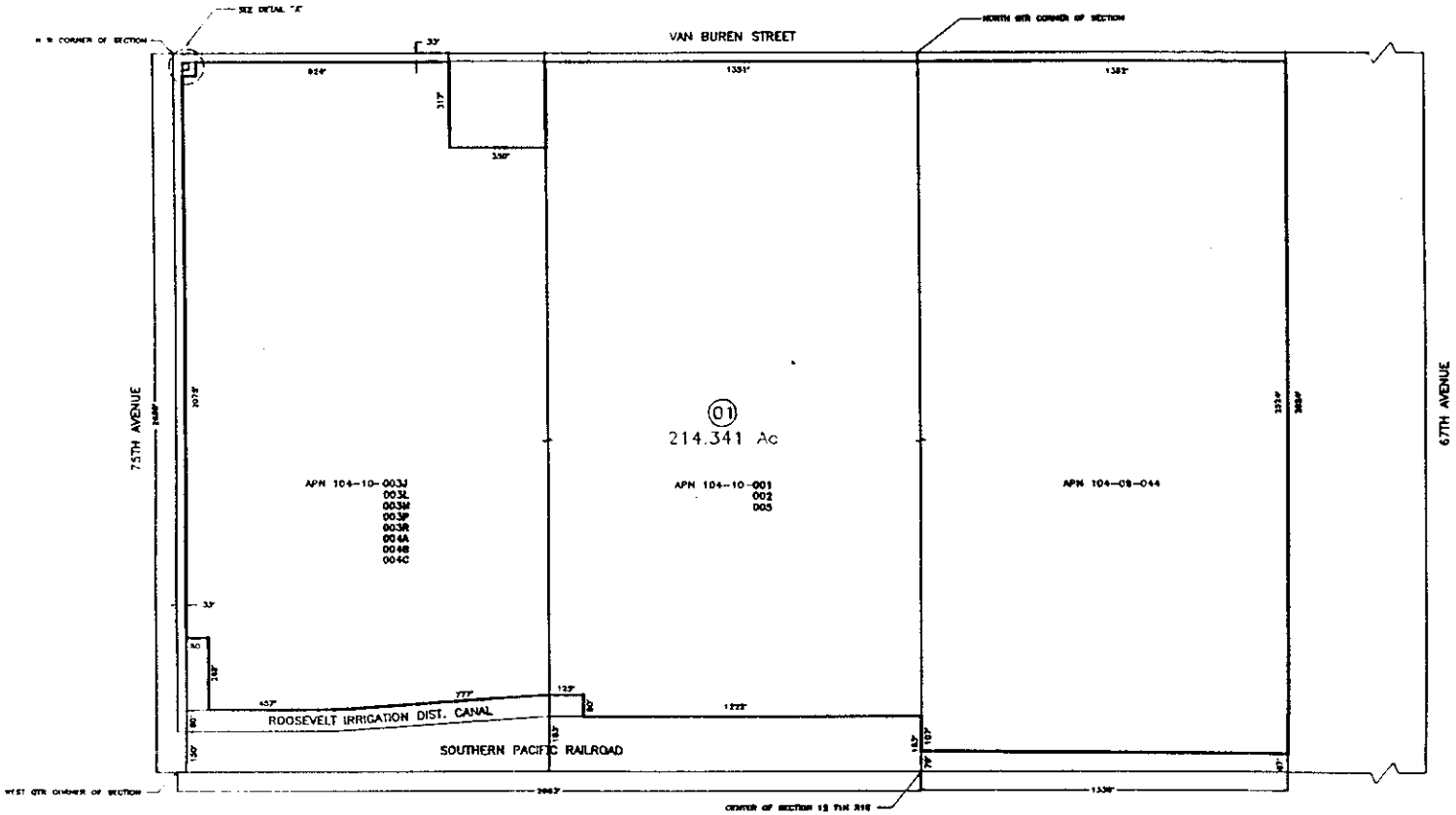
APPROVED AS TO FORM

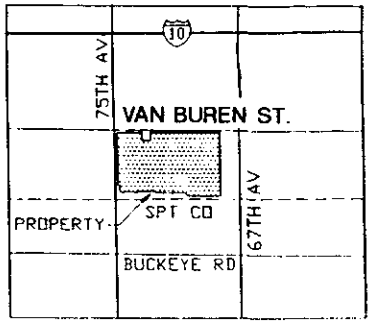
Clay M. Smith
Assistant General Counsel

Catellus Development Corporation

By:_____
Its: _____

H:\CONTRACT\DIBBLE.ROE





CAPITOL
COMMERCE
CENTER

N

SCALE IN FEET
0 100 200 400

EXHIBIT "A"

CATELLUS DEVELOPMENT CORPORATION
1065 PowellCenter Drive, Suite 200
Anaheim, California 92808
714 630-8100

MARICOPA COUNTY
PHOENIX, ARIZONA

DATE 8/00	DWG. NO. AZ01312	SHEET 1 OF 1

EXHIBIT "B"

INSURANCE RIDER - PERMITTEE'S INSURANCE

Permittee shall, at Permittee's sole cost and expense, obtain and keep in force at all times during the term of this Agreement the following insurance:

A. Insurance Coverage.

1. Commercial General Liability Insurance (Occurrence Form). A policy of commercial general liability insurance (occurrence form) having a combined single limit of not less than Two Million Dollars ($2,000,000) per occurrence and Two Million Dollars ($2,000,000) aggregate per location if Permittee has multiple locations, providing coverage for, among other things, blanket contractual liability, premises, products/completed operations and personal and advertising injury coverage, with deletion of (a) the exclusion for operations within fifty (50) feet of a railroad track (railroad protective liability), if applicable, and (b) the exclusion for explosion, collapse or underground hazard, if applicable, and, if necessary, Permittee shall provide for restoration of the aggregate limit;

2. Automobile Liability Insurance. Comprehensive automobile liability insurance having a combined single limit of not less than Two Million Dollars ($2,000,000) per occurrence and insuring Permittee against liability for claims arising out of ownership, maintenance, or use of any owned, hired or non-owned automobiles;

3. Workers' Compensation and Employer's Liability Insurance. Workers' compensation insurance having limits not less than those required by state statute and federal statute, if applicable, and covering all persons employed by Permittee in the conduct of its operations on the Property (including the all states endorsement and, if applicable, the volunteers endorsement), together with employer's liability insurance coverage in the amount of at least One Million Dollars ($1,000,000); and

4. Property Insurance. "All risk" property insurance including boiler and machinery comprehensive form, if applicable, covering damage to or loss of any of Permittee's personal property, fixtures, equipment and alterations, including electronic data processing equipment (collectively "Permittee's Property") (and coverage for the full replacement cost thereof including business interruption of Permittee), together with, if the property of Permittee's invitees is to be kept on the Property, warehouser's legal liability or bailee customers insurance for the full replacement cost of the property belonging to invitees and located on the Property.

B. General.

1. Insurance Companies. Insurance required to be maintained by Permittee shall be written by companies licensed to do business in the state in which the Property is located and having a "General Policyholders Rating" of at least "A VIII" (or such higher rating as may be required by a lender having a lien on the Property) as set forth in the most current issue of "Best's Insurance Guide."

2. Certificates of Insurance. Permittee shall deliver to CDC certificates of insurance for all insurance required to be maintained by Permittee in the form of the ACORD standard certificate of insurance, no later than seven (7) days prior to the date of possession of the Property. Permittee shall, at least ten (10) days prior to expiration of the policy, furnish CDC with certificates of renewal or "binders' thereof. Each certificate shall expressly provide that such policies shall not be cancelable or otherwise subject to modification except after sixty (60) days prior written notice to the parties named as additional insureds in this Permit (except in the case of cancellation for nonpayment of premium in which case cancellation shall not take effect until at least ten (10) days' notice has been given to CDC). If Permittee fails to maintain any insurance required in this Permit, Permittee shall be liable for all losses and cost resulting from said failure.

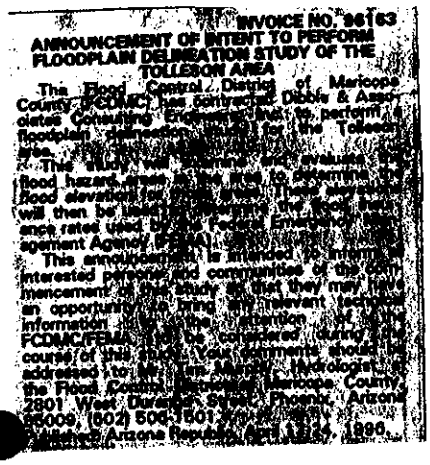
3. Additional Insureds. CDC and any property management company of CDC for the Property shall be named as additional insureds under all of the policies required under paragraph A.1. Such policies shall provide for severability of interest.

4. Primary Coverage. All insurance to be maintained by Permittee shall, except for workers' compensation and employers' liability insurance, be primary, without right of contribution from insurance of CDC. Any umbrella liability policy or excess liability policy (which shall be in "following form") shall provide that if the underlying aggregate is exhausted, the excess coverage will drop down as primary insurance. The limits of insurance maintained by Permittee shall not limit Permittee's liability under this Permit.

5. Waiver of Subrogation Permittee waives any right to recover against CDC for claims for damages to Permittee's Property covered by insurance. This provision is intended to waive fully, and for the benefit of CDC, any rights and/or claims which might give rise to a right of subrogation in favor of any insurance carrier. The coverage obtained by Permittee pursuant to this Permit shall include, without limitation, a waiver of subrogation endorsement attached to the certificate of insurance.

AFFIDAVIT OF PUBLICATION

The Arizona Republic/The Phoenix Gazette



INVOICE NO. 96163

ANNOUNCEMENT OF INTENT TO PERFORM FLOODPLAIN DELINEATION STUDY OF THE TOLLESON AREA

This Flood Control District of Maricopa County (FCDMC) has contracted Dibble & Associates Consulting Engineers, Inc. to perform a floodplain delineation study for the Tolleson area. [illegible]

This study will [illegible] and evaluate the flood hazard areas [illegible] to determine the flood elevation for [illegible] These parameters will then be used [illegible] the flood insurance rates used by the Federal Emergency Management Agency (FEMA) [illegible]

This announcement is intended to inform all interested persons and communities of the commencement of this study so that they may have an opportunity to bring any relevant technical information to the attention of the FCDMC/FEMA [illegible] be considered during the course of this study. Your comments should be addressed to: [illegible] Hydrologist, [illegible] the Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona 85009, (602) 506-1501. [illegible]

Published: Arizona Republic, April 17, 24, 1996.

STATE OF ARIZONA
COUNTY OF MARICOPA } SS.

TOM BIANCO, being first duly sworn, upon oath deposes and says: That he is the legal advertising manager of the Arizona Business Gazette, a newspaper of general circulation in the county of Maricopa, State of Arizona, published at Phoenix, Arizona, by Phoenix Newspapers Inc., which also publishes The Arizona Republic and The Phoenix Gazette, and that the copy hereto attached is a true copy of the advertisement published in the said paper on the dates as indicated.

The Arizona Republic
~~The Phoenix Gazette~~

APRIL 17, 24, 1996

Tom Bianco

Sworn to before me this

6TH day of

MAY A.D. 19 96

OFFICIAL SEAL
MARY LEE BOOHER
Notary Public - State of Arizona
MARICOPA COUNTY
My Comm. Expires March 17, 1999

Notary Public

Public Notice

INVOICE NO. 56163

ANNOUNCEMENT OF INTENT TO PERFORM FLOODPLAIN DELINEATION STUDY OF THE TOLLESON AREA

The Flood Control District of Maricopa County (FCDMC) has contracted Dibble & Associates Consulting Engineers, Inc. to perform a floodplain delineation study for the Tolleson area.

This study will examine and evaluate the flood hazard areas in the area to determine the flood elevation for those areas. These elevations will then be used to determine the flood insurance rates used by the Federal Emergency Management Agency (FEMA).

This announcement is intended to inform all interested persons and communities of the commencement of this study so that they may have an opportunity to bring any relevant technical information to the attention of the FCDMC/FEMA, to be considered during the course of this study. Your comments should be addressed to Mr. Tim Murphy, Hydrologist at the Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona 85009, (602) 506-1501.

Published: Arizona Republic, April 17,24, 1996.

WEST VALLEY BUSINESS

310 N. Dysart Rd. Avondale, Arizona 85323 (602) 932-5555

Public Notice

ANNOUNCEMENT OF INTENT TO PERFORM FLOODPLAIN DELINEATION STUDY OF THE TOLLESON AREA

The Flood Control District of Maricopa County (FCDMC) has contracted Dibble & Associates Consulting Engineers, Inc. to perform a floodplain delineation study for the Tolleson area.

This study will examine and evaluate the flood hazard areas in the area to determine the flood elevation for those areas. These elevations will then be used to determine the flood insurance rates used by the Federal Emergency Management Agency (FEMA).

This announcement is intended to inform all interested persons and communities of the commencement of this study so that they may have an opportunity to bring any relevant technical information to the attention of the FCDMC/FEMA, to be considered during the course of this study. Your comments should be addressed to Mr. Tim Murphy, Hydrologist at the Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona 85009, (602) 506-1501.

Published in West Valley View and West Valley Business on April 17 and 24, 1996.

AFFIDAVIT OF PUBLICATION

State of Arizona

County of Maricopa

I, Elliott Freireich, publisher of West Valley View and West Valley Business, newspapers of general circulation in Avondale, Buckeye, Goodyear, Litchfield Park and Tolleson, Arizona, attest that the legal advertisement for

Dibble & Assoc. Consulting

was published on April 17 & 24, 1996

Public Notice

E Freireich

Elliott Freireich

April 24, 1996

Date

Sworn and Subscribed to before me,

this 24th Day of April, 1996

Margaret B. Clay

Notary Public

My Commission Expires

My Commission Expires Oct. 16, 1999

B.3 Contract Documents

FCD 95-26
SCOPE OF WORK
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FLOODPLAIN DELINEATION OF THE TOLLESON AREA

GENERAL

The project consists of approximately 12.5 total linear miles of floodplain delineation. Three and a half miles of delineation will be performed along the Southern Pacific Railroad (SPRR) from east of 83rd Avenue to west of 107th Avenue, and approximately 9 miles of delineation along the Roosevelt Irrigation District's (RID) Main Canal from 35th Avenue to Interstate-10. This will require field survey work, hydraulic analysis, and the updating of 52 square miles of watershed hydrology. The approximate watershed limits for this study are Interstate-10 on the north, the Salt River on the south, Cave Creek on the east, and the Agua Fria River on the west. The consultant will update the hydrology using the Corps of Engineer's HEC-1 computer model. The consultant must use sound engineering judgement in the development of the hydrologic and hydraulic models. The results of the models must be analyzed carefully and refinements made to the input parameters in order to obtain the most realistic results. All work must meet Arizona Department of Water Resources (ADWR) and Federal Emergency Management Agency (FEMA) requirements for floodplain delineations. The results of this study must be reviewed and accepted by FEMA prior to the finalization of this contract. All work under this Scope will be completed within 270 calendar days from the date of Notice to Proceed, including 60 days for District reviews. All reports and drawings shall be sealed by persons of appropriate registration.

TASK 1 - COORDINATION

1.1 ✓The consultant will submit a project schedule showing coordination meetings and completion dates for each of the tasks in the scope within 14 days of Notice To Proceed. The consultant shall update this project schedule when appropriate.

1.2 The consultant shall participate in regular coordination meetings (at least every six weeks) with the District's Project Manager and in milestone coordination meetings in the development of the hydrologic and hydraulic analyses. The consultant is responsible for the minutes of any meetings. Whenever possible, coordination and milestone meetings should be combined.

1.3 ✓The consultant will submit a quarterly estimation of the projected billing within 14 days of Notice to Proceed. Thereafter, this estimation will be updated and submitted to the District's Project Manager at least 10 days prior to the end of each quarter.

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

a. A description of the work accomplished by task during the reporting month.

b. Percent (%) completed for the month and percent (%) cumulative completed for each task.

c. A brief description of the work to be accomplished the following month.

d. A description of any problems encountered.

1.5 The consultant is responsible for placing the legal advertising at the beginning of the study, notifying the public of the study. The ad will be run in a widely circulated newspaper two times, with approximately one week between runs. The ad must also be run two times in a local newspaper that serves the area being studied. After the ad is run the consultant will supply the District with the original affidavits of publication from the newspapers for each day that the ad ran.

1.6 The consultant will notify all property owners and obtain any necessary Rights of Entry for the study area. The District will assist the consultant as may be necessary to complete this task. The consultant will furnish the District with a list of all the property owners notified and a sample Right of Entry letter.

1.7 The consultant shall meet with officials from the Cities of Phoenix and Tolleson. The purpose of these meetings is to identify local flooding problems and obtain information on current and planned public works projects, channel modifications, storm-drainage systems, development, and obtain the current corporate limits.

1.8 The District will plan and conduct one public meetings in conjunction with this study which will require the attendance of the consultant. This meeting will be to inform the public and obtain public comment on the study results, and will take place prior to the submittal of the final report to FEMA. The consultant will respond to the comments from the public and make revisions to the study if necessary.

1.9 Prior to finalizing of the hydrologic analysis, the consultant will submit hydrologic maps, HEC-1 model, and hydrologic report to ADWR and any other governmental agency reviewers through the District. The consultant will respond to questions by the reviewers and make modifications to the hydrologic maps, HEC-1 model, and hydrologic report if necessary.

1.10 The consultant will submit delineation maps, hydraulics report, to ADWR, FEMA for review by the Technical Evaluation Contractor (TEC), and any other governmental agency reviewers through the District. The consultant will respond to questions by the reviewers and make modifications to the delineation maps, hydraulics report, as required.

1.11 Consultant/District Performance Evaluations will be performed. An informal evaluation will be performed at the completion of the hydrologic analysis. A formal evaluation will be performed at the completion of the project upon receipt of all deliverables.

TASK 2 - DATA COLLECTION

2.1 The consultant will collect and review pertinent data from the District and other outside sources. Data to be collected will include previous flood hazard reports and hydrology for the study area; existing topographic mapping; historical flooding information; FEMA Flood Hazard Boundary Maps and any Letters of Map Amendment and/or Revisions, and other pertinent information.

2.2 A written report summarizing the data collected will be submitted to the District for information purposes. A preliminary draft of this report is due within 90 days of Notice to Proceed.

2.3 The District will supply topographic mapping at a scale of one inch equals 200 feet, with a two foot contour interval. Copies of this mapping will be made available to the consultant in both a digital and printed format.

2.4 The District will supply the consultant with a preliminary hydrologic model and report for the area.

TASK 3 - TOPOGRAPHIC MAPPING

3.1 The District will supply topographic mapping at a scale of one inch equals 200 feet, with a two foot contour interval. Copies of this mapping will be made available to the consultant in both a digital and printed format.

3.2 Hydrologic work maps should be at a scale of 1 inch = 2000 feet (or larger scale if available) and shall include: reproducible transparent overlay maps of existing drainage patterns, subwatersheds; major flow paths; and general topographic maps.

TASK 4 - FIELD SURVEY

4.1 The consultant shall conduct all field surveys and prepare all mapping necessary to supplement the available topographic mapping. All survey work shall be supervised by a registered land surveyor. All topographic mapping and survey work shall meet or exceed Federal Emergency Management Agency (FEMA) minimum criteria as defined in FEMA Document 37, Flood Insurance Study Guidelines and Specifications for Study Contractors, January 1995. This would include, but is not limited to: the establishment of "permanent" elevation reference marks (ERM's) and field control.

4.2 Horizontal and Vertical Control: All survey control shall be the same as the control used for the aerial topographic mapping provided by the District.

4.3 The consultant shall verify the accuracy of the mapping in the vicinity of the ponding areas by the procedures called for in FEMA Document 37 or other methods approved by FEMA.

4.4 Elevation Reference Marks (ERMs) shall be established using, at least one "permanent" point per mile. "Permanent" survey points shall consist of existing monumentation, such as brass caps or similar survey monuments. Where additional monumentation is needed, survey markers conforming to Maricopa Association of Governments (MAG) Uniform Standard Detail for Public Works Construction, detail 120-1, Type C, shall be placed 2" +/- above grade, and topped with a brass cap. Elevation Reference Marks will be labelled on available maps and described in a manner which allow them to be readily located in the field.

4.5 For purposes of delineating the floodplain the consultant will be required to complete field surveys to determine the top of rail (SPRR) and top of canal bank (RID). Road profiles shall be field surveyed for the portion of main roads that lie within the anticipated floodplain delineation. Profile shots will be taken at an interval of 100 feet.

4.6 Field surveys of all culverts that drain across the SPRR and RID are to be obtained by the consultant. This information should be reduced and compiled into an 11"x 17" (maximum size) drawing for inclusion in the final report.

TASK 5 - HYDROLOGY

5.1 The consultant will update the HEC-1 model report supplied by the District. The updated hydrologic study of the watershed will be delivered to the District under separate cover from the floodplain delineation report. The consultant shall use the U.S. Army Corps of Engineers computer program HEC-1, 1991 Version, to update the hydrologic model for the area. Sub-basin break-downs will be done in sufficient detail to provide peak discharges at structures, major road crossings, confluences, and at boundary lines. An appropriate time step and number of ordinates is to be selected that allows for complete calculation of the flood hydrograph without sacrificing resolution of the flood peak. All calculations, or assumptions used in developing sub-basin and routing parameters shall be documented and made a part of the appendix for the hydrology report.

5.2 Two meetings associated with two tasks, and two field trips shall be held with the Flood Control District staff at the following milestones:

a. One field trip at the start of the project to scope out the critical points of the watershed and problem areas.

b. Meeting number 1 after the preliminary HEC-1 results have been obtained and a draft report has been prepared. A copy of the draft report and the copy of the HEC-1 on a floppy disc, compatible with the Districts computer, must be delivered two weeks prior to the meeting. A second copy of each will be forwarded by the District to ADWR for their review and comment.

c. Meeting number 2 to review comments by the District and ADWR one week after the consultant has received the review comments. The District will require a minimum of two weeks to review the report and the model. A second field trip may be scheduled for the same day so the results obtained could be discussed.

5.3 The specific hydrologic techniques to be used in this study should be in accordance to the Drainage Design Manual, Volume 1, Hydrology, except for:

a. Unit Hydrograph: SCS Unit dimensionless (Agriculture S-Graph) will be used in accordance with the updated hydrology manual.

b. S-Graph Lag Equation: The S-graph lag equation, along with the MCUHP2 computer program, should be used with the appropriate S-graph.

c. Channel Routing: Channel routing will be accomplished using the Normal-Depth option of HEC-1. Average cross sections will be developed utilizing available mapping and field reconnaissance data. Sufficient field cross sections will be taken to ensure that routing reaches are reasonable and representative of field conditions.

d. Reservoir Routing: Detailed analysis of structures and ponding areas will be accomplished using the Modified Puls reservoir routing option of HEC-1. Stage versus discharge tables for hydraulic structures and ponded areas will be developed using appropriate methodologies.

5.4 The District will provide appropriate references to facilitate parameter estimation upon request by the consultant.

5.5 Output of the computer model should be reviewed to see if the peak flows and volumes are realistic. Adjustments to input for obtaining the most realistic results is normal to the scope.

5.6 An attempt will be made to recover historic stream gage data near the area and use it to compare with the results obtained by the hydrologic model. Major differences must be discussed in the final report. Applicable regression equations may be used to estimate peak Q's for comparison purposes.

5.7 It is required that the consultant obtain the approval of the District at each of the following steps:

a. If necessary before revising the subbasins.

b. HEC-1 parameter estimation.

c. HEC-1 flow diagram and input parameters.

d. HEC-1 results.

5.8.1 The final hydrologic report should include the following sections and documentation using ADWR standards (as a minimum):

a. Scope of the study.

b. Description of the watershed.

c. Previous studies and reports.

d. Methodology.

e. Assumptions.

f. Results.

g. Comparison of the results with other studies and/or stream gages.

h. Conclusion.

i. List of references and agencies contacted.

5.8.2 Tables and Figures for the main Text:

a. Location map (maximum size 11"x 17") at the appropriate scale.

b. Table showing the flow peaks and volumes at critical concentration points for different rainfall events.

c. Table showing the critical peaks and volumes for major concentration points as compared to previous studies (where available).

d. Table(s) showing the major parameters for all sub-basins (slope, area, soil loss calculations, friction, total rainfall, time of concentration or lag, major structures, etc.).

5.8.3 Tables and Figures for the appendices:

a. Topographic base map(s) showing the sub-basins, routing reaches, Tc flow paths or lag flow paths, major man-made structures, and references (i.e. street names, Township, Range, Section, etc.) at a scale of 1 inch = 2000 feet.

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

c. Land use map(s) at the same scale as above.

d. Schematic map for the HEC-1 showing the sub-basins (area, Tc), the flow paths, the routing reaches (length, slope, friction, width, velocities, transmission losses, etc.), order of combining the hydrographs, channel, pipe or culvert dimensions (where appropriate).

e. Pertinent data on all the modeled structures in the watershed (such as spillway elevation, rating curves, etc.).

f. One set of study maps (i.e. sub-basin boundary maps, flow path maps, soils maps, land use maps) to be folded and delivered in a binder.

Specific deviations from this hydrologic scope shall not be undertaken without the specific written concurrence from the Flood Control District.

TASK 6 - FLOODPLAIN DELINEATION

6.1 The floodplain delineations must be obtained using methodology acceptable to FEMA. The flood hazards along the SPRR and RID are anticipated to be from ponding. HEC-2 modeling will not be used. The consultant will perform the study using the guidelines established in FEMA Document 37, Flood Insurance Study Guidelines and Specification for Study Contractors, January 1995, and FIA Document 12, Appeals, Revisions, and Amendments to Flood Insurance Maps, January 1990.

6.2 Based upon the results of reservoir routing analysis, the consultant will determine the elevation of ponding along the SPRR (83rd Avenue to 107th Avenue) and RID (35th Avenue to I-10). The consultant shall use the ponding elevation, and topographic mapping along with the grid (spot) elevations to delineate the ponding limits. For the purpose of determining ponding limits no conveyance of runoff will be assumed within the RID Canal, and no hydraulic analysis of the canal will be made.

6.3 The consultant is to make refinements to the floodplain delineation based on review of the results by the District, ADWR, FEMA, and the Technical Evaluation Contractor. The consultant shall review the floodplain delineation results for reasonableness. Adjustments to the input parameters for obtaining the most realistic results is normal to the scope.

6.4 The consultant will prepare working maps and models of the 100-year floodplain during the course of the hydraulic modeling analysis for review by the District at progress and milestone meetings.

6.5 The consultant shall provide permanent non-erasable topographic mylars of the work study drawings. The drawings shall be 24" X 36" in size, with a scale of 1 inch = 200 feet and a contour interval of 2 feet for all mapping. A cover sheet will be provided with the project title, date of topographic mapping, and a location map showing geographic range covered by each specific mapping sheet. Each drawing shall include the floodplain delineation and a minimum of a north arrow, scale, section corners and quarter corners, current and proposed streets and highway names, State Plane Coordinate System, major drainage features, corporate boundaries, cross section lines, channel station center line, index map, description and elevation of control points and ERMs, and reference marks used in ground control. The District's HIS Data Delivery Specifications contain an Exhibit with proper sheet layout shown. The District can also provide copies of acceptable sheet layouts from previous studies. The mapping will have an accuracy such that ninety percent (90%) of all contours shall be within one-half contour of the true elevations and the remaining ten percent (10%) of the contours shall not be in error by more than one contour interval.

6.6 The consultant must obtain District approval at each of the following steps:

a. Field reconnaissance report.

b. Proposed location and alignment of the flow control weir sections.

c. Floodplain (natural) delineation.

e. Final Floodplain Delineation Report.

6.7.1 The consultant will conduct a field reconnaissance of the full study reach. This will include observation of floodplain conditions; photographic documentation of floodplain characteristics; observation of possible overflow areas; and observation of levees or other flood control structures.

6.7.2 A draft report on the field reconnaissance will be submitted to the District for review and approval prior to beginning modeling. The report will discuss floodplain conditions affecting the delineation, describe structures and obstructions, and provide color photos or photocopies of major hydraulic structures. Photo locations and structures, will be displayed on reduced scale mapping include in the report. The final report will be included in the Final Floodplain Delineation Report.

6.8 Flood zones must be determined according to FEMA criteria and clearly labelled on the final drawings.

6.9 The total area of the floodplain must be determined for each reach in square miles and acres.

6.10 The final report for the floodplain delineation study will include, but is not limited to the following:

I. Introduction
   a. Purpose of study
   b. Authority for study
   c. Coordination and acknowledgments
   d. Public notification and contact

II. Area Studied
   a. Scope of study
   b. Community description
   c. Principal flood problems
   d. Flood protection measures

III. Engineering methods
   a. Hydrologic analyses
   b. Hydraulic analyses

IV. Floodplain Management applications
   a. Flood boundaries

V. Insurance applications and CRS summary

VI. Other studies

VII. Location of data

VIII. Bibliography

IX. Reduced Delineation Maps (11"x17")

X. ERM's

TASK 7 - HIS DATA

7.1 Digital data will be prepared in conformance with the District's HIS Data Delivery Specifications, Revision 2.0 dated June 20, 1995, for the following themes:

a. Floodplain FCD Zone (LP-550, FPZNFCD)

b. Floodplain FCD Water Surface Elevation (LP-535, FPSRFFCD)

c. Data Quality (LP-410, DQ)

d. FCD Project Boundaries Index (LP-40, NDXPRJ)

e. FCD Project Boundaries (LP-60, PRJ)

f. FEMA Control Survey Points (LP-525, FPCTRL)

7.2 Separate check plots will be produced from either Arc-Info or Arc-Cad from the digital databases of each theme in 7.1. The check plots will be prepared with a minimum of annotation and will only serve to verify the information in the data base. If the hydrologic and delineation maps have not derived directly from the digital data delivered to the District, than the consultant will certify that the check plots have been examined and that the check plots faithfully represent the data and maps used in the report and/or work maps.

7.3 The District will update the existing subbasin delineations and related information on the District's HIS system. The District will supply the consultant with the hydrologic parameters for the revised subbasins. Any HIS coverages supplied by the District that have been modified by the consultant will have to be submitted to the District and check plots produced.

TASK 8 - DELIVERABLES

8.1 FEMA Submittal: The consultant will submit the following items to the District for review by FEMA and any other appropriate governmental agency. All of the following products are considered deliverables for the FEMA submittal:

8.1.1 Original Affidavits of Publication.

8.1.2 Two complete sets of blueline topographic base maps with the floodplain delineation shown. All drawings will be signed and sealed by persons of appropriate professional registrations. Each registrant should provide a statement as to what service they performed.

8.1.3 Two complete copies of the Technical Data Notebook, including hydrologic and hydraulic modeling input/output files on diskettes. The Technical Data Notebook will be prepared in accordance with ADWR State Standards Attachment 1-90 (SSA 1-90). The notebook will be organized as specified by the District, following SSA 1-90 format.

8.1.4 Two sets of completed FEMA forms will be submitted in a notebook separate from the Final Report.

8.1.5 Three sets of complete survey notes will be submitted in a notebook separate from the Final Report.

8.1.6 Two copies of the current FIRM panels showing the proposed delineation.

8.2 Final Submittal: The following products are considered deliverables for the final submittal to the District after FEMA approval is issued:

8.2.1 One complete set of non-erasable mylars of the work study drawings. Sheets shall be 24" X 36" in size. All drawings will be signed and sealed by persons of appropriate professional registration(s). Each registrant should provide a statement as to what service they performed. Mylars shall be 3 mil or thicker with no "sticky backs" or other types of tape products attached to them.

8.2.2 Digitized data and floodplain boundaries in conformance with the District's HIS Specifications.

8.2.3 Four complete copies of the Technical Data Notebook including hydrologic and hydraulic modeling input/output files on diskettes. The Technical Data Notebook will be prepared in accordance with ADWR State Standards Attachment 1-90 (SSA 1-90). The notebook will be organized as specified by the District, following SSA 1-90 format. This submittal of the Technical Data Notebook shall include any correspondence and/or meeting minutes with the reviewing agencies (FEMA) and shall reflect any revisions required by those reviewing agencies. Revisions may include, but are not limited, to modifications to the delineation, hydrologic and hydraulic models, and the Final Report.

FCD 95-26
SCOPE OF WORK
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FLOODPLAIN DELINEATION OF THE TOLLESON AREA
CHANGE ORDER NO. 2
July 15, 1997

GENERAL

The work included in this scope of work consists of approximately 15 total linear miles of floodplain delineation. Six miles of delineation will be performed along the Southern Pacific Railroad (SPRR) from east of 83rd Avenue to the Agua Fria River west of El Mirage Road, and approximately nine miles of delineation along the Roosevelt Irrigation District (RID) Main Canal from 35th Avenue to Interstate 10. Hydrology was prepared and floodplain delineations from ponding were completed for the length of the project to 107th Avenue under the original scope of work. The results of the ponding analysis indicate there is flooding from conveyance along the SPRR and RID Canal embankments. The floodplain delineation limits will be extended from 107th Avenue to the Agua Fria River, a distance of approximately 2.5 miles, and a HEC-RAS model will be developed for approximately 8 linear miles to supplement the ponding delineation to identify the combined floodplain impacts of ponding and conveyance. The HEC-RAS model will be developed for 2 linear miles north of the SPRR and RID canal from 67th Avenue to 83rd Avenue and for approximately 6 miles along the north side of the SPRR from 75th Avenue to El Mirage Road.

This scope of work identifies additional work to be completed beyond that described in the original scope for this project. No part of the original scope of work is eliminated or superceded as part of this scope. Therefore, only additions to the original scope of work are identified herein.

TASK 4 - FIELD SURVEY

4.1 Additional field surveys will be conducted to obtain culverts, top of rail and side road profiles for the added delineation area from 107th Avenue to the Agua Fria River. New ERM's will also be established if needed and additional check cross-sections taken to verify the mapping. A new railroad spur and building will be surveyed east of 107th Avenue, north of the SPRR.

TASK 6 - FLOODPLAIN DELINEATION

6.1 Floodplain delineations must be obtained using the U.S. Army Corps of Engineers latest release of HEC-RAS, and methodology acceptable to FEMA. This model will simulate the effects of floodplain geomorphology, flow changes, bridges, culverts, hydraulic roughness factors, effective flow limitations, split-flows, and other considerations. The consultant will prepare the study using the guidelines established in FEMA Document 37, Flood Insurance Study Guidelines and Specification for Study Contractors, January 1995, and FIA Document 12, Appeals, Revisions, and Amendments to Flood Insurance Maps, December 1993.

6.2 The delineation work shall meet requirements for floodplain delineations as prescribed by FEMA and the Arizona Department of Water Resources.

6.3 The delineation study shall be based on the final results of the hydrologic study as directed by the District.

6.4 The consultant is to make refinements to the HEC-RAS model based on review of the model results by the District, ADWR, FEMA, and FEMA's Technical Evaluation Contractor. The consultant shall review the HEC-RAS model results for reasonableness. Adjustments to the input parameters for obtaining the most realistic results is normal to the scope.

✓6.5 Floodway determination is not included in this work.

6.6 The consultant must obtain District approval at each of the following steps:

✓a. Field reconnaissance report and estimation of Manning's "n" values.

✓b. Proposed location and alignment of the cross sections and channel centerline.

✓c. Floodplain (natural) delineation.

d. Final Hydraulics Report.

✓6.7 Field Reconnaissance Update

✓6.7.1 The consultant will conduct a field reconnaissance of the full study reach. This will include observation of channel and floodplain conditions for estimating Manning's "n" values; photographic documentation of floodplain characteristics; determination of channel bank stations; observation of possible overflow areas; inspection of levees or other flood control structures; and measurement of bridge dimensions.

✓6.7.2 Manning's "n" values are to be determined using the methodology in the USGS report, Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona, April 1991. Copies of the report are available through the District.

✓6.7.3 A draft report update on the field reconnaissance will be submitted to the District for review and approval prior to beginning the HEC-RAS modeling. The report will present the determination of channel and overbank "n" values using captioned color photographs or color photocopies. The report will also discuss floodplain conditions affecting the delineation, describe structures and obstructions, and provide color photos or photocopies of major hydraulic structures. Photo locations, structures, and "n" values will be displayed on reduced scale mapping and included in the Final Report.

6.8 Cross Sections

6.8.1 The location and alignment of cross sections and channel centerline will be submitted for the District's review and approval before digitizing the cross section data. Cross section stationing will be from left to right looking downstream with the RID Canal or SPRR as station 5,000. Cross sections will be spaced approximately every 500 feet, unless geographic or structural constraints dictate otherwise, and will extend the full width of the area inundated by 100-year flood waters. Identification of cross sections will be in river miles, increasing upstream. The stationing will tie into the specified river mile of the existing FEMA studies. The cross section may need to be reoriented or altered after running the HEC-RAS model to ensure that they are perpendicular to flow per FEMA criteria. Cross sections developed by the HEC-RAS interpolation feature are not to be used.

6.8.2 All cross sections will be plotted using a pen, laser, or electrostatic plotter. The cross section plots will show water surface profiles, ineffective flow areas, "n" values, encroachments, channel stationing and other pertinent information. All plots are to be accompanied by a legend. These plots should be available at all reviews.

6.8.3 Cross section plots are limited to one plot at the following three stages of work: (a.) a plot of digitized "GR", STCHL, STCHR, centerline (station 5,000) to be used as a check of input data and for working sections during compilation of the floodplain model; (b.) a plot of the cross section for the completed floodplain run which shows the floodplain water surface elevation, ineffective flow areas, and "n" factor. These cross sections, generated under (a) and (b), will be submitted as part of the Final Report.

6.9 Bridges and culverts must be modeled according to HEC-RAS modeling requirements for the selected routine. Where multiple bridges occur, each bridge will be modeled separately. The HEC-2 modeling results for bridges, culverts, and other hydraulic structures must be checked by using an independent method approved by the District to analyze these structures.

6.10 For floodplains identified as ponding areas, it is preferable to analyze the area by using the HEC-RAS model, which will provide the District with water surface elevations.

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

6.12 The total area of the floodplain must be determined for each reach in square miles and acres.

6.13 The findings of the floodplain delineation study will be presented in Section 4 of the Technical Data Notebook and will be prepared in accordance with ADWR State Standards Attachment 1-90 (SSA 1-90). The report will be organized as specified by the District standards, following SSA 1-90 format.

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

TASK 7 - HIS DATA

7.1 Digital data will be prepared in conformance with the District's Hydrologic Information System Data Delivery Specifications, Revision 2.1. The following themes will be prepared in addition to those specified in the original Scope of Work:

a. FPXFCD (Floodplain FCD Cross Section)

b. FPBLN (Floodplain Baseline Route System)

C.1 Cross Section Test Results

Urban
Engineering

Planning
Engineering
Surveying
Environmental
Transportation
Aviation

2633
E. Indian School Rd.
Suite 110
Phoenix, AZ 85016
Phone
602.381.0004
Fax 602.381.0044

San Diego
Tucson
Reno

July 16, 1996

Mr. Brian Fry
DIBBLE AND ASSOCIATES
2633 East Indian School Road, Suite 410
Phoenix, AZ 85016

RE: FDC 95-26 - RID CANAL
FLOODPLAIN DELINEATION OF THE TOLLESON AREA

Dear Brian:

We have completed the test cross sections, verifying the accuracy of the aerial mapping throughout the project. The planemetric map features, spot elevations and the contouring have been checked and tested utilizing said sections. Sufficient surveys have been performed to assure that each phase of the mapping meets FEMA standards and specifications.

Our staff involved with this project has previous experience in delineation studies and surveys for the District and FEMA.

All guidelines, procedures and methods called for in FEMA Document 37 have been strictly adhered to by Urban Engineering while conducting said tests. A tabulation of test sections taken are as follows:

Test Section 1

Location: Between 107th & 99th Avenue extending north from railroad tracks 1300± at an easting coordinate of approximately 388,500. Test section averaged 0.20' difference from aerial mapping with a worst case discrepancy of 0.5'.

Test Section 2

Location: On the east side of 99th Avenue between roadway and right-of-way, centered on railroad tracks. Test section did not fall within guidelines set by FEMA or Urban Engineering. A second test section was performed approximately 100 feet west of original section and no measurable difference was detected between the check and mapping surveys.

Test Section 3

Location: On the east side of the 95th Avenue alignment extending south from the railroad tracks. Test section did not fall within guidelines set by FEMA or Urban Engineering. A second test section was performed approximately 50 feet west of original section and no measurable difference was detected between the check and mapping surveys.

Test Section 4

Location: Along the south right-of-way of I-10 from where the Roosevelt Irrigation District Canal crosses under I-10, east 800'± to approximately the 87th Avenue alignment, then south along the west side of said alignment to the intersect with said district canal. Test section averaged 0.06' difference from aerial mapping with worst case discrepancy of 0.5'.

Test Section 5

Location: 400'± west of 87th Avenue alignment running north/south, centered on railroad tracks. Test section averaged 0.04' difference from aerial mapping with the worst case discrepancy of 0.1'.

Test Section 6

Location: Off the roadway on the west side of 79th Avenue, centered on the Roosevelt Irrigation District Canal. Test section averaged 0.04' difference from aerial mapping with the worst case discrepancy of 0.3'.

Test Section 7

Location: Between 75th and 67th Avenues running parallel and approximately 180' south of railroad tracks centered on the Roosevelt Irrigation District canal where it makes a 90° turn in direction from the west to the south. Test section averaged 0.09' difference from aerial mapping with the worst case discrepancy of 0.4'.

Test Section 8

Location: On the 63rd Avenue alignment centered on the Roosevelt Irrigation District Canal where it makes a 90° turn in direction from the north to the east. With the left bank running along the east side of said canal and the right bank running along the east side of a local collection channel. Test section averaged 0.17' difference from aerial mapping with worst case discrepancy of 1.0'.

Test Section 9

Location: On the east side of 59th Avenue centered on the Roosevelt Irrigation District Canal. Test section showed no measurable difference detected between the check and mapping surveys.

If you have any questions or have any additional information, please do not hesitate to call.

Sincerely,

URBAN ENGINEERING

Paul Sowers

Paul M. Sowers, R.L.S.
Assistant Vice President
Survey Supervisor

PMS/jv
file/data/document/FDC95-26

C.2 Survey Field Notes for Hydraulic Modeling

TOPCON

FIELD BOOK

56502

R.I.D.

CANAL

95232

50% cotton-content paper
water resistant surface
50 sheets. . . . 4 7/8" X 7 1/4"

TABLE OF CONTENTS

DESCRIPTION	PAGE NO.
* BENCH RUN FROM 99TH AVE & BUCKEYE RD TO 107TH AVE & BUCKEYE	1 & 2
* BENCH RUN FROM 99TH AVE & BUCKEYE RD NORTH 1/2 MI. TO R.R. TRACKS	3

THIS SURVEY WAS CONDUCTED UNDER MY SUPERVISION

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
14172
LOUIS P.
DePRISCO
Date Signed 9-10-98
ARIZONA, U.S.A.

Louis P. DePrisco

STA	+	H'	-	℄	-146 DATUM ADJ.
90534	5.59	100.37		~~99.80~~	99 34
TP1			5.34	~~94.55~~ 91 55	93 09
	4.74	99.29			
TP2			5.72	~~93.57~~ 93 56	92 10
	5.10	98.67			
TP3			5.48	~~93.19~~ 93 18	91 72
	4.20	97.39			
TP4			4.57	~~92.82~~ 92 81	91 35
	4.60	97.42			
TP5			4.95	~~92.47~~ 92 46	91 00
	5.06	95.03			
TP6			5.79	~~92.24~~ 92 22	90 76
	4.82	96.76			
TP7			4.82	~~91.94~~ 91 92	90 46
	3.57	95.51			
TP8			5.64	~~89.87~~ 89 85	88 39
	5.89	95.76			
TP9			4.44	~~91.32~~ 91 29	89 83
	6.95	93.27			
TBM1			3.00	~~95.27~~ 95 24	99 38
	2.91	98.18			
TP10			6.35	~~91.83~~ 91 80	
	4.99	95.82			

NAD
NJG

BENCH RUN FROM 99R TO

107 AVE & Bulleye RD.

BCMH 2.99 ABC [illegible]

SET CPS

MARKED "SA" ON [illegible]

SET CPS

MARKED "SA" ON HANDHOLE

SET CPS

MARKED "SA" T/C LINE [illegible]
& BULLEYE RD N/E CORNER

SIA	I	II	-		
TP8			5.94	~~89.88~~ 12 ~~91.84~~	
	5.64	95.52			
TP7			3.57	~~91.95~~ 13 ~~91.91~~	
	4.79	96.74			
TP10			4.45	~~92.29~~ 14 ~~92.25~~	
	5.14	97.73			
T5			5.25	~~92.48~~ 15 ~~92.44~~	
	[illegible]	[illegible]			
[illegible]			1.61	~~92.86~~ 16 ~~92.81~~	
	[illegible]	92.57			
[illegible]			4.14	~~93.23~~ 17 ~~93.18~~	
	5.45	93.03			
[illegible]			[illegible]	~~93.03~~ 18 ~~93.58~~	
	[illegible]	99.02			
TP11			4.11	~~94.61~~ 19 ~~94.55~~	
	5.54	100.15			
(100.[illegible])			5.29	~~94.86~~ 20 ~~94.80~~	~~94.80~~
TBM1	5.07	100.31		~~95.27~~	993.78 ✓
(80147)			5.63	~~94.94~~	93.22 ✓
	5.54	1000.25			
			1.93	~~95.27~~	

②

CONT. SAME

MARKED "[illegible]" T/C

BOLH @ 107 AVE & BUCKERT RD / (80147)

STA	+	HI	−	EL	−146 DATUM ADJ.
90534	5.70	1000.50		~~994.80~~	993.34
TP1			5.03	~~95.47~~	94.01
	6.02	01.49			
TP2			4.44	~~97.05~~	95.59
	5.25	02.30			
TP3			4.42	~~97.83~~	96.42
	5.65	03.53			
TP4			4.28	~~99.25~~	97.79
	6.05	05.30			
TP5			3.78	~~01.52~~	100.06
	5.74	07.26			
TBM2			4.00	~~03.26~~	100.80
	4.07	07.33			
TP5			5.81	~~01.52~~	
	3.80	05.32			
TP4			6.07	~~99.25~~	
	4.45	03.70			
TP3			5.84	~~97.86~~	
	4.57	02.43			
TP2			5.40	~~97.03~~	
	4.23	01.26			
TP6			5.85	~~95.41~~	
	4.86	1000.27			
90534			5.47	~~994.80~~	993.34

APR. 13

BENCH RUN FROM 99th AVE & BUCKLE RD JOB NO

NORTH 1/2 MILE TO RR

MARKED "⊠" ON CULV. BOX

MARKED "⊠" ON CONC. IR. DITCH

MARKED "⊠" ON CURB NORTH S/W CORNER SMITH'S MINIMART

BCHM HKSPEED ON 99th AVE & [illegible] S/B

April 3

BENCH LOOP FROM 91st AVE & Buckeye RD JG NB

BR HH North 1/2 mile to RR

STA	+	HI	−	EL	−144 DATUM ADJ.
80148	6.14	08.22		~~1002.08~~	
				1 ~~04.63~~ 04.63	
TP1			3.59		03 19
	4.73	9.36		2 ~~5.32~~ 5.32	
TP2			4.04		03 89
	5.10	10.42		3 ~~6.19~~ 6.20	
TP3			4.23		04 76
	6.12	12.31		4 ~~7.83~~ 7.85	
TP4			4.48		06 42
	5.62	13.45		5 ~~11.71~~ 11.73	
TP5			1.74		10 29
	5.76	17.47		6 ~~12.52~~ 12.55	
TBM4			4.95		~~10 29~~
	4.75	17.27		7 ~~11.70~~ 11.73	
TP5			5.57		10 29
	1.68	13.38		8 ~~7.82~~ 7.85	
TP4			5.56		06 41
	4.69	12.51		9 ~~7.16~~ 7.20	
TP6			5.35		05 76
	3.38	10.54		10 ~~5.31~~ 5.35	
TP7			5.23		03 91
	4.24	9.55		11 ~~4.58~~ 4.63	
TP1			4.97		03 19
	3.26	7.84		12 ~~1002.03~~ 2.08	
80148			5.81		1000 64

BCHH EAST SIDE SOUTH BOUND HISPEED LN
12' SOUTH OF R.R. TRACKS 91st AVE

HORIZONTAL CONTROL FROM 1/2 mile NORTH
OF 99th AVE & VAN BUREN SOUTH TO
99th AVE & RR TRACKS / EAST & WEST
OF 99th AVE & RR TRACKS

PROC	PTOBS	HZ	H.D.	
1				
	2	00-00-00	2639.93	
			2639.94 ✓	
	3	180-01-51	2643.74	
		0-03-45	2643.73	180-01-54
		180-05-37	2643.75	180-01-52
		0-7-28	2643.75 ✓	180-01-51
		∡ 180-01-52 ✓		
3				
	1	00-00-00	2643.72	
	4	269-43-09	1836.52	
		179-26-16	1836.52	269-43-07
		89-09-37	1836.52	269-43-21 ✓
		358-52-41	1836.51	269-43-04
		∡ 269-43-07		
	5	89-41-06	1997.45	
		179-22-10	1997.46	89-41-04
		269-03-19	1997.47	89-41-09
		358-44-29	1997.46	89-41-10
		∡ 89-41-07		

FND BC HH @ 99th AVE & VAN BUREN
FND BC HH @ 99th AVE 1/2 MILE NORTH OF VAN BUREN AT BO140
FND BC HH @ 99th AVE ± 2' SOUTH OF RR TRACKS (TBM 2)

SET 1/2 REBAR ± 5' SOUTH OF BCLL/NPH OF RR TRACKS ± 100' EAST of SW COR. OF ALBERTSONS WAREHOUSE

SET CB

PROC	PROBS	HZ	H.O.		
4					
	3	00-00-00	1836.52		
			1836.51		
	6	149-59-42	1611.44		
		299-59-24	1611.44	149-59-42	
		89-59-10	1611.44	149-59-46	
		239-58-50	1611.44	149-59-40	
		∑ 149-59-42			

SET 1/2 REBAR ± 200 NORTH FROM SOUTH END OF DIRT ROAD

Level Loop FROM 107th Ave & Dickey Rd
NORTH 1½ miles to END BC FLUSH (PT 80147
TO 90526)

SIA	+	III	−	LL	LOOP ADJ	-149 DATUM ADJ.
B0147	4.75	99.46		~~99.71~~	~~9471~~	99322
				1		
TP1			6.85	~~92.61~~	~~9261~~	91 12
	5.56	98.17		2		
TP2			3.32	~~94.85~~	~~9486~~	93 37
	6.08	100.93		3		
TP3			3.61	~~97.32~~	~~9733~~	95 84
	5.93	103.25		4		
TP4			3.18	~~100.07~~	~~10009~~	98 60
	5.37	105.44		5		
TP5			2.51	~~102.93~~	~~10295~~	101 46
	4.68	107.61		6		
TP6			2.65	~~104.96~~	~~10498~~	103 49
	4.79	109.75		7		
TP7			3.65	~~106.10~~	~~10613~~	104 64
	5.17	111.27		8		
TP8			4.18	~~107.09~~	~~10712~~	105 63
	5.27	112.36		9		
TP9			3.95	~~108.41~~	~~10845~~	106 96
	4.99	113.40		10		
TP10			4.03	~~109.37~~	~~10941~~	107 92
	5.34	114.71		11		
90526			3.84	~~110.87~~	~~11091~~	109 42
				12		

PLAN 100943

STA	+	HI	−	EL	LOOP ADJ.
90526				~~110.87~~	~~110.41~~
	3.61	114.48		13	
TP10			5.12	~~109.36~~	~~109.41~~
	4.05	113.41		14	
TP9			5.03	~~108.38~~	~~108.43~~
	4.11	112.49		15	
TP8			5.44	~~107.05~~	~~107.11~~
	4.03	111.08		16	
TP7			4.99	~~106.09~~	~~106.15~~
	3.51	109.60		17	
TP6			4.67	~~104.93~~	~~105.00~~
	3.02	107.95		18	
TP5			5.08	~~102.87~~	~~102.94~~
	2.72	105.59		19	
TP4			5.59	~~100.00~~	~~100.07~~
	3.25	103.25		20	
TP3			6.01	~~97.24~~	~~97.32~~
	3.69	100.93		21	
TP2			6.15	~~94.78~~	~~94.86~~
	3.55	98.33		22	
TP1			5.81	~~92.52~~	~~92.44~~
	5.49	98.01		23	
80147			3.39	~~94.62~~	~~94.71~~
TBM1			2.84	~~95.17~~	~~95.24~~

DATUM ADJ.

~~993.27~~

~~993.78~~

HORIZONTAL CONTROL FROM U.G. 10
PT 80147

PTOCC	PTOBS	HZ	H.O.		
6					
	4	00-00-00	1611.47		
	7	145-38-39	1349.17		
		291-17-21	1349.16	145-38-42	
		76-56-00	1349.16	145-38-39	
		222-39-43	1349.16	145-38-43	
		≠ 145-38-41			
7					
	6	00-00-00	1349.16		
	8	221-09-49	1612.99		
		82-19-35	1613.00	221-09-46	
		303-29-28	1612.99	221-09-53	
		164-39-20	1613.00	221-09-52	
		≠ 221-09-50			

SET 1/2 REBAR ± 200 EAST OF A METAL POWER POLE / ± 80' NORTH OF RR TRACK @ EDGE OF MINERA FIELD

BC HH 107 TK Bearing 80 / Pi 80H17

Level loop from TBM (pg. 1) to

VE 7

STA	+	H1	-	EL	-1.49 DATUM ~~ADJUST~~
TBM1				95.27	93.78
	2.24	97.51			
TP1			5.99	91.52	
	4.49	96.01			
TP2			4.40	91.61	
	4.39	96.00			
UE 7			4.21	91.79	90.30
	4.52	96.31			
TP3			4.56	91.75	
	4.24	95.99			
TP4			4.64	91.35	
	6.16	97.51			
TBM1			2.25	95.26	

"X" ℄ + ℄ (PAGE 1)

P

15

Horizontal Con

Proc	Pt to BS	H K	H D		
5					
	3	00 00 00	997.51		
	9	178-56-50	1865.40		
		357-53-35	1865.41	178-56-45	
		176-50-25	1865.40	178-56-50	
		355-47-15	1865.41	178-56-50	
	∡	178-56-49			
9					
	5	00-00-00	1865.41		
	10	181-07-45	1460.04		
		02-15-30	1460.04	181-07-45	
		183-23-10	1460.02	181-07-40	
		04-30-50	1460.04	181-07-40	
	∡	181-07-43			

SET C.P.S. NORTH SIDE TRAS @
SOUTH SIDE EVERKRISP UTL. INC
BLD

SET C.P.S. NORTH SIDE R.P.
@ 91ST AVE EAST SIDE

Point	Angles	HE	H.D		
10					
	9	0000.00	1460.04		
	11	333-38-00	52.27		
		307-16-05	52.26	333-38-05	
		280-54-10	52.27	333-38-05	
		254-32-20	52.26	333-38-10	
	∡	333-38-05			
	12	271-20-10	2712.89		
		182-40-25	2712.89	271-20-15	
		94-00-40	2712.89	271-20-10	
		5-20-50	2712.90	271-20-10	
	∡	271-20-11			
	13	178-05-20	2103.39		
		356-10-40	2103.39	178-05.20	
		174-16-05	2103.40	178-05.25	
		352-21-25	2103.39	178-05.20	
	∡	178-05-21			

BCHH @ 91ST AVE & R.R. TRACKS

BCHH @ 91ST AVE & BUCKEYE RD.
POINT # 80148 KENNEY ACKIAUS

SET. CPS. N SIDE R.R. TRACKS

PT occ	PT obs	HZ	HD		
13					
	10	00-00	2103.40		
			2103.40		
	14	180°-04-30	2062.09		
		0°-09-00	2062.08	180°04 30	
		180°13-30	2062.08	180°04 30	
		0°17'-55	2062.08	—	
		~~Z~~ 180°-04-30			
14	13	00-00	2062.08		
			2062.08		
	15	127°-09-10	1716.75		
		254°-18-25	1716.75	127°09 15	
		21°-27-45	1716.75	127°09 20	
		148°-37-00	1716.75	127°09 15	
		~~Z~~ 127°09'15"			

C.P.S. N. side R.R. - 2100' E. 91ST AVE.

C.P.S. N. side R.R. @ 91ST AVE. - East side

SET C.P.S. N. Side R.R. - 4166' E. 91ST AVE.

SET C.P.S. South side canal @ Bar canal jors site From 87TH AVE. - east side

Pt occ.	Pt. BS/FS	HZ	H.D.		
15					
	14	00-00	1716.72		
			1716.72		
	16	273-29-15	658.35		
		186-58-35	658.35	273 29 20	
		100-27-50	658.35	273 29 15	
		13-57-00	658.35	273 29 10	
		~~273-29-15~~			

SET CPS @ ℄ BRK CRNK - southside

PTOCC	PTOBS	H K	H.D.		
16					
	15	00-00	658.33		
			658.33		
	17	140-55-35	2080.52		
		281-51-20	2080.52	140-55-45	
		62-47-10	2080.52	140-55-50	
		203-42-30	2080.52	140-55-20	
	K	140-55-43			

SET R/B

PT Occ	PT Obs	H ∢	H.D	
17				
	16	00-00	2080.53	
			2080.53	
	18	197-11-35	1399.05	
		34-23-30	1399.05	197-11-55
		231-35-05	1399.05	197-11-35
		68-46-55	1399.05	197-11-50
		∢ 197-11-42		

1/2" IP. 13' NW P.P. S. Side Canal - 29TH Ave.

Set CPS

Pt Occ.	Pt. BS/FS	HI	HD		
18					
	17	00-0-0	1399.02		
			1399.03		
	19	161-53-10	1204.58		
		323-46-10	1204.57	161-53-0	
		125-39-20	1204.58	161-53-10	
		287-32-20	1204.57	161-53-0	
		~~4~~ 161-53-05			

C.P.S @ 36' SW of Canal corner - 1250' W. 75th AVE

Set C.P.S. 3' NE Cor. chainlink fence - S. canal @ 75th Ave. (west side)

Pt occ	Pt. BS/FS	HZ	HD		
19					
	18	00-0-0	1204.58		
			1204.57		
	20	269-22-25	3110.29		
		178-44-40	3110.27	269-22-15	
		88-07-00	3110.30	269-22-20	
		357-29-20	3110.28	269-22-20	
		~~X~~ 269-22-20			
	21	196-10-20	1425.63		
		32-20-40	1425.63	196-10-20	
		228-31-05	1425.63	196-10-25	
		64-41-30	1425.63	196-10-25	
		~~X~~ 196-10-23			

Pk panel pt. @ 75TH AVE & Buckeye Rd = 80149

Set CPS 5.5' N. RR Spur 1400' E 75TH AVE.
@ Canal X-ING of RR - 20' W. Canal

Pt. Occ	Pt BS/FS	HZ	HD		
21					
	19	00-00	1425.58		
			1425.59		
	22	170-20-15	1362.27		
		340-40-25	1362.27	170-20-10	
		151-00-35	1362.27	170-20-10	
		321-20-50	1362.26	170-20-15	
		~~170-20-12~~			

set. CPG. 8' N. Power line S. of RR. 1363' E. of pt. 21

PTacc	PTOBS	H ∡	H.D.	
22				
	21	00-00	1362.26	
			1362.26	
			1362.25	
	23	177-15-09	1317.22	
		354-30-16	1317.21	177-15-07
		171-45 18	1317.21	177-15-02
		349-00 24	1317.22	177-15-06
		~~177-15-07~~		

Set ½ I.R. 39 S. & 8' E P.R. - NE. 95% in canal going S. & W. - 1400' W. of 67th Ave & 100'± S. P.R.

Pt. Occ.	Pt BS/FS	HZ	ND		
23					
	22	00-0-0	1317.23		
			1317.23		
	24	172-58-37	1338.52		
		345-57-21	1338.51	172-58-44	
100		158-55-58	1338.52	172-58-37	
58		331-54-40	1338.53	172-58-42	
42		172-58-40			

Set C.P.S. 24' W ℄ 67 Ave. & 33' N. R.R.

Pt occ.	Pt. 35/13	H ~~Z~~	H.D.		
24					
	23	00-0-0	1338.52		
			1338.52		
	25	97-02-54	1916.05		
		194-05-45	1916.04	97-02-51	
		291-08-41	1916.05	97-02-56	
		28-11-35	1916.05	97-02-54	
		~~97-02-57~~			
	28	274-08-55	1964.64		
		188-17-54	1964.64	274-08-59	
		102-26-59	1964.63	274-08-55	
		16-36-00	1964.63	274-09-01	
		~~274-08-57.5~~			

Set C.P.S. 18' E ℄ 67th Ave. @ (130 N. 67th Ave.)

Set. C.P.S. 12' W. of canal & 200' N. Buckeye
N.E. Cor. Buckeye & 67th Ave.

Pt. Occ.	Pt BS/FS	H ∡	HD.		
25					
	24	00-0-0	1916.03		
			1916.03		
	26	177-33-15	1927.82		
		355-06-38	1927.81	177-33-23	
		172-39-59	1927.83	177-33-21	
		∡ 177-33-18.5			

Set. Pk nail 25' S. (500 N. 67TH) sign 24' W. ℄ 67TH Ave. (Fillmore St Int.)

Pt. occ.	Pt. BS/FS	HZ	HD		
26					
	25	00-0-0	1927.78		
			1927.79		
	27	180-45-18	1495.81		
		1°-30-51	1495.80	180-45-24	
		182-16-24	1495.79	180-45-33	
		∡ 180-45-25			

Pk nail (Pt. 80142) panel pt. ℄ 67TH AVE ℄

LOOP FROM 83RD & CANAL N.W, then SOUTH TO 91ST & R.R. PT. 10

Rob
Don
4/24/96

30

Pt. occ.	Pt. BS/FS	H∡	HD.	
15				
	14	00-0-0	1716.74	
			1716.74	
	80	102-45-26	1985.41	
		205-30-42	1985.41	102-45-16
		308-16-02	1985.41	102-45-20
		51-01-29	1985.41	102-45-27
		∡ 102-45-24		

CPS @ South side Canal @ ∡ in canal 60' E. & 83RD AVE. - 205' N. Washington St.

*80 SET C.P.S. EAST SIDE of CANAL @ VAN BUREN ST 40' NORTH

Pt occ	Pt BS/FS	HZ	HD		
80					
	15	00-0-0	1985.44		
			1985.44		
	81	220-13-19	1298.29		
		80-26-28	1298.28	220-13-09	
		300-39-46	1298.28	220-13-18	
		160-53-06	1298.28	220-13-20	
		~~4~~ 220-13-19			

ALUM. CAP @ NORTH SIDE CANAL
@ P.C. of CANAL
A-DOT B.M. 110-B 1981

Pt. occ.	Pt. BS/FS	H∡	HD.		
81					
	80	00-0-0	1298.27		
			1298.26		
			1298.26		
	82	134-43-23	3371.36		
		269-26-51	3371.37	134-43-23	
		44-10-14	3371.38	134-43-23	
		178-53-38	3371.36	134-43-24	
		~~134-43-23~~			

CK

Set C/P/S. 7' W. canal @ ∡ in canal going under I-10 — 60' NE. H.W.R. of W. marker.

Pt. Occ.	Pt. BS/FS	HZ	HD		
82					
	81	00-0-0	3371.40		
			3371.39		
			3371.39		
	83	136-15-54	1371.36		
		272-31-40	1371.34	136-15-46	
		48-47-29	1371.36	136-15-49	
		185-03-19	1371.35	136-15-50	
		136-15-50			

CK

100
54
46

89
40
49

79
29
50

Set Pt 4 in center sidewalk w. side 91st Ave 66' S of S. side crosswalk S. side I-10.

Pt. occ.	Pt. BS/FS	H ∡	HD		
83					
	82	00-0-0	1371.34		
			1371.34		
	84	90-45-27	1688.82		
		181-30-46	1688.82	90-45-19	
		272-16-12	1688.82	90-45-26	
		3°-01-27	1688.82	90-45-15	
		∡ 90-45-22			
46 27 19					
72 46 26					
27 12 15					

Set. pk nail in asphalt 18' S. of (W. Beden St. & 91st Ave) street sign

Pt. occ.	Pt Bs/Fs	HZ	HD.		
84					
	83	00-0-0	1688.79		
			1688.80		
			1688.80		
(1)	85	178-48-34	2018.14		
		357-36-51	2018.14	178-48-17	
		176-24-48	2018.14	178-48-57	
		355-13-09	2018.13	178-48-21	
		~~178-48-25~~			
51 34 17		178-48-27			
108 51 57	1)	178-48-55			
		357-37-50			
69 48 21		176-26-45			
		355-15-40			
		178-48-56			

Set CPS. 3' S. N. end drive culvert - E. side 91st Ave (24' E. ℄ 91st) - 80' S. Polk St.

Pt. Occ.	Pt. BS/FS	HA	HD		
85					
	84	00-0-0	2018.12		
			2018.10		
			2018.14		
CL	86	184-20-43	1060.91		
		8°-41-34	1060.94	184-20-51	
		193-02-21	1060.89	184-20-13	
		17°-23-07	1060.91	184-20-46	
		~~∑ 184-20-47~~			
94 43 51					
14 21 13 67 21 46		✓ 184°-21-07	1060.91		
		8°-42-14			
		193-03-21			
		17-24-28			
		∑ 184-21-07			

Set CRS. 1'S. end sidewalk & 6.5'W curb
southside Adams St @ 91ST Ave.

HORIZ CONTROL (CONTINUED)

R1D CANAL

95232

UE-301-0004

NATIONAL
425

DID CANAL

HORIZONTAL CONTROL

PROJECT 95232

Pt. occ.	Pt BS/FS	HZ	HD		
28					
	24	00-0-0	1964.68		
			1964.67		
			1964.68		
	29	151-23-55	1550.13		
		302-49-50	1550.14	151-23-55	
		94-11-45	1550.14	151-23-55	
		245-38-25	1550.14	151-23-40	
		~~151-23-55~~			

Set CPS. 21' S. South edge canal 1000' ± E. of 67th Ave. – S. of Buckeye

Pt. Occ.	Pt BS/FS	HZ	HD.	
29				
	28	00-0-0	1550.13	
			1550.13	
	30	119-50-45	1656.59	
		239-41-25	1656.59	119-50-40
		359-32-00	1656.60	119-50-40
		119-22-35	1656.58	119-50-35
		∑ 119-50-40		

85 05/n 0

2

Sect. CPS. 6' S. of Canal & N. end of 63rd Ave. in line with E. edge of E. sidewalk.

Pt. occ.	Pt. BS/FS	HZ	HD	
30				
	29	00-0-0	1656.60	
			1656.61	
			1656.60	
	31	226-03-30	1188.60	
		92-06-55	1188.61	226-03-25
		318-10-20	1188.63	226-03-25
		184-13-45	1188.63	226-03-25
		226-03-25		

set CRS. 40's of Canal (@ yellow rebar steps)
1000'± east of 63rd Ave.

Pt. occ.	Pt. BS/FS	HZ	HD		
31					
	30	00-0-0	1188.63		
			1188.63		
	32	189-19-35	1405.75		Set C.P.S. 35' S. of Canal 1123' W. of 59 Ave.
		18-39-20	1405.73	189-19-45	
		207-58-55	1405.74	189-19-35	
		37-18-35	1405.74	189-19-40	
		∡ 189-19-37			
55					
55					

Proc	Points	H ~~S~~	H.D		
32					
	31	00-00	1405.74		
			1405.74		
	33	124-05-10	1122.46		
		~~248-09-00~~	1122.46	~~124-05-50~~	
		12-14-00	1122.46	124-05-00	
		124-05-05	1122.46	~~-05~~	
		248-10-20	1122.46	124-05-15	
60 +10 /50		~~4~~ 124-05-07			

Set CPS. 9' S. of canal & South west end of bridge @ 59 Ave.

Pt. occ.	Pt. BS/FS	HZ	HD	
33				
	32	00-0-0	1122.49	
			1122.49	
			1122.49	
	34	181-01-38	2200.02	
		2-03-12	2200.02	181-01-34
		181-01-34	2200.02	181-01-22
		2-03-06	2200.02	181-01-32
		4 181-01-35		

72
38
34

66
34
32

44
12
22

38
4
42.7

31 14
20

Set. CPS. 3' S. Canal 42' W. of Crossing.
Canal box ≈ 2200' E. of 59TH Ave.

Pt. occ	Pt BS/FS	H ∡	H D		
34					
	33	00-0-0	2199.98		
			2199.99		
			2199.98		
	35	180-30-19	2777.78		Set C.P.S. 6' N. of small 4' canal @ ∡ in
		1°-00-40	2777.78	180-30-21	main canal 372' W. ℄ 51 Ave.
		181-31-00	2777.78	180-30-20	
		2-01-18	2777.79	180-30-18	
	∡	180-30-19.5			

19
21
20
18 19.5
4) 78
4
38
36
2

Pt. Occ.	Pt. BS/FS	H ∡	H D.	
35				
	34	00-0-0	2777.82	
			2777.81	
			2777.79	
	36	166-14-58	938.16	
		332-29-57	938.16	166-14-59
		138-44-51	938.20	166-14-54
		304-59-51	938.17	166-15-00
		∡ 166-14-59		

Set, CPS, 28's. of Canal (18' N. Chainlink ⊥) @ 600' ± E. of ℄ 51ST AVE.

Pt occ	Pt obs	HZ	ND		
36					
	35	00-00	938.15		
			938.16		
	37	193-23-17	2035.46		
		26-46-33	2035.46	193-23-16	
		220-09-55	2035.47	193-23-22	
		53-33-10	2035.46	193-23-25	
		✗ 193-23-21			

Set CPS. 18' S. of Canal under duel transmission lines ½ mile E. of 51st Ave. (19' W. of cross canal.)

Pt. occ.	Pt. Obs/Ps	HZ	HD.		
37					
	36	00-0-0	2035.42		
			2035.42		
			2035.42		
	38	186-39-22	1393.78		Set CPS, 18'S, Canal ± 1200' W. 43rd Ave. (45' E. of PP.)
		13-18-41	1393.79	186-39-19	
		199-58-06	1393.78	186-39-25	
		26-37-37	1393.79	186-39-31	
		~~186-39-22~~			
		213-16-52		186-39-15	
		39-56-15		186-39-37	
		226-35-34		186-39-19	
		53-14-55		186-39-21	

Pt. Dec.	Pt. BS/FS	H ∡	H D	
38				
	37	00-0-0	1393.82	
			1393.83	
			1393.82	
	39	168-44-30	1488.75	
		337-28-54	1488.76	168-44-24
		146-13-21	1488.74	168-44-27
		314-57-52	1488.74	168-44-31
		~~∡ 168-44-29~~		

8'1
24
27

30
31
27
3 | 88 | 29
8
22
27
1

set CPS 7.5' North NW End Chainlink Fence 20' S. of canal & 200' ± E. of 43RD Ave.

Pt. occ.	Pt. BS/FS	HA	HD	
39				
	38	00-0-0	1488.77	
			1488.77	
			1488.77	
	40	183-52-04	1256.93	
		7-44-10	1256.94	183-52-06
		191-36-14	1256.94	183-52-04
		15-28-16	1256.93	186-52-02
		~~183-52-04~~		

Set CPS. 24' S. of Canal 180' E. of Chainlink Fence. ¼ 1700'± E. of 43rd Ave.

St. occ.	Pt. BS/FS	H ∡	H D	
40				
	39	00-0-0	1256.95	
			1256.94	
			1256.95	
	44	180-14-24	1836.59	
		0°-28-49	1836.58	180-14-25
		180-43-07	1836.61	180-14-13
		0-57-36	1836.59	180-14-23
67		~~∡ 180-14-24~~		
67				
49				
18				
119				
+1				
56				

Set CPS, 4' ± S. of canal & 2000'±W. of 35th Ave.

Pt. occ	Pt BS/FS	HZ	HD		
41					
	40	00-0-0	1836.56		
			1836.57		
			1836.56		
	42	178-52-33	1969.24		
		357-44-56	1969.23	178-52-23	
		176-37-23	1969.23	178-52-27	
		355-29-52	1969.23	178-52-29	
		~~4~~ 178-52-295			

52
56
27

55
27
29

33
29
27
3 | 89 | 29
6
29
27
2

23
27
28
3 | 79 | 26
9
19
18

Set CPs. back edge sidewalk 5.5's. of traffic signal w. side 35th Ave.

Pt. occ.	Pt BS/FS	HZ	HD	
42				
	41	00-0-0	1969.26	
			1969.25	
			1969.26	
	43	92-39-02	1561.30	
		185-18-01	1561.30	92-38-59
		277-57-02	1561.30	92-39-01
		10-36-04	1561.30	92-39-02
		∡ 92-39-01		
43				
	42	0000	1561.33	
			1561.35	
			1561.31	
			1561.33	
	44	175 31 15		
		351 02 24	1054.795	
		∡ 175 31 13		

Set Pk. nail in E. sidewalk of 35th Ave. 192' South of ℄ Raggo St

Be in Hk. @ 35th Ave & Buckeye

$\boxed{00150}$

TOPCON

FIELD BOOK

56502

RID.

CANAL

95232

50% cotton-content paper
water resistant surface
50 sheets. . . . 4 7/8" X 7 1/4"

JOB # 95352
LEVEL RUN

FROM BUCKEYE RD + 99TH AVE
EAST TO BUCKEYE + 91 AVE

4-3-96 R.K.
D.B

99TH AVE. East ON Buckeye to 91ST. AVE

+	HI	−	ELEV.		-146 DATUM ADJ.
6.33	1001.13		994.80	BM 1	993.34
		4.65	996.48 996.48	TP#1	
5.18	1001.66			2	
		4.46	997.20 997.2	TP#2	
5.29	1002.49			3	
		4.59	997.91 997.9	TP#3	
5.47	1003.37			4	
		4.52	998.86 998.85	TP#4	
6.04	1004.89			5	
		4.75	1000.15 1000.14	TP#5	
5.27	1005.41			6	
		4.66	1000.76 1000.75	TP#6	
5.25	1006.0			7	
		4.49	1001.52 1001.51	TP#7	
5.32	1006.83			8	
		4.74	1002.10 1002.09	TP#8	
5.42	1007.51			9	
80148		5.43	1002.10 1002.08	BM.	[redacted]
					PLANE 1000.5

1

B.M. BCHH Buckeye + 99TH AVE
Point # 90534

BM BCHH Buckeye & 91ST AVE
Point # 80148

(cont'd.)

+	HI	–	EL	
5.43	1007.51		02 10 1002.08	BM
		5.43	02 10 1007.09	10 TP #9
4.75	1006.73			11
		5.34	01 51 1001.19	TP #10
4.80	1006.79			12
		5.56	00 75 1000.73	TP# 11
4.77	1005.85			13
		5.38	00 14 1000.12	TP# 12
4.81	1004.93			14
		6.10	98 85 998.83	TP# 13
4.58	1003.41			15
		5.52	97 88 997.88	TP# 14
4.73	1002.62			16
		5.65	97 00 996.97	TP# 15
4.86	1001.43			17
		5.38	96 48 996.45	TP# 16
4.80	1001.25			18
90534		6.48	94 80 994.77	BM

BM BC.HH Buckeye Rd & 91st Ave.
Point # 80148

BM BC.HH Buckeye Rd & 99th Ave
Point # 90534
01 03

				-14 DATUM ADJ.	
+	HI	-	ERU		
			~~1002.08~~	1000 64	
5.55	1007.63		1		
		3.89	~~1003.74~~	1002 30	TP#1
5.13	1008.87		2		
		4.29	~~1004.58~~	1003 14	TP#2
4.80	1009.46		3		
		3.90	~~1005.56~~	1004 12	TP#3
5.79	1011.35		4		
		4.60	~~1006.75~~	1005 31	TP#4
5.34	1012.09		5		
		4.58	~~1007.51~~	1006 07	TP#5
5.00	1012.51		6		
-		4.64	~~1007.87~~	1006 43	TP#6
5.00	1012.87		7		
		4.40	~~1008.47~~	1007 04	TP#7
4.98	1013.45		8		
		4.33	~~1009.12~~	1007 69	TP#8
5.10	1014.22		9		
		3.50	~~1010.72~~	1009 29	TP#9

4-9-96 R.K.L.M

Level Run
From 81st Ave & Buckeye
To 83rd Ave & Buckeye

B.M. BCWH 91st Ave & Buckeye
80148

S. Edge Pump Rim

" " "

" " "

" " "

" " "

" " "

" " "

" " "

" " "

On Top of Crub Ret. NE Ret. RET going N
83rd & Buckeye CHISELED Box "□"

+	H.	.	ELV		
			~~1010.72~~	1009.29	
3.32	1014.04		10		
		4.91	~~1009.13~~		TP#10
4.28	1013.41		11		
		4.95	~~1008.46~~		TP# 11
4.28	1012.74		12		
		4.87	~~1007.87~~		TP # 12
4.54	1012.41		13		
		4.90	~~1007.51~~		TP # 13
4.52	1012.03		14		
		5.28	~~1006.75~~		TP # 14
4.62	1011.37		15		
		5.80	~~1005.57~~		TP # 15
3.98	1009.55		16		
		4.97	~~1004.58~~		TP # 16
3.79	1008.37		17		
		4.82	~~1003.55~~		TP # 17
4.32	1007.87		18		
		5.81	~~1002.06~~	1006.62	

TBM 03 PK & Rebar
PC Ret gang N. NE Ret Bucky + 8.32
TP Edge of Road S Keel mark
" " " "
" " " "
" " " "
" " " " "
" " " "
" " " "
" " " "

4-2-96				-143 DATUM ADJ	
+	HI	-	ELEV.		
			~~1010.72~~	1009.29	
4.32	1014.04				
		3.24	1012.3		
8.49	1022.79				
		2.44	1018.35		
5.91	1024.19				
		4.14	1020.05		
7.71	1027.76				
		0.55	~~1027.21~~	1025.79	
0.47	1027.68				
		7.63	1020.05		
4.25	1024.3				
		5.96	1018.34		
3.34	1021.68				
		8.67	1013.01		
2.84	1015.85				
		5.15	1010.70		

LEVEL RUN 83 AVE & BUCKEYE TO THE MAP RAILROAD

B.M. CHISLED BOX N RAT NE COR 83 AVE & BUCKEYE "□"

TP 1 " MARK ON EAST T/C

TP 2 "

TP 3

TP 4 Top of Box Culvert S side Center Alum. cap SRP @ SS Railway 83 AVE @ R.R.

TP #5

TP 6

TP 7

CK BM OK

Bench circuit From BM#FR to I-10

					-142 DATUM ADJ.
BM#4	[illegible]	[illegible]		1027.21	[illegible]
				1	
#100	4.49	[illegible]	2.67	25 82 ~~1025.84~~	~~1024.41~~
				2	
#101	4.46	[illegible]	3.07	27 23 ~~[illegible]~~	~~1025.86~~
				3	
#102	[illegible]	1031.55	4.55	27 13 ~~1027.17~~	~~1025.31~~ 1020.00
				4	
#103	5.19	[illegible]	5.03	26 07 ~~1026.1~~	~~1021.95~~
				5	
#104	[illegible]	1030.92	4.62	26 61 ~~1026.68~~	~~1025.77~~ 1025.55
				6	
#105	[illegible]	1032.98	3.77	27 08 ~~1027.16~~	~~1025.46~~
				7	
#106	[illegible]	1031.90	6.20	26 69 ~~1026.78~~	~~1025.27~~
				8	
#107	3.23	1031.33	3.80	27 99 ~~1029.10~~	~~1026.51~~
				9	
#108	4.66	1030.37	5.62	25 59 ~~1025.71~~	~~1024.75~~
				10	
#109	2.84	1029.13	4.08	26 16 ~~1026.29~~	~~1024.74~~
				11	
#110	5.27	1026.50	7.90	21 08 ~~1021.23~~	~~1019.46~~
				12	

4/19/96
Sunny
78°

T. [illegible]
L. Maddock

6

BM#4) B.C. TOPNUT [illegible] 83rd Ave

#100) Marker mark [illegible] E. outlet M/P # [illegible] W.S. 83rd Ave 500'± N of AR Park

#101) S.W. flange bolt [illegible] #[illegible] N.W. cor. 83rd & Hatch.

#102) B.C. TOPNUT W [illegible]

#103) Cut X in S. [illegible]

#104) B.C. TOPNUT S. [illegible] 100' E [illegible]

#105) Set Pk nail @ E. edge of 4' west of wood [illegible]

#106) Set Rebar @ S. Edge Rd 5' N. of 6" wood Tel pole, Warning sign post 2633+00

#107) Set Rebar @ E. edge Rd 5' N. of 24" 641 CLF car post @ N.W. cor. pit

#108) Set Rebar @ S. edge Rd 3' N. of 6" wood Tel. Warn. Sign post 2702+00

#109) Set Rebar 3' N. of 6" wood Tel. Warn. Sign post @ edge of Rd Extended 2709+99

#110) Set Rebar IN center of EMPTY lot S.E. cor. 93rd & I-10

		1026.50			
90527			6.54	1019.80 ~~1019.96~~	~~1018.38~~
	4.18				

7

90527 FND P.K. @ H.W.C.P. INTC. 91st

83rd & Washington

Bench circuit from B2[10] St East

					-145' DATUM ADJ.
#101	4.19	1031.44		1027.26	[illegible]
				1	
U.E. #16	5.83	1032.90	4.36	27 09 ~~1027.08~~	[illegible]
				2	
#111	4.44	1033.01	4.34	28 58 ~~1028.57~~	[illegible]
				3	
#112	5.18	1033.37	4.82	28 21 ~~1028.19~~	[illegible]
				4	
U.E. #17	4.53	1032.21	4.69	28 71 ~~1028.69~~	[illegible]
				5	
#113	3.37	1031.13	5.35	27 89 ~~1027.86~~	[illegible]
				6	
#5	5.31	1031.86	4.58	26 59 ~~1026.55~~	[illegible]
				7	
#114	5.52	1032.54	4.84	27 06 ~~1027.02~~	[illegible]
				8	
U.E. #19	3.91	1034.80	1.65	30 94 ~~1030.97~~	[illegible]
				9	
#115			3.70	31 16 ~~1031.10~~	[illegible]
				27.62	

(U.E. #16) C.P.S. @ S. side Rd S. side canal 17.5' N. of G.

#111) Set Rebar 12' N. of 3" cor post 6+1 CLF @ N.E. cor. Fence

#112) Set Rebar @ S. edge Rd S. side canal 3' N. of S. lateral canal

#17) Rebar @ S. edge Rd S. of canal 8' north & N 3' west of PWP #2 @ 79th Ave & canal

#113) Set Rebar @ S. edge Rd S. side canal 9' N. of 5" lateral on line with E 4" Gate Post & fence line to North

#18) C.P.S. @ canal Rd & Tendeed From East

#114) Set Rebar S. edge Rd S. side canal 3' N. of 4" cor. Post 8' CLF @ N.E. cor Bldg S.W. Pet Products

#19) C.P.S. 3' N. & 2' E. of 5" Cor. Post 8+1 CLF N.E. cor well

1 N Closure S.W. cor. Inter canal & 75th Ave

#115) M.C.B.C. B.M. Date 3/75 N. end of N.E. wing wall 75th Ave bridge Canal Stamped 1030.02

+	HI	-	Elev	-145 DATUM ADJ.
			~~1031.10~~	TBM #115
3.17	[illegible]		10	
		4.50	~~1029.97~~ 29 93	1028 38
6.06	[illegible]		11	
		5.88	~~1027.95~~ 30 02	1028 57
5.68	[illegible]		12	
		4.82	~~1030.81~~ 30 89	1029 44
4.67	35.18		13	
		6.05	~~1029.43~~ 29 51	1028 06
6.21	[illegible]		14	
		4.62	~~1030.65~~ 30 29	1029 29
6.50	[illegible]		15	
		4.31	~~1032.84~~ 32 94	1031 49
7.58	[illegible]		16	
		7.62	~~1032.80~~ 32 90	1031 45
5.43	38.23		17	
		6.45	~~1031.96~~ 31 89	1030 44
4.57	36.37		18	
		4.67	~~1031.70~~ 31 81	1030 36
5.23	36.43		19	
		4.33	~~1032.10~~ 32 72	1031 27
6.23	38.83		20	
		1.70	~~1037.19~~ 37 26	1035 81
1.29	38.42		21	

BK wing wall 75 Ave + canal

TBM 116 R/B SS canal [illegible] 75 Ave

TBM 117 R/B

TBM = Δ 21 CPS

TBM 118 R/B SS canal

TBM #119 R/B "

TBM #120 R/B "

TBM #121 R/B

TBM #122 R/B

TBM #123 R/B

TBM #124 R/B

TBM #125 top bolt S/W corner wall

+	[illegible]	–	[illegible]	
	39.12		21	
		5.20	~~1033.77~~ 33 35	1031 90
3.07	1036.29		22	
		6.72	~~1030.57~~ 30 51	1029 06
		[illegible]	~~1030.76~~ 30 90	1029 45

TBM: 126 Point [illegible]

BCH 67 AVE & BUCKEYE

Rim of [illegible] 90536

VERTICAL CONTROL TO PT
$\Delta = 10$ & VERTICAL CONTROL TO PT 82
& 81

STA	+	HI	−	EL	
TBM 4				1011.11	
	5.07	6.18			
VE 10			5.12	1011.06	
	5.47	16.53			
TBM 4			5.42	1011.11	1011.11
TP 109				1024.74	
	5.09	1029.83			
VE 82			4.99	1024.84	
	5.[illegible]	1029.92			
TP 109			5.18	1024.74	1024.74
TP 106				1025.27	
	3.63	1028.90			
V.81			2.59	1026.31	
	2.68	1028.99			
TP 106			3.71	1025.28	

Apr 1 21

JG LM MB

BC HH @ 91st & RR TRACKS

TRANSFER VERTICAL CONTROL
TO PT 80, 1490, 1507, & 1522

Appr. 630
JG LM MB

STA	+	HI	-	EL	
TP 101				1025.19	✓
	2.82	28.01			
LE80			5.15	1022.86	✓
TP 104				1025.19	✓
	4.46	29.65			
1490			4.93	24.72	✓
	4.31	29.56			
TP 101			4.37	1025.19	1025.19
TP 103				1024.65	✓
	4.81	29.46			
1507			4.59	1024.87	✓
TP102				1025.71	
	ZENITH @ 90°00.00			5.47	
		ROD READING		1031.18	
		MEASUR UP		5.25	
		1522 EL =		1025.93	

24.44

25.97

5-1-96 RK DB

+	HT	−	ELEV	
6.15	1035.21		1029.06	
		6.80	28.41	TP#1
7.02	35.43			
		5.85	29.58	LE#29
5.91	35.49			
		5.48	30.01	TBN#130
6.54	36.55			
		4.87	? 31.68	LE#30
4.45	36.13			
		3.69	32.44	TBN#131
2.33	34.77			
		4.65	30.12	LE#31
6.97	37.09			
		7.44	29.65	TBN#132
6.77	36.42			
		7.47	28.95	LE#32
6.94	35.89			
		5.49	30.40	TBN#133
5.89	36.29			
		2.85	33.44	LE#33
3.74	37.18			
		4.13	33.05	TP#2

LEVEL RUN 67 AVE + BUCKEYE TO 59 AVE + BUCKEYE

B.M. B&HH 67 AVE & BUCKEYE

90536

Horz. Control Pt.

Rebar 4' N.W. RR. (2 houses East of House w/ rooftop satellite dish.
Horz. Control Pt.

Top steel/conc. protective post @ water well #86
@ N/S - E/W bend in Canal.
Horz. Control Pt.

1/2 Rebar 200' S. of bend in Canal; 40' W. of Canal.
HORZ. CONTROL PT.

1/2 rebar 600' W. of 59TH Ave & 40' S. of Canal.

HORZ. CONTROL PT.

Mark on paint line

+	HI	−	ELEV		
			33.05		
6.83	39.88				
		4.91	34.97	TP#3	
5.63	40.60				
		2.28	38.32		
2.66 .71					
		6.05	34.98	TP#3	
4.73					
		6.65	33.06	TP#4	
4.47					
		4.08	33.45	UE#33	
2.65					
		5.78	30.40	TBN#133	
5.60					
		7.06	28.94	UE#32	
7.05					
		6.36	29.63	TBN#132	
7.20					
		6.73	30.10	UE#31	
4.86					
		2.55	32.41	TBN#131	

Mark on white line

Pk. Nail ② panel ③ inter. 59th Ave & Buckeye (Panel Pt. #90537)

Return to start

Mark on white line

Horz Control Pt.

+	HI	−	ELEV.	
			32.41	TBN #131
3.81				
		4.57	31.65	UE #30
4.82				
		6.50	29.97	TBN #130
5.50				
		5.93	29.54	UE #29
5.93				
		7.10	28.37	TP #1
6.14				
		5.49	29.02	BCMH
		5.07		RIM

NOTE ADD 1000.00 TO ELEV. TO CONVERT TO DATUM.

Bowlerene Rd & 67 ST AVE
" " " "

CL OK -.04

NOTE ADD 1000.0 TO GET TO DATUM

+	HI	-	ELEV.		
			33.45		
4.53	37.98				
		5.07	32.91		
4.10	37.01				
		5.70	31.31		
6.17	37.48				
		4.35	33.13		
4.57	37.7				
		2.45	35.25	✓	34
2.93	38.18				
		4.76	33.42		#134
4.25	37.67				
		5.07	32.60		
5.41	38.01				
		5.33	32.68		
4.73	37.41				
		5.51	31.90		
5.58	37.48				
		5.40	32.08	✓	35
6.54	38.62				
		4.98	33.64		#135

RK. M.B 5-3-96 RUN ? 18

T.B.M. UE 33 CPS SS AVE & CANAL

T.P. "PAINT HUB"

T.P. "PAINT ROCK"

T.P.

UE 34 CPS HUB

TBM #134 RIB 50' EAST of WELL SITE @ SS CANAL BANK

T.P.

T.P.

T.P.

UE 35 CPS

T.B.M. S/W COR CON SIGN "NO FISHING" PAINTED PINK S/W COR CANAL @ 51 AVE

cont →

+	HI	-	Elev		
4.13	37.77				
		6.23	31.54		#36
5.48	37.02				
		6.08	30.94		
5.82	36.76				
		4.84	31.92		
5.89	37.81				
		4.00	33.81		#37
4.74	38.55				
		3.58	34.97		#137
5.58	40.55				
		6.42	34.13		
6.80	40.93				
		3.67	37.26		
6.04	43.3				
		3.68	39.62		#138
4.50	44.12				
		5.11	39.01		
6.84	45.85				

TBM 135

UE 36 CPS

T.P. HUB TBM 136
500 EAST UE 36 SOUTH ROAD

T.P.

UE 37 CPS

T.P. TBM #137 RIB SE. CANAL
500± WEST of UE 38

UE 38 CPS

T.P. Rock

TBM PAINT MARK ROCK N/W CANAL @ 43 AVE
TBC @ CANAL ROAD N. SIDE CANAL

T.P. 'X' CURB E. 43 AVE

+	HI	–	ELV		
	45.85				
		-3.78	42.07		
6.87	48.94				
		4.00	44.94		
6.30	51.24				
		4.65	46.59		

T.P.

T.P. TO E. 43 AVE

[90539] "X" CONC. N/E COR
43 AVE & BUCKEYE IN SIDEWALK
PANEL PT. PLAN 1046.59 OK

April 76
JC LM21

STA	+	HI	−	EL	GR
TBM2				1001.80	
	4.74				
		1006.54	5.38		
1159				1001.16	
	5.40				
		1006.56	4.76		
TBM2				1001.80	

>ET CPS

TBM 122 = 1030.44
V.D = -3.63
ROD 4.68
HI = 5.10
VE 24 1033.65

VE 16 = 1025.64
V.D = +1.25
HI 5.11
ROD - 5.03
VE 15 1024.31

TP 123 1030.36
ZENITH 4.29
@ 90°
1034.65
HI - 5.16
1823 = 1029.49

TP 125 1035.81
ZENITH 1.86
@ 90° 37.67
HI - 5.34
1861 = 32.33

TP 124
1031.27
ZENITH + 5.58
@ 90°
36.85
- 5.22
1844 = 31.63

TBM 119 1029.29
V.D. - 0.79
HI 5.10
ROD 5.75
22 = 1030.73

TP 125 35.81
1.86
ZENITH
@ 90° 37.67
- 5.34 HI
1861 = 32.33

5-10-96

+	HI	−	Elev		
			39.62		
4.02	43.64				
		5.78	37.86		UE 39
		4.36	39.28		
5.[illegible]	45.13				
		3.71	41.42		
5.80	47.22				
		5.71	41.51		UE 40
		5.58	41.64		
2.63	44.27				
		4.58	39.69		
3.86	43.55				
		4.81	38.74		UE 41
6.00	44.74				
		4.31	40.43		
5.38	45.81				
		4.58	41.23		UE 42

TBM # 138 PM N/W CANAL @
43 AVE & CANAL

UE 39 CPS (5.5)

TBM #139 400' EAST of 43 Ave
SET CPS 3' NORTH of Power Pole

T.B.M #140 CPS 3' North Power Pole

UE 40 CPS
T.BM. NAIL IN POLE # 141
2' ABOVE GROUND NORTH SIDE
POLE "TEXAS NAIL"

T.BM. S/E COR CANAL BRIDGE HEADWALL
CHANGE WANT MARK #142

T.BM. UE 41 CPS

T.B.M. 143 Paint mark R.R. Headwall
S/E COR EAST HEADWALL

UE 42

+	HI	−	Elev
			41.23
4.63	45.86		
		5.47	40.39
4.35	44.74		
		6.05	38.69
5.11	43.8		
		4.17	39.63
4.76	44.39		
		2.80	41.59
5.93	47.52		
		6.17	41.35
4.52	45.87		
		6.65	39.27
4.16	43.38		
		3.82	39.56

LE 42 "Goin Back"

4 143 T.BM

LE 41 C.P.S.

T.BM 142

T.BM 141

T.BM 140

T.BM 139

CK T.BM 138

.46 P- 38.42

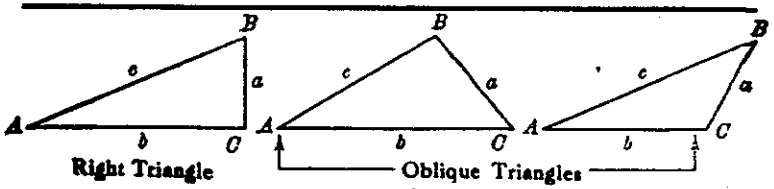
+	EL	−	
			1025.19
2.82	1028.01		
		5.15	1022.86

1
TP 104
PT 80

10	7414.9640			
	15320.9278			
13	7492.	7330		
	17422.	8796		
	1012.769	LC		
14	7566.	2772		
	19483.	6477		
	1017.028			
TBm 4	= 1011 11			
178	0513			
	2103.11			
82	14031.	7382		
CPS	16622.	6248		
81	11740.	5745		
	19095.	8221		
80	10143.	0167		
	19139.	1185		

8-18 B/C 4 N C 100: 1001.27

TRIGONOMETRIC FORMULÆ



Solution of Right Triangles

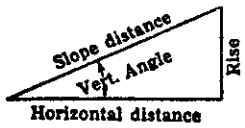
For Angle A. $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

Given	Required	
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B,\ c = \sqrt{a^2+b^2} = a\sqrt{1+\frac{b^2}{a^2}}$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B,\ b = \sqrt{(c+a)(c-a)} = c\sqrt{1-\frac{a^2}{c^2}}$
A, a	B, b, c	$B = 90° - A,\ b = a \cot A,\ c = \frac{a}{\sin A}.$
A, b	B, a, c	$B = 90° - A,\ a = b \tan A,\ c = \frac{b}{\cos A}.$
A, c	B, a, b	$B = 90° - A,\ a = c \sin A,\ b = c \cos A,$

Solution of Oblique Triangles

Given	Required	
A, B, a	b, c, C	$b = \frac{a \sin B}{\sin A},\ C = 180° - (A+B),\ c = \frac{a \sin C}{\sin A}$
A, a, b	B, c, C	$\sin B = \frac{b \sin A}{a},\ C = 180° - (A+B),\ c = \frac{a \sin C}{\sin A}$
a, b, C	A, B, c	$A+B = 180° - C,\ \tan \frac{1}{2}(A-B) = \frac{(a-b)\tan\frac{1}{2}(A+B)}{a+b},$ $c = \frac{a \sin C}{\sin A}$
a, b, c	A, B, C	$s = \frac{a+b+c}{2},\ \sin\frac{1}{2}A = \sqrt{\frac{(s-b)(s-c)}{bc}},$ $\sin\frac{1}{2}B = \sqrt{\frac{(s-a)(s-c)}{ac}},\ C = 180° - (A+B)$
a, b, c	Area	$s = \frac{a+b+c}{2},\ \text{area} = \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	$\text{area} = \frac{b\,c \sin A}{2}$
A, B, C, a	Area	$\text{area} = \frac{a^2 \sin B \sin C}{2 \sin A}$

REDUCTION TO HORIZONTAL



Horizontal distance=Slope distance multiplied by the cosine of the vertical angle. Thus: slope distance=319.4 ft. Vert. angle=5°10′. From the table, cos 5°10′=.9959. Horizontal distance=319.4×.9959=318.09 ft.

Horizontal distance also=Slope distance minus slope distance times (1−cosine of vertical angle). With the same figures as in the preceding example, the following result is obtained. Cosine 5°10′=.9959.1−.9959=.0041. 319.4×.0041=1.31. 319.4−1.31=318.09 ft.

When the rise is known, the horizontal distance is approximately:—the slope distance less the square of the rise divided by twice the slope distance. Thus: rise=14 ft., slope distance=302.6 ft. Horizontal distance=302.6−$\frac{14\times14}{2\times302.6}$=302.6−0.32=302.28 ft.

C O G O

PROJECT: Tolleson DATE: 10-20-98
PAGE: 1 TIME: 14:55:49

NODE/COORDINATE LIST

Number	Northing	Easting	Elevation	Description
4	889186.9600	402106.6370	1025.7900	ALUM 83AVE.
5	889950.0880	407418.1450	1029.7100	BM115
6	889267.5400	402106.7370	1022.6400	NLST
7	889467.4000	407317.1260	1027.9800	NLST
8	890623.1090	402229.3150	1024.2330	NLST
9	889320.5820	403486.7480	1023.8120	NLST
10	889372.1130	404831.1510	1023.9100	NLST
11	889429.7630	406335.1750	1025.6610	NLST11
12	889251.6310	402121.0170	1023.5230	RR
13	890258.5560	404779.1780	1027.4120	NLST
14	890232.8910	402729.2350	1025.2660	NLST14
15	889264.1100	402449.2400	1023.8160	RR
18	890623.1250	402229.2480	1023.7290	PT8
115	889920.3590	407440.3610	1029.7100	BM BC.75AVE.
200	889244.1270	401923.2560	1022.8560	NRR
201	889248.6920	402044.7800	1023.1830	RR
202	889251.6310	402121.0170	1023.5230	RR
203	889255.3710	402219.6730	1023.6920	RR
204	889259.7830	402337.6500	1023.7030	RR
205	889264.1100	402449.2400	1023.8160	RR
206	889267.4860	402536.1870	1023.8970	RR
207	889271.8050	402651.8500	1024.0820	RR
208	889276.0360	402763.3010	1024.3880	NRR
209	889280.3560	402874.1730	1024.7360	RR
210	889284.8400	402987.9250	1025.0690	RR
211	889289.1450	403102.6250	1025.2870	RR
212	889293.1990	403211.6730	1025.4600	RR
213	889297.3230	403319.5890	1025.6800	RR
214	889302.5470	403464.9830	1025.8790	RR
215	889307.3720	403591.3500	1026.0800	RR
216	889311.4770	403701.5600	1026.2660	RR
217	889315.6990	403809.2130	1026.4530	RR
218	889319.8440	403918.5650	1026.7240	NRR
219	889324.2140	404034.5990	1026.9240	RR
220	889328.4070	404143.6150	1027.1480	RR
221	889332.7720	404255.0900	1027.2190	RR
222	889336.7180	404363.1340	1027.1980	RR
223	889340.9980	404476.9080	1027.0830	RR
224	889345.2570	404585.2870	1026.8120	RR
225	889349.3120	404691.2840	1026.5060	RR
226	889353.5600	404800.8870	1026.2740	RR

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
26412
ARTHUR A.
WITZELL
Date signed 10-29-98
ARIZONA, U.S.A.

C O G O

PROJECT: Tolleson DATE: 10-20-98
PAGE: 2 TIME: 14:56:09

227	889351.6930	404814.6530	1025.5810	PKCLRR
228	889357.5250	404902.1590	1026.1120	RR
229	889361.6650	405012.5460	1026.0790	RR
230	889365.9570	405126.2400	1026.0910	RR
231	889370.2990	405238.9270	1026.1570	RR
232	889374.5950	405352.4260	1026.2560	RR
233	889378.7880	405462.0770	1026.3240	RR
234	889383.3130	405579.3480	1026.4000	RR
235	889387.4900	405691.2510	1026.4700	RR
236	889391.6410	405801.0320	1026.5410	NRR
237	889396.0430	405917.6390	1026.6300	RR
238	889400.1910	406025.7330	1026.8370	RR
239	889404.4620	406138.6230	1026.8910	RR
240	889408.8320	406251.2220	1027.2550	RR
241	889412.0120	406335.6570	1027.7410	RR
242	889416.1860	406446.0350	1028.1830	RR
243	889420.5050	406557.5170	1028.5960	RR
244	889424.7480	406672.2540	1029.0150	RR
245	889429.2530	406789.5330	1029.4140	RR
246	889433.7400	406905.9380	1029.7700	RR
247	889438.1970	407023.2160	1030.1230	RR
248	889442.7650	407140.4900	1030.5250	RR
249	889447.3280	407260.6460	1030.8400	RR
250	889451.3890	407372.7580	1031.1810	RR
251	889452.4880	407400.1940	1031.1950	RR
252	889456.6590	407510.6410	1030.8270	NRR
300	890300.5560	403468.5910	1027.5840	ND
301	890299.8010	403585.2610	1026.4800	ND
302	890301.0240	403700.6800	1026.8500	ND
303	890301.4260	403819.4850	1026.7440	ND
304	890302.3310	403937.8770	1026.2600	ND
305	890303.8390	404052.2680	1026.3790	ND
306	890304.9860	404169.8910	1026.5480	ND
307	890304.5240	404284.7780	1026.1310	ND
308	890305.9340	404402.2010	1026.4380	ND
309	890307.0160	404515.9200	1026.4810	ND
310	890308.5520	404631.7510	1026.4600	ND
311	890310.4990	404718.4500	1026.6240	ND
312	890310.9780	404776.6890	1028.7450	ND
313	890307.9430	404842.4040	1026.3740	ND
314	890272.7760	404837.7460	1026.6580	SD
315	890275.2900	404776.3160	1026.8850	SD
316	890273.0420	404718.1100	1026.8180	SD
317	890272.4480	404632.0110	1026.7380	SD
318	890272.6770	404515.9090	1026.7310	SD
319	890271.8280	404401.6530	1026.8300	SD
320	890270.3810	404284.8600	1026.8330	SD
321	890266.9870	404169.7020	1026.8310	SD

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
26412
ARTHUR A.
WITZELL
Date Signed 10/20/98
ARIZONA, U.S.A.

C O G O

PROJECT: Tolleson DATE: 10-20-98

 TIME: 14:56:11

322	890268.2200	404052.4630	1026.5760	SD
323	890267.7520	403937.2140	1026.5670	SD
324	890265.9910	403819.4280	1026.5120	SD
325	890263.9110	403699.3370	1026.7970	SD
326	890262.9170	403584.4560	1026.7200	SD
327	890259.3360	403470.2440	1027.5060	SD
328	890260.8090	403401.7550	1025.8450	SD
329	890260.8480	403362.3180	1025.7120	SD
330	890261.7110	403253.7280	1025.5260	SC
331	890261.0970	403135.6430	1025.6860	SC
332	890260.8450	403082.2900	1025.6830	SC
333	890257.4350	403068.1220	1026.0530	SD
334	890255.6730	403026.3960	1026.7420	SD
335	890250.5290	402909.5050	1026.7770	SD
336	890249.5130	402793.2270	1026.4750	SD
337	890251.0250	402680.0220	1026.1170	SD
338	890253.9740	402641.1320	1025.8680	SC
339	890260.2300	402597.2460	1025.6590	SC
340	890317.9560	402538.4340	1026.2430	SC
341	890398.2090	402463.8080	1025.5370	SC
342	890482.5370	402385.9340	1025.7480	SC
343	890567.4150	402306.3830	1025.8100	SC
344	0.0000	0.0000	0.0000	SC
345	890294.7510	403362.5810	1026.4520	ND
346	890293.8410	403252.7230	1026.2790	ND
347	890294.2510	403135.3250	1026.5520	ND
348	890292.9280	403026.7780	1026.4090	ND
349	890291.0560	402908.7290	1026.6490	ND
350	890291.2970	402794.0550	1026.9030	ND
351	890288.8150	402680.0250	1026.3380	ND
352	890298.3050	402616.0600	1026.2840	ND
353	890339.5410	402563.6120	1025.9520	ND
354	890420.5870	402487.0610	1025.7700	ND
355	890505.0100	402410.0620	1026.1260	ND
356	890587.0320	402330.8550	1026.3350	ND
357	890636.0590	402285.4400	1026.3590	ND
358	890681.3740	402253.4290	1026.4800	ND
359	890734.4670	402246.6710	1026.1220	ND
360	890852.0350	402248.0990	1026.0640	ND
361	890969.5930	402249.0770	1026.0390	ND
362	891087.3410	402248.5850	1026.1610	ND
363	891202.3920	402249.1280	1026.4220	ND
364	891341.2210	402249.5890	1025.9280	ND
365	891401.4770	402243.8530	1025.9170	ND
366	891429.2340	402212.7880	1025.4800	ND
367	891390.7170	402200.2070	1025.7120	SC
368	891383.7030	402213.2240	1025.4600	SC
369	891343.3150	402218.0430	1025.6880	SC

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
26412
ARTHUR A.
WITZELL
Date Signed 10/20/98
ARIZONA, U.S.A.

370	891204.6550	402217.6050	1025.7940	SC
371	891088.7710	402216.1540	1026.1540	SC
372	890970.9650	402217.6520	1026.1620	SC
373	890853.8060	402217.8260	1026.2190	SC
374	890744.3520	402216.4840	1026.0970	SC
375	890688.8100	402216.8570	1026.0550	SC
376	890613.7780	402261.2260	1026.1820	SC

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
26412
ARTHUR A.
WITZELL
Date Signed 10/20/98
ARIZONA U.S.A.

Appendix D: Hydrologic Analysis Supporting Documentation

Refer to separate Hydrology report.

Floodplain Delineation of Tolleson Area

Field Reconnaissance Report

Prepared for

Flood Control District
of
Maricopa County

Prepared by:

Dibble & Associates Consulting Engineers
2633 E. Indian School Rd., Suite 401
Phoenix, AZ 85016-6763
602-957-1155

JE Fuller/ Hydrology & Geomorphology, Inc.
583 W. Magdalena Dr.
Tempe, AZ 85283
602-752-2124

October 1997
(Revised)

Contents

	Page
Introduction	1
Study Limits	1
Field Reconnaissance Objective	1
Watershed Description	3
Reach Definition	3
Ponding Area Hydraulic Controls	5
Hydraulic Structures	6
FDS HEC-RAS Modeling	7
Manning's N Value Selection	8
Channel Bank Stations	9
Overflow Areas	9
Bridge Dimensions	9
Photographic Documentation	9
Summary	9

Figures

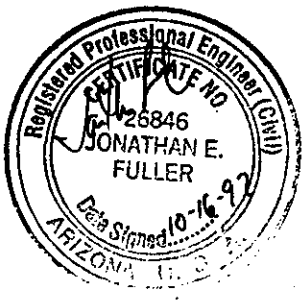
1. General Location Map 2
2. Reach Designations 4

Tables

1. Ponding Area Reach Limits 5
2. Estimated Excess RID Capacity vs. Possible Weir Inflow to Canal 7
3. Typical N Values 8

Appendixes

A Photographic Documentation



Introduction

This report summarizes the results of the field reconnaissance for the Tolleson Area Floodplain Delineation Study (FDS). The purpose of this report is to:

- Document field conditions relevant to floodplain modeling
- Document the proposed locations of ponding area control weirs
- Document the methodology used to select Manning's N values

This report is the deliverable for Tasks 6.6a and 6.7 of Flood Control District of Maricopa County (FCDMC) contract number FCD 95-26, Change Order #2 (July 15, 1997).

Study Limits

The Tolleson Area FDS study limits include approximately 15 total linear miles of floodplain delineation. Six miles of the delineation area are located along the Southern Pacific Railroad (SPRR) between 83rd Avenue and the Agua Fria River west of El Mirage Road (Figure 1). The remainder of the delineation area is located along the Roosevelt Irrigation District (RID) canal between 35th Avenue and Interstate 10. Ponding areas in the later two reaches were modeled using HEC-1 routing. Two portions of the study area, from 67th Avenue to 83rd Avenue along the RID/SPRR, and from 75th Avenue to El Mirage Road along the SPRR were modeled using HEC-RAS. The study area is generally located in Township 1 North, Range 1 East (T1N, R1E) and Township 1 North, Range 2 East (T1N, R2E). The Tolleson Area Floodplain Delineation study area includes reaches of ponded urban and agricultural runoff, as well as riverine-like flow upstream of, and parallel to, the SPRR and RID.

Field Reconnaissance Objectives

The project team conducted initial field reconnaissance visits to the study area on March 26, 1996, April 10, 1996, and September 17, 1997. Additional site-specific field visits by individual members of the project team at other times between March 1996 and October 1997. The overall goal of field reconnaissance was to become familiar with the study area prior to floodplain modeling. Specific goals of field reconnaissance included the following:

- Identify hydraulic controls and flow obstructions for probable ponding areas
- Document the proposed locations of ponding area control weirs
- Identify the locations of culverts and other hydraulic structures
- Identify topographic and hydraulic features to be surveyed by the survey subconsultant
- Observe ponding areas, critical watershed points and flooding problem areas
- Obtain photographic documentation of watershed and floodplain conditions
- Obtain photographic documentation for use in estimating Manning's N values

This report documents the results of the field reconnaissance for the Tolleson FDS.

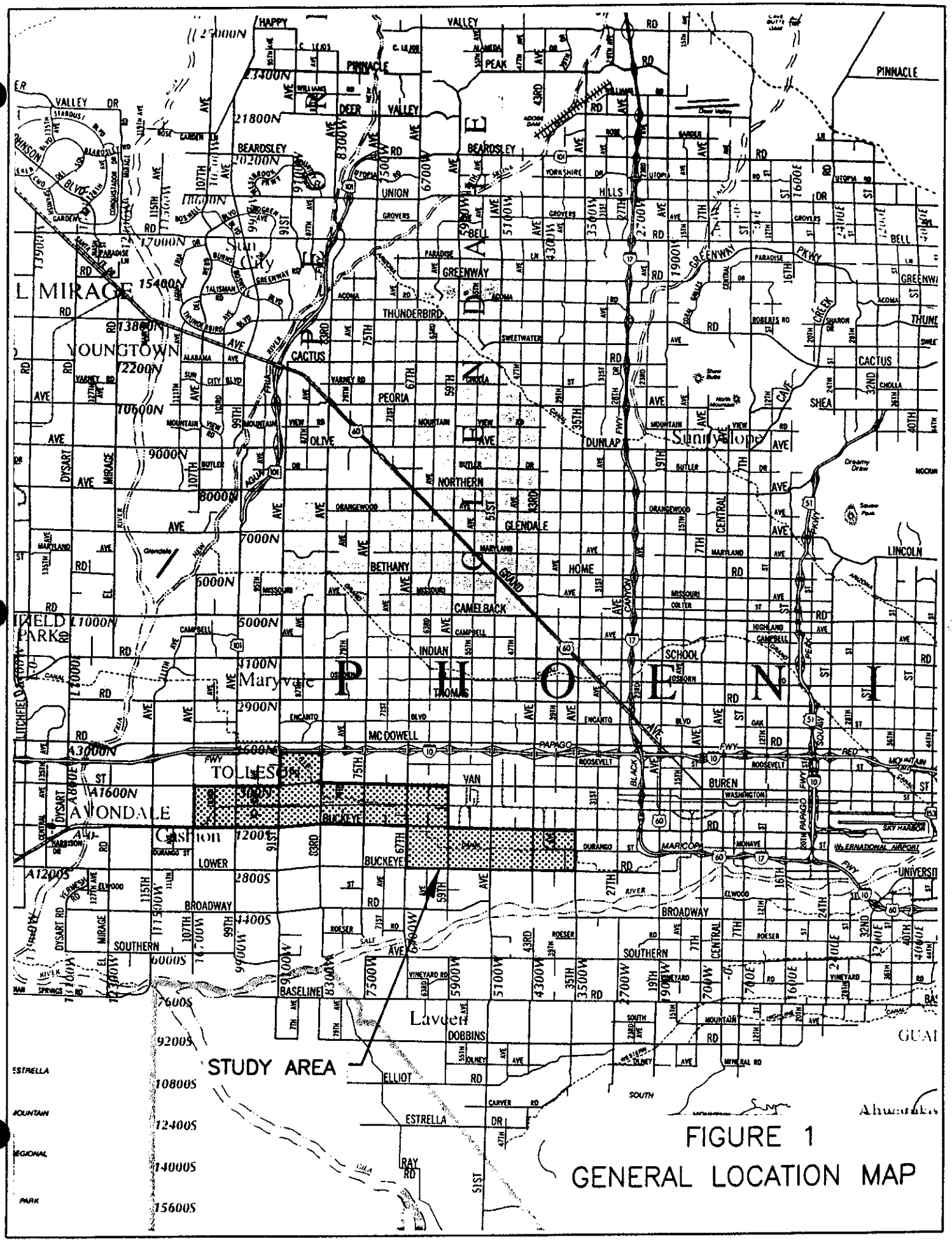


FIGURE 1
GENERAL LOCATION MAP

Watershed Description

The study area watershed is located in central Maricopa County, and includes areas within the cities of Phoenix, Tolleson, and Avondale, as well as small portions of unincorporated Maricopa County. The watershed limits are defined by Interstate 10 (I-10) to the north, 35th Avenue to the east, the Agua Fria River to the west, and the Salt River to the south. For the purposes of this study, no runoff from north of I-10 was assumed to enter the study area.

The watershed, which was subject to sheet flow and poorly-defined distributary flow prior to development, slopes gently to the southwest toward the Salt and Gila Rivers at a slope of about 0.3 percent (18 ft/mi). Past and current agricultural use, as well as more recent urbanization, have obscured most remnants of the natural drainage pattern in the watershed. In existing conditions storm water runoff flows in streets, along irrigation canal berms and laterals, or as urban and agricultural sheet flow. Because engineered and/or 100-year drainage facilities generally are lacking in the watershed and because most runoff is unconfined, storm water tends to pond upstream of several types of flow obstructions. Obstructions that may cause local ponding areas include irrigation canals, flood irrigation berms, railroad grades, roads, block walls, fences, buildings, and natural topographic features.

Reach Definition

Two types of reaches were defined for the Tolleson Area FDS: (1) ponding reaches, and (2) riverine-like floodplain reaches. Two main obstructions cause ponding within the study area - the RID canal and the SPRR grade. The RID flows due west from 35th Avenue to about 59th Avenue, before turning to the northwest along an irregular alignment until it passes under I-10 and leaves the study area. The SPRR crosses the study area along an east-west alignment from I-17 to the Agua Fria River. Ponding area reaches mapped using detailed methods for this study include the area upstream of the RID canal between 35th Avenue and I-10, and the area upstream of the SPRR between 83rd Avenue and the Agua Fria River. Local ponding areas east of 83rd Avenue along the SPRR were identified for hydrologic modeling purposes, but were not mapped as part of this study. The two main ponding reaches along the SPRR and RID were further subdivided based on the features that provide hydraulic control of ponded water, as described below. Ponding subreaches are shown in Table 1 and Figure 2.

Riverine-type floodplains also occur in the study area. These floodplains are not defined rivers or streams, but consist of unconfined flow between adjacent ponding areas. These riverine-type floodplains occur where storm water runoff flows over the hydraulic control from one ponding area, and flows parallel to the SPRR or the RID, and enters the next downstream ponding area. These floodplains were modeled using the HEC-RAS hydraulic model along the SPRR/RID alignment from 67th Avenue to 83rd Avenue, and along the SPRR alignment from 75th Avenue to the El Mirage Road alignment. The same reach designations shown in Table 1 and Figure 2 were used for both ponding and riverine-type floodplains.

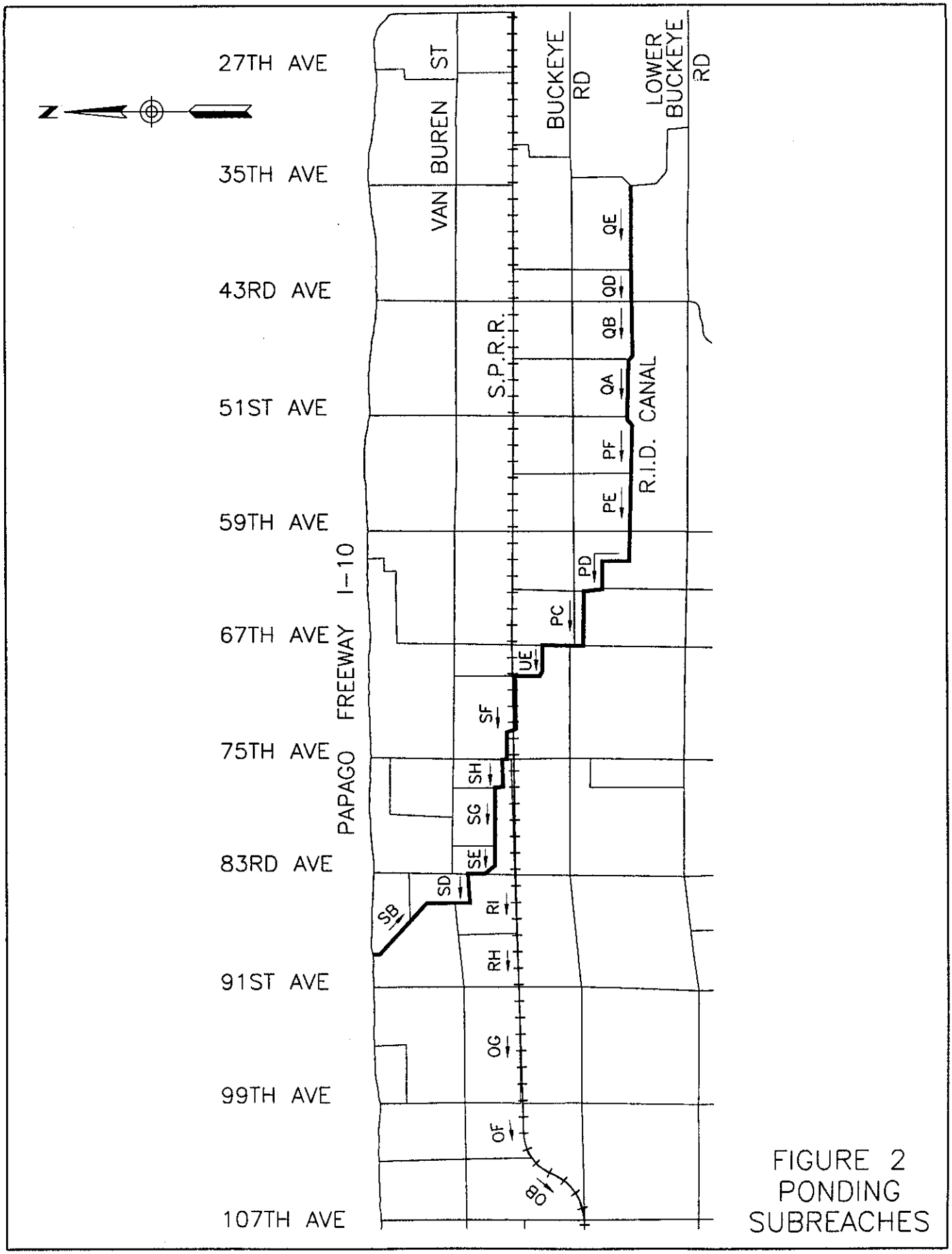


FIGURE 2
PONDING
SUBREACHES

Table 1. Tolleson Area FDS - Reach Limits and Reach Type					
Ponding Reach	***Subreach***	***East Limit***	***West Limit***	***Ponding***	***Riverine***
RID	QE	35th Ave.	41st Ave.[1]	x	
RID	QD	41st Ave.[1]	43rd Ave.	x	
RID	QB	43rd Ave.	47th Ave.[1]	x	
RID	QA	47th Ave.[1]	51st Ave.	x	
RID	PF	51st Ave.	55th Ave.	x	
RID	PE	55th Ave.	59th Ave.	x	
RID	PD	59th Ave.	63rd Ave.[1]	x	
RID	PC	63rd Ave.[1]	67th Ave.	x	
RID	UE	67th Ave.	69th Ave.[1]	x	x
RID[2]	SF	69th Ave.[1]	75th Ave.	x	x
RID[2]	SH	75th Ave.	77th Ave.[1]	x	x
RID[2]	SG	77th Ave.[1]	81st Ave.[1]	x	x
RID[2]	SE	81st Ave.[1]	83rd Ave.	x	x
RID[2]	SD	83rd Ave.	RID/85th Ave.[1]	x	
RID	SB	85th Ave.[1]	RID/I-10	x	
SPRR	RI	83rd Ave.	87th Ave.[1]	x	x
SPRR	RH	87th Ave.[1]	91st Ave.	x	x
SPRR	OG	91st Ave.	99th Ave.	x	x
SPRR	OF	99th Ave.	103rd Ave.[1]	x	x
SPRR	OB	103rd Ave.[1]	107th Ave.	x	x
SPRR	LE	107th Ave.	111th Ave.	x	x
SPRR	KD	111th Ave.	115th Ave.	x	x
SPRR	KA	115th Ave.	El Mirage Ave[1]	x	x

Notes:
[1] Alignment only
[2] Downstream control of RID ponding area probably provided by SPRR grade

Ponding Area Hydraulic Controls

Hydraulic control of the ponding areas upstream of the RID canal and the SPRR alignment is generally provided by topographic and man-made features that may be modeled as broad-crested weirs. The main types of topographic and man-made features to be modeled as weirs for the FDS include the following:

- Access road grades (south or north side) along the RID
- Top of gunite/concrete lining of the RID canal
- Berms along irrigation laterals
- Top of rail along the SPRR grade or spur grades
- Roadway centerline crown or top of curb

Access Roads. Access roads are located along the north and/or south sides of the RID canal. These dirt roads generally provide the downstream hydraulic control for ponding areas located upstream of the RID canal. Routine maintenance of the RID canal and access roads often leaves a small, uneven earthen "wind-row" berm between the access road and the canal. Use of the top of the wind-row berm for the weir crest elevation could raise the

upstream ponding elevation estimates by as much as 1.5 feet. However, the elevations of the wind-row berms were not used for hydraulic modeling for the FDS study because they are not compacted[1], would probably not withstand erosion during overtopping, and are not permanent features[2].

Canal Lining. In some places along the RID canal, the access roads are located topographically below the top of canal lining. In these reaches, the downstream hydraulic control is assumed to be the top of the canal lining.

Top of Rail. Where the SPRR or a railroad spur parallels the RID canal, the elevation of the top of rail was assumed to provide the downstream control (weir crest) elevation, if it was higher than any other possible hydraulic control feature. Flow under the rails was assumed to be negligible due to the small size of the openings between the rail and the railroad grade, and the potential for debris blockage of the openings.

Roadways. Hydraulic controls for east-west flow in ponding areas were also defined for two reasons. First, the watershed generally slopes to the southwest. The RID canal and SPRR are aligned northwest and east-west, respectively. Therefore, it is likely that a portion of the storm water in the ponding areas may flow west before overtopping the downstream hydraulic control, i.e., there is a natural westerly component to storm water runoff in the watershed. Second, many of the features that provide hydraulic control for east-west flow in the ponding areas (i.e., the north-south roadways) are topographically lower than the downstream hydraulic control features (RID or SPRR). In these areas, flow to the west will occur before overtopping of the downstream control[3].

East-west hydraulic control features included north-south roadway alignments (Avenues), north-south canal laterals, railroad spurs, and north-south segments of the RID canal. Along roadways, the highest of the top of curb elevation or centerline crest elevation was used to define the control elevation. Where irrigation laterals paralleled the roadway, the highest of the roadway features or the lateral was used to define the control (weir) elevation.

Hydraulic Structures

There are only four hydraulic structures[4] that were identified within the floodplain delineation study limits. First, there is a 24-inch RCP culvert with a headwall located just east of Evergreen Vegetable, Inc. west of 91st Avenue. This culvert is partially blocked with sediment, but appears to adequately convey small nuisance flows under the SPRR. Second, there are two 24-inch RCP culverts located east of 107th Avenue south of an active agricultural area. Both of the latter two culverts are partially blocked with sediment and debris, but probably convey only a insignificant amount of flood flow under the SPRR. Third, there are 2-24" CSP under a newly constructed railroad spur located east of 107th Avenue. This spur was constructed between the time of the original field reconnaissance

[1] Standing on the wind-row berm compacted it by as much as 4 inches in places.
[2] There is no evidence that the wind-row berms would meet FEMA levee criteria.
[3] Assuming ponding has not already filled area to the west and created a backwater condition at the weir.
[4] Not including weirs as described above.

visits and the most recent field visits. Fourth, there are 2-24" CSP under a railroad spur located west of 83rd Avenue. No as-built plans for any of the three culverts were available, as noted in the Data Collection Report. Due to the small diameter of the culverts, low capacity, and high potential for debris clogging, the culverts were not included in the HEC-1 routing calculations for the ponding storage areas. There are no hydraulic structures that convey flow under the RID canal.

The RID canal itself was not considered a hydraulic feature (i.e., conveyance of flood water within the canal) for purposes of HEC-1 modeling or floodplain delineation for several reasons. First, while the open channel portions of the RID canal appear to have some available freeboard and excess capacity during normal flow conditions, most of the roadway crossings (culverts and bridges) do not. Many roadway and laterals cross the RID canal with less than 0.5 foot of freeboard. Several crossings appear to act as flumes or have inlet headwater pools. Therefore, it was assumed that overflow into the canal would tend to pond rather than be effectively conveyed downstream in the canal.[5] Second, flood overflow from the watershed into the canal would probably load the canal with debris and further reduce capacity at roadway and lateral crossings. Third, given the length of the downstream control weirs along the RID canal, the capacity available in the canal above the normal flow is minimal, as shown in Table 2. That is, the weir inflow rate into the canal, even at low head, would be greater than the conveyance capacity (outflow) of the canal given the limited capacity at the roadway crossings.

Table 2. Tolleson Area FDS.
Estimated Excess RID Canal Capacity vs. Possible Weir Inflow to Canal

Feature	Condition	Estimated Flow Rate
Canal[1]	Normal Flow Rate (y = 6 ft.)	300 cfs
Canal[1]	Canal Full (y = 10 ft.)	800 cfs
Canal[2]	Excess Canal Capacity Available	500 cfs
Crossing	Bridge With Tailwater = Canal Full	0 cfs
Weir[3]	Subreach Segment (L = 0.5 mi., H = 2 in.)	500 cfs
Weir[3]	Entire RID (L = 9 mi., H = 1 in.)	3,100 cfs

Notes:
1. Canal rating estimated using Manning, assuming 1:1 side slopes, 10 ft. depth, 0.03% slope, n=.02.
2. Canal full rating neglects limited capacity at roadway and lateral crossings.
3. Weir flow assumes C = 2.7

FDS HEC-RAS Modeling

The Tolleson Area FDS floodplain delineation will include HEC-RAS modeling of flow along the RID and SPRR, in addition to HEC-1 modeling of ponding areas using weir flow relationships. The following HEC-RAS modeling considerations are described in the paragraphs below, based on the field reconnaissance data:

- Manning's N Value Selection
- Determination of channel bank stations

[5] See Special Problem Report #2 for description of RID conveyance assumptions.

- Observation of possible overflow areas
- Measurement of bridge dimensions
- Photographic documentation of floodplain characteristics

Manning's N Value Selection. Manning's roughness coefficients, or "n" values, were determined using procedures adopted by the FCDMC[6]. In addition, the following materials were used to support the analysis:

- Aerial Photographs. 1994 1:2,400 contact prints by Kenney Aerial Mapping, Inc. used for base mapping of study area.
- Ground Photographs. Color photographs taken during field reconnaissance trips.
- Field Data. Hydraulic information and geomorphic data gathered during field reconnaissance trips.

The typical FCDMC procedure consists of selection of a base "n" value and addition of several adjustment factors to determine a composite roughness coefficient for hydraulic modeling. The base "n" value accounts for roughness due to the bed material (Table 1, FCDMC Manual). Adjustments to the base "n" value include factors for the degree of channel irregularity, obstructions, vegetation, variations in cross section geometry, and degree of meandering (Table 2, FCDMC Manual). However, because the floodplains along the RID and SPRR are significantly different from typical riverine floodplains, an alternative methodology to select "n" values was used, as described below.

100-year flooding along the SPRR and RID to be modeled using HEC-RAS generally occurs as broad unconfined, low-velocity runoff. Typical continuous riverine channels do not exist, and channel/overbank relationships probably do not apply within the HEC-RAS modeling reaches. Flow characteristics in these reaches may be more analogous to overbank flooding conditions than to channelized flow. Therefore, Manning's n values for the study reach reflect the land uses and cover types upstream of the SPRR and RID, and the FCDMC (FCDMC, 1991; Table 3) tables for floodplain "n" values were used to estimate Manning's n, as shown in Table 3 below.

Table 3. Tolleson Area FDS
Typical "N" Values

Description	Average Value	Range
Agricultural Areas		
Row Crops	0.035	0.025-0.045
Field Crops	0.040	0.030-0.050
Dense Trees & Brush	0.080	0.065-0.110
Vacant Land	0.030	0.025-0.035
Developed Areas		
Residential	0.075	0.024-0.150
Commercial/Industrial	0.080	0.024-0.150

[6]Thomsen, B.W., and Hjalmarson, H.W., 1991, *Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona*, Report by the USGS to the FCDMC, April.

In practice, "n" values will be selected for each cross section based on features observed in the field and on the aerial photographs, using the typical values shown in Table 3 above. A composite "n" value will be computed by the HEC-RAS model.

Channel Bank Stations. No continuous defined channels exist in the HEC-RAS modeling reaches. Therefore, channel bank stations could not be defined based on topographic or geomorphic features. To account for these unusual floodplain characteristics, the following procedure was used:

- Left Bank Station. The left channel station was defined as the overflow point for the SPRR or RID. This station was also the furthest left station in the HEC-RAS model.

- Right Bank Station. The right channel station was defined at the edge of the effective flow boundary along the right side of the floodplain, or at points where a break in conveyance characteristics was thought to occur.

The area between the left and right bank stations generally encompassed the entire floodplain.

Overflow Areas. Overflow areas were modeled using HEC-1 storage routing and irregular weir calculations as described elsewhere in this report, and in the hydraulics report. Overflows of the RID and SPRR occur where the storage capacity is exceeded and flow over the lateral control (roads and canals) is limited. Within the HEC-RAS modeling reach, overflows estimated in the HEC-1 modeling task were accounted for in selection of the discharges at each cross section.

Bridge Dimensions. There are no bridges located in the study area that will be modeling using HEC-1 or HEC-RAS. Other hydraulic structures are described elsewhere in this memorandum.

Photographic Documentation. Photographic documentation of typical field conditions, floodplain delineation reaches and hydraulic structures is provided in Appendix A. Photographs show typical "n" value variation for selected channel reaches.

Summary

Field reconnaissance of the Tolleson Area FDS study area was conducted to support the floodplain delineation. Field tasks included collection of data to assist in definition of hydraulic controls and weirs, and identification of significant watershed characteristics. Photographic documentation of channel conditions was provided to support the field reconnaissance report, and is attached as Appendix A.

Appendix A: Field Reconnaissance Photographs

Registered Professional Engineer (Civil)
CERTIFICATE NO.
26846
JONATHAN E.
FULLER
Date Signed 10-16-92
ARIZONA

Appendix E: Hydraulic Analysis Supporting Documentation

E.1 Field Reconnaissance Report

E.2 HEC-RAS Cross Section Plots

E.3 HEC-RAS Output

E.1 Field Reconnaissance Report and Roughness Coefficient Estimation

Figure A-1. View along north side of RID Canal, looking west from 39th Avenue alignment. Photo #5, Roll #1: March 29, 1996.

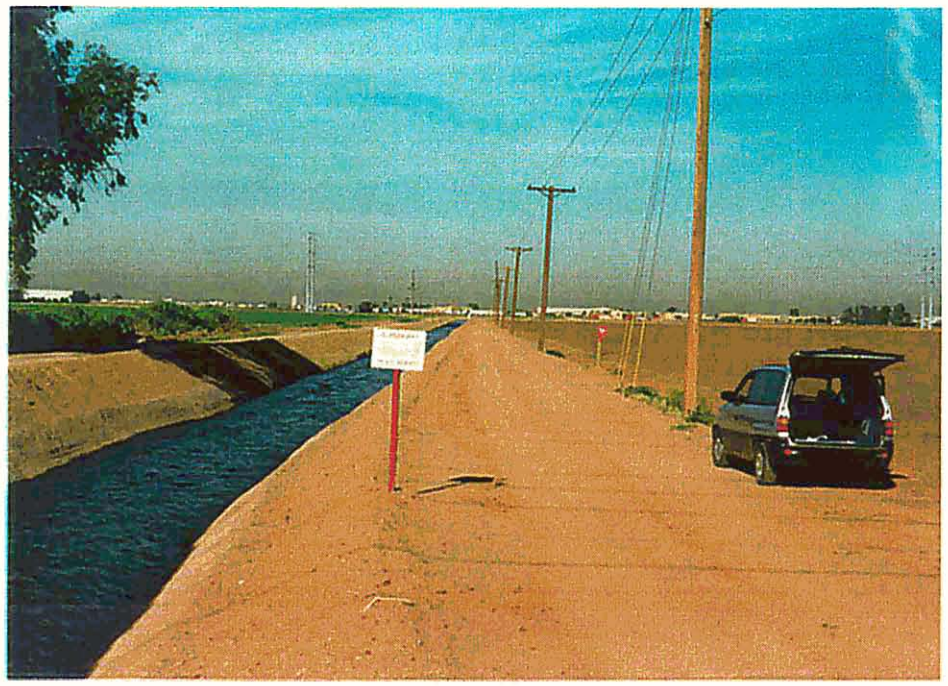


Figure A-2. View along north side of RID Canal, looking west from 43rd Avenue. Photo #9, Roll #1: March 29, 1996.

Figure A-3. View looking north along 59th Avenue from RID Canal crossing.
Photo #17, Roll #1: March 29, 1996.

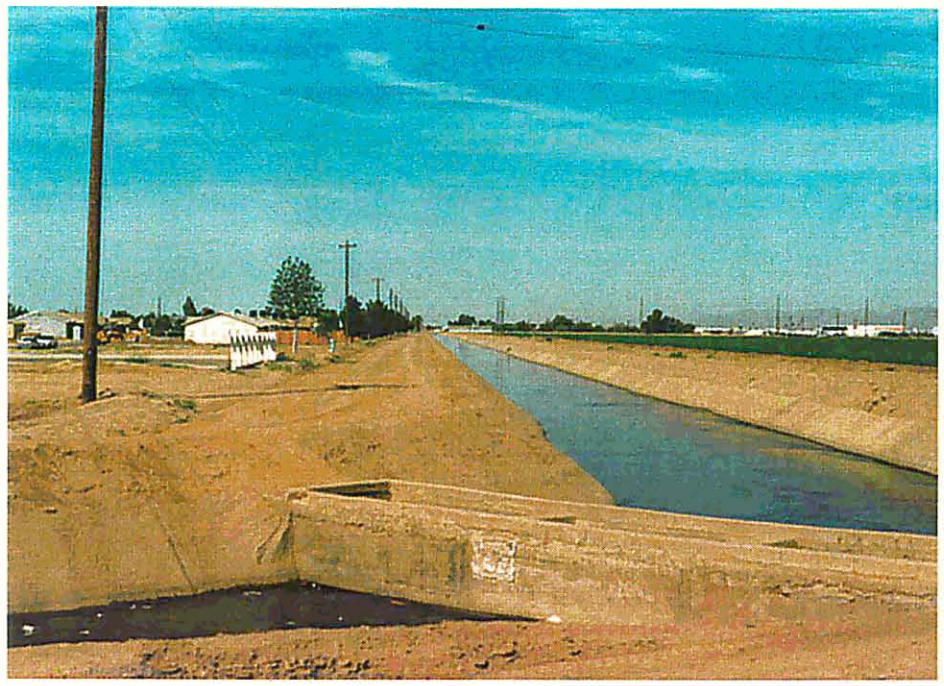


Figure A-4. Lateral crossing structure on RID Canal west of 59th Avenue. Note lack of freeboard at overchute. Photo #20, Roll #1: March 29, 1996.

Figure A-5. View of RID Canal banks west of 67th Avenue with SPRR grade in the background. Photo #24, Roll #1: March 29, 1996.

Figure A-6. View looking east along north side of SPRR toward 83rd Avenue. Photo #12, Roll #2: March 29, 1996.

Figure A-7. View looking north along subwatershed drainage divide formed by irrigation lateral and agricultural field leveling along 87th Avenue alignment between subwatersheds RH and RI. Photo #14, Roll #2: March 29, 1996.

Figure A-8. Unblocked culvert under SPRR west of 91st Avenue. Photo #18, Roll #2: March 29, 1996.

Figure A-9. Culvert under SPRR blocked by farm access road crossing structure and debris, located east of 107th Avenue. Photo #24, Roll #2: March 29, 1996.

Figure A-10. View looking east along SPRR grade from 107th Avenue. Photo #27, Roll #2: March 29, 1996.

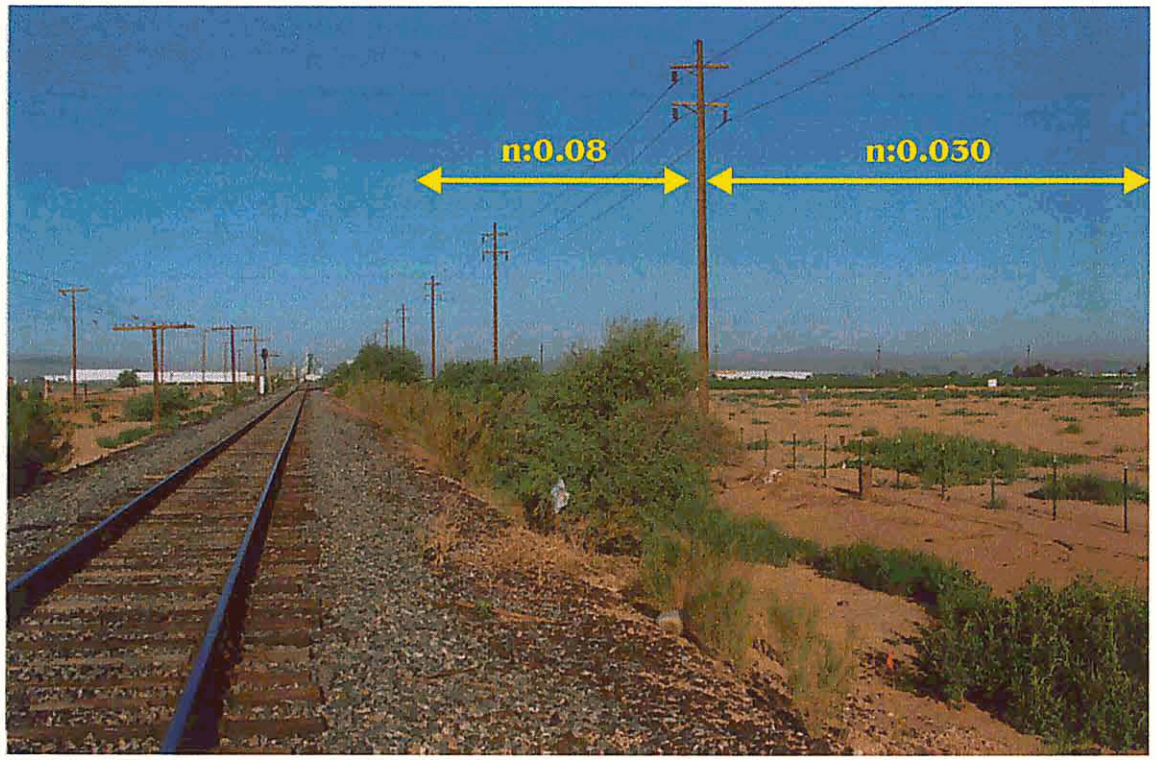


Figure A-11. View looking west along north side of SPRR west of 67th Avenue in HEC-RAS modeling reach. Photo #2, Roll #1: September 17, 1997.

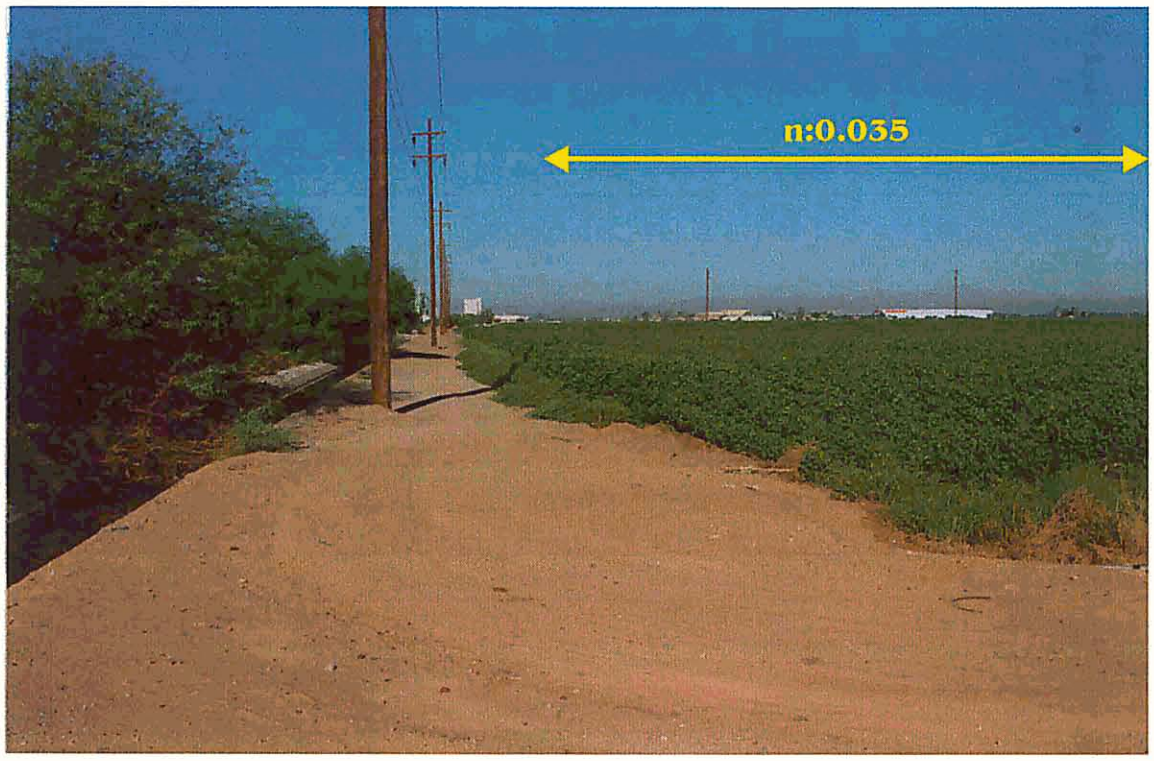


Figure A-12. View looking west in agricultural area (cotton) west of 67th Avenue in HEC-RAS modeling reach. Photo #5, Roll #1: September 17, 1997.

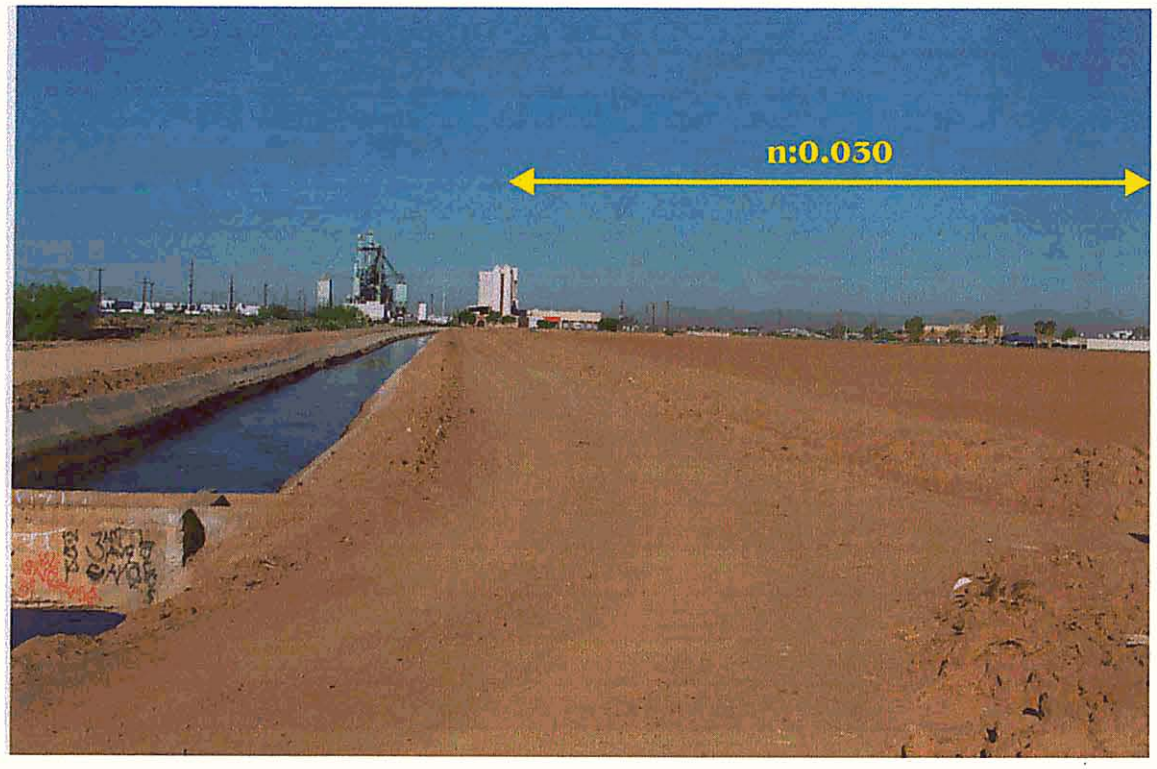


Figure A-13. View looking west along north side of RID in vacant agricultural area east of 75th Avenue in HEC-RAS modeling reach. Photo #7, Roll #1: September 17, 1997.

Figure A-14. View looking west along SPRR in industrial area with railroad spur west of 83rd Avenue in HEC-RAS modeling reach. Photo #11, Roll #1: September 17, 1997.

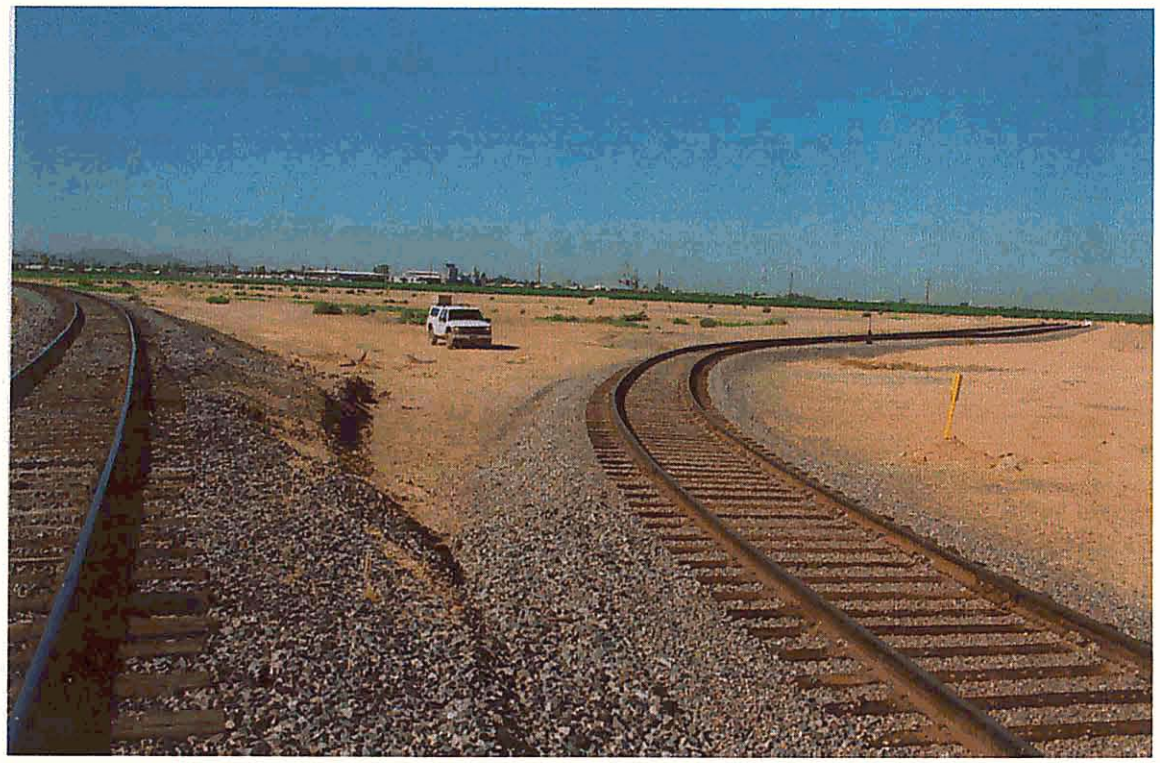
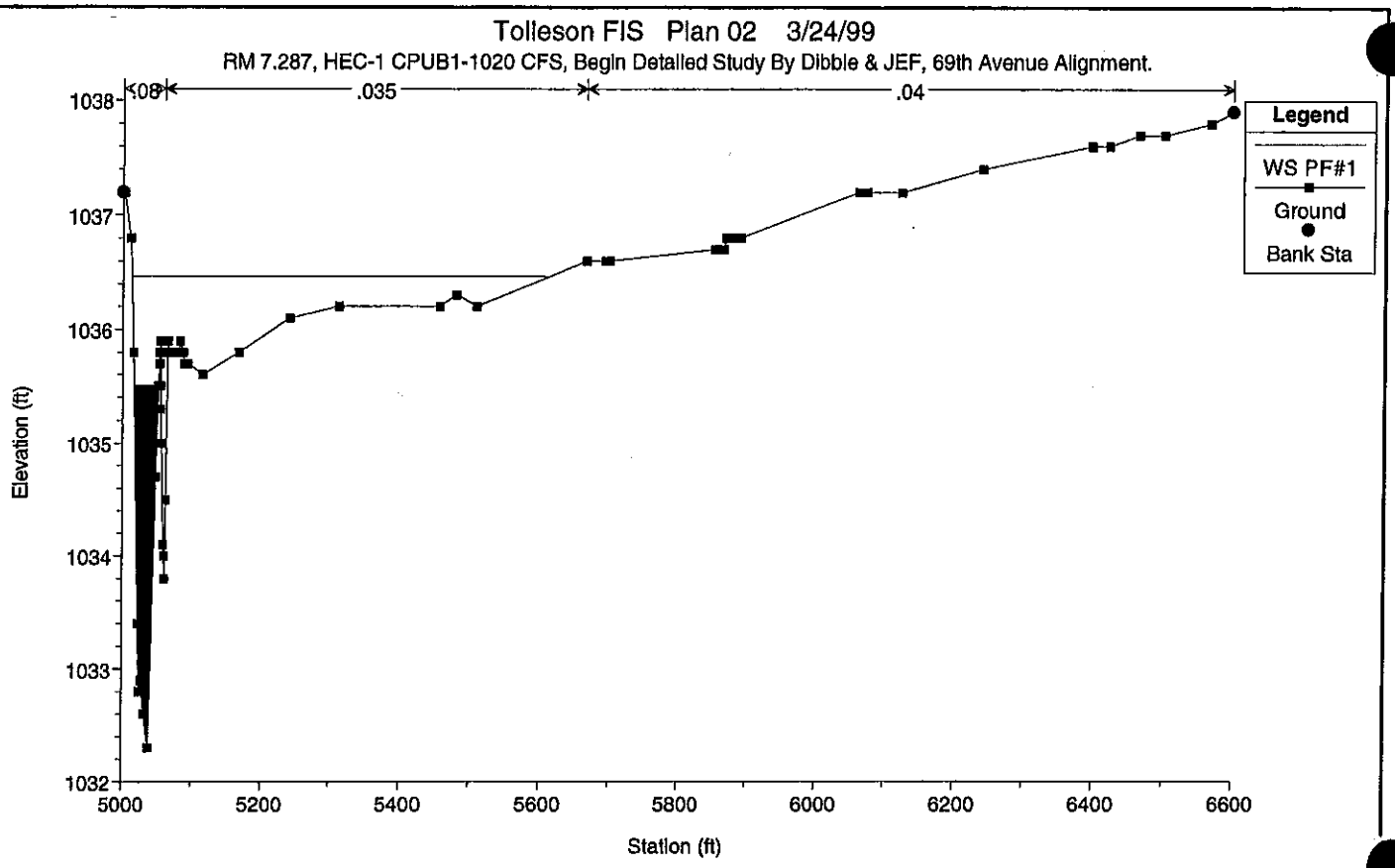


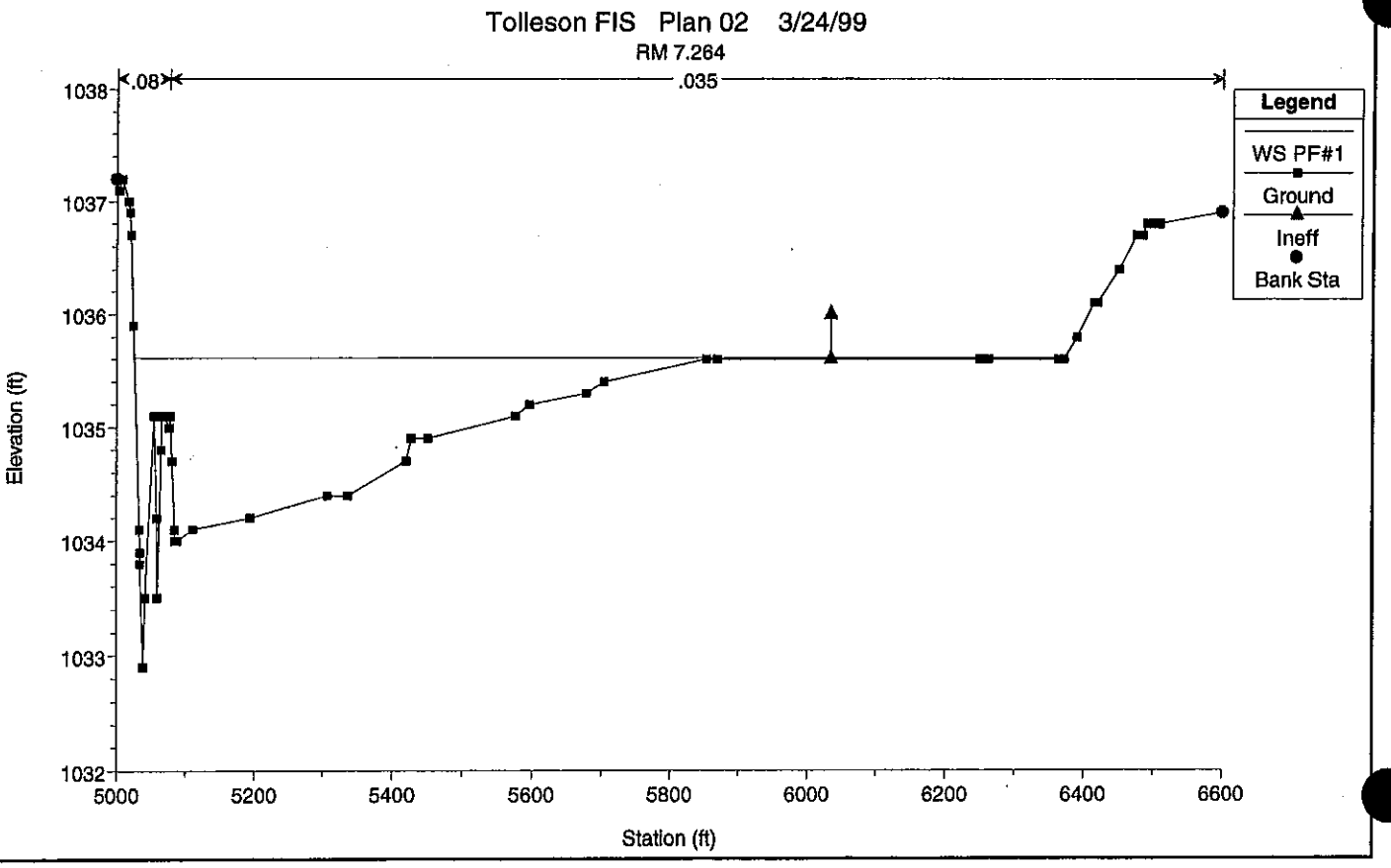
Figure A-15. View looking west over railroad spur north of SPRR in area converting use from agricultural to industrial east of 107th Avenue in HEC-RAS modeling reach. Photo #17, Roll #1: September 17, 1997.

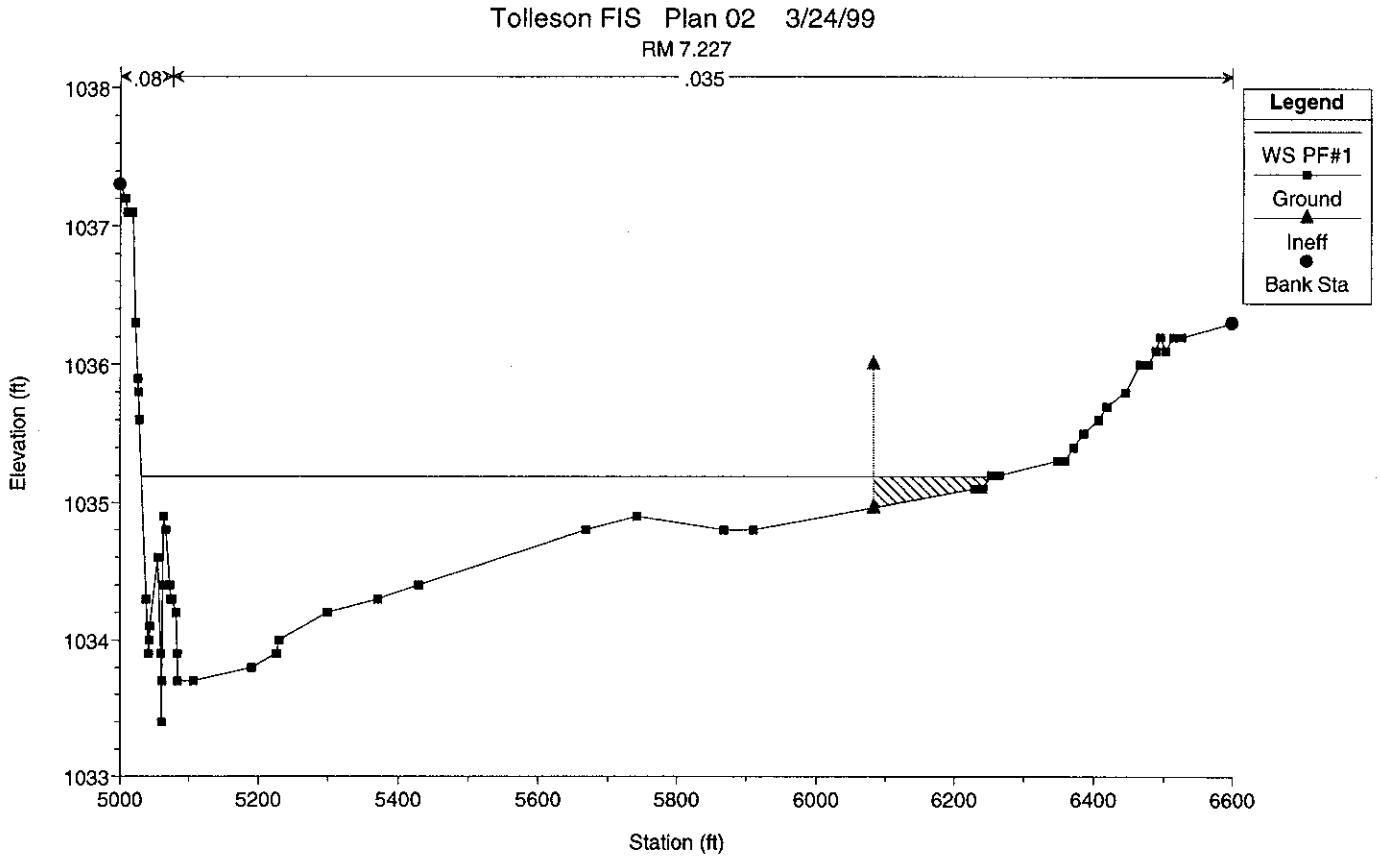
Figure A-16. Undersized, partially blocked 24-inch culverts typical of railroad crossings in study area. Photo location at spur east of 107th Avenue. Photo #19, Roll #1: September 17, 1997.

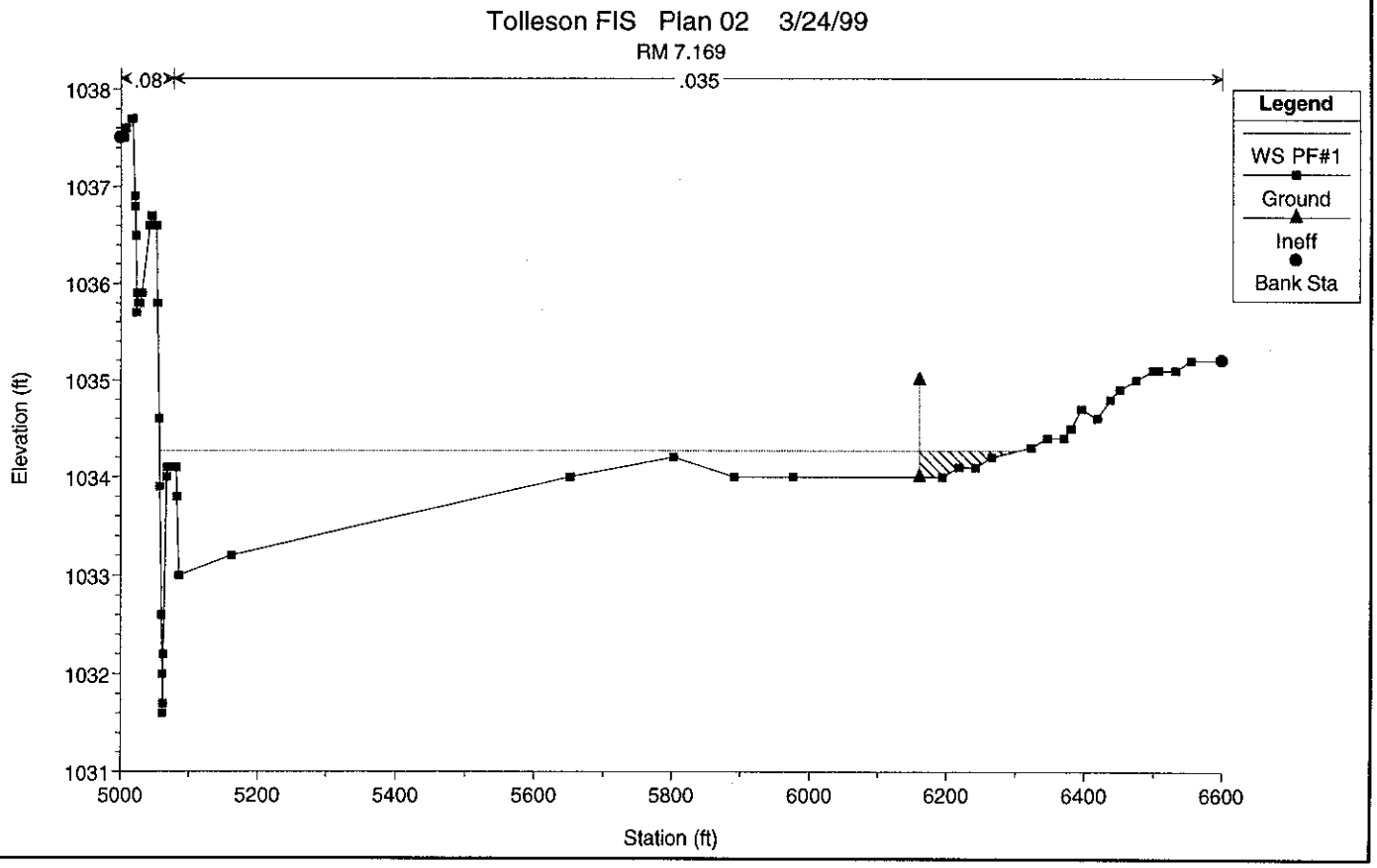
E.2 continued: **HEC-RAS Cross Section Plots**

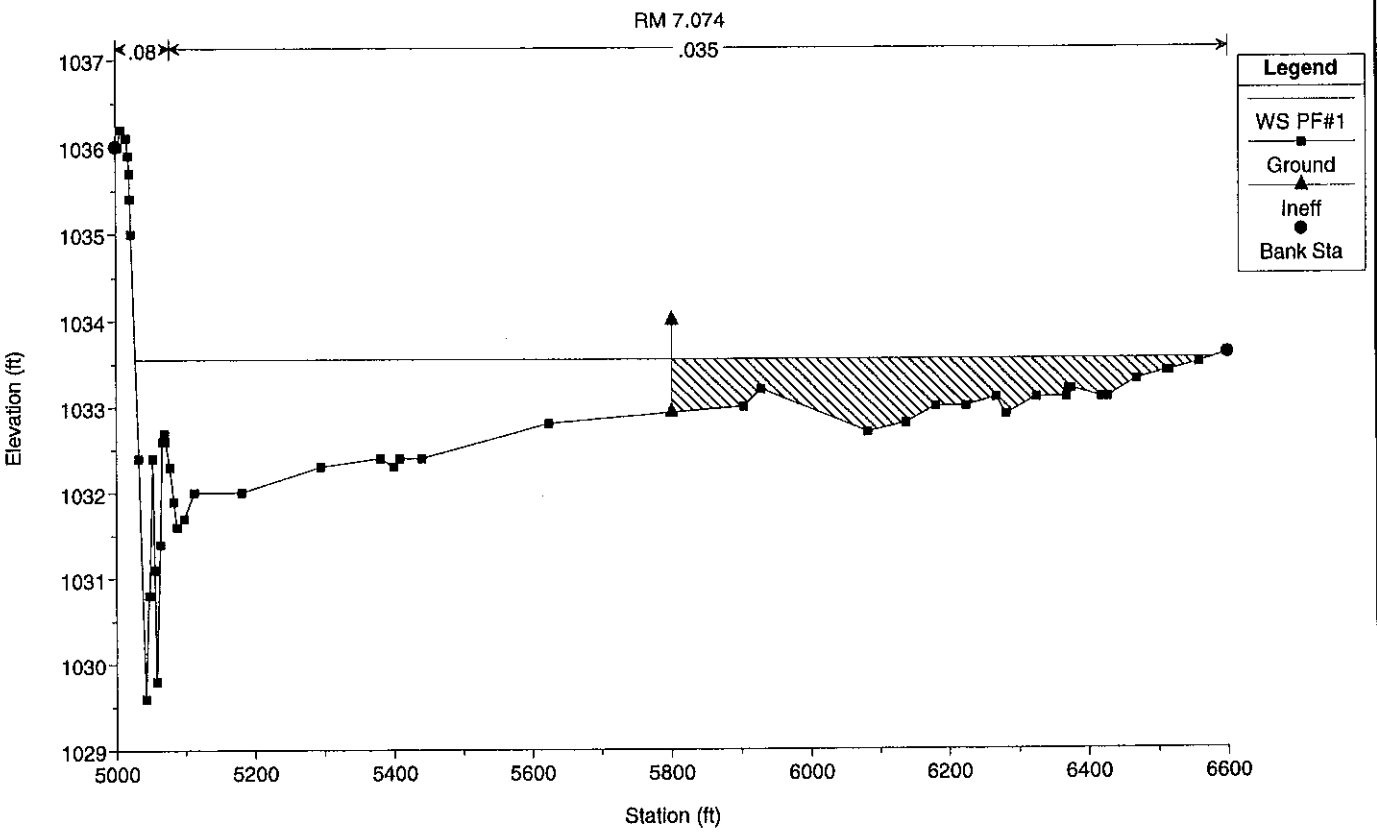
Flooding Source	HEC-RAS Reach Label	From River Mile to River Mile
Southern Pacific Railroad	Tolleson 1	7.287 to 6.412

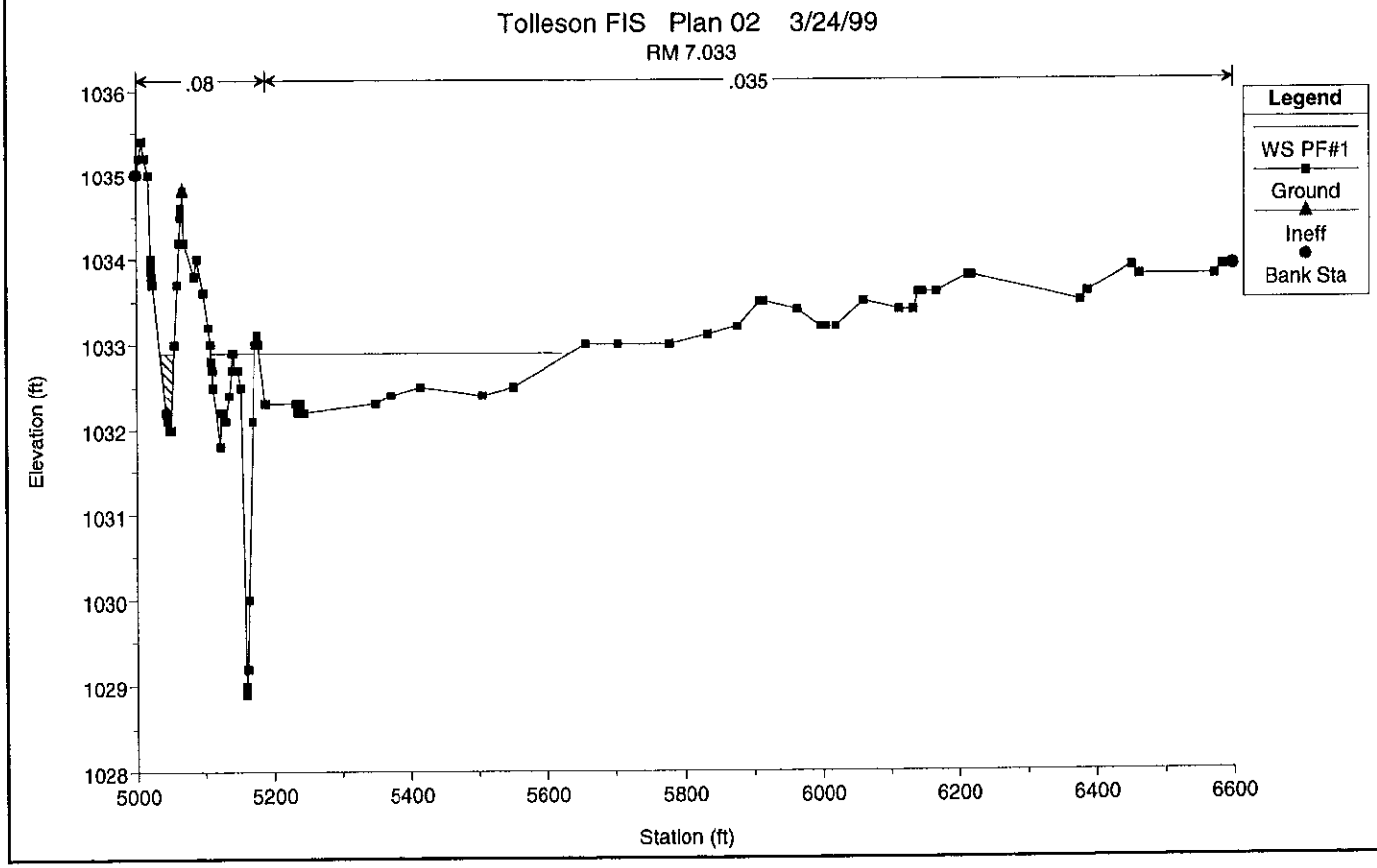

Tolleson FIS Plan 02 3/24/99
RM 7.287, HEC-1 CPUB1-1020 CFS, Begin Detailed Study By Dibble & JEF, 69th Avenue Alignment.
.08
.035
.04
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1038
1037
1036
1035
1034
1033
1032
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

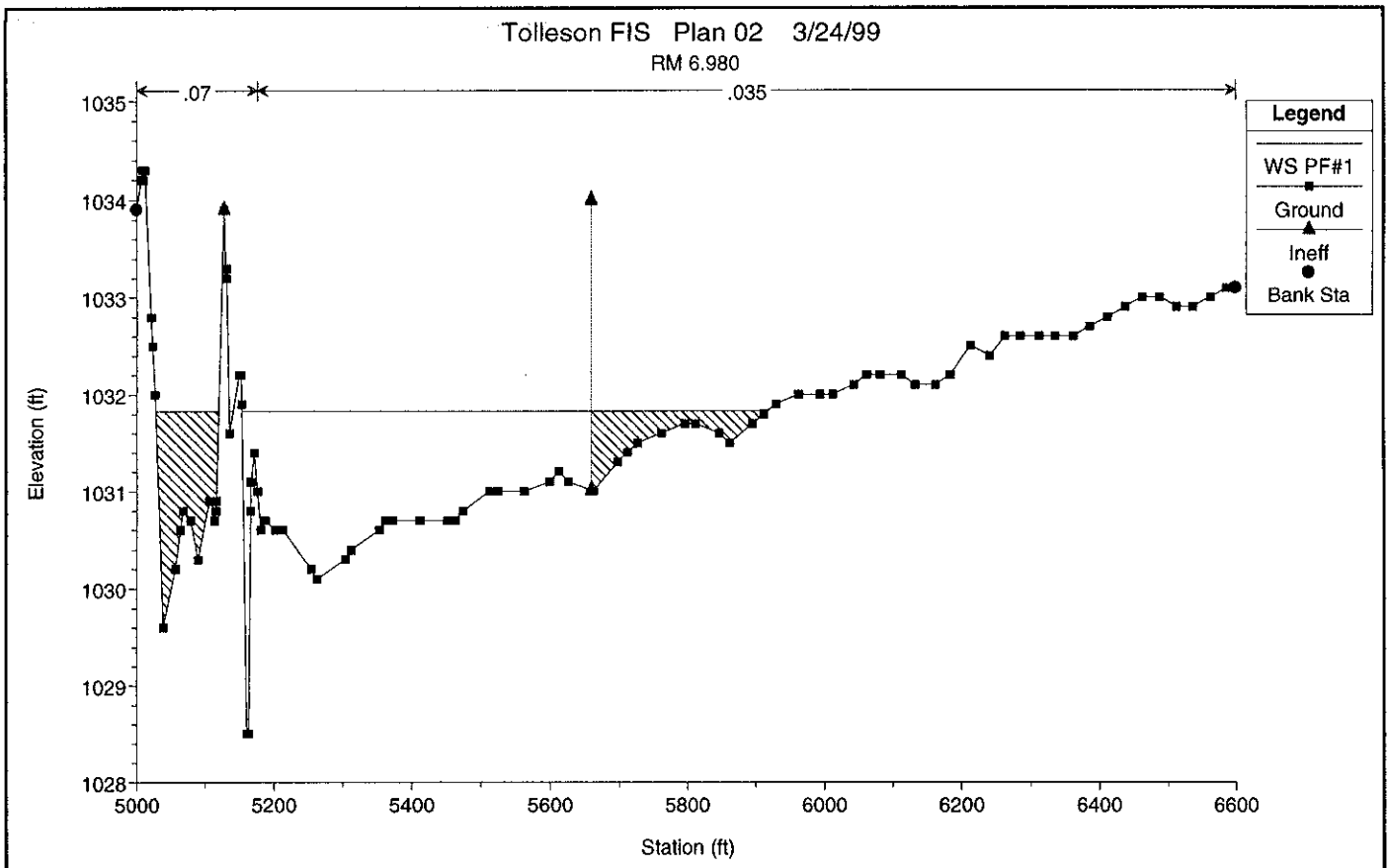

Tolleson FIS Plan 02 3/24/99
RM 7.264
.08
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1038
1037
1036
1035
1034
1033
1032
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

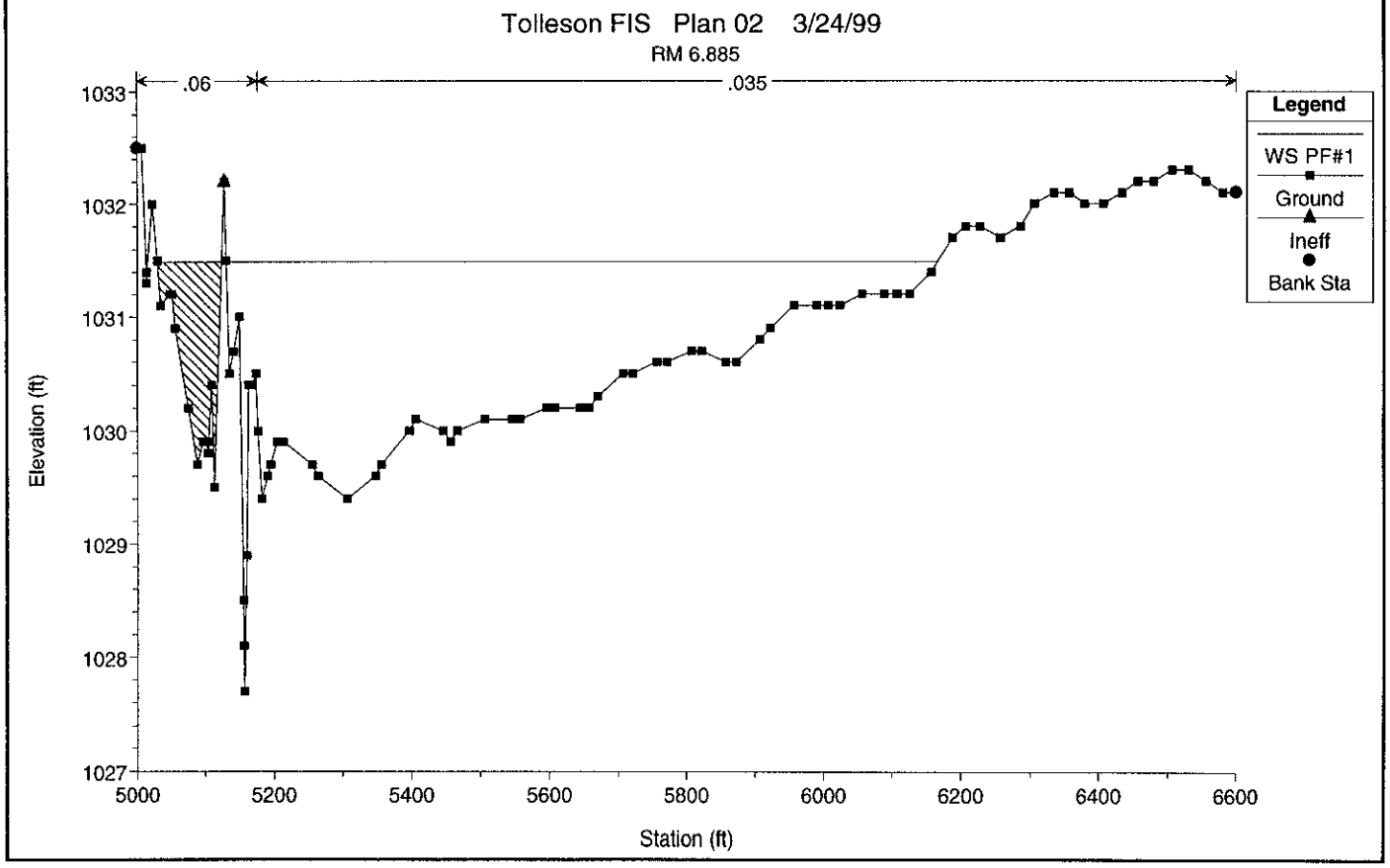

Tolleson FIS Plan 02 3/24/99
RM 7.227
.08
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1038
1037
1036
1035
1034
1033
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

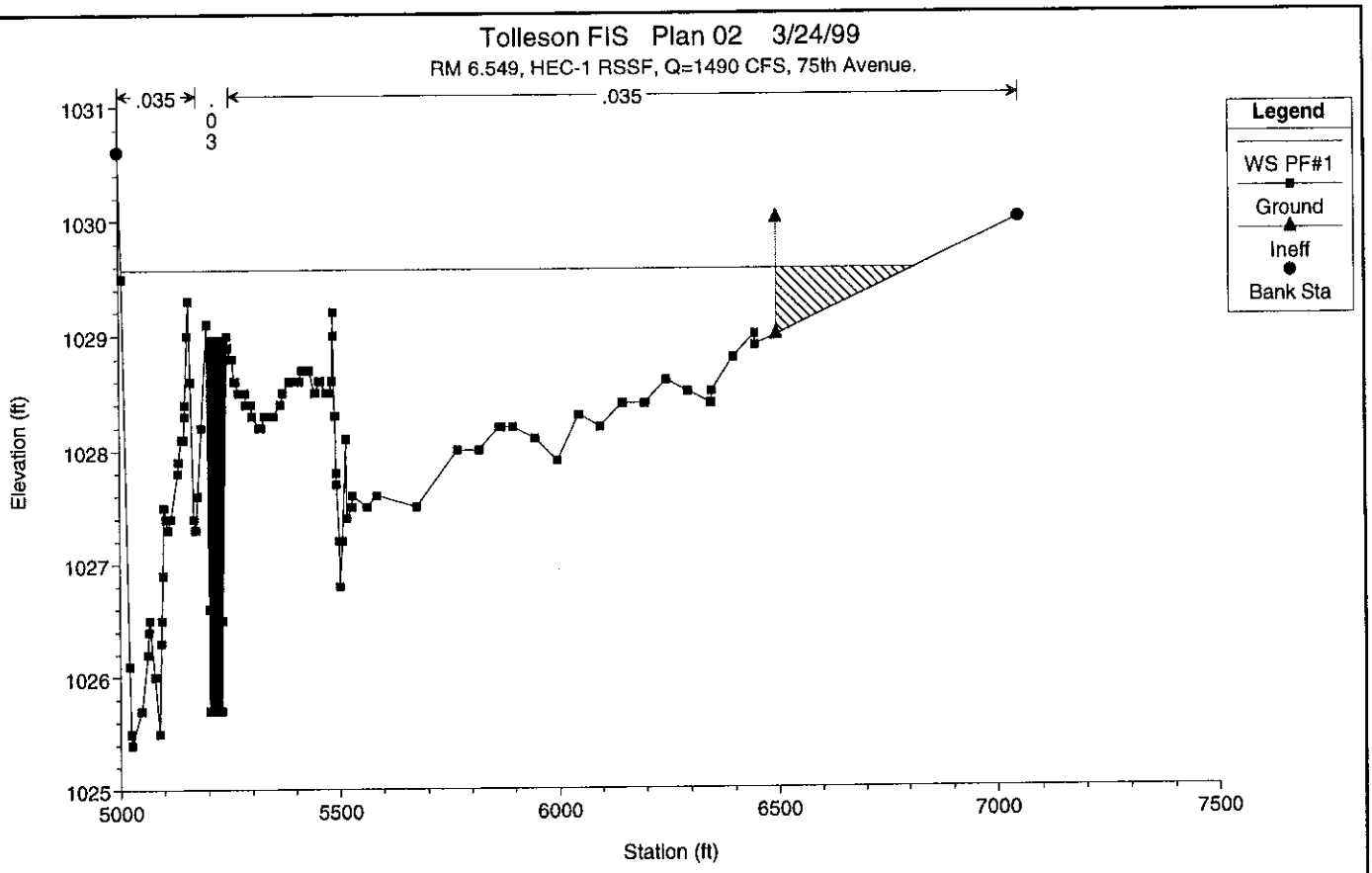

Tolleson FIS Plan 02 3/24/99
RM 7.169
.08
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1038
1037
1036
1035
1034
1033
1032
1031
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

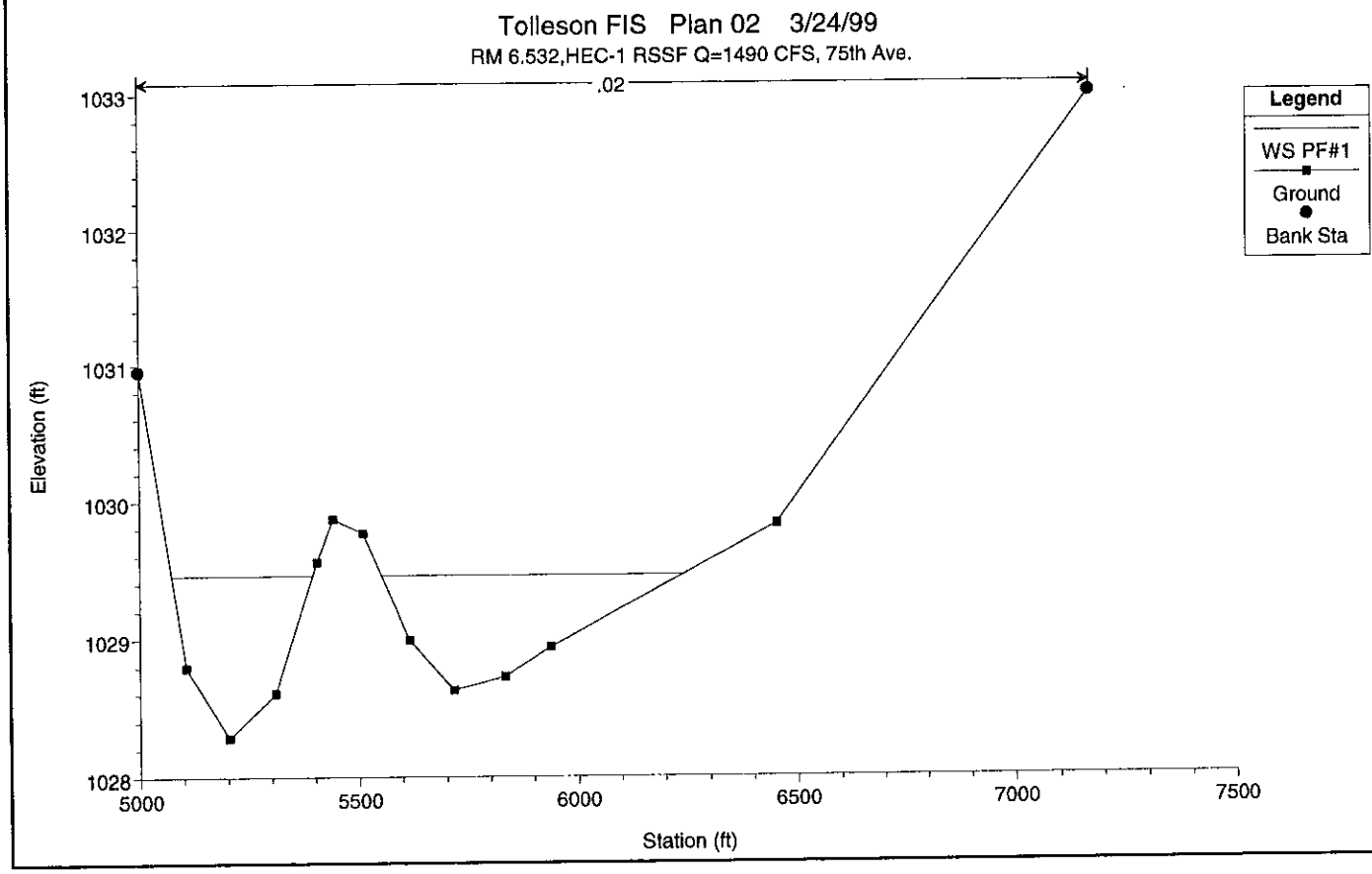

Tolleson FIS Plan 02 3/24/99
RM 7.074
.08
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1037
1036
1035
1034
1033
1032
1031
1030
1029
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

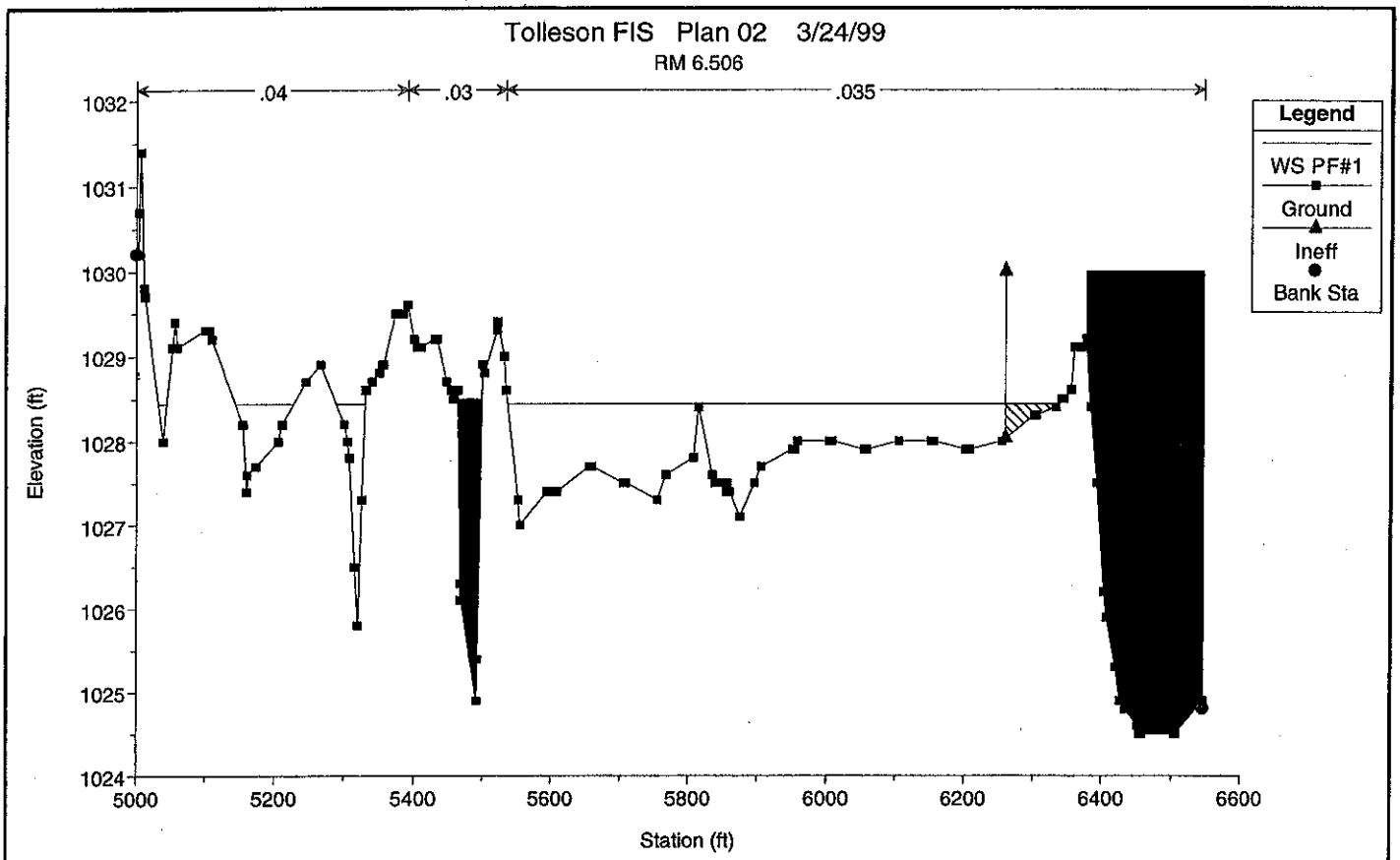

Tolleson FIS Plan 02 3/24/99
RM 7.033
.08
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1036
1035
1034
1033
1032
1031
1030
1029
1028
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

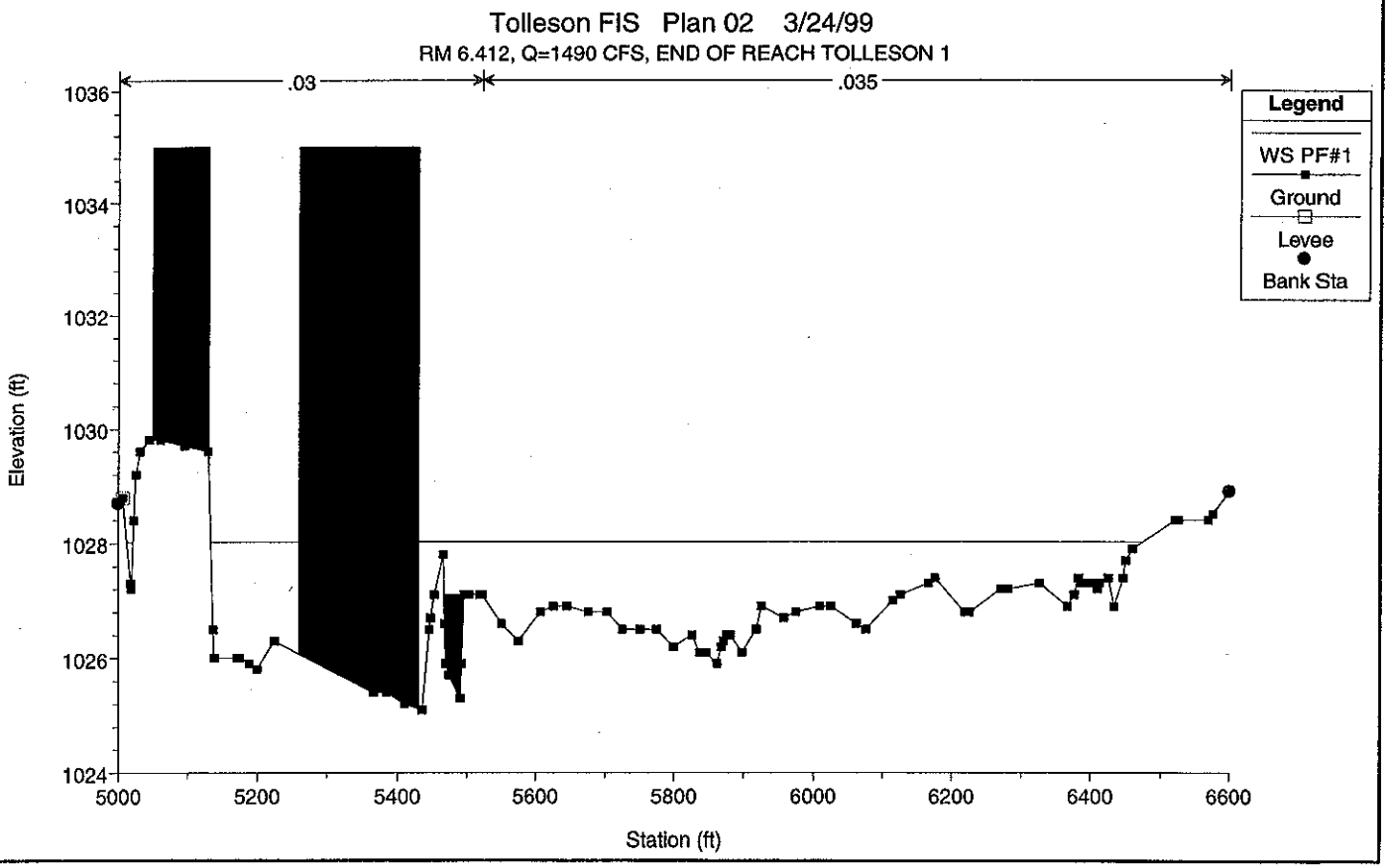

Tolleson FIS Plan 02 3/24/99
RM 6.980
.07
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1035
1034
1033
1032
1031
1030
1029
1028
5000
5200
5400
5600
5800
6000
6200
6400
6600


Tolleson FIS Plan 02 3/24/99
RM 6.885
.06
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1033
1032
1031
1030
1029
1028
1027
5000
5200
5400
5600
5800
6000
6200
6400
6600


Tolleson FIS Plan 02 3/24/99
RM 6.549, HEC-1 RSSF, Q=1490 CFS, 75th Avenue.
.035
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1031
1030
1029
1028
1027
1026
1025
5000
5500
6000
6500
7000
7500
Station (ft)

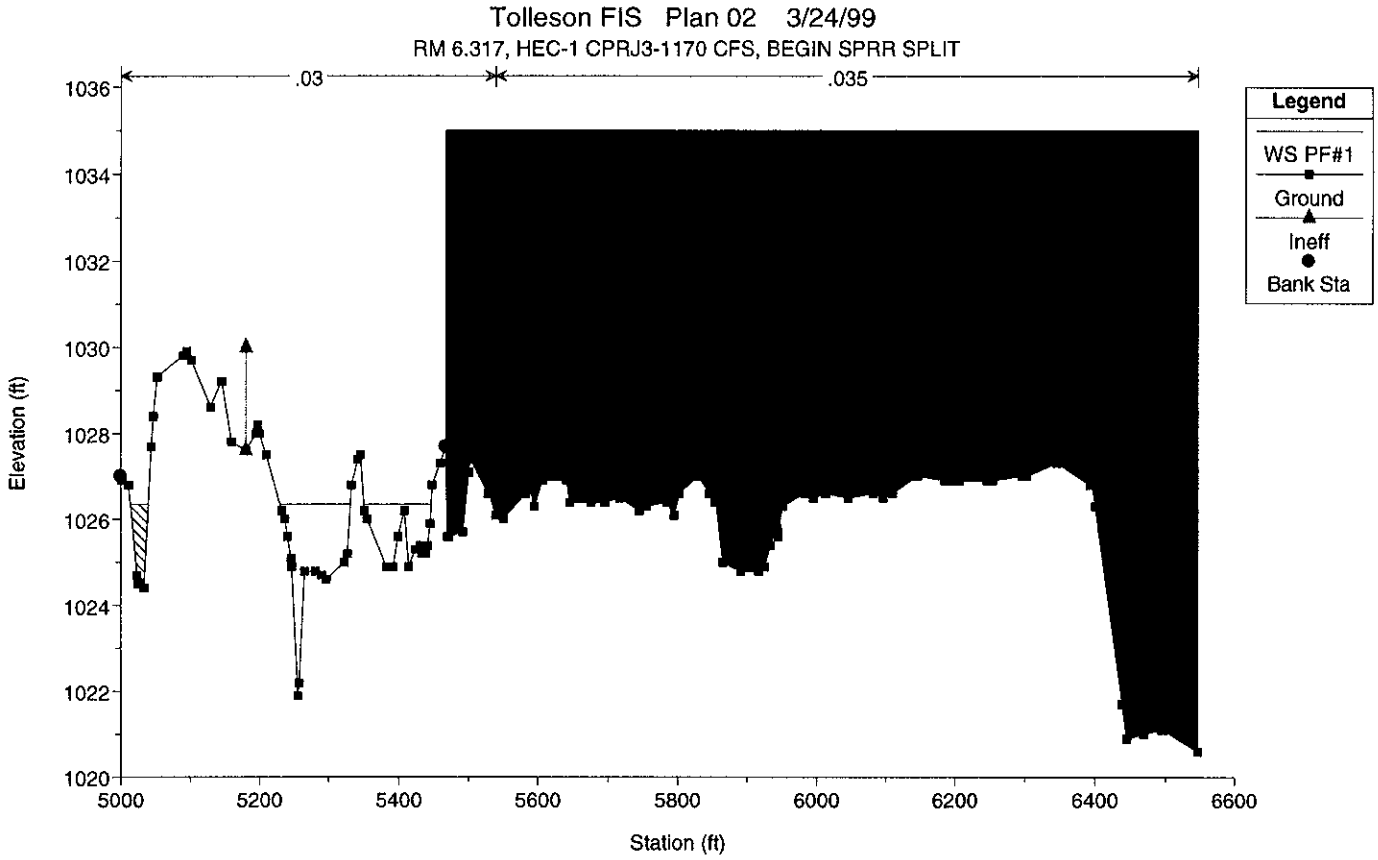

Tolleson FIS Plan 02 3/24/99
RM 6.532,HEC-1 RSSF Q=1490 CFS, 75th Ave.
.02
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1033
1032
1031
1030
1029
1028
5000
5500
6000
6500
7000
7500
Station (ft)

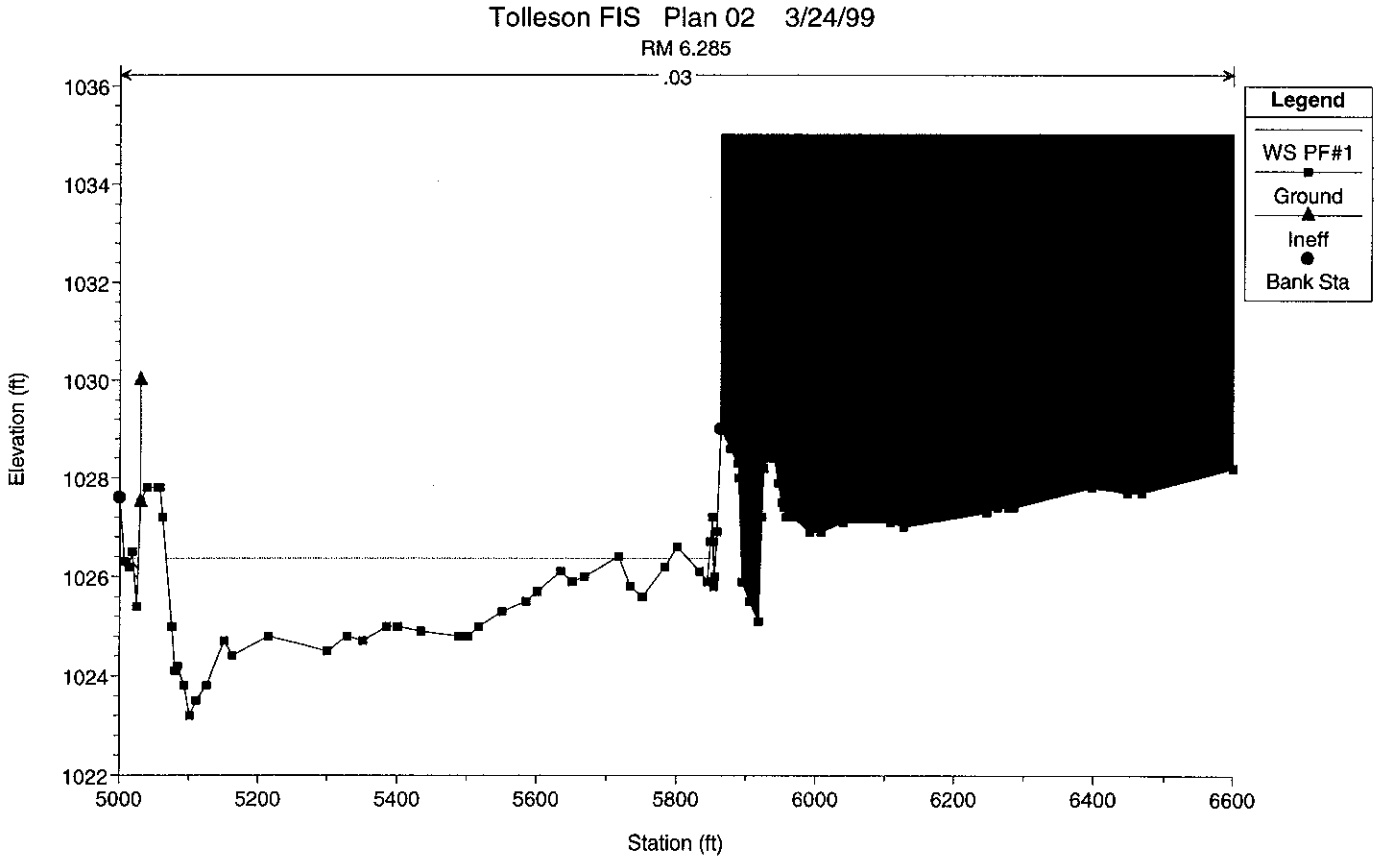

Tolleson FIS Plan 02 3/24/99
RM 6.506
.04
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1032
1031
1030
1029
1028
1027
1026
1025
1024
5000
5200
5400
5600
5800
6000
6200
6400
6600

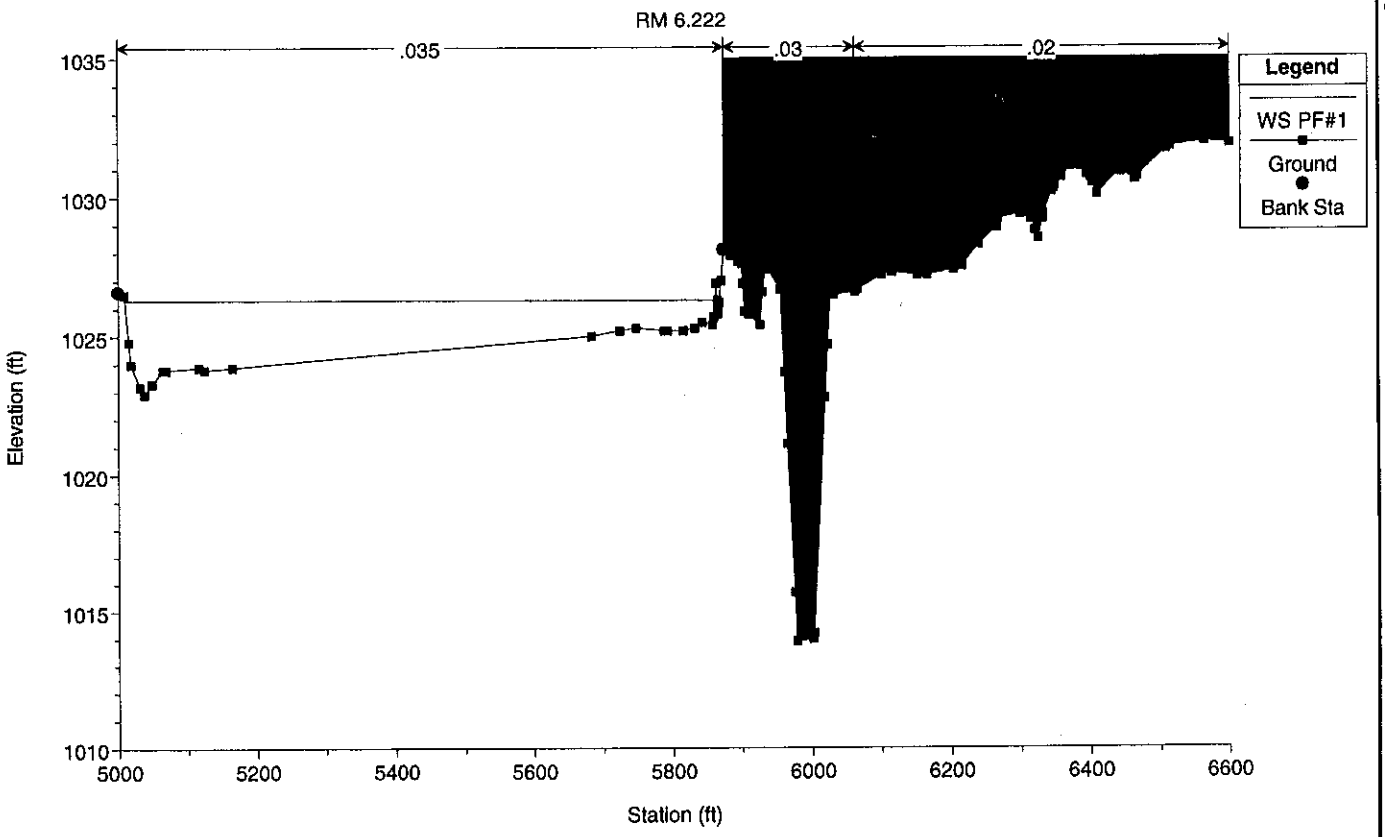

Tolleson FIS Plan 02 3/24/99
RM 6.412, Q=1490 CFS, END OF REACH TOLLESON 1
.03
.035
Legend
WS PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
1036
1034
1032
1030
1028
1026
1024
5000
5200
5400
5600
5800
6000
6200
6400
6600

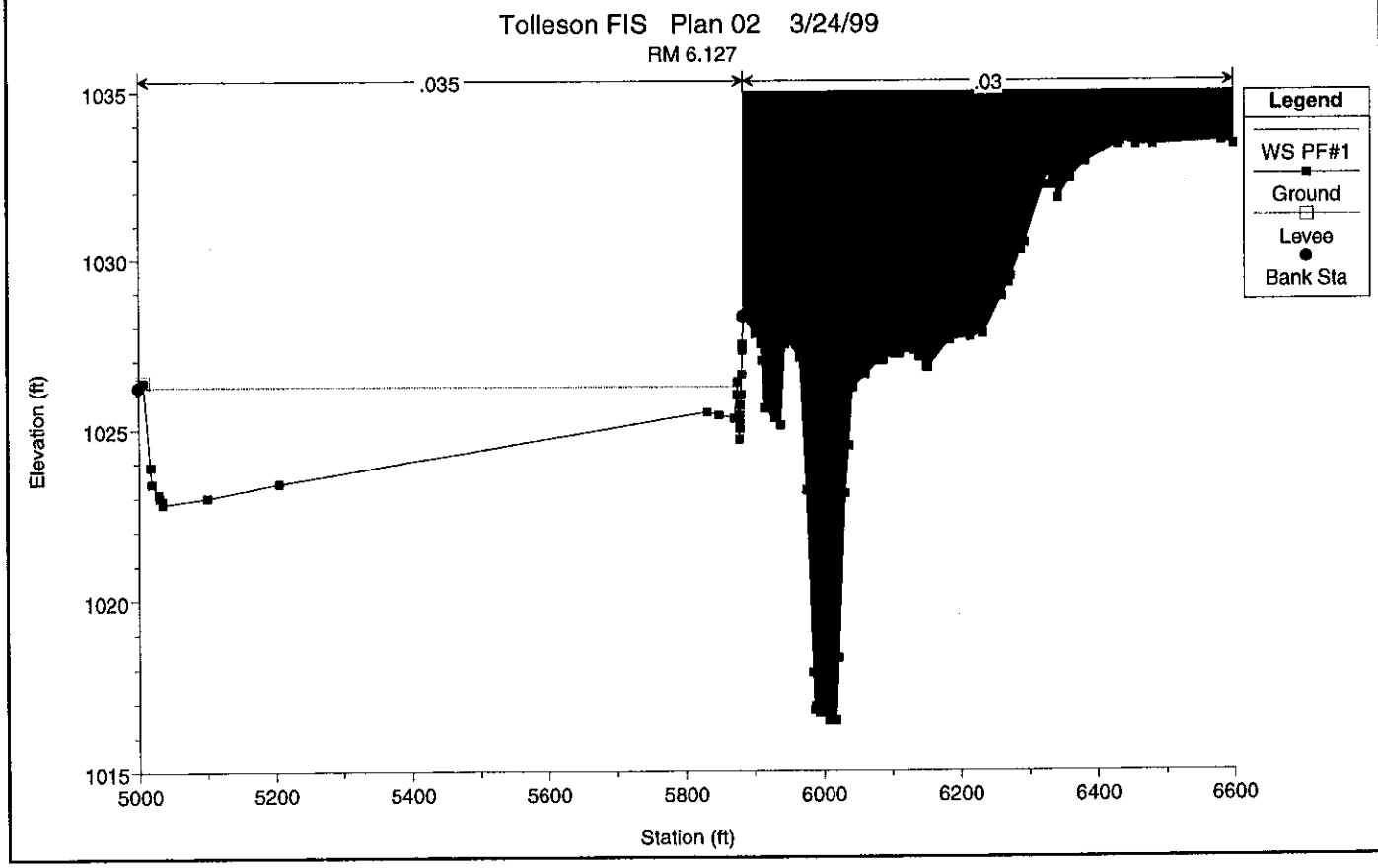
E.2 continued **HEC-RAS Cross Section Plots**

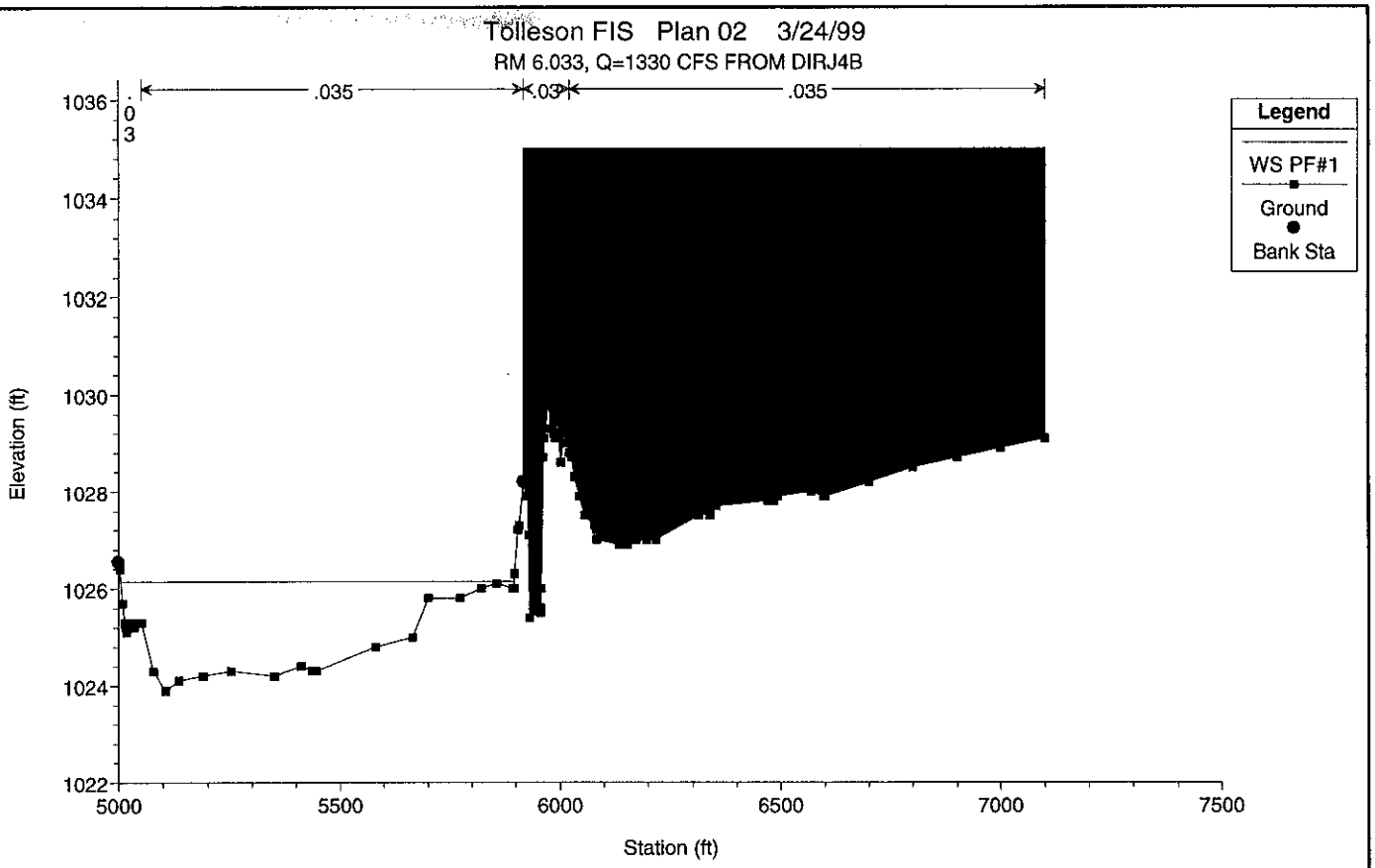
Flooding Source	HEC-RAS Reach Label	From River Mile to River Mile
Southern Pacific Railroad	RR Split	6.317 to 5.654

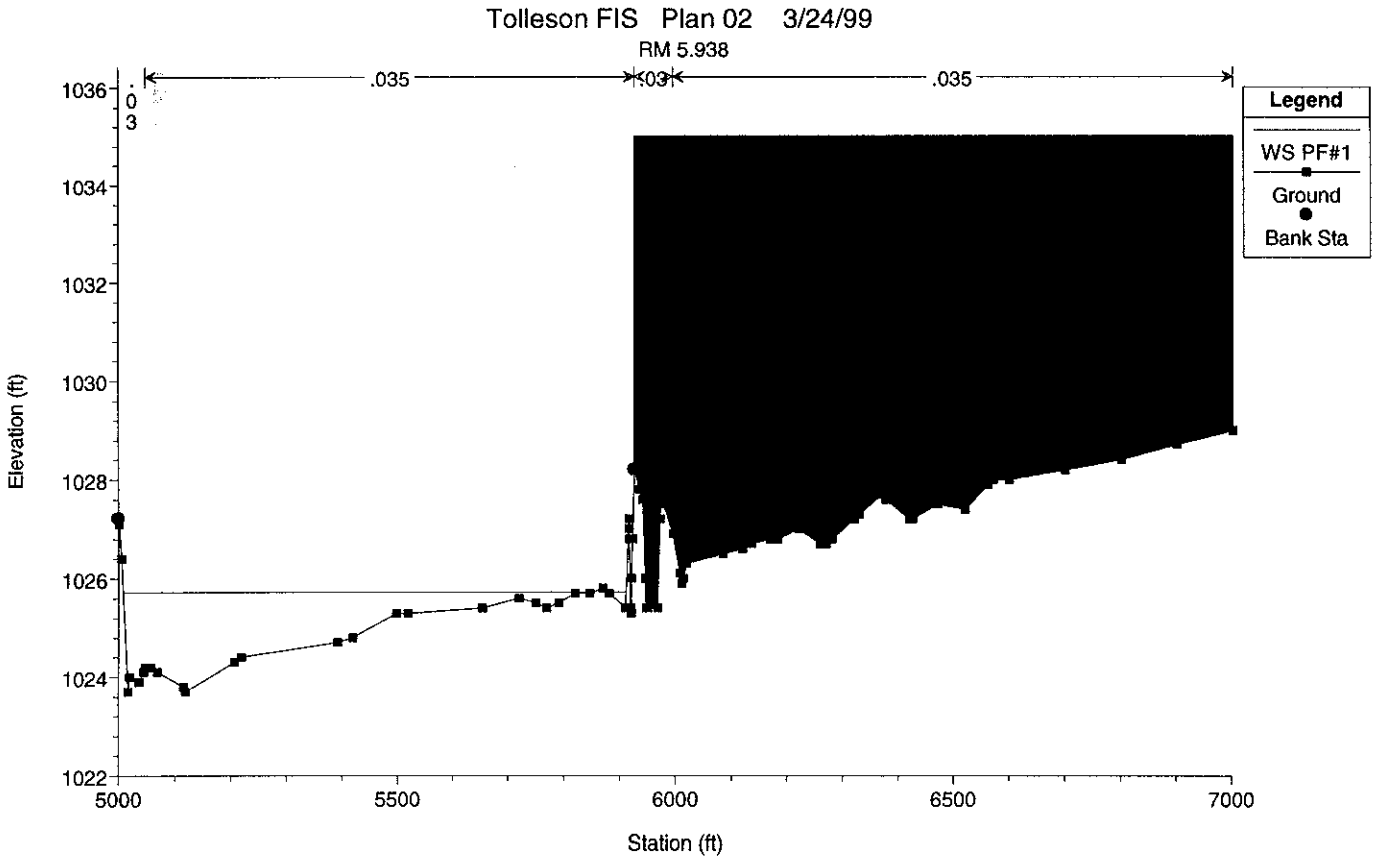

Tolleson FIS Plan 02 3/24/99
RM 6.317, HEC-1 CPRJ3-1170 CFS, BEGIN SPRR SPLIT
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1036
1034
1032
1030
1028
1026
1024
1022
1020
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

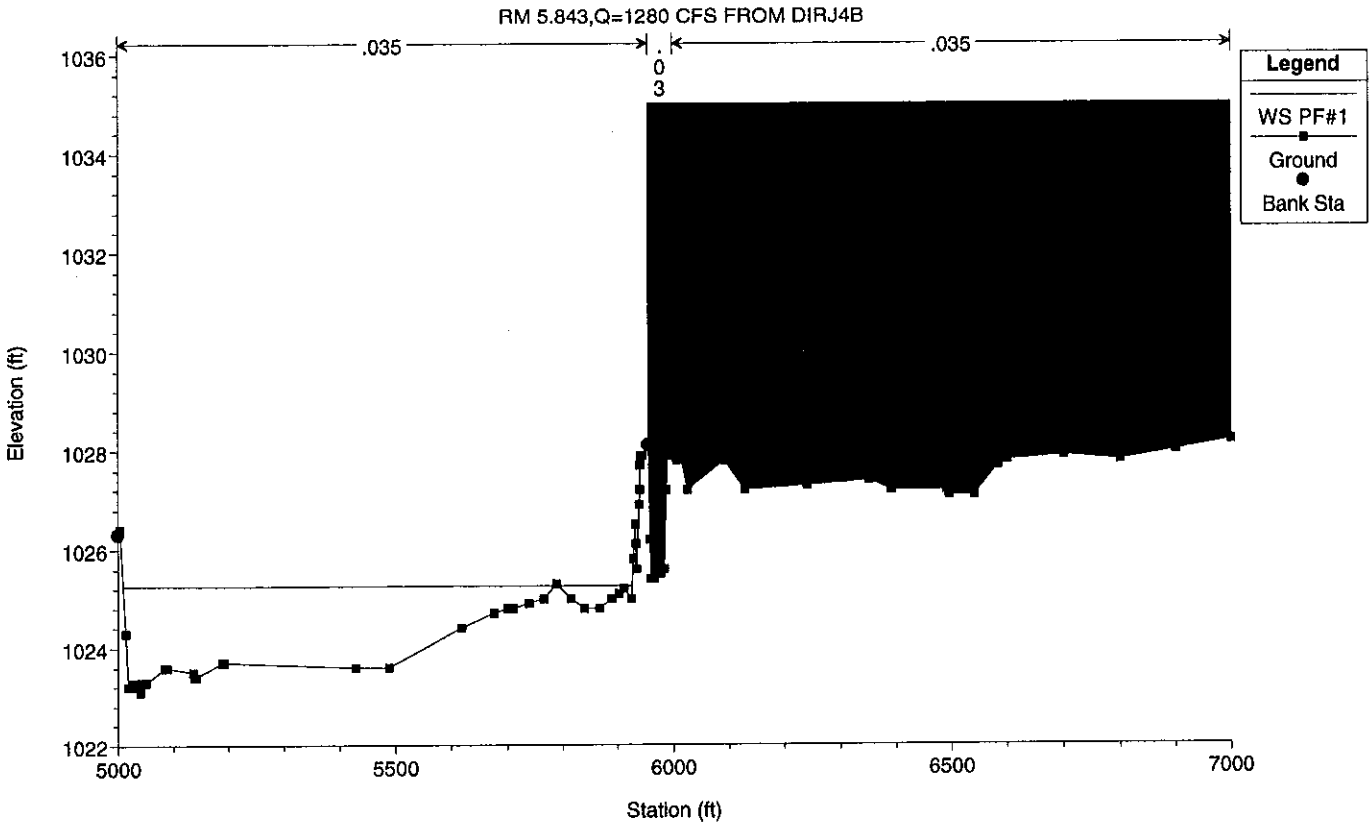

Tolleson FIS Plan 02 3/24/99
RM 6.285
.03
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1036
1034
1032
1030
1028
1026
1024
1022
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

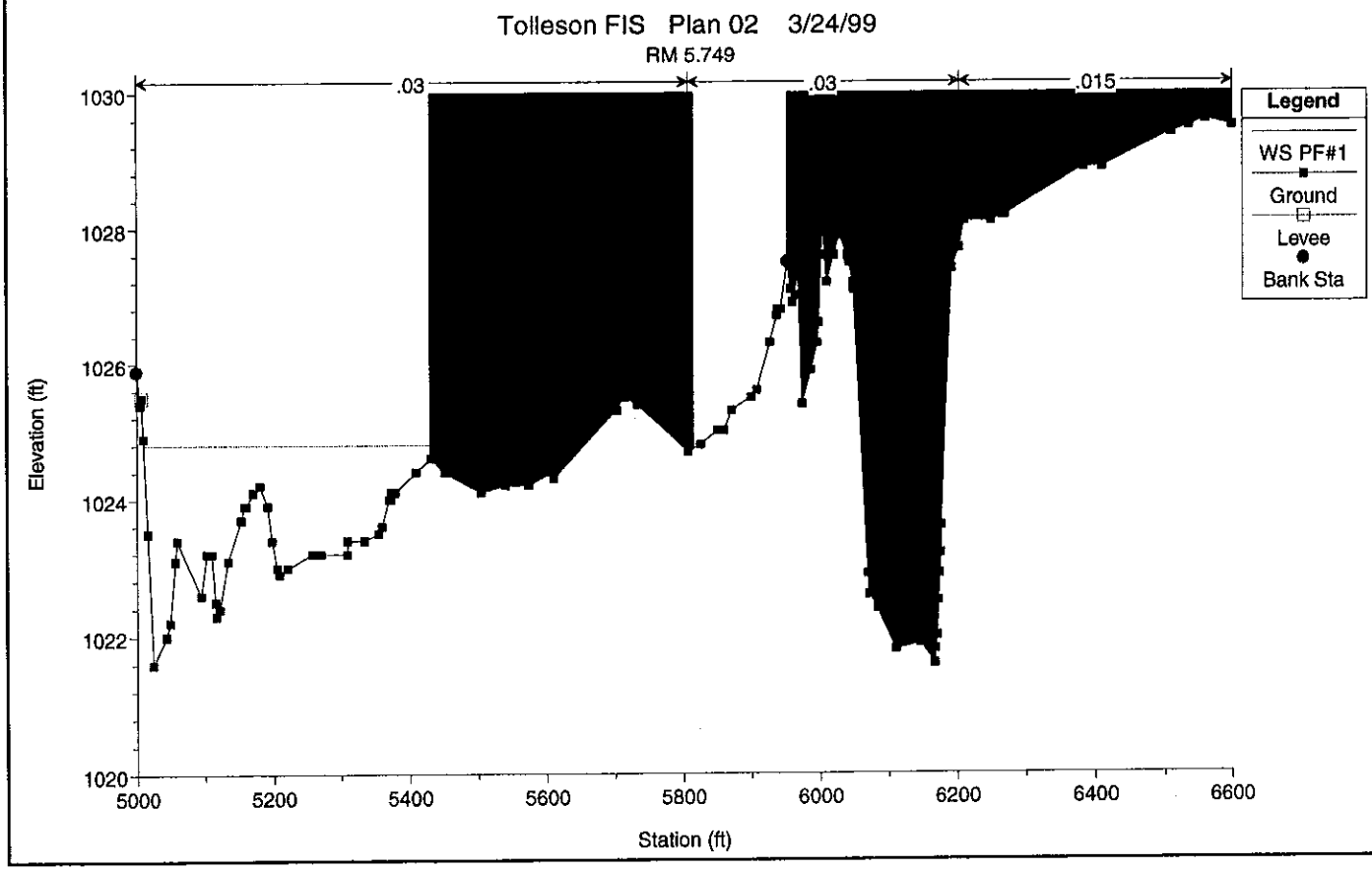

Tolleson FIS Plan 02 3/24/99
RM 6.222
.035
.03
.02
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1035
1030
1025
1020
1015
1010
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

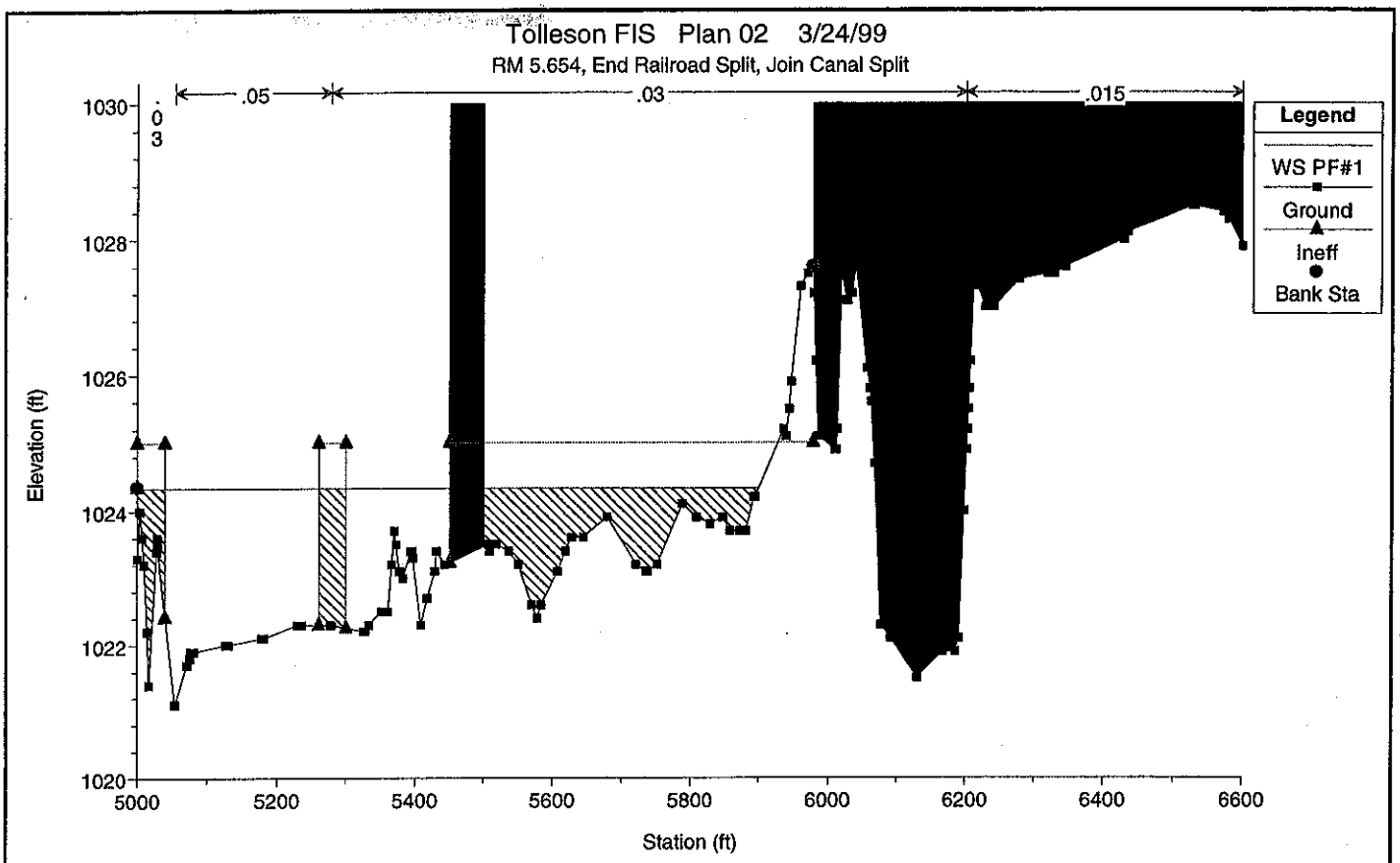

Tolleson FIS Plan 02 3/24/99
RM 6.127
.035
.03
Legend
WS PF#1
Ground
Levee
Bank Sta
Elevation (ft)
1035
1030
1025
1020
1015
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)


Tolleson FIS Plan 02 3/24/99
RM 6.033, Q=1330 CFS FROM DIRJ4B
.035
.03
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1036
1034
1032
1030
1028
1026
1024
1022
5000
5500
6000
6500
7000
7500
Station (ft)

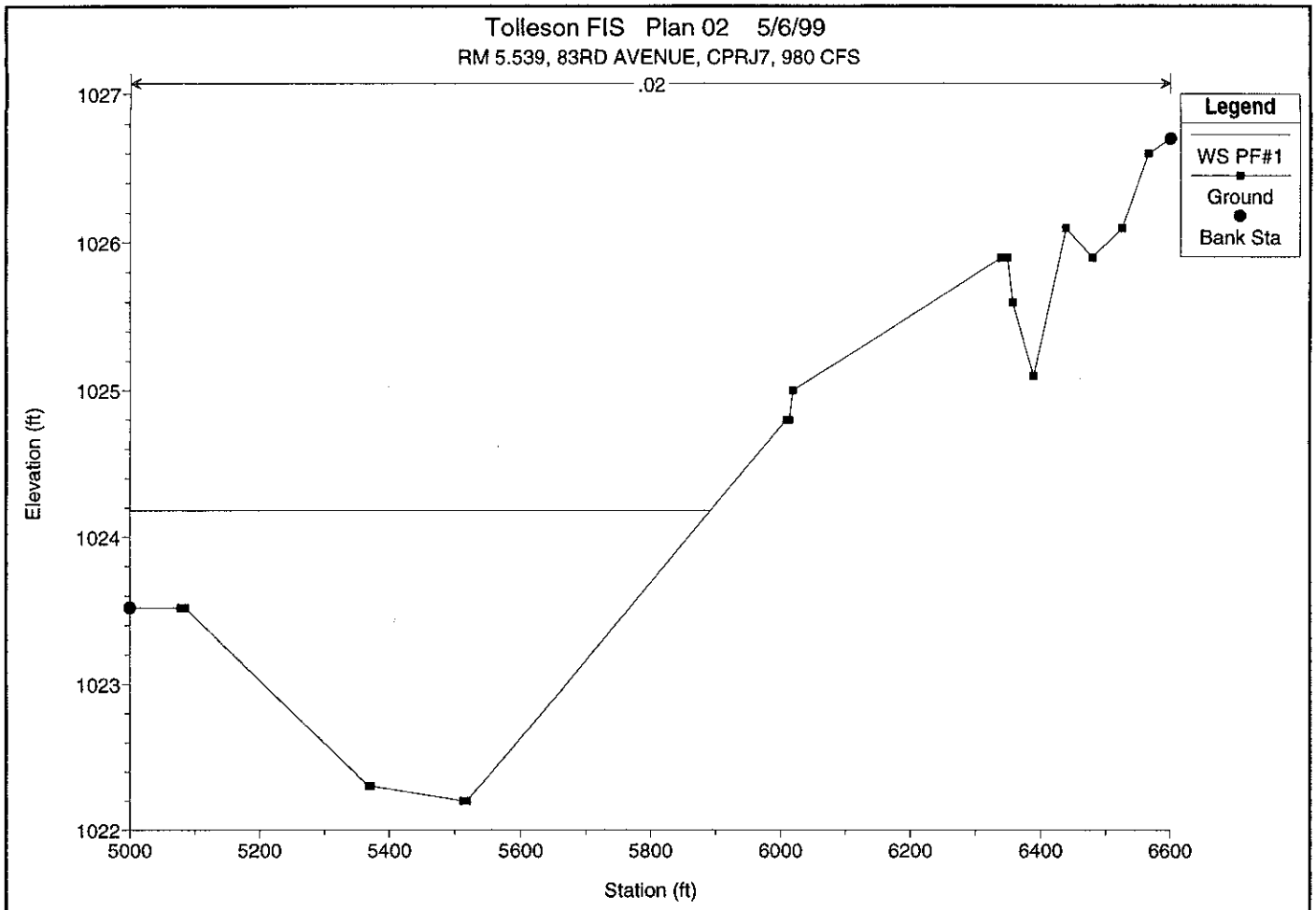

Tolleson FIS Plan 02 3/24/99
RM 5.938
.035
.03
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1036
1034
1032
1030
1028
1026
1024
1022
5000
5500
6000
6500
7000
Station (ft)

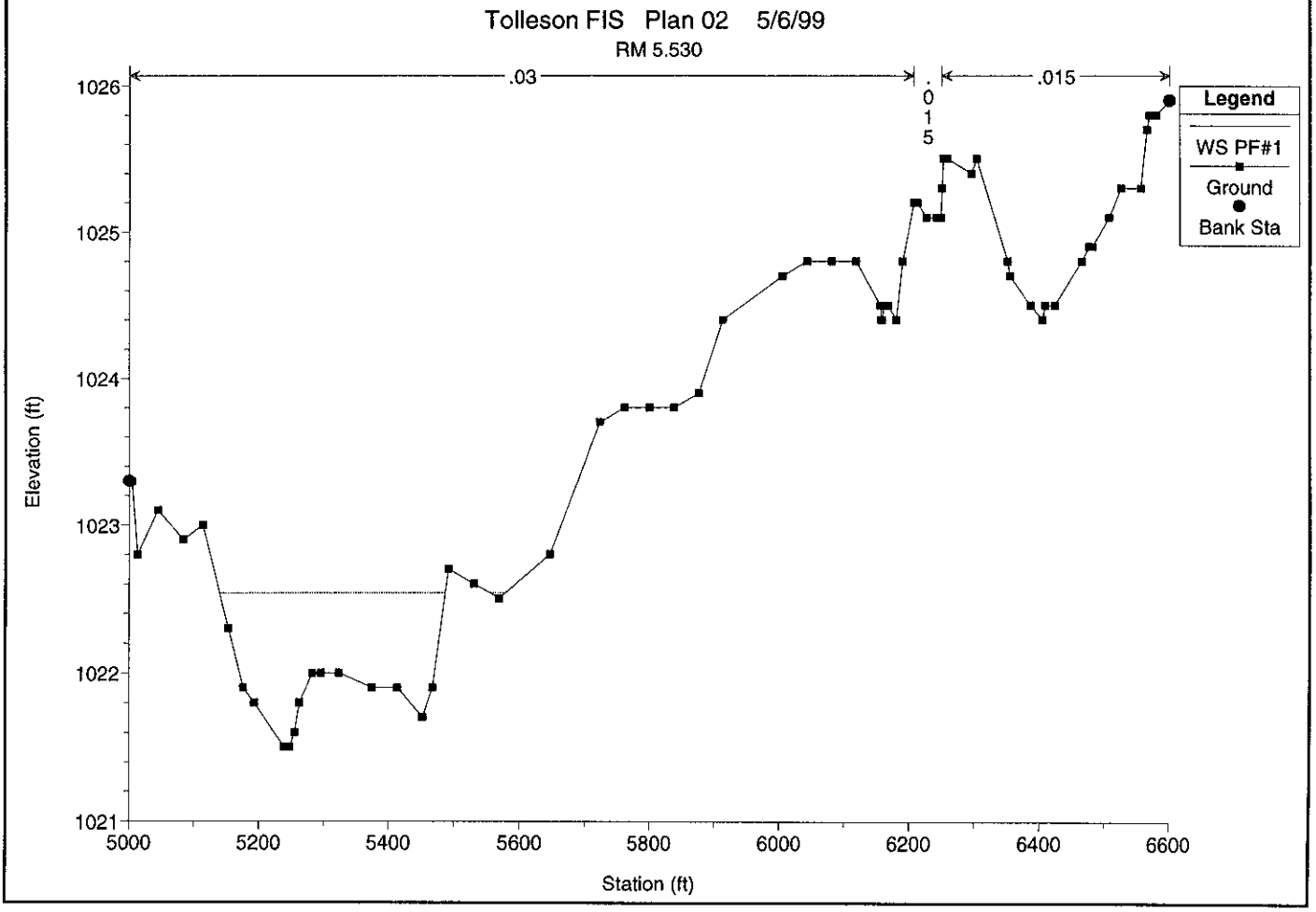

Tolleson FIS Plan 02 3/24/99
RM 5.843,Q=1280 CFS FROM DIRJ4B
.035
.03
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1036
1034
1032
1030
1028
1026
1024
1022
5000
5500
6000
6500
7000
Station (ft)

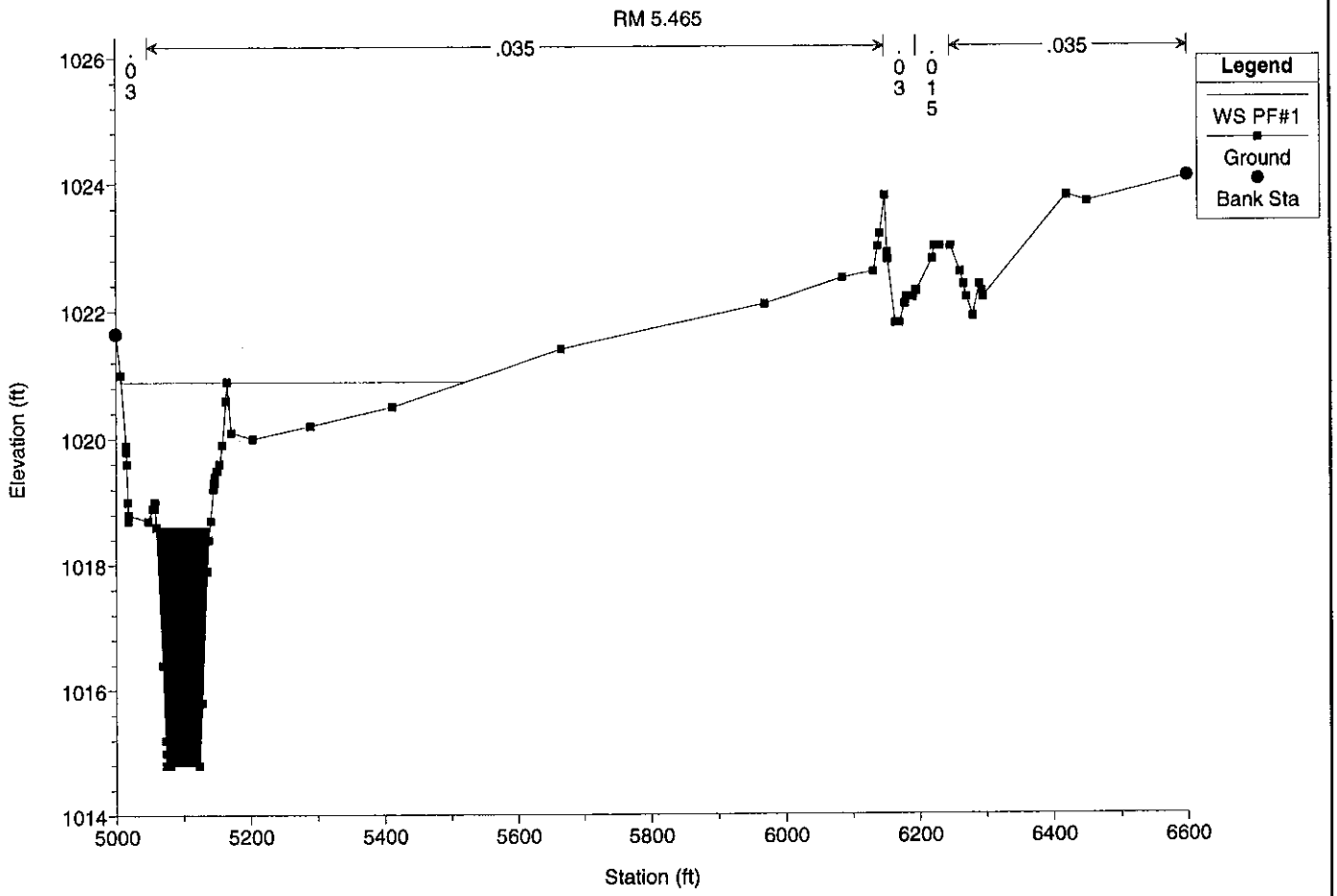

Tolleson FIS Plan 02 3/24/99
RM 5.749
.03
.03
.015
Legend
WS PF#1
Ground
Levee
Bank Sta
Elevation (ft)
1030
1028
1026
1024
1022
1020
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

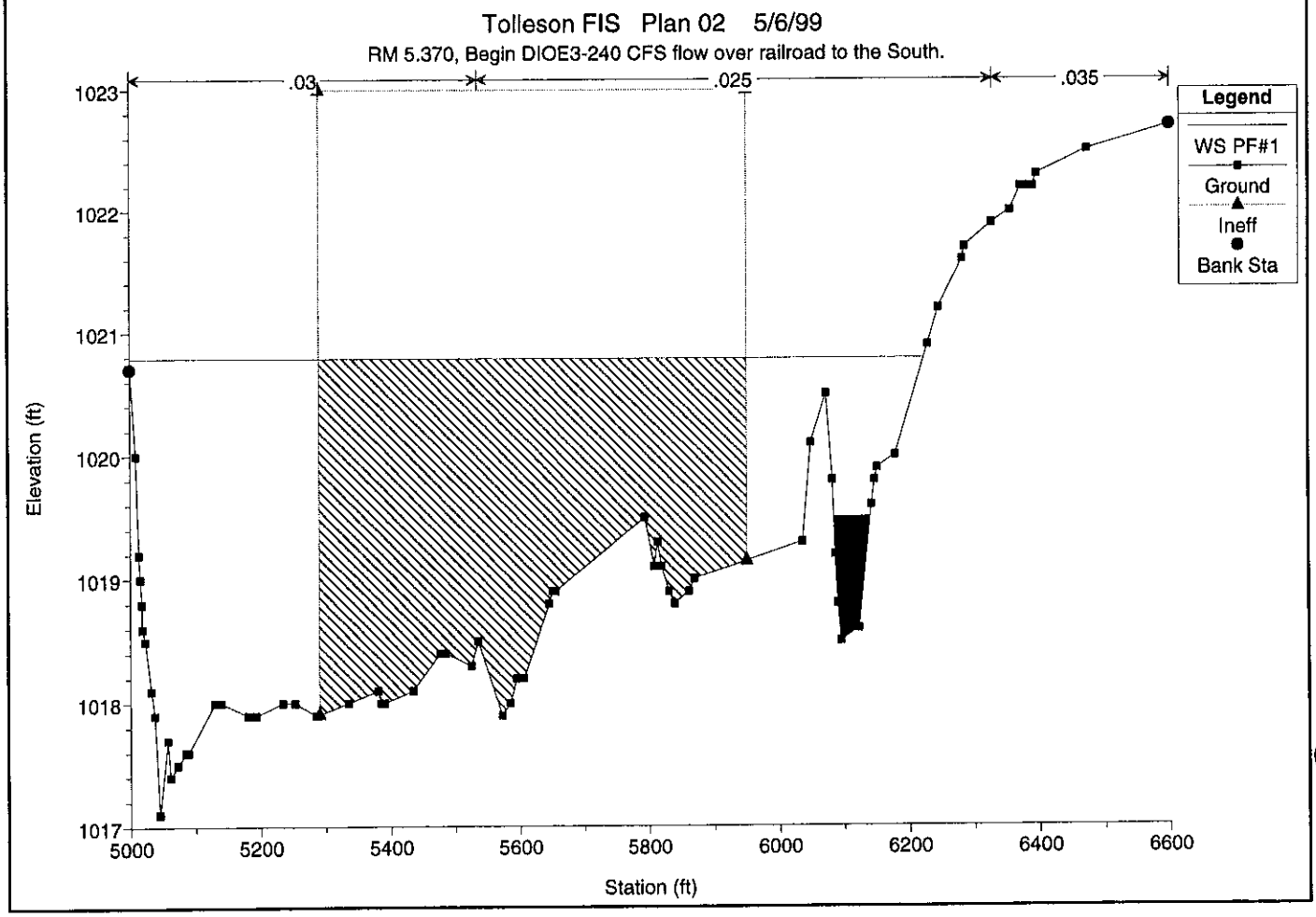

Tolleson FIS Plan 02 3/24/99
RM 5.654, End Railroad Split, Join Canal Split
.05
.03
.015
.03
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1030
1028
1026
1024
1022
1020
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

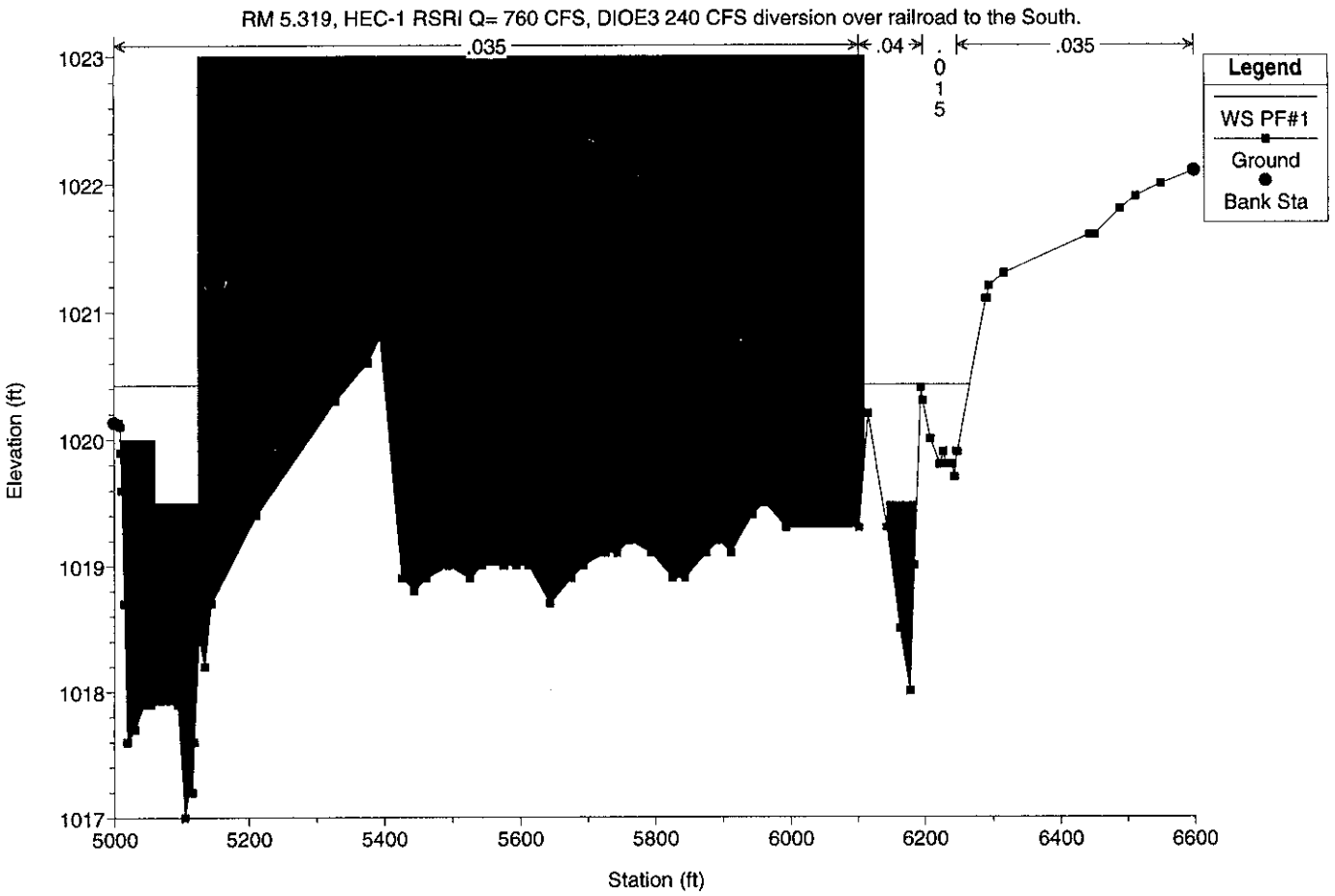
Flooding Source	HEC-RAS Reach Label	From River Mile to River Mile
Southern Pacific Railroad	Tolleson 2	5.539 to 0.387

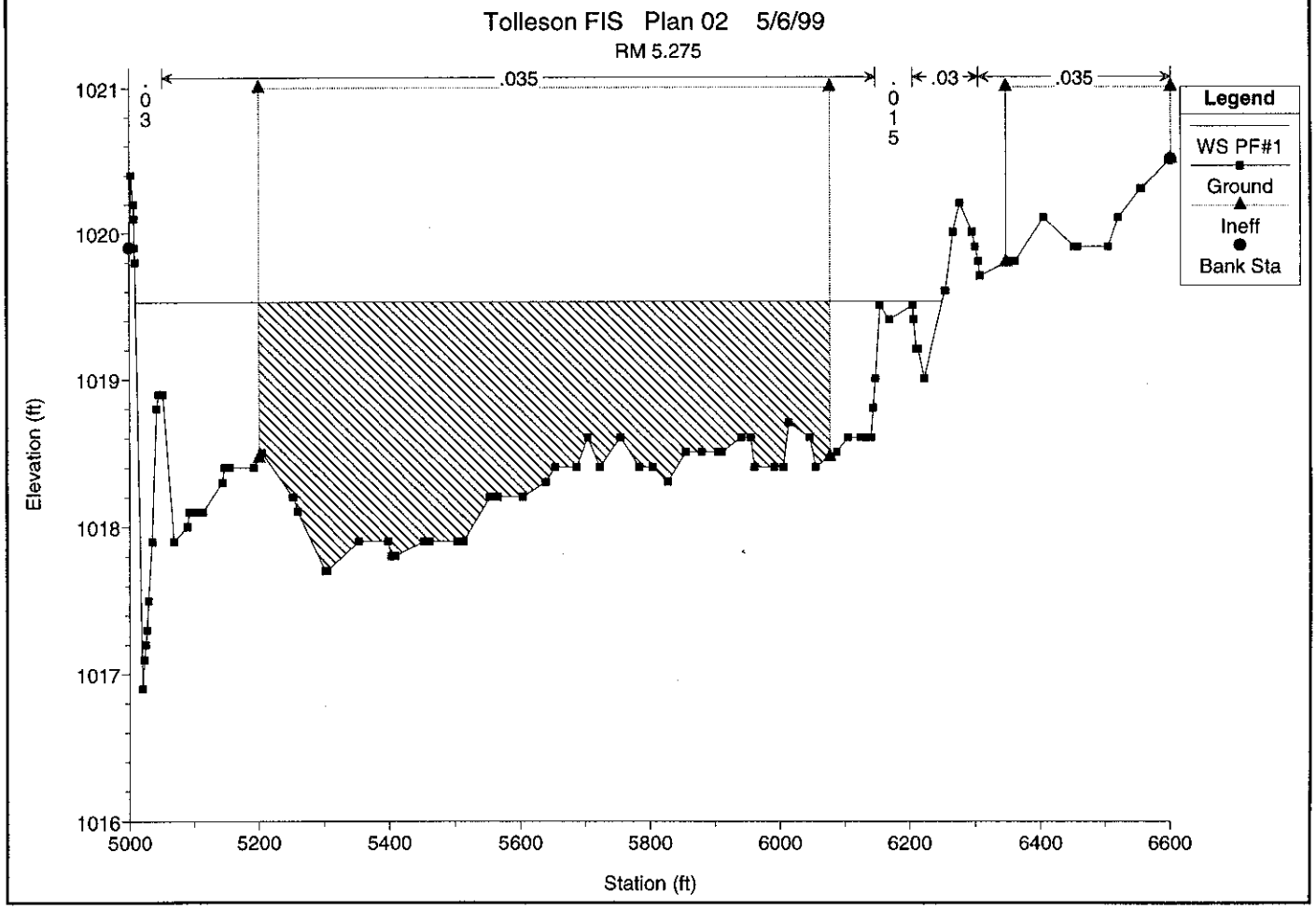

Tolleson FIS Plan 02 5/6/99
RM 5.539, 83RD AVENUE, CPRJ7, 980 CFS
.02
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1027
1026
1025
1024
1023
1022
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

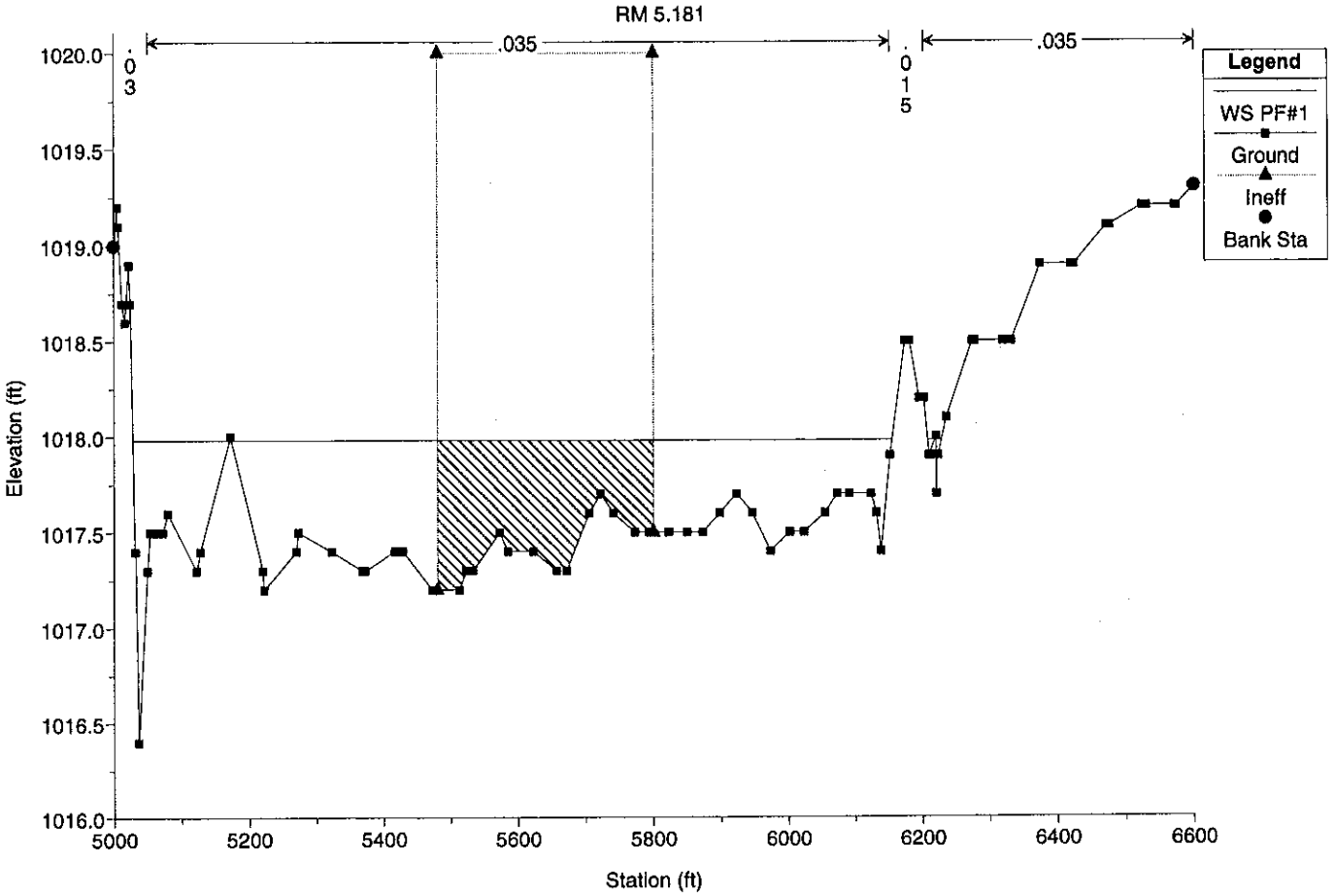

Tolleson FIS Plan 02 5/6/99
RM 5.530
.03
.015
.015
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1026
1025
1024
1023
1022
1021
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

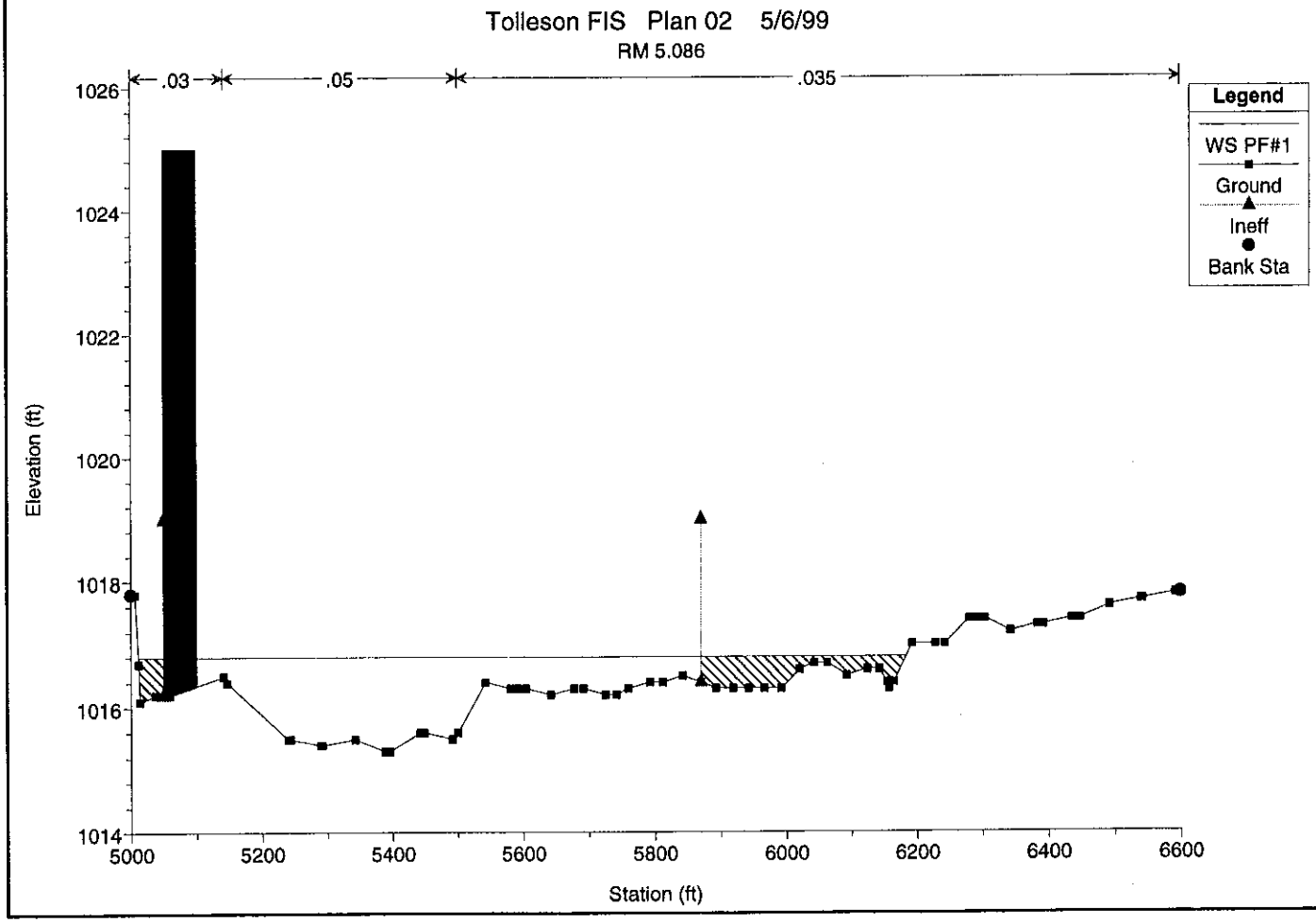

Tolleson FIS Plan 02 5/6/99
RM 5.465
.03
.035
.03
.015
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1014
1016
1018
1020
1022
1024
1026
5000
5200
5400
5600
5800
6000
6200
6400
6600

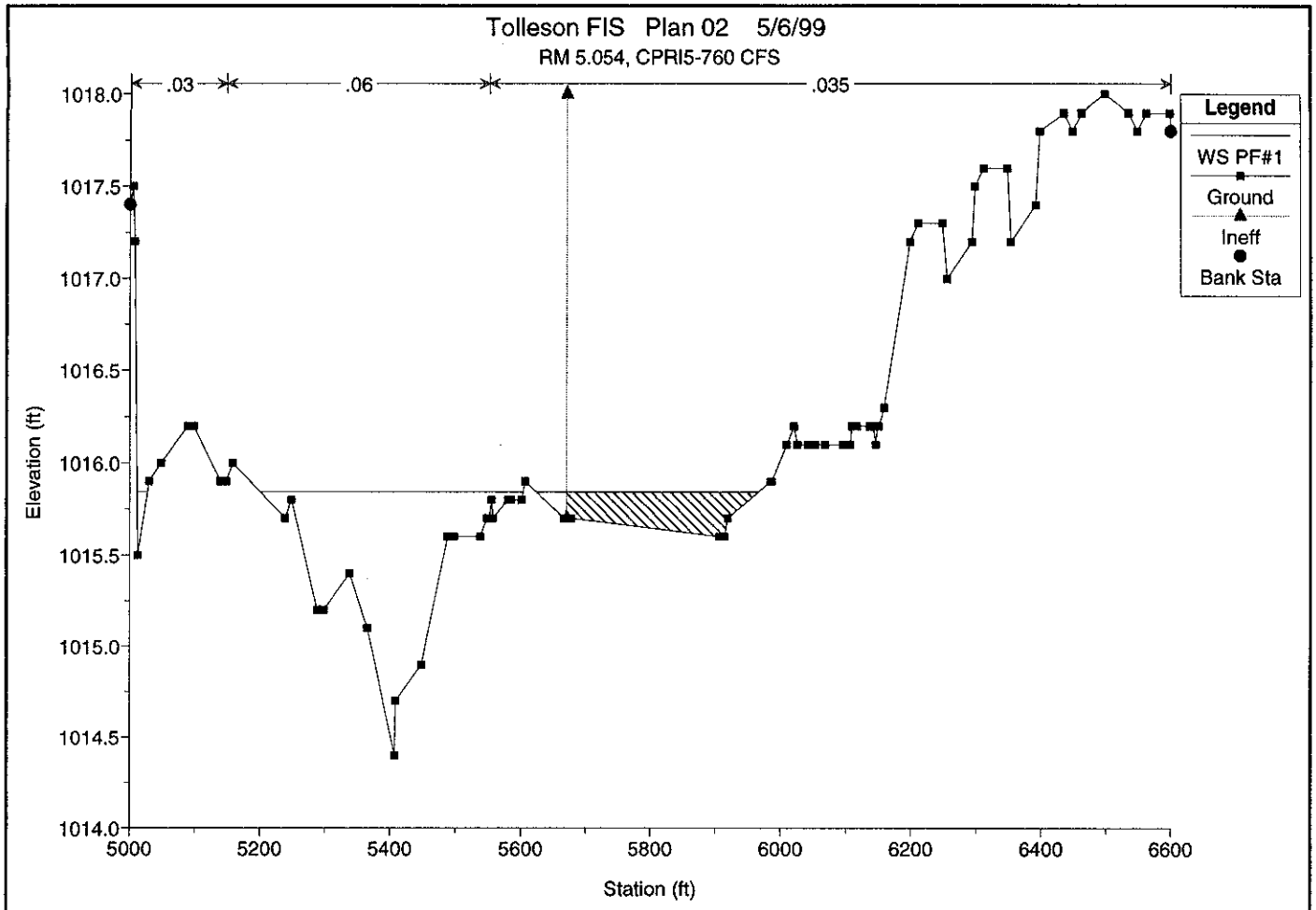

Tolleson FIS Plan 02 5/6/99
RM 5.370, Begin DIOE3-240 CFS flow over railroad to the South.
.03
.025
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1017
1018
1019
1020
1021
1022
1023
5000
5200
5400
5600
5800
6000
6200
6400
6600

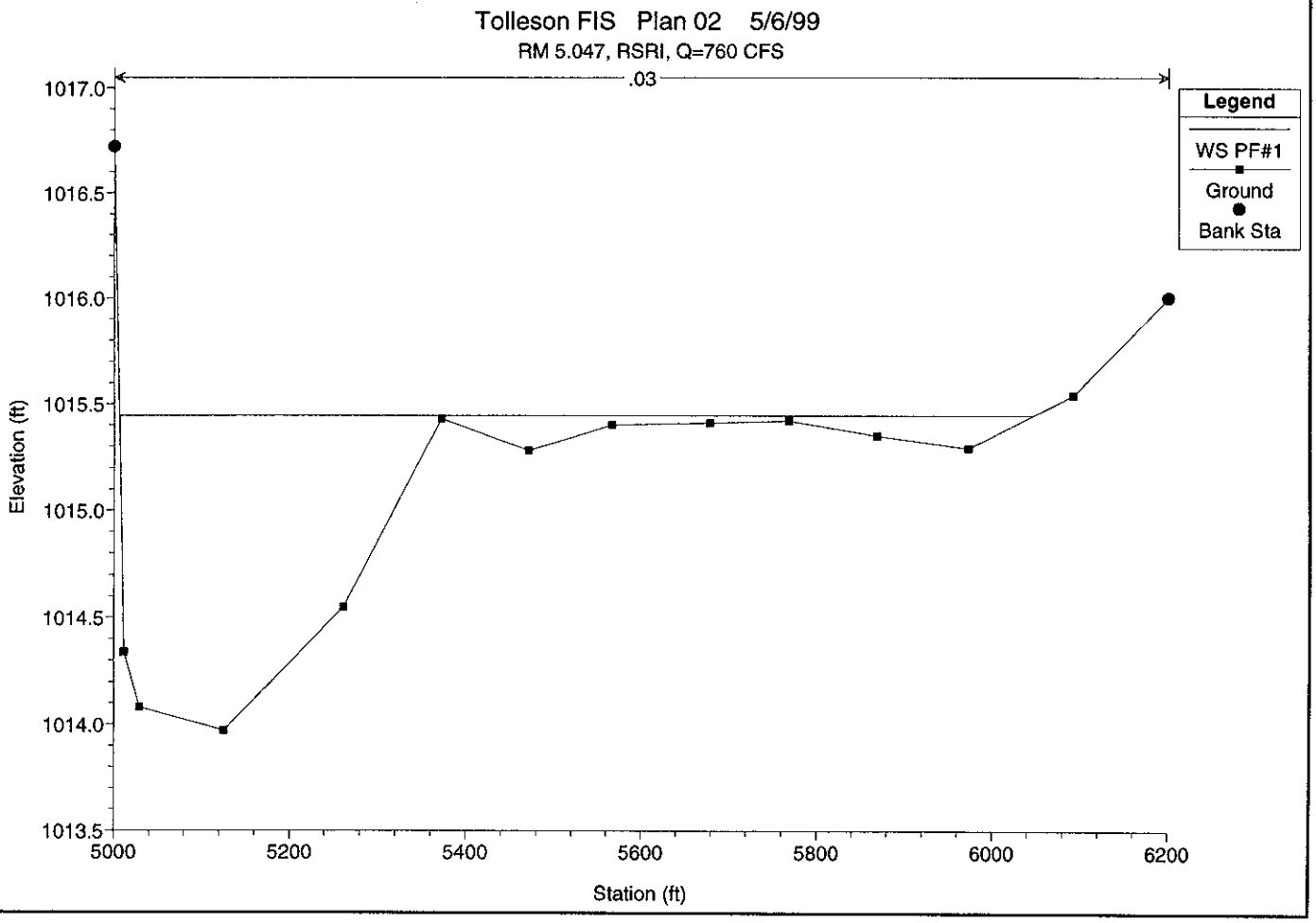

Tolleson FIS Plan 02 5/6/99
RM 5.319, HEC-1 RSRI Q= 760 CFS, DIOE3 240 CFS diversion over railroad to the South.
.035
.04
.015
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1017
1018
1019
1020
1021
1022
1023
5000
5200
5400
5600
5800
6000
6200
6400
6600

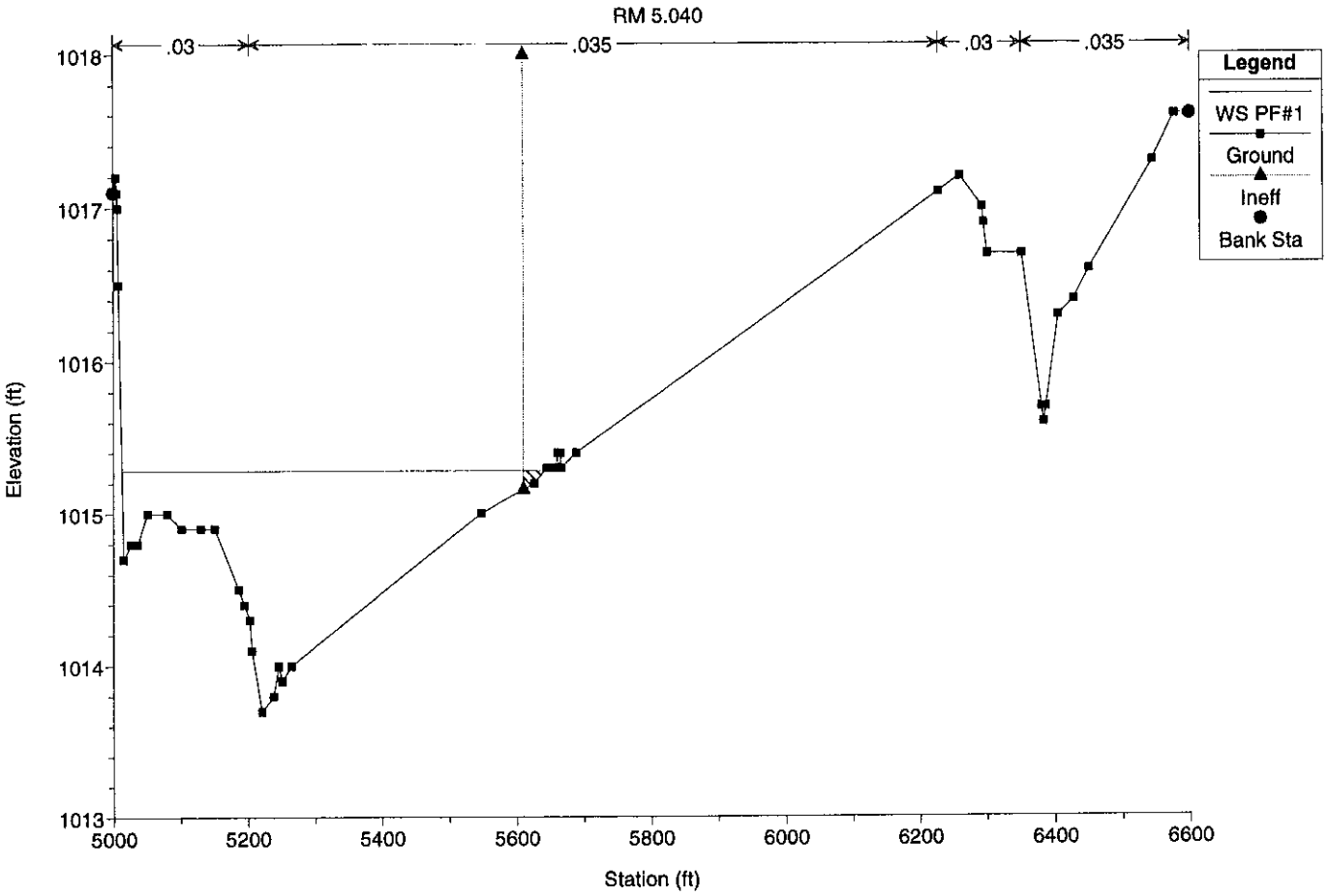

Tolleson FIS Plan 02 5/6/99
RM 5.275
.03
.035
.015
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1016
1017
1018
1019
1020
1021
5000
5200
5400
5600
5800
6000
6200
6400
6600

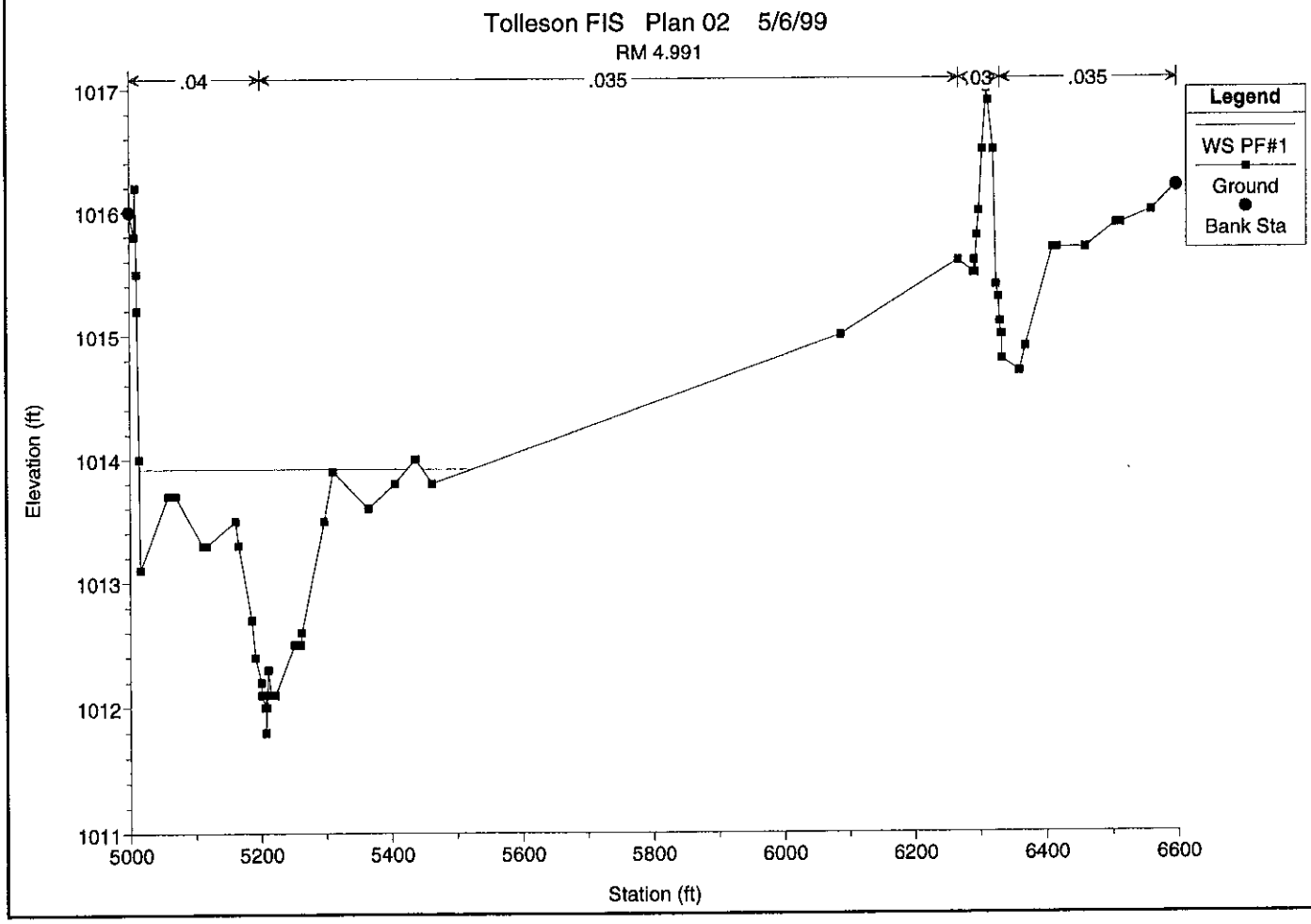

Tolleson FIS Plan 02 5/6/99
RM 5.181
.03
.035
.015
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1020.0
1019.5
1019.0
1018.5
1018.0
1017.5
1017.0
1016.5
1016.0
5000
5200
5400
5600
5800
6000
6200
6400
6600

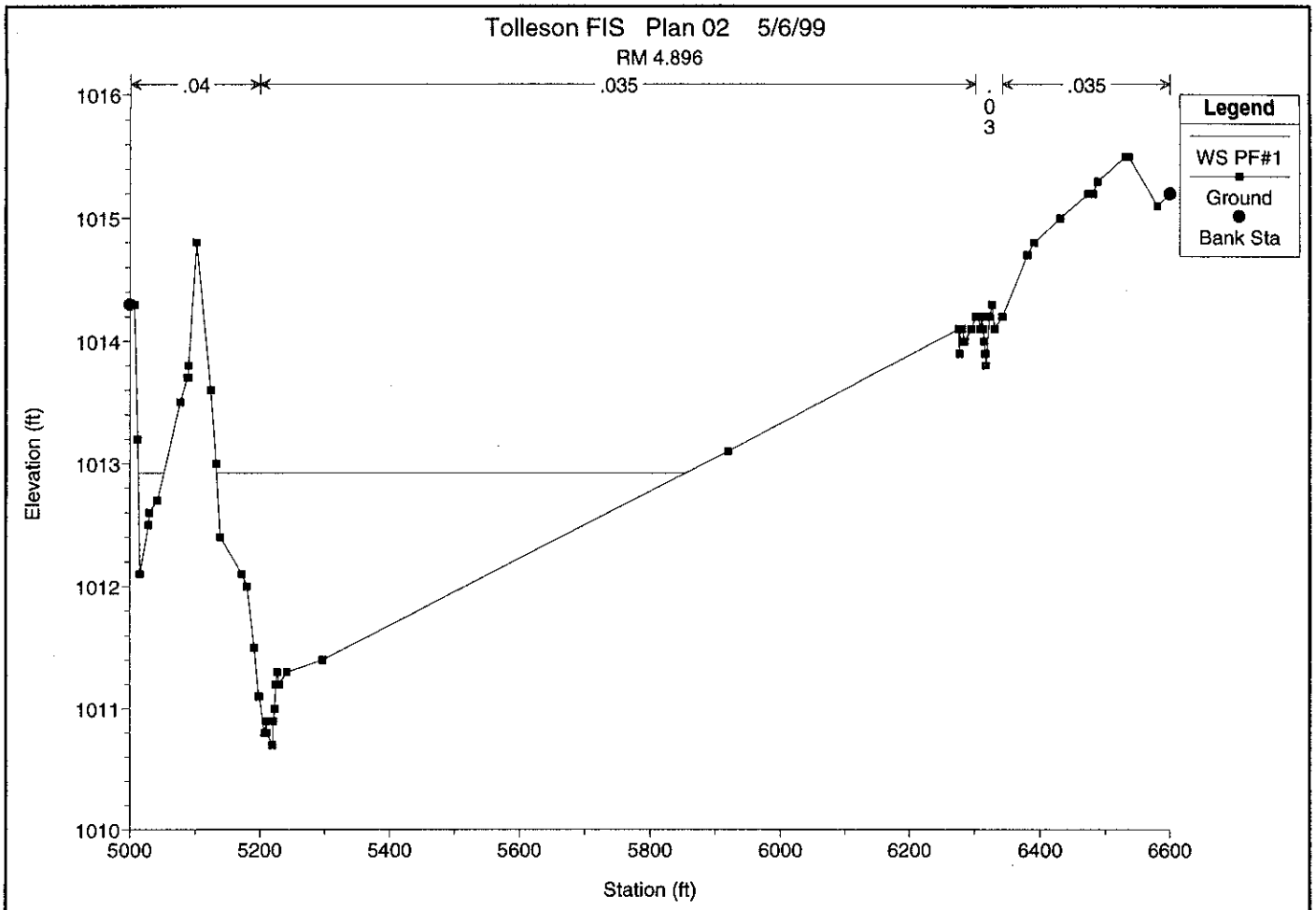

Tolleson FIS Plan 02 5/6/99
RM 5.086
.03
.05
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1026
1024
1022
1020
1018
1016
1014
5000
5200
5400
5600
5800
6000
6200
6400
6600

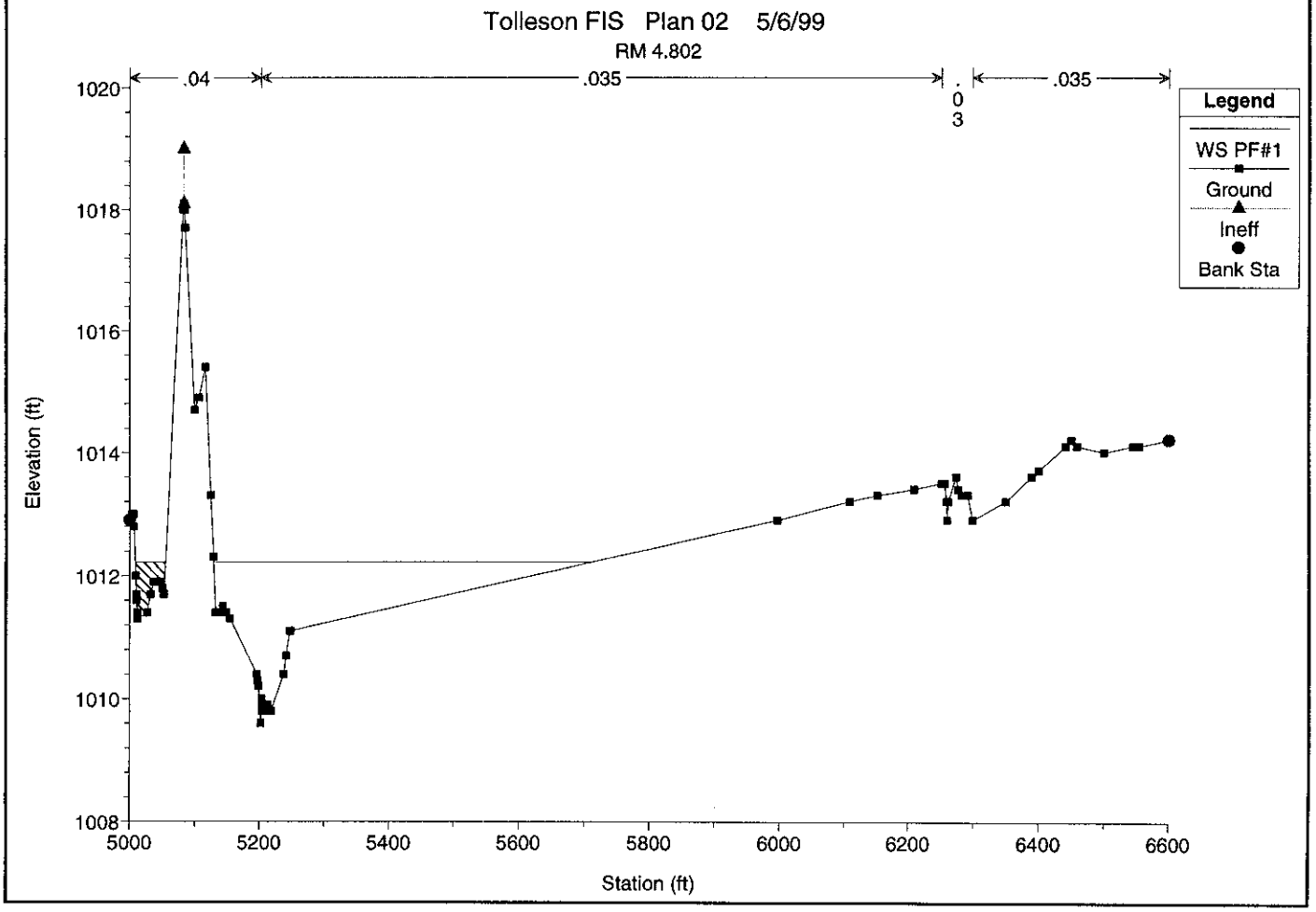

Tolleson FIS Plan 02 5/6/99
RM 5.054, CPRI5-760 CFS
.03
.06
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1018.0
1017.5
1017.0
1016.5
1016.0
1015.5
1015.0
1014.5
1014.0
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

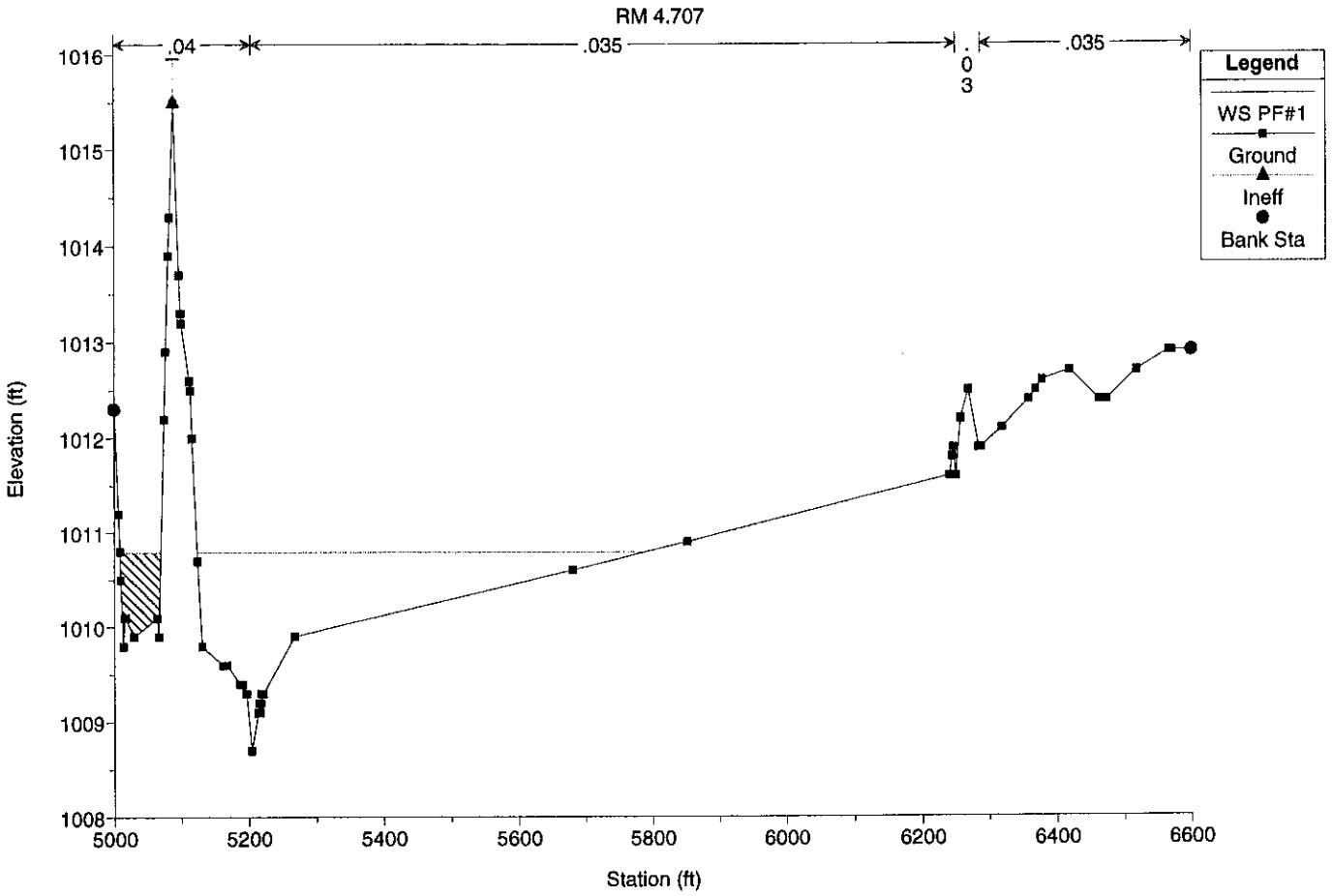

Tolleson FIS Plan 02 5/6/99
RM 5.047, RSRI, Q=760 CFS
.03
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1017.0
1016.5
1016.0
1015.5
1015.0
1014.5
1014.0
1013.5
5000
5200
5400
5600
5800
6000
6200
Station (ft)

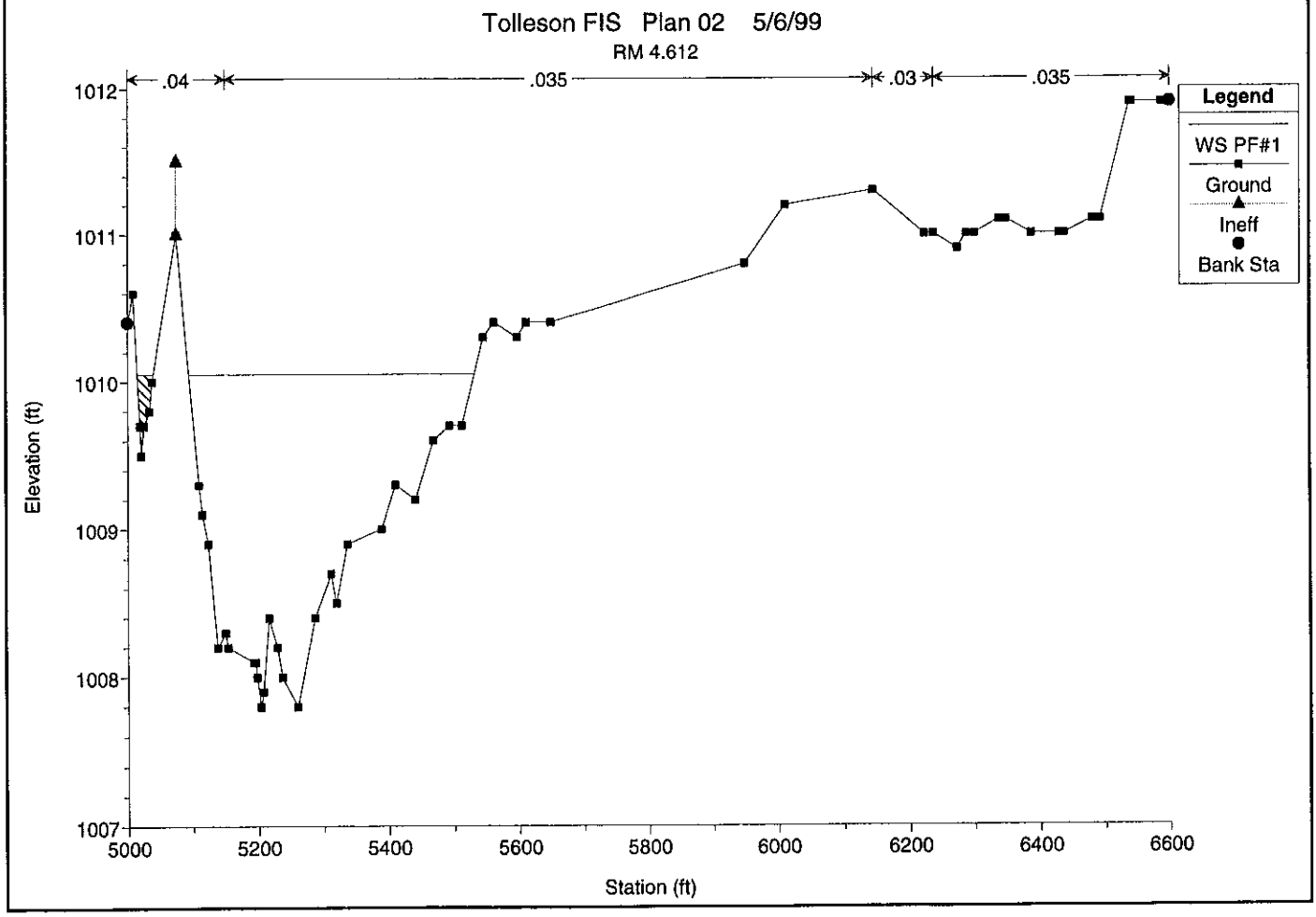

Tolleson FIS Plan 02 5/6/99
RM 5.040
.03
.035
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1018
1017
1016
1015
1014
1013
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

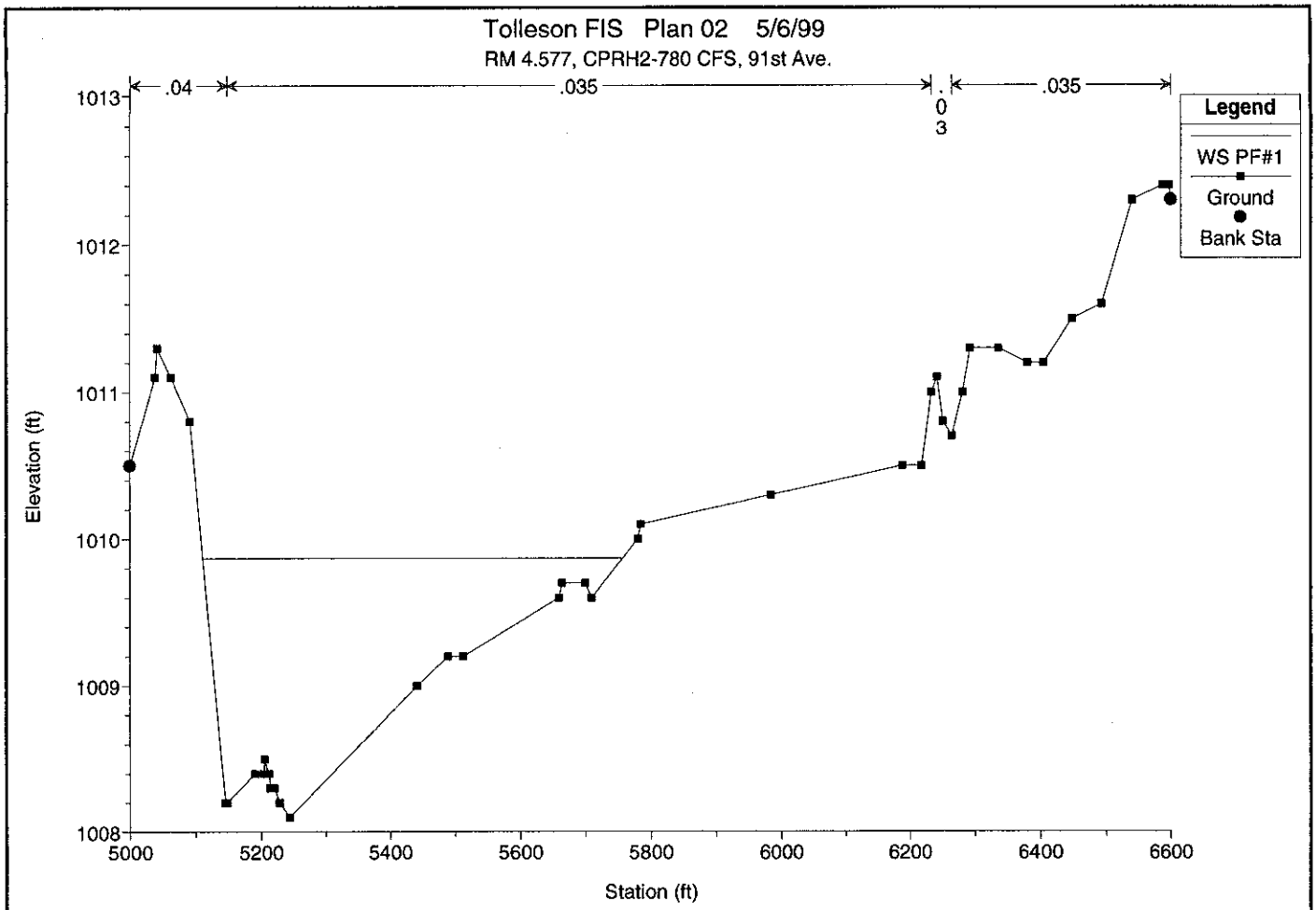

Tolleson FIS Plan 02 5/6/99
RM 4.991
.04
.035
.03
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1017
1016
1015
1014
1013
1012
1011
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

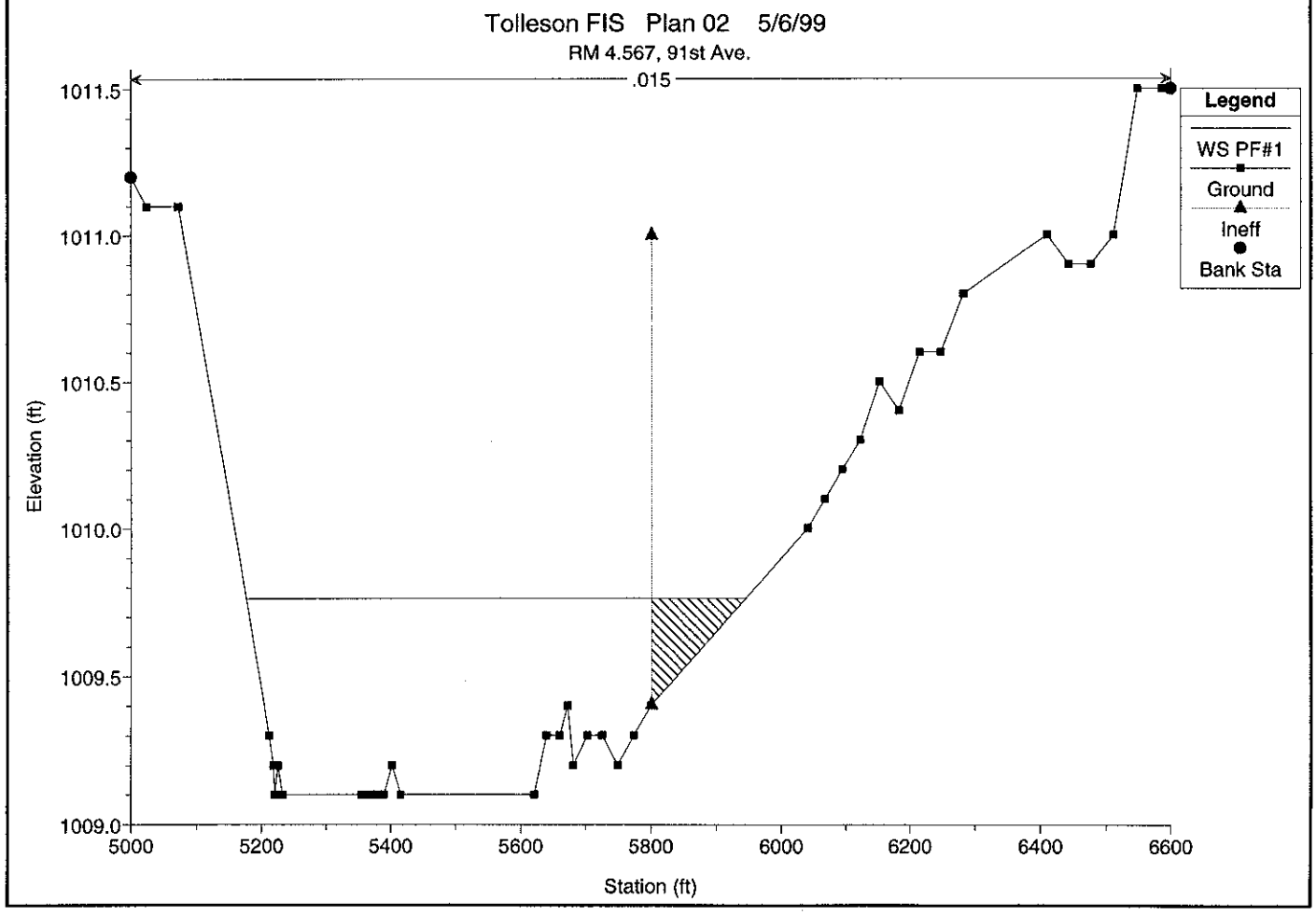

Tolleson FIS Plan 02 5/6/99
RM 4.896
.04
.035
.03
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1016
1015
1014
1013
1012
1011
1010
5000
5200
5400
5600
5800
6000
6200
6400
6600

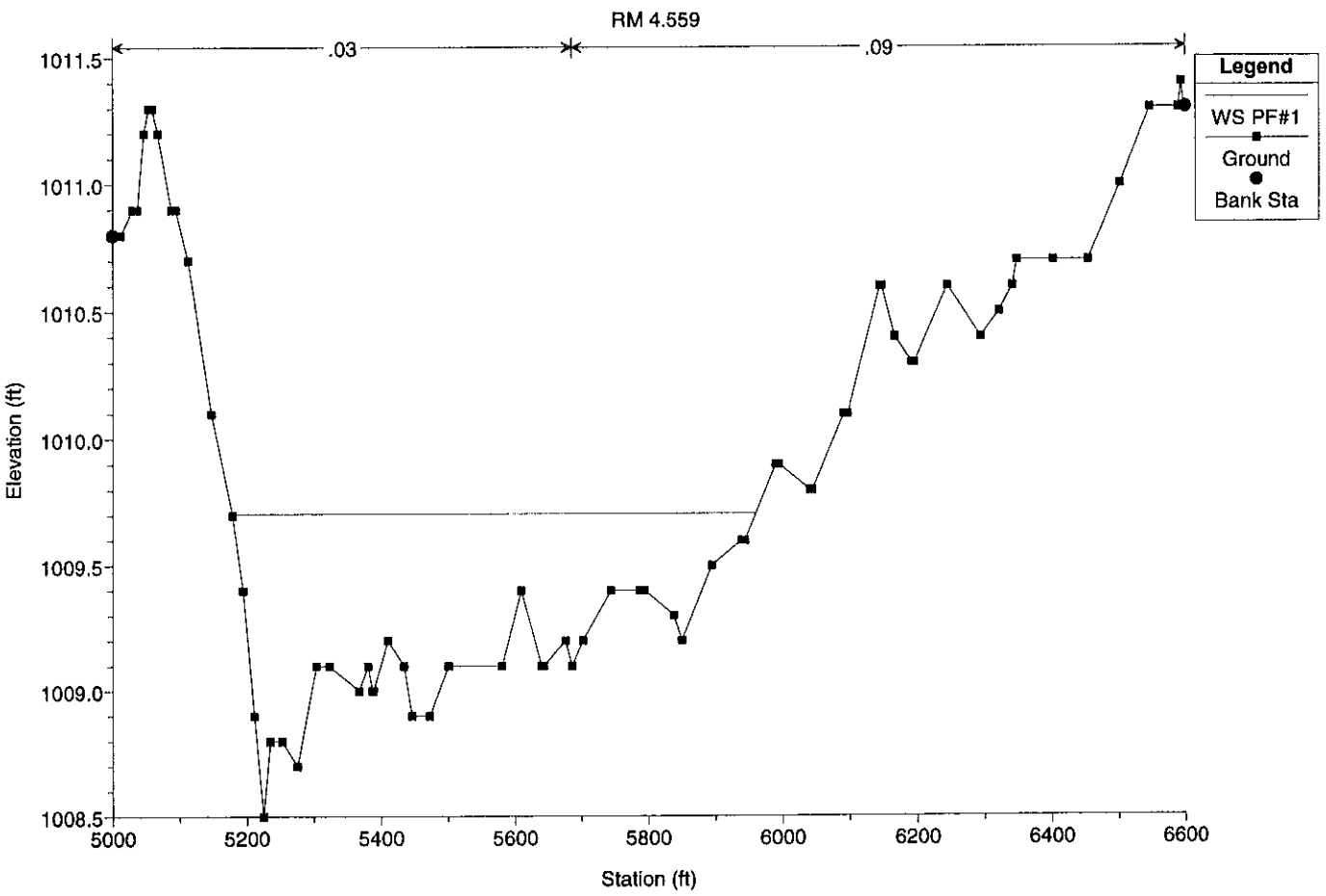

Tolleson FIS Plan 02 5/6/99
RM 4.802
.04
.035
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1020
1018
1016
1014
1012
1010
1008
5000
5200
5400
5600
5800
6000
6200
6400
6600

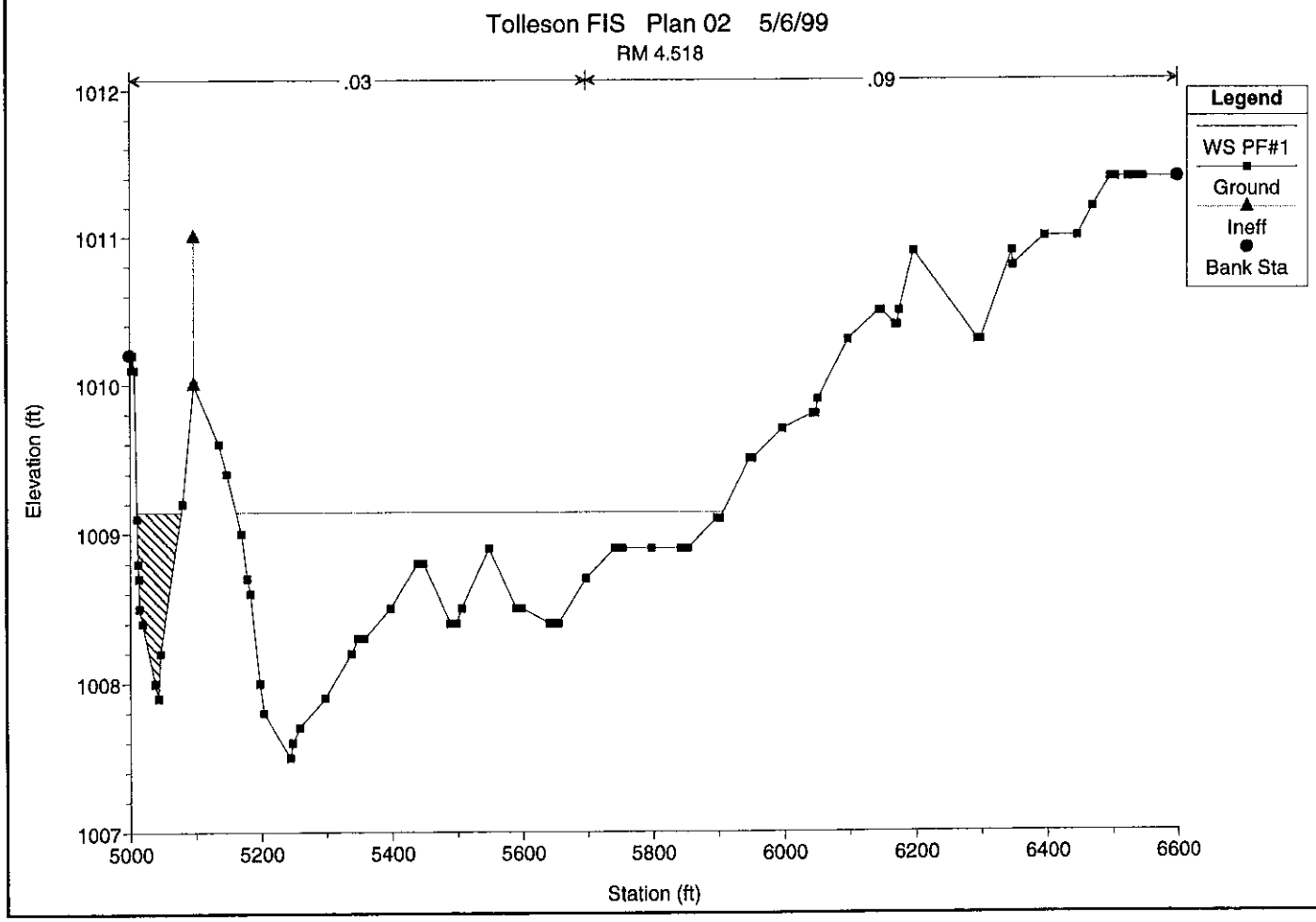

Tolleson FIS Plan 02 5/6/99
RM 4.707
.04
.035
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1016
1015
1014
1013
1012
1011
1010
1009
1008
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

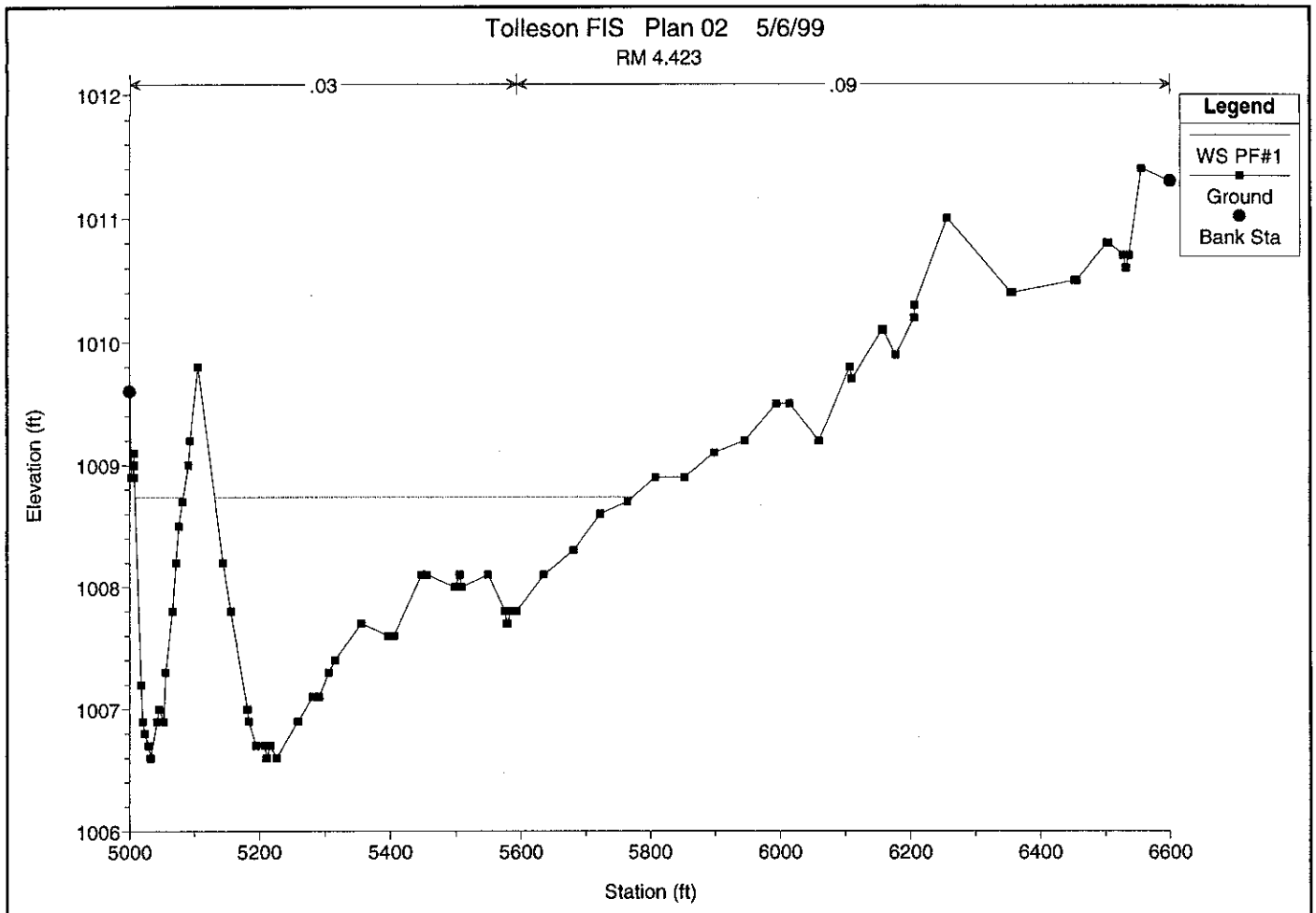

Tolleson FIS Plan 02 5/6/99
RM 4.612
.04
.035
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1012
1011
1010
1009
1008
1007
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

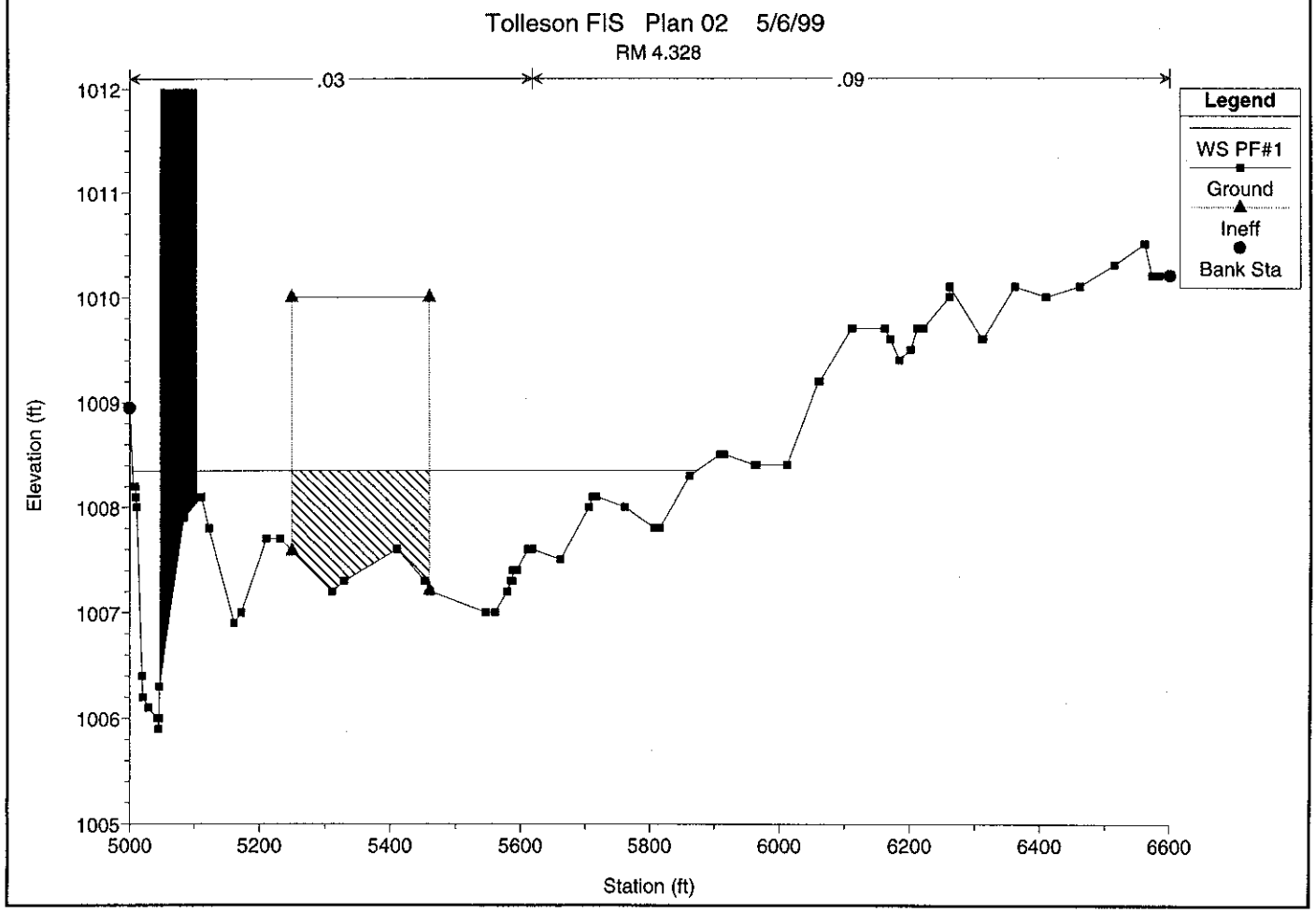

Tolleson FIS Plan 02 5/6/99
RM 4.577, CPRH2-780 CFS, 91st Ave.
.04
.035
.03
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1013
1012
1011
1010
1009
1008
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

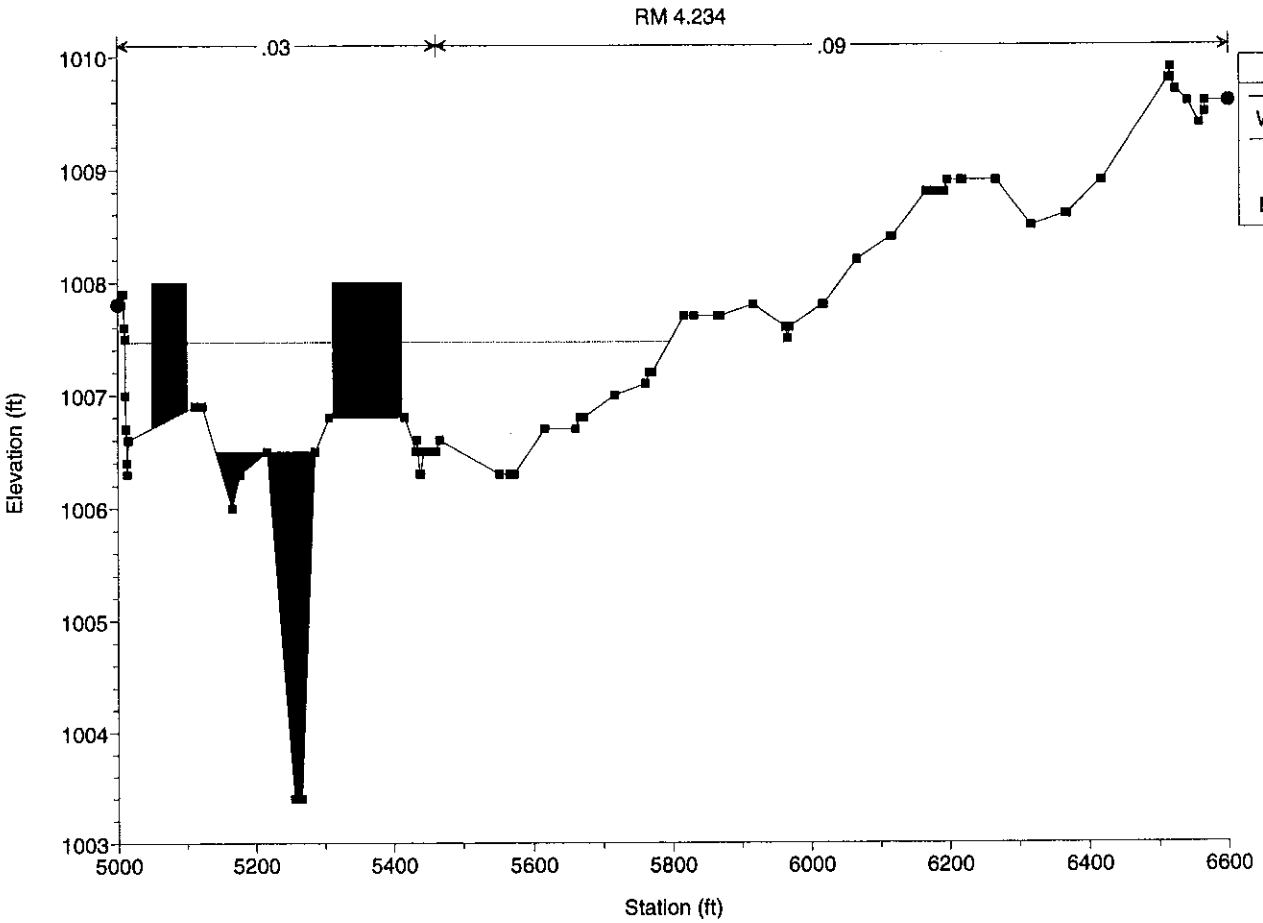

Tolleson FIS Plan 02 5/6/99
RM 4.567, 91st Ave.
.015
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1011.5
1011.0
1010.5
1010.0
1009.5
1009.0
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

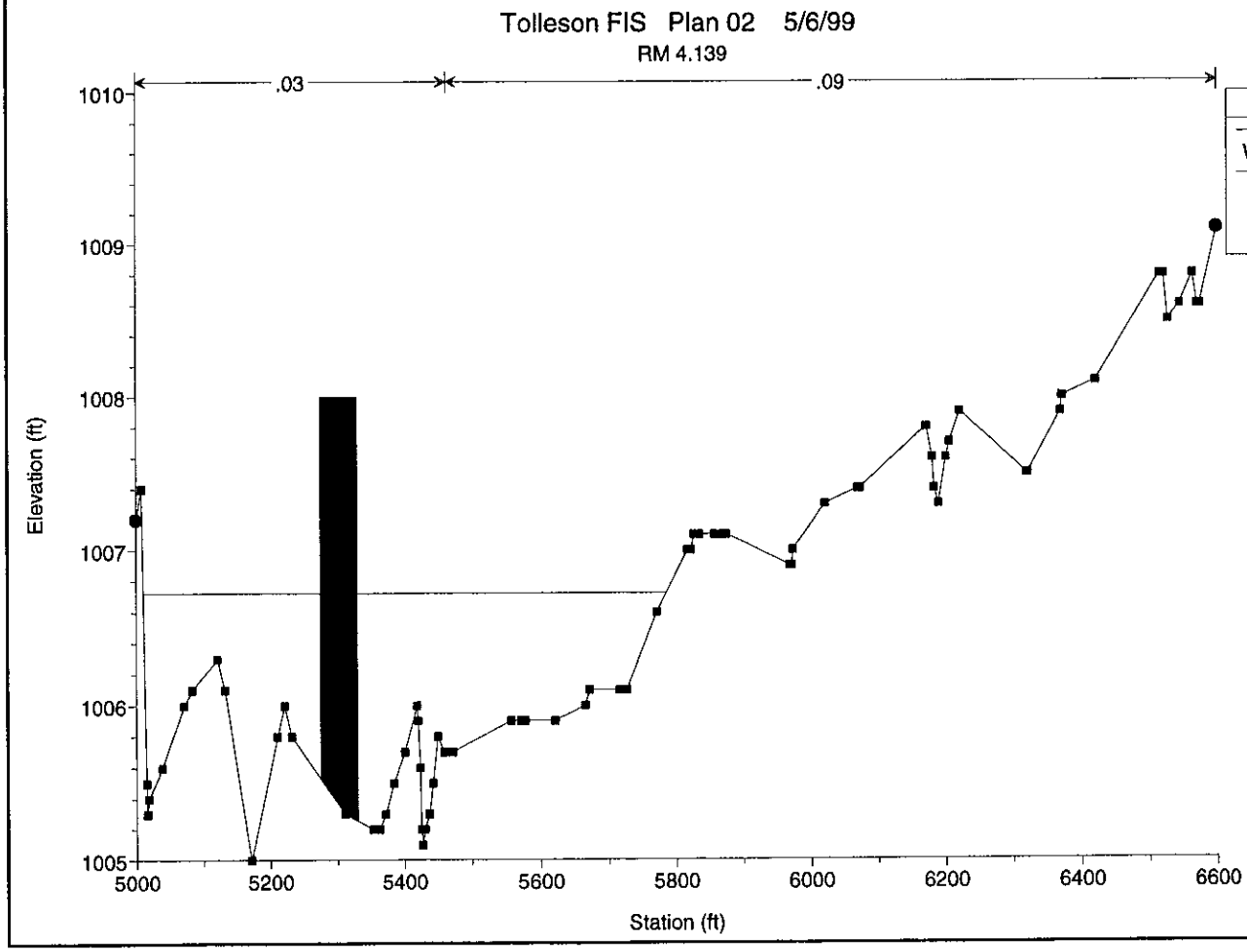

Tolleson FIS Plan 02 5/6/99
RM 4.559
.03
.09
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1011.5
1011.0
1010.5
1010.0
1009.5
1009.0
1008.5
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

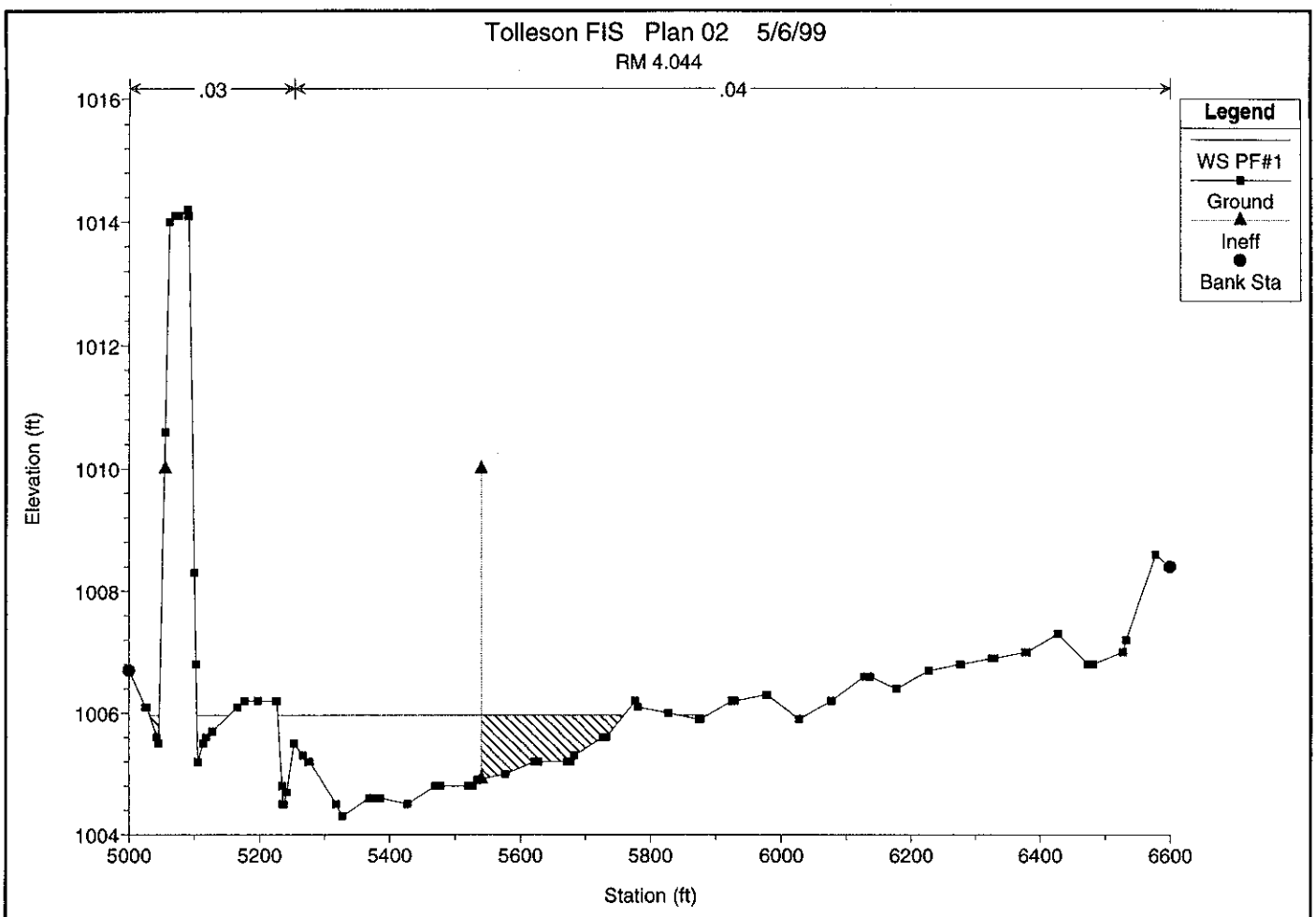

Tolleson FIS Plan 02 5/6/99
RM 4.518
.03
.09
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1012
1011
1010
1009
1008
1007
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

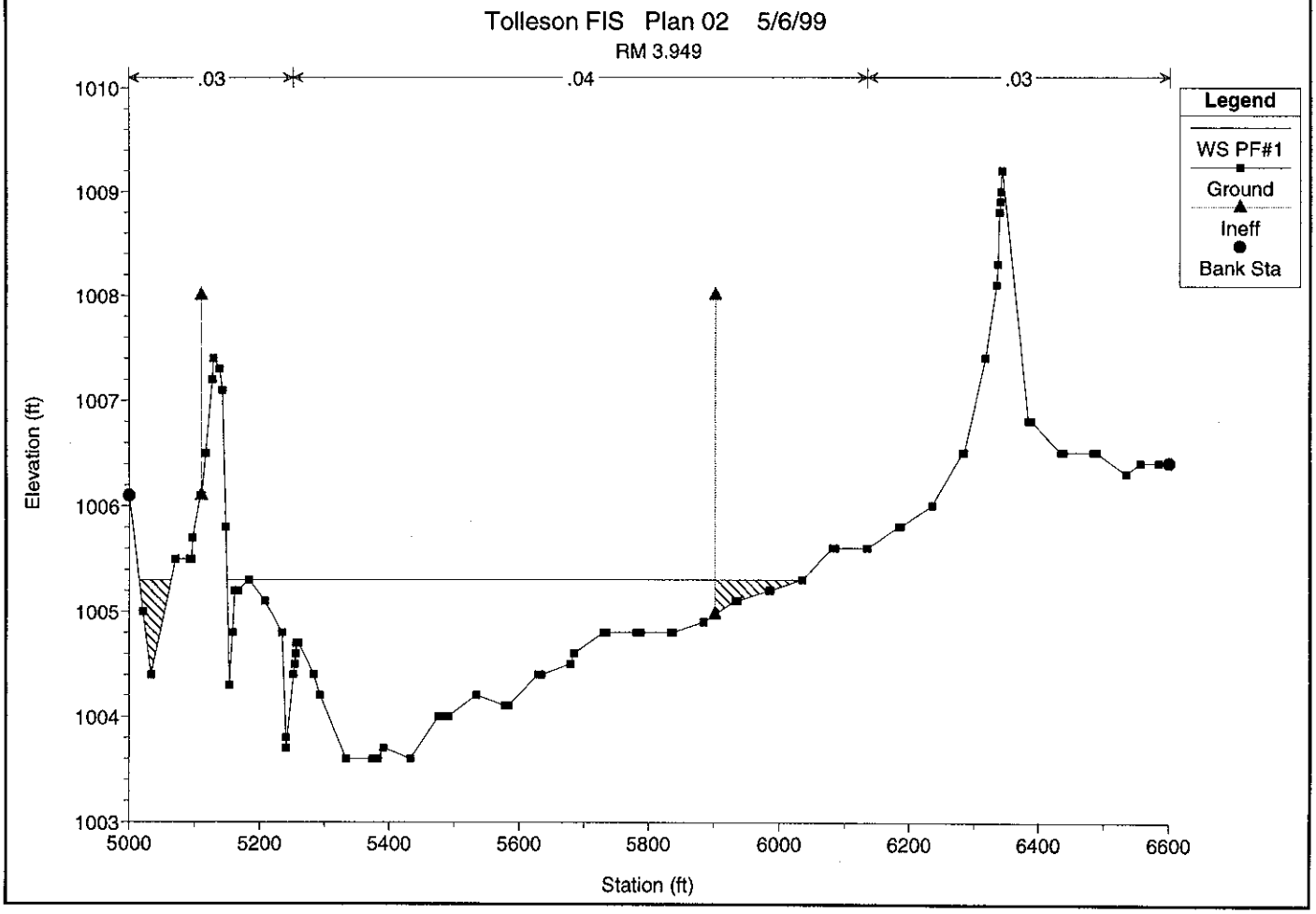

Tolleson FIS Plan 02 5/6/99
RM 4.423
.03
.09
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1006
1007
1008
1009
1010
1011
1012
5000
5200
5400
5600
5800
6000
6200
6400
6600

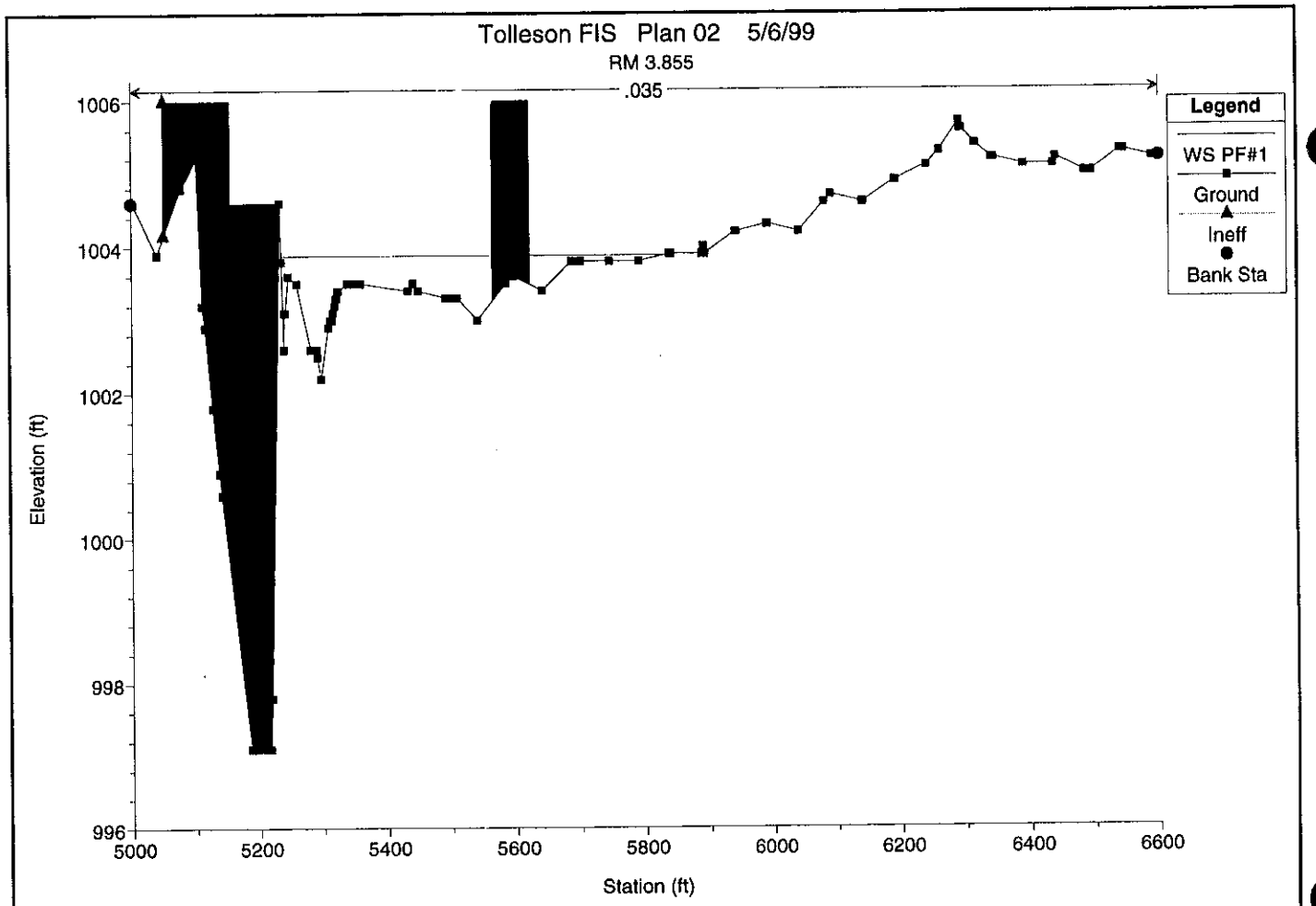

Tolleson FIS Plan 02 5/6/99
RM 4.328
.03
.09
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1005
1006
1007
1008
1009
1010
1011
1012
5000
5200
5400
5600
5800
6000
6200
6400
6600

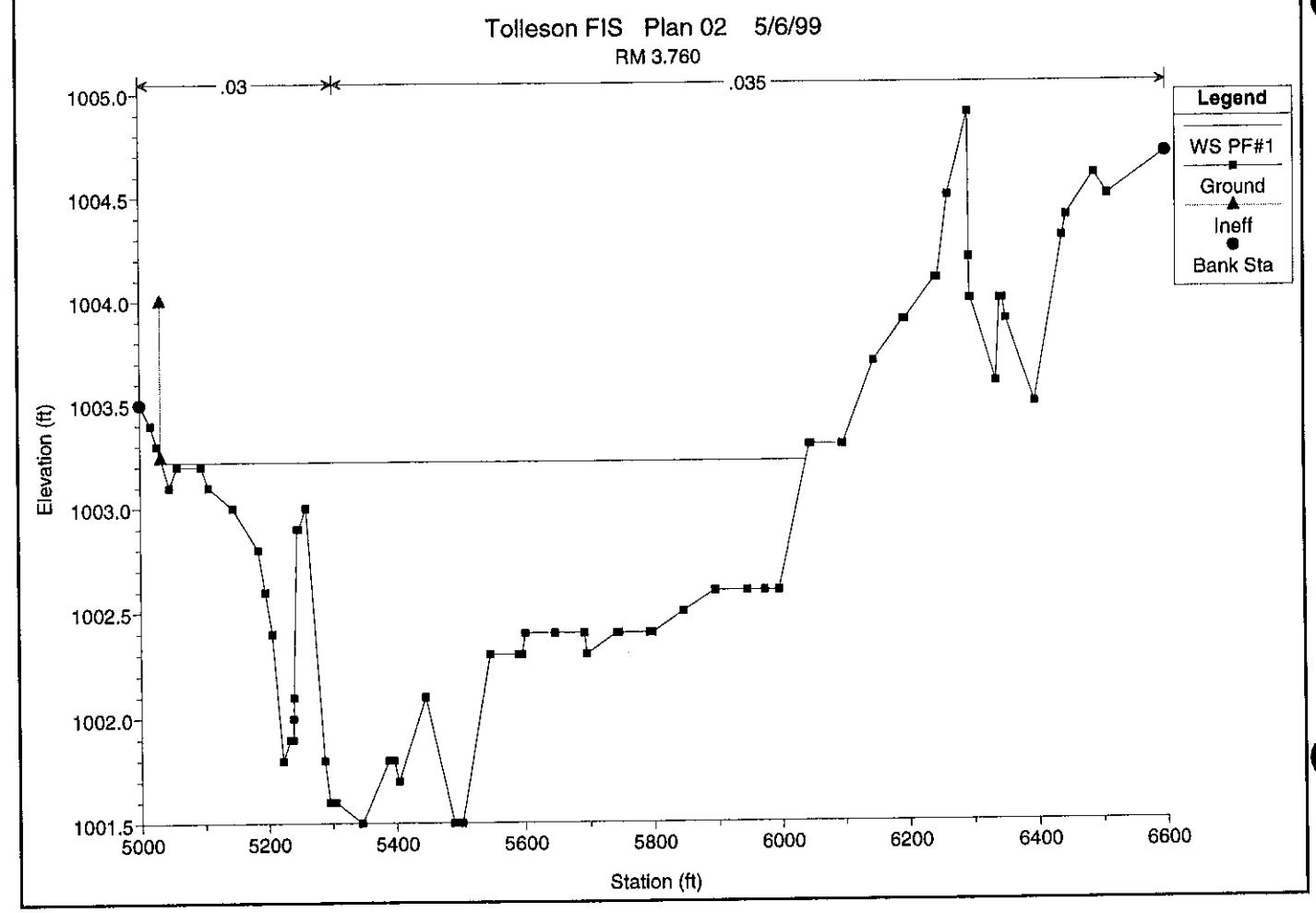

Tolleson FIS Plan 02 5/6/99
RM 4.234
.03
.09
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1010
1009
1008
1007
1006
1005
1004
1003
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

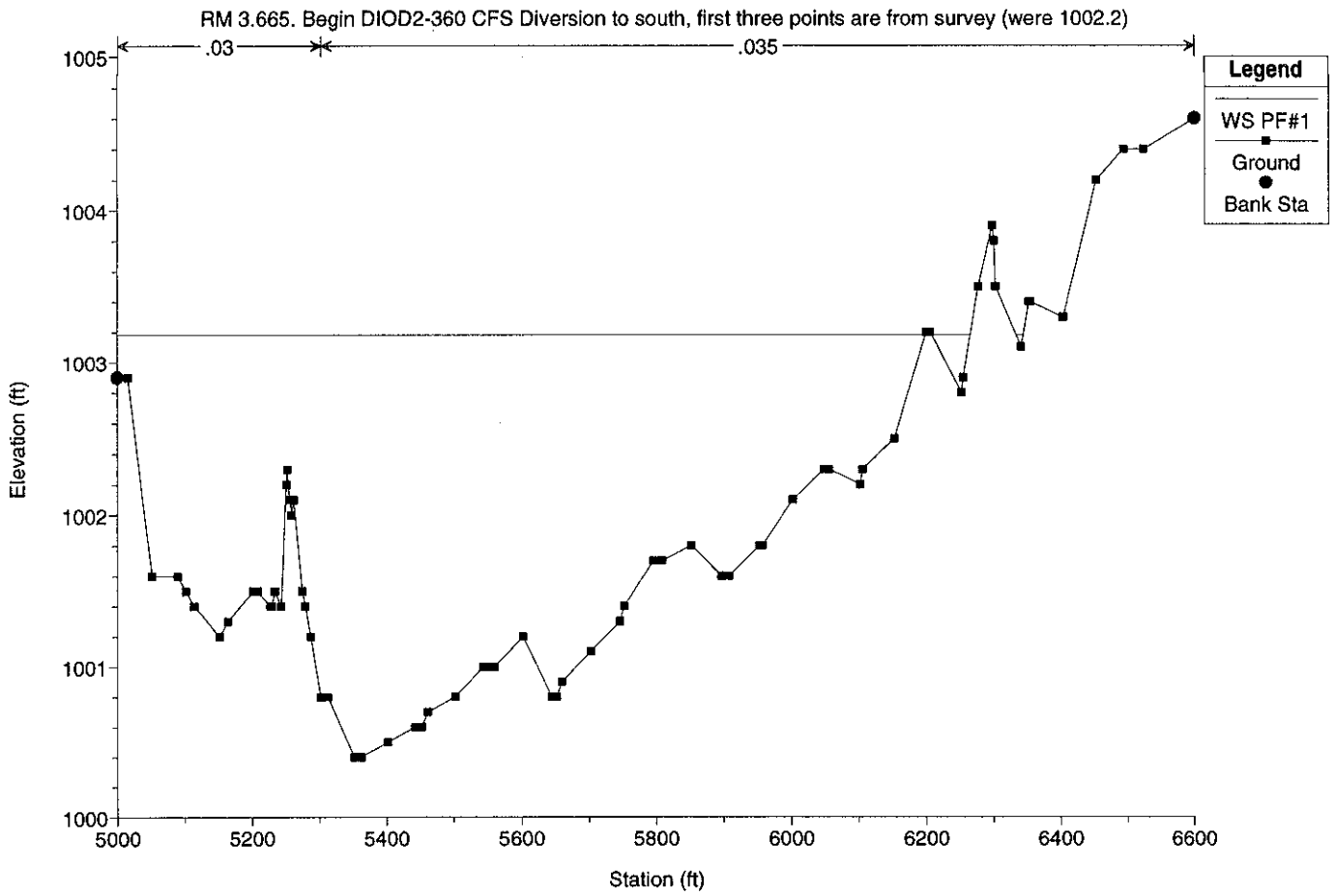

Tolleson FIS Plan 02 5/6/99
RM 4.139
.03
.09
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1010
1009
1008
1007
1006
1005
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

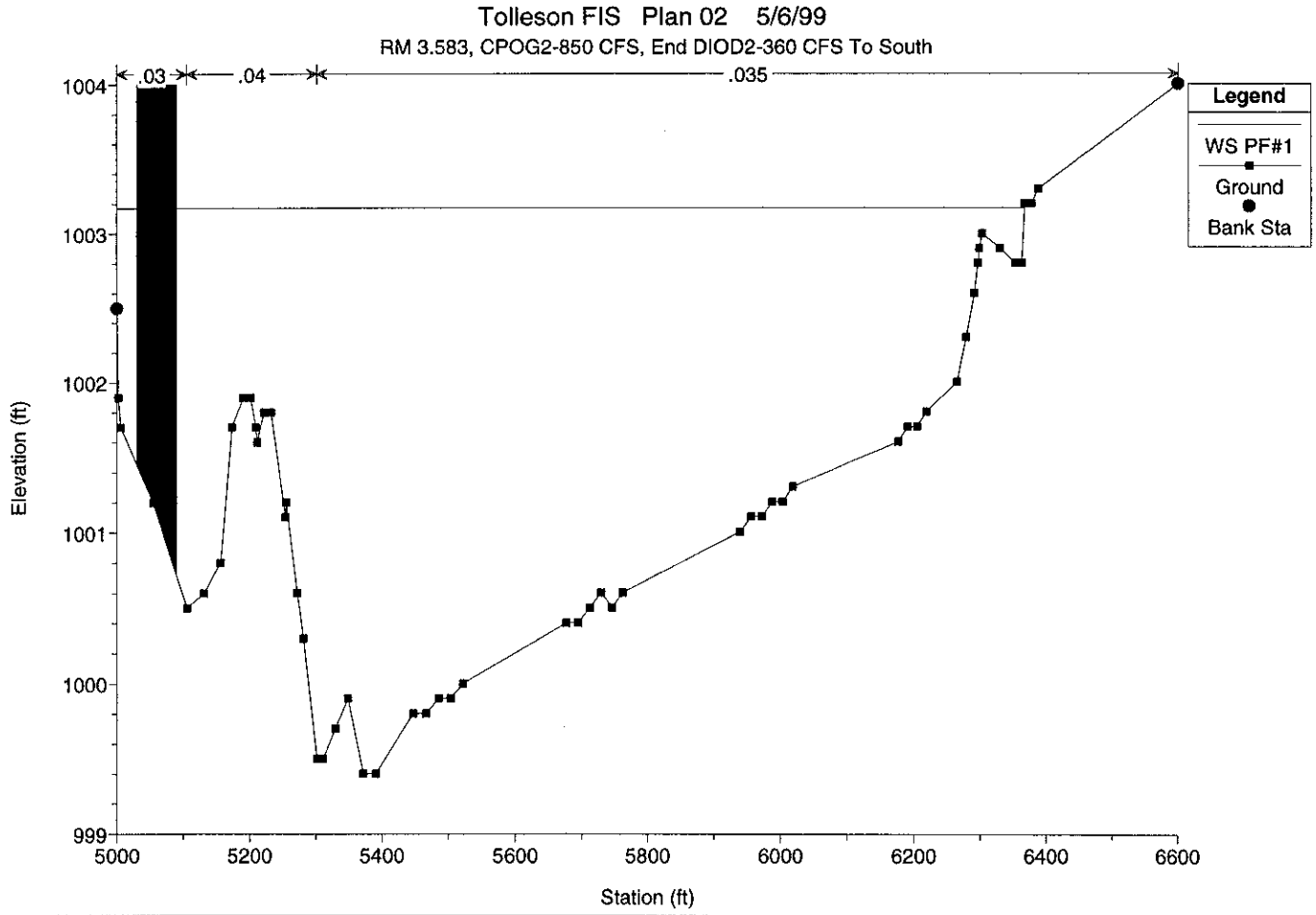

Tolleson FIS Plan 02 5/6/99
RM 4.044
.03
.04
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1016
1014
1012
1010
1008
1006
1004
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

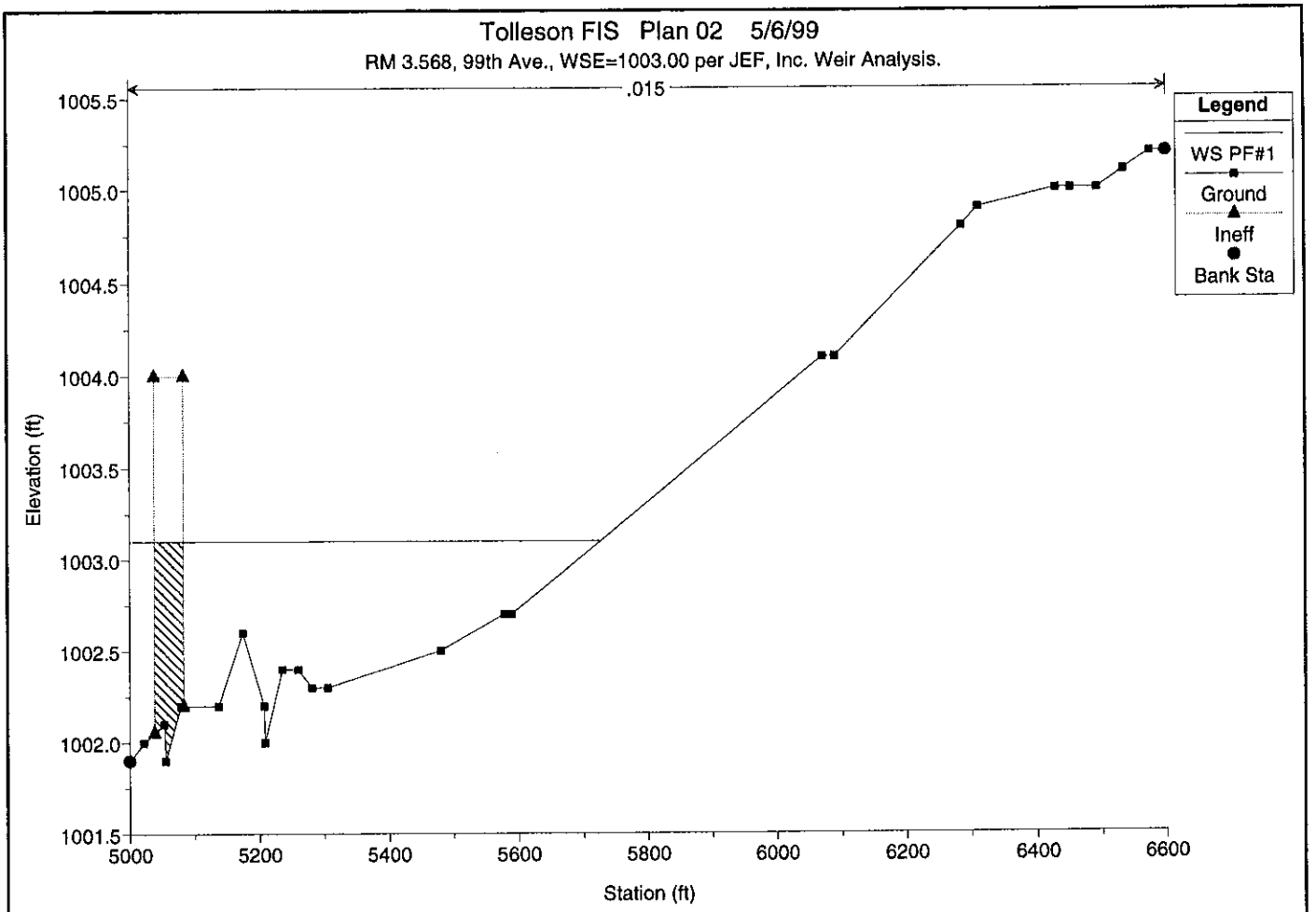

Tolleson FIS Plan 02 5/6/99
RM 3.949
.03
.04
.03
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1010
1009
1008
1007
1006
1005
1004
1003
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

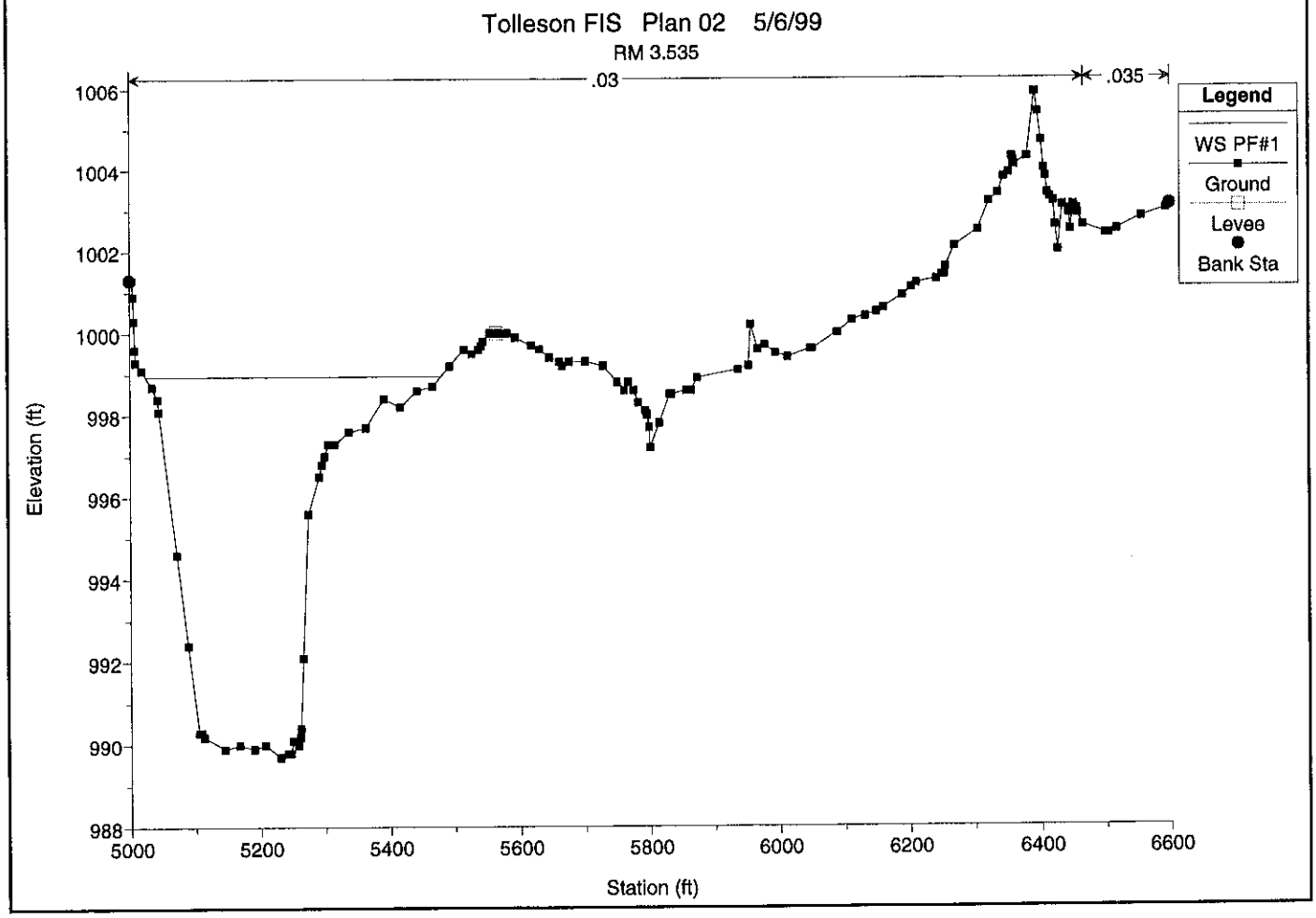

Tolleson FIS Plan 02 5/6/99
RM 3.855
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1006
1004
1002
1000
998
996
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

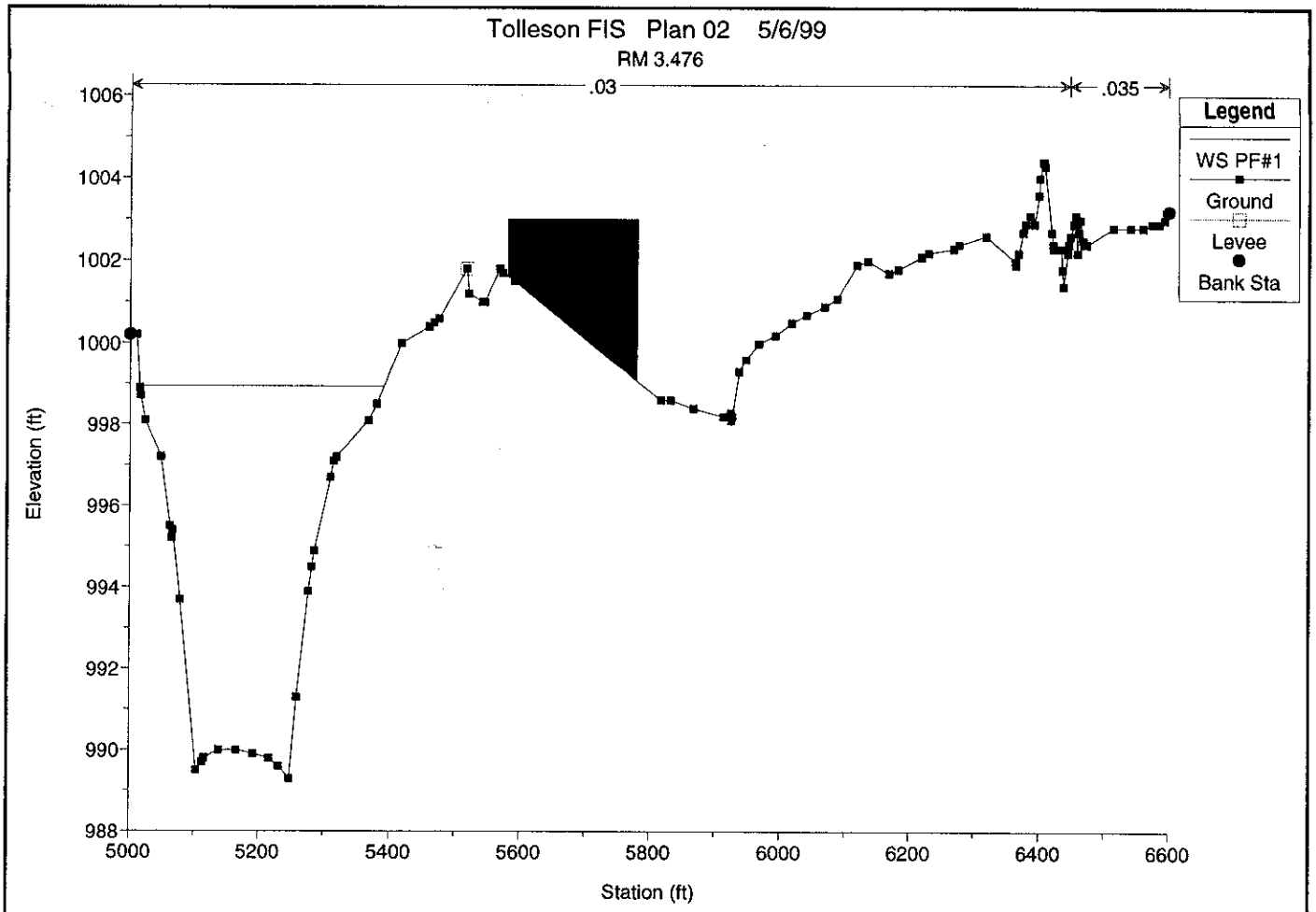

Tolleson FIS Plan 02 5/6/99
RM 3.760
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1005.0
1004.5
1004.0
1003.5
1003.0
1002.5
1002.0
1001.5
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

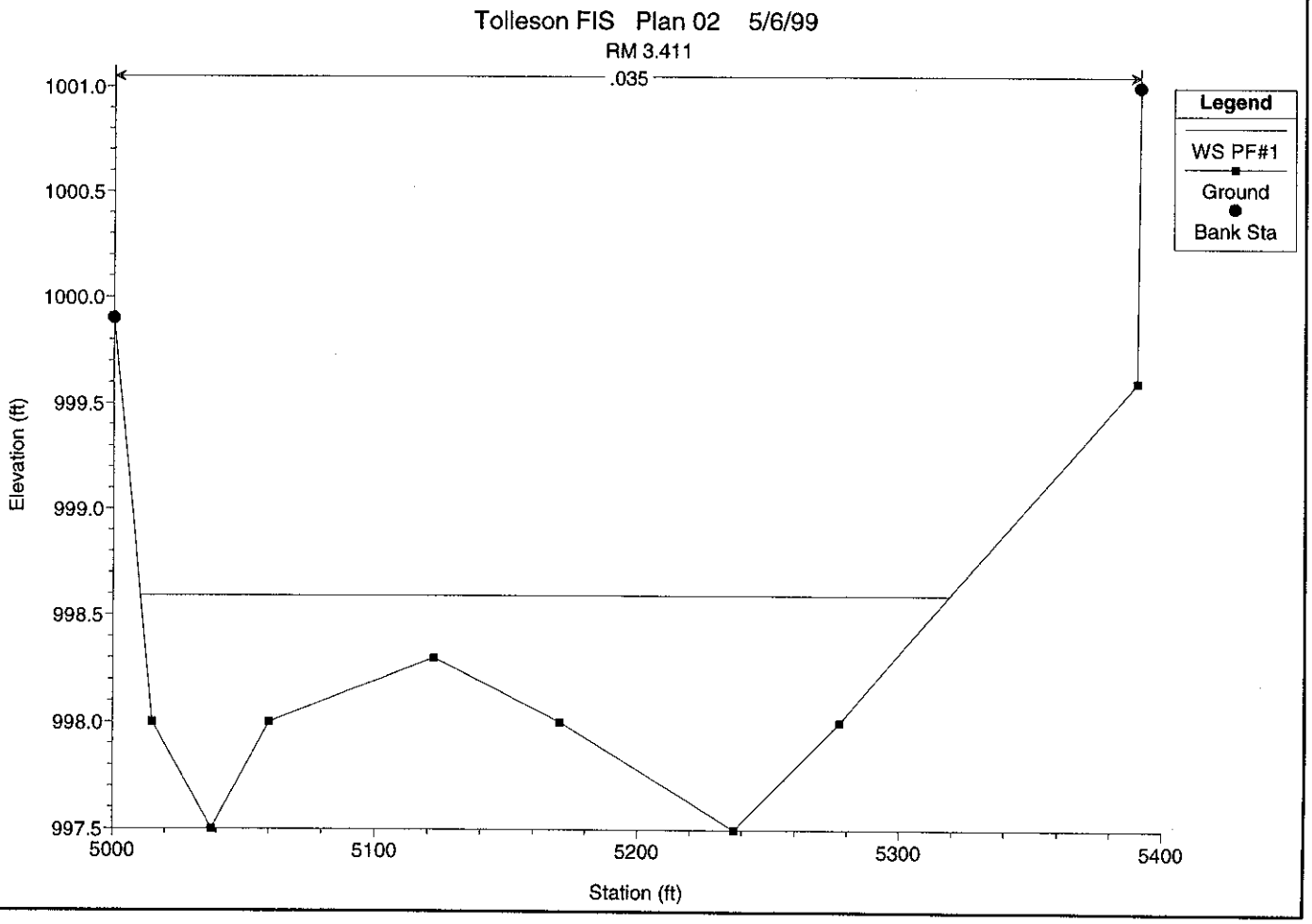

Tolleson FIS Plan 02 5/6/99
RM 3.665. Begin DIOD2-360 CFS Diversion to south, first three points are from survey (were 1002.2)
.03
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1005
1004
1003
1002
1001
1000
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

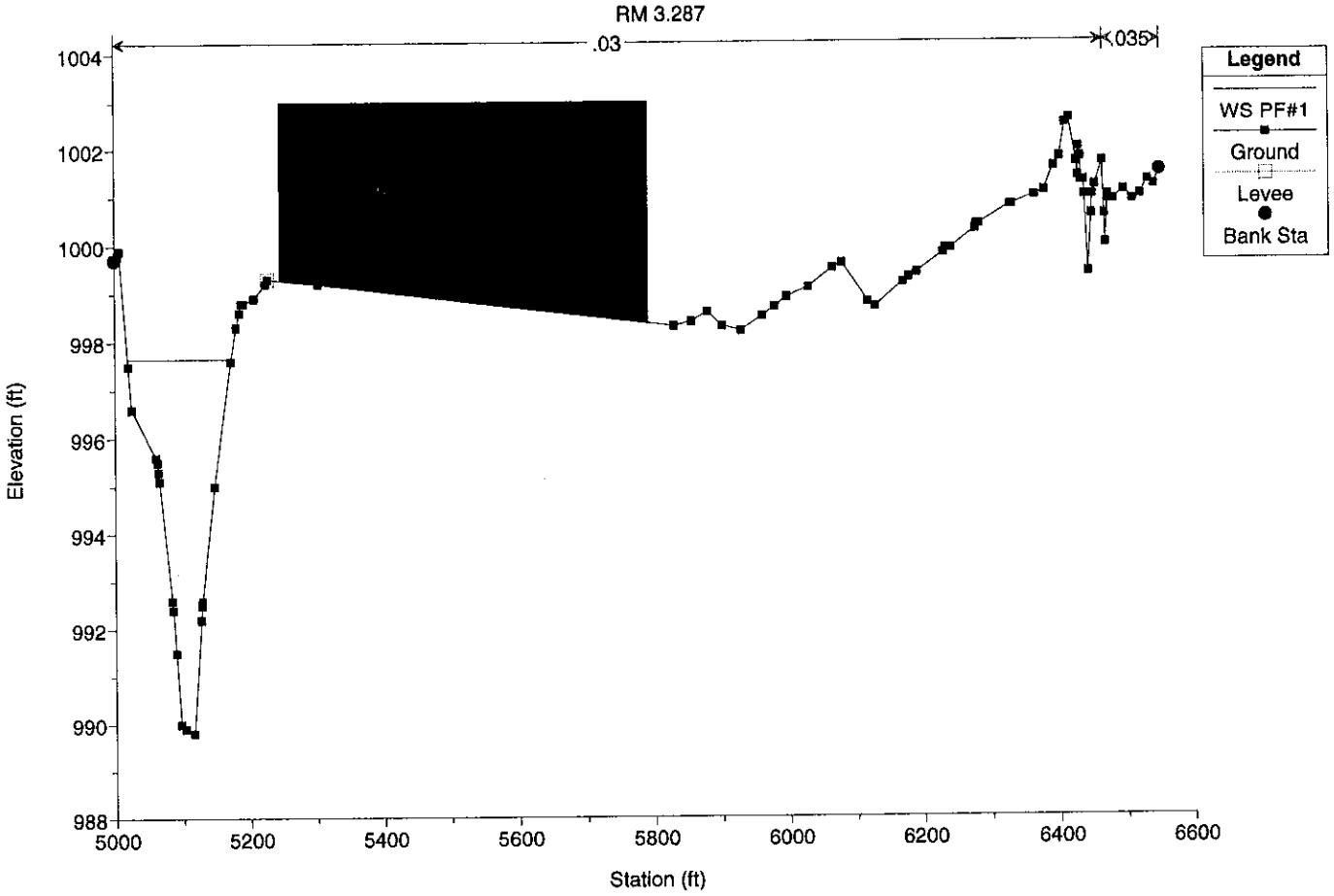

Tolleson FIS Plan 02 5/6/99
RM 3.583, CPOG2-850 CFS, End DIOD2-360 CFS To South
.03
.04
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1004
1003
1002
1001
1000
999
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

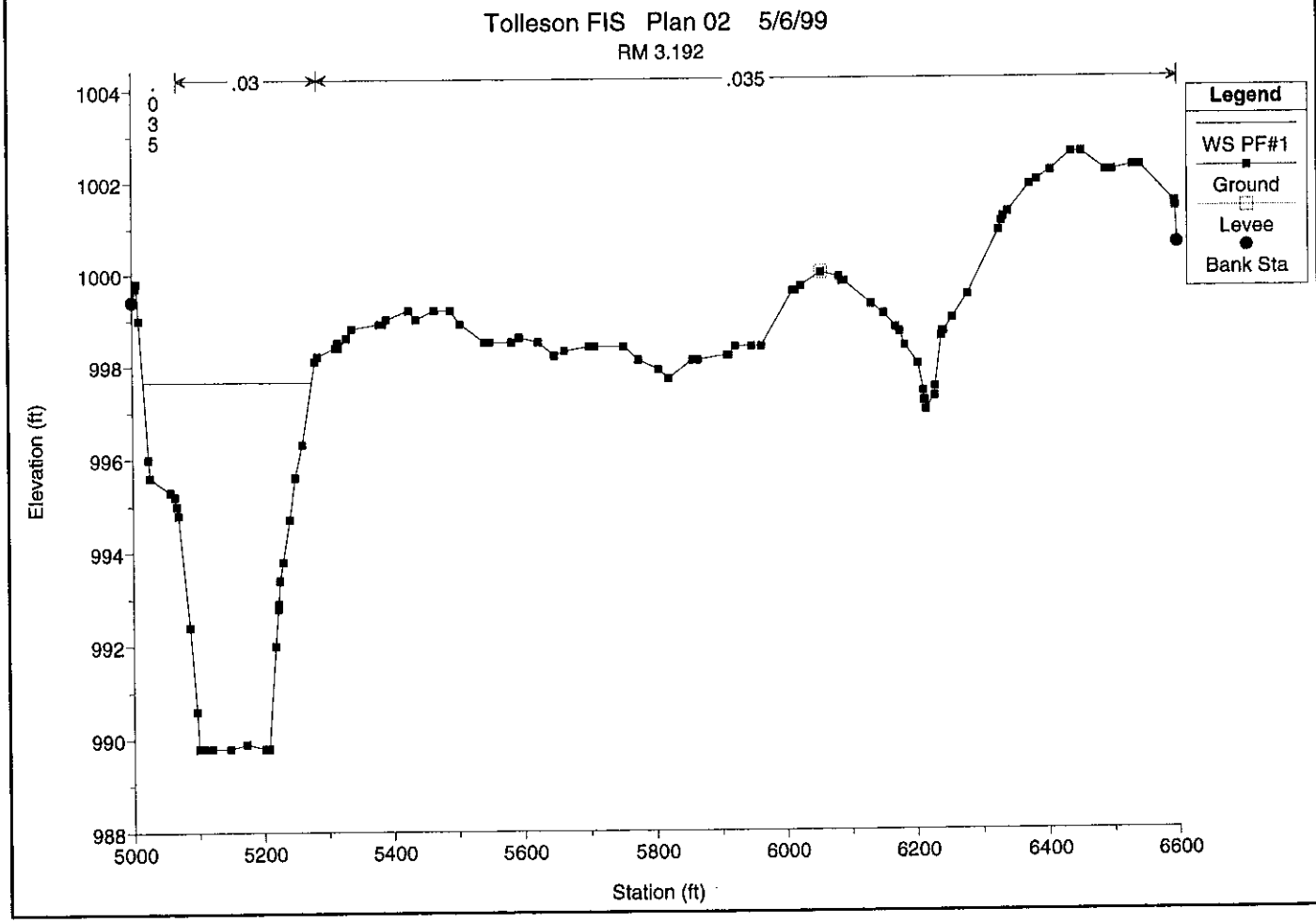

Tolleson FIS Plan 02 5/6/99
RM 3.568, 99th Ave., WSE=1003.00 per JEF, Inc. Weir Analysis.
.015
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1005.5
1005.0
1004.5
1004.0
1003.5
1003.0
1002.5
1002.0
1001.5
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

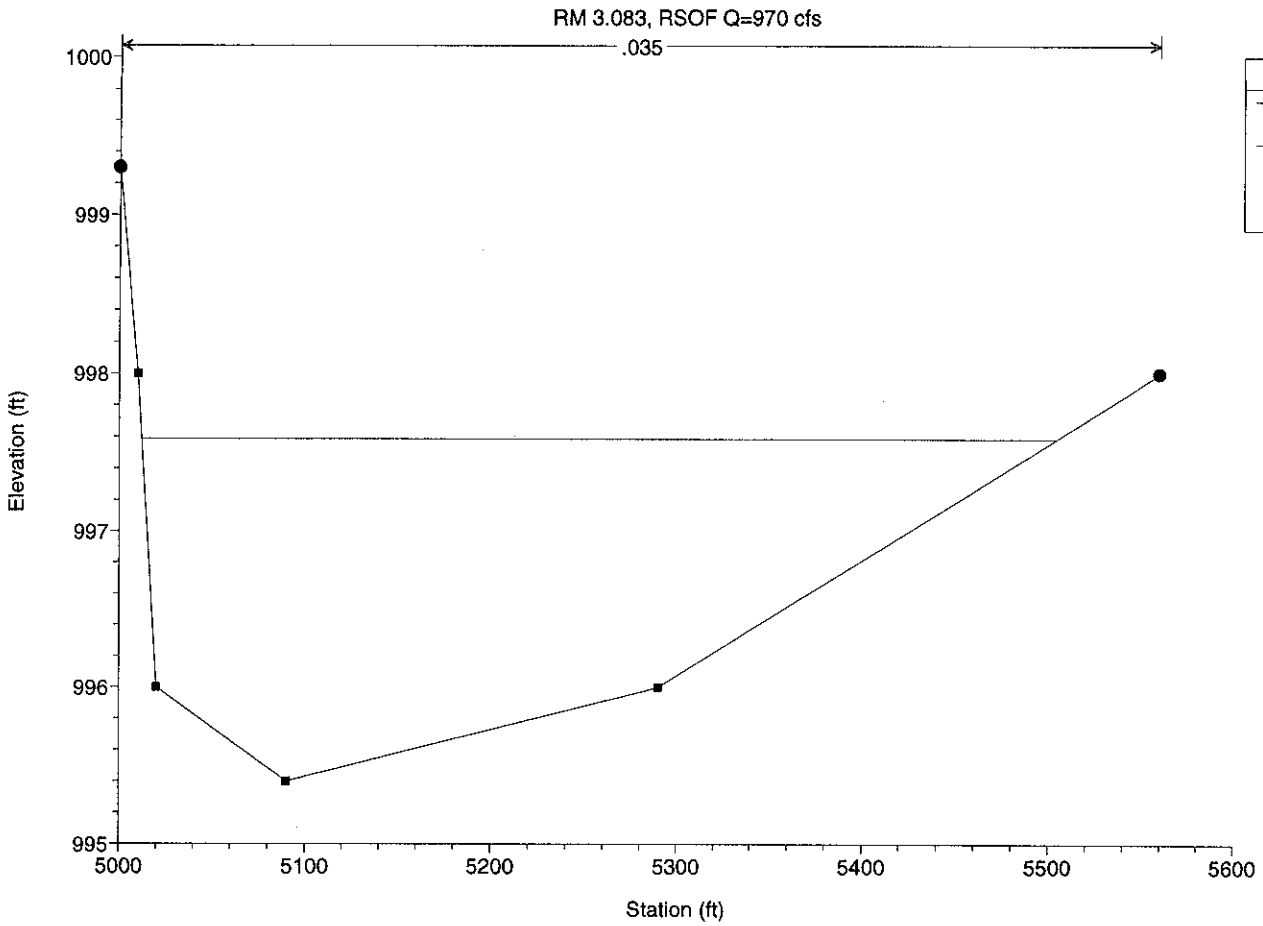

Tolleson FIS Plan 02 5/6/99
RM 3.535
.03
.035
Legend
WS PF#1
Ground
Levee
Bank Sta
Elevation (ft)
1006
1004
1002
1000
998
996
994
992
990
988
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

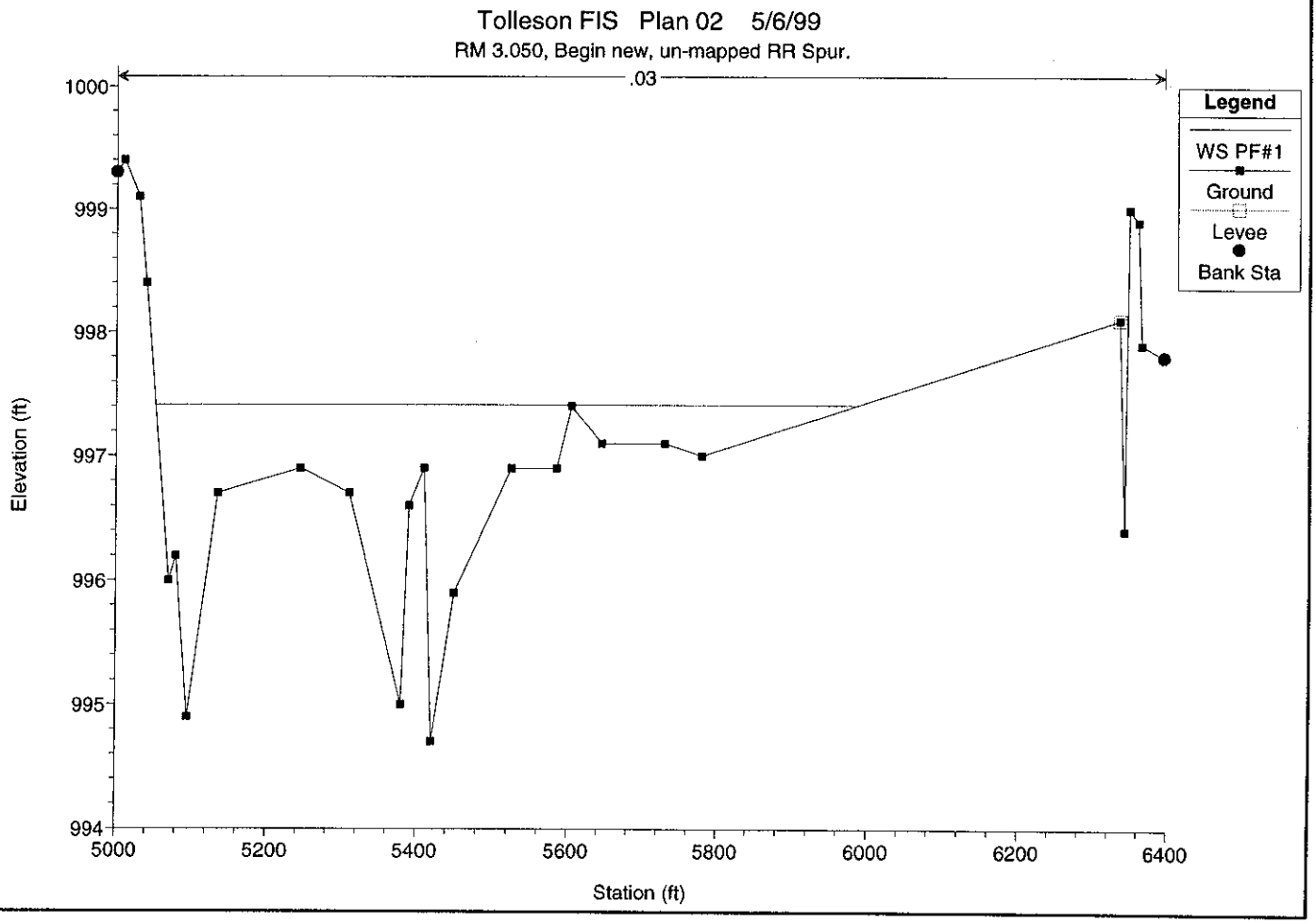

Tolleson FIS Plan 02 5/6/99
RM 3.476
.03
.035
Legend
WS PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
1006
1004
1002
1000
998
996
994
992
990
988
5000
5200
5400
5600
5800
6000
6200
6400
6600

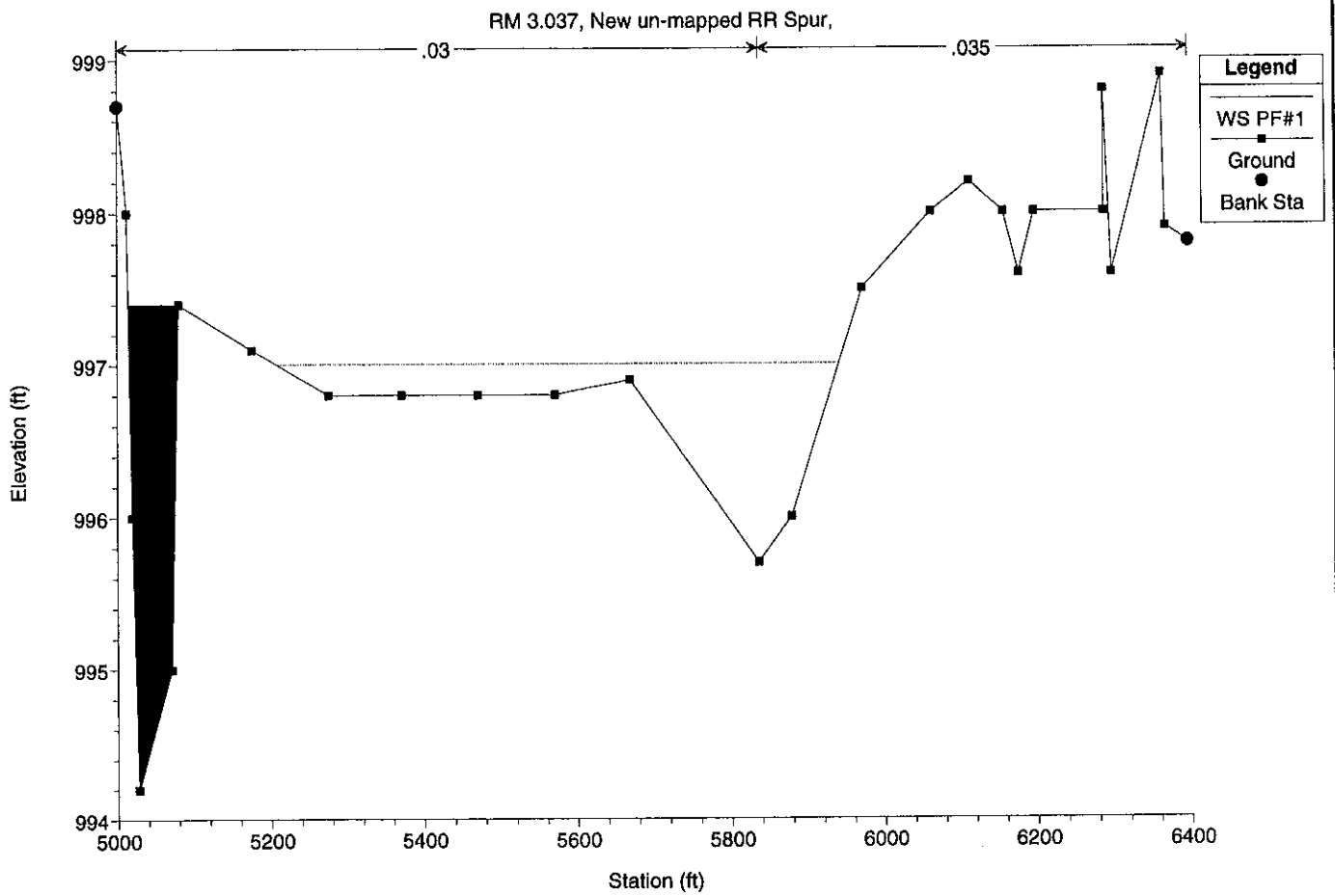

Tolleson FIS Plan 02 5/6/99
RM 3.411
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1001.0
1000.5
1000.0
999.5
999.0
998.5
998.0
997.5
5000
5100
5200
5300
5400

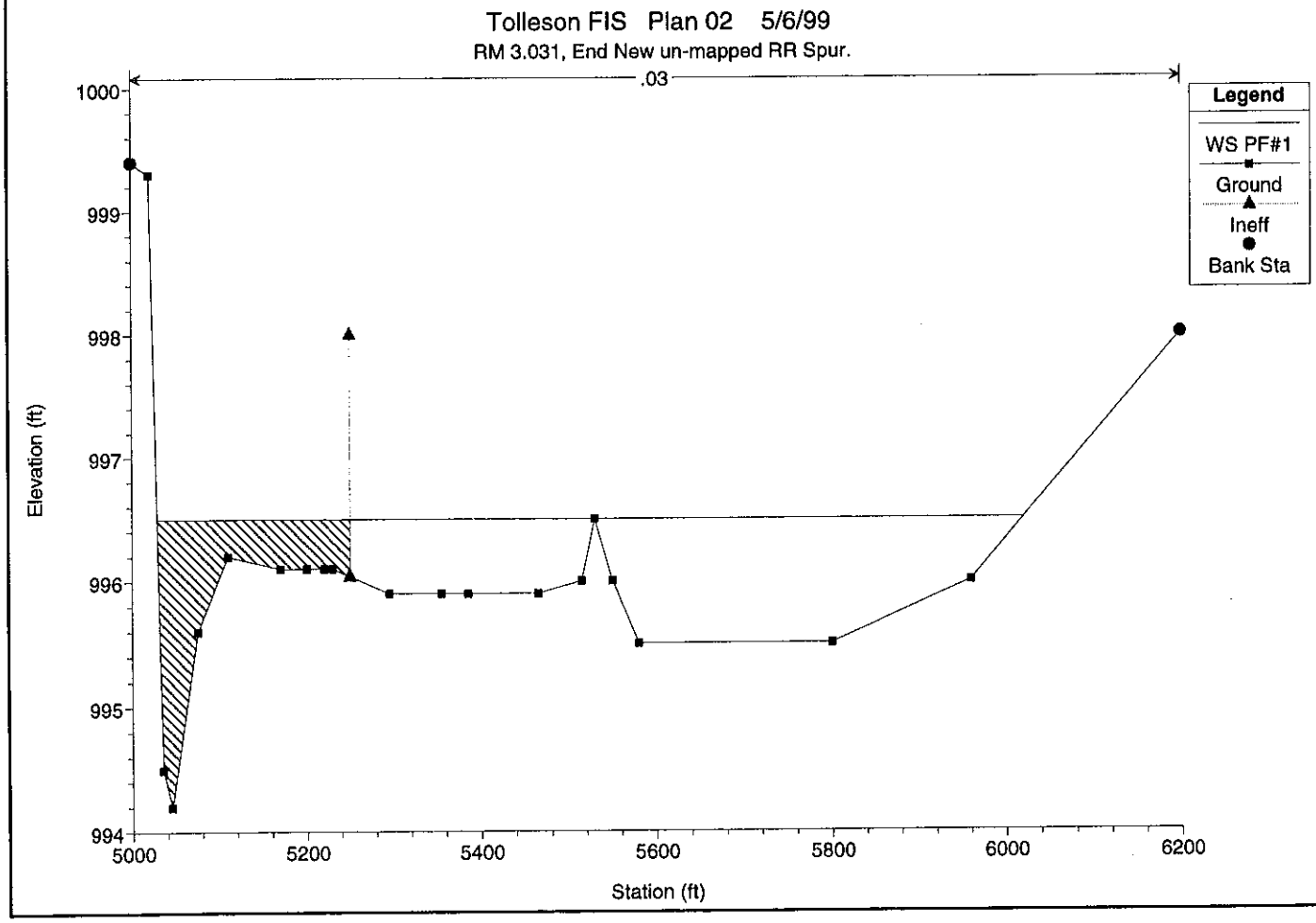

Tolleson FIS Plan 02 5/6/99
RM 3.287
.03
.035
Legend
WS PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
1004
1002
1000
998
996
994
992
990
988
5000
5200
5400
5600
5800
6000
6200
6400
6600

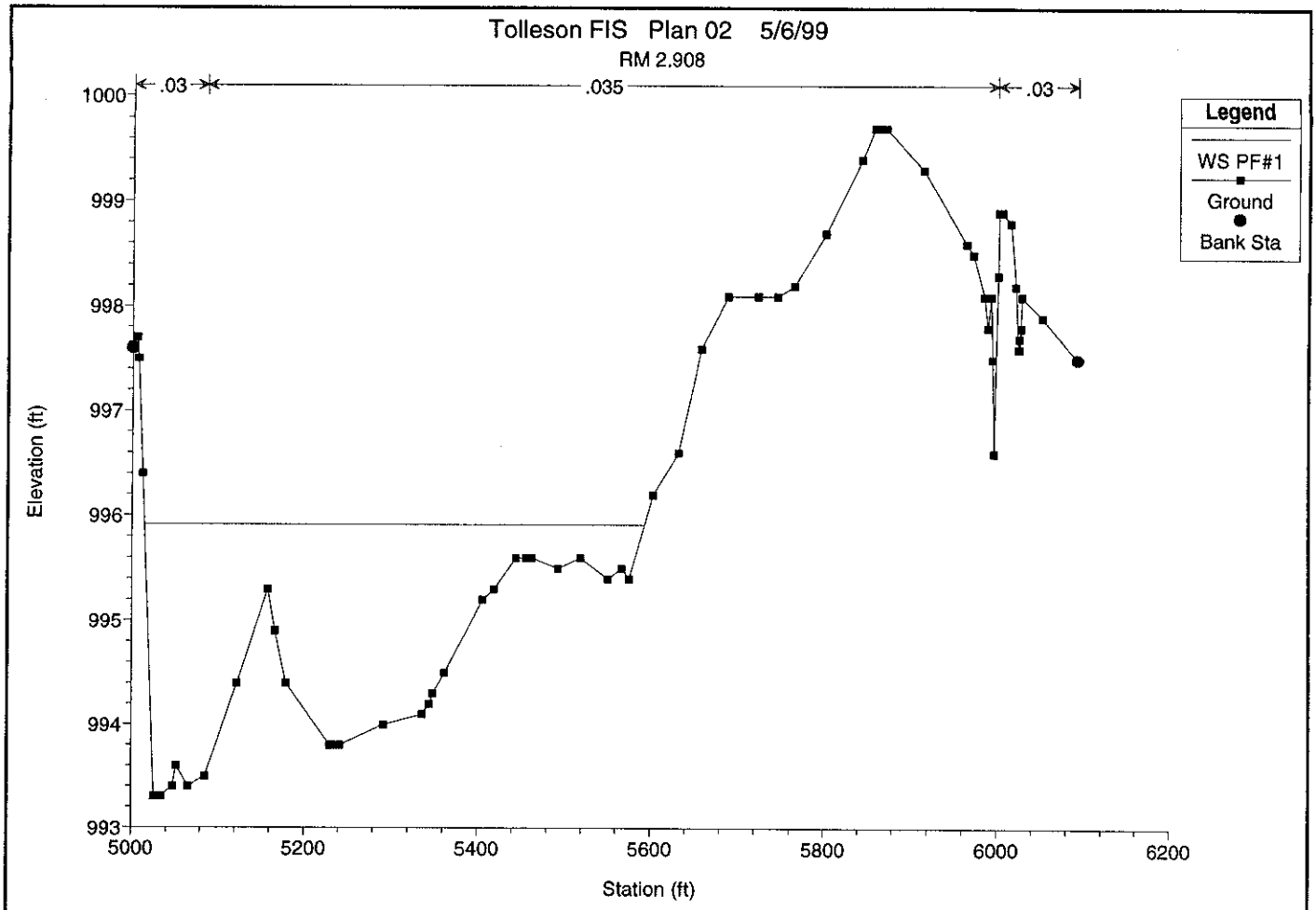

Tolleson FIS Plan 02 5/6/99
RM 3.192
.03
.035
.035
Legend
WS PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
1004
1002
1000
998
996
994
992
990
988
5000
5200
5400
5600
5800
6000
6200
6400
6600

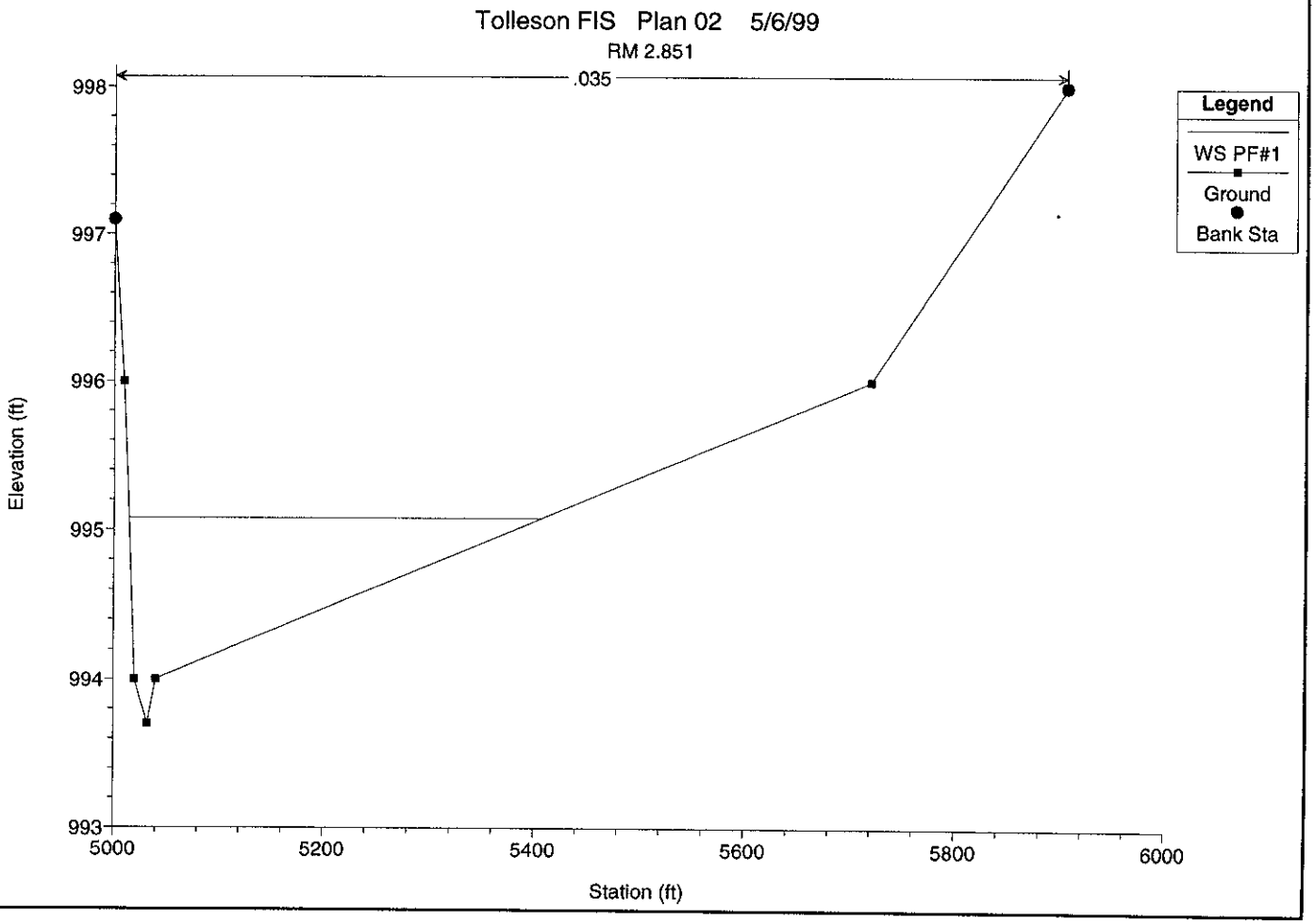

Tolleson FIS Plan 02 5/6/99
RM 3.083, RSOF Q=970 cfs
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1000
999
998
997
996
995
5000
5100
5200
5300
5400
5500
5600
Station (ft)

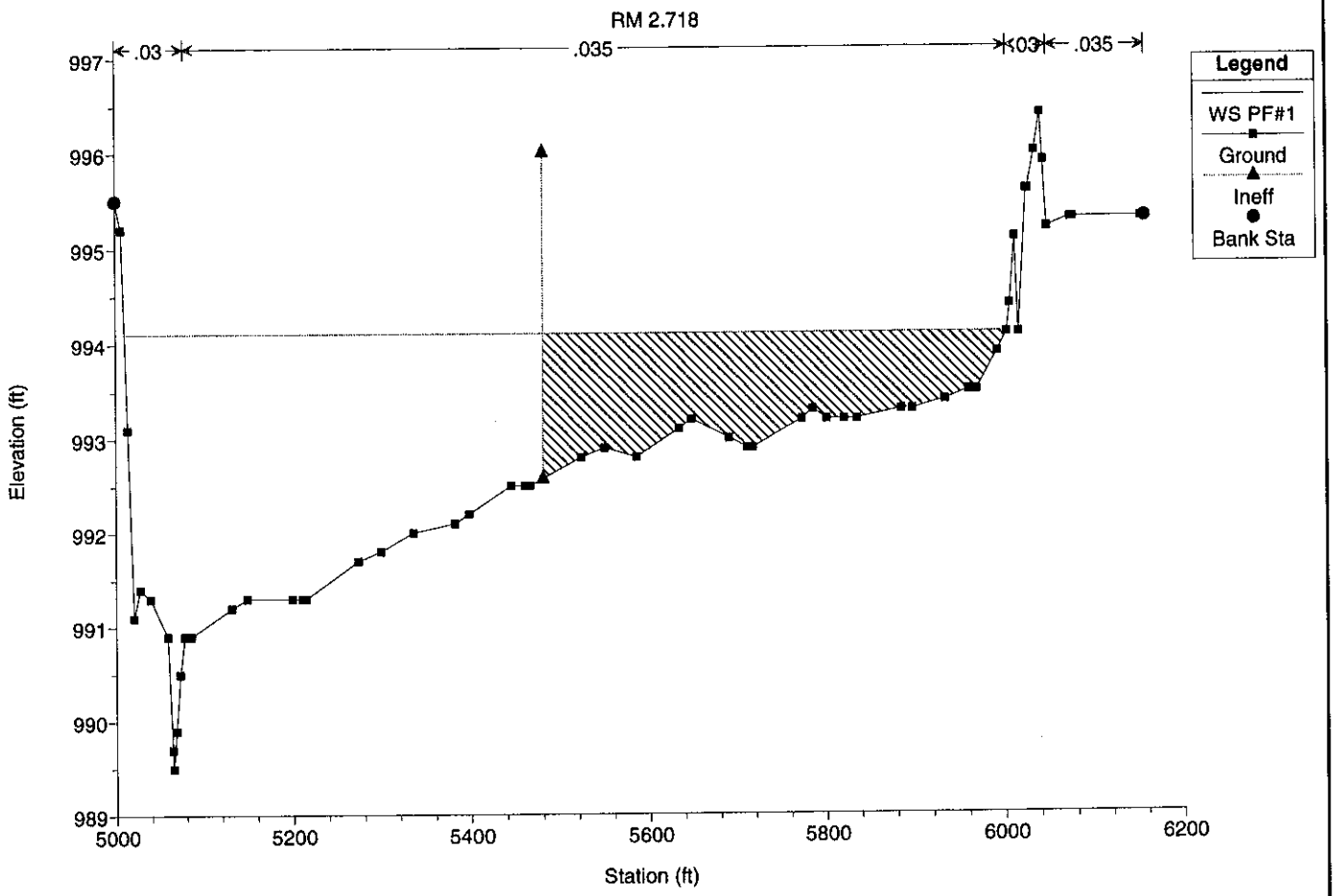

Tolleson FIS Plan 02 5/6/99
RM 3.050, Begin new, un-mapped RR Spur.
.03
Legend
WS PF#1
Ground
Levee
Bank Sta
Elevation (ft)
1000
999
998
997
996
995
994
5000
5200
5400
5600
5800
6000
6200
6400
Station (ft)

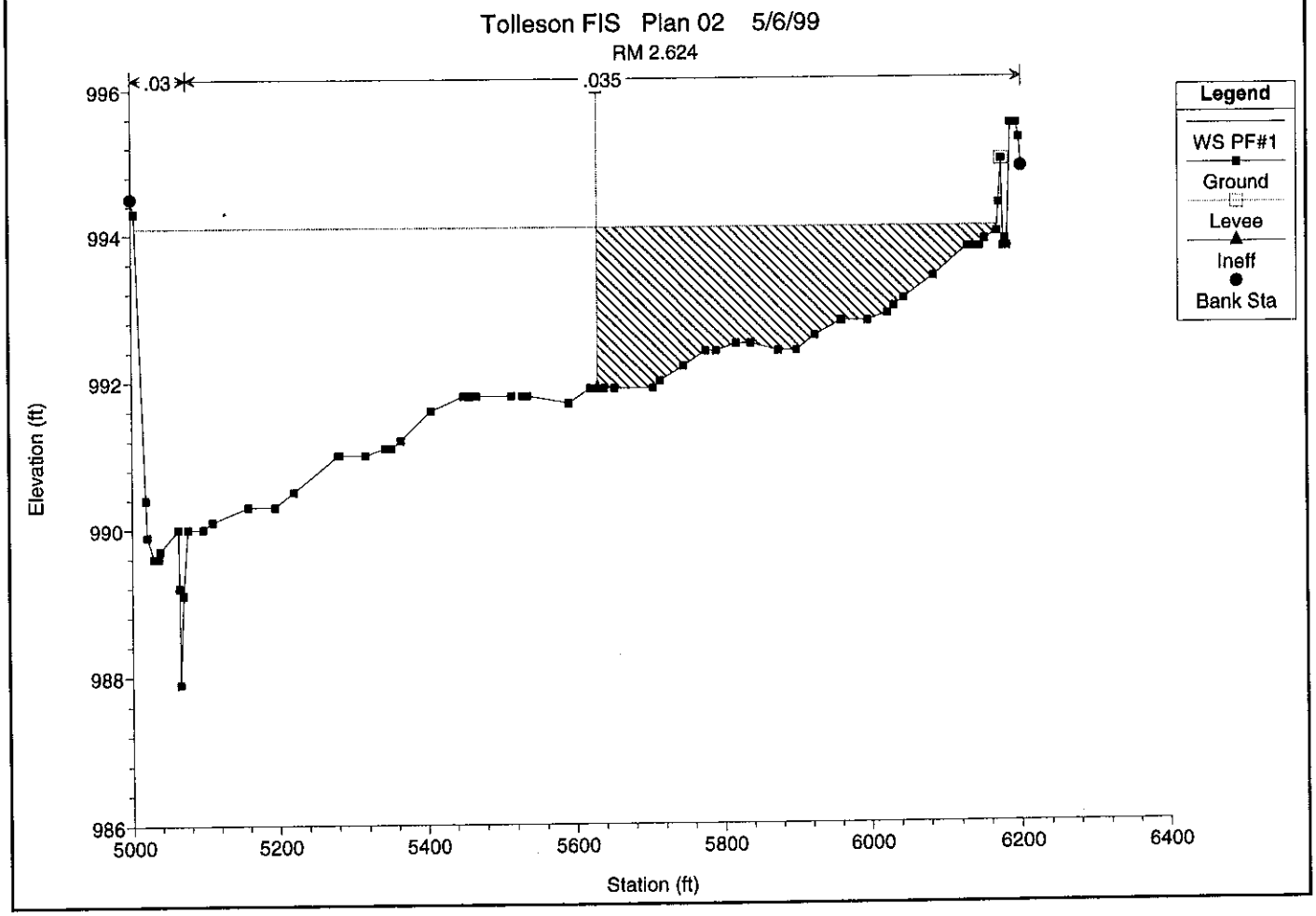

Tolleson FIS Plan 02 5/6/99
RM 3.037, New un-mapped RR Spur,
.03
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
999
998
997
996
995
994
5000
5200
5400
5600
5800
6000
6200
6400
Station (ft)

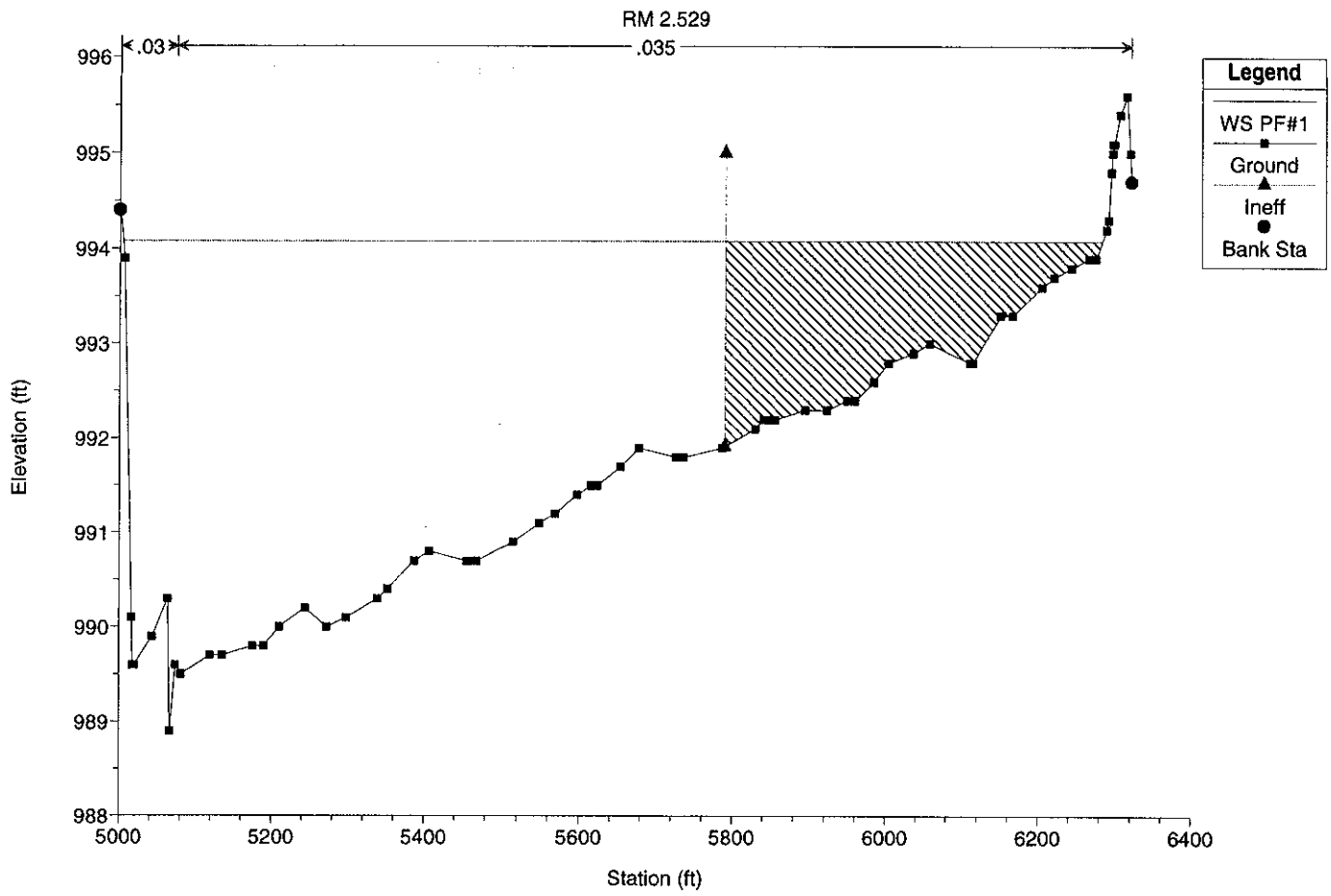

Tolleson FIS Plan 02 5/6/99
RM 3.031, End New un-mapped RR Spur.
.03
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1000
999
998
997
996
995
994
5000
5200
5400
5600
5800
6000
6200
Station (ft)

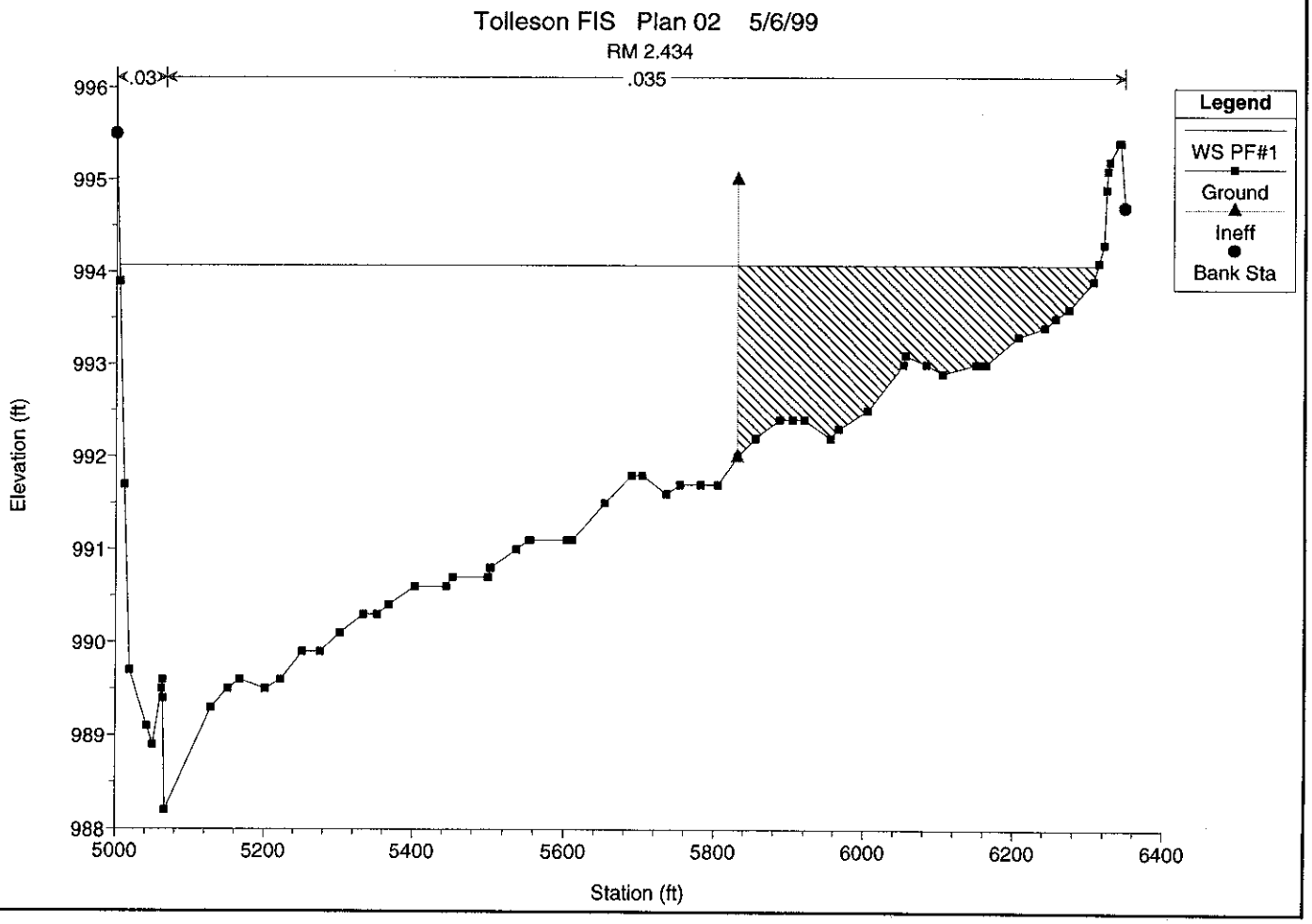

Tolleson FIS Plan 02 5/6/99
RM 2.908
.03
.035
.03
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1000
999
998
997
996
995
994
993
5000
5200
5400
5600
5800
6000
6200
Station (ft)

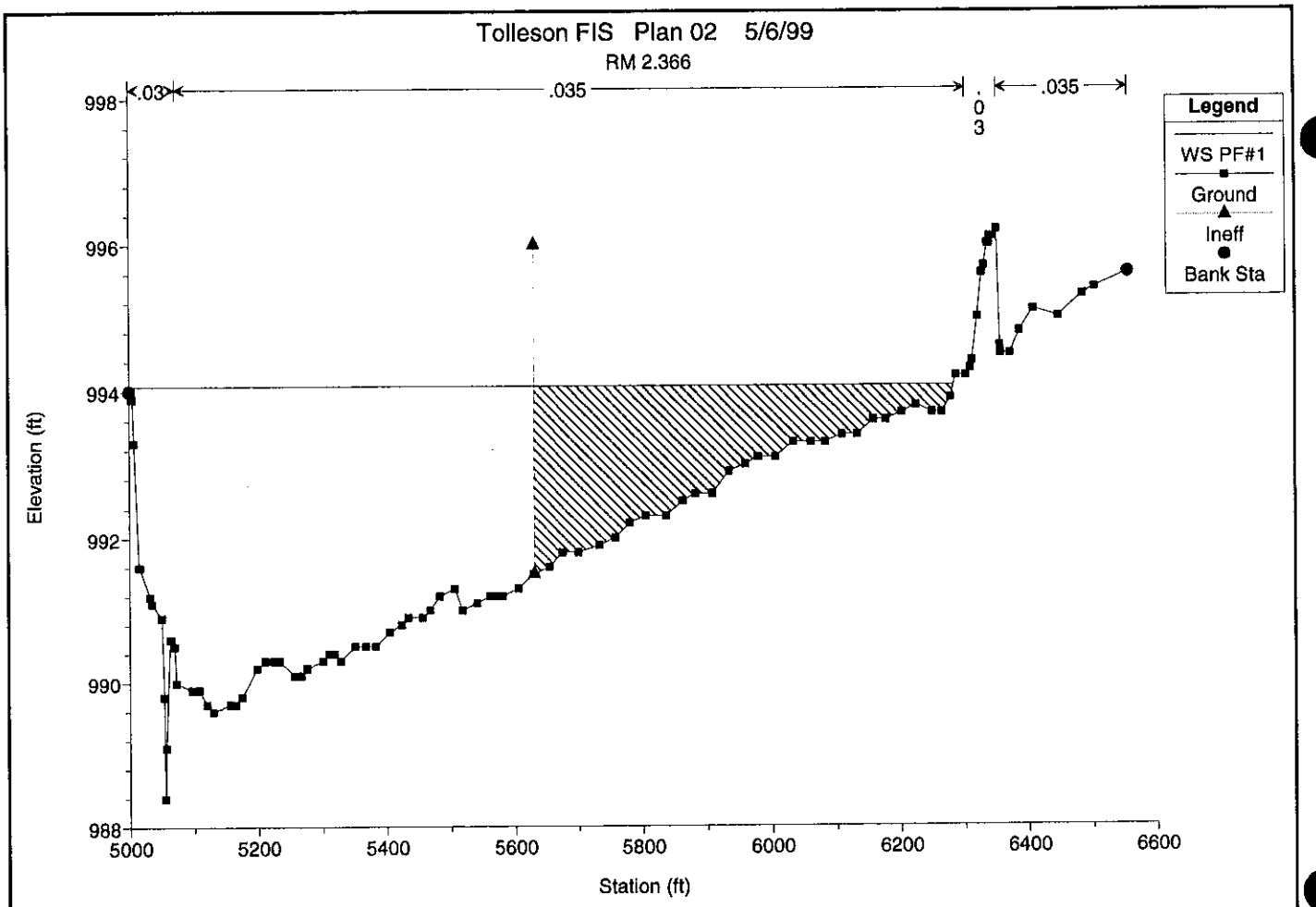

Tolleson FIS Plan 02 5/6/99
RM 2.851
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
998
997
996
995
994
993
5000
5200
5400
5600
5800
6000
Station (ft)

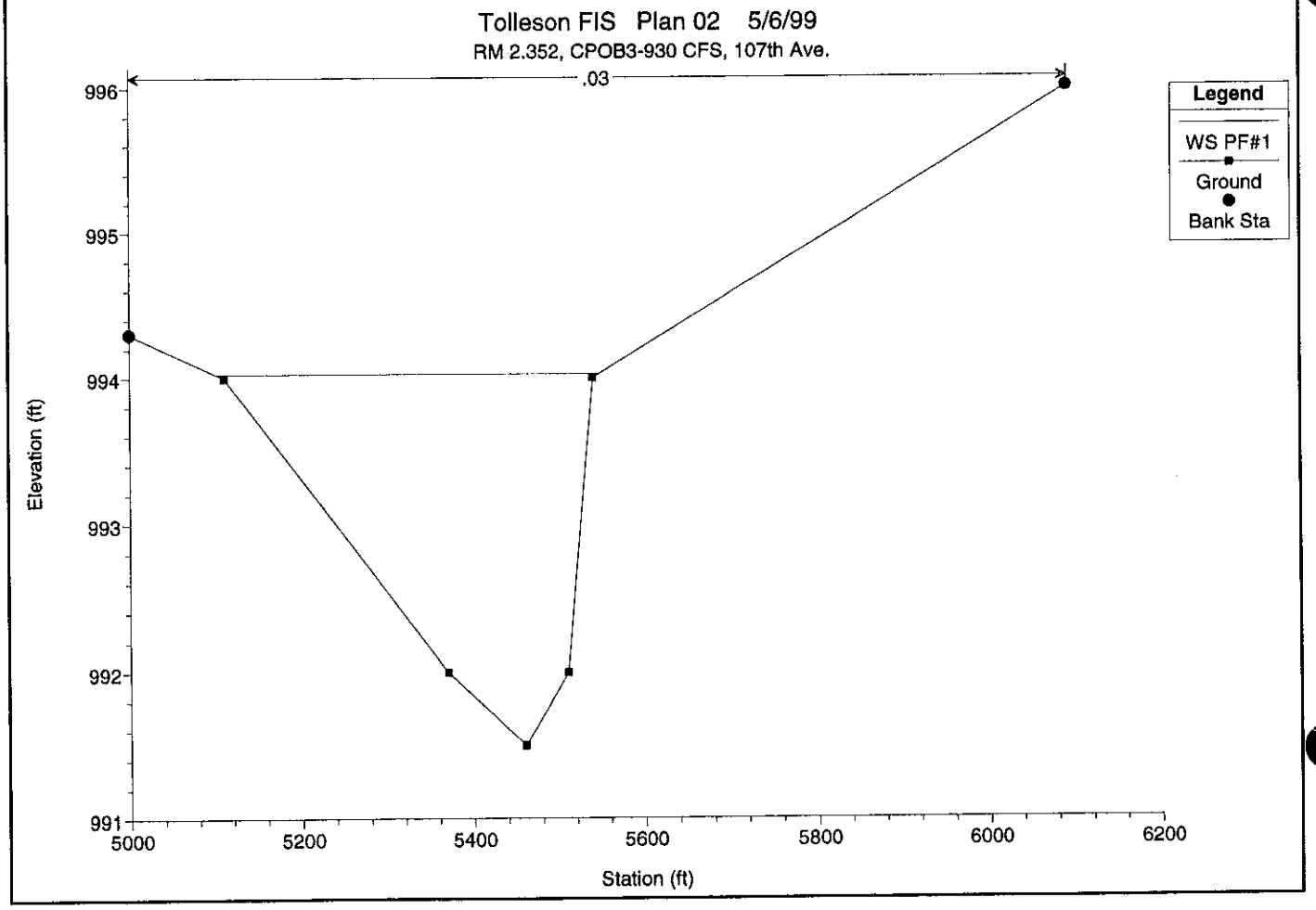

Tolleson FIS Plan 02 5/6/99
RM 2.718
.03
.035
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
997
996
995
994
993
992
991
990
989
5000
5200
5400
5600
5800
6000
6200
Station (ft)

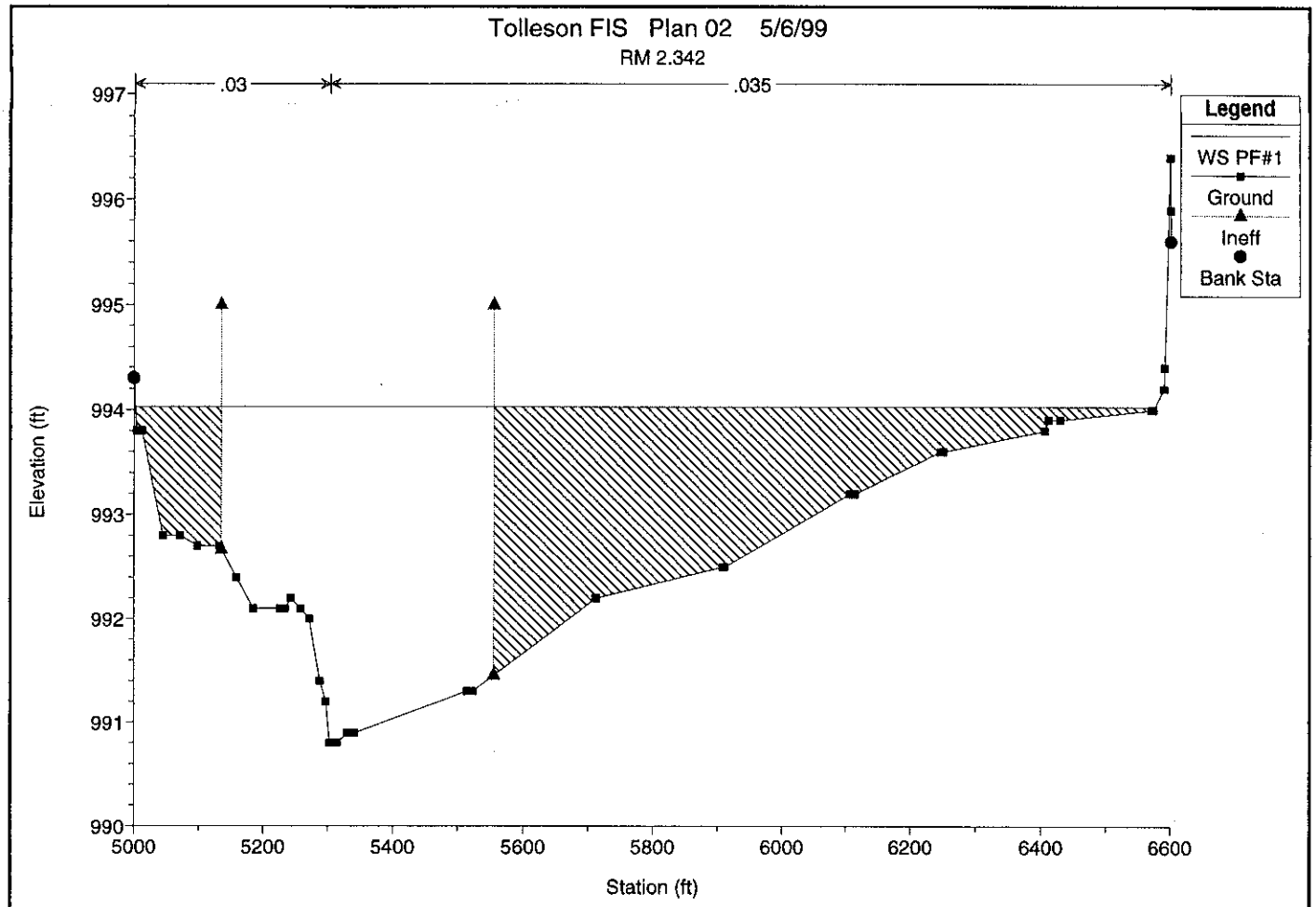

Tolleson FIS Plan 02 5/6/99
RM 2.624
.03
.035
Legend
WS PF#1
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
996
994
992
990
988
986
5000
5200
5400
5600
5800
6000
6200
6400
Station (ft)

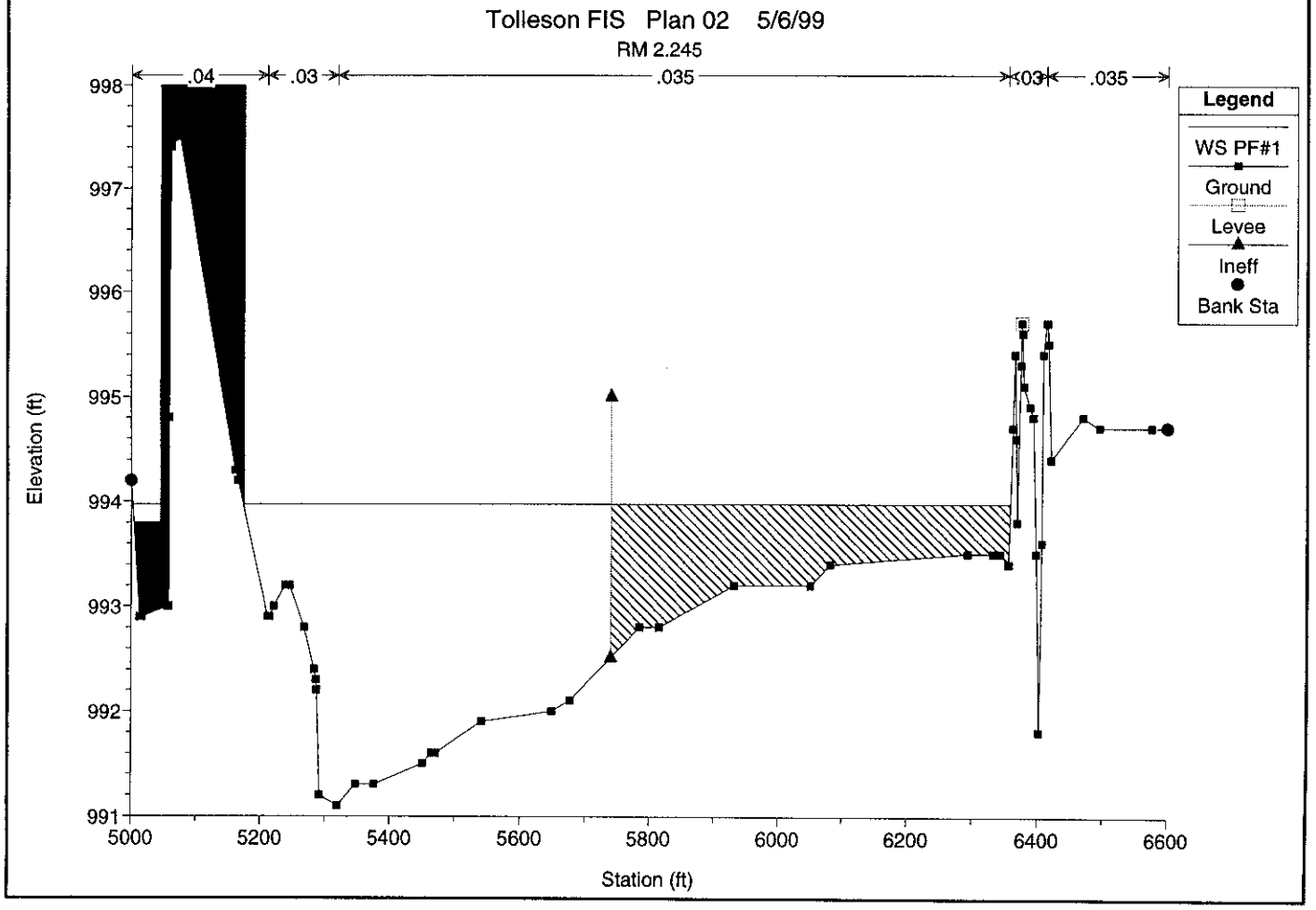

Tolleson FIS Plan 02 5/6/99
RM 2.529
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
996
995
994
993
992
991
990
989
988
5000
5200
5400
5600
5800
6000
6200
6400

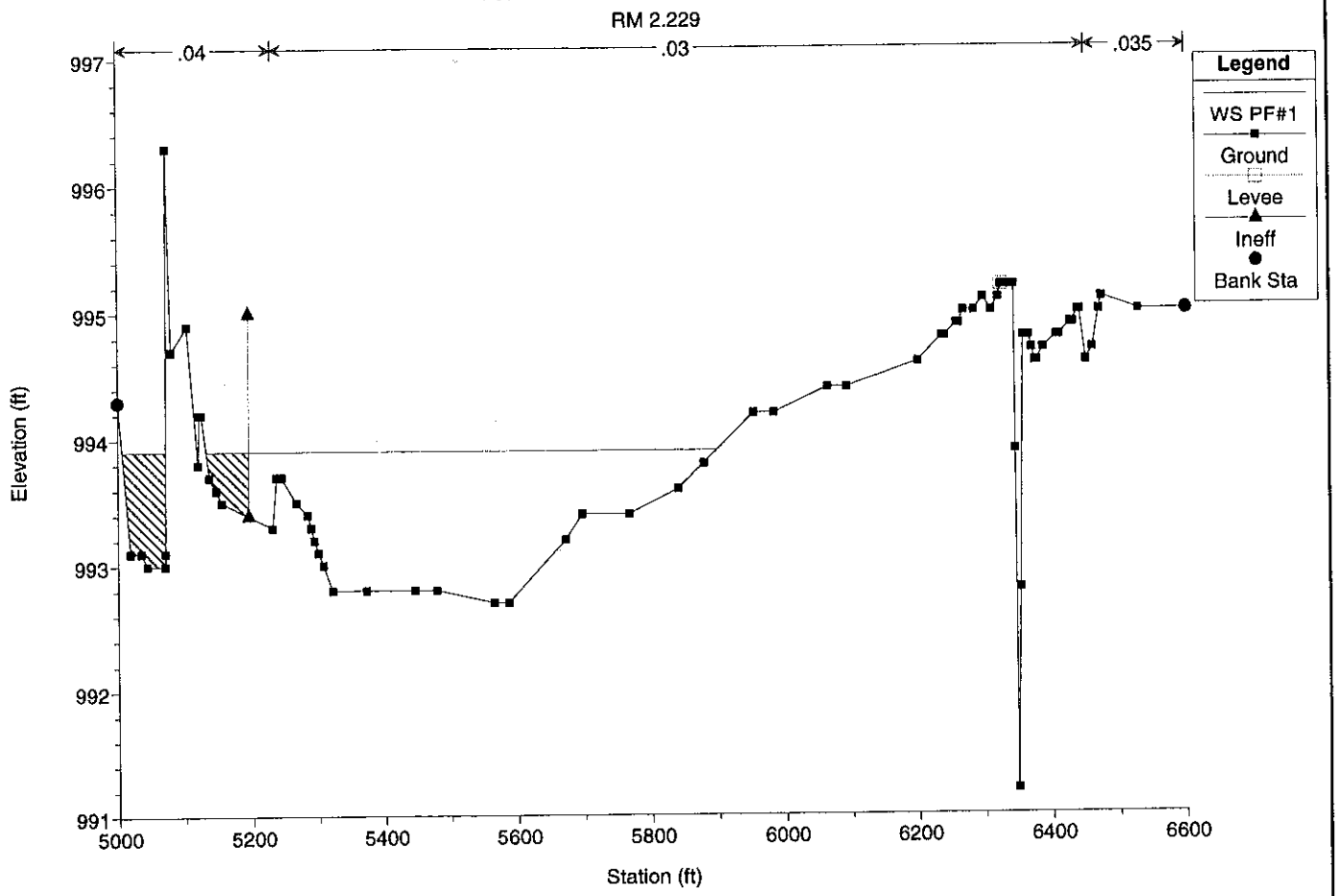

Tolleson FIS Plan 02 5/6/99
RM 2.434
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
996
995
994
993
992
991
990
989
988
5000
5200
5400
5600
5800
6000
6200
6400

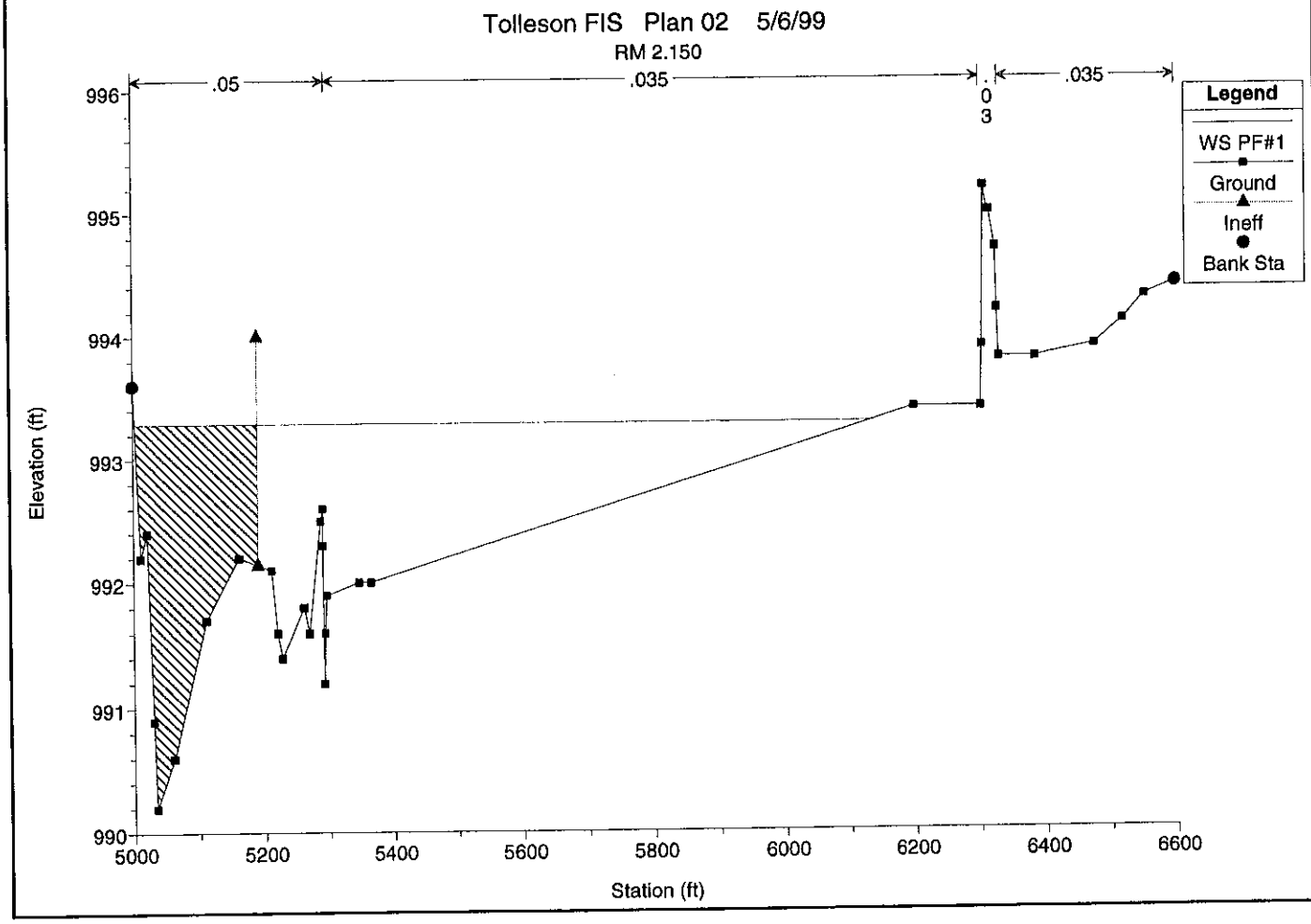

Tolleson FIS Plan 02 5/6/99
RM 2.366
.03
.035
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
998
996
994
992
990
988
5000
5200
5400
5600
5800
6000
6200
6400
6600

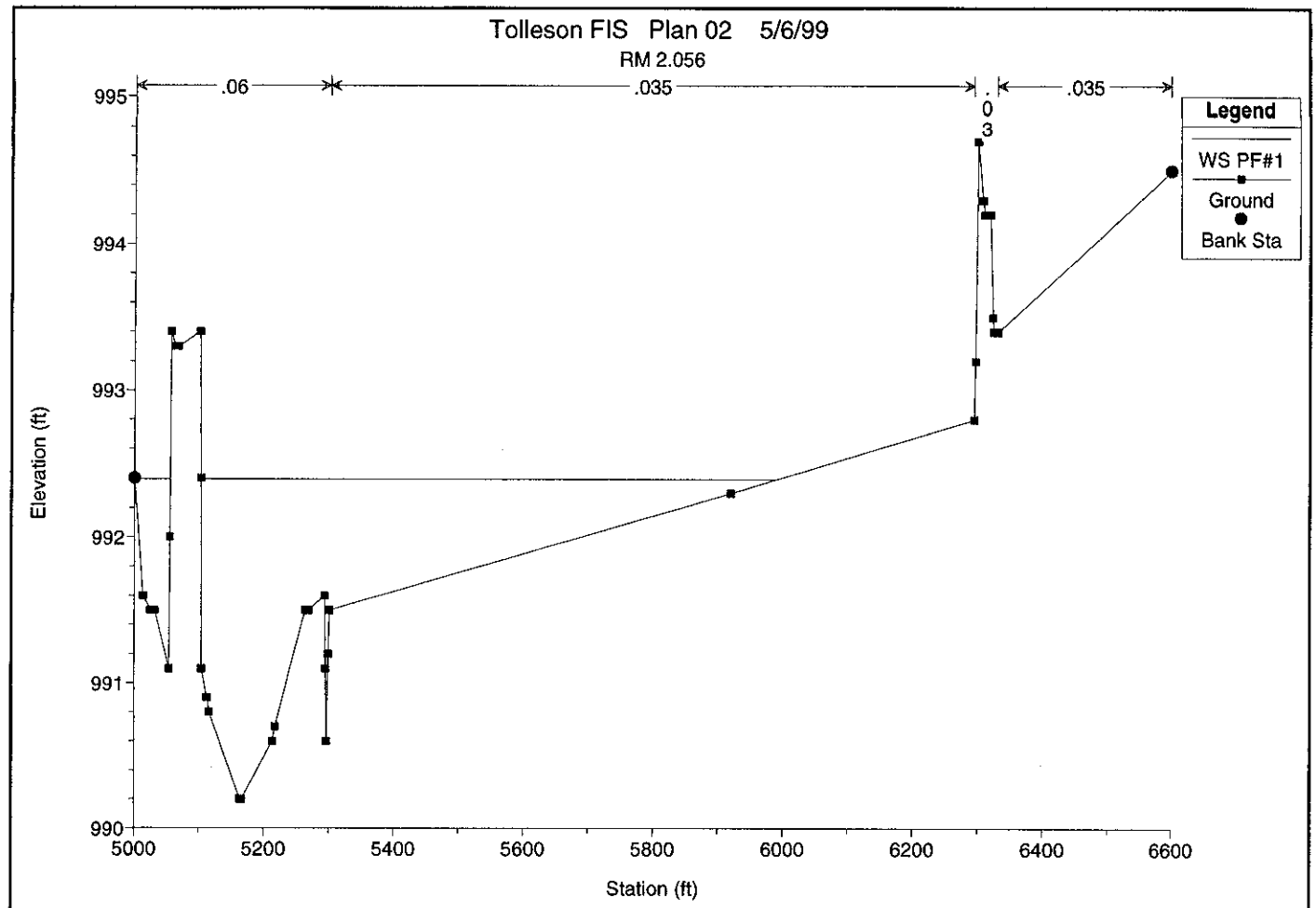

Tolleson FIS Plan 02 5/6/99
RM 2.352, CPOB3-930 CFS, 107th Ave.
.03
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
Station (ft)
996
995
994
993
992
991
5000
5200
5400
5600
5800
6000
6200

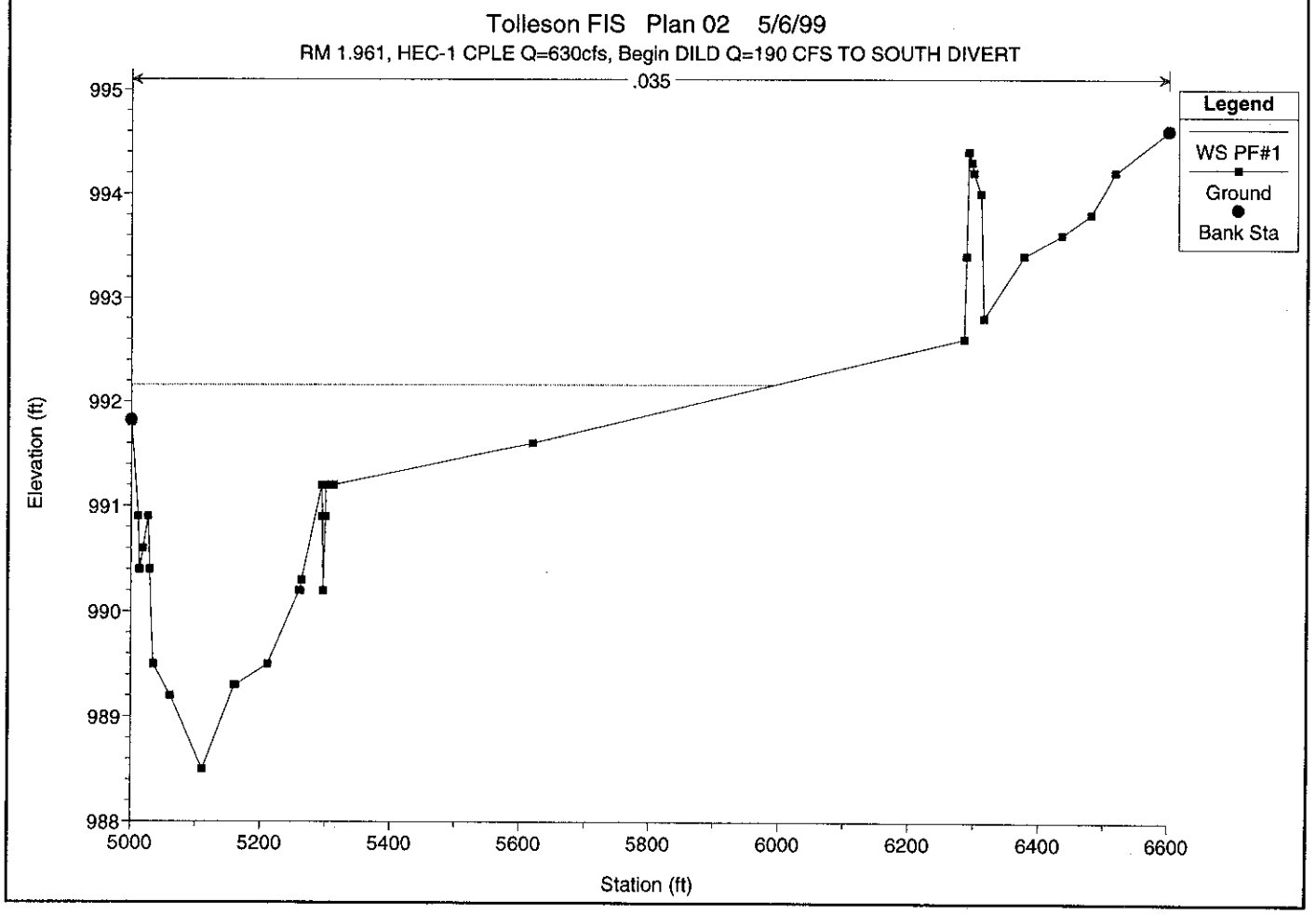

Tolleson FIS Plan 02 5/6/99
RM 2.342
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
997
996
995
994
993
992
991
990
5000
5200
5400
5600
5800
6000
6200
6400
6600

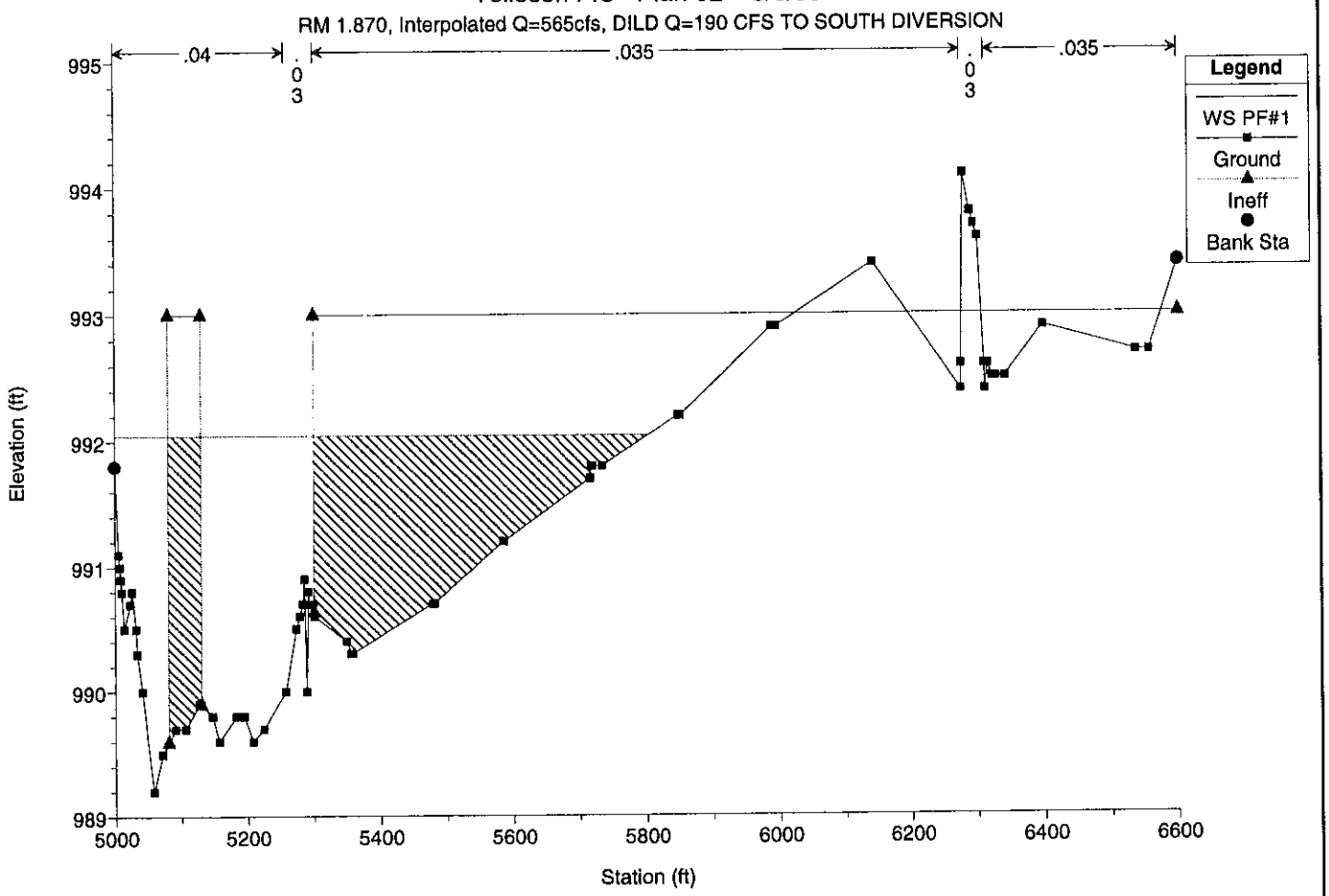

Tolleson FIS Plan 02 5/6/99
RM 2.245
.04
.03
.035
.03
.035
Legend
WS PF#1
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)
998
997
996
995
994
993
992
991
5000
5200
5400
5600
5800
6000
6200
6400
6600

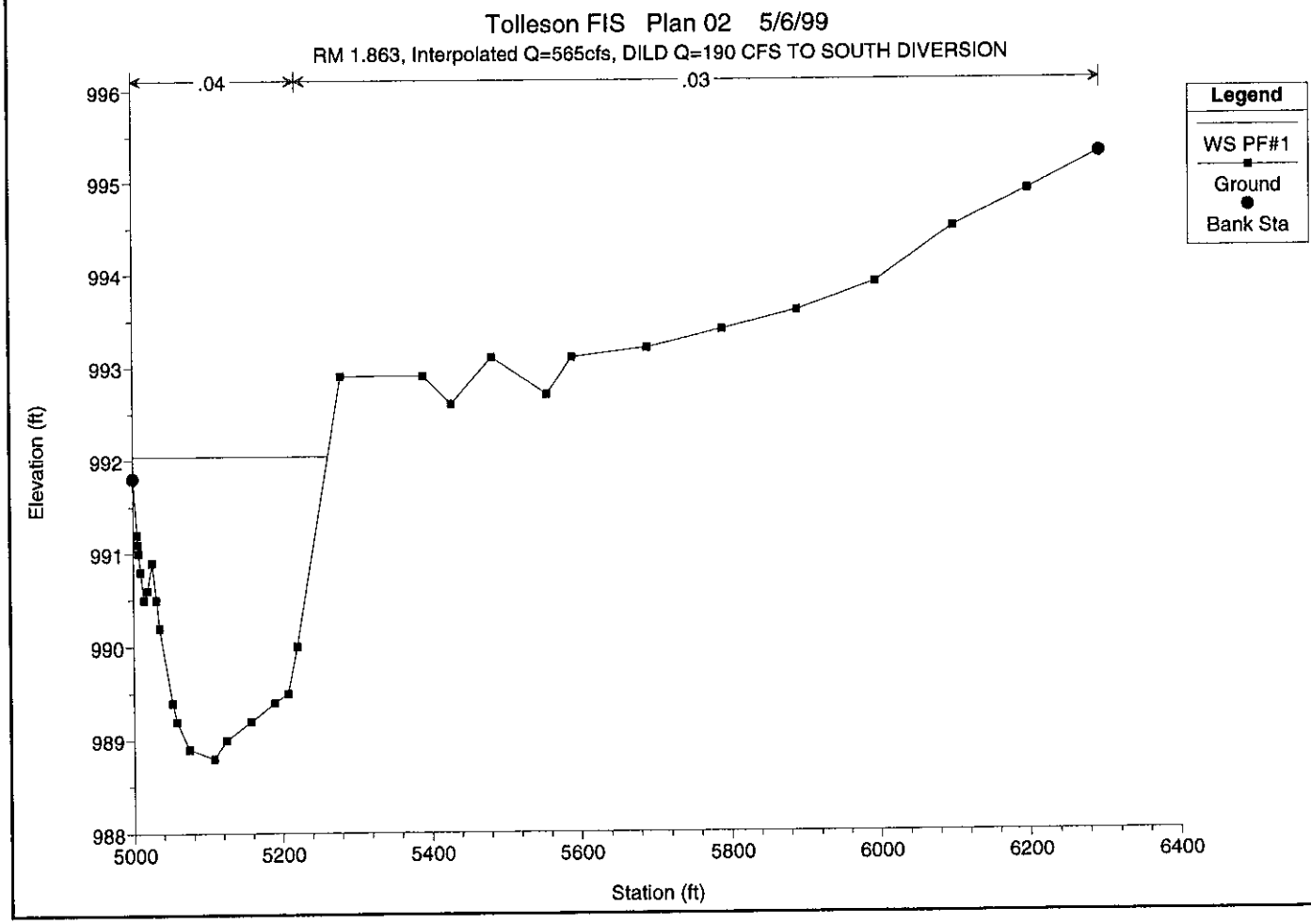

Tolleson FIS Plan 02 5/6/99
RM 2.229
.04
.03
.035
Legend
WS PF#1
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
997
996
995
994
993
992
991
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

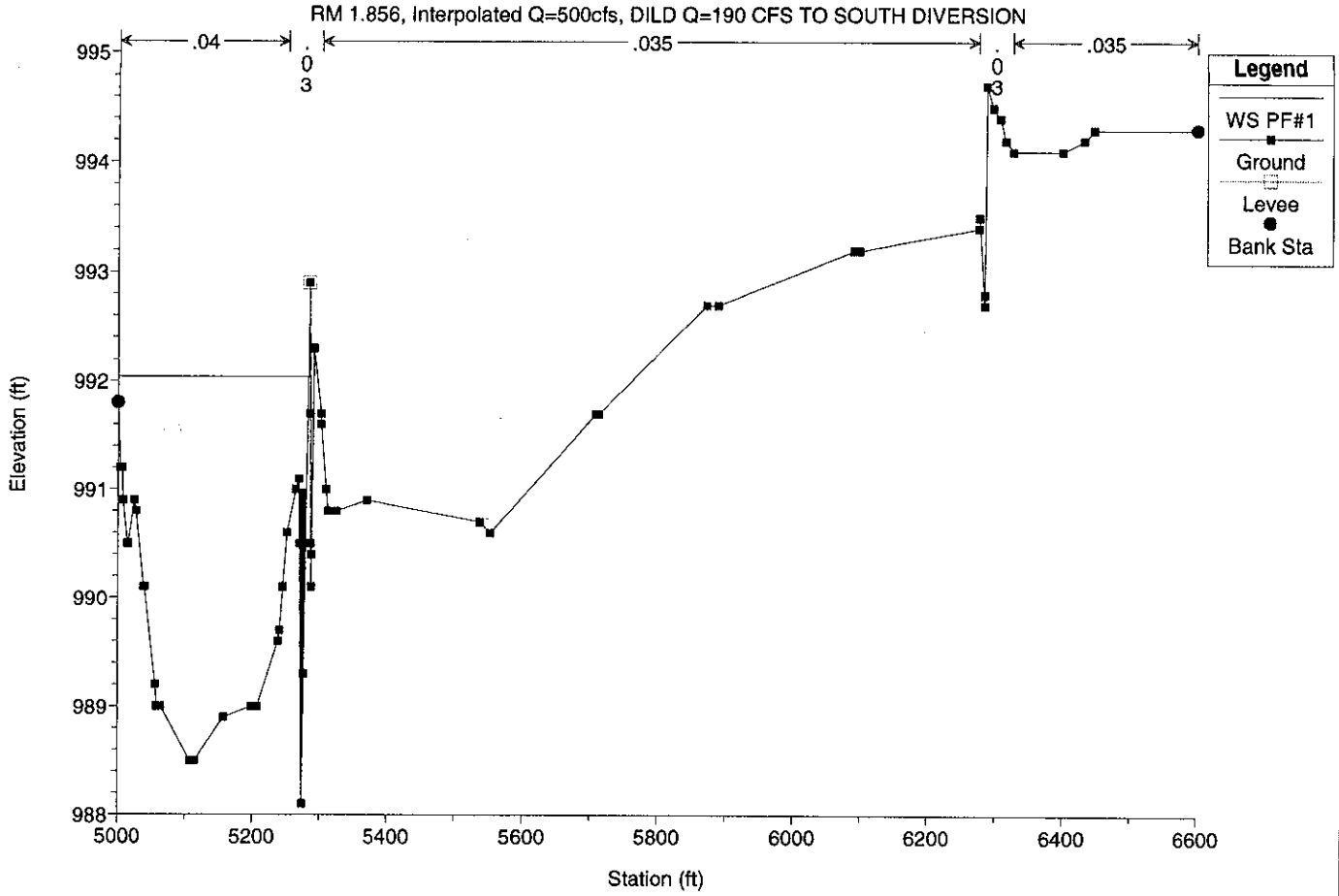

Tolleson FIS Plan 02 5/6/99
RM 2.150
.05
.035
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
996
995
994
993
992
991
990
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

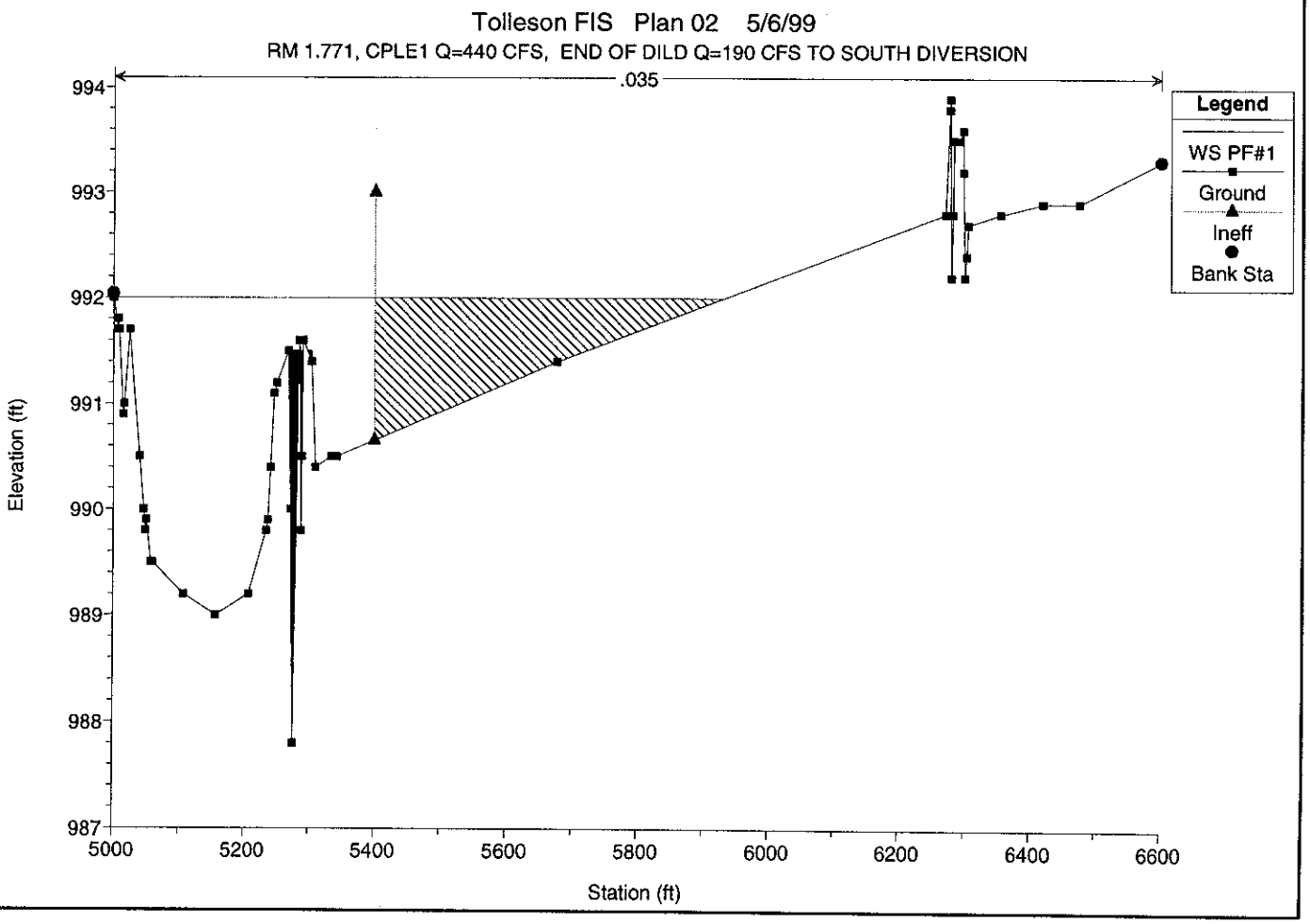

Tolleson FIS Plan 02 5/6/99
RM 2.056
.06
.035
.0
3
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
995
994
993
992
991
990
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

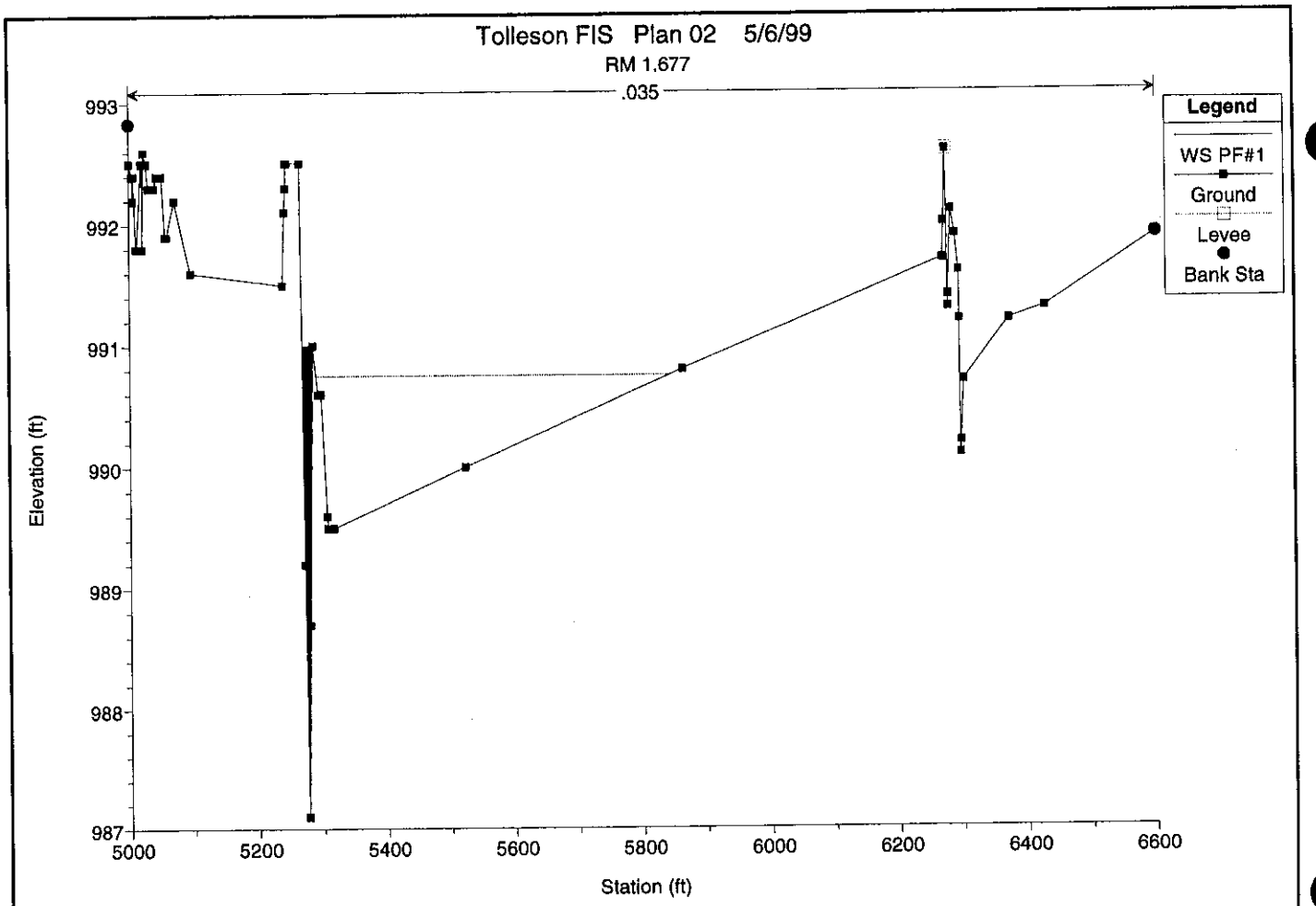

Tolleson FIS Plan 02 5/6/99
RM 1.961, HEC-1 CPLE Q=630cfs, Begin DILD Q=190 CFS TO SOUTH DIVERT
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
995
994
993
992
991
990
989
988
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

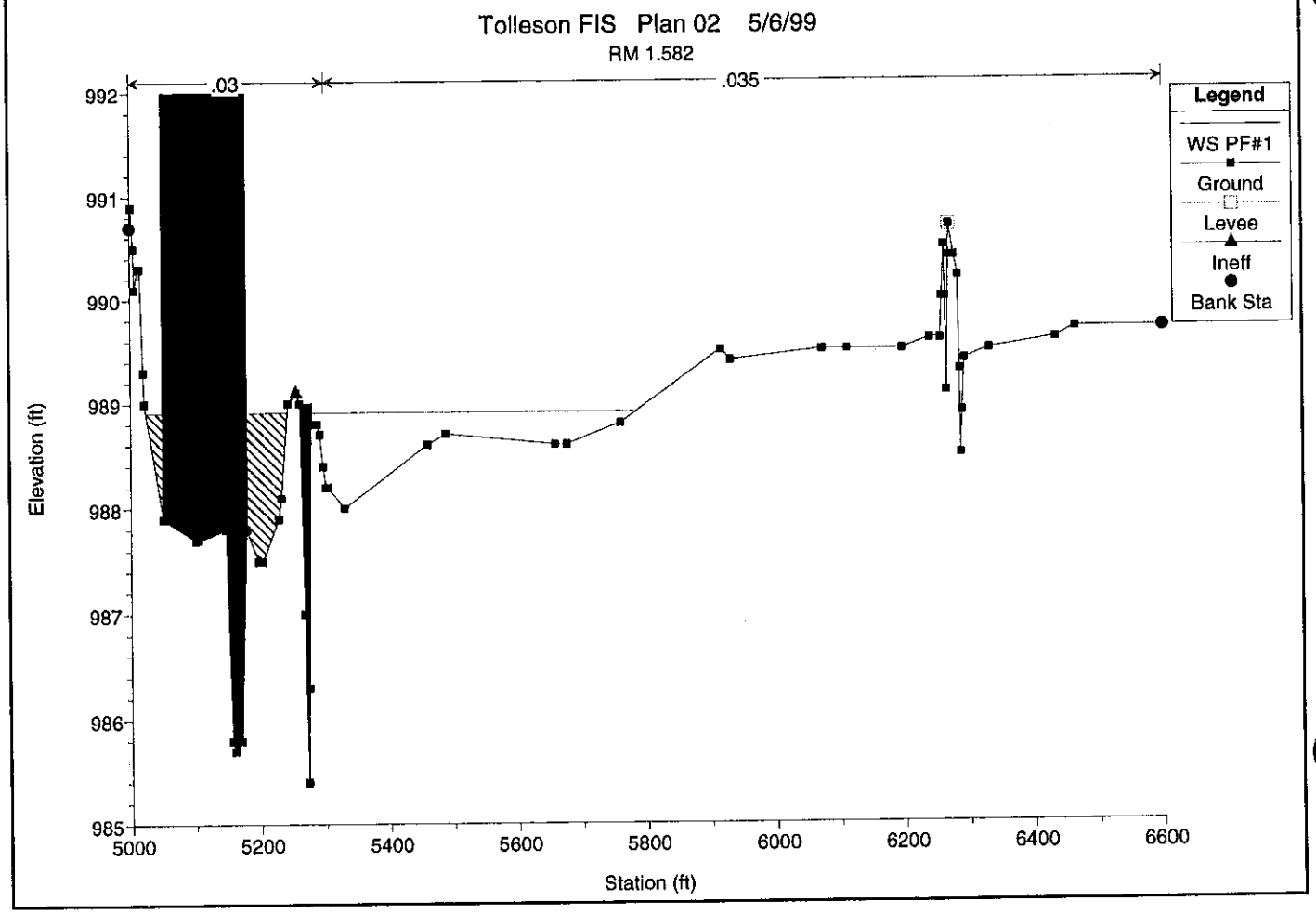

Tolleson FIS Plan 02 5/6/99
RM 1.870, Interpolated Q=565cfs, DILD Q=190 CFS TO SOUTH DIVERSION
.04
.03
.035
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
995
994
993
992
991
990
989
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

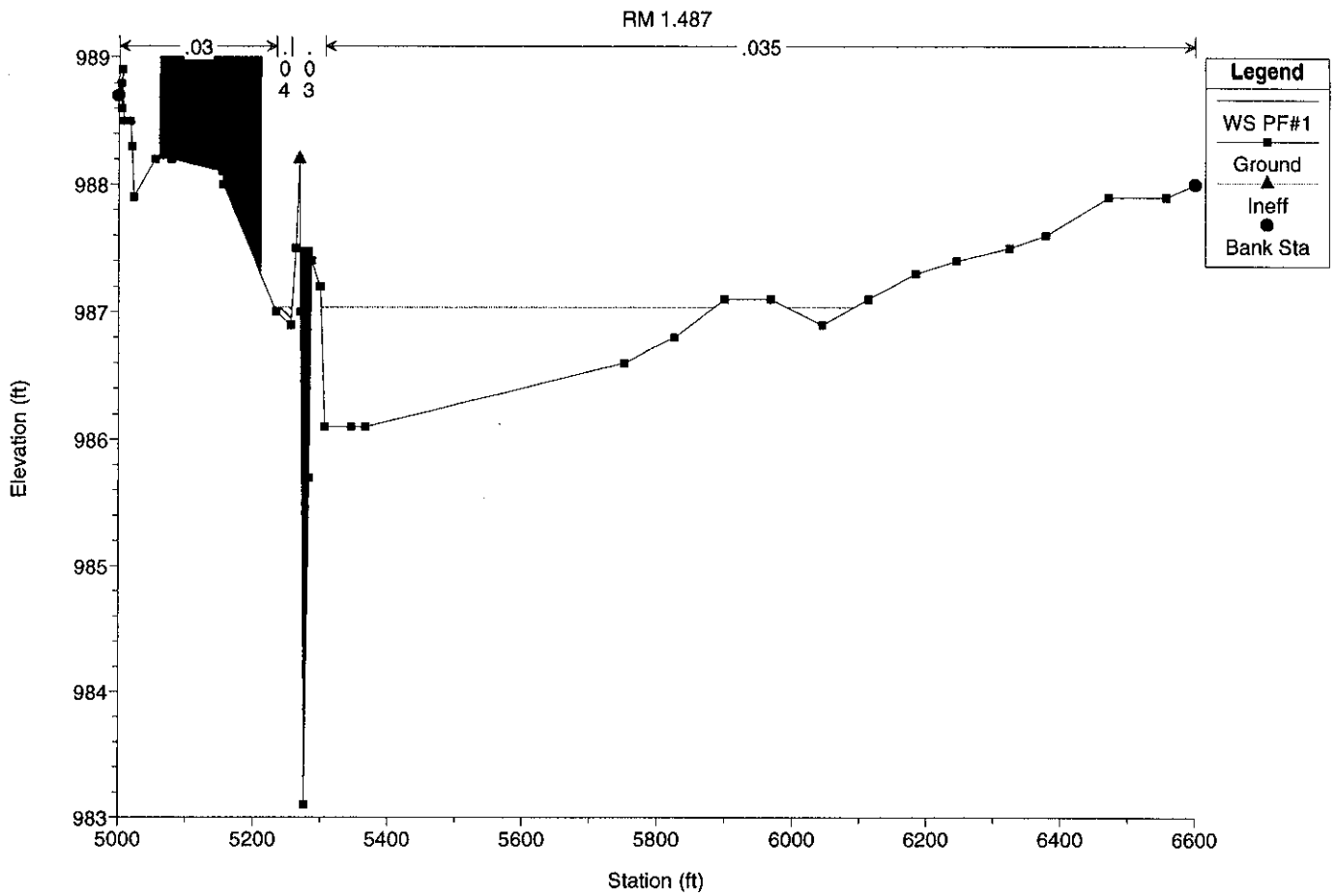

Tolleson FIS Plan 02 5/6/99
RM 1.863, Interpolated Q=565cfs, DILD Q=190 CFS TO SOUTH DIVERSION
.04
.03
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
996
995
994
993
992
991
990
989
988
5000
5200
5400
5600
5800
6000
6200
6400
Station (ft)

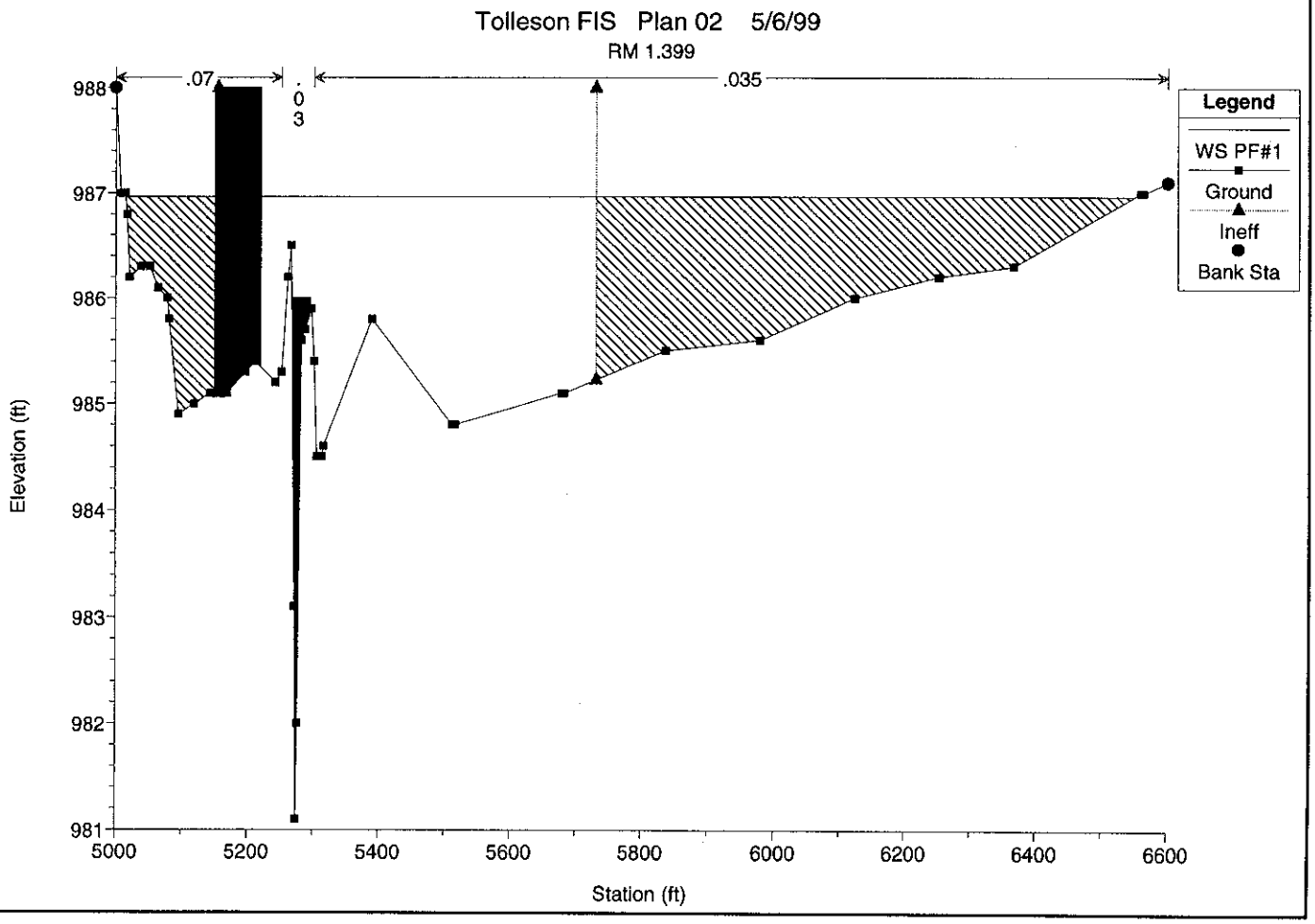

Tolleson FIS Plan 02 5/6/99
RM 1.856, Interpolated Q=500cfs, DILD Q=190 CFS TO SOUTH DIVERSION
.04
.03
.035
.03
.035
Legend
WS PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
995
994
993
992
991
990
989
988
5000
5200
5400
5600
5800
6000
6200
6400
6600

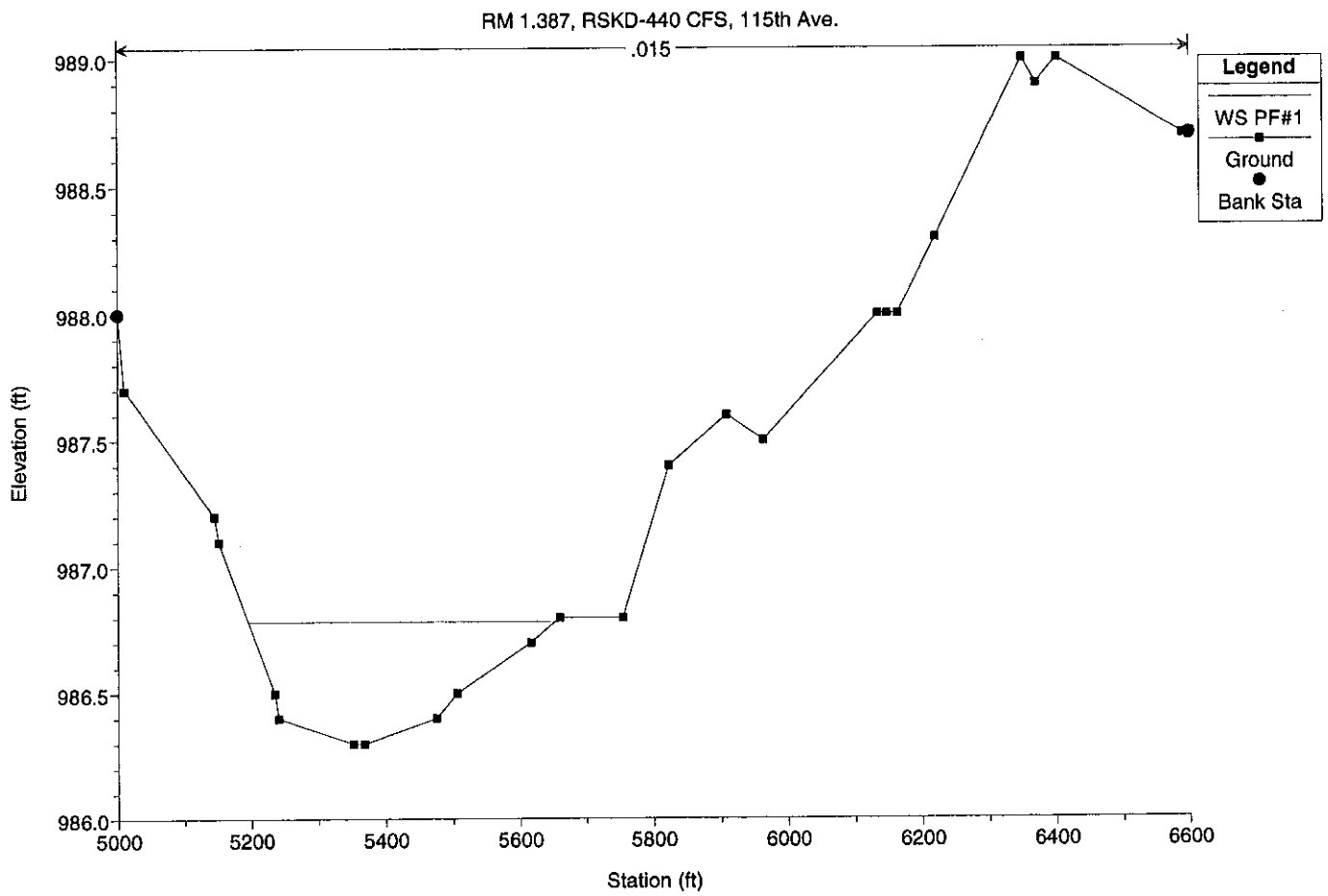

Tolleson FIS Plan 02 5/6/99
RM 1.771, CPLE1 Q=440 CFS, END OF DILD Q=190 CFS TO SOUTH DIVERSION
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
994
993
992
991
990
989
988
987
5000
5200
5400
5600
5800
6000
6200
6400
6600

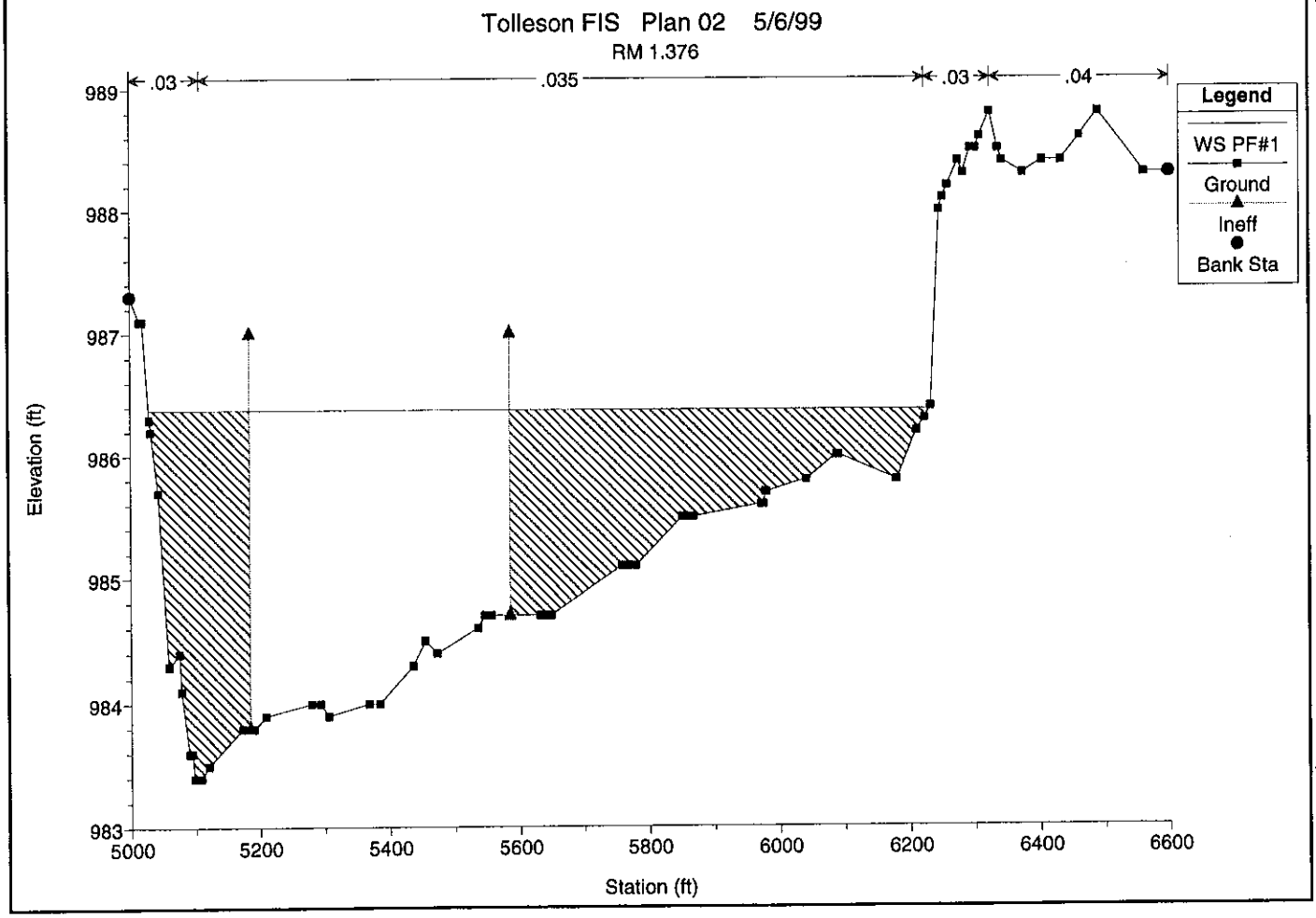

Tolleson FIS Plan 02 5/6/99
RM 1.677
.035
Legend
WS PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
993
992
991
990
989
988
987
5000
5200
5400
5600
5800
6000
6200
6400
6600

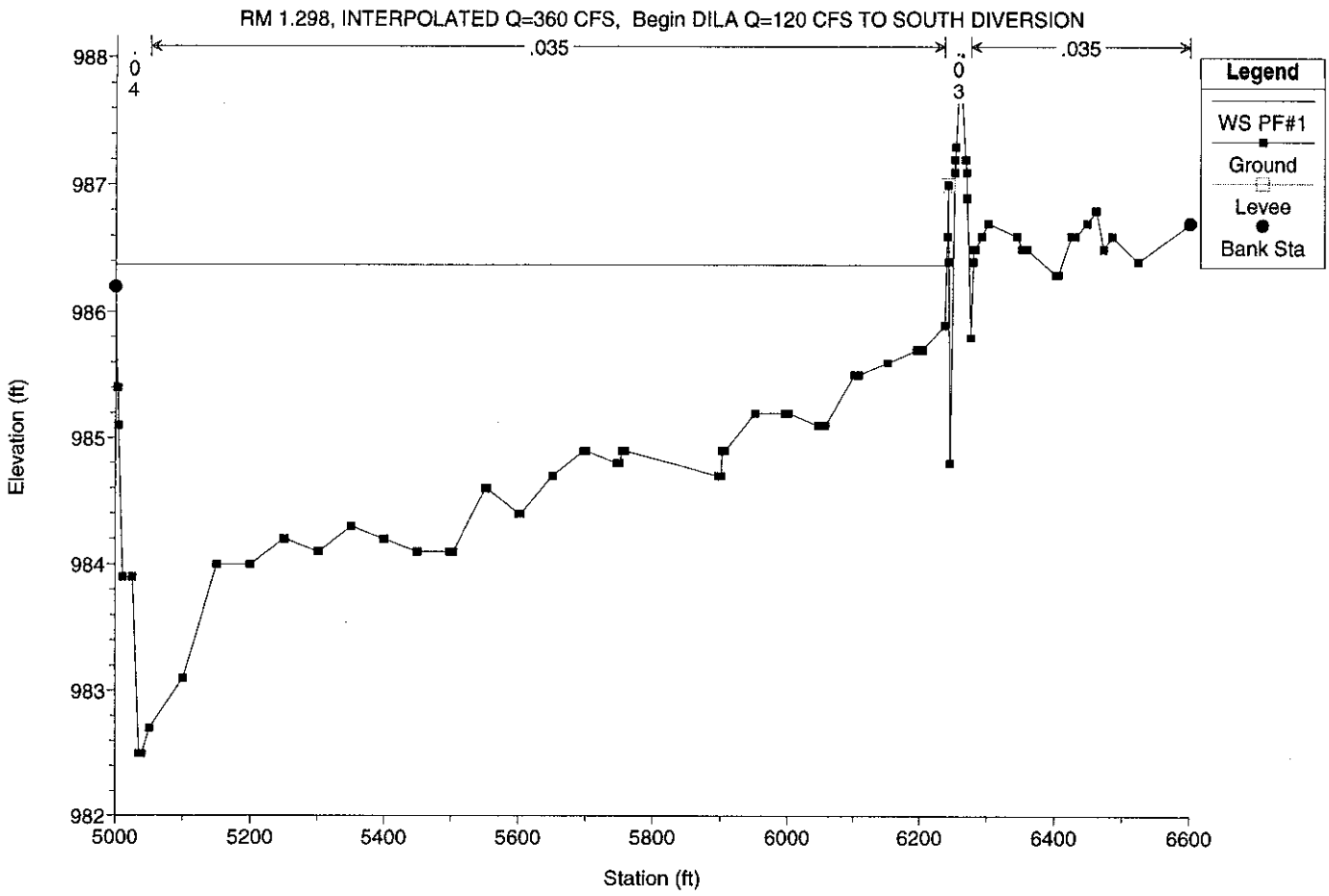

Tolleson FIS Plan 02 5/6/99
RM 1.582
.03
.035
Legend
WS PF#1
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)
992
991
990
989
988
987
986
985
5000
5200
5400
5600
5800
6000
6200
6400
6600

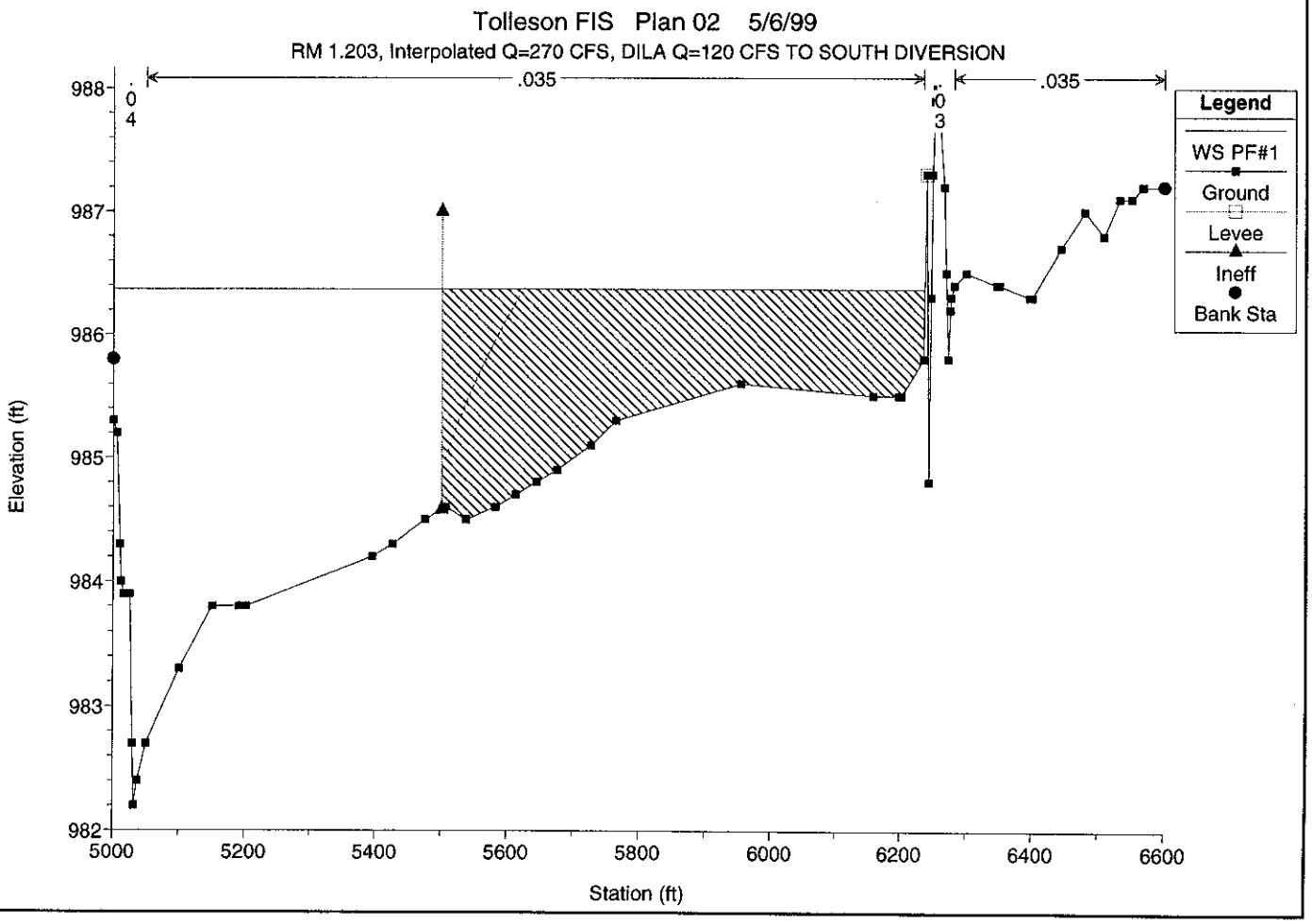

Tolleson FIS Plan 02 5/6/99
RM 1.487
.03
.04
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
989
988
987
986
985
984
983
5000
5200
5400
5600
5800
6000
6200
6400
6600

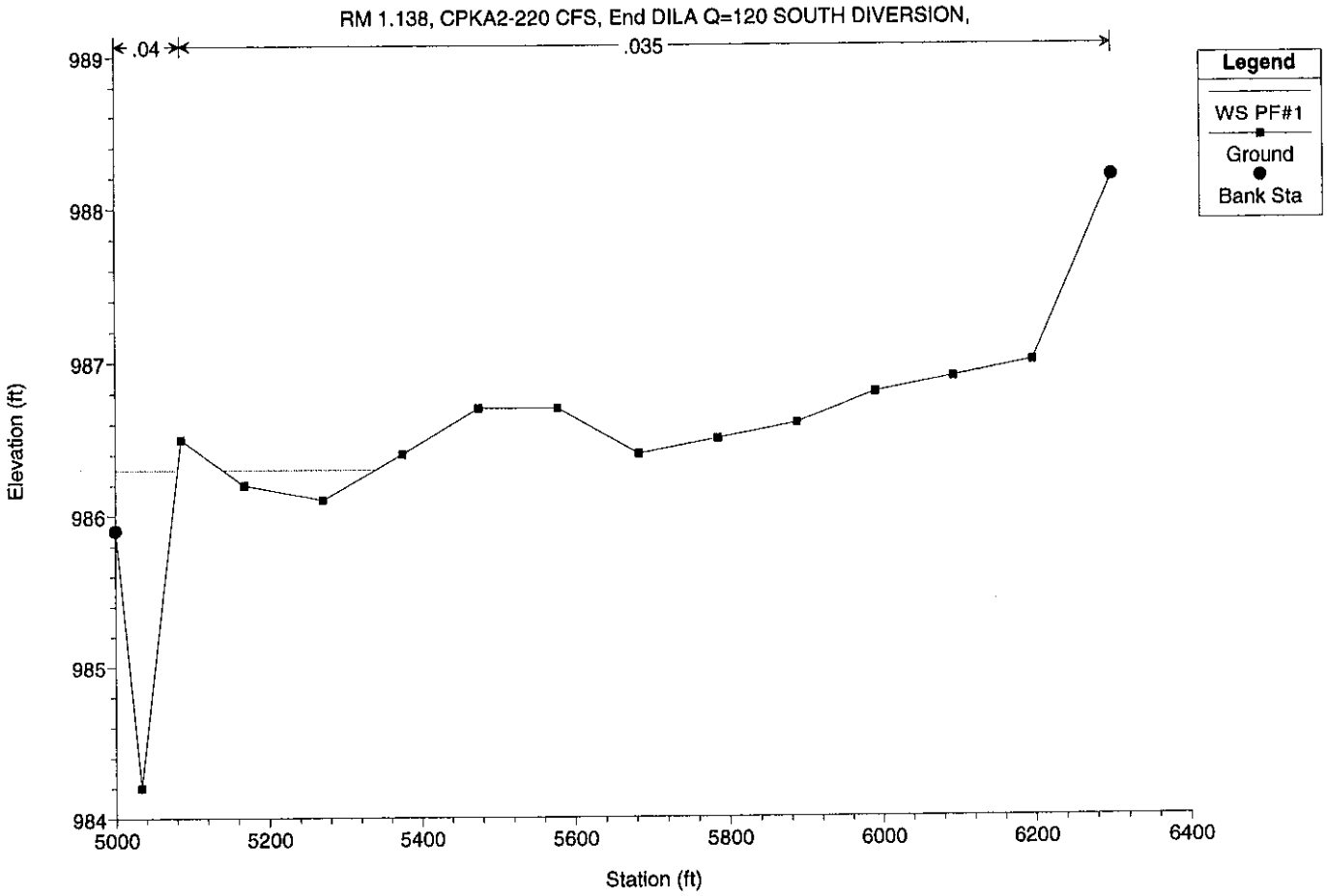

Tolleson FIS Plan 02 5/6/99
RM 1.399
.07
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
988
987
986
985
984
983
982
981
5000
5200
5400
5600
5800
6000
6200
6400
6600

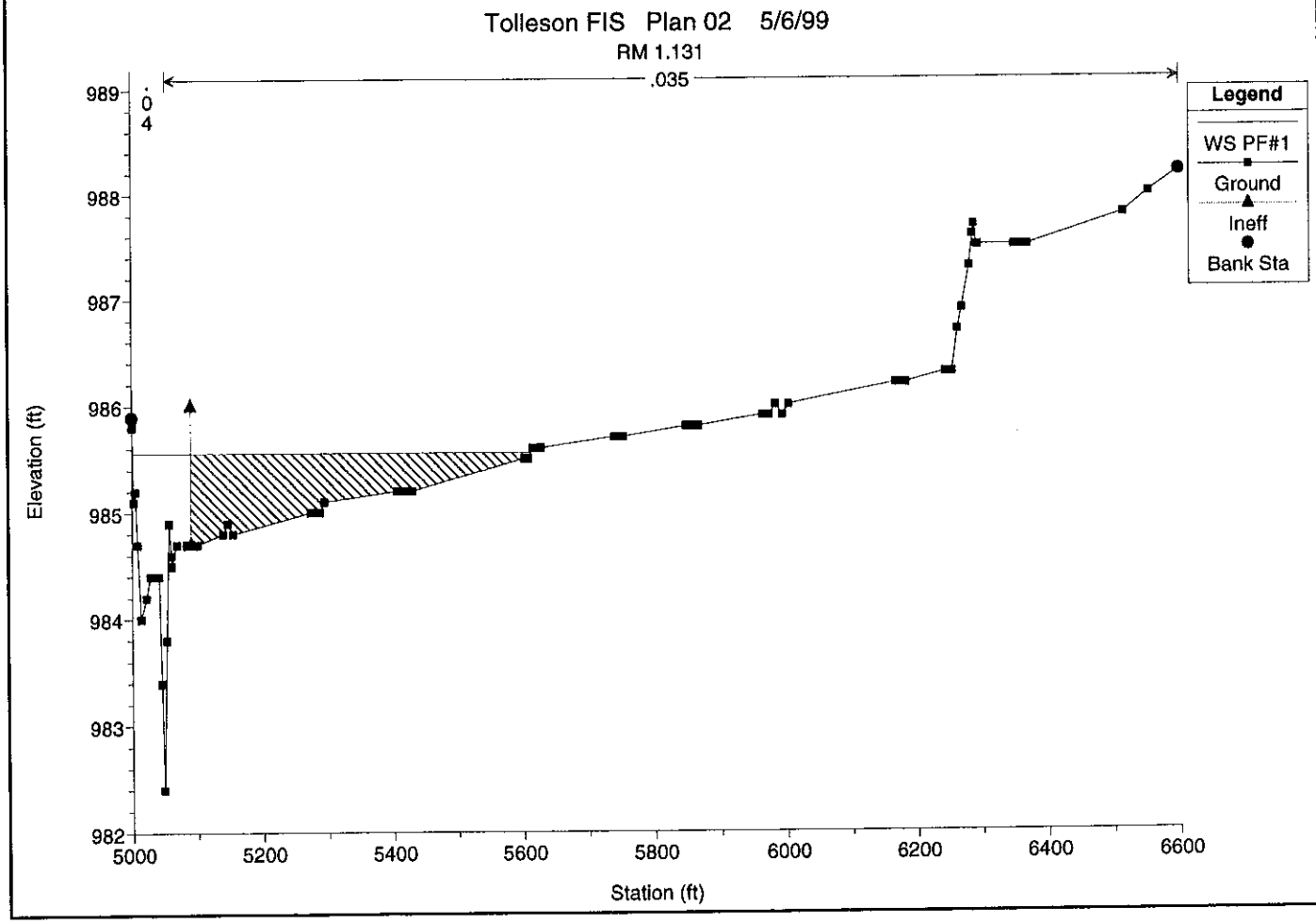

Tolleson FIS Plan 02 5/6/99
RM 1.387, RSKD-440 CFS, 115th Ave.
.015
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
989.0
988.5
988.0
987.5
987.0
986.5
986.0
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

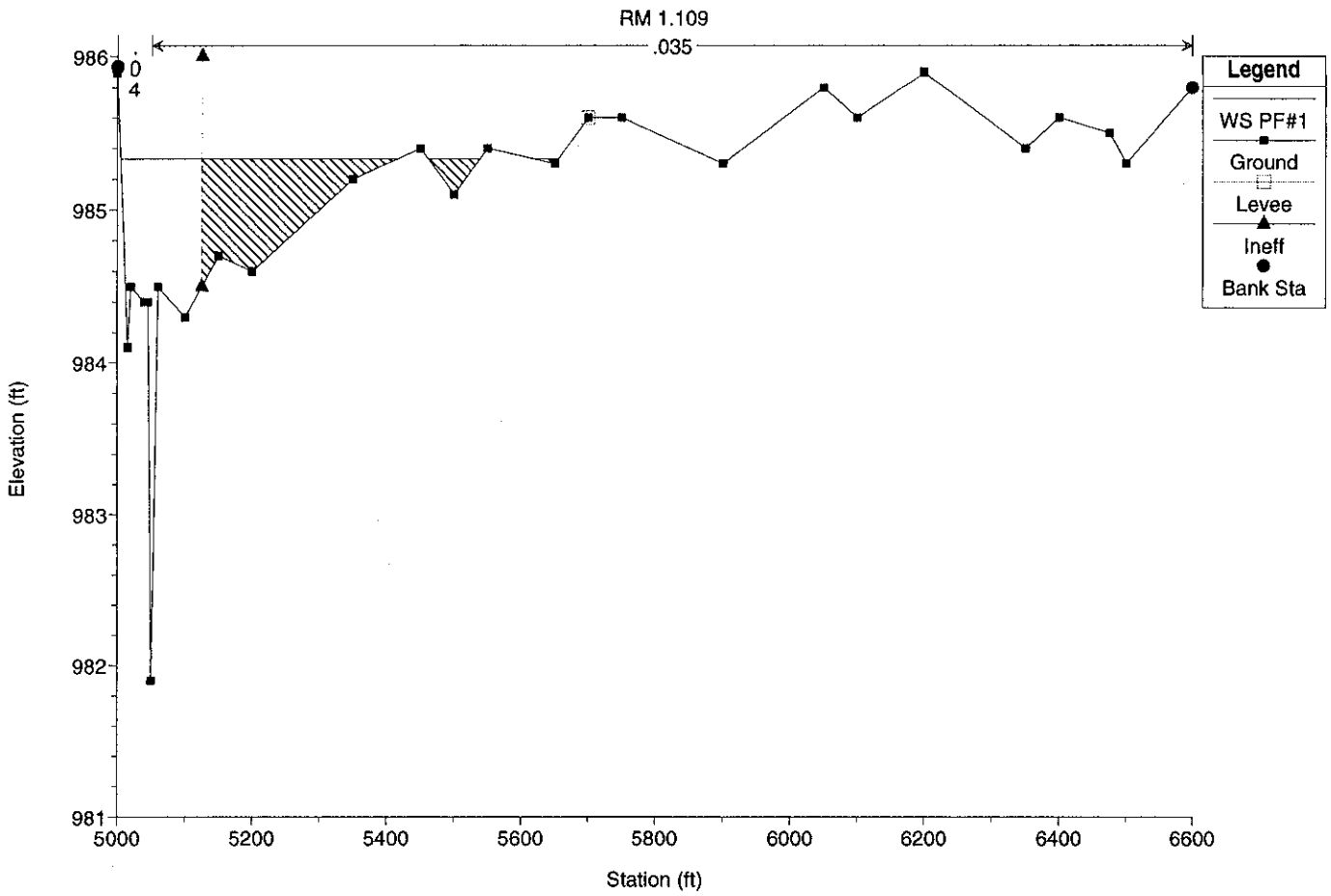

Tolleson FIS Plan 02 5/6/99
RM 1.376
.03
.035
.03
.04
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
989
988
987
986
985
984
983
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

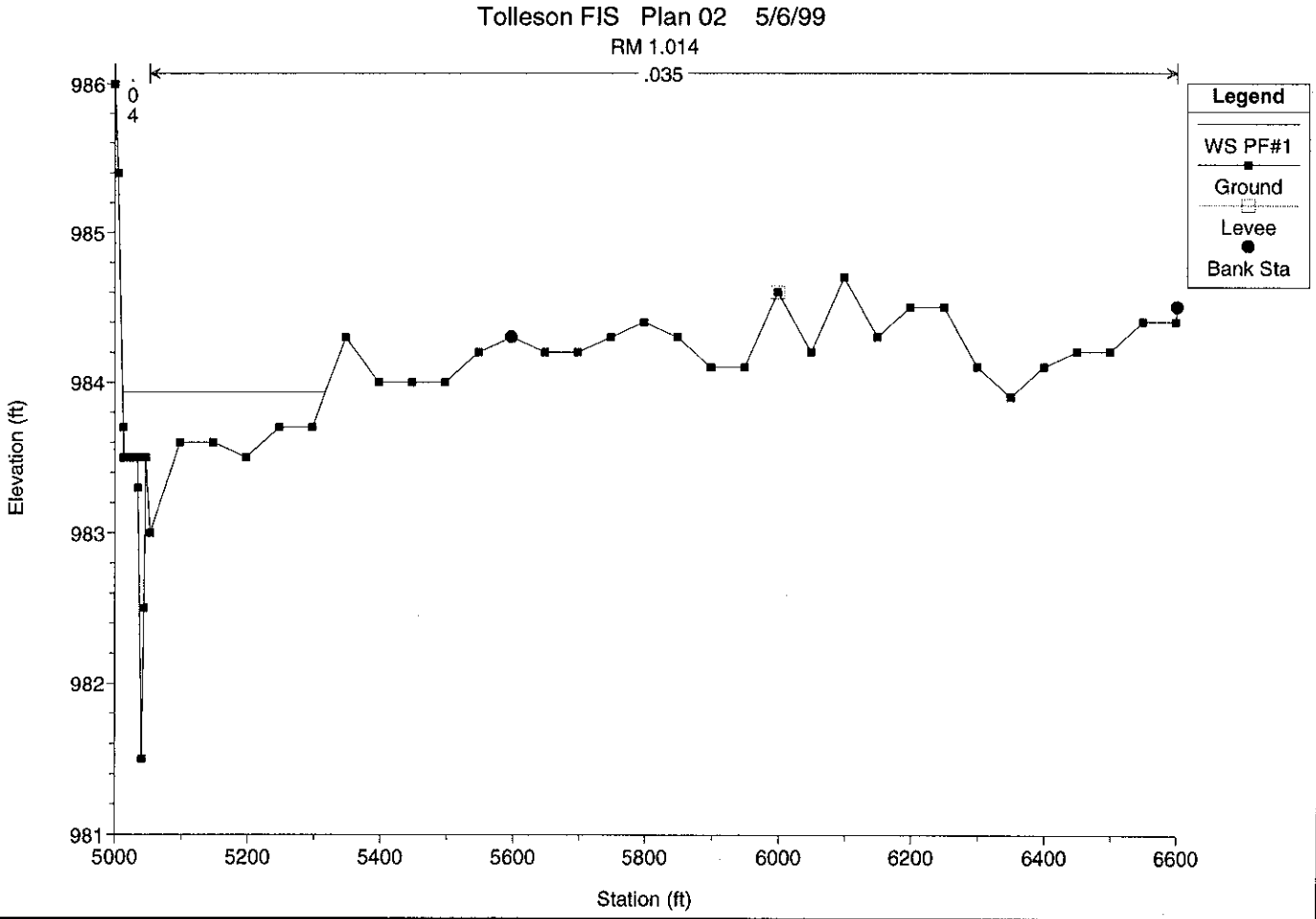

Tolleson FIS Plan 02 5/6/99
RM 1.298, INTERPOLATED Q=360 CFS, Begin DILA Q=120 CFS TO SOUTH DIVERSION
.035
.035
Legend
WS PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

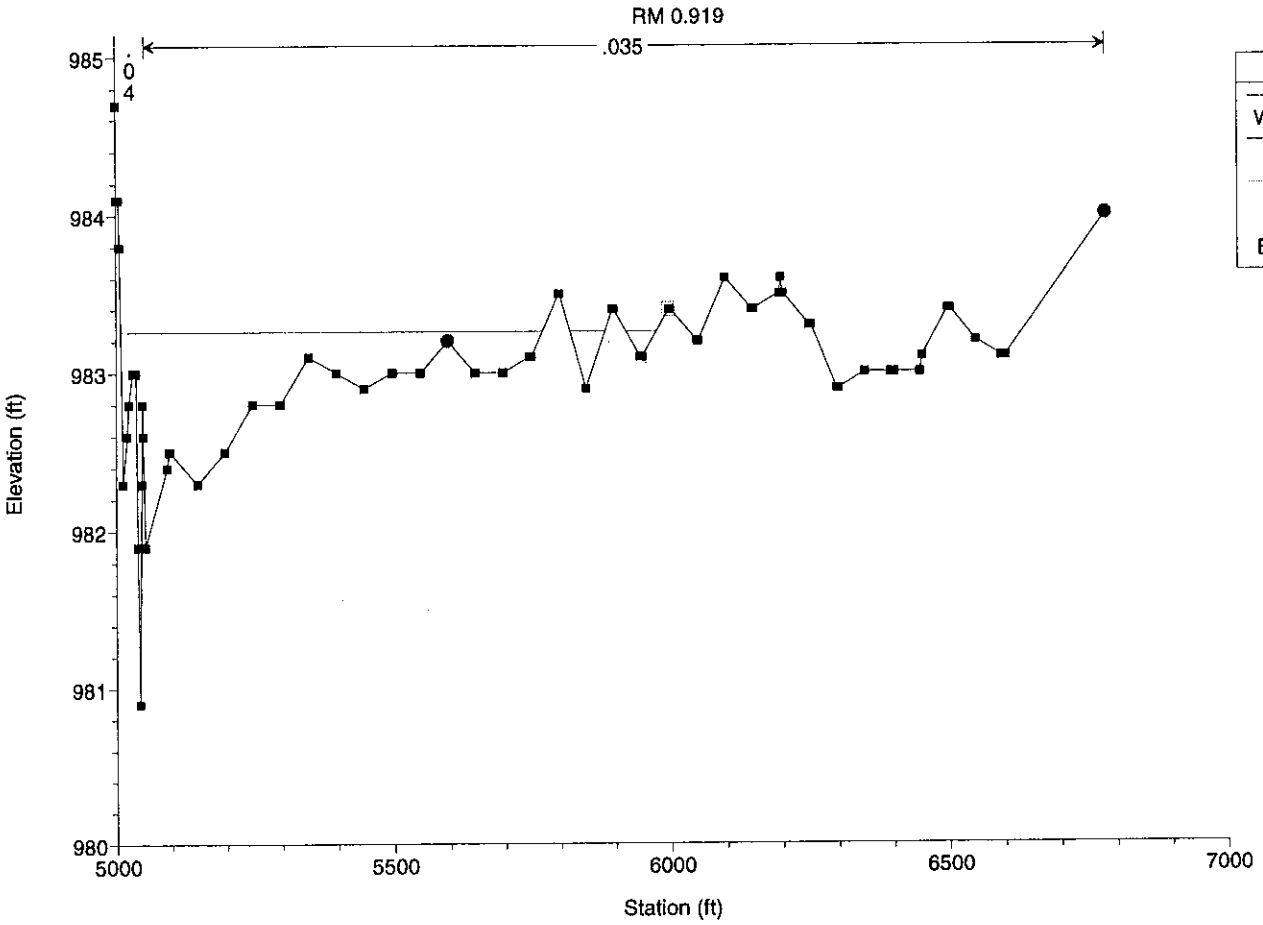

Tolleson FIS Plan 02 5/6/99
RM 1.203, Interpolated Q=270 CFS, DILA Q=120 CFS TO SOUTH DIVERSION
.035
.035
Legend
WS PF#1
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)

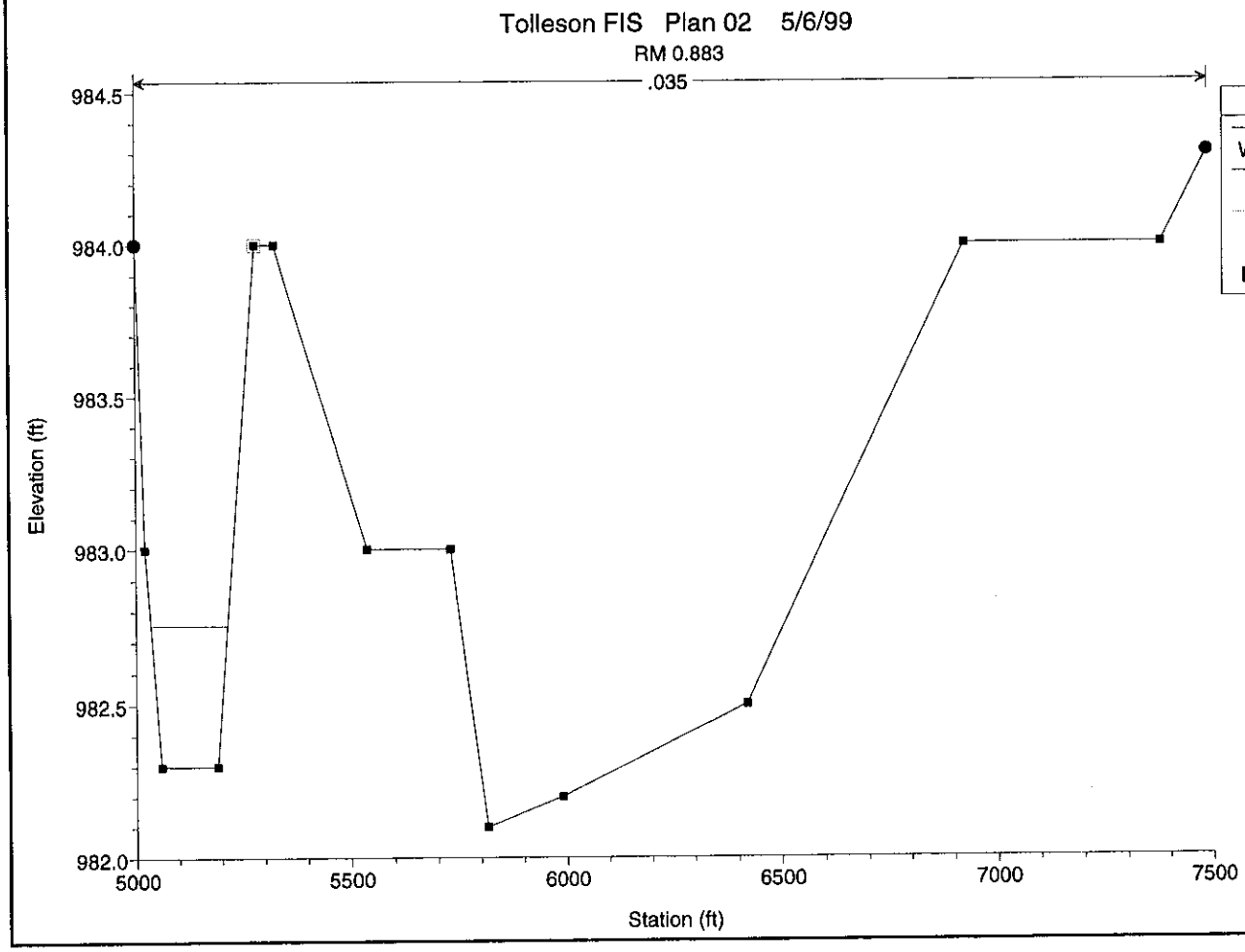

Tolleson FIS Plan 02 5/6/99
RM 1.138, CPKA2-220 CFS, End DILA Q=120 SOUTH DIVERSION,
.04
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
989
988
987
986
985
984
5000
5200
5400
5600
5800
6000
6200
6400
Station (ft)

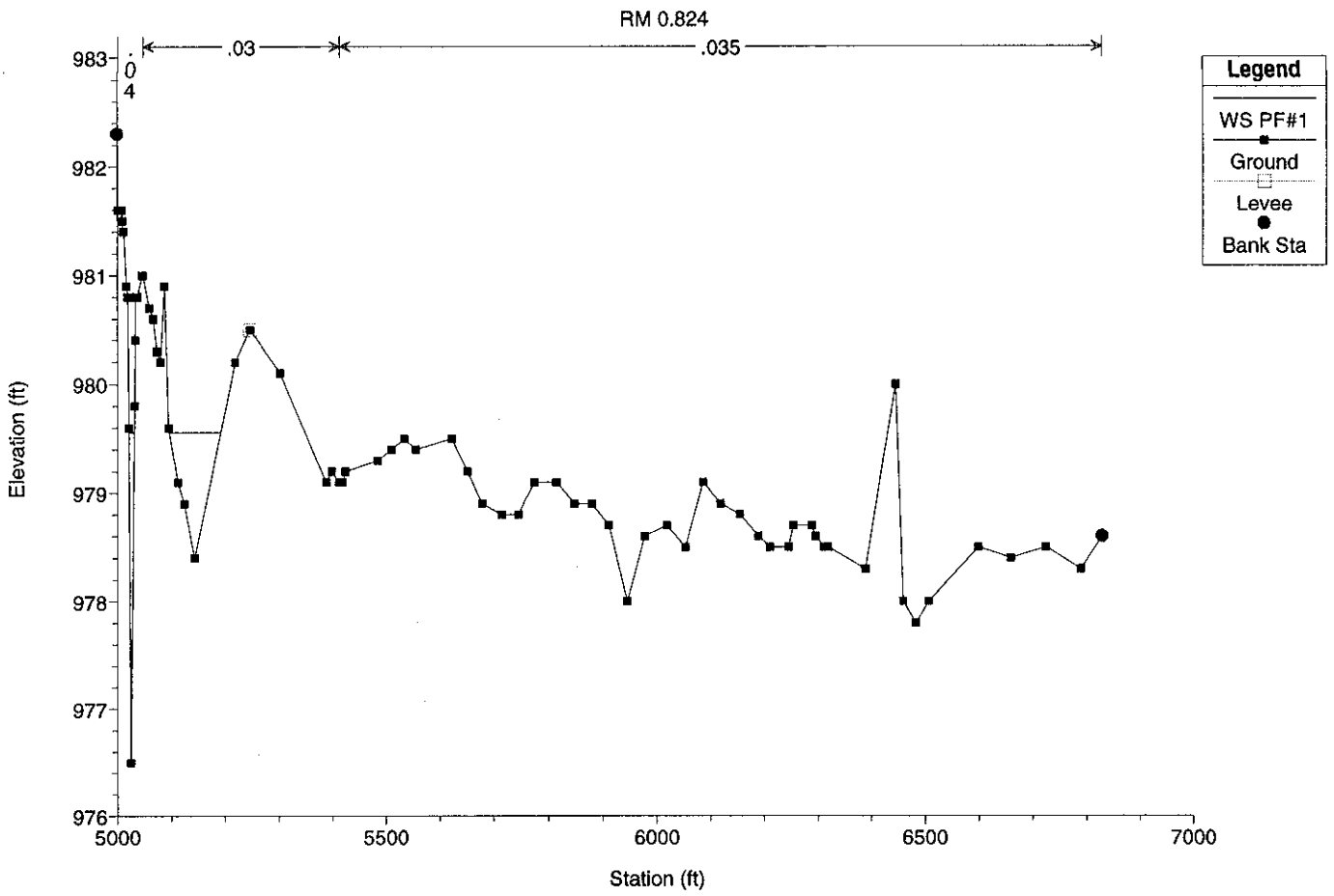

Tolleson FIS Plan 02 5/6/99
RM 1.131
.035
.04
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
989
988
987
986
985
984
983
982
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

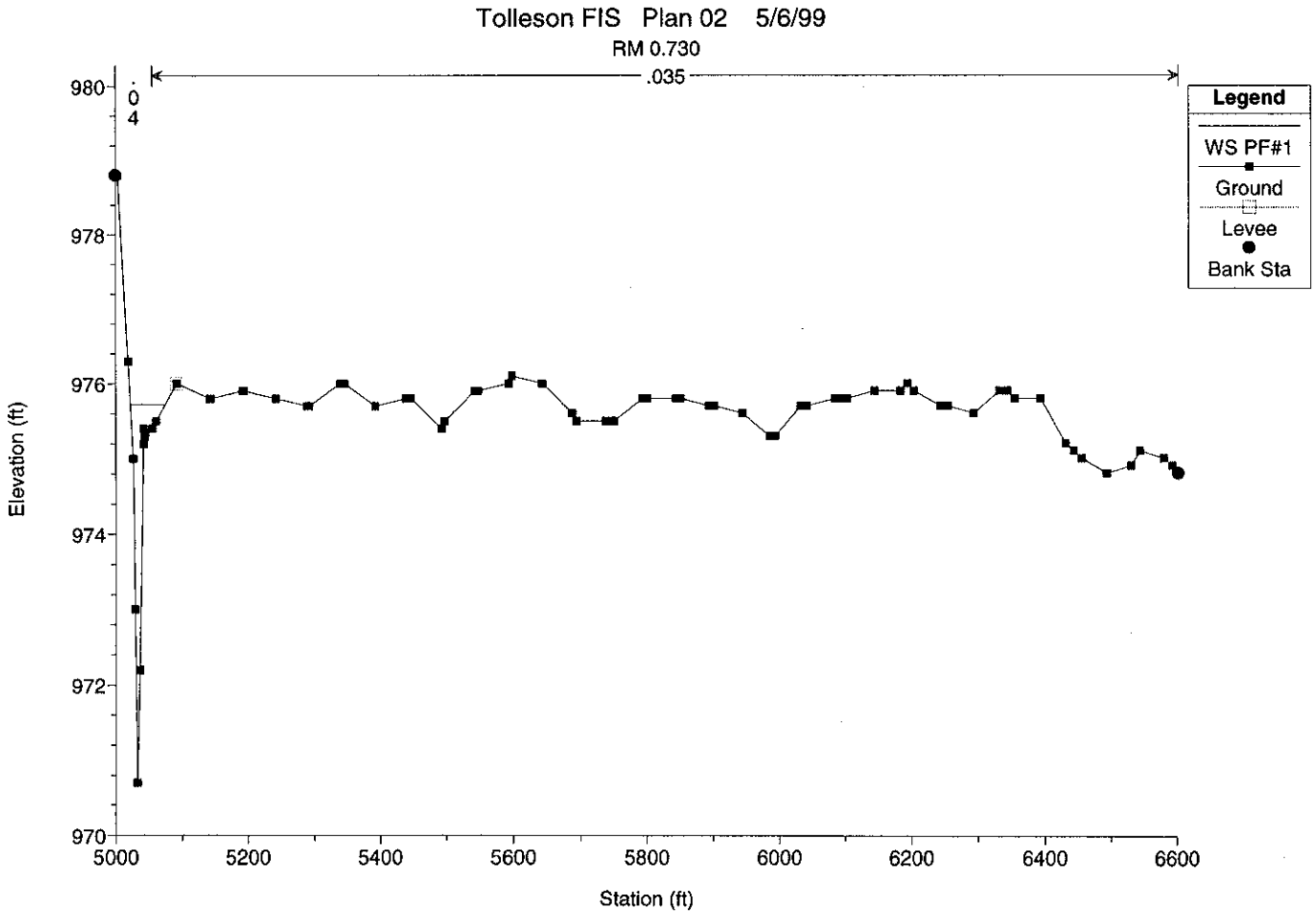

Tolleson FIS Plan 02 5/6/99
RM 1.109
.035
0
4
Legend
WS PF#1
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
986
985
984
983
982
981
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

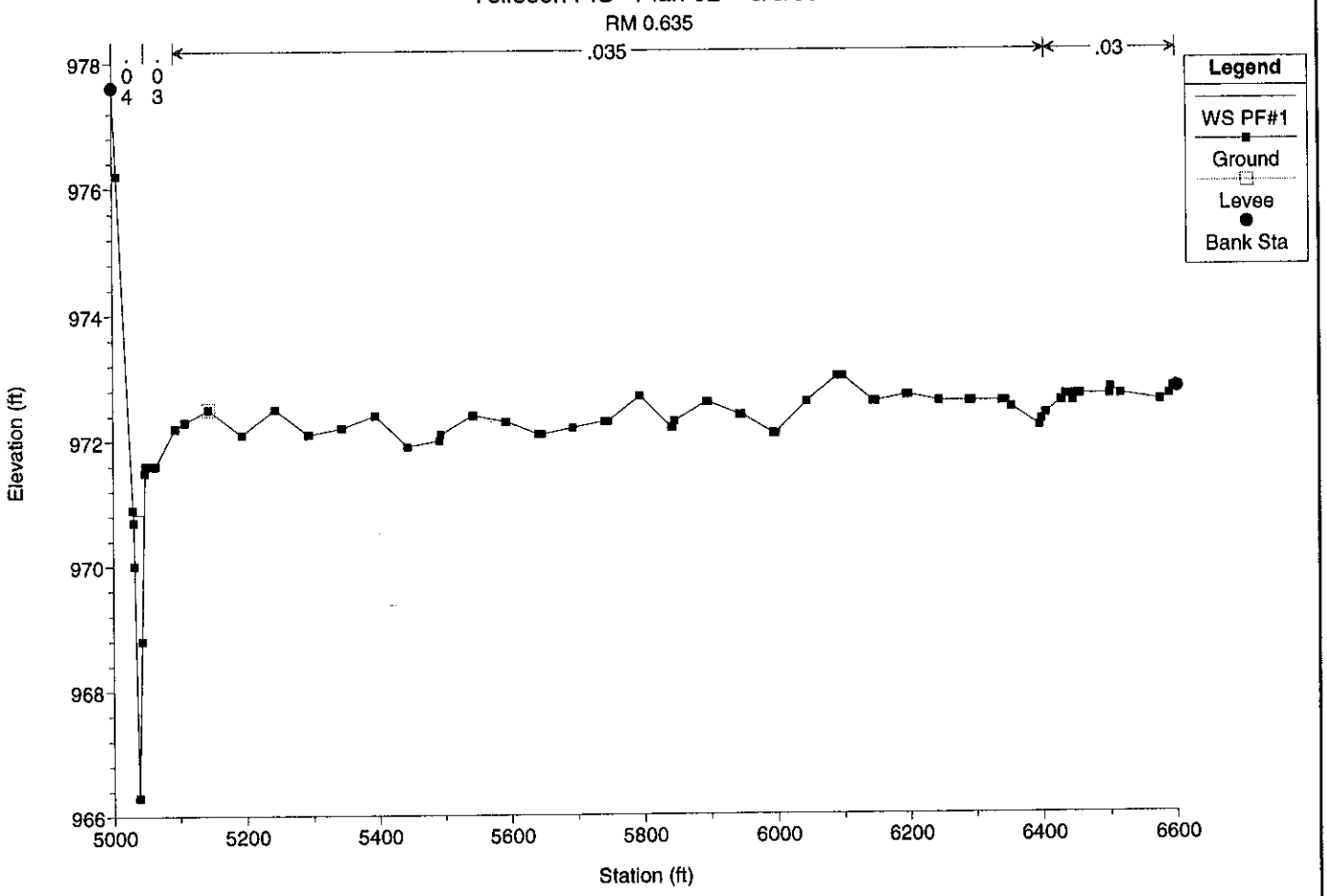

Tolleson FIS Plan 02 5/6/99
RM 1.014
.035
0
4
Legend
WS PF#1
Ground
Levee
Bank Sta
Elevation (ft)
986
985
984
983
982
981
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

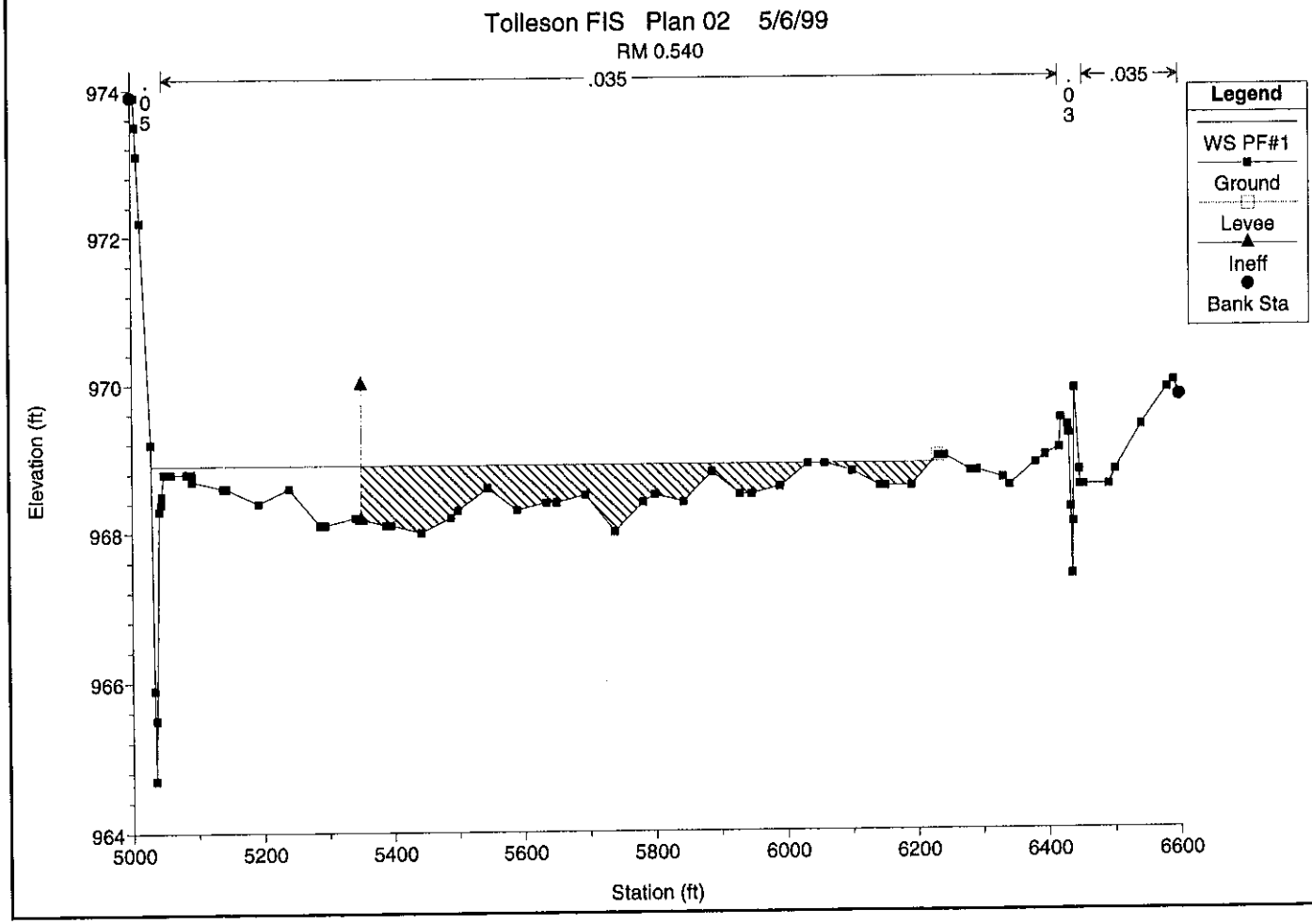

Tolleson FIS Plan 02 5/6/99
RM 0.919
.035
Legend
WS PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
985
984
983
982
981
980
5000
5500
6000
6500
7000

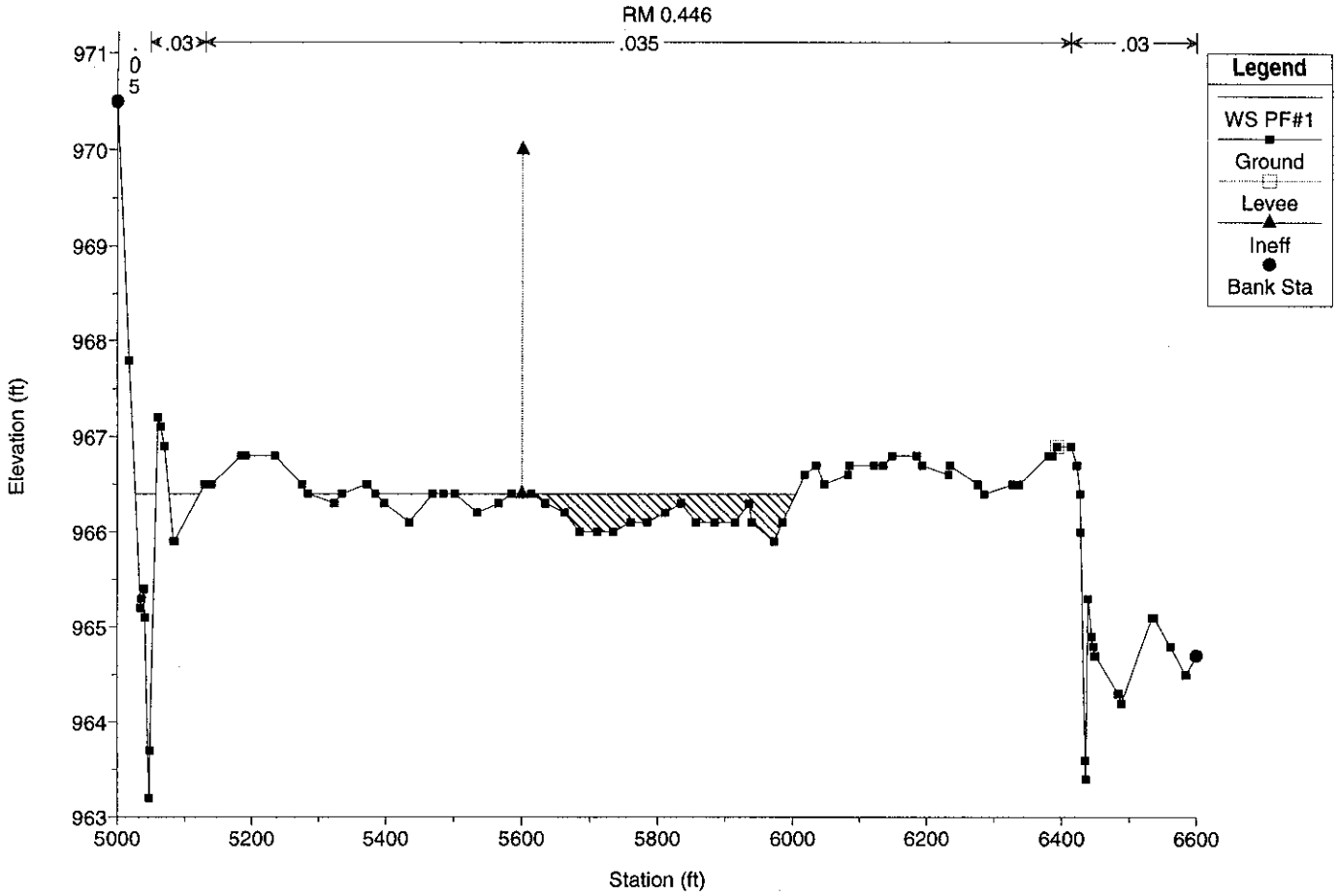

Tolleson FIS Plan 02 5/6/99
RM 0.883
.035
Legend
WS PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
984.5
984.0
983.5
983.0
982.5
982.0
5000
5500
6000
6500
7000
7500

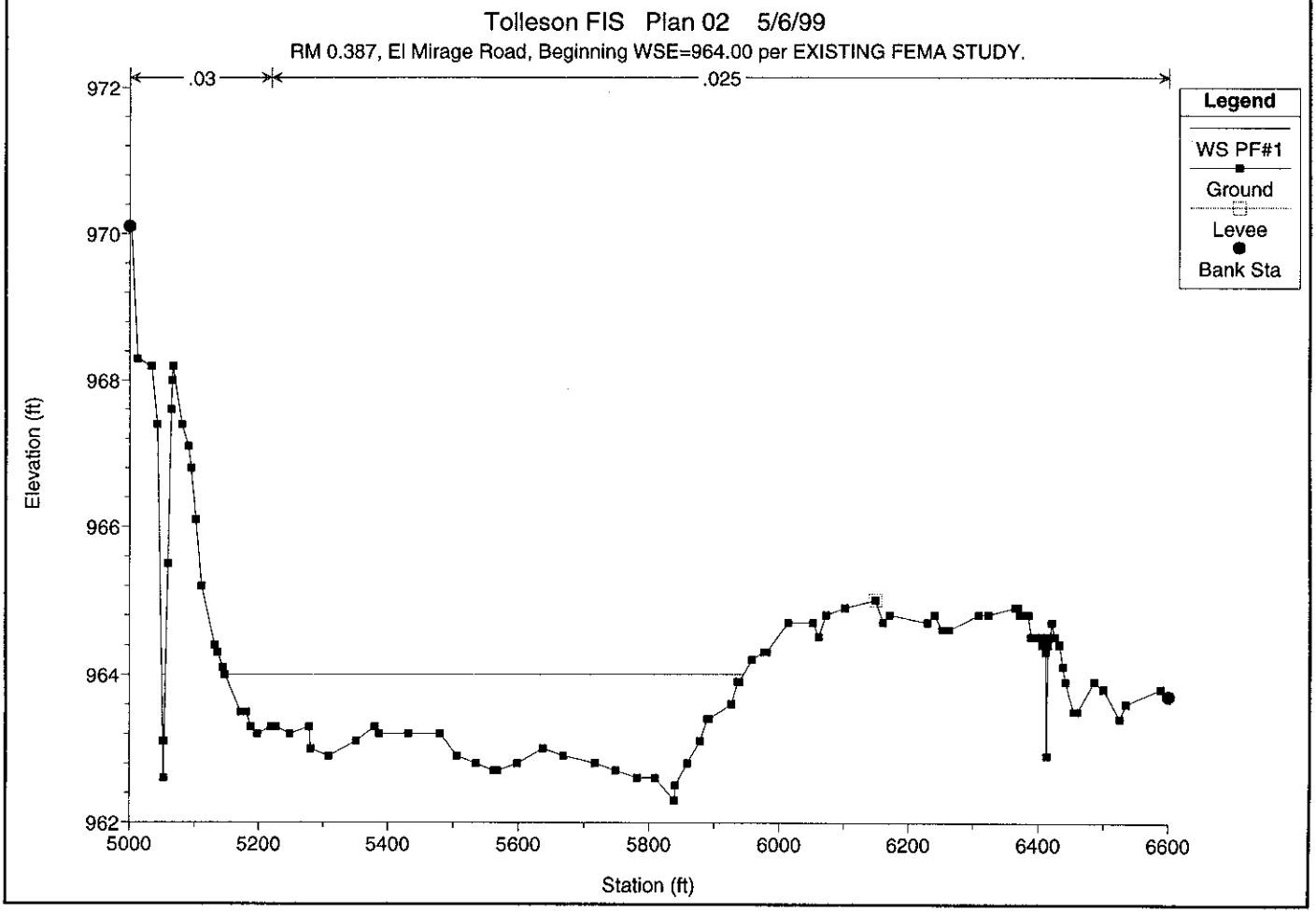

Tolleson FIS Plan 02 5/6/99
RM 0.824
.03
.035
Legend
WS PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
983
982
981
980
979
978
977
976
5000
5500
6000
6500
7000


Tolleson FIS Plan 02 5/6/99
RM 0.730
.035
Legend
WS PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
980
978
976
974
972
970
5000
5200
5400
5600
5800
6000
6200
6400
6600

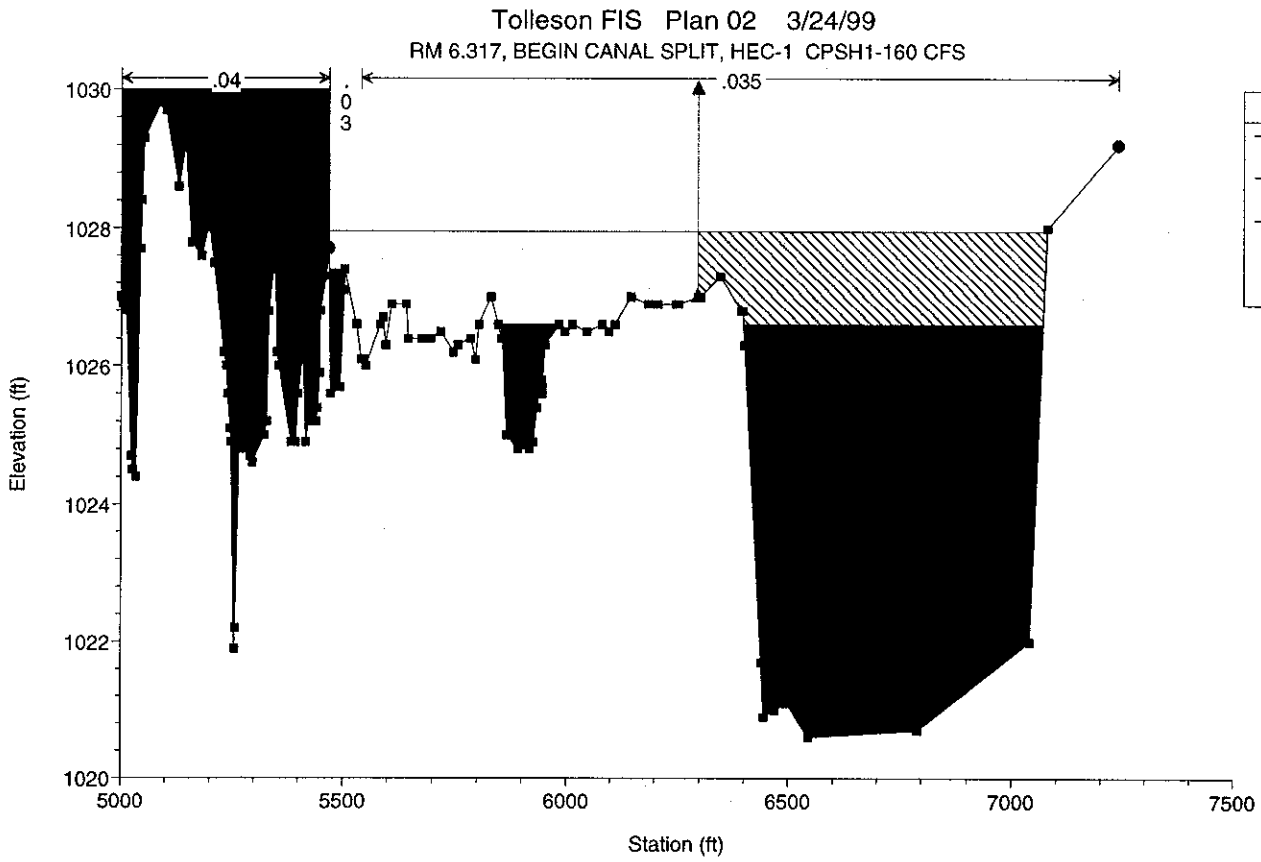

Tolleson FIS Plan 02 5/6/99
RM 0.635
.035
.03
.04
.03
Legend
WS PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
978
976
974
972
970
968
966
5000
5200
5400
5600
5800
6000
6200
6400
6600

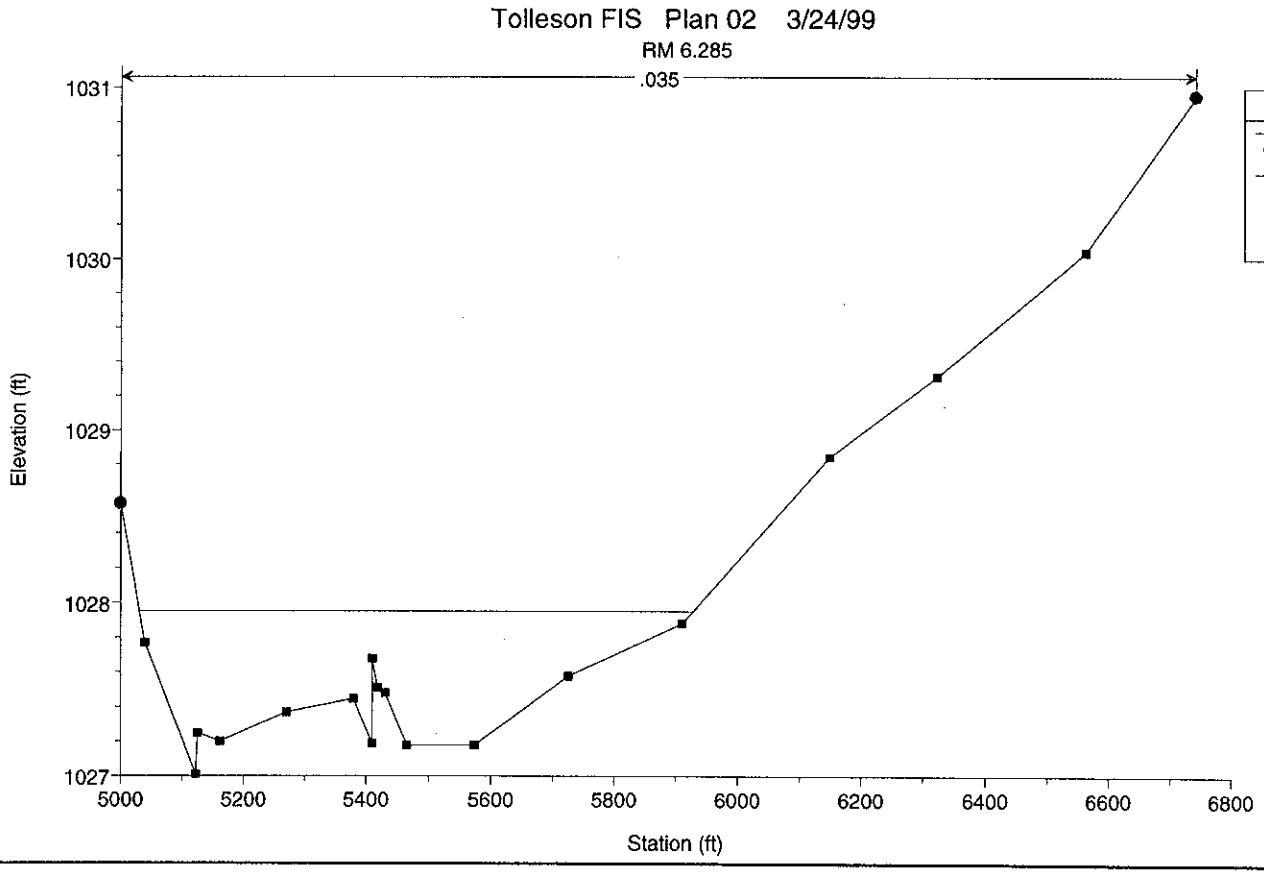

Tolleson FIS Plan 02 5/6/99
RM 0.540
.035
.035
.05
.03
Legend
WS PF#1
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)
974
972
970
968
966
964
5000
5200
5400
5600
5800
6000
6200
6400
6600

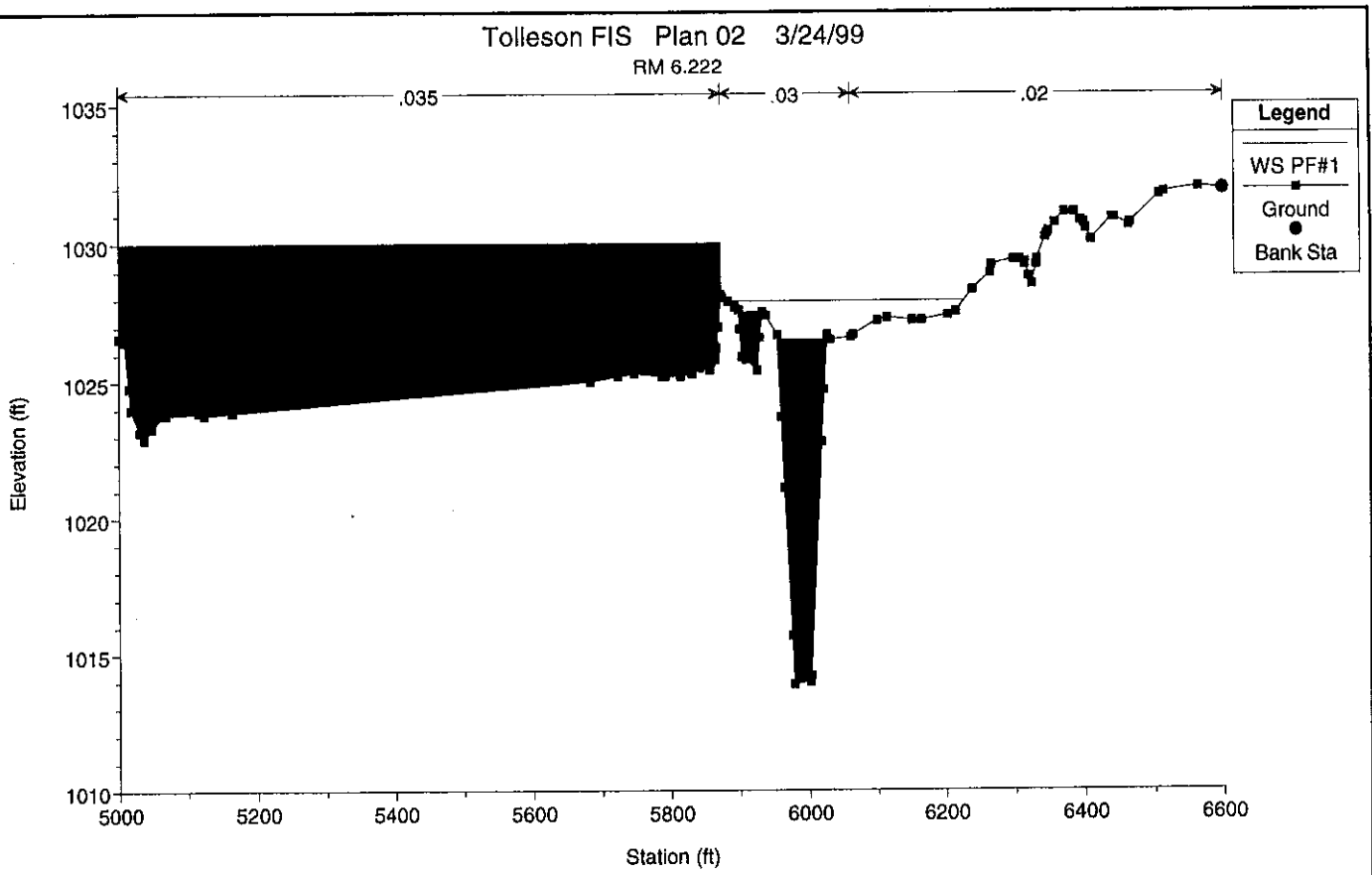

Tolleson FIS Plan 02 5/6/99
RM 0.446
.03
.035
.03
.05
Legend
WS PF#1
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)
971
970
969
968
967
966
965
964
963
5000
5200
5400
5600
5800
6000
6200
6400
6600

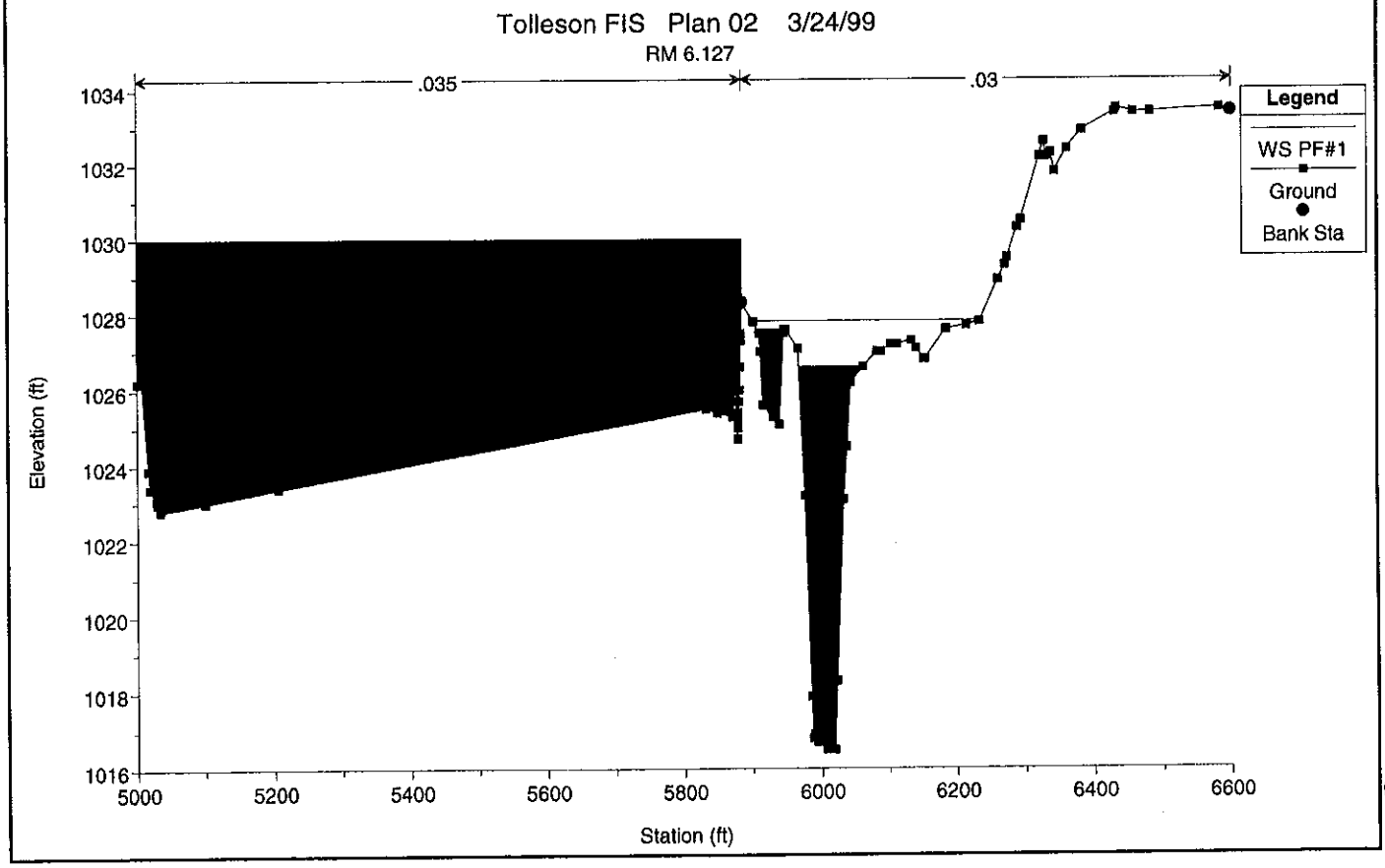

Tolleson FIS Plan 02 5/6/99
RM 0.387, El Mirage Road, Beginning WSE=964.00 per EXISTING FEMA STUDY.
.03
.025
Legend
WS PF#1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
972
970
968
966
964
962
5000
5200
5400
5600
5800
6000
6200
6400
6600

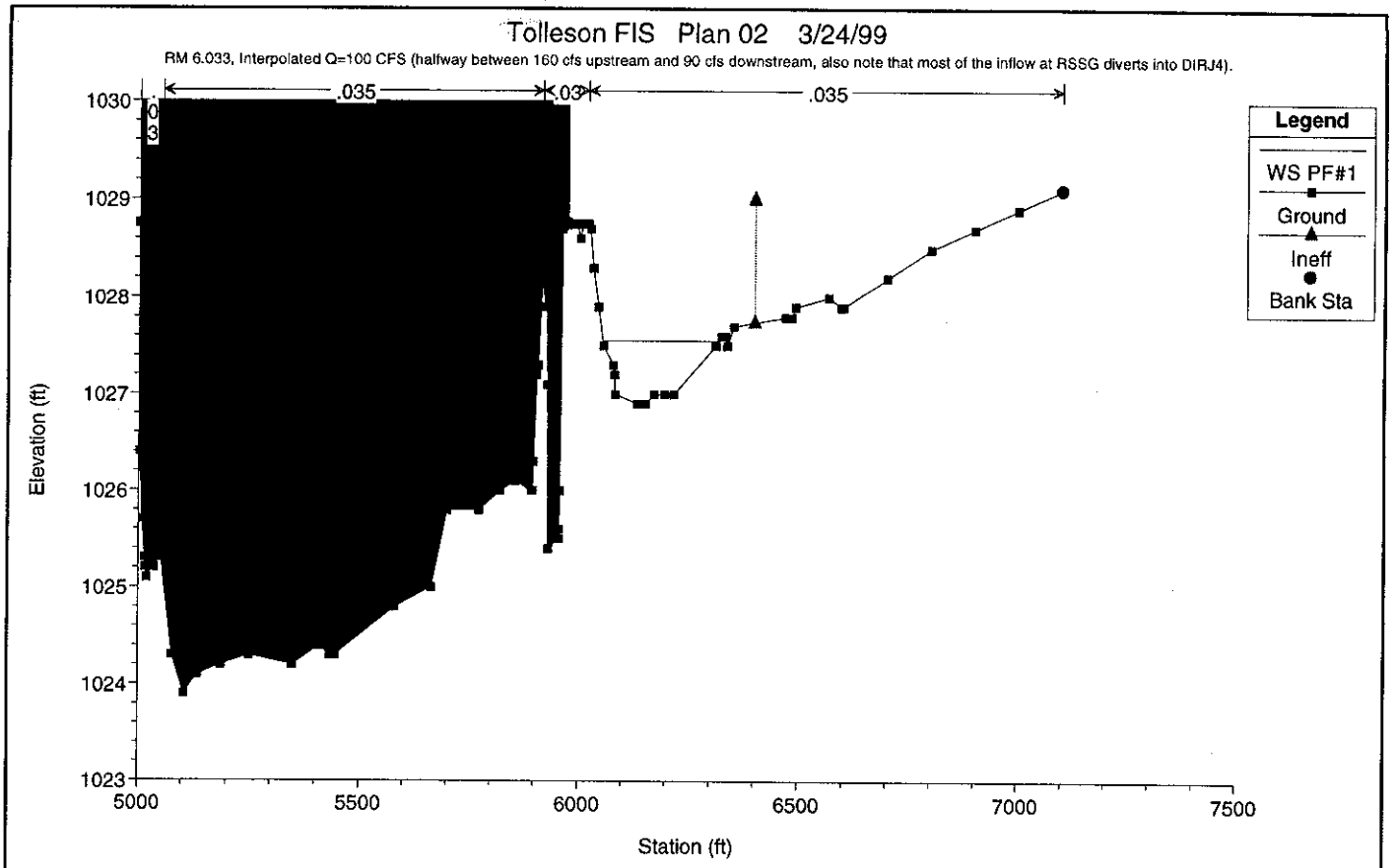
Flooding Source	HEC-RAS Reach Label	From River Mile to River Mile
RID Canal	Canal Split	6.317 to 5.578

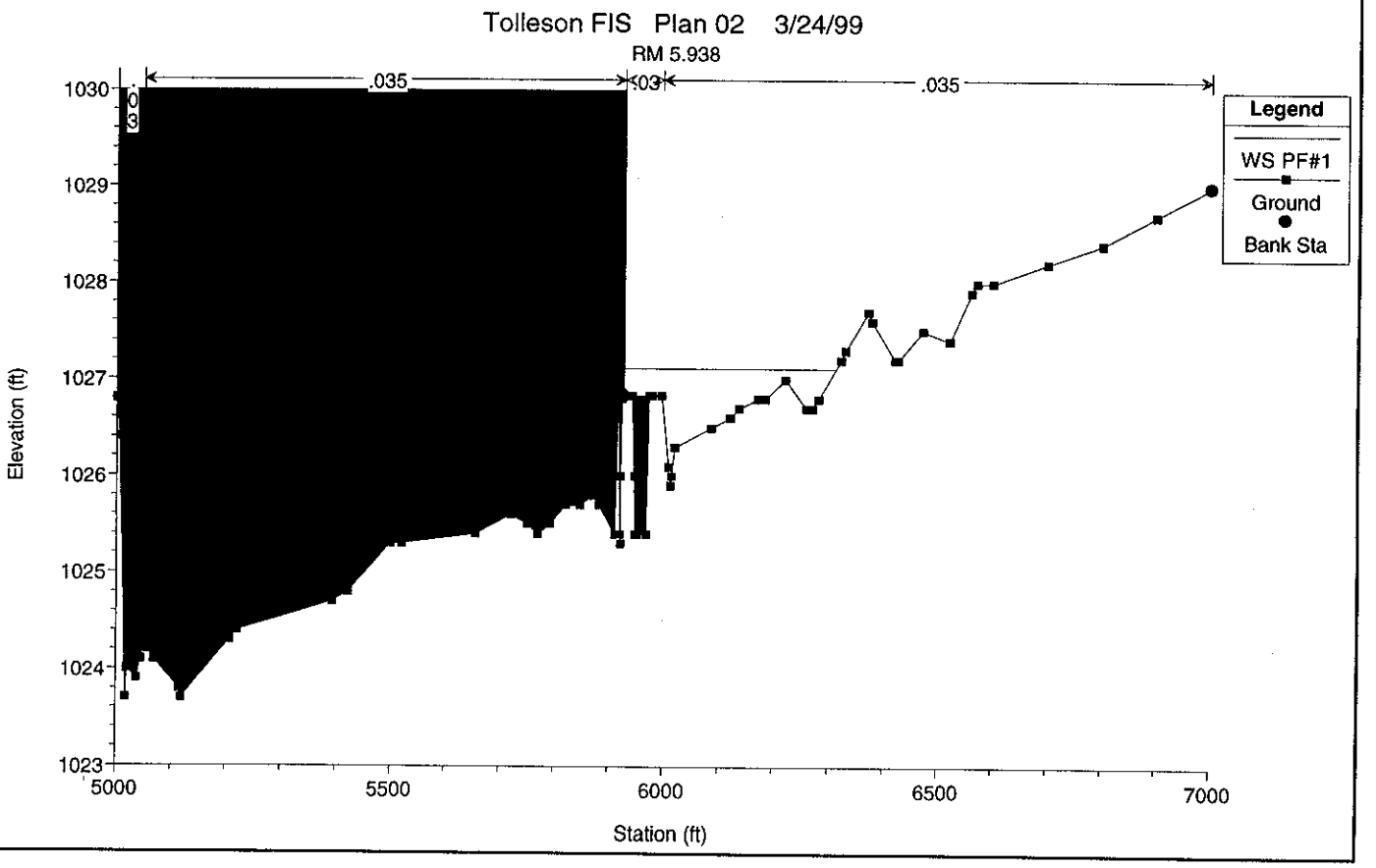

Tolleson FIS Plan 02 3/24/99
RM 6.317, BEGIN CANAL SPLIT, HEC-1 CPSH1-160 CFS
.04
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1030
1028
1026
1024
1022
1020
5000
5500
6000
6500
7000
7500
Station (ft)

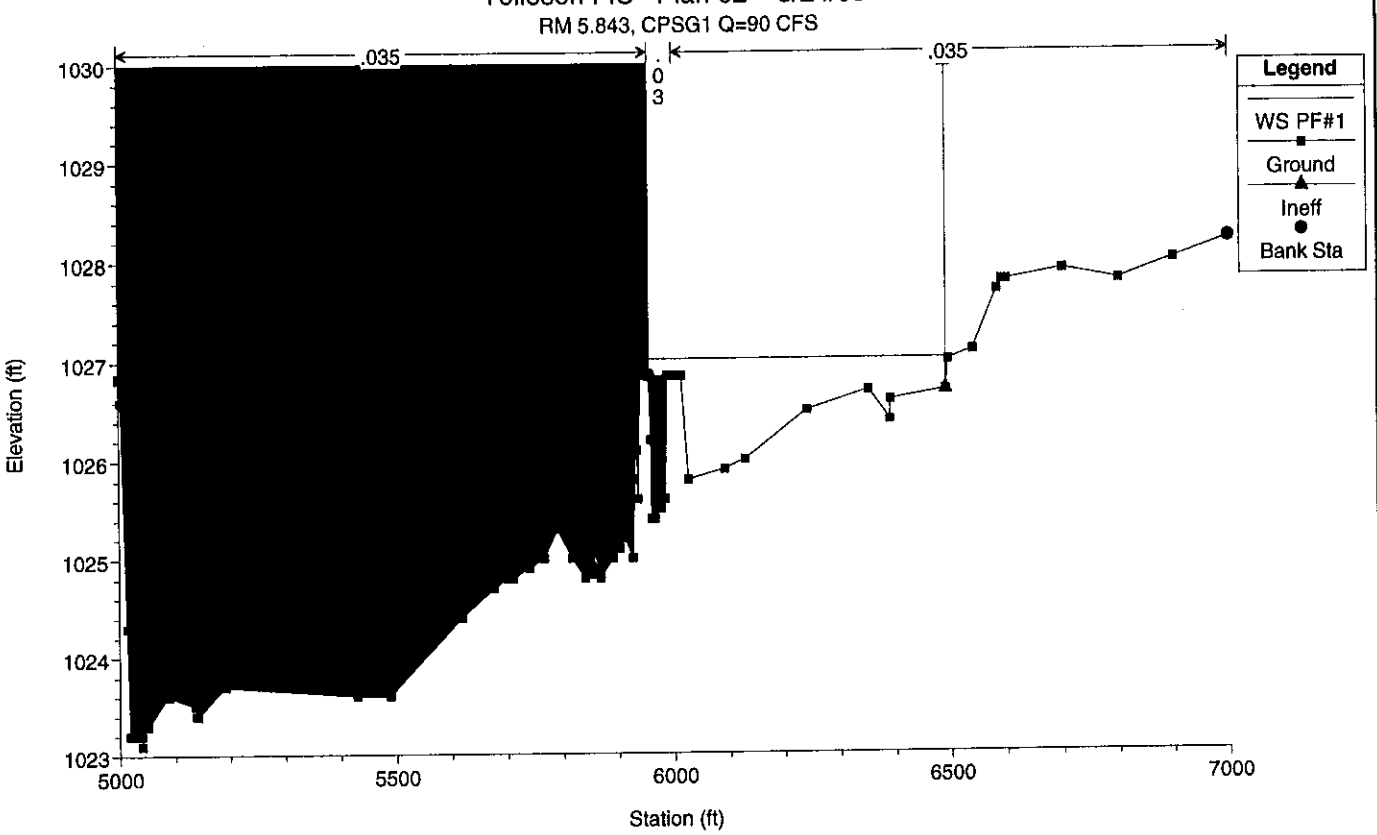

Tolleson FIS Plan 02 3/24/99
RM 6.285
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1031
1030
1029
1028
1027
5000
5200
5400
5600
5800
6000
6200
6400
6600
6800
Station (ft)

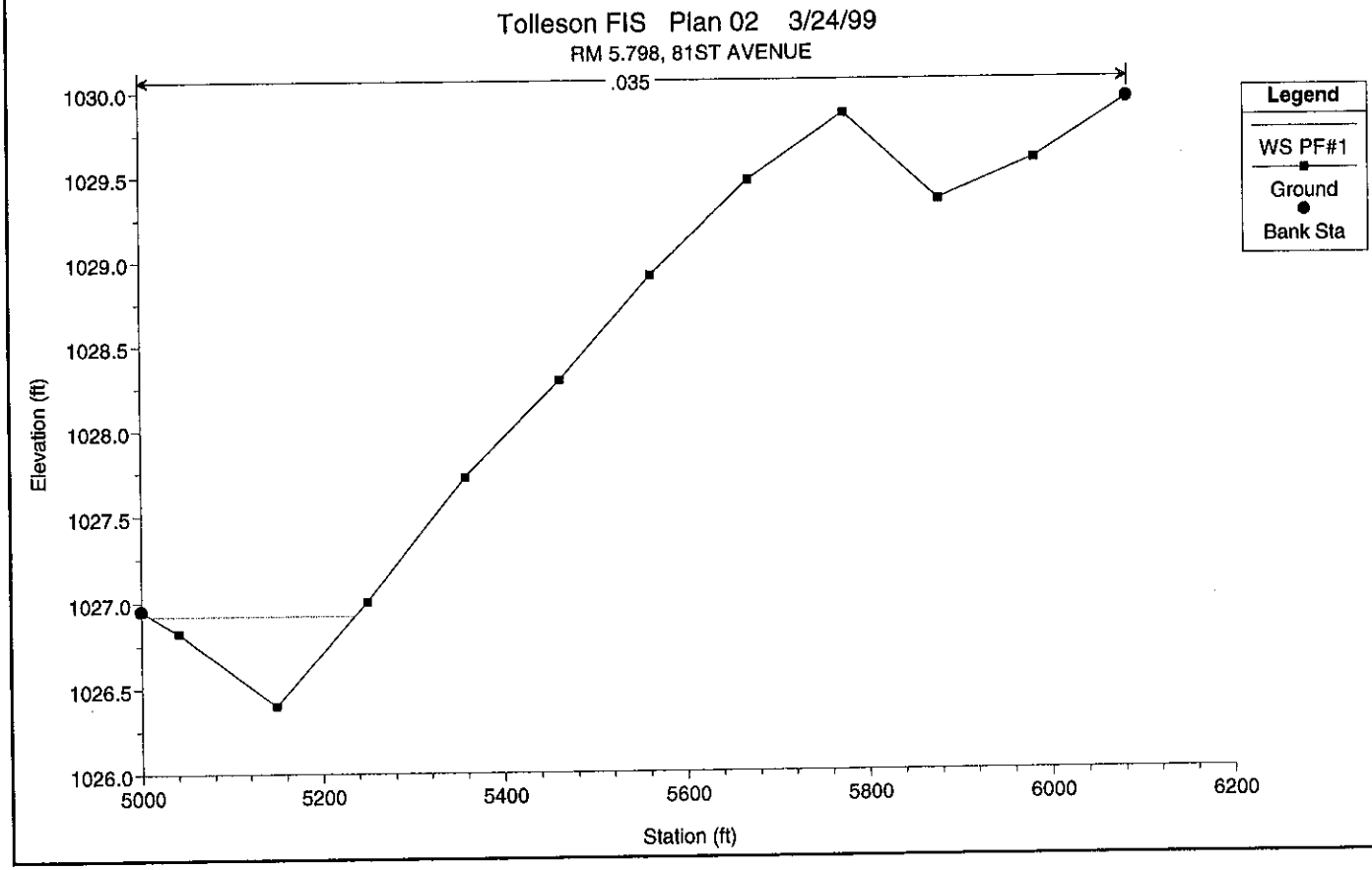

Tolleson FIS Plan 02 3/24/99
RM 6.222
.035
.03
.02
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1035
1030
1025
1020
1015
1010
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

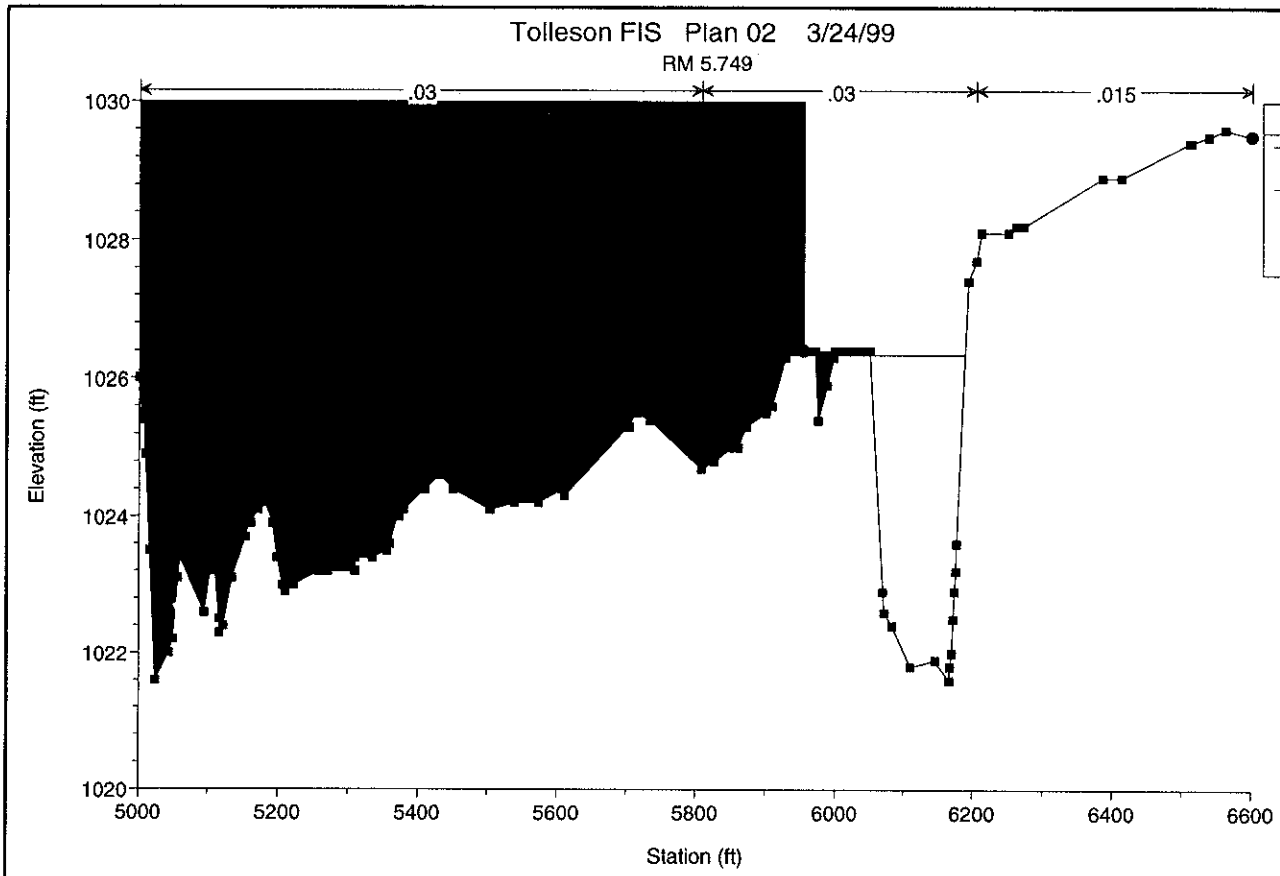

Tolleson FIS Plan 02 3/24/99
RM 6.127
.035
.03
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1034
1032
1030
1028
1026
1024
1022
1020
1018
1016
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

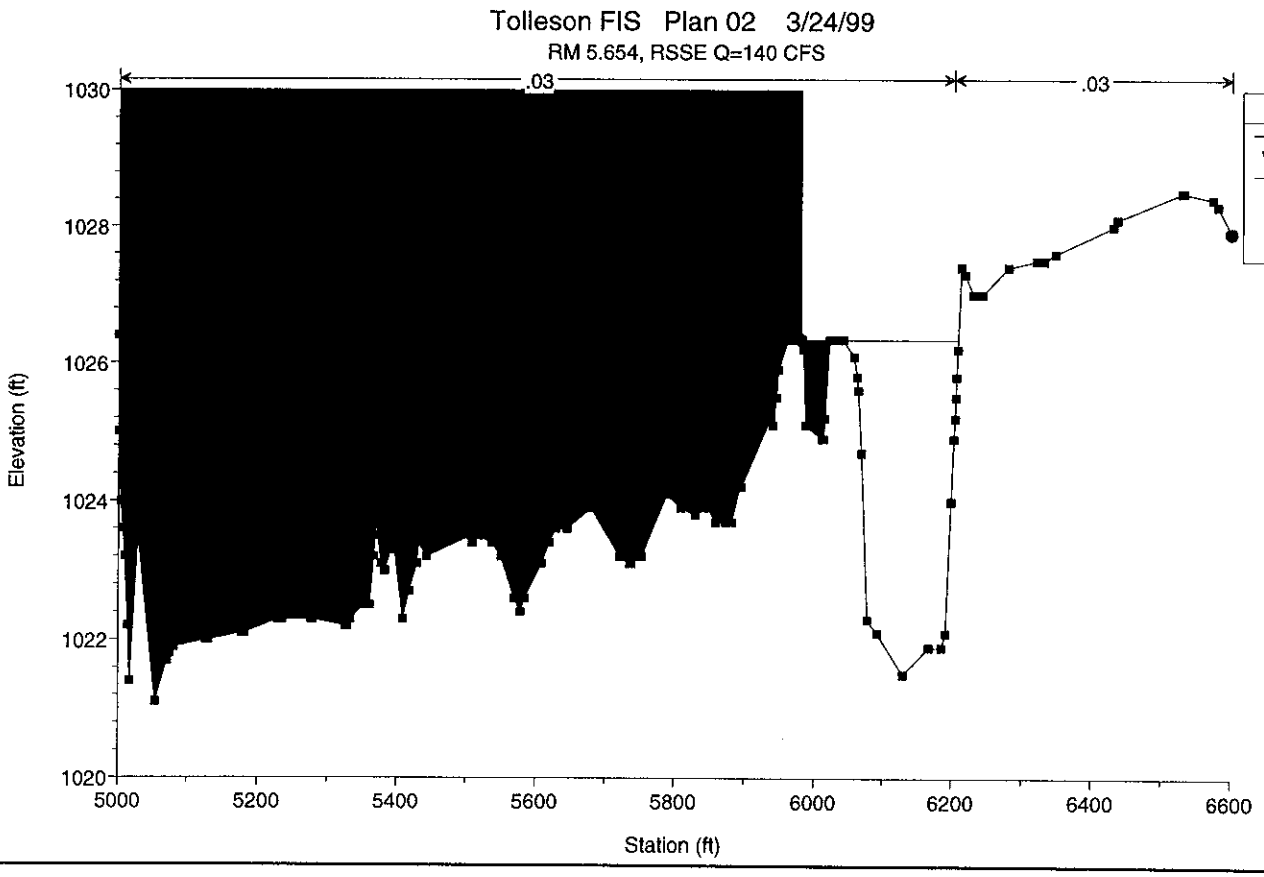

Tolleson FIS Plan 02 3/24/99
RM 6.033, Interpolated Q=100 CFS (halfway between 160 cfs upstream and 90 cfs downstream, also note that most of the inflow at RSSG diverts into DIRJ4).
.035
.03
.035
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1030
1029
1028
1027
1026
1025
1024
1023
5000
5500
6000
6500
7000
7500
Station (ft)

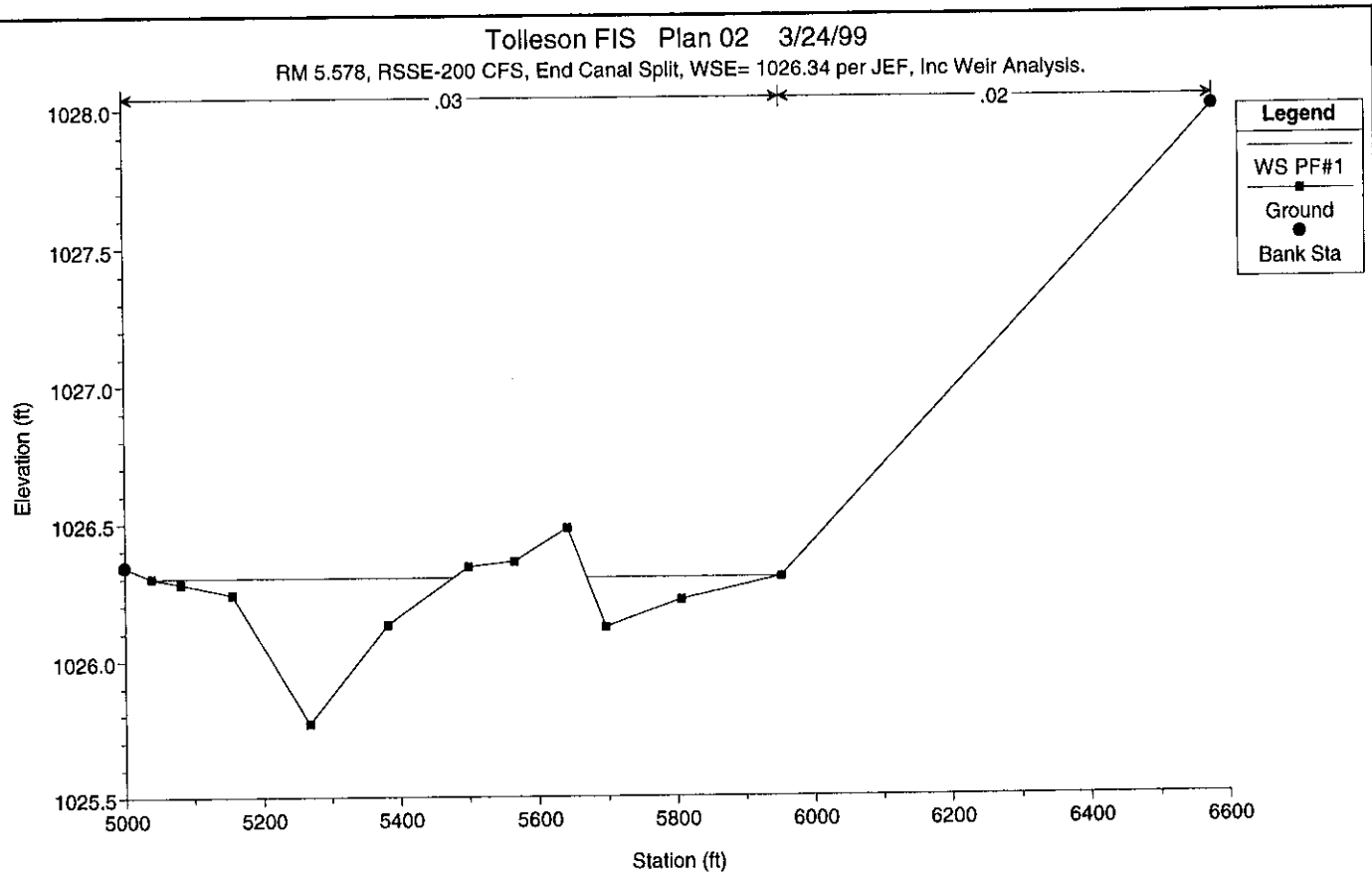

Tolleson FIS Plan 02 3/24/99
RM 5.938
.035
.03
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1030
1029
1028
1027
1026
1025
1024
1023
5000
5500
6000
6500
7000
Station (ft)


Tolleson FIS Plan 02 3/24/99
RM 5.843, CPSG1 Q=90 CFS
.035
.035
.03
Legend
WS PF#1
Ground
Ineff
Bank Sta
Elevation (ft)
1030
1029
1028
1027
1026
1025
1024
1023
5000
5500
6000
6500
7000
Station (ft)


Tolleson FIS Plan 02 3/24/99
RM 5.798, 81ST AVENUE
.035
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1030.0
1029.5
1029.0
1028.5
1028.0
1027.5
1027.0
1026.5
1026.0
5000
5200
5400
5600
5800
6000
6200
Station (ft)


Tolleson FIS Plan 02 3/24/99
RM 5.749
.03
.03
.015
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1030
1028
1026
1024
1022
1020
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)


Tolleson FIS Plan 02 3/24/99
RM 5.654, RSSE Q=140 CFS
.03
.03
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1030
1028
1026
1024
1022
1020
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)


Tolleson FIS Plan 02 3/24/99
RM 5.578, RSSE-200 CFS, End Canal Split, WSE= 1026.34 per JEF, Inc Weir Analysis.
.03
.02
Legend
WS PF#1
Ground
Bank Sta
Elevation (ft)
1028.0
1027.5
1027.0
1026.5
1026.0
1025.5
5000
5200
5400
5600
5800
6000
6200
6400
6600
Station (ft)

E.3 HEC-RAS Output

HEC-RAS Plan: Exist. Cond.

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Vel Chnl	Top Width	Froude # Chl	Hydr Depth	Sta W.S. Lft	Sta W.S. Rgt
			(cfs)	(ft)	(ft)	(ft/s)	(ft)		(ft)	(ft)	(ft)
Canal	Canal Split	6.317	160	1026.00	1028.0	0.1	1612.5	0.02	1.3	5467	7080
Canal	Canal Split	6.285	160	1027.01	1028.0	0.3	897.3	0.08	0.5	5030	5927
Canal	Canal Split	6.222	160	1026.50	1027.9	0.5	345.0	0.10	0.9	5881	6227
Canal	Canal Split	6.127	160	1026.60	1027.8	0.7	332.9	0.15	0.7	5901	6234
Canal	Canal Split	6.033	100	1026.90	1027.6	0.9	271.6	0.24	0.4	6053	6342
Canal	Canal Split	5.938	100	1025.90	1027.1	0.6	384.9	0.17	0.4	5926	6311
Canal	Canal Split	5.843	90	1025.80	1027.0	0.3	548.6	0.06	0.6	5955	6504
Canal	Canal Split	5.798	90	1026.40	1026.9	1.6	227.0	0.54	0.3	5009	5236
Canal	Canal Split	5.749	90	1021.60	1026.3	0.2	139.0	0.02	3.7	6049	6188
Canal	Canal Split	5.654	140	1021.50	1026.3	0.2	166.5	0.02	3.5	6041	6207
Canal	Canal Split	5.578	140	1025.77	1026.3	1.3	719.8	0.60	0.1	5039	5951
Southern Pacific	Tolleson 1	7.287	1020	1033.80	1036.5	4.0	602.3	1.07	0.4	5012	5615
Southern Pacific	Tolleson 1	7.264	1020	1032.90	1035.6	1.5	1347.8	0.33	0.7	5025	6373
Southern Pacific	Tolleson 1	7.227	1020	1033.40	1035.2	1.4	1219.3	0.30	0.7	5031	6250
Southern Pacific	Tolleson 1	7.169	1020	1031.60	1034.3	1.9	1246.6	0.47	0.5	5057	6303
Southern Pacific	Tolleson 1	7.074	1020	1029.60	1033.5	1.1	1550.6	0.19	1.2	5028	6578
Southern Pacific	Tolleson 1	7.033	1020	1028.90	1032.9	3.7	535.9	0.89	0.5	5034	5634
Southern Pacific	Tolleson 1	6.980	1020	1028.50	1031.8	1.8	862.3	0.30	1.1	5028	5918
Southern Pacific	Tolleson 1	6.885	1020	1027.70	1031.5	0.9	1130.8	0.15	1.1	5013	6165
Southern Pacific	Tolleson 1	6.782	1020	1028.90	1030.6	4.0	561.4	0.91	0.6	5019	5664
Southern Pacific	Tolleson 1	6.723	1020	1026.50	1029.9	1.5	1071.6	0.25	1.1	5042	6315
Southern Pacific	Tolleson 1	6.696	1020	1026.30	1029.8	1.3	1212.0	0.22	1.0	5029	6327
Southern Pacific	Tolleson 1	6.601	1020	1025.60	1029.6	0.7	1475.9	0.10	1.3	5033	6553
Southern Pacific	Tolleson 1	6.549	1490	1025.40	1029.6	0.7	1809.4	0.10	1.5	5007	6816
Southern Pacific	Tolleson 1	6.532	1490	1028.29	1029.5	2.7	1007.7	0.63	0.6	5073	6239
Southern Pacific	Tolleson 1	6.506	1490	1025.80	1028.4	2.5	937.6	0.53	0.7	5032	6337
Southern Pacific	Tolleson 1	6.412	1490	1025.10	1028.0	1.0	1180.8	0.16	1.3	5012	6475
Southern Pacific	RR Split	6.317	1170	1021.90	1026.3	4.6	223.1	0.71	1.3	5014	5446
Southern Pacific	RR Split	6.285	1170	1023.20	1026.4	1.2	770.5	0.19	1.3	5006	5856
Southern Pacific	RR Split	6.222	1170	1022.90	1026.3	0.8	853.0	0.10	1.8	5009	5866
Southern Pacific	RR Split	6.127	1170	1022.80	1026.2	0.7	873.2	0.08	2.0	5008	5881
Southern Pacific	RR Split	6.033	1230	1023.90	1026.1	1.1	890.7	0.16	1.3	5005	5896
Southern Pacific	RR Split	5.938	1230	1023.70	1025.7	1.7	878.4	0.32	0.8	5008	5920
Southern Pacific	RR Split	5.843	1280	1023.10	1025.2	1.2	908.8	0.19	1.2	5009	5926
Southern Pacific	RR Split	5.749	1280	1021.60	1024.8	2.1	430.5	0.31	1.4	5010	5825
Southern Pacific	RR Split	5.654	1280	1021.10	1024.3	1.7	849.8	0.21	2.0	5000	5900
Southern Pacific	Tolleson 2	5.539	980	1022.20	1024.2	0.9	891.5	0.15	1.2	5000	5892
Southern Pacific	Tolleson 2	5.530	980	1021.50	1022.5	4.4	370.7	1.00	0.6	5139	5578
Southern Pacific	Tolleson 2	5.465	980	1018.60	1020.9	2.0	513.3	0.35	1.0	5008	5521
Southern Pacific	Tolleson 2	5.370	980	1017.10	1020.8	0.9	1222.4	0.11	2.0	5000	6222
Southern Pacific	Tolleson 2	5.319	760	1019.30	1020.4	4.2	281.1	0.92	0.6	5000	6266
Southern Pacific	Tolleson 2	5.275	760	1016.90	1019.5	2.3	1238.8	0.42	0.9	5009	6248

HEC-RAS Plan: Exist. Cond. (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Vel Chnl	Top Width	Froude # Chl	Hydr Depth	Sta W.S. Lft	Sta W.S. Rgt
			(cfs)	(ft)	(ft)	(ft/s)	(ft)		(ft)	(ft)	(ft)
Southern Pacific	Tolleson 2	5.181	760	1016.40	1018.0	1.9	1142.2	0.48	0.5	5028	6228
Southern Pacific	Tolleson 2	5.086	760	1015.30	1016.8	1.2	1122.4	0.23	0.8	5011	6183
Southern Pacific	Tolleson 2	5.054	760	1014.40	1015.8	3.8	761.5	1.03	0.4	5011	5966
Southern Pacific	Tolleson 2	5.047	760	1013.97	1015.4	1.8	1039.9	0.49	0.4	5006	6046
Southern Pacific	Tolleson 2	5.040	760	1013.70	1015.3	1.9	628.9	0.40	0.7	5012	5641
Southern Pacific	Tolleson 2	4.991	760	1011.80	1013.9	2.8	487.3	0.66	0.6	5014	5524
Southern Pacific	Tolleson 2	4.896	760	1010.70	1012.9	1.1	761.4	0.22	0.9	5013	5855
Southern Pacific	Tolleson 2	4.802	760	1009.60	1012.2	1.7	630.0	0.35	0.8	5009	5713
Southern Pacific	Tolleson 2	4.707	760	1008.70	1010.8	1.8	725.3	0.41	0.6	5008	5787
Southern Pacific	Tolleson 2	4.612	760	1007.80	1010.1	1.4	461.1	0.22	1.2	5015	5531
Southern Pacific	Tolleson 2	4.577	780	1008.10	1009.9	1.3	646.3	0.25	0.9	5111	5757
Southern Pacific	Tolleson 2	4.567	780	1009.10	1009.8	2.2	768.8	0.50	0.6	5176	5945
Southern Pacific	Tolleson 2	4.559	780	1008.50	1009.7	1.9	782.1	0.45	0.5	5178	5960
Southern Pacific	Tolleson 2	4.518	780	1007.50	1009.1	1.7	813.3	0.37	0.6	5010	5907
Southern Pacific	Tolleson 2	4.423	780	1006.60	1008.7	1.1	715.4	0.19	1.0	5008	5772
Southern Pacific	Tolleson 2	4.328	780	1005.90	1008.3	1.6	811.9	0.30	0.8	5004	5872
Southern Pacific	Tolleson 2	4.234	780	1006.30	1007.5	1.5	635.0	0.30	0.8	5010	5795
Southern Pacific	Tolleson 2	4.139	780	1005.00	1006.7	1.2	719.9	0.22	0.9	5010	5785
Southern Pacific	Tolleson 2	4.044	780	1004.30	1006.0	2.0	659.6	0.33	1.1	5031	6038
Southern Pacific	Tolleson 2	3.949	780	1003.60	1005.3	1.1	931.9	0.21	0.9	5015	6032
Southern Pacific	Tolleson 2	3.855	780	1002.20	1003.9	3.3	533.9	0.89	0.4	5234	5826
Southern Pacific	Tolleson 2	3.760	780	1001.50	1003.2	0.9	1005.1	0.18	0.8	5034	6039
Southern Pacific	Tolleson 2	3.665	780	1000.40	1003.2	0.4	1266.0	0.05	1.6	5000	6344
Southern Pacific	Tolleson 2	3.583	850	999.40	1003.2	0.3	1306.4	0.03	2.3	5000	6366
Southern Pacific	Tolleson 2	3.568	850	1001.90	1003.1	2.0	727.0	0.45	0.6	5000	5727
Southern Pacific	Tolleson 2	3.535	850	989.70	998.9	0.4	454.7	0.04	4.4	5024	5479
Southern Pacific	Tolleson 2	3.476	850	989.30	998.9	0.4	375.9	0.03	5.5	5015	5391
Southern Pacific	Tolleson 2	3.411	850	997.50	998.6	4.5	308.4	1.00	0.6	5010	5319
Southern Pacific	Tolleson 2	3.287	850	989.80	997.6	1.5	153.9	0.14	3.6	5018	5172
Southern Pacific	Tolleson 2	3.192	850	989.80	997.6	0.6	259.4	0.05	5.1	5016	5275
Southern Pacific	Tolleson 2	3.083	970	995.40	997.6	1.4	492.3	0.21	1.4	5012	5504
Southern Pacific	Tolleson 2	3.050	970	994.70	997.4	1.5	934.1	0.32	0.7	5052	5987
Southern Pacific	Tolleson 2	3.037	970	995.70	997.0	3.5	732.5	0.99	0.4	5207	5940
Southern Pacific	Tolleson 2	3.031	970	994.20	996.5	1.8	991.0	0.38	0.7	5029	6020
Southern Pacific	Tolleson 2	2.908	970	993.30	995.9	1.3	578.5	0.20	1.3	5014	5592
Southern Pacific	Tolleson 2	2.851	970	993.70	995.1	4.3	391.5	1.01	0.6	5014	5406
Southern Pacific	Tolleson 2	2.718	970	989.50	994.1	0.8	992.0	0.09	2.5	5010	6015
Southern Pacific	Tolleson 2	2.624	970	987.90	994.1	0.5	1165.7	0.05	3.1	5005	6171
Southern Pacific	Tolleson 2	2.529	970	988.90	994.1	0.4	1278.7	0.03	3.4	5004	6283
Southern Pacific	Tolleson 2	2.434	970	988.20	994.1	0.3	1307.3	0.03	3.6	5004	6311
Southern Pacific	Tolleson 2	2.366	970	988.40	994.1	0.4	1282.7	0.04	3.4	5000	6283
Southern Pacific	Tolleson 2	2.352	930	991.50	994.0	1.5	446.3	0.23	1.4	5101	5547

HEC-RAS Plan: Exist. Cond. (Continued)

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Vel Chnl	Top Width	Froude # Chl	Hydr Depth	Sta W.S. Lft	Sta W.S. Rgt
			(cfs)	(ft)	(ft)	(ft/s)	(ft)		(ft)	(ft)	(ft)
Southern Pacific	Tolleson 2	2.342	930	990.80	994.0	0.9	1574.3	0.10	2.5	5002	6576
Southern Pacific	Tolleson 2	2.245	930	991.10	994.0	0.8	1226.1	0.11	1.9	5002	6368
Southern Pacific	Tolleson 2	2.229	930	991.20	993.9	1.7	833.3	0.35	0.8	5006	5897
Southern Pacific	Tolleson 2	2.150	930	990.20	993.3	1.3	1129.4	0.25	0.8	5002	6132
Southern Pacific	Tolleson 2	2.056	930	990.20	992.4	1.4	943.1	0.29	0.7	5000	5991
Southern Pacific	Tolleson 2	1.961	630	988.50	992.2	0.6	990.0	0.09	1.1	5000	5990
Southern Pacific	Tolleson 2	1.870	565	989.20	992.0	1.1	803.4	0.14	2.1	5000	5803
Southern Pacific	Tolleson 2	1.863	565	988.80	992.0	0.9	262.2	0.11	2.3	5000	5262
Southern Pacific	Tolleson 2	1.856	500	988.50	992.0	0.7	282.5	0.08	2.6	5000	5283
Southern Pacific	Tolleson 2	1.771	440	989.00	992.0	0.6	930.9	0.08	1.9	5000	5931
Southern Pacific	Tolleson 2	1.677	440	989.50	990.8	1.3	552.5	0.28	0.6	5289	5842
Southern Pacific	Tolleson 2	1.582	440	987.50	988.9	2.4	592.4	0.70	0.4	5024	5784
Southern Pacific	Tolleson 2	1.487	440	986.10	987.0	1.2	709.0	0.29	0.5	5230	6090
Southern Pacific	Tolleson 2	1.399	440	984.50	987.0	0.5	1463.9	0.06	1.8	5015	6549
Southern Pacific	Tolleson 2	1.387	450	986.30	986.8	3.2	457.0	1.00	0.3	5196	5652
Southern Pacific	Tolleson 2	1.376	450	983.40	986.4	0.5	1202.4	0.06	2.2	5028	6230
Southern Pacific	Tolleson 2	1.298	360	982.50	986.4	0.2	1238.2	0.02	1.8	5000	6238
Southern Pacific	Tolleson 2	1.203	270	982.20	986.4	0.2	1236.6	0.02	2.5	5000	6237
Southern Pacific	Tolleson 2	1.138	220	984.20	986.3	1.9	280.7	0.52	0.4	5000	5340
Southern Pacific	Tolleson 2	1.131	220	982.40	985.6	2.1	610.6	0.34	1.2	5001	5611
Southern Pacific	Tolleson 2	1.109	220	981.90	985.3	1.7	525.9	0.30	1.1	5005	5655
Southern Pacific	Tolleson 2	1.014	220	983.90	983.9		305.7	0.00	0.4	5011	5317
Southern Pacific	Tolleson 2	0.919	220	982.90	983.3	0.3	878.6	0.14	0.4	5008	5974
Southern Pacific	Tolleson 2	0.883	220	982.10	982.8	3.1	180.8	0.87	0.4	5033	5214
Southern Pacific	Tolleson 2	0.824	220	976.50	979.6	3.0	106.8	0.65	0.7	5021	5192
Southern Pacific	Tolleson 2	0.730	220	970.70	975.7	4.1	52.6	0.70	1.0	5022	5074
Southern Pacific	Tolleson 2	0.635	220	966.30	970.8	5.9	16.9	0.70	2.2	5030	5047
Southern Pacific	Tolleson 2	0.540	220	964.70	968.9	1.4	1193.1	0.34	0.5	5029	6222
Southern Pacific	Tolleson 2	0.446	220	963.20	966.4	2.8	679.9	0.97	0.3	5026	6004
Southern Pacific	Tolleson 2	0.387	220	962.30	964.0	0.3	803.5	0.05	1.0	5049	5944

HEC-RAS Version 2.1 October 1997
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

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

PROJECT DATA
Project Title: Tolleson FIS
Project File : tol_ras.prj
Run Date and Time: 5/6/99 2:14:24 PM

Project in English units

Project Description:
Tolleson FIS, Project FCD 95-26, El Mirage Road to 69th Avenue Alignment.
August 17, 1998
Dibble & Associates, Inc., with JE Fuller/Hydrology &
Geomorphology, Inc.

The Cross-section data were generated by ROADCALC from
March 28, 1994 Topo flown by Kenney Aerial Mapping, Inc., NGVD 1929.
Top-of-rail elevations and roadway/canal profile data were added to most
cross-sections based on subsequent survey by Urban Engineering. Some cross
sections were edited or added by hand.

Discharge data are from HEC-1 model
for Tolleson Area dated May 1999 unless otherwise noted.

Hydrologic
concentration points are noted in cross-section descriptions using the
corresponding HEC-1 IDs. The flow rates have been rounded to the nearest 10
cubic feet per second (cfs).

The floodplain was mapped utilizing HEC-RAS
Version 2.1, dated October 1997.

PLAN DATA

Plan Title: Plan 02
Plan File : j:\9532\hec-ras\final\tol_ras.p02

Geometry Title: Existing Geometry
Geometry File : j:\9532\hec-ras\final\tol_ras.g01

Flow Title : Flow from Existing HEC-1 Model
Flow File : j:\9532\hec-ras\final\tol_ras.f01

Plan Summary Information:

Number of:	Cross Sections	= 114	Mulitple Openings	=	0
	Culverts	= 0	Inline Weirs	=	0
	Bridges	= 0			

Computational Information

Water surface calculation tolerance	=	0.01
Critical depth calculaton tolerance	=	0.01
Maximum number of interations	=	20
Maximum difference tolerance	=	0.3
Flow tolerance factor	=	0.001

Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Flow from Existing HEC-1 Model
Flow File : j:\9532\hec-ras\final\tol_ras.f01

Flow Data (cfs)

River	Reach	RS	PF#1
Southern Pacific	Tolleson 1	7.287	1020
Southern Pacific	Tolleson 1	6.549	1490
Southern Pacific	RR Split	6.317	1170
Southern Pacific	RR Split	6.033	1230
Southern Pacific	RR Split	5.843	1280
Southern Pacific	Tolleson 2	5.539	980
Southern Pacific	Tolleson 2	5.319	760
Southern Pacific	Tolleson 2	5.054	760
Southern Pacific	Tolleson 2	4.577	780
Southern Pacific	Tolleson 2	3.583	850
Southern Pacific	Tolleson 2	3.083	970
Southern Pacific	Tolleson 2	2.352	930
Southern Pacific	Tolleson 2	1.961	630
Southern Pacific	Tolleson 2	1.870	565
Southern Pacific	Tolleson 2	1.856	500
Southern Pacific	Tolleson 2	1.771	440
Southern Pacific	Tolleson 2	1.387	450
Southern Pacific	Tolleson 2	1.298	360
Southern Pacific	Tolleson 2	1.203	270
Southern Pacific	Tolleson 2	1.138	220
Canal	Canal Split	6.317	160
Canal	Canal Split	6.033	100
Canal	Canal Split	5.843	90
Canal	Canal Split	5.654	140

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Southern Pacific	Tolleson 2	PF#1		Known WS = 964

Changes in WS and EG

River	Reach	RS	Profile		Type	Value
Southern Pacific	Tolleson 1	6.532	PF#1	Known WS	1029.46	
Southern Pacific	Tolleson 2	5.539	PF#1	Known WS	1024.18	
Southern Pacific	Tolleson 2	5.054	PF#1	Known WS	1015.2	
Southern Pacific	Tolleson 2	3.568	PF#1	Known WS	1003.1	
Southern Pacific	Tolleson 2	1.771	PF#1	Known WS	992	
Southern Pacific	Tolleson 2	1.138	PF#1	Known WS	986.3	
Canal	Canal Split	5.798	PF#1	Known WS	1026.92	
Canal	Canal Split	5.578	PF#1	Known WS	1026.3	

GEOMETRY DATA

Geometry Title: Existing Geometry
Geometry File : j:\9532\hec-ras\final\tol_ras.g01

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
Southern Pacific	Tolleson 1		Junction 1
Southern Pacific	RR Split	Junction 1	Junction 2
Southern Pacific	Tolleson 2	Junction 2	
Canal	Canal Split	Junction 1	Junction 2

JUNCTION INFORMATION

Name: Junction 1
Description:
Energy computation Method

Length across Junction River	Reach		Tributary River	Reach	Length	Angle
Southern Pacific	Tolleson 1	to	Southern Pacific	RR Split	500	
Southern Pacific	Tolleson 1	to	Canal	Canal Split	500	

Name: Junction 2
Description:
Energy computation Method

Length across Junction River	Reach		Tributary River	Reach	Length	Angle
Southern Pacific	RR Split	to	Southern Pacific	Tolleson 2	610	
Canal	Canal Split	to	Southern Pacific	Tolleson 2	800	

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 1 RS: 7.287

INPUT
Description: RM 7.287, HEC-1 CPUB1-1020 CFS, Begin Detailed Study By Dibble & JEF, 69th Avenue Alignment.
Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1037.2	5001.6	1037.2	5010.1	1036.8	5010.2	1036.8	5010.5	1036.8
5010.7	1036.8	5016	1035.8	5023	1033.4	5025.2	1032.8	5027.8	1032.9
5032	1032.6	5038.3	1032.3	5048.1	1034.7	5051.9	1035.5	5053.3	1035.7
5053.5	1035.8	5053.6	1035.8	5054	1035.9	5054.1	1035.8	5054.3	1035.8
5055	1035.5	5055.6	1035.3	5056.5	1035	5059.4	1034.1	5059.9	1034
5060.7	1033.8	5062.5	1034.5	5065.5	1035.9	5066.5	1035.8	5072.1	1035.8
5076.6	1035.8	5081	1035.8	5082.8	1035.9	5087.3	1035.8	5089.7	1035.7
5094.2	1035.7	5115.9	1035.6	5167.7	1035.8	5241.4	1036.1	5312.7	1036.2
5457.9	1036.2	5481.4	1036.3	5510.7	1036.2	5668.1	1036.6	5695.3	1036.6
5701.3	1036.6	5854.7	1036.7	5862	1036.7	5867.4	1036.7	5870.3	1036.8
5879.9	1036.8	5891	1036.8	6062.7	1037.2	6066	1037.2	6067	1037.2
6070.1	1037.2	6075.3	1037.2	6124.6	1037.2	6240.6	1037.4	6398.7	1037.6

6423.9	1037.6	6465.8	1037.7	6502.5	1037.7	6567.4	1037.8	6600	1037.9

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.08	5059.9	.035	5668.1	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	124	124	124	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5000	5055	1035.5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1036.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.042	
E.G. Elev (ft)	1036.71	Reach Len. (ft)	124.00	124.00	124.00
Crit W.S. (ft)	1036.46	Flow Area (sq ft)		257.00	
E.G. Slope (ft/ft)	0.034066	Area (sq ft)		257.00	
Q Total (cfs)	1020.00	Flow (cfs)		1020.00	
Top Width (ft)	602.26	Top Width (ft)		602.26	
Vel Total (ft/s)	3.97	Avg. Vel. (ft/s)		3.97	
Max Chl Dpth (ft)	2.66	Hydr. Depth (ft)		0.43	
Conv. Total (cfs)	5526.4	Conv. (cfs)		5526.4	
Length Wtd. (ft)	124.00	Wetted Per. (ft)		603.23	
Min Ch El (ft)	1033.80	Shear (lb/sq ft)		0.91	
Alpha	1.00	Stream Power (lb/ft s)		3.60	
Frctn Loss (ft)	0.78	Cum Volume (acre-ft)		124.60	
C & E Loss (ft)	0.06	Cum SA (acres)		118.02	

Warning - The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 1 RS: 7.264

INPUT
Description: RM 7.264
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1037.2	5003.1	1037.1	5007.3	1037.2	5016.5	1037	5018.1	1036.9
5020.1	1036.7	5023.8	1035.9	5033.2	1034.1	5034	1033.9	5034.5	1033.8
5038.9	1032.9	5041.7	1033.5	5054.9	1035.1	5058.4	1034.2	5059.5	1033.5
5064.3	1034.8	5065.3	1035.1	5070.4	1035.1	5076.9	1035	5077.2	1035.1
5080.2	1034.7	5083.7	1034.1	5084	1034	5088.1	1034	5110.4	1034.1
5193.6	1034.2	5306.8	1034.4	5336	1034.4	5419.5	1034.7	5427.6	1034.9
5451.5	1034.9	5575.5	1035.1	5595.7	1035.2	5678.4	1035.3	5704.2	1035.4
5853.6	1035.6	5869.4	1035.6	6249.8	1035.6	6254.3	1035.6	6258.8	1035.6
6263.3	1035.6	6363.5	1035.6	6367.8	1035.6	6372.1	1035.6	6390.1	1035.8
6415.5	1036.1	6419.7	1036.1	6451.5	1036.4	6475.9	1036.7	6480.1	1036.7
6484.3	1036.7	6491.3	1036.8	6500.9	1036.8	6505.1	1036.8	6509.3	1036.8
6600	1036.9								

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.08	5076.9	.035

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

5000	6600	192	192	192	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
6035	6600	1036

CROSS SECTION OUTPUT Profile #PF#1

			Left OB	Channel	Right OB
W.S. Elev (ft)	1035.61	Element			
Vel Head (ft)	0.04	Wt. n-Val.		0.038	
E.G. Elev (ft)	1035.65	Reach Len. (ft)	192.00	192.00	192.00
Crit W.S. (ft)	1034.91	Flow Area (sq ft)		667.97	
E.G. Slope (ft/ft)	0.002537	Area (sq ft)		671.84	
Q Total (cfs)	1020.00	Flow (cfs)		1020.00	
Top Width (ft)	1347.83	Top Width (ft)		1347.83	
Vel Total (ft/s)	1.53	Avg. Vel. (ft/s)		1.53	
Max Chl Dpth (ft)	2.71	Hydr. Depth (ft)		0.66	
Conv. Total (cfs)	20250.7	Conv. (cfs)		20250.7	
Length Wtd. (ft)	192.00	Wetted Per. (ft)		1010.77	
Min Ch El (ft)	1032.90	Shear (lb/sq ft)		0.10	
Alpha	1.00	Stream Power (lb/ft s)		0.16	
Frctn Loss (ft)	0.43	Cum Volume (acre-ft)		123.28	
C & E Loss (ft)	0.00	Cum SA (acres)		115.24	

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 1 RS: 7.227

INPUT
Description: RM 7.227
Station Elevation Data num= 57

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1037.3	5007.8	1037.2	5010.5	1037.1	5018.1	1037.1	5022.2	1036.3
5025.9	1035.9	5026.7	1035.8	5027.9	1035.6	5038.2	1034.3	5041.1	1033.9
5042	1034	5043.2	1034.1	5054.9	1034.6	5058.8	1033.9	5058.9	1033.9
5060	1033.4	5060.5	1033.7	5062	1034.4	5063.2	1034.9	5066	1034.8
5071.6	1034.4	5073.9	1034.3	5075.3	1034.3	5081.1	1034.2	5082.6	1033.9
5083	1033.7	5083.1	1033.7	5106	1033.7	5190.3	1033.8	5225.9	1033.9
5229.3	1034	5298.7	1034.2	5371.1	1034.3	5429.3	1034.4	5667.9	1034.8
5742	1034.9	5867.6	1034.8	5909.9	1034.8	6227.9	1035.1	6239.9	1035.1
6251.9	1035.2	6263.9	1035.2	6347.7	1035.3	6359.4	1035.3	6371.2	1035.4
6386.3	1035.5	6407.5	1035.6	6419.2	1035.7	6445.8	1035.8	6466.2	1036
6477.9	1036	6489.5	1036.1	6495.4	1036.2	6503.5	1036.1	6515.2	1036.2
6526.8	1036.2	6600	1036.3						

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.08	5075.3	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	308	308	308	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
6082	6600	1036

CROSS SECTION OUTPUT Profile #PF#1

			Left OB	Channel	Right OB
W.S. Elev (ft)	1035.19	Element			
Vel Head (ft)	0.03	Wt. n-Val.		0.036	
E.G. Elev (ft)	1035.22	Reach Len. (ft)	308.00	308.00	308.00
Crit W.S. (ft)	1034.68	Flow Area (sq ft)		719.03	
E.G. Slope (ft/ft)	0.001966	Area (sq ft)		743.47	
Q Total (cfs)	1020.00	Flow (cfs)		1020.00	
Top Width (ft)	1219.33	Top Width (ft)		1219.33	
Vel Total (ft/s)	1.42	Avg. Vel. (ft/s)		1.42	
Max Chl Dpth (ft)	1.79	Hydr. Depth (ft)		0.68	
Conv. Total (cfs)	23006.2	Conv. (cfs)		23006.2	
Length Wtd. (ft)	308.00	Wetted Per. (ft)		1051.55	
Min Ch El (ft)	1033.40	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)		0.12	
Frctn Loss (ft)	0.90	Cum Volume (acre-ft)		120.16	
C & E Loss (ft)	0.00	Cum SA (acres)		109.58	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 1 RS: 7.169

INPUT
Description: RM 7.169
Station Elevation Data num= 58

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1037.5	5004.8	1037.5	5007.2	1037.6	5016.1	1037.7	5017.4	1037.7
5020.7	1036.9	5021.1	1036.8	5022.3	1036.5	5023	1035.7	5024.2	1035.9
5025.5	1035.8	5028.4	1035.8	5031.1	1035.9	5042	1036.6	5042.6	1036.6
5045.2	1036.7	5045.3	1036.7	5052.3	1036.6	5053.8	1035.8	5056	1034.6
5057.3	1033.9	5059.6	1032.6	5060.5	1032	5061.3	1031.6	5062	1031.7
5062.8	1032.2	5067	1034	5067.4	1034	5068.1	1034.1	5077.7	1034.1
5078.9	1034.1	5081.3	1034.1	5082.3	1033.8	5085.2	1033	5162.5	1033.2
5651.1	1034	5803.1	1034.2	5890.3	1034	5975.4	1034	6192.9	1034
6216.9	1034.1	6240.9	1034.1	6264.9	1034.2	6322.3	1034.3	6346.1	1034.4
6369.9	1034.4	6380.3	1034.5	6394.8	1034.7	6418.6	1034.6	6436.8	1034.8
6450.8	1034.9	6474.5	1035	6498.2	1035.1	6502.2	1035.1	6507.8	1035.1
6531.5	1035.1	6555.2	1035.2	6600	1035.2				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.08	5077.7	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
6160	6600	1035

CROSS SECTION OUTPUT Profile #PF#1

			Left OB	Channel	Right OB
W.S. Elev (ft)	1034.27	Element			
Vel Head (ft)	0.05	Wt. n-Val.		0.036	
E.G. Elev (ft)	1034.32	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1034.02	Flow Area (sq ft)		547.87	
E.G. Slope (ft/ft)	0.005098	Area (sq ft)		569.93	
Q Total (cfs)	1020.00	Flow (cfs)		1020.00	
Top Width (ft)	1246.57	Top Width (ft)		1246.57	
Vel Total (ft/s)	1.86	Avg. Vel. (ft/s)		1.86	
Max Chl Dpth (ft)	2.67	Hydr. Depth (ft)		0.50	
Conv. Total (cfs)	14285.9	Conv. (cfs)		14285.9	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		1104.77	
Min Ch El (ft)	1031.60	Shear (lb/sq ft)		0.16	
Alpha	1.00	Stream Power (lb/ft s)		0.29	
Frctn Loss (ft)	0.74	Cum Volume (acre-ft)		115.52	
C & E Loss (ft)	0.01	Cum SA (acres)		100.87	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 1 RS: 7.074

INPUT
Description: RM 7.074
Station Elevation Data num= 54

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1036	5002.5	1036	5007.2	1036.2	5014.7	1036.1	5017.9	1035.9
5019.1	1035.7	5019.8	1035.4	5020	1035.4	5021.2	1035	5032.5	1032.4
5042.9	1029.6	5047	1030.8	5047.7	1030.8	5052.2	1032.4	5055.4	1031.1
5058.3	1029.8	5063.3	1031.4	5066.2	1032.6	5069.5	1032.7	5069.8	1032.7
5071.4	1032.6	5077.9	1032.3	5082.7	1031.9	5087.6	1031.6	5098	1031.7

5112.2	1032	5181	1032	5294.6	1032.3	5380.6	1032.4	5399.6	1032.3
5408.8	1032.4	5440.5	1032.4	5624.1	1032.8	5902.3	1033	5927.3	1033.2
6081.5	1032.7	6136.7	1032.8	6180.1	1033	6223.5	1033	6266.9	1033.1
6281.5	1032.9	6324.9	1033.1	6368.1	1033.1	6370.8	1033.2	6374.6	1033.2
6417.8	1033.1	6422.5	1033.1	6426.1	1033.1	6469.3	1033.3	6512.5	1033.4
6513.6	1033.4	6515	1033.4	6558.1	1033.5	6600	1033.6		

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.08	5077.9	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	218	218	218	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5800	6600	1034

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1033.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.038	
E.G. Elev (ft)	1033.57	Reach Len. (ft)	218.00	218.00	218.00
Crit W.S. (ft)	1032.64	Flow Area (sq ft)		892.03	
E.G. Slope (ft/ft)	0.000697	Area (sq ft)		1275.84	
Q Total (cfs)	1020.00	Flow (cfs)		1020.00	
Top Width (ft)	1550.64	Top Width (ft)		1550.64	
Vel Total (ft/s)	1.14	Avg. Vel. (ft/s)		1.14	
Max Chl Dpth (ft)	3.95	Hydr. Depth (ft)		1.15	
Conv. Total (cfs)	38633.9	Conv. (cfs)		38633.9	
Length Wtd. (ft)	218.00	Wetted Per. (ft)		774.50	
Min Ch El (ft)	1029.60	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.06	
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)		104.93	
C & E Loss (ft)	0.02	Cum SA (acres)		84.81	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 1 RS: 7.033

INPUT
Description: RM 7.033
Station Elevation Data num= 94

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1035	5003.7	1035.2	5007.5	1035.4	5011.1	1035.2	5016.5	1035
5020.3	1034	5020.7	1033.9	5021.2	1033.8	5022.4	1033.7	5022.6	1033.7
5023.1	1033.7	5023.5	1033.7	5042.6	1032.2	5042.9	1032.2	5044.3	1032.1
5046.9	1032	5049.5	1032	5054.4	1033	5059.5	1033.7	5062	1034.2
5063.5	1034.5	5064.4	1034.6	5064.5	1034.6	5067.1	1034.8	5067.3	1034.8
5069.9	1034.2	5084.7	1033.8	5088.7	1034	5098.2	1033.6	5105.6	1033.2
5107.9	1033	5109.3	1032.8	5110.7	1032.7	5111.5	1032.5	5123.1	1031.8
5124.1	1032.2	5126.7	1032.2	5130.3	1032.1	5135.8	1032.4	5138.9	1032.7
5139.4	1032.9	5141.4	1032.9	5143.2	1032.7	5148	1032.7	5152	1032.5
5159.4	1029	5159.9	1028.9	5161.3	1029.2	5163.6	1030	5169.7	1032.1
5172.7	1033	5176.4	1033.1	5178.4	1033	5188.6	1032.3	5189.2	1032.3
5232.8	1032.3	5235.5	1032.2	5238.7	1032.3	5243.7	1032.2	5348.4	1032.3
5370.5	1032.4	5415.1	1032.5	5506	1032.4	5551.3	1032.5	5657.2	1033
5703.9	1033	5779.2	1033	5834.5	1033.1	5876.7	1033.2	5909	1033.5
5915.8	1033.5	5963.8	1033.4	5998.1	1033.2	6002.1	1033.2	6005.5	1033.2
6005.9	1033.2	6006.1	1033.2	6020.1	1033.2	6061	1033.5	6112.7	1033.4
6135	1033.4	6141.9	1033.6	6147.5	1033.6	6168.1	1033.6	6214.5	1033.8
6218.6	1033.8	6378.9	1033.5	6388.6	1033.6	6453	1033.9	6464.7	1033.8
6573.5	1033.8	6584.3	1033.9	6589.6	1033.9	6600	1033.9		

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.08	5189.2	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	282	282	282	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5000	5067.1	1034.8

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1032.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.043	
E.G. Elev (ft)	1033.10	Reach Len. (ft)	282.00	282.00	282.00
Crit W.S. (ft)	1032.81	Flow Area (sq ft)		275.27	
E.G. Slope (ft/ft)	0.024570	Area (sq ft)		286.01	
Q Total (cfs)	1020.00	Flow (cfs)		1020.00	
Top Width (ft)	535.92	Top Width (ft)		535.92	
Vel Total (ft/s)	3.71	Avg. Vel. (ft/s)		3.71	
Max Chl Dpth (ft)	3.99	Hydr. Depth (ft)		0.53	
Conv. Total (cfs)	6507.3	Conv. (cfs)		6507.3	
Length Wtd. (ft)	282.00	Wetted Per. (ft)		517.51	
Min Ch El (ft)	1028.90	Shear (lb/sq ft)		0.82	
Alpha	1.00	Stream Power (lb/ft s)		3.02	
Frctn Loss (ft)	1.18	Cum Volume (acre-ft)		101.02	
C & E Loss (ft)	0.05	Cum SA (acres)		79.59	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 1 RS: 6.980

INPUT
Description: RM 6.980
Station Elevation Data num= 95

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1033.9	5006.3	1034.2	5008	1034.3	5009.1	1034.2	5011.8	1034.3
5020.8	1032.8	5023.5	1032.5	5026.8	1032	5039.1	1029.6	5056.3	1030.2
5063.9	1030.6	5066.9	1030.8	5078.3	1030.7	5089.7	1030.3	5106.3	1030.9
5108.9	1030.9	5113.4	1030.7	5115.8	1030.8	5116	1030.9	5127.5	1033.9
5129.7	1033.2	5130.9	1033.2	5131.3	1033.3	5136.1	1031.6	5149.6	1032.2
5152.5	1032.2	5153.3	1031.9	5161	1028.5	5162.7	1028.5	5162.9	1028.5
5166.2	1030.8	5166.5	1031.1	5166.8	1031.1	5171.5	1031.4	5176.7	1031
5180.9	1030.6	5187	1030.7	5201.8	1030.6	5212.9	1030.6	5254.9	1030.2
5262.9	1030.1	5304.2	1030.3	5312.9	1030.4	5353.6	1030.6	5362.9	1030.7
5372.6	1030.7	5412.9	1030.7	5452.2	1030.7	5463	1030.7	5474	1030.8
5513	1031	5524.7	1031	5563	1031	5600.1	1031.1	5613	1031.2
5626.2	1031.1	5663	1031	5698.8	1031.3	5713	1031.4	5727.6	1031.5
5763	1031.6	5797.4	1031.7	5813	1031.7	5846.7	1031.6	5863	1031.5
5896	1031.7	5913	1031.8	5930.4	1031.9	5963	1032	5994.6	1032
6013	1032	6043.9	1032.1	6063	1032.2	6082.6	1032.2	6113	1032.2
6133.3	1032.1	6163	1032.1	6184	1032.2	6213	1032.5	6241.2	1032.4
6263	1032.6	6285.5	1032.6	6313	1032.6	6336.2	1032.6	6363	1032.6
6386.9	1032.7	6413	1032.8	6438.5	1032.9	6463.1	1033	6488.3	1033
6513.1	1032.9	6537.1	1032.9	6563.1	1033	6586.4	1033.1	6600	1033.1

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.07	5176.7	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5127.5	1033.9	5660	6600	1034

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1031.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.036	
E.G. Elev (ft)	1031.88	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1031.18	Flow Area (sq ft)		569.90	
E.G. Slope (ft/ft)	0.001641	Area (sq ft)		766.15	
Q Total (cfs)	1020.00	Flow (cfs)		1020.00	
Top Width (ft)	862.28	Top Width (ft)		862.28	
Vel Total (ft/s)	1.79	Avg. Vel. (ft/s)		1.79	
Max Chl Dpth (ft)	3.33	Hydr. Depth (ft)		1.11	
Conv. Total (cfs)	25176.1	Conv. (cfs)		25176.1	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		513.99	
Min Ch El (ft)	1028.50	Shear (lb/sq ft)		0.11	
Alpha	1.00	Stream Power (lb/ft s)		0.20	
Frctn Loss (ft)	0.37	Cum Volume (acre-ft)		97.61	
C & E Loss (ft)	0.01	Cum SA (acres)		75.07	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 1 RS: 6.885

INPUT
Description: RM 6.885
Station Elevation Data num= 96

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1032.5	5005.5	1032.5	5005.8	1032.5	5006.4	1032.5	5006.8	1032.5
5013.4	1031.4	5013.9	1031.3	5014.3	1031.4	5022.6	1032	5029.8	1031.5
5034.5	1031.1	5048.1	1031.2	5050.9	1031.2	5055.2	1030.9	5074.7	1030.2
5087.9	1029.7	5096.4	1029.9	5101.8	1029.9	5103.3	1029.8	5104	1029.9
5108.8	1030.4	5113	1029.5	5127.2	1032.2	5130.1	1031.5	5134.4	1030.5
5141.6	1030.7	5149.7	1031	5155.1	1028.5	5156	1028.1	5156.7	1027.7
5159.6	1028.9	5162.8	1030.4	5168.8	1030.4	5173.3	1030.5	5176.7	1030
5181.4	1029.4	5190.4	1029.6	5194.4	1029.7	5203.6	1029.9	5205.9	1029.9
5213.1	1029.9	5255.9	1029.7	5263.8	1029.6	5305.9	1029.4	5347.1	1029.6
5356	1029.7	5396.4	1030	5406	1030.1	5445.8	1030	5456	1029.9
5466.4	1030	5506	1030.1	5544.6	1030.1	5556	1030.1	5593.9	1030.2
5606	1030.2	5643.3	1030.2	5656	1030.2	5669	1030.3	5706	1030.5
5719.6	1030.5	5756	1030.6	5770.3	1030.6	5806	1030.7	5820.9	1030.7
5856	1030.6	5871.6	1030.6	5906	1030.8	5922.2	1030.9	5956	1031.1
5988.9	1031.1	6006	1031.1	6023.5	1031.1	6056	1031.2	6087.7	1031.2
6106	1031.2	6124.8	1031.2	6156	1031.4	6186.4	1031.7	6206	1031.8
6226.1	1031.8	6256	1031.7	6285.1	1031.8	6306	1032	6334.5	1032.1
6356	1032.1	6378.1	1032	6406	1032	6433.3	1032.1	6456	1032.2
6479.4	1032.2	6506	1032.3	6530	1032.3	6556	1032.2	6580.7	1032.1
6600	1032.1								

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.06	5176.7	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	545	545	545	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5000	5127.2	1032.2

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1031.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.036	
E.G. Elev (ft)	1031.50	Reach Len. (ft)	545.00	545.00	545.00
Crit W.S. (ft)	1030.38	Flow Area (sq ft)		1135.41	
E.G. Slope (ft/ft)	0.000415	Area (sq ft)		1232.07	
Q Total (cfs)	1020.00	Flow (cfs)		1020.00	
Top Width (ft)	1130.76	Top Width (ft)		1130.76	
Vel Total (ft/s)	0.90	Avg. Vel. (ft/s)		0.90	
Max Chl Dpth (ft)	3.79	Hydr. Depth (ft)		1.10	

Conv. Total (cfs)	50060.1	Conv. (cfs)	50060.1
Length Wtd. (ft)	545.00	Wetted Per. (ft)	1036.17
Min Ch El (ft)	1027.70	Shear (lb/sq ft)	0.03
Alpha	1.00	Stream Power (lb/ft s)	0.03
Frctn Loss (ft)	0.65	Cum Volume (acre-ft)	86.14
C & E Loss (ft)	0.02	Cum SA (acres)	63.63

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 1 RS: 6.782

INPUT
Description: RM 6.782
Station Elevation Data num= 112

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1032	5003.5	1032	5004.7	1032	5005.2	1032	5008.3	1031.7
5015.3	1031	5019.5	1030.5	5019.8	1030.5	5024.4	1030.9	5028.6	1030.7
5035.6	1030.3	5038.5	1030.2	5038.9	1030.2	5041.6	1029.9	5043.1	1029.9
5051.3	1029.8	5052.2	1029.9	5054.1	1029.8	5057.9	1029.6	5063	1029.7
5064.5	1029.6	5066.7	1029.6	5069.2	1029.6	5069.4	1029.6	5074.5	1029.6
5075.5	1029.6	5078.1	1029.5	5078.8	1029.6	5079.9	1029.6	5092.6	1029.4
5093	1029.3	5093.4	1029.3	5095.6	1029.3	5104.9	1029	5106.2	1028.9
5109.4	1028.9	5113.6	1028.9	5120	1028.9	5125.6	1029.2	5126.6	1029.2
5128.4	1029.2	5133.7	1029.5	5136.5	1029.6	5143.7	1029.8	5150	1030
5152.9	1030.3	5155.8	1030.3	5161.5	1030.6	5162.2	1030.7	5171.5	1031
5172.8	1031	5173.3	1031	5176.3	1028.6	5179	1025.9	5179.6	1025.3
5180.3	1024.6	5180.4	1024.4	5181	1024.5	5185.8	1025.2	5196.9	1026.9
5203	1027.8	5203.2	1027.8	5205.7	1028.5	5212.3	1031.3	5213.4	1031.2
5219.2	1031.2	5224.7	1031	5233.3	1030.8	5236.7	1030.4	5238.2	1030.3
5244.7	1030.2	5248.9	1030.1	5254.5	1030.1	5261.2	1030.1	5267.8	1030.1
5274.9	1030.2	5281.3	1030.1	5289.7	1030	5295.6	1029.8	5306.1	1029.6
5314.1	1029.5	5336.1	1029.5	5347.2	1029.5	5362.8	1029.5	5427.5	1029.6
5446.1	1030.1	5475.3	1030.1	5511.3	1030.1	5552.6	1030.3	5589.7	1030.2
5633.7	1030.3	5677.5	1030.7	5725.2	1030.7	5785.4	1030.8	5857.6	1030.7
5895.3	1030.9	5972.1	1030.9	6001.9	1030.9	6072.8	1031.1	6159	1031.3
6187.1	1031.3	6265.9	1031.6	6273	1031.6	6368.7	1031.7	6392.4	1031.8
6482	1031.8	6555.2	1031.7	6565.3	1031.6	6566.2	1031.7	6567.7	1031.7
6572.1	1031.8	6600	1031.8						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.035	5176.3	.03	5224.7	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	312	312	312	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5000	5212.3	1031.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5171.5	5212.3	1031.3

CROSS SECTION OUTPUT Profile #PF#1

			Left OB	Channel	Right OB
W.S. Elev (ft)	1030.58	Element			
Vel Head (ft)	0.25	Wt. n-Val.		0.030	
E.G. Elev (ft)	1030.83	Reach Len. (ft)	312.00	312.00	312.00
Crit W.S. (ft)	1030.54	Flow Area (sq ft)		255.94	
E.G. Slope (ft/ft)	0.012897	Area (sq ft)		384.39	
Q Total (cfs)	1020.00	Flow (cfs)		1020.00	
Top Width (ft)	561.43	Top Width (ft)		561.43	
Vel Total (ft/s)	3.99	Avg. Vel. (ft/s)		3.99	
Max Chl Dpth (ft)	1.68	Hydr. Depth (ft)		0.60	
Conv. Total (cfs)	8981.6	Conv. (cfs)		8981.6	
Length Wtd. (ft)	312.00	Wetted Per. (ft)		429.18	
Min Ch El (ft)	1028.90	Shear (lb/sq ft)		0.48	

Alpha	1.00	Stream Power (lb/ft s)	1.91
Frctn Loss (ft)	0.84	Cum Volume (acre-ft)	76.03
C & E Loss (ft)	0.06	Cum SA (acres)	53.04

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 1 RS: 6.723

INPUT
Description: RM 6.723
Station Elevation Data num= 105

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1030.9	5006.5	1031	5008.6	1031.2	5008.9	1031.2	5010.9	1031.1
5013.5	1030.6	5016.5	1030.2	5017.3	1030.2	5017.7	1030.1	5018.4	1030.2
5022.2	1030.6	5028.5	1030.3	5034.2	1030	5048.4	1029.8	5056.6	1030
5059.1	1029.6	5069	1028.7	5071.3	1028.5	5079.7	1029.1	5095.1	1030.2
5101.4	1031.4	5103.2	1031.7	5103.8	1031.8	5104.2	1031.8	5107.3	1032.4
5109.7	1032	5112	1031.7	5113.9	1031.2	5114.9	1030.3	5118.3	1027.4
5125.9	1028.9	5131.5	1028.8	5132.7	1029.9	5134.7	1029.9	5137.4	1029.8
5143.6	1030.1	5147.6	1030.4	5158.3	1030.8	5162.9	1030.9	5169	1030.9
5171	1029.7	5174.4	1027.6	5175.7	1027	5177	1026.3	5180	1024.6
5184.6	1025.1	5195.8	1026.1	5199.6	1026.5	5209.8	1031.3	5210.9	1031.9
5211.4	1031.9	5211.8	1031.9	5217.8	1031.8	5225.5	1031.7	5233.1	1027.3
5234.7	1026.5	5235.6	1026.8	5236.4	1027.2	5238	1027.9	5241.9	1030
5242.1	1030.2	5248.6	1029.9	5255.3	1029.5	5260.1	1028.8	5261.3	1028.7
5263.9	1028.5	5265.2	1028.5	5265.9	1028.3	5391.5	1028.6	5419.9	1028.4
5467.1	1028.5	5497.6	1028.5	5503.6	1028.8	5519.5	1028.7	5861.3	1029.4
5898.5	1029.2	5911.3	1029.2	5948.4	1029.4	5961.7	1029.4	5974.5	1029.5
6011.6	1029.2	6048.7	1029.3	6061.1	1029.2	6074.6	1029.3	6111.6	1029.6
6148.5	1029.9	6161.6	1029.9	6198.5	1029.8	6211.3	1029.8	6224.2	1029.8
6261.1	1030	6274.7	1030	6311.6	1029.8	6348.3	1030.9	6361.6	1030.9
6374.8	1031	6411.6	1030.2	6448.3	1030.4	6461.6	1030.5	6498.2	1030.4
6511.6	1030.5	6525	1030.6	6561.6	1031	6598.2	1031	6600	1031

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.035	5147.6	.03	5225.5	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	143	143	143	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5210.9	1031.9	5861.3	6600	1032

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5162.9	5210.9	1031

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1029.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.035	
E.G. Elev (ft)	1029.92	Reach Len. (ft)	143.00	143.00	143.00
Crit W.S. (ft)	1029.17	Flow Area (sq ft)		678.86	
E.G. Slope (ft/ft)	0.001128	Area (sq ft)		878.88	
Q Total (cfs)	1020.00	Flow (cfs)		1020.00	
Top Width (ft)	1071.56	Top Width (ft)		1071.56	
Vel Total (ft/s)	1.50	Avg. Vel. (ft/s)		1.50	
Max Chl Dpth (ft)	3.39	Hydr. Depth (ft)		1.09	
Conv. Total (cfs)	30376.8	Conv. (cfs)		30376.8	
Length Wtd. (ft)	143.00	Wetted Per. (ft)		627.38	
Min Ch El (ft)	1026.50	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)		0.11	
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)		71.51	
C & E Loss (ft)	0.00	Cum SA (acres)		47.19	

Warning - Divided flow computed for this cross-section.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 1 RS: 6.696

INPUT
Description: RM 6.696
Station Elevation Data num= 102

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1030.7	5005.9	1030.7	5007	1030.7	5007.4	1030.6	5008.1	1030.6
5015.3	1030.1	5017.7	1030.1	5018.2	1029.9	5020.7	1030.2	5022.5	1030.3
5033	1029.4	5035.9	1029.4	5053.7	1029.7	5058.9	1029.8	5061	1029.9
5065.7	1029.2	5085.8	1026.8	5088.1	1026.5	5089.3	1026.4	5089.9	1026.3
5090.4	1026.5	5094	1028.1	5103.9	1031.4	5114.5	1031.3	5115.7	1031.3
5117	1027.4	5117.5	1027.3	5124.2	1026.5	5125.1	1026.8	5130.5	1028.2
5132.3	1028.8	5135.2	1029.5	5136.2	1029.5	5144.8	1028.9	5149.9	1029
5151	1029.1	5153.2	1029.2	5158	1029.4	5164.3	1029.7	5167.2	1029.8
5172.1	1029.9	5176.7	1027.3	5181.1	1024.6	5195.9	1025.4	5197.6	1025.4
5200.9	1025.6	5205.6	1028.6	5209.8	1031	5211.5	1031	5216	1030.9
5217	1030.9	5224.8	1031	5225.9	1031.1	5226.8	1031.1	5227.1	1030.9
5235.6	1026.4	5241	1028.5	5243.5	1029.6	5250.7	1029.6	5256.2	1029.6
5259.1	1029.3	5260.6	1029.1	5265.7	1028.5	5266.8	1028.1	5266.9	1028.3
5267.1	1028.3	5302.8	1028.1	5313.3	1028.1	5357.2	1028.2	5359.4	1028.3
5365.4	1028.2	5867.4	1029.2	5898.2	1029.1	5917.3	1029	5948	1029.2
5968.1	1029.1	5987.3	1029.3	6017.9	1029	6048.5	1029.1	6067.2	1029
6087.5	1029.1	6117.9	1029.4	6148.3	1029.6	6168	1029.6	6198.3	1029.5
6217.5	1029.6	6237	1029.5	6267.2	1029.7	6287.8	1029.7	6318	1029.5
6348	1030.4	6368	1030.5	6388.1	1030.6	6418	1030	6447.9	1030.1
6468.1	1030.2	6497.9	1030.2	6518.1	1030.2	6538.4	1030.4	6568.1	1030.7
6597.8	1030.7	6600	1030.7						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.035	5149.9	.03	5224.8	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5209.8	1031	6000	6600	1031

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5167.2	5205.6	1030

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1029.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.035	
E.G. Elev (ft)	1029.78	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1028.99	Flow Area (sq ft)		804.82	
E.G. Slope (ft/ft)	0.000844	Area (sq ft)		1043.69	
Q Total (cfs)	1020.00	Flow (cfs)		1020.00	
Top Width (ft)	1212.05	Top Width (ft)		1212.05	
Vel Total (ft/s)	1.27	Avg. Vel. (ft/s)		1.27	
Max Chl Dpth (ft)	3.46	Hydr. Depth (ft)		1.04	
Conv. Total (cfs)	35115.7	Conv. (cfs)		35115.7	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		772.47	
Min Ch El (ft)	1026.30	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.07	
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)		68.35	
C & E Loss (ft)	0.01	Cum SA (acres)		43.44	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 1 RS: 6.601

INPUT
Description: RM 6.601
Station Elevation Data num= 93

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1030.5	5002.7	1030.6	5005.6	1030.8	5013.7	1030.2	5014.4	1030.2
5017	1030.1	5031.2	1029.9	5036.3	1029	5036.9	1028.9	5038	1028.7
5041.9	1028.1	5045.6	1028	5058.3	1026.9	5058.7	1026.9	5076.6	1026
5082.7	1025.8	5086.7	1025.6	5087.4	1026.3	5094.8	1028.1	5105.5	1030.7
5114.9	1031.1	5115.1	1031.1	5116.3	1031.1	5136.7	1030.8	5139.5	1030.8
5140.6	1030.6	5141.6	1030.4	5148.7	1028.9	5148.9	1028.9	5149	1028.9
5159.1	1029	5164.5	1029	5181.9	1029	5186.4	1027.3	5188.9	1024.9
5189.2	1024.7	5190.1	1024.7	5192.3	1024.7	5203.2	1025.1	5210.7	1025.2
5213.8	1026.9	5217.6	1029.1	5221.2	1029.2	5236	1029.5	5236.7	1029.1
5236.9	1029	5245.1	1026.2	5251.6	1028.3	5253.4	1028.7	5257.2	1028.4
5265.6	1027.9	5271.3	1027.6	5275.1	1027.5	5276.6	1027.4	5396.2	1027.7
5401.5	1027.7	5494.2	1027.6	5547.9	1027.9	5576	1027.8	5602.7	1028
5619.1	1028.1	5645.6	1028.1	5886.8	1028.6	5897.7	1028.5	5936.6	1028.4
5947.4	1028.5	5988.1	1028.3	6027.1	1028.6	6037.7	1028.6	6048.4	1028.6
6086.2	1028.5	6127.1	1028.6	6137.6	1028.7	6148.2	1028.8	6187.8	1028.8
6198.2	1028.7	6236.8	1028.9	6275.7	1028.8	6286.1	1028.9	6327.2	1028.8
6337.5	1028.8	6347.7	1029.1	6387.5	1029.3	6427.5	1029.5	6437.6	1029.3
6447.6	1029.3	6487.6	1029.4	6497.6	1029.4	6537.6	1029.5	6577.8	1029.8
6587.7	1029.9	6597.5	1029.9	6600	1029.9				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.035	5149	.03	5236	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	273	273	273	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5114.9	1031.1	6300	6600	1030

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5181.9	5217.6	1029

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1029.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.035	
E.G. Elev (ft)	1029.62	Reach Len. (ft)	273.00	273.00	273.00
Crit W.S. (ft)	1028.31	Flow Area (sq ft)		1537.65	
E.G. Slope (ft/ft)	0.000160	Area (sq ft)		1786.41	
Q Total (cfs)	1020.00	Flow (cfs)		1020.00	
Top Width (ft)	1475.93	Top Width (ft)		1475.93	
Vel Total (ft/s)	0.66	Avg. Vel. (ft/s)		0.66	
Max Chl Dpth (ft)	4.02	Hydr. Depth (ft)		1.33	
Conv. Total (cfs)	80592.8	Conv. (cfs)		80592.8	
Length Wtd. (ft)	273.00	Wetted Per. (ft)		1155.81	
Min Ch El (ft)	1025.60	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.01	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)		52.11	
C & E Loss (ft)	0.00	Cum SA (acres)		28.02	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 1 RS: 6.549

INPUT
Description: RM 6.549, HEC-1 RSSF, Q=1490 CFS, 75th Avenue.
Station Elevation Data num= 121

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1030.6	5007.3	1029.5	5022.3	1026.1	5024.5	1025.5	5024.7	1025.5
5026	1025.4	5048.2	1025.7	5049.4	1025.7	5063.1	1026.2	5065.7	1026.4
5068.3	1026.5	5079.5	1026	5088.9	1025.5	5093	1026.3	5095	1026.5

5098.1	1026.9	5101.4	1027.5	5105.6	1027.4	5110.1	1027.3	5116.7	1027.4
5132.6	1027.8	5134.8	1027.9	5141.2	1028.1	5145.3	1028.1	5147.9	1028.3
5148.7	1028.4	5154.6	1029	5157.8	1029.3	5161.8	1028.6	5168.4	1027.4
5171.7	1027.3	5173.7	1027.3	5177.8	1027.6	5185.6	1028.2	5199.1	1029.1
5202.6	1026.6	5204	1025.7	5207.2	1025.7	5220	1025.7	5230.2	1025.7
5232.9	1026.5	5244.9	1029	5246.3	1028.9	5252.3	1028.8	5256.63	1028.8
5261.1	1028.6	5264	1028.6	5270.8	1028.5	5272.5	1028.5	5286	1028.5
5287.4	1028.4	5298.7	1028.4	5301.1	1028.3	5317.4	1028.2	5320.8	1028.2
5329.5	1028.3	5342.1	1028.3	5350.5	1028.3	5366.6	1028.4	5372.6	1028.5
5386.6	1028.6	5390.4	1028.6	5409.8	1028.6	5414.8	1028.7	5431.1	1028.7
5432.3	1028.7	5444.2	1028.5	5446.3	1028.5	5454.5	1028.6	5457.1	1028.6
5470.6	1028.5	5471.7	1028.5	5477.6	1028.5	5478.1	1028.5	5483.6	1028.6
5484.5	1028.6	5486.9	1029.2	5487.7	1029	5490.3	1028.3	5491.2	1028.3
5493.4	1027.8	5495.2	1027.7	5500.5	1027.2	5502.4	1026.8	5507.2	1027.2
5515.9	1028.1	5518.3	1027.4	5529.8	1027.5	5531.2	1027.6	5563.5	1027.5
5586	1027.6	5676.2	1027.5	5770.6	1028	5819.4	1028	5865.5	1028.2
5867.2	1028.2	5870	1028.2	5896.2	1028.2	5897.4	1028.2	5945.9	1028.1
5947.1	1028.1	5997.7	1027.9	6046	1028.3	6047.2	1028.3	6048.4	1028.3
6095.3	1028.2	6145.8	1028.4	6147	1028.4	6148.2	1028.4	6197.2	1028.4
6198.4	1028.4	6245.9	1028.6	6293.8	1028.5	6295	1028.5	6345.5	1028.4
6346.7	1028.4	6347.9	1028.5	6396.7	1028.8	6445.5	1029	6446.7	1028.9
7050	1030								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.035	5177.8	.03	5252.3	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	7050	0	0	0	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
6495	7050	1030

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5199.1	5244.9	1029

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1029.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.035	
E.G. Elev (ft)	1029.58	Reach Len. (ft)	0.00	0.00	0.00
Crit W.S. (ft)	1028.05	Flow Area (sq ft)		2177.18	
E.G. Slope (ft/ft)	0.000143	Area (sq ft)		2271.25	
Q Total (cfs)	1490.00	Flow (cfs)		1490.00	
Top Width (ft)	1809.40	Top Width (ft)		1809.40	
Vel Total (ft/s)	0.68	Avg. Vel. (ft/s)		0.68	
Max Chl Dpth (ft)	4.17	Hydr. Depth (ft)		1.46	
Conv. Total (cfs)	124602.2	Conv. (cfs)		124602.2	
Length Wtd. (ft)	0.00	Wetted Per. (ft)		1489.73	
Min Ch El (ft)	1025.40	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.01	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		39.39	
C & E Loss (ft)	0.01	Cum SA (acres)		17.72	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 1 RS: 6.532

INPUT
Description: RM 6.532,HEC-1 RSSF Q=1490 CFS, 75th Ave.
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1030.95	5105	1028.8	5204	1028.29	5308	1028.61	5404	1029.56
5441	1029.87	5511	1029.77	5615	1028.99	5717	1028.63	5833	1028.73
5938	1028.94	6453	1029.83	7170	1033				

Manning's n Values num= 1

Sta	n Val
5000	.02

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	7170	135	135	135	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

			Left OB	Channel	Right OB
W.S. Elev (ft)	1029.46	Element			
Vel Head (ft)	0.11	Wt. n-Val.		0.020	
E.G. Elev (ft)	1029.57	Reach Len. (ft)	135.00	135.00	135.00
Crit W.S. (ft)		Flow Area (sq ft)		558.11	
E.G. Slope (ft/ft)	0.002839	Area (sq ft)		558.11	
Q Total (cfs)	1490.00	Flow (cfs)		1490.00	
Top Width (ft)	1007.68	Top Width (ft)		1007.68	
Vel Total (ft/s)	2.67	Avg. Vel. (ft/s)		2.67	
Max Chl Dpth (ft)	1.17	Hydr. Depth (ft)		0.55	
Conv. Total (cfs)	27964.5	Conv. (cfs)		27964.5	
Length Wtd. (ft)		Wetted Per. (ft)		1007.70	
Min Ch El (ft)	1028.29	Shear (lb/sq ft)		0.10	
Alpha	1.00	Stream Power (lb/ft s)		0.26	
Frctn Loss (ft)		Cum Volume (acre-ft)		39.39	
C & E Loss (ft)		Cum SA (acres)		17.72	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note - The user has entered a known water surface elevation at this cross section.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 1 RS: 6.506

INPUT
Description: RM 6.506
Station Elevation Data num= 120

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1030.2	5002.5	1030.2	5003.3	1030.7	5005.1	1031.4	5010.7	1029.8
5011.6	1029.7	5039.2	1028	5051.6	1029.1	5055.7	1029.4	5059.1	1029.1
5098.8	1029.3	5105	1029.3	5109.3	1029.2	5154.5	1028.2	5159.5	1027.4
5160.6	1027.6	5173.3	1027.7	5205.4	1028	5205.9	1028	5211.4	1028.2
5245.5	1028.7	5266.7	1028.9	5301.2	1028.2	5305.6	1028	5308.3	1027.8
5315.3	1026.5	5319.8	1025.8	5326	1027.3	5331.5	1028.6	5332.6	1028.6
5340.7	1028.7	5350.3	1028.8	5355.1	1028.9	5357.2	1028.9	5373.4	1029.5
5384.6	1029.5	5390.9	1029.6	5400.7	1029.2	5405	1029.1	5405.2	1029.1
5410.9	1029.1	5429.8	1029.2	5434	1029.2	5447.7	1028.7	5454.3	1028.6
5457.3	1028.5	5464.4	1028.6	5467.8	1026.3	5468	1026.1	5469.1	1026.1
5491.6	1024.9	5492.8	1025.4	5500.2	1028.9	5502.7	1028.8	5520.9	1029.3
5521.7	1029.4	5522.3	1029.4	5531.4	1029	5534.5	1028.6	5551.9	1027.3
5554.4	1027	5593.9	1027.4	5605	1027.4	5609.2	1027.4	5655	1027.7
5659.1	1027.7	5705	1027.5	5709.1	1027.5	5755	1027.3	5767.8	1027.6
5807	1027.8	5814.7	1028.4	5834.8	1027.6	5838.3	1027.5	5849.8	1027.5
5855.7	1027.4	5856.7	1027.5	5860.4	1027.4	5874.4	1027.1	5895.9	1027.5
5905.1	1027.7	5951.5	1027.9	5955.1	1027.9	5958.6	1028	6005.1	1028
6008.5	1028	6055	1027.9	6058.4	1027.9	6105	1028	6151.9	1028
6155	1028	6202	1027.9	6205	1027.9	6208.1	1027.9	6255.1	1028
6302.3	1028.3	6305.1	1028.3	6333.6	1028.4	6341.3	1028.5	6344	1028.5
6355.1	1028.6	6355.4	1028.6	6360	1029.1	6371.8	1029.1	6377.9	1029.2
6383.9	1028.4	6393.2	1027.5	6403.5	1026.2	6407.1	1025.9	6420.1	1025.3
6426.5	1024.9	6434.2	1024.8	6452.5	1024.6	6453.9	1024.5	6454.5	1024.5
6457	1024.5	6504.5	1024.5	6506.2	1024.5	6545.1	1024.9	6546.7	1024.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.04	5390.9	.03	5534.5	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6546.7	500	500	500	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
6260	6546.7	1030

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5464.4	5500.2	1028.5	6377.9	6546.7	1030

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1028.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.036	
E.G. Elev (ft)	1028.54	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1028.17	Flow Area (sq ft)		592.45	
E.G. Slope (ft/ft)	0.005923	Area (sq ft)		607.04	
Q Total (cfs)	1490.00	Flow (cfs)		1490.00	
Top Width (ft)	937.59	Top Width (ft)		937.59	
Vel Total (ft/s)	2.51	Avg. Vel. (ft/s)		2.51	
Max Chl Dpth (ft)	2.64	Hydr. Depth (ft)		0.69	
Conv. Total (cfs)	19360.1	Conv. (cfs)		19360.1	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		861.70	
Min Ch El (ft)	1025.80	Shear (lb/sq ft)		0.25	
Alpha	1.00	Stream Power (lb/ft s)		0.64	
Frctn Loss (ft)	0.47	Cum Volume (acre-ft)		37.59	
C & E Loss (ft)	0.02	Cum SA (acres)		14.71	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 1 RS: 6.412

INPUT
Description: RM 6.412, Q=1490 CFS, END OF REACH TOLLESON 1
Station Elevation Data num= 103

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1028.7	5006.5	1028.8	5017.7	1027.3	5018.5	1027.2	5022.4	1028.4
5024.8	1029.2	5025.4	1029.2	5031.8	1029.6	5044	1029.8	5060.9	1029.8
5095.5	1029.7	5128.8	1029.6	5136.6	1026.5	5138.1	1026	5170.4	1026
5173.9	1026	5174.9	1026	5189.2	1025.9	5200.2	1025.8	5224.1	1026.3
5224.9	1026.3	5366.1	1025.4	5384.4	1025.4	5410.6	1025.2	5435.5	1025.1
5445.6	1026.5	5446.1	1026.5	5447.6	1026.7	5453.1	1027.1	5465.9	1027.8
5467.9	1026.6	5469.5	1025.9	5474.7	1025.7	5490.6	1025.3	5492.6	1025.9
5496.4	1027.1	5503.5	1027.1	5518.3	1027.1	5521.9	1027.1	5549.6	1026.6
5575.2	1026.3	5606.9	1026.8	5625.3	1026.9	5645.1	1026.9	5675.3	1026.8
5703.2	1026.8	5725.3	1026.5	5751.3	1026.5	5775.4	1026.5	5799.4	1026.2
5825.4	1026.4	5837.2	1026.1	5846.5	1026.1	5862	1025.9	5867.9	1026.2
5871.1	1026.3	5875.4	1026.4	5879.4	1026.4	5880.1	1026.4	5880.6	1026.4
5881.6	1026.4	5898.2	1026.1	5918.5	1026.5	5925.5	1026.9	5957.8	1026.7
5975.5	1026.8	6009.9	1026.9	6025.6	1026.9	6062.1	1026.6	6075.6	1026.5
6114.2	1027	6125.7	1027.1	6166.3	1027.3	6175.7	1027.4	6218.4	1026.8
6225.7	1026.8	6270.6	1027.2	6275.8	1027.2	6280.6	1027.2	6325.8	1027.3
6327.2	1027.3	6366.4	1026.9	6375.7	1027.1	6375.8	1027.1	6376.7	1027.1
6382.3	1027.4	6383.4	1027.4	6386	1027.3	6394	1027.3	6402.3	1027.3
6410.1	1027.2	6413.8	1027.3	6425.4	1027.4	6425.9	1027.4	6433.9	1026.9
6446.9	1027.4	6450.7	1027.7	6459.4	1027.9	6521.2	1028.4	6526	1028.4
6569.3	1028.4	6576	1028.5	6600	1028.9				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5521.9	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Left Levee Station= 5006.5 Elevation= 1028.8
Blocked Obstructions num= 3

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
5050	5130	1035	5260	5430	1035	5465.9	5496.4	1027.1

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1028.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.033	
E.G. Elev (ft)	1028.04	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1026.99	Flow Area (sq ft)		1490.01	
E.G. Slope (ft/ft)	0.000370	Area (sq ft)		1490.01	
Q Total (cfs)	1490.00	Flow (cfs)		1490.00	
Top Width (ft)	1180.80	Top Width (ft)		1180.80	
Vel Total (ft/s)	1.00	Avg. Vel. (ft/s)		1.00	
Max Chl Dpth (ft)	2.92	Hydr. Depth (ft)		1.26	
Conv. Total (cfs)	77421.2	Conv. (cfs)		77421.2	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		1186.66	
Min Ch El (ft)	1025.10	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.03	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)		22.15	
C & E Loss (ft)	0.00	Cum SA (acres)			

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - A flow split was encountered. The program first calculated the momentum of both channels below the junction. An energy balance was performed across the junction from the stream with the highest momentum downstream to the section upstream.

CROSS SECTION RIVER: Southern Pacific
REACH: RR Split RS: 6.317

INPUT
Description: RM 6.317, HEC-1 CPRJ3-1170 CFS, BEGIN SPRR SPLIT
Station Elevation Data num= 120

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1027	5002.2	1026.9	5011.1	1026.8	5022.9	1024.7	5024	1024.5
5024.6	1024.5	5025.9	1024.5	5033.5	1024.4	5043.2	1027.7	5045.9	1028.4
5051.8	1029.3	5088.5	1029.8	5094.2	1029.9	5100.4	1029.7	5127.9	1028.6
5144.2	1029.2	5144.6	1029.2	5144.8	1029.2	5158.8	1027.8	5180.3	1027.6
5195	1028	5196.6	1028.2	5199.2	1028	5209.2	1027.5	5231.4	1026.2
5236.4	1026	5239.7	1025.6	5245.3	1025.1	5246.7	1024.9	5255.4	1021.9
5257.3	1022.2	5265.1	1024.8	5280.7	1024.8	5289.4	1024.7	5296.1	1024.6
5322	1025	5327	1025.2	5332.2	1026.8	5341.5	1027.4	5345.5	1027.5
5351	1026.2	5354.2	1026	5381.9	1024.9	5392.5	1024.9	5398.3	1025.6
5408.1	1026.2	5414.6	1024.9	5424.5	1025.3	5430.5	1025.4	5432.3	1025.2
5438.2	1025.2	5441.4	1025.4	5444.9	1025.9	5447.1	1026.8	5459.4	1027.3
5467.2	1027.7	5469.9	1025.6	5470.4	1025.6	5471.5	1025.6	5491.9	1025.7
5500	1027.1	5501.5	1027.4	5528	1026.6	5529.5	1026.6	5538.7	1026.1
5544.4	1026.1	5549.5	1026	5581.5	1026.6	5587.7	1026.7	5594.6	1026.3
5606.5	1026.9	5640.4	1026.9	5644.7	1026.4	5675	1026.4	5694.7	1026.4
5715.9	1026.5	5744.7	1026.2	5754.8	1026.3	5783.3	1026.4	5794.7	1026.1
5802	1026.6	5829	1027	5844.8	1026.6	5852.6	1026.4	5854.7	1026.4
5864.9	1025	5890.2	1024.8	5916	1024.8	5924.3	1024.9	5932.7	1025.4
5940.4	1025.8	5943.4	1025.8	5944	1025.6	5944.2	1025.7	5950.4	1026.3
5981.8	1026.6	5994.9	1026.5	6012.4	1026.6	6044.9	1026.5	6080.1	1026.6
6095	1026.5	6108.8	1026.6	6145	1027	6184.1	1026.9	6195	1026.9
6205.1	1026.9	6245.1	1026.9	6253.3	1026.9	6295.1	1027	6301.5	1027
6345.1	1027.3	6392.3	1026.8	6395.2	1026.8	6399.7	1026.3	6438.2	1021.7
6445.1	1020.9	6468.8	1021	6494.6	1021.1	6496.6	1021.1	6546.1	1020.6

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5538.7	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	5467.2	171	171	171	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5000	5180	1030

Blocked Obstructions num= 1

Sta L	Sta R	Elev

5467.2 6546.1 1035

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1026.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.		0.030	
E.G. Elev (ft)	1026.68	Reach Len. (ft)	171.00	171.00	171.00
Crit W.S. (ft)	1026.04	Flow Area (sq ft)		255.01	
E.G. Slope (ft/ft)	0.006169	Area (sq ft)		288.12	
Q Total (cfs)	1170.00	Flow (cfs)		1170.00	
Top Width (ft)	223.12	Top Width (ft)		223.12	
Vel Total (ft/s)	4.59	Avg. Vel. (ft/s)		4.59	
Max Chl Dpth (ft)	4.45	Hydr. Depth (ft)		1.29	
Conv. Total (cfs)	14896.6	Conv. (cfs)		14896.6	
Length Wtd. (ft)	171.00	Wetted Per. (ft)		199.11	
Min Ch El (ft)	1021.90	Shear (lb/sq ft)		0.49	
Alpha	1.00	Stream Power (lb/ft s)		2.26	
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)		100.59	
C & E Loss (ft)	0.09	Cum SA (acres)		58.71	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: RR Split RS: 6.285

INPUT
Description: RM 6.285
Station Elevation Data num= 79

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1027.6	5006.4	1026.3	5012.5	1026.2	5017.9	1026.5	5023.7	1025.4
5029.6	1027.5	5038.9	1027.8	5054.8	1027.8	5056.5	1027.8	5057.3	1027.8
5060.5	1027.2	5075	1025	5079.6	1024.1	5082.9	1024.2	5092.5	1023.8
5100.5	1023.2	5110	1023.5	5125	1023.8	5150.7	1024.7	5162.2	1024.4
5215.1	1024.8	5299.9	1024.5	5328.8	1024.8	5350.7	1024.7	5384.7	1025
5400.7	1025	5433.5	1024.9	5488.1	1024.8	5500.7	1024.8	5517.1	1025
5550.4	1025.3	5584.1	1025.5	5600.7	1025.7	5633.9	1026.1	5650.7	1025.9
5667.6	1026	5717	1026.4	5733.6	1025.8	5750.7	1025.6	5783.4	1026.2
5800.7	1026.6	5832.9	1026.1	5844	1025.9	5848.7	1026.7	5851.4	1027.2
5852.4	1026.7	5853.7	1025.8	5853.9	1025.9	5854.3	1026	5857.7	1026.9
5864.1	1029	5877.7	1028.6	5888.7	1028.3	5889.4	1028	5894	1025.9
5905	1025.5	5918.4	1025.1	5923.1	1027.2	5925.3	1028.2	5929.3	1028.4
5940.7	1028.4	5946.6	1027.9	5951.5	1027.5	5955	1027.4	5958	1027.2
5966.9	1027.2	5991.6	1026.9	6007.8	1026.9	6038.6	1027.1	6107.1	1027.1
6127	1027	6246.8	1027.3	6262.4	1027.4	6278.2	1027.4	6285.3	1027.4
6396.7	1027.8	6448.1	1027.7	6468.2	1027.7	6600	1028.2		

Manning's n Values num= 1

Sta	n Val
5000	.03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
5000 5864.1 329 329 329 .1 .3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5000	5029.6	1030

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5864.1	6600	1035

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1026.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.030	
E.G. Elev (ft)	1026.39	Reach Len. (ft)	329.00	329.00	329.00
Crit W.S. (ft)	1025.21	Flow Area (sq ft)		944.74	
E.G. Slope (ft/ft)	0.000463	Area (sq ft)		949.49	
Q Total (cfs)	1170.00	Flow (cfs)		1170.00	

Top Width (ft)	770.53	Top Width (ft)	770.53
Vel Total (ft/s)	1.24	Avg. Vel. (ft/s)	1.24
Max Chl Dpth (ft)	3.17	Hydr. Depth (ft)	1.25
Conv. Total (cfs)	54390.8	Conv. (cfs)	54390.8
Length Wtd. (ft)	329.00	Wetted Per. (ft)	753.89
Min Ch El (ft)	1023.20	Shear (lb/sq ft)	0.04
Alpha	1.00	Stream Power (lb/ft s)	0.04
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	98.16
C & E Loss (ft)	0.00	Cum SA (acres)	56.76

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: RR Split RS: 6.222

INPUT
Description: RM 6.222
Station Elevation Data num= 94

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1026.6	5001.7	1026.6	5008.6	1026.5	5015	1024.8	5017.9	1024
5030.2	1023.2	5037.1	1022.9	5048.3	1023.3	5063.3	1023.8	5067.4	1023.8
5068.2	1023.8	5115.6	1023.9	5124	1023.8	5163.8	1023.9	5682.8	1025
5723	1025.2	5746.5	1025.3	5786.8	1025.2	5791.4	1025.2	5813.9	1025.2
5830.4	1025.3	5841.6	1025.5	5856.7	1025.4	5857.7	1025.7	5861.1	1026.9
5862.8	1026.3	5863.5	1026	5863.7	1025.8	5865.4	1026.2	5868.2	1027
5871.6	1028.1	5881.8	1027.9	5892.3	1027.7	5897.8	1027.6	5899.6	1026.9
5902.7	1025.9	5908	1025.8	5924.7	1025.4	5928.7	1026.6	5931.8	1027.5
5936.2	1027.4	5953.7	1026.7	5959.2	1023.7	5964	1021.1	5974.9	1015.7
5978.4	1013.9	6001.1	1014	6001.5	1014	6001.9	1014.2	6018	1022.8
6021.6	1024.7	6025.8	1026.7	6026.5	1026.7	6030.7	1026.5	6060.5	1026.6
6064	1026.7	6098.7	1027.2	6114.1	1027.3	6150.7	1027.2	6164.1	1027.2
6202.7	1027.4	6214.1	1027.5	6238.6	1028.3	6264.4	1028.9	6265.8	1029.2
6298.5	1029.4	6305.1	1029.4	6306.6	1029.4	6314.1	1029.2	6314.2	1029.3
6319.9	1028.8	6324.3	1028.5	6330.4	1029.2	6331.7	1029.4	6343.8	1030.2
6345.9	1030.3	6348	1030.4	6357.5	1030.7	6370.9	1031.1	6385.4	1031.1
6393.8	1030.8	6398.7	1030.7	6402	1030.5	6409.3	1030.1	6439.7	1030.9
6441.8	1030.9	6463.2	1030.6	6464.3	1030.7	6465.9	1030.7	6507.6	1031.7
6514.3	1031.8	6514.6	1031.8	6564.4	1032	6600	1031.9		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.035	5871.6	.03	6060.5	.02

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	5871.6	500	500	500	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5871.6	6600	1035

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1026.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.035	
E.G. Elev (ft)	1026.31	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)		Flow Area (sq ft)		1533.98	
E.G. Slope (ft/ft)	0.000148	Area (sq ft)		1533.98	
Q Total (cfs)	1170.00	Flow (cfs)		1170.00	
Top Width (ft)	852.96	Top Width (ft)		852.96	
Vel Total (ft/s)	0.76	Avg. Vel. (ft/s)		0.76	
Max Chl Dpth (ft)	3.40	Hydr. Depth (ft)		1.80	
Conv. Total (cfs)	96257.6	Conv. (cfs)		96257.6	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		853.67	
Min Ch El (ft)	1022.90	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.01	
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)		88.78	
C & E Loss (ft)	0.00	Cum SA (acres)		50.63	

Warning - Divided flow computed for this cross-section.

CROSS SECTION RIVER: Southern Pacific
REACH: RR Split RS: 6.127

INPUT
Description: RM 6.127
Station Elevation Data num= 83

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1026.2	5006.9	1026.4	5016.9	1023.9	5018.7	1023.4	5028.8	1023.1
5029.9	1023	5033.9	1022.9	5034.4	1022.8	5099.7	1023	5205.5	1023.4
5832.6	1025.5	5849.3	1025.4	5871.1	1025.3	5875.1	1026	5875.9	1026.4
5876.5	1026	5877.6	1025.3	5878.6	1024.7	5879.1	1025	5879.3	1025.2
5879.5	1025.2	5879.8	1025.4	5880.2	1025.7	5880.9	1026	5881.9	1026.6
5882.7	1027.3	5883.5	1027.5	5885.1	1028.3	5901.7	1027.8	5909.8	1027.5
5911.2	1027	5915	1025.6	5930.3	1025.3	5939.1	1025.1	5945.9	1027.5
5946.3	1027.6	5948.5	1027.6	5967.1	1027.1	5976.3	1023.2	5985.5	1017.9
5987.4	1016.8	5988.9	1016.9	5993.9	1016.7	6007.4	1016.5	6018.6	1016.5
6022.4	1018.3	6032.8	1023.1	6038	1024.5	6043.3	1026.2	6062.4	1026.6
6082.8	1027	6088.2	1027	6102.8	1027.2	6112	1027.2	6133.3	1027.3
6140.5	1027.1	6152	1026.8	6152.6	1026.8	6153.6	1026.8	6183.7	1027.6
6184.7	1027.6	6214.5	1027.7	6233.1	1027.8	6233.7	1027.8	6260.2	1028.9
6270.9	1029.3	6274.7	1029.5	6289.4	1030.3	6294.4	1030.5	6320.9	1032.2
6327.8	1032.6	6331.4	1032.2	6333	1032.2	6338.3	1032.3	6343.1	1031.8
6360.8	1032.4	6383	1032.9	6429.8	1033.4	6433.1	1033.5	6456.9	1033.4
6481.8	1033.4	6582.5	1033.5	6600	1033.4				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.035	5885.1	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	5885.1	500	500	500	.1	.3

Left Levee Station= 5006.9 Elevation= 1026.4
Blocked Obstructions num= 1

Sta L	Sta R	Elev
5885.1	6600	1035

CROSS SECTION OUTPUT Profile #PF#1

			Left OB	Channel	Right OB
W.S. Elev (ft)	1026.24	Element			
Vel Head (ft)	0.01	Wt. n-Val.		0.035	
E.G. Elev (ft)	1026.25	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1024.08	Flow Area (sq ft)		1765.46	
E.G. Slope (ft/ft)	0.000096	Area (sq ft)		1765.46	
Q Total (cfs)	1170.00	Flow (cfs)		1170.00	
Top Width (ft)	873.20	Top Width (ft)		873.20	
Vel Total (ft/s)	0.66	Avg. Vel. (ft/s)		0.66	
Max Chl Dpth (ft)	3.44	Hydr. Depth (ft)		2.02	
Conv. Total (cfs)	119716.1	Conv. (cfs)		119716.1	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		874.60	
Min Ch El (ft)	1022.80	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.01	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)		69.84	
C & E Loss (ft)	0.00	Cum SA (acres)		40.73	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: RR Split RS: 6.033

INPUT
Description: RM 6.033, Q=1330 CFS FROM DIRJ4B
Station Elevation Data num= 83

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1026.55	5003.3	1026.4	5008.2	1025.7	5013.9	1025.3	5016.4	1025.2
5018.5	1025.1	5029.7	1025.2	5034.2	1025.3	5035.7	1025.2	5047	1025.3

5051.6	1025.3	5077.5	1024.3	5105.2	1023.9	5135.8	1024.1	5188.8	1024.2
5252	1024.3	5349.8	1024.2	5411.6	1024.4	5435.9	1024.3	5444.9	1024.3
5580.9	1024.8	5664.5	1025	5700.1	1025.8	5772.7	1025.8	5822.4	1026
5856.7	1026.1	5892.9	1026	5894.9	1026	5896.9	1026.3	5904.6	1027.2
5906.7	1027.3	5916.9	1028.2	5917.6	1028.2	5922.5	1027.9	5926.6	1027.9
5927.8	1027.1	5930.7	1025.4	5955.9	1025.5	5956.4	1025.6	5957.1	1026
5961.3	1028.7	5964.4	1029.1	5974	1029.9	5978	1029.3	5986.1	1029.2
5989.3	1029.1	5994.4	1029.5	6002	1028.6	6007.2	1029.2	6016.3	1029
6020.4	1028.8	6025.8	1028.7	6032.9	1028.3	6043.7	1027.9	6055	1027.5
6077.9	1027.3	6080.8	1027.2	6082.3	1027	6133.5	1026.9	6151.3	1026.9
6172.6	1027	6194.5	1027	6217	1027	6311.4	1027.5	6324.3	1027.6
6331.9	1027.6	6333.3	1027.6	6337.7	1027.5	6351.7	1027.7	6469.5	1027.8
6476.6	1027.8	6480.6	1027.8	6481.3	1027.8	6484	1027.8	6491.8	1027.9
6567.4	1028	6596.2	1027.9	6600	1027.9	6700	1028.2	6800	1028.5
6900	1028.7	7000	1028.9	7100	1029.1				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5051.6	.035	5917.6	.03	6020.4	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	5917.6	500	500	500	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5917.6	7100	1035

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1026.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.035	
E.G. Elev (ft)	1026.16	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)		Flow Area (sq ft)		1168.10	
E.G. Slope (ft/ft)	0.000422	Area (sq ft)		1168.10	
Q Total (cfs)	1230.00	Flow (cfs)		1230.00	
Top Width (ft)	890.70	Top Width (ft)		890.70	
Vel Total (ft/s)	1.05	Avg. Vel. (ft/s)		1.05	
Max Chl Dpth (ft)	2.24	Hydr. Depth (ft)		1.31	
Conv. Total (cfs)	59905.1	Conv. (cfs)		59905.1	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		890.80	
Min Ch El (ft)	1023.90	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.04	
Frctn Loss (ft)	0.38	Cum Volume (acre-ft)		53.00	
C & E Loss (ft)	0.00	Cum SA (acres)		30.60	

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

CROSS SECTION RIVER: Southern Pacific
REACH: RR Split RS: 5.938

INPUT
Description: RM 5.938
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1027.22	5001.3	1027.1	5005.4	1026.4	5017.5	1023.7	5019.3	1024
5020.7	1024	5036.4	1023.9	5044.9	1024.1	5049	1024.2	5057.5	1024.2
5069.2	1024.1	5115.9	1023.8	5119.3	1023.7	5205.9	1024.3	5218.4	1024.4
5219.3	1024.4	5392	1024.7	5419.5	1024.8	5498	1025.3	5519.5	1025.3
5653.6	1025.4	5719.7	1025.6	5749.7	1025.5	5769.7	1025.4	5791.3	1025.5
5819.8	1025.7	5846.1	1025.7	5869.8	1025.8	5881.2	1025.7	5910	1025.4
5916.2	1027	5916.7	1027.2	5917.4	1026.8	5919.8	1025.4	5920.1	1025.3
5920.3	1026	5922.5	1026.8	5926.1	1028.2	5935.1	1027.8	5940.8	1027.6
5945.5	1026	5947.2	1025.4	5950.2	1025.4	5967.7	1025.4	5972.4	1027.2
5973.5	1027.6	5977.7	1027.5	5995.6	1026.9	6008.1	1026.1	6011.3	1025.9
6013.7	1026	6019.9	1026.3	6084.8	1026.5	6119.9	1026.6	6135.6	1026.7
6170	1026.8	6183.9	1026.8	6220	1027	6258.9	1026.7	6270.1	1026.7
6280.4	1026.8	6320.1	1027.2	6328.7	1027.3	6370.1	1027.7	6376.9	1027.6
6420.1	1027.2	6425.1	1027.2	6470.2	1027.5	6518.7	1027.4	6520.2	1027.4
6560.8	1027.9	6570.2	1028	6570.6	1028	6600	1028	6700	1028.2

6800	1028.4	6900	1028.7	7000	1029

Mannir.g's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5049	.035	5926.1	.03	5995.6	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	5926.1	500	500	500	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5926.1	7000	1035

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1025.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.034	
E.G. Elev (ft)	1025.77	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)		Flow Area (sq ft)		738.46	
E.G. Slope (ft/ft)	0.001793	Area (sq ft)		738.46	
Q Total (cfs)	1230.00	Flow (cfs)		1230.00	
Top Width (ft)	878.41	Top Width (ft)		878.41	
Vel Total (ft/s)	1.67	Avg. Vel. (ft/s)		1.67	
Max Chl Dpth (ft)	2.03	Hydr. Depth (ft)		0.84	
Conv. Total (cfs)	29050.2	Conv. (cfs)		29050.2	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		879.15	
Min Ch El (ft)	1023.70	Shear (lb/sq ft)		0.09	
Alpha	1.00	Stream Power (lb/ft s)		0.16	
Frctn Loss (ft)	0.49	Cum Volume (acre-ft)		42.06	
C & E Loss (ft)	0.01	Cum SA (acres)		20.45	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: RR Split RS: 5.843

INPUT
Description: RM 5.843,Q=1280 CFS FROM DIRJ4B
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1026.3	5003.2	1026.4	5013.5	1024.3	5017.9	1023.2	5026.4	1023.3
5031.1	1023.2	5039.1	1023.3	5039.4	1023.2	5039.8	1023.1	5042.3	1023.3
5051	1023.3	5085.3	1023.6	5088.8	1023.6	5136.6	1023.5	5138.9	1023.4
5141	1023.4	5188.9	1023.7	5191.5	1023.7	5429.6	1023.6	5489.2	1023.6
5618.1	1024.4	5675.8	1024.7	5699.9	1024.8	5711	1024.8	5739.4	1024.9
5765.5	1025	5789.4	1025.3	5815.4	1025	5839.5	1024.8	5867.7	1024.8
5889.5	1025	5902.5	1025.1	5911.1	1025.2	5925	1025	5928.6	1025.8
5931.5	1026.5	5932.8	1026.1	5934.2	1025.6	5938.3	1026.9	5939.5	1027.2
5940.3	1027.7	5940.6	1027.9	5945.2	1027.9	5955.3	1028.1	5958.9	1026.2
5960.2	1025.4	5965.5	1025.4	5976.6	1025.5	5983.7	1025.6	5986.9	1027.2
5989.1	1028.1	5989.2	1028	5989.6	1027.9	5999.4	1027.9	6003.7	1028
6005.5	1027.8	6009.5	1027.9	6012.5	1027.9	6025.2	1027.2	6090.8	1027.8
6128.4	1027.2	6239.8	1027.3	6351.2	1027.4	6390	1027.2	6390.6	1027.2
6490	1027.2	6494.4	1027.1	6540.1	1027.1	6582.1	1027.7	6590.1	1027.8
6598.8	1027.8	6600	1027.8	6700	1027.9	6800	1027.8	6900	1028
7000	1028.2								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.035	5955.3	.03	5999.4	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	5955.3	500	500	500	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5955.3	7000	1035

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1025.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.035	
E.G. Elev (ft)	1025.27	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)		Flow Area (sq ft)		1072.69	
E.G. Slope (ft/ft)	0.000634	Area (sq ft)		1072.69	
Q Total (cfs)	1280.00	Flow (cfs)		1280.00	
Top Width (ft)	908.77	Top Width (ft)		908.77	
Vel Total (ft/s)	1.19	Avg. Vel. (ft/s)		1.19	
Max Chl Dpth (ft)	2.15	Hydr. Depth (ft)		1.18	
Conv. Total (cfs)	50853.1	Conv. (cfs)		50853.1	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		909.08	
Min Ch El (ft)	1023.10	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.06	
Frctn Loss (ft)	0.40	Cum Volume (acre-ft)		31.67	
C & E Loss (ft)	0.00	Cum SA (acres)		10.19	

Warning - Divided flow computed for this cross-section.

CROSS SECTION RIVER: Southern Pacific
REACH: RR Split RS: 5.749

INPUT
Description: RM 5.749
Station Elevation Data num= 117

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1025.88	5004.5	1025.4	5006.3	1025.5	5009.5	1024.9	5015.3	1023.5
5023.9	1021.6	5043.4	1022	5049.1	1022.2	5056.3	1023.1	5058.6	1023.4
5094.5	1022.6	5102.4	1023.2	5109.5	1023.2	5115.6	1022.5	5115.9	1022.3
5121.4	1022.4	5133.9	1023.1	5153.3	1023.7	5158.2	1023.9	5160.1	1023.9
5170.6	1024.1	5180.5	1024.2	5191.6	1023.9	5198.7	1023.4	5205.9	1023
5209.6	1022.9	5221.5	1023	5257.4	1023.2	5259.7	1023.2	5270.3	1023.2
5308.9	1023.2	5309.2	1023.4	5334.1	1023.4	5355	1023.5	5359.7	1023.6
5370.1	1024	5371.3	1024	5371.6	1024	5372	1024	5372.6	1024
5373.5	1024.1	5376.1	1024.1	5379.5	1024.1	5409.8	1024.4	5431.6	1024.6
5451.1	1024.4	5503.8	1024.1	5538.9	1024.2	5573.3	1024.2	5606.5	1024.4
5610.2	1024.3	5701.5	1025.3	5703	1025.3	5711.7	1025.5	5714.2	1025.5
5733.7	1025.4	5807.5	1024.7	5826.2	1024.8	5850.7	1025	5860.1	1025
5870.9	1025.3	5899.9	1025.5	5907.7	1025.6	5927.4	1026.3	5937.3	1026.7
5938.7	1026.8	5940.3	1026.8	5942.9	1026.8	5953.6	1027.5	5958.1	1027.1
5960.2	1026.9	5967.7	1027.3	5969.1	1027.3	5969.9	1027	5974	1025.4
5987	1025.9	5997	1026.3	5998.3	1026.6	6003.7	1028.1	6007.7	1027.6
6010.2	1027.2	6020.1	1027.6	6028.8	1027.9	6039.7	1027.6	6042.4	1027.5
6048.4	1027.2	6048.8	1027.1	6069.8	1022.9	6071.1	1022.6	6072.6	1022.6
6082.9	1022.4	6110.3	1021.8	6146	1021.9	6165.9	1021.6	6167.5	1021.8
6169.8	1022	6171.7	1022.5	6173.9	1022.9	6175.4	1023.2	6176.8	1023.6
6192.6	1027.4	6202.9	1027.7	6210.4	1028.1	6249.4	1028.1	6260.4	1028.2
6265.6	1028.2	6270.5	1028.2	6384	1028.9	6410.5	1028.9	6509.5	1029.4
6510	1029.4	6510.6	1029.4	6511.5	1029.4	6537.4	1029.5	6560.6	1029.6
6561.5	1029.6	6600	1029.5						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5807.5	.03	6202.9	.015

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	5953.6	500	500	500	.1	.3

Left Levee Station= 5006.3 Elevation= 1025.5
Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5430	5815	1030	5953.6	6650	1030

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1024.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.030	
E.G. Elev (ft)	1024.86	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1023.83	Flow Area (sq ft)		615.62	
E.G. Slope (ft/ft)	0.001063	Area (sq ft)		615.62	
Q Total (cfs)	1280.00	Flow (cfs)		1280.00	

Top Width (ft)	430.54	Top Width (ft)	430.54
Vel Total (ft/s)	2.08	Avg. Vel. (ft/s)	2.08
Max Chl Dpth (ft)	3.20	Hydr. Depth (ft)	1.43
Conv. Total (cfs)	39252.5	Conv. (cfs)	39252.5
Length Wtd. (ft)	500.00	Wetted Per. (ft)	431.53
Min Ch El (ft)	1021.60	Shear (lb/sq ft)	0.09
Alpha	1.00	Stream Power (lb/ft s)	0.20
Frctn Loss (ft)	0.48	Cum Volume (acre-ft)	21.98
C & E Loss (ft)	0.01	Cum SA (acres)	2.51

Warning - Divided flow computed for this cross-section.

CROSS SECTION RIVER: Southern Pacific
REACH: RR Split RS: 5.654

INPUT
Description: RM 5.654, End Railroad Split, Join Canal Split
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1024.35	5000.2	1023.3	5004	1024	5006.7	1023.6	5009.4	1023.2
5013.6	1022.2	5016.9	1021.4	5027.4	1023.4	5028.6	1023.6	5028.9	1023.5
5053.4	1021.1	5070.6	1021.7	5075	1021.8	5076.8	1021.9	5078	1021.9
5080.4	1021.9	5126.4	1022	5128.6	1022	5130.5	1022	5177.9	1022.1
5178.6	1022.1	5180.6	1022.1	5228.6	1022.3	5228.9	1022.3	5234.9	1022.3
5277.1	1022.3	5278.7	1022.3	5325.3	1022.2	5328.7	1022.2	5333.5	1022.3
5351.3	1022.5	5353.3	1022.5	5360.9	1022.5	5366	1023.2	5369.8	1023.7
5373	1023.5	5377.6	1023.1	5378.7	1023.1	5378.9	1023.1	5382.9	1023
5394.3	1023.4	5396	1023.4	5397	1023.3	5409	1022.3	5418	1022.7
5428.7	1023.1	5431	1023.4	5442.6	1023.2	5506.6	1023.5	5508.4	1023.4
5518	1023.5	5536.4	1023.4	5549.7	1023.2	5569.5	1022.6	5577.3	1022.4
5583.6	1022.6	5606.8	1023.1	5618.2	1023.4	5627	1023.6	5644.2	1023.6
5679	1023.9	5721	1023.2	5735.2	1023.1	5737.5	1023.1	5751.7	1023.2
5788.4	1024.1	5808.7	1023.9	5829	1023.8	5847.4	1023.9	5857.4	1023.7
5872.3	1023.7	5878.2	1023.7	5880.1	1023.7	5892.3	1024.2	5894.5	1024.2
5935.3	1025.2	5935.9	1025.2	5939.2	1025.1	5943.6	1025.5	5947	1025.9
5960.6	1027.3	5970.5	1027.5	5979.1	1027.6	5979.7	1027.2	5980.2	1027.2
5982.3	1026.2	5986.6	1025.1	6010.5	1024.9	6012.6	1024.9	6013.9	1025.2
6020.4	1027.5	6026.7	1027.1	6029.2	1027.1	6035	1027.2	6040.4	1027.6
6056.3	1026.1	6060.8	1025.8	6063.3	1025.6	6067.2	1024.7	6077	1022.3
6091.2	1022.1	6129.3	1021.5	6166.7	1021.9	6185.2	1021.9	6190.2	1022.1
6197.4	1024	6201.7	1024.9	6202.8	1025.2	6203.8	1025.5	6205.2	1025.8
6206.6	1026.2	6211.8	1027.4	6217.4	1027.3	6229.3	1027	6241.7	1027
6279.3	1027.4	6319.9	1027.5	6329.4	1027.5	6346.3	1027.6	6429.5	1028
6434.6	1028.1	6527.9	1028.5	6529.5	1028.5	6531.1	1028.5	6572.6	1028.4
6579.6	1028.3	6600	1027.9						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5053.4	.05	5278.7	.03	6201.7	.015

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	5979.1	0	0	0	.1	.3

Ineffective Flow num= 3

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5040	1025	5260	5300	1025	5450	5979.1	1025

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5450	5500	1030	5979.1	6650	1030

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1024.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.041	
E.G. Elev (ft)	1024.38	Reach Len. (ft)	610.00	610.00	610.00
Crit W.S. (ft)	1022.94	Flow Area (sq ft)		744.09	
E.G. Slope (ft/ft)	0.000871	Area (sq ft)		1215.18	
Q Total (cfs)	1280.00	Flow (cfs)		1280.00	
Top Width (ft)	849.83	Top Width (ft)		849.83	
Vel Total (ft/s)	1.72	Avg. Vel. (ft/s)		1.72	
Max Chl Dpth (ft)	3.23	Hydr. Depth (ft)		2.01	

Conv. Total (cfs)	43373.3	Conv. (cfs)	43373.3
Length Wtd. (ft)	610.00	Wetted Per. (ft)	371.37
Min Ch El (ft)	1021.10	Shear (lb/sq ft)	0.11
Alpha	1.00	Stream Power (lb/ft s)	0.19
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	12.27
C & E Loss (ft)	0.01	Cum SA (acres)	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 5.539

INPUT
Description: RM 5.539, 83RD AVENUE, CPRJ7, 980 CFS
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1023.52	5078	1023.52	5085.3	1023.52	5367.7	1022.3	5369	1022.3
5369.3	1022.3	5370	1022.3	5370.7	1022.3	5370.9	1022.3	5371.1	1022.3
5371.3	1022.3	5512.9	1022.2	5514	1022.2	5515.8	1022.2	5518.5	1022.2
6008.3	1024.8	6012.4	1024.8	6018	1025	6337.8	1025.9	6347.6	1025.9
6355.7	1025.6	6388.4	1025.1	6437.7	1026.1	6478.5	1025.9	6524.6	1026.1
6565.6	1026.6	6600	1026.7						

Manning's n Values num= 1

Sta	n Val
5000	.02

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	48	48	48	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1024.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.020	
E.G. Elev (ft)	1024.19	Reach Len. (ft)	48.00	48.00	48.00
Crit W.S. (ft)		Flow Area (sq ft)		1075.40	
E.G. Slope (ft/ft)	0.000117	Area (sq ft)		1075.40	
Q Total (cfs)	980.00	Flow (cfs)		980.00	
Top Width (ft)	891.50	Top Width (ft)		891.50	
Vel Total (ft/s)	0.91	Avg. Vel. (ft/s)		0.91	
Max Chl Dpth (ft)	1.98	Hydr. Depth (ft)		1.21	
Conv. Total (cfs)	90492.8	Conv. (cfs)		90492.8	
Length Wtd. (ft)		Wetted Per. (ft)		892.17	
Min Ch El (ft)	1022.20	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.01	
Frctn Loss (ft)		Cum Volume (acre-ft)	3.85	581.67	
C & E Loss (ft)		Cum SA (acres)	8.21	464.50	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 5.530

INPUT
Description: RM 5.530
Station Elevation Data num= 73

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1023.3	5003.9	1023.3	5012.6	1022.8	5043.6	1023.1	5083.1	1022.9
5112.9	1023	5152.9	1022.3	5176	1021.9	5192.7	1021.8	5239.4	1021.5
5247.8	1021.5	5255.2	1021.6	5262.7	1021.8	5282.2	1022	5295.6	1022

5323	1022	5373.9	1021.9	5413.2	1021.9	5452.3	1021.7	5467.3	1021.9
5491.1	1022.7	5529.8	1022.6	5568.2	1022.5	5645.3	1022.8	5722.5	1023.7
5760.9	1023.8	5799	1023.8	5836.9	1023.8	5874.6	1023.9	5912	1024.4
6003.8	1024.7	6041.7	1024.8	6079.3	1024.8	6116.7	1024.8	6154	1024.5
6155.1	1024.4	6157	1024.4	6158.4	1024.5	6166.3	1024.5	6178.7	1024.4
6188.3	1024.8	6205.8	1025.2	6208.5	1025.2	6211.4	1025.2	6224.8	1025.1
6240.9	1025.1	6247.3	1025.1	6249.3	1025.3	6251.2	1025.5	6253.3	1025.5
6254.8	1025.5	6257.6	1025.5	6294.3	1025.4	6302.2	1025.5	6349.6	1024.8
6349.8	1024.8	6353	1024.7	6384.8	1024.5	6403.4	1024.4	6407.3	1024.5
6422.2	1024.5	6463.7	1024.8	6474.6	1024.9	6475.4	1024.9	6480.2	1024.9
6505.7	1025.1	6524.2	1025.3	6554.8	1025.3	6564.4	1025.7	6568.5	1025.8
6570.6	1025.8	6578.5	1025.8	6600	1025.9				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	6205.8	.015	6249.3	.015

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	345	345	345	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1022.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.30	Wt. n-Val.		0.030	
E.G. Elev (ft)	1022.84	Reach Len. (ft)	345.00	345.00	345.00
Crit W.S. (ft)	1022.54	Flow Area (sq ft)		222.52	
E.G. Slope (ft/ft)	0.015616	Area (sq ft)		222.52	
Q Total (cfs)	980.00	Flow (cfs)		980.00	
Top Width (ft)	370.69	Top Width (ft)		370.69	
Vel Total (ft/s)	4.40	Avg. Vel. (ft/s)		4.40	
Max Chl Dpth (ft)	1.04	Hydr. Depth (ft)		0.60	
Conv. Total (cfs)	7842.3	Conv. (cfs)		7842.3	
Length Wtd. (ft)	345.00	Wetted Per. (ft)		370.72	
Min Ch El (ft)	1021.50	Shear (lb/sq ft)		0.59	
Alpha	1.00	Stream Power (lb/ft s)		2.58	
Frctn Loss (ft)	1.50	Cum Volume (acre-ft)	3.85	580.95	
C & E Loss (ft)	0.07	Cum SA (acres)	8.21	463.81	

Warning - The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 5.465

INPUT
Description: RM 5.465
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1021.64	5006.7	1021	5014.6	1019.9	5015	1019.8	5015.5	1019.6
5017.5	1019	5017.8	1018.7	5018.8	1018.8	5047.6	1018.7	5054.6	1018.9
5056.5	1018.9	5057.6	1019	5059.5	1018.6	5069	1016.4	5073.5	1015.2
5074.1	1015	5074.4	1014.8	5080.7	1014.8	5123.5	1014.8	5127.7	1015.8
5135.4	1017.9	5137.7	1018.4	5140.4	1018.7	5144.5	1019.2	5145.1	1019.3
5146.2	1019.3	5146.8	1019.4	5147	1019.4	5149.4	1019.5	5150.6	1019.5
5153.9	1019.6	5158.2	1019.9	5163.1	1020.6	5165.1	1020.9	5165.2	1020.9
5170.8	1020.1	5203.4	1020	5288.8	1020.2	5411.7	1020.5	5665.4	1021.4
5969	1022.1	6085	1022.5	6131.7	1022.6	6138.2	1023	6138.7	1023

6141.7	1023.2	6149	1023.8	6152.2	1022.9	6152.4	1022.8	6152.9	1022.8
6164.6	1021.8	6165.7	1021.8	6170.4	1021.8	6178.2	1022.1	6178.7	1022.1
6180.5	1022.2	6191.1	1022.2	6194.4	1022.3	6196.4	1022.3	6219.6	1022.8
6222.1	1023	6222.6	1023	6223	1023	6227.8	1023	6230.7	1023
6246.6	1023	6260.7	1022.6	6265.9	1022.4	6270.2	1022.2	6280	1021.9
6290	1022.4	6293.4	1022.3	6295.3	1022.2	6420.5	1023.8	6450.9	1023.7
6600	1024.1								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5047.6	.035	6149	.03	6196.4	.015	6246.6	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5000	5140.4	1018.6

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1020.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.034	
E.G. Elev (ft)	1020.95	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)		Flow Area (sq ft)		495.41	
E.G. Slope (ft/ft)	0.001998	Area (sq ft)		495.41	
Q Total (cfs)	980.00	Flow (cfs)		980.00	
Top Width (ft)	513.30	Top Width (ft)		513.30	
Vel Total (ft/s)	1.98	Avg. Vel. (ft/s)		1.98	
Max Chl Dpth (ft)	2.29	Hydr. Depth (ft)		0.97	
Conv. Total (cfs)	21926.0	Conv. (cfs)		21926.0	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		513.88	
Min Ch El (ft)	1018.60	Shear (lb/sq ft)		0.12	
Alpha	1.00	Stream Power (lb/ft s)		0.24	
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	3.85	578.11	
C & E Loss (ft)	0.01	Cum SA (acres)	8.21	460.31	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 5.370

INPUT
Description: RM 5.370, Begin DIOE3-240 CFS flow over railroad to the South.
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1020.7	5008.3	1020	5013.1	1019.2	5015	1019	5017.4	1018.8
5018	1018.6	5022.7	1018.5	5031.6	1018.1	5036.8	1017.9	5037	1017.9
5044.3	1017.1	5044.7	1017.1	5056.9	1017.7	5060.6	1017.4	5061	1017.4
5071.9	1017.5	5084.3	1017.6	5088.6	1017.6	5129.2	1018	5139.8	1018
5180.2	1017.9	5185.9	1017.9	5192.8	1017.9	5233.5	1018	5252.6	1018
5284.7	1017.9	5286	1017.9	5334.7	1018	5379.7	1018.1	5384.7	1018
5390.1	1018	5434.7	1018.1	5476	1018.4	5484.8	1018.4	5524.2	1018.3
5534.8	1018.5	5572.3	1017.9	5584.8	1018	5594.9	1018.2	5604.3	1018.2
5606.2	1018.2	5645	1018.8	5650.1	1018.9	5655.8	1018.9	5793.4	1019.5
5807.7	1019.1	5813	1019.3	5818.7	1019.1	5830.4	1018.9	5839.4	1018.8
5860.8	1018.9	5869.2	1019	6035.2	1019.3	6047.7	1020.1	6071.5	1020.5
6080.9	1019.8	6085.3	1019.2	6089.6	1018.8	6094.4	1018.5	6121.9	1018.6
6141.4	1019.6	6146.5	1019.8	6150.3	1019.9	6178.1	1020	6228.6	1020.9
6244.5	1021.2	6281.4	1021.6	6285.4	1021.7	6327.4	1021.9	6355.2	1022
6371.7	1022.2	6382.5	1022.2	6390.2	1022.2	6396	1022.3	6473.2	1022.5
6600	1022.7								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5534.8	.025	6327.4	.035

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

5000	6600	270	270	270	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5290	5950	1023

Blocked Obstructions num= 1

Sta L	Sta R	Elev
6085.3	6141.4	1019.5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1020.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.029	
E.G. Elev (ft)	1020.80	Reach Len. (ft)	270.00	270.00	270.00
Crit W.S. (ft)	1018.59	Flow Area (sq ft)		1106.42	
E.G. Slope (ft/ft)	0.000099	Area (sq ft)		2544.63	
Q Total (cfs)	980.00	Flow (cfs)		980.00	
Top Width (ft)	1222.38	Top Width (ft)		1222.38	
Vel Total (ft/s)	0.89	Avg. Vel. (ft/s)		0.89	
Max Chl Dpth (ft)	3.69	Hydr. Depth (ft)		1.97	
Conv. Total (cfs)	98363.3	Conv. (cfs)		98363.3	
Length Wtd. (ft)	270.00	Wetted Per. (ft)		563.12	
Min Ch El (ft)	1017.10	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.01	
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	3.85	560.66	
C & E Loss (ft)	0.03	Cum SA (acres)	8.21	450.34	

Warning - The cross-section end points had to be extended vertically for the computed water surface.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION *RIVER: Southern Pacific*
REACH: Tolleson 2 RS: 5.319

INPUT
Description: RM 5.319, HEC-1 RSRI Q= 760 CFS, DIOE3 240 CFS diversion over railroad to the South.

Station Elevation Data num= 80

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1020.13	5001	1020.13	5005.1	1020.13	5005.7	1020.13	5006.5	1020.13
5008.6	1020.1	5009.3	1019.9	5011	1019.6	5014.2	1018.7	5018.8	1017.6
5031.1	1017.7	5043.8	1017.9	5053.6	1017.9	5093.8	1017.9	5104.8	1017
5111	1017.2	5115.7	1017.2	5118.4	1017.6	5126.3	1018.5	5126.8	1018.4
5133.7	1018.2	5143.8	1018.7	5211.3	1019.4	5328.2	1020.3	5375.6	1020.6
5393.8	1020.8	5425.6	1018.9	5443.8	1018.8	5461.9	1018.9	5493.8	1019
5525.6	1018.9	5543.7	1019	5575.6	1019	5593.7	1019	5611.9	1019
5643.7	1018.7	5675.6	1018.9	5693.7	1019	5725.6	1019.1	5743.7	1019.1
5761.8	1019.2	5793.8	1019.1	5825.7	1018.9	5843.7	1018.9	5875.8	1019.1
5893.8	1019.2	5911.9	1019.1	5943.8	1019.4	5961.9	1019.5	5993.8	1019.3
6101.7	1019.3	6115.7	1020.2	6143.8	1019.3	6163.3	1018.5	6178	1018
6184.3	1019	6193.8	1020.4	6197.4	1020.3	6208.2	1020	6222	1019.8
6227.3	1019.9	6230.7	1019.8	6240.4	1019.8	6243.8	1019.7	6247.1	1019.9
6247.5	1019.9	6247.8	1019.9	6289.5	1021.1	6289.9	1021.1	6290.3	1021.1
6291	1021.1	6293.7	1021.2	6316.3	1021.3	6443.7	1021.6	6449.2	1021.6
6451	1021.6	6489.6	1021.8	6512.5	1021.9	6550.9	1022	6600	1022.1

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.035	6101.7	.04	6197.4	.015	6247.8	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	230	230	230	.1	.3

Blocked Obstructions num= 4

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5060	1020	5060	5125	1019.5	5125	6110	1023
6143.8	6189	1019.5						

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1020.43	Element	Left OB	Channel	Right OB

Vel Head (ft)	0.27	Wt. n-Val.		0.031	
E.G. Elev (ft)	1020.70	Reach Len. (ft)	230.00	230.00	230.00
Crit W.S. (ft)		Flow Area (sq ft)		180.63	
E.G. Slope (ft/ft)	0.013812	Area (sq ft)		180.63	
Q Total (cfs)	760.00	Flow (cfs)		760.00	
Top Width (ft)	281.07	Top Width (ft)		281.07	
Vel Total (ft/s)	4.21	Avg. Vel. (ft/s)		4.21	
Max Chl Dpth (ft)	1.13	Hydr. Depth (ft)		0.64	
Conv. Total (cfs)	6466.7	Conv. (cfs)		6466.7	
Length Wtd. (ft)	230.00	Wetted Per. (ft)		283.72	
Min Ch El (ft)	1019.30	Shear (lb/sq ft)		0.55	
Alpha	1.00	Stream Power (lb/ft s)		2.31	
Frctn Loss (ft)	1.04	Cum Volume (acre-ft)	3.85	552.21	
C & E Loss (ft)	0.06	Cum SA (acres)	8.21	445.68	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 5.275

INPUT
Description: RM 5.275
Station Elevation Data num= 100

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1019.9	5002.2	1020.4	5005.5	1020.2	5005.8	1020.2	5006.4	1020.2
5007	1020.1	5007.5	1019.9	5008.3	1019.8	5019.3	1016.9	5022.1	1017.1
5024.2	1017.2	5026.3	1017.3	5028.8	1017.5	5033.9	1017.9	5041.5	1018.8
5044.6	1018.9	5051.1	1018.9	5067.6	1017.9	5067.9	1017.9	5088.3	1018
5091.7	1018.1	5101	1018.1	5112.8	1018.1	5142.7	1018.3	5146.5	1018.4
5154.4	1018.4	5191.4	1018.4	5204.7	1018.5	5251.4	1018.2	5252.6	1018.2
5258.4	1018.1	5300.8	1017.7	5302.4	1017.7	5304.3	1017.7	5352.5	1017.9
5397	1017.9	5402.5	1017.8	5408.5	1017.8	5452.5	1017.9	5460.6	1017.9
5502.6	1017.9	5512.6	1017.9	5552.6	1018.2	5564.7	1018.2	5602.6	1018.2
5637.6	1018.3	5652.6	1018.4	5685.7	1018.4	5702.7	1018.6	5721	1018.4
5752.8	1018.6	5781.9	1018.4	5802.8	1018.4	5825.2	1018.3	5852.8	1018.5
5877.5	1018.5	5902.9	1018.5	5908.7	1018.5	5938.4	1018.6	5953	1018.6
5958.4	1018.4	5989.6	1018.4	6003	1018.4	6011.4	1018.7	6044	1018.6
6053	1018.4	6085.9	1018.5	6103.1	1018.6	6123	1018.6	6133.4	1018.6
6139.1	1018.6	6142.2	1018.8	6146.3	1019	6153.1	1019.5	6167.1	1019.4
6203.1	1019.5	6204.5	1019.4	6208.7	1019.2	6211.7	1019.2	6220.7	1019
6252.1	1019.6	6253.2	1019.6	6264.7	1020	6275.1	1020.2	6292.9	1020
6298.2	1019.9	6303.2	1019.8	6305.3	1019.7	6348.8	1019.8	6353.2	1019.8
6359.5	1019.8	6403.2	1020.1	6450.6	1019.9	6453.3	1019.9	6455.8	1019.9
6503.3	1019.9	6518.7	1020.1	6553.3	1020.3	6554.8	1020.3	6600	1020.5

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5051.1	.035	6146.3	.015	6203.1	.03	6303.2	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5200	6075	1021	6345	6600	1021

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1019.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.034	
E.G. Elev (ft)	1019.60	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1018.95	Flow Area (sq ft)		335.10	
E.G. Slope (ft/ft)	0.002201	Area (sq ft)		1455.77	
Q Total (cfs)	760.00	Flow (cfs)		760.00	
Top Width (ft)	1238.83	Top Width (ft)		1238.83	

Vel Total (ft/s)	2.27	Avg. Vel. (ft/s)			2.27
Max Chl Dpth (ft)	2.63	Hydr. Depth (ft)			0.92
Conv. Total (cfs)	16197.9	Conv. (cfs)			16197.9
Length Wtd. (ft)	500.00	Wetted Per. (ft)			364.35
Min Ch El (ft)	1016.90	Shear (lb/sq ft)			0.13
Alpha	1.00	Stream Power (lb/ft s)			0.29
Frctn Loss (ft)	1.56	Cum Volume (acre-ft)		3.85	547.89
C & E Loss (ft)	0.01	Cum SA (acres)		8.21	441.67

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

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 5.181

INPUT
Description: RM 5.181
Station Elevation Data num= 86

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1019	5004.7	1019.2	5005.1	1019.1	5006.1	1019.1	5011.7	1018.7
5016.1	1018.6	5021.8	1018.9	5023.8	1018.7	5030.7	1017.4	5031.7	1017.4
5036.2	1016.4	5050	1017.3	5053.6	1017.5	5061.6	1017.5	5072.1	1017.5
5079.5	1017.6	5122.2	1017.3	5127.8	1017.4	5172.2	1018	5220.3	1017.3
5222.2	1017.2	5269.7	1017.4	5272.3	1017.5	5272.4	1017.5	5322.3	1017.4
5368.4	1017.3	5372.3	1017.3	5416.5	1017.4	5422.3	1017.4	5428.7	1017.4
5472.4	1017.2	5512.8	1017.2	5522.4	1017.3	5532.8	1017.3	5572.4	1017.5
5584.9	1017.4	5622.5	1017.4	5657.1	1017.3	5672.5	1017.3	5705.2	1017.6
5722.5	1017.7	5741.2	1017.6	5772.5	1017.5	5793.4	1017.5	5822.7	1017.5
5849.6	1017.5	5872.7	1017.5	5897.8	1017.6	5922.8	1017.7	5946	1017.6
5972.8	1017.4	6001.9	1017.5	6022.9	1017.5	6054	1017.6	6072.9	1017.7
6090.3	1017.7	6122.9	1017.7	6131	1017.6	6137.9	1017.4	6151.3	1017.9
6172.9	1018.5	6179.9	1018.5	6194	1018.2	6201.2	1018.2	6209.4	1017.9
6219.9	1018	6220.1	1017.7	6221.4	1017.9	6223	1017.9	6234.7	1018.1
6273	1018.5	6277	1018.5	6317.9	1018.5	6323	1018.5	6330.9	1018.5
6373.1	1018.9	6418.7	1018.9	6423.1	1018.9	6470.8	1019.1	6473.1	1019.1
6475.3	1019.1	6523.1	1019.2	6530.1	1019.2	6571.5	1019.2	6573.2	1019.2
6600	1019.3								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5050	.035	6151.3	.015	6201.2	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5480	5800	1020

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1017.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.035	
E.G. Elev (ft)	1018.04	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1017.77	Flow Area (sq ft)		399.81	
E.G. Slope (ft/ft)	0.004833	Area (sq ft)		579.15	
Q Total (cfs)	760.00	Flow (cfs)		760.00	
Top Width (ft)	1142.21	Top Width (ft)		1142.21	
Vel Total (ft/s)	1.90	Avg. Vel. (ft/s)		1.90	
Max Chl Dpth (ft)	1.58	Hydr. Depth (ft)		0.49	
Conv. Total (cfs)	10932.6	Conv. (cfs)		10932.6	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		822.61	
Min Ch El (ft)	1016.40	Shear (lb/sq ft)		0.15	
Alpha	1.00	Stream Power (lb/ft s)		0.28	
Frctn Loss (ft)	1.20	Cum Volume (acre-ft)	3.85	536.22	
C & E Loss (ft)	0.01	Cum SA (acres)	8.21	428.01	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 5.086

INPUT
Description: RM 5.086
Station Elevation Data num= 70

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1017.8	5001.4	1017.8	5005.8	1017.8	5011.4	1016.7	5013.3	1016.1
5037.3	1016.2	5041.6	1016.2	5059.1	1016.2	5141.7	1016.5	5147	1016.4
5239.8	1015.5	5241.7	1015.5	5243.4	1015.5	5288.8	1015.4	5291.7	1015.4
5291.8	1015.4	5341.8	1015.5	5388	1015.3	5391.8	1015.3	5395.9	1015.3
5441.8	1015.6	5447.9	1015.6	5491.8	1015.5	5499.9	1015.6	5541.9	1016.4
5580.8	1016.3	5591.9	1016.3	5603.9	1016.3	5641.9	1016.2	5677.2	1016.3
5691.9	1016.3	5725.4	1016.2	5742	1016.2	5759.9	1016.3	5792.1	1016.4
5812.1	1016.4	5842.1	1016.5	5870.1	1016.4	5892.2	1016.3	5918.3	1016.3
5942.2	1016.3	5966.5	1016.3	5992.3	1016.3	6020.1	1016.6	6042.3	1016.7
6062.9	1016.7	6092.3	1016.5	6124.1	1016.6	6142.3	1016.6	6154.2	1016.4
6157	1016.3	6164.8	1016.4	6192.4	1017	6228.1	1017	6242.4	1017
6280.1	1017.4	6292.4	1017.4	6303.8	1017.4	6342.4	1017.2	6384.1	1017.3
6392.5	1017.3	6436.1	1017.4	6442.5	1017.4	6448.4	1017.4	6492.5	1017.6
6540.1	1017.7	6542.5	1017.7	6592.1	1017.8	6592.6	1017.8	6600	1017.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5141.7	.05	5499.9	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	170	170	170	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5050	1019	5870	6600	1019

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5050	5100	1025

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1016.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.046	
E.G. Elev (ft)	1016.82	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)	1016.07	Flow Area (sq ft)		637.77	
E.G. Slope (ft/ft)	0.001429	Area (sq ft)		767.15	
Q Total (cfs)	760.00	Flow (cfs)		760.00	
Top Width (ft)	1122.41	Top Width (ft)		1122.41	
Vel Total (ft/s)	1.19	Avg. Vel. (ft/s)		1.19	
Max Chl Dpth (ft)	1.50	Hydr. Depth (ft)		0.83	
Conv. Total (cfs)	20101.9	Conv. (cfs)		20101.9	
Length Wtd. (ft)	170.00	Wetted Per. (ft)		770.47	
Min Ch El (ft)	1015.30	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.73	Cum Volume (acre-ft)	3.85	528.49	
C & E Loss (ft)	0.02	Cum SA (acres)	8.21	415.01	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 5.054

INPUT
Description: RM 5.054, CPRI5-760 CFS

Station Elevation Data num= 81

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1017.4	5004.8	1017.5	5007.6	1017.2	5011.9	1015.5	5029	1015.9
5048	1016	5088.8	1016.2	5098	1016.2	5138.7	1015.9	5148	1015.9
5157.4	1016	5238.3	1015.7	5248	1015.8	5288.2	1015.2	5298	1015.2
5338	1015.4	5365.2	1015.1	5406.8	1014.4	5408.2	1014.7	5448	1014.9
5487.5	1015.6	5497.9	1015.6	5537.3	1015.6	5547.9	1015.7	5551.3	1015.7
5554.9	1015.8	5556.6	1015.7	5579.9	1015.8	5584.5	1015.8	5600.4	1015.8
5606	1015.9	5665.5	1015.7	5669.2	1015.7	5673	1015.7	5676.8	1015.7
5905.8	1015.6	5910.1	1015.6	5914.4	1015.6	5918.7	1015.7	5984.9	1015.9
5986.1	1015.9	6009.2	1016.1	6020.4	1016.2	6025.9	1016.1	6041.4	1016.1
6049	1016.1	6053.1	1016.1	6067.7	1016.1	6095.6	1016.1	6103.1	1016.1
6106.5	1016.1	6108.6	1016.2	6116.2	1016.2	6116.5	1016.2	6136.9	1016.2
6138.6	1016.2	6141.8	1016.2	6146.1	1016.1	6148.5	1016.2	6150.9	1016.2
6159.2	1016.3	6198	1017.2	6210.7	1017.3	6248	1017.3	6255.2	1017
6293.3	1017.2	6297.9	1017.5	6311	1017.6	6347.9	1017.6	6353.5	1017.2
6391.2	1017.4	6397.9	1017.8	6434.5	1017.9	6447.9	1017.8	6461.4	1017.9
6497.9	1018	6534.2	1017.9	6547.9	1017.8	6561.7	1017.9	6598	1017.9
6600	1017.8								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5148	.06	5551.3	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	35	35	35	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5670	6600	1018

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1015.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.		0.059	
E.G. Elev (ft)	1016.07	Reach Len. (ft)	35.00	35.00	35.00
Crit W.S. (ft)	1015.84	Flow Area (sq ft)		198.31	
E.G. Slope (ft/ft)	0.057382	Area (sq ft)		249.73	
Q Total (cfs)	760.00	Flow (cfs)		760.00	
Top Width (ft)	761.50	Top Width (ft)		761.50	
Vel Total (ft/s)	3.83	Avg. Vel. (ft/s)		3.83	
Max Chl Dpth (ft)	1.44	Hydr. Depth (ft)		0.43	
Conv. Total (cfs)	3172.7	Conv. (cfs)		3172.7	
Length Wtd. (ft)		Wetted Per. (ft)		465.65	
Min Ch El (ft)	1014.40	Shear (lb/sq ft)		1.53	
Alpha	1.00	Stream Power (lb/ft s)		5.85	
Frctn Loss (ft)		Cum Volume (acre-ft)	3.85	526.50	
C & E Loss (ft)		Cum SA (acres)	8.21	411.33	

Warning - The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note - The user has entered a known water surface elevation at this cross section.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 5.047

INPUT
Description: RM 5.047, RSRI, Q=760 CFS
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1016.72	5011.19	1014.34	5028.77	1014.08	5124.77	1013.97	5261.4	1014.55
5371.8	1015.43	5470.64	1015.28	5566.54	1015.4	5678.38	1015.41	5767.79	1015.42
5868.08	1015.35	5972.01	1015.29	6090.99	1015.54	6200	1016		

Manning's n Values num= 1

Sta	n Val

5000 .03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6200	45	45	45	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1015.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.030	
E.G. Elev (ft)	1015.49	Reach Len. (ft)	45.00	45.00	45.00
Crit W.S. (ft)		Flow Area (sq ft)		424.03	
E.G. Slope (ft/ft)	0.004331	Area (sq ft)		424.03	
Q Total (cfs)	760.00	Flow (cfs)		760.00	
Top Width (ft)	1039.86	Top Width (ft)		1039.86	
Vel Total (ft/s)	1.79	Avg. Vel. (ft/s)		1.79	
Max Chl Dpth (ft)	1.48	Hydr. Depth (ft)		0.41	
Conv. Total (cfs)	11548.3	Conv. (cfs)		11548.3	
Length Wtd. (ft)	45.00	Wetted Per. (ft)		1039.98	
Min Ch El (ft)	1013.97	Shear (lb/sq ft)		0.11	
Alpha	1.00	Stream Power (lb/ft s)		0.20	
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	3.85	526.23	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	410.61	

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 5.040

INPUT
Description: RM 5.040
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1017.1	5003.5	1017.2	5005.2	1017.1	5005.7	1017.1	5006	1017
5007.3	1016.5	5014.8	1014.7	5025.9	1014.8	5035.9	1014.8	5050.6	1015
5079.7	1015	5100.7	1014.9	5130	1014.9	5150.7	1014.9	5186.2	1014.5
5194.3	1014.4	5202.3	1014.3	5205.6	1014.1	5220.8	1013.7	5237.6	1013.8
5245.8	1014	5250.4	1013.9	5250.7	1013.9	5264.1	1014	5546.8	1015
5626.2	1015.2	5644.7	1015.3	5653	1015.3	5657.7	1015.3	5660.7	1015.4
5662.8	1015.3	5664.4	1015.3	5665.6	1015.4	5666.5	1015.3	5688.3	1015.4
6227.8	1017.1	6259.2	1017.2	6292.9	1017	6295.1	1016.9	6300.3	1016.7
6301	1016.7	6351.3	1016.7	6380.7	1015.7	6383.5	1015.6	6387.2	1015.7
6405.2	1016.3	6428.2	1016.4	6451.2	1016.6	6544.5	1017.3	6577.6	1017.6
6600	1017.6								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5202.3	.035	6227.8	.03	6351.3	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	260	260	260	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5610	6600	1018

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1015.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.034	
E.G. Elev (ft)	1015.34	Reach Len. (ft)	260.00	260.00	260.00
Crit W.S. (ft)	1014.91	Flow Area (sq ft)		405.70	
E.G. Slope (ft/ft)	0.002925	Area (sq ft)		407.97	
Q Total (cfs)	760.00	Flow (cfs)		760.00	
Top Width (ft)	628.88	Top Width (ft)		628.88	
Vel Total (ft/s)	1.87	Avg. Vel. (ft/s)		1.87	
Max Chl Dpth (ft)	1.58	Hydr. Depth (ft)		0.68	
Conv. Total (cfs)	14052.2	Conv. (cfs)		14052.2	
Length Wtd. (ft)	260.00	Wetted Per. (ft)		597.71	
Min Ch El (ft)	1013.70	Shear (lb/sq ft)		0.12	
Alpha	1.00	Stream Power (lb/ft s)		0.23	
Frctn Loss (ft)	1.29	Cum Volume (acre-ft)	3.85	525.80	
C & E Loss (ft)	0.01	Cum SA (acres)	8.21	409.75	

Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 4.991

INPUT
Description: RM 4.991
Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1016	5007.1	1015.8	5008.9	1016.2	5010.5	1015.5	5011.2	1015.2
5013.6	1014	5015.3	1013.1	5058.1	1013.7	5060.7	1013.7	5069.4	1013.7
5110.7	1013.3	5117.6	1013.3	5160.8	1013.5	5166	1013.3	5185.5	1012.7
5191.2	1012.4	5200	1012.2	5201	1012.1	5205.8	1012	5207.1	1012.1
5207.1	1011.8	5208.7	1012	5210.8	1012.3	5211.1	1012.3	5214.7	1012.1
5217.3	1012.1	5221.6	1012.1	5251	1012.5	5260.8	1012.5	5262.1	1012.6
5296.7	1013.5	5310.8	1013.9	5364.7	1013.6	5405.3	1013.8	5436.8	1014
5462	1013.8	6087.7	1015	6268.1	1015.6	6291.8	1015.5	6292.9	1015.6
6294.6	1015.5	6296.9	1015.8	6300.1	1016	6305.2	1016.5	6311.5	1017
6313.9	1016.9	6321.5	1016.5	6326.1	1015.4	6329.3	1015.3	6331.6	1015.1
6333.4	1015	6334.7	1015	6335.2	1014.8	6360.7	1014.7	6361.6	1014.7
6370.3	1014.9	6411.6	1015.7	6418.5	1015.7	6461.6	1015.7	6508.2	1015.9
6511.6	1015.9	6514.8	1015.9	6561.7	1016	6598.1	1016.2	6600	1016.2

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.04	5200	.035	6268.1	.03	6331.6	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

			Left OB	Channel	Right OB
W.S. Elev (ft)	1013.92	Element			
Vel Head (ft)	0.12	Wt. n-Val.		0.037	
E.G. Elev (ft)	1014.04	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)		Flow Area (sq ft)		271.47	
E.G. Slope (ft/ft)	0.010576	Area (sq ft)		271.47	
Q Total (cfs)	760.00	Flow (cfs)		760.00	
Top Width (ft)	487.34	Top Width (ft)		487.34	
Vel Total (ft/s)	2.80	Avg. Vel. (ft/s)		2.80	
Max Chl Dpth (ft)	2.12	Hydr. Depth (ft)		0.56	
Conv. Total (cfs)	7390.1	Conv. (cfs)		7390.1	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		487.95	
Min Ch El (ft)	1011.80	Shear (lb/sq ft)		0.37	
Alpha	1.00	Stream Power (lb/ft s)		1.03	
Frctn Loss (ft)	1.07	Cum Volume (acre-ft)	3.85	523.78	
C & E Loss (ft)	0.03	Cum SA (acres)	8.21	406.42	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 4.896

INPUT
Description: RM 4.896
Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1014.3	5006.8	1014.3	5011.6	1013.2	5015.3	1012.1	5027.9	1012.5
5029.3	1012.6	5041.8	1012.7	5076.3	1013.5	5087.3	1013.7	5088.4	1013.7
5089.1	1013.8	5101.6	1014.8	5123.1	1013.6	5131.3	1013	5138.3	1012.4
5172	1012.1	5179.5	1012	5190.7	1011.5	5197.6	1011.1	5198.1	1011.1

5198.4	1011.1	5198.7	1011.1	5199	1011.1	5206.9	1010.8	5209.8	1010.9
5210	1010.8	5219.4	1010.7	5219.7	1010.9	5220.9	1010.9	5222.5	1011
5224.4	1011.2	5226.7	1011.3	5229.5	1011.2	5241.3	1011.3	5296.3	1011.4
5918.8	1013.1	6275.3	1014.1	6276.7	1013.9	6277.6	1014.1	6280.2	1014.1
6284.3	1014	6294.6	1014.1	6301	1014.2	6305.4	1014.2	6308.6	1014.1
6311.1	1014.2	6313	1014.1	6314.6	1014	6315.9	1013.9	6316.9	1013.9
6317.3	1013.8	6322.6	1014.2	6326.6	1014.3	6330.2	1014.1	6342.3	1014.2
6380.2	1014.7	6390.7	1014.8	6430.3	1015	6473	1015.2	6480.3	1015.2
6487	1015.3	6530.3	1015.5	6535.4	1015.5	6580.3	1015.1	6600	1015.2

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.04	5199	.035	6301	.03	6342.3	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

			Left OB	Channel	Right OB
W.S. Elev (ft)	1012.92	Element			
Vel Head (ft)	0.02	Wt. n-Val.		0.035	
E.G. Elev (ft)	1012.95	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)		Flow Area (sq ft)		664.67	
E.G. Slope (ft/ft)	0.000882	Area (sq ft)		664.67	
Q Total (cfs)	760.00	Flow (cfs)		760.00	
Top Width (ft)	761.45	Top Width (ft)		761.45	
Vel Total (ft/s)	1.14	Avg. Vel. (ft/s)		1.14	
Max Chl Dpth (ft)	2.22	Hydr. Depth (ft)		0.87	
Conv. Total (cfs)	25589.6	Conv. (cfs)		25589.6	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		761.74	
Min Ch El (ft)	1010.70	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.05	
Frctn Loss (ft)	0.68	Cum Volume (acre-ft)	3.85	518.40	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	399.25	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 4.802

INPUT
Description: RM 4.802
Station Elevation Data num= 81

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1012.9	5001.8	1012.9	5003.5	1013	5004.6	1013	5005.3	1012.8
5005.4	1013	5009.4	1012	5010.2	1011.7	5010.8	1011.6	5011.3	1011.4
5011.5	1011.3	5026.8	1011.4	5031.9	1011.7	5036.7	1011.9	5045.1	1011.9
5047.8	1011.9	5049.7	1011.8	5052	1011.7	5081.4	1018	5082.3	1018.1
5083.2	1018	5084.3	1017.7	5099.1	1014.7	5105.3	1014.9	5115.6	1015.4
5124	1013.3	5128.1	1012.3	5132	1011.4	5137	1011.4	5143.2	1011.5
5148	1011.4	5154.3	1011.3	5196.4	1010.4	5196.8	1010.3	5198.2	1010.2
5198.7	1010.2	5202.4	1009.6	5203.9	1010	5204.6	1009.9	5204.7	1009.8
5205.1	1009.9	5213.2	1009.9	5214.6	1009.8	5215.6	1009.8	5216.4	1009.8
5217.1	1009.8	5217.7	1009.8	5218	1009.8	5218.1	1009.8	5237.8	1010.4
5241.4	1010.7	5247.5	1011.1	5248	1011.1	5995.9	1012.9	6107.7	1013.2
6150.9	1013.3	6207.2	1013.4	6250.2	1013.5	6254.4	1013.5	6257.7	1013.2
6258.4	1012.9	6260.4	1013.2	6272.2	1013.6	6276.1	1013.4	6281.6	1013.3
6289.8	1013.3	6297.5	1012.9	6297.6	1012.9	6298.3	1012.9	6348.7	1013.2
6387.9	1013.6	6398.7	1013.7	6439.9	1014.1	6448.7	1014.2	6457	1014.1
6498.8	1014	6543.8	1014.1	6548.8	1014.1	6553.5	1014.1	6598.8	1014.2
6600	1014.2								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.04	5202.4	.035	6250.2	.03	6298.3	.035

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

5000	6600	500	500	500	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5000	5082.3	1019

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1012.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.036	
E.G. Elev (ft)	1012.26	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1011.66	Flow Area (sq ft)		443.17	
E.G. Slope (ft/ft)	0.002392	Area (sq ft)		469.07	
Q Total (cfs)	760.00	Flow (cfs)		760.00	
Top Width (ft)	630.02	Top Width (ft)		630.02	
Vel Total (ft/s)	1.71	Avg. Vel. (ft/s)		1.71	
Max Chl Dpth (ft)	2.62	Hydr. Depth (ft)		0.76	
Conv. Total (cfs)	15538.7	Conv. (cfs)		15538.7	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		584.45	
Min Ch El (ft)	1009.60	Shear (lb/sq ft)		0.11	
Alpha	1.00	Stream Power (lb/ft s)		0.19	
Frctn Loss (ft)	1.42	Cum Volume (acre-ft)	3.85	511.90	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	391.26	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 4.707

INPUT
Description: RM 4.707
Station Elevation Data num= 71

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1012.3	5005.9	1011.2	5008.2	1010.8	5009.1	1010.5	5013.4	1009.8
5015.4	1010.1	5016.9	1010.1	5028.7	1009.9	5063.9	1010.1	5066.3	1009.9
5074.3	1012.2	5076.7	1012.9	5080.2	1013.9	5082.7	1014.3	5088	1015.5
5096.5	1013.7	5098.7	1013.3	5099	1013.3	5099.7	1013.2	5111.5	1012.6
5113.2	1012.5	5115.4	1012	5123.4	1010.7	5130.5	1009.8	5161.6	1009.6
5167.1	1009.6	5186.5	1009.4	5190.1	1009.4	5195.4	1009.3	5196.3	1009.3
5203.6	1008.7	5213.2	1009.1	5215.4	1009.2	5216.7	1009.1	5217.3	1009.2
5217.8	1009.3	5217.9	1009.3	5218.1	1009.3	5218.5	1009.3	5219.2	1009.3
5221.1	1009.3	5267.2	1009.9	5680.2	1010.6	5851.6	1010.9	6240.1	1011.6
6243.7	1011.8	6245.8	1011.9	6249.3	1011.6	6256.2	1012.2	6267.8	1012.5
6283	1011.9	6283.7	1011.9	6284	1011.9	6284.6	1011.9	6284.7	1011.9
6284.9	1011.9	6285.2	1011.9	6286.5	1011.9	6317.9	1012.1	6357.6	1012.4
6367.9	1012.5	6377.5	1012.6	6417.9	1012.7	6461.6	1012.4	6468	1012.4
6473.8	1012.4	6518	1012.7	6565.7	1012.9	6568	1012.9	6570.2	1012.9
6600	1012.9								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.04	5203.6	.035	6249.3	.03	6286.5	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5000	5088	1016

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1010.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.037	
E.G. Elev (ft)	1010.84	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1010.39	Flow Area (sq ft)		413.08	
E.G. Slope (ft/ft)	0.003435	Area (sq ft)		458.89	
Q Total (cfs)	760.00	Flow (cfs)		760.00	
Top Width (ft)	725.27	Top Width (ft)		725.27	
Vel Total (ft/s)	1.84	Avg. Vel. (ft/s)		1.84	

Max Chl Dpth (ft)	2.09	Hydr. Depth (ft)		0.62
Conv. Total (cfs)	12967.3	Conv. (cfs)		12967.3
Length Wtd. (ft)	500.00	Wetted Per. (ft)		664.26
Min Ch El (ft)	1008.70	Shear (lb/sq ft)		0.13
Alpha	1.00	Stream Power (lb/ft s)		0.25
Frctn Loss (ft)	0.75	Cum Volume (acre-ft)	3.85	506.57
C & E Loss (ft)	0.01	Cum SA (acres)	8.21	383.49

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 4.612

INPUT
Description: RM 4.612
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1010.4	5008.3	1010.6	5018.5	1009.7	5020.2	1009.5	5025	1009.7
5033.4	1009.8	5036.8	1010	5074.5	1011	5109.2	1009.3	5114.2	1009.1
5123	1008.9	5137.6	1008.2	5149.8	1008.3	5153.6	1008.2	5192.4	1008.1
5195.2	1008.1	5197.6	1008	5203.8	1007.8	5207.3	1007.9	5216.3	1008.4
5229.2	1008.2	5236.3	1008	5259.9	1007.8	5286.3	1008.4	5310.9	1008.7
5319.5	1008.5	5336.5	1008.9	5388.5	1009	5410	1009.3	5440.6	1009.2
5467.6	1009.6	5492.7	1009.7	5511.3	1009.7	5544.7	1010.3	5561	1010.4
5596.7	1010.3	5611.2	1010.4	5648.7	1010.4	5949.1	1010.8	6010.9	1011.2
6144.5	1011.3	6222.9	1011	6223.2	1011	6237	1011	6273.2	1010.9
6287.1	1011	6299.9	1011	6337.1	1011.1	6348.1	1011.1	6387.1	1011
6429.3	1011	6437.1	1011	6481.3	1011.1	6487.1	1011.1	6492.6	1011.1
6537.3	1011.9	6540.8	1011.9	6587.3	1011.9	6589	1011.9	6600	1011.9

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.04	5149.8	.035	6144.5	.03	6237	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	185	185	185	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5000	5074.5	1011.5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1010.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.035	
E.G. Elev (ft)	1010.08	Reach Len. (ft)	185.00	185.00	185.00
Crit W.S. (ft)	1009.02	Flow Area (sq ft)		541.67	
E.G. Slope (ft/ft)	0.000842	Area (sq ft)		548.37	
Q Total (cfs)	760.00	Flow (cfs)		760.00	
Top Width (ft)	461.08	Top Width (ft)		461.08	
Vel Total (ft/s)	1.40	Avg. Vel. (ft/s)		1.40	
Max Chl Dpth (ft)	2.25	Hydr. Depth (ft)		1.24	
Conv. Total (cfs)	26190.0	Conv. (cfs)		26190.0	
Length Wtd. (ft)	185.00	Wetted Per. (ft)		437.01	
Min Ch El (ft)	1007.80	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	3.85	500.79	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	376.68	

Warning - Divided flow computed for this cross-section.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 4.577

INPUT
Description: RM 4.577, CPRH2-780 CFS, 91st Ave.
Station Elevation Data num= 46

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1010.5	5038.2	1011.1	5041.6	1011.3	5062.9	1011.1	5091.6	1010.8
5145	1008.2	5145.9	1008.2	5146.9	1008.2	5148.1	1008.2	5190.1	1008.4
5203.8	1008.4	5205.3	1008.5	5211	1008.4	5211.8	1008.4	5212.5	1008.4
5213.6	1008.3	5220.2	1008.3	5228.3	1008.2	5243.8	1008.1	5441.1	1009
5489.1	1009.2	5511.8	1009.2	5658.4	1009.6	5663.6	1009.7	5699.4	1009.7
5709.4	1009.6	5780.1	1010	5784.9	1010.1	5983.9	1010.3	6187.7	1010.5
6217.7	1010.5	6232.6	1011	6241.8	1011.1	6250.8	1010.8	6264.6	1010.7
6281.2	1011	6292.2	1011.3	6335.7	1011.3	6380.7	1011.2	6404.6	1011.2
6447.6	1011.5	6492.5	1011.6	6539.1	1012.3	6587.5	1012.4	6596.8	1012.4
6600	1012.3								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.04	5148.1	.035	6232.6	.03	6264.6	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	55	55	55	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

			Left OB	Channel	Right OB
W.S. Elev (ft)	1009.87	Element			
Vel Head (ft)	0.03	Wt. n-Val.		0.035	
E.G. Elev (ft)	1009.90	Reach Len. (ft)	55.00	55.00	55.00
Crit W.S. (ft)	1009.05	Flow Area (sq ft)		580.97	
E.G. Slope (ft/ft)	0.001170	Area (sq ft)		580.97	
Q Total (cfs)	780.00	Flow (cfs)		780.00	
Top Width (ft)	646.25	Top Width (ft)		646.25	
Vel Total (ft/s)	1.34	Avg. Vel. (ft/s)		1.34	
Max Chl Dpth (ft)	1.77	Hydr. Depth (ft)		0.90	
Conv. Total (cfs)	22805.6	Conv. (cfs)		22805.6	
Length Wtd. (ft)	55.00	Wetted Per. (ft)		646.31	
Min Ch El (ft)	1008.10	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	3.85	498.39	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	374.32	

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 4.567

INPUT
Description: RM 4.567, 91st Ave.
Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1011.2	5023.2	1011.1	5070.5	1011.1	5071.2	1011.1	5071.8	1011.1
5211.7	1009.3	5218.2	1009.2	5220.2	1009.1	5225	1009.2	5232.1	1009.1
5354.7	1009.1	5365.7	1009.1	5377.3	1009.1	5389.3	1009.1	5401.9	1009.2
5415.1	1009.1	5619.6	1009.1	5638.9	1009.3	5659.1	1009.3	5671.2	1009.4
5680	1009.2	5701.8	1009.3	5724.5	1009.3	5748.3	1009.2	5773.1	1009.3
5799	1009.4	6040.1	1010	6066.2	1010.1	6093.4	1010.2	6121.6	1010.3
6151	1010.5	6181.7	1010.4	6213.7	1010.6	6247.2	1010.6	6282.1	1010.8
6409.8	1011	6442.2	1010.9	6475.9	1010.9	6511.2	1011	6547.9	1011.5
6586.3	1011.5	6593	1011.5	6600	1011.5				

Manning's n Values num= 1

Sta	n Val
5000	.015

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	40	40	40	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5800	6600	1011

CROSS SECTION OUTPUT Profile #PF#1

			Left OB	Channel	Right OB
W.S. Elev (ft)	1009.76	Element			
Vel Head (ft)	0.07	Wt. n-Val.		0.015	
E.G. Elev (ft)	1009.83	Reach Len. (ft)	40.00	40.00	40.00
Crit W.S. (ft)	1009.54	Flow Area (sq ft)		362.37	

E.G. Slope (ft/ft)	0.000975	Area (sq ft)			388.39
Q Total (cfs)	780.00	Flow (cfs)			780.00
Top Width (ft)	768.83	Top Width (ft)			768.83
Vel Total (ft/s)	2.15	Avg. Vel. (ft/s)			2.15
Max Chl Dpth (ft)	0.66	Hydr. Depth (ft)			0.58
Conv. Total (cfs)	24980.0	Conv. (cfs)			24980.0
Length Wtd. (ft)	40.00	Wetted Per. (ft)			624.25
Min Ch El (ft)	1009.10	Shear (lb/sq ft)			0.04
Alpha	1.00	Stream Power (lb/ft s)			0.08
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)		3.85	497.78
C & E Loss (ft)	0.01	Cum SA (acres)		8.21	373.43

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 4.559

INPUT
Description: RM 4.559
Station Elevation Data num= 75

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1010.8	5006.1	1010.8	5011.6	1010.8	5028.9	1010.9	5030.8	1010.9
5034.1	1010.9	5036.4	1010.9	5046.4	1011.2	5053.3	1011.3	5058.8	1011.3
5067.1	1011.2	5087.3	1010.9	5093.7	1010.9	5112.2	1010.7	5147.1	1010.1
5178.3	1009.7	5193.8	1009.4	5210.8	1008.9	5225.1	1008.5	5234.4	1008.8
5252.4	1008.8	5275.3	1008.7	5303.3	1009.1	5322.8	1009.1	5366.7	1009
5380.2	1009.1	5386.8	1009	5388.4	1009	5409.7	1009.2	5433.5	1009.1
5445.6	1008.9	5472.1	1008.9	5500.2	1009.1	5580.2	1009.1	5608.8	1009.4
5639	1009.1	5643	1009.1	5675.5	1009.2	5685.6	1009.1	5701.8	1009.2
5743.8	1009.4	5786.8	1009.4	5793.7	1009.4	5837.6	1009.3	5850	1009.2
5893.8	1009.5	5938.8	1009.6	5943.8	1009.6	5989.5	1009.9	5993.8	1009.9
6040.2	1009.8	6043.9	1009.8	6090.9	1010.1	6093.9	1010.1	6096.8	1010.1
6143.8	1010.6	6146.6	1010.6	6165.8	1010.4	6191.4	1010.3	6193.8	1010.3
6195.4	1010.3	6243.8	1010.6	6293.5	1010.4	6293.9	1010.4	6321.4	1010.5
6341.4	1010.6	6347.4	1010.7	6402.4	1010.7	6453.7	1010.7	6501.8	1011
6546.7	1011.3	6588.9	1011.3	6593.9	1011.4	6597.4	1011.3	6600	1011.3

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5685.6	.09

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	220	220	220	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1009.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.033	
E.G. Elev (ft)	1009.76	Reach Len. (ft)	220.00	220.00	220.00
Crit W.S. (ft)		Flow Area (sq ft)		415.67	
E.G. Slope (ft/ft)	0.003674	Area (sq ft)		415.67	
Q Total (cfs)	780.00	Flow (cfs)		780.00	
Top Width (ft)	782.11	Top Width (ft)		782.11	
Vel Total (ft/s)	1.88	Avg. Vel. (ft/s)		1.88	
Max Chl Dpth (ft)	1.21	Hydr. Depth (ft)		0.53	
Conv. Total (cfs)	12867.9	Conv. (cfs)		12867.9	
Length Wtd. (ft)	220.00	Wetted Per. (ft)		782.15	
Min Ch El (ft)	1008.50	Shear (lb/sq ft)		0.12	
Alpha	1.00	Stream Power (lb/ft s)		0.23	
Frctn Loss (ft)	0.57	Cum Volume (acre-ft)	3.85	497.41	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	372.72	

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 4.518

INPUT
Description: RM 4.518

Station Elevation Data num= 84

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1010.2	5002.9	1010.1	5004.3	1010.2	5006.5	1010.1	5010.2	1009.1
5011.6	1008.8	5013	1008.7	5013.9	1008.5	5018.5	1008.4	5037.7	1008
5043.4	1007.9	5046	1008.2	5079.9	1009.2	5097.2	1010	5135.6	1009.6
5147.3	1009.4	5169.7	1009	5178.5	1008.7	5183.5	1008.6	5197.3	1008
5203.3	1007.8	5243.9	1007.5	5247.3	1007.6	5257.9	1007.7	5297.2	1007.9
5337.3	1008.2	5347.2	1008.3	5357	1008.3	5397.2	1008.5	5438.2	1008.8
5447.3	1008.8	5488.6	1008.4	5497.3	1008.4	5505.7	1008.5	5547.2	1008.9
5589.6	1008.5	5597.4	1008.5	5640	1008.4	5647.3	1008.4	5654.5	1008.4
5697.3	1008.7	5740.9	1008.9	5747.3	1008.9	5753.6	1008.9	5797.2	1008.9
5841.8	1008.9	5847.3	1008.9	5852.8	1008.9	5897.3	1009.1	5902.3	1009.1
5947.3	1009.5	5951.8	1009.5	5997.2	1009.7	6043.6	1009.8	6047.4	1009.8
6051.1	1009.9	6097.3	1010.3	6144.4	1010.5	6147.3	1010.5	6168.9	1010.4
6171.9	1010.4	6175.1	1010.5	6197.3	1010.9	6294.3	1010.3	6297.4	1010.3
6298.9	1010.3	6347.3	1010.9	6348.4	1010.8	6397.3	1011	6397.9	1011
6447.3	1011	6470.2	1011.2	6497.1	1011.4	6497.4	1011.4	6505.2	1011.4
6524.2	1011.4	6524.5	1011.4	6524.8	1011.4	6535.1	1011.4	6547.4	1011.4
6596.2	1011.4	6597.3	1011.4	6598.4	1011.4	6600	1011.4		

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5697.3	.09

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5000	5097.2	1011

CROSS SECTION OUTPUT Profile #PF#1

			Left OB	Channel	Right OB
W.S. Elev (ft)	1009.14	Element			
Vel Head (ft)	0.04	Wt. n-Val.		0.031	
E.G. Elev (ft)	1009.19	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1008.74	Flow Area (sq ft)		464.47	
E.G. Slope (ft/ft)	0.001943	Area (sq ft)		511.75	
Q Total (cfs)	780.00	Flow (cfs)		780.00	
Top Width (ft)	813.26	Top Width (ft)		813.26	
Vel Total (ft/s)	1.68	Avg. Vel. (ft/s)		1.68	
Max Chl Dpth (ft)	1.64	Hydr. Depth (ft)		0.62	
Conv. Total (cfs)	17696.5	Conv. (cfs)		17696.5	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		745.39	
Min Ch El (ft)	1007.50	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)		0.13	
Frctn Loss (ft)	0.42	Cum Volume (acre-ft)	3.85	495.07	
C & E Loss (ft)	0.01	Cum SA (acres)	8.21	368.69	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 4.423

INPUT
Description: RM 4.423
Station Elevation Data num= 84

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1009.6	5002.9	1008.9	5005.2	1008.9	5005.5	1009	5006.3	1009.1
5006.8	1009	5007.1	1008.9	5017.3	1007.2	5019.9	1006.9	5023.6	1006.8
5028.9	1006.7	5032.1	1006.6	5041.8	1006.9	5045.3	1007	5052.6	1006.9
5055.2	1007.3	5065.8	1007.8	5071.4	1008.2	5075.5	1008.5	5080.9	1008.7
5090.5	1009	5093.3	1009.2	5105.1	1009.8	5143.7	1008.2	5155.1	1007.8
5181.6	1007	5183.2	1006.9	5194.9	1006.7	5208.3	1006.7	5210.9	1006.6
5216.4	1006.7	5226.1	1006.6	5258.5	1006.9	5280.9	1007.1	5290.9	1007.1
5305.2	1007.3	5314.7	1007.4	5355.1	1007.7	5396.5	1007.6	5405.2	1007.6
5447.1	1008.1	5455.2	1008.1	5497.6	1008	5505.2	1008.1	5507.7	1008
5548.9	1008.1	5574.5	1007.8	5577.5	1007.7	5578.2	1007.7	5578.8	1007.7

5582.8	1007.8	5592.4	1007.8	5634.7	1008.1	5680.3	1008.3	5721.3	1008.6
5763.4	1008.7	5806.7	1008.9	5851.5	1008.9	5897.4	1009.1	5944.8	1009.2
5993.6	1009.5	6013.4	1009.5	6059.2	1009.2	6106.5	1009.8	6109.1	1009.7
6155.3	1010.1	6157.8	1010.1	6176.7	1009.9	6205.2	1010.2	6205.7	1010.3
6255.2	1011	6255.7	1011	6353.7	1010.4	6355.3	1010.4	6356.9	1010.4
6452.6	1010.5	6455.2	1010.5	6502	1010.8	6505.2	1010.8	6527.1	1010.7
6531.5	1010.6	6535.5	1010.7	6555.3	1011.4	6600	1011.3		

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5592.4	.09

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

CROSS SECTION OUTPUT *Profile #PF#1*

W.S. Elev (ft)	1008.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.031	
E.G. Elev (ft)	1008.76	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)		Flow Area (sq ft)		711.82	
E.G. Slope (ft/ft)	0.000465	Area (sq ft)		711.82	
Q Total (cfs)	780.00	Flow (cfs)		780.00	
Top Width (ft)	715.40	Top Width (ft)		715.40	
Vel Total (ft/s)	1.10	Avg. Vel. (ft/s)		1.10	
Max Chl Dpth (ft)	2.14	Hydr. Depth (ft)		1.00	
Conv. Total (cfs)	36161.0	Conv. (cfs)		36161.0	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		715.68	
Min Ch El (ft)	1006.60	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.03	
Frctn Loss (ft)	0.37	Cum Volume (acre-ft)	3.85	488.05	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	359.92	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 4.328

INPUT
Description: RM 4.328
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1008.95	5005.2	1008.2	5007.6	1008.2	5008.3	1008.2	5008.9	1008.1
5010.6	1008	5019	1006.4	5020	1006.2	5028.5	1006.1	5042.2	1006
5043.2	1006	5043.6	1006	5044.3	1005.9	5044.5	1006	5045.4	1006.3
5083.4	1007.9	5110.5	1008.1	5122.3	1007.8	5160.6	1006.9	5171.8	1007
5210.6	1007.7	5231.7	1007.7	5310.5	1007.2	5329.6	1007.3	5410.5	1007.6
5452.4	1007.3	5460.6	1007.2	5546.1	1007	5560.5	1007	5578.7	1007.2
5585	1007.3	5586.3	1007.3	5586.9	1007.3	5587.5	1007.4	5593.9	1007.4
5610.6	1007.6	5617.1	1007.6	5660.6	1007.5	5705.1	1008	5710.6	1008.1
5716	1008.1	5760.5	1008	5806.1	1007.8	5810.5	1007.8	5814.9	1007.8
5860.6	1008.3	5907.4	1008.5	5910.6	1008.5	5913.7	1008.5	5960.6	1008.4
5963.2	1008.4	6010.5	1008.4	6058.9	1009.2	6060.7	1009.2	6109.5	1009.7
6110.6	1009.7	6160	1009.7	6160.6	1009.7	6169.1	1009.6	6182.5	1009.4
6200	1009.5	6210.7	1009.7	6219.2	1009.7	6260.1	1010	6260.5	1010.1
6309.7	1009.6	6310.7	1009.6	6311.7	1009.6	6360.6	1010.1	6408.6	1010
6460.6	1010.1	6513.8	1010.3	6560.7	1010.5	6572	1010.2	6575.5	1010.2
6577.4	1010.2	6583.5	1010.2	6600	1010.2				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5617.1	.09

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev

5250	5460	1010

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5047	5103	1012

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1008.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.033	
E.G. Elev (ft)	1008.39	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1007.74	Flow Area (sq ft)		501.08	
E.G. Slope (ft/ft)	0.001327	Area (sq ft)		698.71	
Q Total (cfs)	780.00	Flow (cfs)		780.00	
Top Width (ft)	811.92	Top Width (ft)		811.92	
Vel Total (ft/s)	1.56	Avg. Vel. (ft/s)		1.56	
Max Chl Dpth (ft)	2.45	Hydr. Depth (ft)		0.83	
Conv. Total (cfs)	21408.6	Conv. (cfs)		21408.6	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		604.52	
Min Ch El (ft)	1005.90	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)		0.11	
Frctn Loss (ft)	0.88	Cum Volume (acre-ft)	3.85	479.95	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	351.15	

Warning - Divided flow computed for this cross-section.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 4.234

INPUT
Description: RM 4.234
Station Elevation Data num= 84

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1007.8	5005.2	1007.8	5008	1007.9	5009.4	1007.6	5010.1	1007.5
5010.8	1007	5011.5	1006.7	5012.7	1006.4	5013.2	1006.3	5014.8	1006.6
5110.9	1006.9	5116.5	1006.9	5118	1006.9	5122	1006.9	5165.8	1006
5177	1006.3	5216	1006.5	5255.6	1003.4	5265.9	1003.4	5285.9	1006.5
5306.1	1006.8	5416	1006.8	5432.4	1006.5	5433.7	1006.6	5437.9	1006.3
5439.3	1006.3	5443.3	1006.5	5448.7	1006.5	5451.6	1006.5	5461.5	1006.5
5466	1006.6	5551.6	1006.3	5565.9	1006.3	5572.8	1006.3	5615.9	1006.7
5660	1006.7	5666	1006.8	5671.8	1006.8	5715.9	1007	5761	1007.1
5765.9	1007.2	5770.7	1007.2	5815.9	1007.7	5816.4	1007.7	5830.4	1007.7
5864.9	1007.7	5866	1007.7	5869.8	1007.7	5916	1007.8	5963.2	1007.6
5965.9	1007.5	5968.6	1007.6	6015.9	1007.8	6018.1	1007.8	6065.9	1008.2
6114.9	1008.4	6116	1008.4	6117.1	1008.4	6166	1008.8	6177.5	1008.8
6180.3	1008.8	6184.8	1008.8	6192	1008.8	6196.6	1008.9	6215.9	1008.9
6218.5	1008.9	6265.4	1008.9	6265.9	1008.9	6266.4	1008.9	6316	1008.5
6317.1	1008.5	6366	1008.6	6367.6	1008.6	6416	1008.9	6418.1	1008.9
6512.7	1009.8	6515.9	1009.9	6516.5	1009.8	6523.4	1009.7	6541	1009.6
6558.2	1009.4	6565.3	1009.5	6566	1009.6	6600	1009.6		

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5461.5	.09

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Blocked Obstructions num= 4

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
5050	5100	1008	5122	5216	1006.5	5216	5285.9	1006.5
5312	5412	1008						

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1007.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.043	
E.G. Elev (ft)	1007.51	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)		Flow Area (sq ft)		516.53	
E.G. Slope (ft/ft)	0.002544	Area (sq ft)		516.53	
Q Total (cfs)	780.00	Flow (cfs)		780.00	
Top Width (ft)	634.96	Top Width (ft)		634.96	

Vel Total (ft/s)	1.51	Avg. Vel. (ft/s)			1.51
Max Chl Dpth (ft)	1.17	Hydr. Depth (ft)			0.81
Conv. Total (cfs)	15464.6	Conv. (cfs)			15464.6
Length Wtd. (ft)	500.00	Wetted Per. (ft)			637.99
Min Ch El (ft)	1006.30	Shear (lb/sq ft)			0.13
Alpha	1.00	Stream Power (lb/ft s)			0.19
Frctn Loss (ft)	0.76	Cum Volume (acre-ft)		3.85	472.98
C & E Loss (ft)	0.00	Cum SA (acres)		8.21	342.85

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 4.139

INPUT
Description: RM 4.139
Station Elevation Data num= 83

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1007.2	5007.9	1007.4	5014.8	1005.5	5015.8	1005.3	5016.1	1005.3
5017.7	1005.4	5038.1	1005.6	5071.3	1006	5083.4	1006.1	5121.2	1006.3
5132.9	1006.1	5171.4	1005	5210.5	1005.8	5221.3	1006	5231.9	1005.8
5311.5	1005.3	5352.7	1005.2	5362	1005.2	5371.2	1005.3	5383.3	1005.5
5400.3	1005.7	5418.9	1006	5420.1	1005.9	5423.6	1005.6	5425.1	1005.2
5425.9	1005.2	5426.9	1005.1	5430.6	1005.2	5436.3	1005.3	5436.8	1005.3
5441.9	1005.5	5449.4	1005.8	5458.6	1005.7	5462.7	1005.7	5471.3	1005.7
5557.1	1005.9	5571.3	1005.9	5578.1	1005.9	5621.4	1005.9	5665.4	1006
5671.3	1006.1	5715.9	1006.1	5721.3	1006.1	5726.6	1006.1	5771.3	1006.6
5817	1007	5821.3	1007	5822	1007	5826.9	1007.1	5835.7	1007.1
5857.2	1007.1	5869.8	1007.1	5871.4	1007.1	5875.1	1007.1	5968.6	1006.9
5971.3	1006.9	5973.9	1007	6021.3	1007.3	6069.8	1007.4	6071.4	1007.4
6073	1007.4	6170.8	1007.8	6171.3	1007.8	6179.6	1007.6	6182.6	1007.4
6189.3	1007.3	6200.5	1007.6	6205.9	1007.7	6221.3	1007.9	6319.2	1007.5
6321.4	1007.5	6369.7	1007.9	6371.4	1008	6373	1008	6421.3	1008.1
6515	1008.8	6521.4	1008.8	6527.6	1008.5	6545.8	1008.6	6564.6	1008.8
6571.4	1008.6	6575.2	1008.6	6600	1009.1				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5462.7	.09

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5275	5330	1008

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1006.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.037	
E.G. Elev (ft)	1006.74	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)		Flow Area (sq ft)		651.67	
E.G. Slope (ft/ft)	0.001004	Area (sq ft)		651.67	
Q Total (cfs)	780.00	Flow (cfs)		780.00	
Top Width (ft)	719.90	Top Width (ft)		719.90	
Vel Total (ft/s)	1.20	Avg. Vel. (ft/s)		1.20	
Max Chl Dpth (ft)	1.72	Hydr. Depth (ft)		0.91	
Conv. Total (cfs)	24613.6	Conv. (cfs)		24613.6	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		722.88	
Min Ch El (ft)	1005.00	Shear (lb/sq ft)		0.06	
Alpha	1.00	Stream Power (lb/ft s)		0.07	
Frctn Loss (ft)	0.71	Cum Volume (acre-ft)	3.85	466.27	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	335.07	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less

than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 4.044

INPUT
Description: RM 4.044
Station Elevation Data num= 84

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1006.7	5024.8	1006.1	5027	1006.1	5042.5	1005.6	5045.1	1005.5
5054.8	1010.6	5061.4	1014	5069.8	1014.1	5076.2	1014.1	5089.5	1014.2
5089.9	1014.1	5090.7	1014.1	5100	1008.3	5102.5	1006.8	5105	1005.2
5113.5	1005.5	5118.3	1005.6	5127	1005.7	5165.8	1006.1	5176.9	1006.2
5197.1	1006.2	5225.4	1006.2	5226.2	1006.2	5234.3	1004.8	5235.2	1004.5
5236.7	1004.5	5241.7	1004.7	5252.5	1005.5	5266	1005.3	5274.1	1005.2
5277	1005.2	5317.6	1004.5	5327	1004.3	5368.1	1004.6	5377	1004.6
5385.6	1004.6	5427.1	1004.5	5469.4	1004.8	5477.1	1004.8	5519.9	1004.8
5527	1004.8	5534	1004.9	5577	1005	5621	1005.2	5627	1005.2
5671.7	1005.2	5677.1	1005.2	5682.3	1005.3	5727.1	1005.6	5731.7	1005.6
5777	1006.2	5781.1	1006.1	5827	1006	5874.1	1005.9	5877.1	1005.9
5924.7	1006.2	5927.1	1006.2	5929.5	1006.2	5977.1	1006.3	5978.9	1006.3
6027	1005.9	6076.3	1006.2	6077	1006.2	6127.1	1006.6	6127.2	1006.6
6136.5	1006.6	6177.1	1006.4	6177.6	1006.4	6227.1	1006.7	6275.4	1006.8
6277	1006.8	6325	1006.9	6327.2	1006.9	6329.4	1006.9	6377.1	1007
6379.9	1007	6427.1	1007.3	6473.2	1006.8	6477.1	1006.8	6481	1006.8
6527	1007	6531.6	1007.2	6577.2	1008.6	6600	1008.4		

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5252.5	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5054.8	1010	5540	6600	1010

CROSS SECTION OUTPUT Profile #PF#1

			Left OB	Channel	Right OB
W.S. Elev (ft)	1005.97	Element			
Vel Head (ft)	0.06	Wt. n-Val.		0.039	
E.G. Elev (ft)	1006.03	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1005.30	Flow Area (sq ft)		395.24	
E.G. Slope (ft/ft)	0.002221	Area (sq ft)		552.94	
Q Total (cfs)	780.00	Flow (cfs)		780.00	
Top Width (ft)	659.56	Top Width (ft)		659.56	
Vel Total (ft/s)	1.97	Avg. Vel. (ft/s)		1.97	
Max Chl Dpth (ft)	1.67	Hydr. Depth (ft)		1.09	
Conv. Total (cfs)	16551.2	Conv. (cfs)		16551.2	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		361.93	
Min Ch El (ft)	1004.30	Shear (lb/sq ft)		0.15	
Alpha	1.00	Stream Power (lb/ft s)		0.30	
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	3.85	459.36	
C & E Loss (ft)	0.01	Cum SA (acres)	8.21	327.16	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 3.949

INPUT
Description: RM 3.949
Station Elevation Data num= 96

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1006.1	5020.5	1005	5033	1004.4	5070.7	1005.5	5092	1005.5
5094.8	1005.5	5096.2	1005.7	5108.5	1006.1	5110.5	1006.1	5110.6	1006.1

5116.6	1006.5	5127	1007.2	5129.2	1007.4	5138.4	1007.3	5142.4	1007.1
5146.8	1005.8	5152.8	1004.3	5157.6	1004.8	5161	1005.2	5166.3	1005.2
5183.1	1005.3	5207.6	1005.1	5233.7	1004.8	5234.2	1004.8	5240.2	1003.8
5240.7	1003.7	5251.5	1004.4	5253 5	1004.5	5254.7	1004.6	5255.4	1004.6
5255.8	1004.7	5256.4	1004.7	5256.9	1004.7	5257.7	1004.7	5258.1	1004.7
5259.6	1004.7	5283	1004.4	5292.6	1004.2	5333	1003.6	5374.4	1003.6
5383	1003.6	5391.4	1003.7	5432.9	1003.6	5475.7	1004	5483.1	1004
5490.3	1004	5533	1004.2	5576.9	1004.1	5583	1004.1	5627.7	1004.4
5633.1	1004.4	5678.3	1004.5	5683.1	1004.6	5728.9	1004.8	5733.1	1004.8
5779.5	1004.8	5783	1004.8	5786.5	1004.8	5833	1004.8	5835.8	1004.8
5883.1	1004.9	5931.4	1005.1	5933.1	1005.1	5934.7	1005.1	5983.1	1005.2
5984.2	1005.2	6033	1005.3	6078.9	1005.6	6083.2	1005.6	6132.5	1005.6
6133.1	1005.6	6181.8	1005.8	6183.1	1005.8	6184.4	1005.8	6233.1	1006
6280.6	1006.5	6283	1006.5	6315.9	1007.4	6333	1008.1	6335.1	1008.3
6337.2	1008.8	6338.2	1008.8	6338.6	1008.9	6339.8	1009	6341.2	1009.2
6342.1	1009.2	6383.1	1006.8	6386.9	1006.8	6433.1	1006.5	6437.5	1006.5
6483.1	1006.5	6488.1	1006.5	6533.2	1006.3	6555.2	1006.4	6583.2	1006.4
6600	1006.4								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5251.5	.04	6133.1	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5110	1008	5900	6600	1008

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1005.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.040	
E.G. Elev (ft)	1005.32	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1004.48	Flow Area (sq ft)		690.09	
E.G. Slope (ft/ft)	0.000954	Area (sq ft)		730.84	
Q Total (cfs)	780.00	Flow (cfs)		780.00	
Top Width (ft)	931.91	Top Width (ft)		931.91	
Vel Total (ft/s)	1.13	Avg. Vel. (ft/s)		1.13	
Max Chl Dpth (ft)	1.70	Hydr. Depth (ft)		0.92	
Conv. Total (cfs)	25246.9	Conv. (cfs)		25246.9	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		751.09	
Min Ch El (ft)	1003.60	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.06	
Frctn Loss (ft)	1.25	Cum Volume (acre-ft)	3.85	451.99	
C & E Loss (ft)	0.02	Cum SA (acres)	8.21	318.02	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 3.855

INPUT
Description: RM 3.855
Station Elevation Data num= 93

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1004.6	5002.4	1004.6	5039.2	1003.9	5076.8	1004.8	5101.2	1005.2
5110.3	1003.2	5114.2	1002.9	5125.8	1001.8	5136.5	1000.9	5140.6	1000.6
5186	997.1	5196.4	997.1	5209.5	997.1	5215.7	997.1	5218.2	997.8
5232.3	1004.6	5234.6	1003.8	5238.1	1002.6	5239.2	1003.1	5240.5	1003.1
5245.1	1003.6	5258	1003.5	5280.4	1002.6	5287.3	1002.6	5289.2	1002.6
5290.4	1002.5	5296.4	1002.2	5307.4	1002.9	5310.3	1003	5312.9	1003
5314.7	1003.1	5317.4	1003.2	5319.4	1003.3	5319.8	1003.3	5320.3	1003.3
5320.6	1003.3	5321	1003.4	5323.1	1003.4	5337.8	1003.5	5350.1	1003.5
5357.7	1003.5	5431.3	1003.4	5439.2	1003.5	5447	1003.4	5489.2	1003.3

5499.9	1003.3	5508.4	1003.3	5539.2	1003	5583.1	1003.5	5595.1	1003.6
5639.1	1003.4	5684.4	1003.8	5689.2	1003.8	5698.5	1003.8	5743.3	1003.8
5789.2	1003.8	5836.2	1003.9	5839.1	1003.9	5886.9	1003.9	5889.3	1004
5891.5	1003.9	5939.2	1004.2	5940.9	1004.2	5989.2	1004.3	5990.3	1004.3
6039.2	1004.2	6079	1004.6	6089	1004.7	6089.1	1004.7	6138.5	1004.6
6139.3	1004.6	6140	1004.6	6189.2	1004.9	6190.6	1004.9	6239.2	1005.1
6259.4	1005.3	6289.9	1005.7	6290.7	1005.6	6292.1	1005.6	6293.3	1005.6
6314.4	1005.4	6339.3	1005.2	6342.5	1005.2	6389.3	1005.1	6434.9	1005.1
6439.2	1005.2	6484.2	1005	6489.2	1005	6494.3	1005	6539.2	1005.3
6544.9	1005.3	6589.3	1005.2	6600	1005.2				

Manning's n Values num= 1

Sta	n Val
5000	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5000	5050	1006

Blocked Obstructions num= 3

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
5050	5155	1006	5155	5232.3	1004.6	5562	5620	1006

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1003.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.		0.035	
E.G. Elev (ft)	1004.05	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1003.83	Flow Area (sq ft)		233.85	
E.G. Slope (ft/ft)	0.018625	Area (sq ft)		233.85	
Q Total (cfs)	780.00	Flow (cfs)		780.00	
Top Width (ft)	533.93	Top Width (ft)		533.93	
Vel Total (ft/s)	3.34	Avg. Vel. (ft/s)		3.34	
Max Chl Dpth (ft)	1.68	Hydr. Depth (ft)		0.44	
Conv. Total (cfs)	5715.5	Conv. (cfs)		5715.5	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		535.37	
Min Ch El (ft)	1002.20	Shear (lb/sq ft)		0.51	
Alpha	1.00	Stream Power (lb/ft s)		1.69	
Frctn Loss (ft)	0.77	Cum Volume (acre-ft)	3.85	446.45	
C & E Loss (ft)	0.05	Cum SA (acres)	8.21	309.61	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 3.760

INPUT
Description: RM 3.760
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1003.5	5016.1	1003.4	5026.4	1003.3	5045.4	1003.1	5057.8	1003.2
5095.4	1003.2	5107.1	1003.1	5145.3	1003	5184.7	1002.8	5195.5	1002.6
5205.8	1002.4	5222.5	1001.8	5233.6	1001.9	5235.6	1001.9	5237.9	1001.9
5238.7	1001.9	5239.1	1002	5239.6	1002.1	5245.4	1002.9	5248.2	1002.9
5260.1	1003	5287.7	1001.8	5295.4	1001.6	5304.5	1001.6	5345.4	1001.5
5387.4	1001.8	5395.3	1001.8	5403.1	1001.7	5445.3	1002.1	5488.8	1001.5
5495.4	1001.5	5501.8	1001.5	5545.4	1002.3	5590.2	1002.3	5595.4	1002.3
5600.4	1002.4	5645.5	1002.4	5691.6	1002.4	5695.5	1002.3	5742.3	1002.4
5745.4	1002.4	5793	1002.4	5795.4	1002.4	5797.8	1002.4	5845.4	1002.5
5894.3	1002.6	5895.3	1002.6	5945.1	1002.6	5945.5	1002.6	5945.8	1002.6
5972.8	1002.6	5995.4	1002.6	6044.4	1003.3	6045.4	1003.3	6046.4	1003.3
6095.5	1003.3	6097.2	1003.3	6145.5	1003.7	6192.5	1003.9	6195.5	1003.9
6241.8	1004.1	6245.4	1004.1	6261.9	1004.5	6293.4	1004.9	6294.8	1004.2
6295.4	1004	6297.1	1004	6335.3	1003.6	6341.7	1004	6345	1004
6345.5	1004	6350.7	1003.9	6395.5	1003.5	6439.1	1004.3	6445.5	1004.4
6488.4	1004.6	6509.5	1004.5	6600	1004.7				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5304.5	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5000	5032	1004

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1003.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.034	
E.G. Elev (ft)	1003.24	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1002.44	Flow Area (sq ft)		851.03	
E.G. Slope (ft/ft)	0.000523	Area (sq ft)		851.03	
Q Total (cfs)	780.00	Flow (cfs)		780.00	
Top Width (ft)	1005.14	Top Width (ft)		1005.14	
Vel Total (ft/s)	0.92	Avg. Vel. (ft/s)		0.92	
Max Chl Dpth (ft)	1.72	Hydr. Depth (ft)		0.85	
Conv. Total (cfs)	34093.6	Conv. (cfs)		34093.6	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		1005.29	
Min Ch El (ft)	1001.50	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.03	
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	3.85	440.23	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	300.78	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 3.665

INPUT
Description: RM 3.665. Begin DIOD2-360 CFS Diversion to south, first three points are from survey (were 1002.2)

Station Elevation Data num= 80

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1002.9	5001.9	1002.9	5015	1002.9	5051.8	1001.6	5089.3	1001.6
5101.8	1001.5	5114.1	1001.4	5151.8	1001.2	5163.6	1001.3	5201.7	1001.5
5208.3	1001.5	5227.1	1001.4	5229	1001.4	5233.7	1001.5	5242.9	1001.4
5250.9	1002.2	5251.9	1002.3	5255.2	1002.1	5257	1002.1	5258	1002
5261.7	1002.1	5274.4	1001.5	5278.7	1001.4	5286.9	1001.2	5301.8	1000.8
5312.4	1000.8	5351.8	1000.4	5361.9	1000.4	5401.8	1000.5	5442.5	1000.6
5451.9	1000.6	5461.1	1000.7	5501.9	1000.8	5543.3	1001	5551.8	1001
5560.2	1001	5601.8	1001.2	5644.1	1000.8	5651.8	1000.8	5659.3	1000.9
5701.9	1001.1	5745.1	1001.3	5751.8	1001.4	5795.5	1001.7	5801.8	1001.7
5808	1001.7	5851.8	1001.8	5896.4	1001.6	5901.9	1001.6	5907.3	1001.6
5951.9	1001.8	5956.8	1001.8	6001.8	1002.1	6047.7	1002.3	6051.8	1002.3
6055.9	1002.3	6101.8	1002.2	6105.4	1002.3	6151.9	1002.5	6199	1003.2
6201.9	1003.2	6204.6	1003.2	6251.8	1002.8	6254	1002.9	6276	1003.5
6297	1003.9	6299.4	1003.8	6301.6	1003.5	6301.8	1003.5	6302.4	1003.5
6340.5	1003.1	6351.8	1003.4	6351.9	1003.4	6353.4	1003.4	6401.9	1003.3
6402.9	1003.3	6451.9	1004.2	6493.3	1004.4	6523.2	1004.4	6600	1004.6

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5301.8	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	437.16	437.16	437.16	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1003.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.034	
E.G. Elev (ft)	1003.18	Reach Len. (ft)	437.16	437.16	437.16
Crit W.S. (ft)		Flow Area (sq ft)		2047.47	

E.G. Slope (ft/ft)	0.000039	Area (sq ft)			2047.47
Q Total (cfs)	780.00	Flow (cfs)			780.00
Top Width (ft)	1265.98	Top Width (ft)			1265.98
Vel Total (ft/s)	0.38	Avg. Vel. (ft/s)			0.38
Max Chl Dpth (ft)	2.78	Hydr. Depth (ft)			1.62
Conv. Total (cfs)	124204.2	Conv. (cfs)			124204.2
Length Wtd. (ft)	437.16	Wetted Per. (ft)			1266.40
Min Ch El (ft)	1000.40	Shear (lb/sq ft)			0.00
Alpha	1.00	Stream Power (lb/ft s)			0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		3.85	423.59
C & E Loss (ft)	0.00	Cum SA (acres)		8.21	287.74

Warning - Divided flow computed for this cross-section.
Warning - The cross-section end points had to be extended vertically for the computed water surface.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 3.583

INPUT
Description: RM 3.583, CPOG2-850 CFS, End DIOD2-360 CFS To South
Station Elevation Data num= 61

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1002.5	5001.8	1001.9	5005.5	1001.7	5054.3	1001.2	5105.6	1000.5
5130.6	1000.6	5155.6	1000.8	5173	1001.7	5190.4	1001.9	5196.2	1001.9
5200.8	1001.9	5208.6	1001.7	5211	1001.6	5221	1001.8	5231.7	1001.8
5253.4	1001.1	5254.5	1001.2	5271.2	1000.6	5280.5	1000.3	5301.3	999.5
5310.5	999.5	5329.1	999.7	5348	999.9	5371.2	999.4	5390.2	999.4
5446.5	999.8	5465.9	999.8	5484.8	999.9	5503.3	999.9	5521.5	1000
5676.4	1000.4	5694.1	1000.4	5711.4	1000.5	5728.4	1000.6	5745	1000.5
5761.4	1000.6	5938.4	1001	5954.8	1001.1	5970.9	1001.1	5986.7	1001.2
6002.3	1001.2	6017.6	1001.3	6176	1001.6	6190.4	1001.7	6204.5	1001.7
6218.3	1001.8	6264.4	1002	6278.4	1002.3	6290.6	1002.6	6295.7	1002.8
6296.5	1002.8	6298.1	1002.9	6302.1	1003	6328.9	1002.9	6352.8	1002.8
6353.4	1002.8	6362.1	1002.8	6366.7	1003.2	6377.1	1003.2	6387.3	1003.3
6600	1004								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5105.6	.04	5301.3	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	75.84	75.84	75.84	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5030	5090	1004

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1003.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.035	
E.G. Elev (ft)	1003.17	Reach Len. (ft)	75.84	75.84	75.84
Crit W.S. (ft)		Flow Area (sq ft)		2970.52	
E.G. Slope (ft/ft)	0.000016	Area (sq ft)		2970.52	
Q Total (cfs)	850.00	Flow (cfs)		850.00	
Top Width (ft)	1306.37	Top Width (ft)		1306.37	
Vel Total (ft/s)	0.29	Avg. Vel. (ft/s)		0.29	
Max Chl Dpth (ft)	3.77	Hydr. Depth (ft)		2.27	
Conv. Total (cfs)	215224.4	Conv. (cfs)		215224.4	
Length Wtd. (ft)	75.84	Wetted Per. (ft)		1311.46	
Min Ch El (ft)	999.40	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	3.85	398.41	
C & E Loss (ft)	0.01	Cum SA (acres)	8.21	274.83	

Warning - Divided flow computed for this cross-section.
Warning - The cross-section end points had to be extended vertically for the computed water surface.

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 3.568

INPUT
Description: RM 3.568, 99th Ave., WSE=1003.00 per JEF, Inc. Weir Analysis.
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1001.9	5021.1	1002	5052.4	1002.1	5054.8	1001.9	5078.8	1002.2
5136.6	1002.2	5174.4	1002.6	5206.9	1002.2	5208.1	1002	5235	1002.4
5259.6	1002.4	5281.3	1002.3	5305.1	1002.3	5479.8	1002.5	5578.8	1002.7
5582.1	1002.7	5589.6	1002.7	6070.6	1004.1	6088.9	1004.1	6284.6	1004.8
6310.8	1004.9	6429.1	1005	6451.5	1005	6492.7	1005	6533.1	1005.1
6575.3	1005.2	6600	1005.2						

Manning's n Values num= 1

Sta	n Val
5000	.015

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
5000 6600 177 177 177 .1 .3
Ineffective Flow num= 1

Sta L	Sta R	Elev
5038	5083	1004

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1003.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.015	
E.G. Elev (ft)	1003.16	Reach Len. (ft)	177.00	177.00	177.00
Crit W.S. (ft)		Flow Area (sq ft)		421.37	
E.G. Slope (ft/ft)	0.000790	Area (sq ft)		467.72	
Q Total (cfs)	850.00	Flow (cfs)		850.00	
Top Width (ft)	727.02	Top Width (ft)		727.02	
Vel Total (ft/s)	2.02	Avg. Vel. (ft/s)		2.02	
Max Chl Dpth (ft)	1.20	Hydr. Depth (ft)		0.62	
Conv. Total (cfs)	30243.2	Conv. (cfs)		30243.2	
Length Wtd. (ft)		Wetted Per. (ft)		683.25	
Min Ch El (ft)	1001.90	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.06	
Frctn Loss (ft)		Cum Volume (acre-ft)	3.85	395.42	
C & E Loss (ft)		Cum SA (acres)	8.21	273.06	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 3.535

INPUT
Description: RM 3.535
Station Elevation Data num= 136

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1001.3	5002.6	1001.3	5004.7	1000.9	5006	1000.3	5007.6	999.6
5008.3	999.3	5017.5	999.1	5033.6	998.7	5041.9	998.4	5043.6	998.1
5071.6	994.6	5088.6	992.4	5105.1	990.3	5108.1	990.3	5112.4	990.2
5144.6	989.9	5167.4	990	5190	989.9	5207.1	990	5230.2	989.7
5242.1	989.8	5246	989.8	5249.1	990.1	5258.2	990	5260.9	990.2
5261.6	990.4	5266.1	992.1	5274	995.6	5290.9	996.5	5295.3	996.8
5299.6	997	5305	997.3	5309.1	997.3	5315.6	997.3	5337.6	997.6
5363.2	997.7	5390.6	998.4	5416.4	998.2	5442.1	998.6	5465.6	998.7
5492.2	999.2	5514.8	999.6	5526.9	999.5	5537.4	999.6	5541	999.7

5544.4	999.8	5554.5	1000	5564.2	1000	5568.3	1000	5580.8	1000
5593.2	999.9	5617.4	999.7	5630.1	999.6	5645.2	999.4	5660.7	999.3
5664.9	999.2	5675.6	999.3	5700.5	999.3	5727.5	999.2	5749.1	998.8
5760.6	998.6	5766.7	998.8	5775.2	998.6	5782.5	998.3	5793.4	998.1
5795.4	998	5796.3	998	5799	997.7	5800.3	997.2	5814.3	997.8
5830.3	998.5	5833	998.5	5856.9	998.6	5864.1	998.6	5873.1	998.9
5936.3	999.1	5953.2	999.2	5956.2	1000.2	5967.5	999.6	5978.1	999.7
5994.5	999.5	6013.3	999.4	6047.8	999.6	6050.9	999.6	6089.1	1000
6090.2	1000	6112.5	1000.3	6132.6	1000.4	6150.2	1000.5	6161	1000.6
6190.3	1000.9	6203.9	1001.1	6211.6	1001.2	6242.3	1001.3	6250.1	1001.4
6254.4	1001.4	6256.1	1001.6	6269.9	1002.1	6306.1	1002.5	6322.7	1003.2
6336.4	1003.4	6345.1	1003.8	6352.2	1003.9	6357.5	1004.3	6359.3	1004.2
6360.9	1004.1	6380.7	1004.3	6391.6	1005.9	6392.7	1005.9	6396.2	1005.4
6401.7	1004.7	6406.2	1004	6408.9	1003.8	6411.7	1003.4	6415	1003.3
6420.6	1003.2	6423.6	1002.6	6427.8	1002	6434.1	1003.1	6434.2	1003.1
6434.5	1003.1	6444	1003	6444.8	1002.9	6446.5	1002.5	6450.4	1003
6450.6	1003.1	6451.7	1003.1	6456.1	1003	6457.5	1002.9	6466	1002.6
6501	1002.4	6506.1	1002.4	6518.1	1002.5	6556.2	1002.8	6594.7	1003
6600	1003.1								

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	6466	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	310	310	310	.1	.3

Right Levee Station= 5564.2 Elevation= 1000

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	998.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.030	
E.G. Elev (ft)	998.95	Reach Len. (ft)	310.00	310.00	310.00
Crit W.S. (ft)	990.93	Flow Area (sq ft)		2000.93	
E.G. Slope (ft/ft)	0.000010	Area (sq ft)		2000.93	
Q Total (cfs)	850.00	Flow (cfs)		850.00	
Top Width (ft)	454.75	Top Width (ft)		454.75	
Vel Total (ft/s)	0.42	Avg. Vel. (ft/s)		0.42	
Max Chl Dpth (ft)	9.24	Hydr. Depth (ft)		4.40	
Conv. Total (cfs)	265460.8	Conv. (cfs)		265460.8	
Length Wtd. (ft)	310.00	Wetted Per. (ft)		456.45	
Min Ch El (ft)	989.70	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	3.85	390.40	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	270.66	

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 3.476

INPUT
Description: RM 3.476
Station Elevation Data num= 107

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1000.2	5000.4	1000.2	5010	1000.2	5014.8	998.9	5015.5	998.7
5015.6	998.7	5016.1	998.7	5023	998.1	5047.3	997.2	5062.3	995.5
5064.5	995.2	5065.8	995.4	5078	993.7	5103.5	989.5	5113	989.7
5116.2	989.8	5138.7	990	5166.4	990	5192	989.9	5216.4	989.8
5231.7	989.6	5248.6	989.3	5258.9	991.3	5276.6	993.9	5281.6	994.5
5285.3	994.9	5309.7	996.7	5314.5	997.1	5314.6	997.1	5318.7	997.2
5366.6	998.1	5379.6	998.5	5416.8	1000	5458.9	1000.4	5466.9	1000.5
5474.1	1000.6	5516.9	1001.8	5517.2	1001.8	5520.4	1001.2	5541.4	1001
5542.6	1001	5544.1	1001	5567.1	1001.8	5572.5	1001.7	5590.5	1001.5
5817.6	998.6	5832.4	998.6	5867.6	998.4	5913.3	998.2	5924.3	998.3
5925.8	998.1	5927	998.2	5937.1	999.3	5947.3	999.6	5967.8	1000
5992.5	1000.2	6017.9	1000.5	6040.5	1000.7	6068	1000.9	6087.7	1001.1
6118.2	1001.9	6134.9	1002	6168.2	1001.7	6182.1	1001.8	6218.3	1002.1
6229.3	1002.2	6268.5	1002.3	6276.5	1002.4	6318.5	1002.6	6363.8	1002
6364.2	1001.9	6368.6	1002.2	6375.7	1002.7	6379.3	1002.9	6386.3	1003.1
6392.8	1002.9	6399.4	1003.6	6401.1	1004	6406	1004.4	6406.7	1004.4
6408.1	1004.3	6418.7	1002.7	6421.3	1002.4	6421.5	1002.3	6422.5	1002.3

6433.6	1002.3	6435.4	1001.8	6437.1	1001.4	6443.9	1002.2	6445.2	1002.4
6447.5	1002.6	6453.2	1002.9	6455.7	1003.1	6456.2	1002.9	6458	1002.2
6460.4	1002.7	6462.3	1003	6467.5	1002.5	6468.7	1002.4	6472.7	1002.4
6514	1002.8	6541	1002.8	6560	1002.8	6574.1	1002.9	6584.9	1002.9
6593.6	1003	6600	1003.2						

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	6447.5	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	400	400	400	.1	.3

Right Levee Station= 5516.9 Elevation= 1001.8

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5580	5780	1003

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	998.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.030	
E.G. Elev (ft)	998.94	Reach Len. (ft)	400.00	400.00	400.00
Crit W.S. (ft)	990.80	Flow Area (sq ft)		2057.78	
E.G. Slope (ft/ft)	0.000007	Area (sq ft)		2057.78	
Q Total (cfs)	850.00	Flow (cfs)		850.00	
Top Width (ft)	375.89	Top Width (ft)		375.89	
Vel Total (ft/s)	0.41	Avg. Vel. (ft/s)		0.41	
Max Chl Dpth (ft)	9.64	Hydr. Depth (ft)		5.47	
Conv. Total (cfs)	315907.2	Conv. (cfs)		315907.2	
Length Wtd. (ft)	400.00	Wetted Per. (ft)		377.11	
Min Ch El (ft)	989.30	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	3.85	375.96	
C & E Loss (ft)	0.03	Cum SA (acres)	8.21	267.71	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 3.411

INPUT
Description: RM 3.411
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	999.9	5015	998	5038	997.5	5060	998	5122	998.3
5170	998	5237	997.5	5277	998	5390	999.6	5391	1001

Manning's n Values num= 1

Sta	n Val
5000	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	5391	655	575	480	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	998.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.31	Wt. n-Val.		0.035	
E.G. Elev (ft)	998.90	Reach Len. (ft)	655.00	575.00	480.00
Crit W.S. (ft)	998.59	Flow Area (sq ft)		189.92	
E.G. Slope (ft/ft)	0.021212	Area (sq ft)		189.92	
Q Total (cfs)	850.00	Flow (cfs)		850.00	
Top Width (ft)	308.37	Top Width (ft)		308.37	
Vel Total (ft/s)	4.48	Avg. Vel. (ft/s)		4.48	
Max Chl Dpth (ft)	1.09	Hydr. Depth (ft)		0.62	
Conv. Total (cfs)	5836.1	Conv. (cfs)		5836.1	
Length Wtd. (ft)	575.00	Wetted Per. (ft)		308.43	
Min Ch El (ft)	997.50	Shear (lb/sq ft)		0.82	

Alpha	1.00	Stream Power (lb/ft s)		3.65
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)	3.85	365.64
C & E Loss (ft)	0.08	Cum SA (acres)	8.21	264.56

Warning - The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 3.287

INPUT
Description: RM 3.287
Station Elevation Data num= 87

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	999.7	5004.5	999.8	5006.5	999.9	5019	997.5	5023.9	996.6
5024.4	996.6	5060.3	995.6	5062.5	995.5	5063.6	995.3	5065.4	995.1
5084	992.6	5085.1	992.4	5089.5	991.5	5096.5	990	5103.2	989.9
5115.7	989.8	5126.7	992.2	5127.7	992.5	5127.8	992.5	5128.7	992.6
5147.1	995	5171.6	997.6	5179.8	998.3	5184.8	998.6	5186.9	998.8
5190.7	998.8	5206.6	998.9	5223.3	999.2	5227	999.3	5301.7	999.2
5827.7	998.3	5853.8	998.4	5877.7	998.6	5899.6	998.3	5927.8	998.2
5958.9	998.5	5978	998.7	5995.3	998.9	6027.9	999.1	6063.9	999.5
6078	999.6	6116.5	998.8	6128.1	998.7	6168.9	999.2	6178.1	999.3
6189.9	999.4	6228.9	999.8	6232.9	999.9	6235.5	999.9	6240	999.9
6276.1	1000.3	6278.3	1000.4	6282.1	1000.4	6328.2	1000.8	6329.8	1000.8
6363.5	1001	6377.7	1001.1	6378.3	1001.1	6392.3	1001.6	6400.8	1001.8
6408.4	1002.5	6414.3	1002.6	6425.3	1001.7	6427.9	1001.4	6428.4	1002
6431.2	1001.8	6432.2	1001.3	6436.6	1001.3	6437.4	1001	6442.7	999.4
6447.4	1000.6	6448.9	1001	6452.8	1001.2	6464	1001.7	6466.8	1000.6
6468.3	1000	6471.2	1000.9	6471.6	1001	6472.3	1000.9	6478.4	1000.9
6480.1	1000.9	6495	1001.1	6508.1	1000.9	6519.9	1001	6530.5	1001.3
6540	1001.2	6548.7	1001.5						

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	6464	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
5000 6548.7 500 500 500 .1 .3
Right Levee Station= 5227 Elevation= 999.3
Blocked Obstructions num= 1

Sta L	Sta R	Elev
5245	5790	1003

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	997.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.030	
E.G. Elev (ft)	997.68	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	992.97	Flow Area (sq ft)		556.66	
E.G. Slope (ft/ft)	0.000173	Area (sq ft)		556.66	
Q Total (cfs)	850.00	Flow (cfs)		850.00	
Top Width (ft)	153.93	Top Width (ft)		153.93	
Vel Total (ft/s)	1.53	Avg. Vel. (ft/s)		1.53	
Max Chl Dpth (ft)	7.85	Hydr. Depth (ft)		3.62	
Conv. Total (cfs)	64628.4	Conv. (cfs)		64628.4	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		155.11	
Min Ch El (ft)	989.80	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.06	

Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	3.85	360.71
C & E Loss (ft)	0.01	Cum SA (acres)	8.21	261.51

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 3.192

INPUT
Description: RM 3.192
Station Elevation Data num= 105

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	999.4	5004.6	999.7	5006.1	999.8	5009.8	999	5023.7	996
5025.7	995.6	5057.2	995.3	5063.9	995.2	5067	995	5069	994.8
5086.8	992.4	5096.2	990.6	5099.7	989.8	5106.9	989.8	5120	989.8
5148	989.8	5172.7	989.9	5201.3	989.8	5207.2	989.8	5218.4	992
5222.6	992.8	5223.3	992.9	5225.3	993.4	5229.8	993.8	5240.4	994.7
5248.7	995.6	5260.3	996.3	5280.5	998.1	5285	998.2	5312.5	998.4
5315.9	998.5	5317.1	998.4	5329.6	998.6	5337.3	998.8	5379.6	998.9
5384.9	998.9	5390.8	999	5424.8	999.2	5436.1	999	5464.4	999.2
5488.9	999.2	5503.9	998.9	5541.5	998.5	5549.3	998.5	5583	998.5
5594.2	998.6	5622.6	998.5	5647	998.2	5662.1	998.3	5699.6	998.4
5701.6	998.4	5707.9	998.4	5752.3	998.4	5774.5	998.1	5805	997.9
5820.3	997.7	5857.6	998.1	5866	998.1	5910.4	998.2	5913.1	998.2
5923.2	998.4	5947.7	998.4	5963.1	998.4	6011.3	999.6	6015.7	999.6
6024.6	999.7	6054.9	1000	6083.1	999.9	6087.3	999.8	6088.3	999.8
6090.5	999.8	6132.9	999.3	6151.2	999.1	6170.1	998.8	6175.7	998.7
6183.8	998.4	6203.7	998	6211.9	997.4	6212.8	997.2	6213.8	997.2
6215.6	997	6228.9	997.3	6229.9	997.5	6239.3	998.6	6240.7	998.7
6242.9	998.7	6256.1	999	6279.3	999.5	6327.1	1000.9	6331.9	1001.1
6334.2	1001.2	6341.3	1001.3	6373.8	1001.9	6384.6	1002	6406.2	1002.2
6437.3	1002.6	6452.9	1002.6	6489.9	1002.2	6499.9	1002.2	6532	1002.3
6542.7	1002.3	6596	1001.5	6596.9	1001.5	6597.1	1001.4	6600	1000.6

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.035	5069	.03	5285	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	575	575	575	.1	.3

Right Levee Station= 6054.9 Elevation= 1000

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	997.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.030	
E.G. Elev (ft)	997.65	Reach Len. (ft)	575.00	575.00	575.00
Crit W.S. (ft)	991.05	Flow Area (sq ft)		1320.56	
E.G. Slope (ft/ft)	0.000018	Area (sq ft)		1320.56	
Q Total (cfs)	850.00	Flow (cfs)		850.00	
Top Width (ft)	259.37	Top Width (ft)		259.37	
Vel Total (ft/s)	0.64	Avg. Vel. (ft/s)		0.64	
Max Chl Dpth (ft)	7.85	Hydr. Depth (ft)		5.09	
Conv. Total (cfs)	202156.9	Conv. (cfs)		202156.9	
Length Wtd. (ft)	575.00	Wetted Per. (ft)		260.57	
Min Ch El (ft)	989.80	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	3.85	349.94	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	259.14	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 3.083

INPUT
Description: RM 3.083, RSOF Q=970 cfs
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	999.3	5010	998	5020	996	5090	995.4	5290	996
5560	998								

Manning's n Values num= 1

Sta	n Val
5000	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	5560	174	174	174	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	997.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.035	
E.G. Elev (ft)	997.62	Reach Len. (ft)	174.00	174.00	174.00
Crit W.S. (ft)		Flow Area (sq ft)		686.26	
E.G. Slope (ft/ft)	0.000712	Area (sq ft)		686.26	
Q Total (cfs)	970.00	Flow (cfs)		970.00	
Top Width (ft)	492.31	Top Width (ft)		492.31	
Vel Total (ft/s)	1.41	Avg. Vel. (ft/s)		1.41	
Max Chl Dpth (ft)	2.19	Hydr. Depth (ft)		1.39	
Conv. Total (cfs)	36347.7	Conv. (cfs)		36347.7	
Length Wtd. (ft)	174.00	Wetted Per. (ft)		492.48	
Min Ch El (ft)	995.40	Shear (lb/sq ft)		0.06	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	3.85	336.70	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	254.18	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 3.050

INPUT
Description: RM 3.050, Begin new, un-mapped RR Spur.
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	999.3	5010	999.4	5030	999.1	5040	998.4	5070	996
5080	996.2	5095	994.9	5135	996.7	5245	996.9	5310	996.7
5380	995	5390	996.6	5410	996.9	5420	994.7	5450	995.9
5525	996.9	5585	996.9	5605	997.4	5645	997.1	5730	997.1
5780	997	6335	998.1	6342	996.4	6348	999	6360	998.9
6365	997.9	6395	997.8						

Manning's n Values num= 1

Sta	n Val
5000	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6395	66.5	66.5	66.5	.1	.3

Right Levee Station= 6335 Elevation= 998.1

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	997.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.030	
E.G. Elev (ft)	997.44	Reach Len. (ft)	66.50	66.50	66.50
Crit W.S. (ft)	996.64	Flow Area (sq ft)		646.52	
E.G. Slope (ft/ft)	0.001500	Area (sq ft)		646.52	
Q Total (cfs)	970.00	Flow (cfs)		970.00	
Top Width (ft)	934.13	Top Width (ft)		934.13	
Vel Total (ft/s)	1.50	Avg. Vel. (ft/s)		1.50	
Max Chl Dpth (ft)	2.71	Hydr. Depth (ft)		0.69	
Conv. Total (cfs)	25045.5	Conv. (cfs)		25045.5	

Length Wtd. (ft)	66.50	Wetted Per. (ft)		934.72
Min Ch El (ft)	994.70	Shear (lb/sq ft)		0.06
Alpha	1.00	Stream Power (lb/ft s)		0.10
Frctn Loss (ft)	0.24	Cum Volume (acre-ft)	3.85	334.03
C & E Loss (ft)	0.02	Cum SA (acres)	8.21	251.33

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 3.037

INPUT
Description: RM 3.037, New un-mapped RR Spur,
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	998.7	5012	998	5019	996	5027	994.2	5070	995
5080	997.4	5175	997.1	5275	996.8	5371	996.8	5470	996.8
5570	996.8	5668	996.9	5835	995.7	5878	996	5970	997.5
6060	998	6110	998.2	6155	998	6175	997.6	6195	998
6285	998	6285	998.8	6295	997.6	6360	998.9	6365	997.9
6395	997.8								

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5835	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6395	33.5	33.5	33.5	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5000	5080	997.4

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	997.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.032	
E.G. Elev (ft)	997.19	Reach Len. (ft)	33.50	33.50	33.50
Crit W.S. (ft)	997.00	Flow Area (sq ft)		280.06	
E.G. Slope (ft/ft)	0.016843	Area (sq ft)		280.06	
Q Total (cfs)	970.00	Flow (cfs)		970.00	
Top Width (ft)	732.45	Top Width (ft)		732.45	
Vel Total (ft/s)	3.46	Avg. Vel. (ft/s)		3.46	
Max Chl Dpth (ft)	1.30	Hydr. Depth (ft)		0.38	
Conv. Total (cfs)	7474.1	Conv. (cfs)		7474.1	
Length Wtd. (ft)	33.50	Wetted Per. (ft)		732.47	
Min Ch El (ft)	995.70	Shear (lb/sq ft)		0.40	
Alpha	1.00	Stream Power (lb/ft s)		1.39	
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	3.85	333.33	
C & E Loss (ft)	0.04	Cum SA (acres)	8.21	250.06	

Warning - The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 3.031

INPUT
Description: RM 3.031, End New un-mapped RR Spur.

Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	999.4	5020	999.3	5035	994.5	5045	994.2	5075	995.6
5110	996.2	5170	996.1	5200	996.1	5220	996.1	5230	996.1
5295	995.9	5355	995.9	5385	995.9	5465	995.9	5515	996
5530	996.5	5550	996	5580	995.5	5800	995.5	5960	996
6200	998								

Manning's n Values num= 1

Sta	n Val
5000	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6200	650	650	650	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5000	5250	998

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	996.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.030	
E.G. Elev (ft)	996.55	Reach Len. (ft)	650.00	650.00	650.00
Crit W.S. (ft)	996.13	Flow Area (sq ft)		538.50	
E.G. Slope (ft/ft)	0.002130	Area (sq ft)		688.55	
Q Total (cfs)	970.00	Flow (cfs)		970.00	
Top Width (ft)	990.97	Top Width (ft)		990.97	
Vel Total (ft/s)	1.80	Avg. Vel. (ft/s)		1.80	
Max Chl Dpth (ft)	2.30	Hydr. Depth (ft)		0.70	
Conv. Total (cfs)	21019.5	Conv. (cfs)		21019.5	
Length Wtd. (ft)	650.00	Wetted Per. (ft)		769.74	
Min Ch El (ft)	994.20	Shear (lb/sq ft)		0.09	
Alpha	1.00	Stream Power (lb/ft s)		0.17	
Frctn Loss (ft)	0.60	Cum Volume (acre-ft)	3.85	332.95	
C & E Loss (ft)	0.01	Cum SA (acres)	8.21	249.40	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 2.908

INPUT
Description: RM 2.908
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	997.6	5005.1	997.7	5005.3	997.7	5006.6	997.5	5011.6	996.4
5025.8	993.3	5033.8	993.3	5047.8	993.4	5051.8	993.6	5065.5	993.4
5085.3	993.5	5122	994.4	5122.3	994.4	5157.6	995.3	5165.8	994.9
5178.6	994.4	5229.5	993.8	5235.1	993.8	5241.4	993.8	5291.8	994
5336.4	994.1	5344.3	994.2	5348.4	994.3	5361.9	994.5	5405	995.2
5418.3	995.3	5443.5	995.6	5455.3	995.6	5461.6	995.6	5492.3	995.5
5518.1	995.6	5550.3	995.4	5566.3	995.5	5574.7	995.4	5602.1	996.2
5631.2	996.6	5657.1	997.6	5687.8	998.1	5722.3	998.1	5744.4	998.1
5764	998.2	5800.9	998.7	5842.5	999.4	5857.5	999.7	5862.1	999.7
5870.8	999.7	5914.2	999.3	5963.1	998.6	5970.8	998.5	5971.2	998.5
5983.9	998.1	5987.9	997.8	5991.6	998.1	5993.3	997.5	5995.8	996.6
5999.5	998.3	6000.6	998.9	6003.9	998.9	6014.2	998.8	6019.8	998.2
6023	997.6	6024.4	997.7	6024.9	997.6	6026.1	997.8	6027.3	998.1
6051.2	997.9	6092.6	997.5						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5085.3	.035	5999.5	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6092.6	300	350	500	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	995.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.033	
E.G. Elev (ft)	995.94	Reach Len. (ft)	300.00	350.00	500.00
Crit W.S. (ft)		Flow Area (sq ft)		761.88	
E.G. Slope (ft/ft)	0.000523	Area (sq ft)		761.88	
Q Total (cfs)	970.00	Flow (cfs)		970.00	
Top Width (ft)	578.47	Top Width (ft)		578.47	
Vel Total (ft/s)	1.27	Avg. Vel. (ft/s)		1.27	
Max Chl Dpth (ft)	2.61	Hydr. Depth (ft)		1.32	
Conv. Total (cfs)	42420.1	Conv. (cfs)		42420.1	
Length Wtd. (ft)	350.00	Wetted Per. (ft)		578.82	
Min Ch El (ft)	993.30	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.05	
Frctn Loss (ft)	0.55	Cum Volume (acre-ft)	3.85	322.13	
C & E Loss (ft)	0.03	Cum SA (acres)	8.21	237.69	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 2.851

INPUT
Description: RM 2.851
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	997.1	5009	996	5020	994	5032	993.7	5040	994
5720	996	5905	998						

Manning's n Values num= 1

Sta	n Val
5000	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	5905	700	700	500	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	995.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.29	Wt. n-Val.		0.035	
E.G. Elev (ft)	995.37	Reach Len. (ft)	700.00	700.00	500.00
Crit W.S. (ft)	995.08	Flow Area (sq ft)		224.23	
E.G. Slope (ft/ft)	0.021835	Area (sq ft)		224.23	
Q Total (cfs)	970.00	Flow (cfs)		970.00	
Top Width (ft)	391.50	Top Width (ft)		391.50	
Vel Total (ft/s)	4.33	Avg. Vel. (ft/s)		4.33	
Max Chl Dpth (ft)	1.38	Hydr. Depth (ft)		0.57	
Conv. Total (cfs)	6564.4	Conv. (cfs)		6564.4	
Length Wtd. (ft)	700.00	Wetted Per. (ft)		391.61	
Min Ch El (ft)	993.70	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		3.38	
Frctn Loss (ft)	0.27	Cum Volume (acre-ft)	3.85	318.17	
C & E Loss (ft)	0.08	Cum SA (acres)	8.21	233.79	

Warning - The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical

depth.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 2.718

INPUT
Description: RM 2.718
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	995.5	5006.1	995.2	5013	993.1	5019.9	991.1	5027.1	991.4
5039	991.3	5058.4	990.9	5063.5	989.7	5064.6	989.5	5067.8	989.9
5072.4	990.5	5077.3	990.9	5078.7	990.9	5085.1	990.9	5131.2	991.2
5148.7	991.3	5199.7	991.3	5211	991.3	5214.8	991.3	5273.3	991.7
5298.5	991.8	5335.7	992	5382.2	992.1	5398.2	992.2	5444.9	992.5
5460.5	992.5	5465.8	992.5	5522.8	992.8	5549.5	992.9	5585.2	992.8
5633.2	993.1	5647.5	993.2	5689.4	993	5709.9	992.9	5716.8	992.9
5772.2	993.2	5784.3	993.3	5800.6	993.2	5820.1	993.2	5834.5	993.2
5884.4	993.3	5896.9	993.3	5933.2	993.4	5959.2	993.5	5963	993.5
5968.1	993.5	5991.1	993.9	6001.5	994.1	6005.2	994.4	6010.7	995.1
6014.8	994.1	6023.4	995.6	6024.8	995.6	6032.5	996	6039.4	996.4
6042.3	995.9	6046.6	995.2	6072.5	995.3	6074	995.3	6075.2	995.3
6151.5	995.3	6156.2	995.3						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5077.3	.035	6001.5	.03	6046.6	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6156.2	500	500	500	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5480	6156.2	996

CROSS SECTION OUTPUT Profile #PF#1

			Left OB	Channel	Right OB
W.S. Elev (ft)	994.11	Element			
Vel Head (ft)	0.01	Wt. n-Val.		0.034	
E.G. Elev (ft)	994.12	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	991.96	Flow Area (sq ft)		1160.78	
E.G. Slope (ft/ft)	0.000109	Area (sq ft)		1670.40	
Q Total (cfs)	970.00	Flow (cfs)		970.00	
Top Width (ft)	991.97	Top Width (ft)		991.97	
Vel Total (ft/s)	0.84	Avg. Vel. (ft/s)		0.84	
Max Chl Dpth (ft)	4.61	Hydr. Depth (ft)		2.47	
Conv. Total (cfs)	93122.8	Conv. (cfs)		93122.8	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		471.00	
Min Ch El (ft)	989.50	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.01	
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	3.85	302.95	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	222.67	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 2.624

INPUT
Description: RM 2.624
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	994.5	5004.1	994.3	5018.1	990.4	5020.3	989.9	5029.3	989.6
5033.9	989.6	5036.2	989.6	5038	989.7	5062.9	990	5064.1	989.2
5065.4	987.9	5069.8	989.1	5076	990	5096.5	990	5109.6	990.1
5158.3	990.3	5194.7	990.3	5220.1	990.5	5279.7	991	5281.9	991
5316.8	991	5343.6	991.1	5352.5	991.1	5364.8	991.2	5405.5	991.6
5449.8	991.8	5460	991.8	5467.4	991.8	5513.9	991.8	5529.2	991.8
5531.6	991.8	5534.9	991.8	5590.9	991.7	5620	991.9	5638.9	991.9

5652.7	991.9	5705	991.9	5714.5	992	5746.3	992.2	5776.3	992.4
5790.3	992.4	5817.9	992.5	5838.1	992.5	5875.3	992.4	5899.8	992.4
5925.4	992.6	5960.5	992.8	5961.6	992.8	5996.9	992.8	6023.5	992.9
6032.8	993	6045.6	993.1	6085.4	993.4	6130.6	993.8	6140.2	993.8
6147.1	993.8	6154.1	993.9	6170	994	6172.7	994.4	6176.2	995
6178.8	993.8	6181.1	993.9	6183.3	993.8	6188.3	995.5	6195.6	995.5
6199.4	995.3	6202.5	994.9						

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5076	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6202.5	500	500	500	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5630	6202.5	996

Right Levee Station= 6176.2 Elevation= 995

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	994.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.034	
E.G. Elev (ft)	994.09	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	990.97	Flow Area (sq ft)		1925.44	
E.G. Slope (ft/ft)	0.000030	Area (sq ft)		2686.13	
Q Total (cfs)	970.00	Flow (cfs)		970.00	
Top Width (ft)	1165.72	Top Width (ft)		1165.72	
Vel Total (ft/s)	0.50	Avg. Vel. (ft/s)		0.50	
Max Chl Dpth (ft)	6.19	Hydr. Depth (ft)		3.08	
Conv. Total (cfs)	178515.6	Conv. (cfs)		178515.6	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		626.72	
Min Ch El (ft)	987.90	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	3.85	277.94	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	210.29	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 2.529

INPUT
Description: RM 2.529
Station Elevation Data num= 75

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	994.4	5000.7	994.4	5006	993.9	5016.1	990.1	5017.4	989.6
5017.5	989.6	5019.7	989.6	5043.2	989.9	5063.6	990.3	5066.1	988.9
5066.3	988.9	5066.6	988.9	5073.6	989.6	5080.9	989.5	5081.5	989.5
5119.5	989.7	5135.7	989.7	5175.3	989.8	5189.9	989.8	5210	990
5244.1	990.2	5272.2	990	5298.4	990.1	5339.2	990.3	5352.6	990.4
5386.9	990.7	5406.8	990.8	5455.6	990.7	5461	990.7	5468.5	990.7
5515.2	990.9	5549.1	991.1	5569.5	991.2	5597.5	991.4	5615.9	991.5
5623.7	991.5	5654.2	991.7	5678.1	991.9	5726.6	991.8	5732.3	991.8
5736.4	991.8	5786.5	991.9	5830	992.1	5840.7	992.2	5845.1	992.2
5855.6	992.2	5894.9	992.3	5923.5	992.3	5949.2	992.4	5959.7	992.4
5984.6	992.6	6003.4	992.8	6036	992.9	6057.6	993	6110.5	992.8
6111.8	992.8	6113.6	992.8	6150.5	993.3	6166.1	993.3	6204	993.6
6220.3	993.7	6242.7	993.8	6265.2	993.9	6274.6	993.9	6288.5	994.2
6291	994.3	6294.6	994.8	6296.4	995	6296.8	995.1	6297.4	995.1
6298.4	995.1	6305.8	995.4	6314.5	995.6	6318.9	995	6320.8	994.7

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5073.6	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6320.8	500	500	500	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5790	6320.8	995

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	994.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.034	
E.G. Elev (ft)	994.08	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	990.55	Flow Area (sq ft)		2659.40	
E.G. Slope (ft/ft)	0.000014	Area (sq ft)		3267.08	
Q Total (cfs)	970.00	Flow (cfs)		970.00	
Top Width (ft)	1278.73	Top Width (ft)		1278.73	
Vel Total (ft/s)	0.36	Avg. Vel. (ft/s)		0.36	
Max Chl Dpth (ft)	5.18	Hydr. Depth (ft)		3.38	
Conv. Total (cfs)	259013.5	Conv. (cfs)		259013.5	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		787.09	
Min Ch El (ft)	988.90	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	3.85	243.78	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	196.26	

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 2.434

INPUT
Description: RM 2.434
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	995.5	5004.6	993.9	5011	991.7	5018.4	989.7	5041.5	989.1
5050.2	988.9	5061.5	989.5	5062.8	989.6	5063.2	989.4	5066.4	988.2
5128.7	989.3	5150.7	989.5	5167	989.6	5200.9	989.5	5222.3	989.6
5251.1	989.9	5275.1	989.9	5301.3	990.1	5332.8	990.3	5351.5	990.3
5367.1	990.4	5401.7	990.6	5443.4	990.6	5451.9	990.7	5498.7	990.7
5502.1	990.8	5535.9	991	5552.3	991.1	5554	991.1	5602.5	991.1
5609.3	991.1	5652.7	991.5	5688.9	991.8	5703	991.8	5735	991.6
5753.3	991.7	5781	991.7	5803.5	991.7	5830.4	992	5853.6	992.2
5885.8	992.4	5903.8	992.4	5918.8	992.4	5954	992.2	5964.9	992.3
6004.2	992.5	6051.5	993	6054.4	993.1	6082.2	993	6104.6	992.9
6148.8	993	6154.8	993	6162.1	993	6205.1	993.3	6240.8	993.4
6255.4	993.5	6272.8	993.6	6305.6	993.9	6312.4	994.1	6319.2	994.3
6322.6	994.9	6324.6	995.1	6326.9	995.2	6340.5	995.4	6341.3	995.4
6341.7	995.4	6347.7	994.7						

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5066.4	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6347.7	361	361	361	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5830	6347.7	995

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	994.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.034	
E.G. Elev (ft)	994.07	Reach Len. (ft)	361.00	361.00	361.00
Crit W.S. (ft)	990.13	Flow Area (sq ft)		2935.82	
E.G. Slope (ft/ft)	0.000011	Area (sq ft)		3520.12	
Q Total (cfs)	970.00	Flow (cfs)		970.00	
Top Width (ft)	1307.34	Top Width (ft)		1307.34	
Vel Total (ft/s)	0.33	Avg. Vel. (ft/s)		0.33	
Max Chl Dpth (ft)	5.87	Hydr. Depth (ft)		3.55	
Conv. Total (cfs)	295367.3	Conv. (cfs)		295367.3	
Length Wtd. (ft)	361.00	Wetted Per. (ft)		826.87	
Min Ch El (ft)	988.20	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	3.85	204.82	

C & E Loss (ft)	0.00	Cum SA (acres)	8.21	181.42

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 2.366

INPUT
Description: RM 2.366
Station Elevation Data num= 102

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	994	5003.3	993.9	5004.8	993.9	5006.9	993.3	5014.4	991.6
5015.6	991.6	5030.9	991.2	5034.3	991.1	5049.1	990.9	5049.8	990.9
5052.9	989.8	5054.6	988.4	5056.4	989.1	5062	990.6	5064.7	990.6
5069.2	990.5	5071.8	990	5096.5	989.9	5107.3	989.9	5119.3	989.7
5129.6	989.6	5156.1	989.7	5164.5	989.7	5174.1	989.8	5197.7	990.2
5210.7	990.3	5223.4	990.3	5233	990.3	5256.3	990.1	5267	990.1
5276	990.2	5299.8	990.3	5310	990.4	5317.8	990.4	5327.6	990.3
5350.6	990.5	5367.2	990.5	5382.6	990.5	5404.4	990.7	5423	990.8
5433	990.9	5455.5	990.9	5467.2	991	5482.3	991.2	5505.8	991.3
5517.9	991	5540.5	991.1	5561	991.2	5570.4	991.2	5580.8	991.2
5605.2	991.3	5629.1	991.5	5653.5	991.6	5674.7	991.8	5699.6	991.8
5732.1	991.9	5757.1	992	5779.6	992.2	5804.8	992.3	5836.2	992.3
5862	992.5	5882.1	992.6	5907.8	992.6	5934.2	992.9	5960.1	993
5979.3	993.1	6005.3	993.1	6033.7	993.3	6060.2	993.3	6082.5	993.3
6108.5	993.4	6132.5	993.4	6158.2	993.6	6177.2	993.6	6202.6	993.7
6224.1	993.8	6249.9	993.7	6264.3	993.7	6278	993.9	6286.5	994.2
6301.8	994.2	6309.9	994.3	6312.1	994.4	6320.3	995	6327.3	995.6
6330.6	995.7	6335.8	996	6338.6	996	6339.5	996.1	6345	996.1
6350.6	996.2	6355.8	994.6	6356.3	994.5	6356.9	994.5	6357.2	994.5
6371.2	994.5	6386.8	994.8	6407.8	995.1	6446	995	6484.4	995.3
6502.7	995.4	6555.3	995.6						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5071.8	.035	6301.8	.03	6350.6	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6555.3	75	75	75	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5630	6555.3	996

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	994.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.035	
E.G. Elev (ft)	994.07	Reach Len. (ft)	75.00	75.00	75.00
Crit W.S. (ft)	990.75	Flow Area (sq ft)		2173.45	
E.G. Slope (ft/ft)	0.000021	Area (sq ft)		2983.19	
Q Total (cfs)	970.00	Flow (cfs)		970.00	
Top Width (ft)	1282.68	Top Width (ft)		1282.68	
Vel Total (ft/s)	0.45	Avg. Vel. (ft/s)		0.45	
Max Chl Dpth (ft)	5.67	Hydr. Depth (ft)		3.45	
Conv. Total (cfs)	213782.9	Conv. (cfs)		213782.9	
Length Wtd. (ft)	75.00	Wetted Per. (ft)		631.44	
Min Ch El (ft)	988.40	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	3.85	177.88	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	170.69	

Warning - The cross-section end points had to be extended vertically for the computed water surface.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 2.352

INPUT
Description: RM 2.352, CPOB3-930 CFS, 107th Ave.

Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	994.3	5110	994	5370	992	5460	991.5	5510	992
5540	994	6090	996						

Manning's n Values num= 1

Sta	n Val
5000	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6090	49	49	49	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	994.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.030	
E.G. Elev (ft)	994.06	Reach Len. (ft)	49.00	49.00	49.00
Crit W.S. (ft)		Flow Area (sq ft)		616.15	
E.G. Slope (ft/ft)	0.000604	Area (sq ft)		616.15	
Q Total (cfs)	930.00	Flow (cfs)		930.00	
Top Width (ft)	446.33	Top Width (ft)		446.33	
Vel Total (ft/s)	1.51	Avg. Vel. (ft/s)		1.51	
Max Chl Dpth (ft)	2.53	Hydr. Depth (ft)		1.38	
Conv. Total (cfs)	37832.5	Conv. (cfs)		37832.5	
Length Wtd. (ft)	49.00	Wetted Per. (ft)		446.41	
Min Ch El (ft)	991.50	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.08	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	3.85	174.78	
C & E Loss (ft)	0.01	Cum SA (acres)	8.21	169.20	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 2.342

INPUT
Description: RM 2.342
Station Elevation Data num= 47

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	994.3	5003.7	993.8	5011.7	993.8	5044.8	992.8	5071.1	992.8
5097.8	992.7	5132.1	992.7	5158.3	992.4	5185	992.1	5226.3	992.1
5234.2	992.1	5242.7	992.2	5257.8	992.1	5271.3	992	5287.5	991.4
5297	991.2	5302.7	990.8	5303.5	990.8	5314.1	990.8	5330.5	990.9
5338.2	990.9	5341.3	990.9	5514.3	991.3	5518	991.3	5518.4	991.3
5522	991.3	5523.1	991.3	5711	992.2	5712.2	992.2	5907	992.5
5908.5	992.5	5910.1	992.5	6105.5	993.2	6111.1	993.2	6113.9	993.2
6245.1	993.6	6249.3	993.6	6404.8	993.8	6410.4	993.9	6429.1	993.9
6570.7	994	6573.7	994	6589.9	994.2	6590.8	994.4	6598.5	996.4
6599.5	995.9	6600	995.6						

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5302.7	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	485	485	485	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5135	995	5555	6600	995

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	994.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.034	
E.G. Elev (ft)	994.04	Reach Len. (ft)	485.00	485.00	485.00
Crit W.S. (ft)	991.82	Flow Area (sq ft)		1068.35	
E.G. Slope (ft/ft)	0.000107	Area (sq ft)		2278.43	
Q Total (cfs)	930.00	Flow (cfs)		930.00	

Top Width (ft)	1574.26	Top Width (ft)			1574.26
Vel Total (ft/s)	0.87	Avg. Vel. (ft/s)			0.87
Max Chl Dpth (ft)	3.23	Hydr. Depth (ft)			2.54
Conv. Total (cfs)	89802.2	Conv. (cfs)			89802.2
Length Wtd. (ft)	485.00	Wetted Per. (ft)			420.03
Min Ch El (ft)	990.80	Shear (lb/sq ft)			0.02
Alpha	1.00	Stream Power (lb/ft s)			0.01
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)		3.85	173.15
C & E Loss (ft)	0.00	Cum SA (acres)		8.21	168.06

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 2.245

INPUT
Description: RM 2.245
Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	994.2	5012.7	992.9	5016.3	992.9	5055.3	993	5057.8	993
5058.7	994.8	5060.5	997.4	5073.7	997.5	5074.3	997.5	5160.4	994.3
5164.3	994.2	5165.1	994.2	5210.9	992.9	5211.7	992.9	5212.9	992.9
5214.1	992.9	5220.6	993	5238.4	993.2	5242	993.2	5245	993.2
5267.9	992.8	5283.6	992.4	5286.2	992.3	5286.9	992.2	5291.8	991.2
5319.5	991.1	5347.6	991.3	5376.1	991.3	5450.5	991.5	5464.3	991.6
5470.7	991.6	5541.7	991.9	5648.4	992	5676.3	992.1	5784.9	992.8
5814.6	992.8	5930.5	993.2	6049.4	993.2	6080.2	993.4	6291.8	993.5
6330.6	993.5	6342	993.5	6354.5	993.4	6360.7	994.7	6364	995.4
6365.7	994.6	6367.4	993.8	6373.3	995.3	6374.7	995.7	6375.5	995.6
6377.6	995.1	6387.1	994.9	6392.3	994.8	6396.3	993.5	6401.5	991.8
6405.1	993.6	6407.8	995.4	6412.9	995.7	6414.3	995.7	6415.5	995.5
6419.7	994.4	6469	994.8	6494.4	994.7	6574.9	994.7	6600	994.7

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.04	5210.9	.03	5319.5	.035	6354.5	.03	6412.9	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	85	85	85	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5740	6600	995

Right Levee Station= 6374.7 Elevation= 995.7
Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5045	993.8	5045	5175	998

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	993.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.034	
E.G. Elev (ft)	993.98	Reach Len. (ft)	85.00	85.00	85.00
Crit W.S. (ft)	992.20	Flow Area (sq ft)		1124.55	
E.G. Slope (ft/ft)	0.000140	Area (sq ft)		1585.80	
Q Total (cfs)	930.00	Flow (cfs)		930.00	
Top Width (ft)	1226.06	Top Width (ft)		1226.06	
Vel Total (ft/s)	0.83	Avg. Vel. (ft/s)		0.83	
Max Chl Dpth (ft)	2.87	Hydr. Depth (ft)		1.85	
Conv. Total (cfs)	78525.1	Conv. (cfs)		78525.1	
Length Wtd. (ft)	85.00	Wetted Per. (ft)		608.16	
Min Ch El (ft)	991.10	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.01	
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	3.85	151.64	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	152.47	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific

REACH: Tolleson 2 RS: 2.229

INPUT
Description: RM 2.229
Station Elevation Data num= 77

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	994.3	5017.8	993.1	5034.5	993.1	5043.2	993	5070.6	993
5070.8	993.1	5073.3	996.3	5079.6	994.7	5103	994.9	5120	993.8
5121.7	994.2	5124.6	994.2	5136.6	993.7	5146.7	993.6	5155.2	993.5
5230.9	993.3	5236.8	993.7	5240.7	993.7	5244.3	993.7	5266.3	993.5
5283.2	993.4	5288.6	993.3	5293.3	993.2	5299.6	993.1	5306.8	993
5320.9	992.8	5371.7	992.8	5445.4	992.8	5478.4	992.8	5564.6	992.7
5586.6	992.7	5671.2	993.2	5696.3	993.4	5767.2	993.4	5839.6	993.6
5878.1	993.8	5951.4	994.2	5982.2	994.2	6062.6	994.4	6091.1	994.4
6199.2	994.6	6235.1	994.8	6239.2	994.8	6256.4	994.9	6259.8	994.9
6266.4	995	6282.4	995	6296.2	995.1	6308.8	995	6319	995.1
6323.1	995.2	6328.1	995.2	6336.5	995.2	6338.3	995.2	6342.4	995.2
6344.4	993.9	6348	991.2	6351.5	992.8	6355.6	994.8	6364.1	994.8
6369.1	994.7	6373.2	994.6	6377.4	994.6	6386.3	994.7	6406.3	994.8
6410.7	994.8	6426.8	994.9	6427.9	994.9	6430.5	994.9	6437.6	995
6440.6	995	6449.6	994.6	6460.1	994.7	6469.6	995	6473.4	995.1
6527.9	995	6600	995						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.04	5230.9	.03	6449.6	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	417	417	417	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5000	5195	995

Right Levee Station= 6323.1 Elevation= 995.2

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	993.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.030	
E.G. Elev (ft)	993.95	Reach Len. (ft)	417.00	417.00	417.00
Crit W.S. (ft)	993.44	Flow Area (sq ft)		539.68	
E.G. Slope (ft/ft)	0.001738	Area (sq ft)		615.02	
Q Total (cfs)	930.00	Flow (cfs)		930.00	
Top Width (ft)	833.32	Top Width (ft)		833.32	
Vel Total (ft/s)	1.72	Avg. Vel. (ft/s)		1.72	
Max Chl Dpth (ft)	2.71	Hydr. Depth (ft)		0.77	
Conv. Total (cfs)	22308.5	Conv. (cfs)		22308.5	
Length Wtd. (ft)	417.00	Wetted Per. (ft)		702.38	
Min Ch El (ft)	991.20	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)		0.14	
Frctn Loss (ft)	0.63	Cum Volume (acre-ft)	3.85	149.49	
C & E Loss (ft)	0.01	Cum SA (acres)	8.21	150.46	

Warning - Divided flow computed for this cross-section.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 2.150

INPUT
Description: RM 2.150
Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	993.6	5010.5	992.2	5010.7	992.2	5020.5	992.4	5029.7	990.9
5034.3	990.2	5060.1	990.6	5060.8	990.6	5110.4	991.7	5110.5	991.7
5110.9	991.7	5160.4	992.2	5161.2	992.2	5210.7	992.1	5210.8	992.1
5219.9	991.6	5227.1	991.4	5260	991.8	5260.7	991.8	5268.8	991.6
5286.1	992.5	5289.2	992.6	5289.4	992.3	5291.7	991.2	5293.2	991.6
5295.6	991.9	5345.6	992	5363.9	992	6198.7	993.4	6301.1	993.4
6303	993.9	6307.1	995.2	6312.8	995	6313.9	995	6315.3	995
6324.4	994.7	6326.8	994.2	6329.2	993.8	6385	993.8	6475.2	993.9
6518.9	994.1	6553.1	994.3	6600	994.4				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.05	5295.6	.035	6301.1	.03	6329.2	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5000	5190	994

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	993.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.038	
E.G. Elev (ft)	993.31	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	992.61	Flow Area (sq ft)		738.41	
E.G. Slope (ft/ft)	0.001340	Area (sq ft)		1062.87	
Q Total (cfs)	930.00	Flow (cfs)		930.00	
Top Width (ft)	1129.39	Top Width (ft)		1129.39	
Vel Total (ft/s)	1.26	Avg. Vel. (ft/s)		1.26	
Max Chl Dpth (ft)	3.09	Hydr. Depth (ft)		0.78	
Conv. Total (cfs)	25403.4	Conv. (cfs)		25403.4	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		942.26	
Min Ch El (ft)	990.20	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)		0.08	
Frctn Loss (ft)	0.89	Cum Volume (acre-ft)	3.85	141.46	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	141.07	

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 2.056

INPUT
Description: RM 2.056
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	992.4	5013.1	991.6	5013.3	991.6	5024.5	991.5	5026.1	991.5
5031.4	991.5	5053.4	991.1	5054.5	992	5055.9	993.4	5062.6	993.3
5063.3	993.3	5067.3	993.3	5101.4	993.4	5102.7	992.4	5104	991.1
5112.1	990.9	5113.3	990.9	5115.6	990.8	5163.3	990.2	5166.4	990.2
5213.3	990.6	5217.3	990.7	5263.3	991.5	5268.8	991.5	5293.3	991.6
5294.8	991.1	5296.5	990.6	5299.3	991.2	5300.6	991.5	5920.7	992.3
6295.4	992.8	6296.7	993.2	6300.7	994.7	6307.7	994.3	6308.7	994.3
6310.4	994.2	6319.4	994.2	6323.7	993.5	6324.5	993.4	6331.2	993.4
6600	994.5								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.06	5300.6	.035	6295.4	.03	6331.2	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	992.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.050	
E.G. Elev (ft)	992.42	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)		Flow Area (sq ft)		665.43	
E.G. Slope (ft/ft)	0.002464	Area (sq ft)		665.43	
Q Total (cfs)	930.00	Flow (cfs)		930.00	
Top Width (ft)	943.09	Top Width (ft)		943.09	
Vel Total (ft/s)	1.40	Avg. Vel. (ft/s)		1.40	
Max Chl Dpth (ft)	2.19	Hydr. Depth (ft)		0.71	
Conv. Total (cfs)	18734.7	Conv. (cfs)		18734.7	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		944.41	
Min Ch El (ft)	990.20	Shear (lb/sq ft)		0.11	
Alpha	1.00	Stream Power (lb/ft s)		0.15	
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	3.85	131.54	
C & E Loss (ft)	0.01	Cum SA (acres)	8.21	129.17	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 1.961

INPUT
Description: RM 1.961, HEC-1 CPLE Q=630cfs, Begin DILD Q=190 CFS TO SOUTH DIVERT
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	991.82	5000.1	991.8	5010.5	990.9	5012.6	990.4	5012.9	990.4
5018	990.6	5026	990.9	5028.7	990.4	5034.1	989.5	5060.4	989.2
5060.5	989.2	5060.7	989.2	5110.5	988.5	5159.6	989.3	5160.5	989.3
5161.4	989.3	5210.5	989.5	5258.9	990.2	5260.5	990.2	5262.4	990.3
5292.9	991.2	5293.9	990.9	5295.5	990.2	5298.6	990.9	5299.3	991.2
5311.6	991.2	5618.4	991.6	6284	992.6	6286.9	993.4	6290.4	994.4
6295.5	994.3	6298.2	994.2	6308.9	994	6309.1	994	6309.3	994
6313.9	992.8	6375.8	993.4	6433.2	993.6	6478.2	993.8	6516.2	994.2
6600	994.6								

Manning's n Values num= 1

Sta	n Val
5000	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	480	480	480	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	992.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.035	
E.G. Elev (ft)	992.16	Reach Len. (ft)	480.00	480.00	480.00
Crit W.S. (ft)		Flow Area (sq ft)		1106.93	
E.G. Slope (ft/ft)	0.000155	Area (sq ft)		1106.93	
Q Total (cfs)	630.00	Flow (cfs)		630.00	
Top Width (ft)	990.00	Top Width (ft)		990.00	
Vel Total (ft/s)	0.57	Avg. Vel. (ft/s)		0.57	
Max Chl Dpth (ft)	3.66	Hydr. Depth (ft)		1.12	
Conv. Total (cfs)	50594.3	Conv. (cfs)		50594.3	
Length Wtd. (ft)	480.00	Wetted Per. (ft)		990.93	
Min Ch El (ft)	988.50	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.01	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	3.85	121.37	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	118.08	

Warning - The cross-section end points had to be extended vertically for the computed water surface.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 1.870

INPUT
Description: RM 1.870, Interpolated Q=565cfs, DILD Q=190 CFS TO SOUTH DIVERSION
Station Elevation Data num= 70

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	991.8	5005	991.1	5007	991	5007.7	990.9	5009.5	990.8
5013.5	990.5	5022.6	990.7	5025.4	990.8	5030.7	990.5	5032.8	990.3
5040.5	990	5057.7	989.2	5071	989.5	5090.8	989.7	5106	989.7
5126.4	989.9	5129.1	989.9	5146.9	989.8	5156.6	989.6	5183	989.8
5194.6	989.8	5207.7	989.6	5224.2	989.7	5257.7	990	5273.1	990.5
5279	990.6	5283.5	990.7	5285.7	990.9	5289	990	5291.6	990.8
5293.6	990.7	5298.6	990.7	5300.7	990.6	5349.3	990.4	5356	990.3
5358	990.3	5477.8	990.7	5480.3	990.7	5480.7	990.7	5584.8	991.2
5585.5	991.2	5585.9	991.2	5586.4	991.2	5716.1	991.7	5717.7	991.8
5719.4	991.8	5733.9	991.8	5848.1	992.2	5851.3	992.2	5988	992.9
5994.6	992.9	6140.8	993.4	6273.8	992.4	6274.2	992.6	6277.9	994.1

6287.9	993.8	6288.4	993.8	6289.6	993.8	6293.6	993.7	6300	993.6
6309.5	992.6	6310.7	992.4	6314.6	992.6	6321.2	992.5	6326.8	992.5
6340.7	992.5	6397.2	992.9	6536.4	992.7	6556.9	992.7	6600	993.4

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.04	5257.7	.03	5300.7	.035	6273.8	.03	6310.7	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	35	35	35	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5080	5130	993	5300	6600	993

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	992.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.039	
E.G. Elev (ft)	992.06	Reach Len. (ft)	35.00	35.00	35.00
Crit W.S. (ft)	990.42	Flow Area (sq ft)		513.57	
E.G. Slope (ft/ft)	0.000310	Area (sq ft)		1113.28	
Q Total (cfs)	565.00	Flow (cfs)		565.00	
Top Width (ft)	803.42	Top Width (ft)		803.42	
Vel Total (ft/s)	1.10	Avg. Vel. (ft/s)		1.10	
Max Chl Dpth (ft)	2.84	Hydr. Depth (ft)		2.05	
Conv. Total (cfs)	32086.2	Conv. (cfs)		32086.2	
Length Wtd. (ft)	35.00	Wetted Per. (ft)		250.64	
Min Ch El (ft)	989.20	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.04	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	3.85	109.14	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	108.20	

Warning - The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 1.863

INPUT
Description: RM 1.863, Interpolated Q=565cfs, DILD Q=190 CFS TO SOUTH DIVERSION
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	991.8	5005.3	991.2	5006.1	991.1	5006.8	991	5009.6	990.8
5014.1	990.5	5019	990.6	5024.9	990.9	5030.7	990.5	5035.1	990.2
5052.1	989.4	5057.6	989.2	5073.9	988.9	5107.6	988.8	5124.6	989
5157.6	989.2	5189.6	989.4	5207.6	989.5	5220	990	5280	992.9
5390	992.9	5428	992.6	5482	993.1	5556	992.7	5590	993.1
5690	993.2	5790	993.4	5890	993.6	5995	993.9	6100	994.5
6200	994.9	6295	995.3						

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.04	5220	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6295	40	40	40	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	992.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.039	
E.G. Elev (ft)	992.05	Reach Len. (ft)	40.00	40.00	40.00
Crit W.S. (ft)		Flow Area (sq ft)		609.14	
E.G. Slope (ft/ft)	0.000184	Area (sq ft)		609.14	
Q Total (cfs)	565.00	Flow (cfs)		565.00	
Top Width (ft)	262.19	Top Width (ft)		262.19	
Vel Total (ft/s)	0.93	Avg. Vel. (ft/s)		0.93	
Max Chl Dpth (ft)	3.24	Hydr. Depth (ft)		2.32	
Conv. Total (cfs)	41603.7	Conv. (cfs)		41603.7	
Length Wtd. (ft)	40.00	Wetted Per. (ft)		262.61	
Min Ch El (ft)	988.80	Shear (lb/sq ft)		0.03	

Alpha	1.00	Stream Power (lb/ft s)		0.02
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	3.85	108.44
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	107.77

Warning - The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 1.856

INPUT
Description: RM 1.856, Interpolated Q=500cfs, DILD Q=190 CFS TO SOUTH DIVERSION
Station Elevation Data num= 69

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	991.8	5003.1	991.2	5005.3	991.2	5005.9	991.2	5007.4	990.9
5013.8	990.5	5014.3	990.5	5014.7	990.5	5014.8	990.5	5014.9	990.5
5024.3	990.9	5026.8	990.8	5038.1	990.1	5039	990.1	5039.5	990.1
5055.4	989.2	5057.4	989	5063.6	989	5107.4	988.5	5114.3	988.5
5157.4	988.9	5199.3	989	5207.4	989	5238.5	989.6	5241.2	989.7
5245.4	990.1	5251.7	990.6	5251.8	990.6	5264.4	991	5269.2	991.1
5270.6	990.5	5274.3	988.1	5276.8	989.3	5284.3	992.9	5285.7	991.7
5287	990.5	5287.6	990.1	5288.2	990.4	5291	992.3	5301.7	991.7
5302	991.6	5309.5	991	5312.6	990.8	5314.5	990.8	5324.9	990.8
5370.4	990.9	5537.4	990.7	5552.5	990.6	5707.7	991.7	5711.8	991.7
5871.7	992.7	5889	992.7	6089.9	993.2	6093.4	993.2	6097.5	993.2
6275.7	993.4	6275.9	993.5	6283.7	992.7	6283.8	992.8	6286.6	994.7
6295.7	994.5	6306	994.4	6306.3	994.4	6313.7	994.2	6326	994.1
6399	994.1	6430.7	994.2	6445.5	994.3	6600	994.3		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.04	5251.7	.03	5301.7	.035	6275.7	.03	6326	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	445	445	445	.1	.3

Right Levee Station= 5284.3 Elevation= 992.9
Blocked Obstructions num= 1

Sta L	Sta R	Elev
5269	5280	991

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	992.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.040	
E.G. Elev (ft)	992.05	Reach Len. (ft)	445.00	445.00	445.00
Crit W.S. (ft)	989.49	Flow Area (sq ft)		725.37	
E.G. Slope (ft/ft)	0.000092	Area (sq ft)		725.37	
Q Total (cfs)	500.00	Flow (cfs)		500.00	
Top Width (ft)	282.50	Top Width (ft)		282.50	
Vel Total (ft/s)	0.69	Avg. Vel. (ft/s)		0.69	
Max Chl Dpth (ft)	3.54	Hydr. Depth (ft)		2.57	
Conv. Total (cfs)	52120.7	Conv. (cfs)		52120.7	
Length Wtd. (ft)	445.00	Wetted Per. (ft)		283.43	
Min Ch El (ft)	988.50	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.01	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	3.85	107.83	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	107.52	

Warning - The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 1.771

INPUT
Description: RM 1.771, CPLE1 Q=440 CFS, END OF DILD Q=190 CFS TO SOUTH DIVERSION
WSE=992.02 per JEF, Inc. Weir Analysis
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	992.04	5000.1	992	5006.8	991.7	5007.5	991.8	5008.5	991.7

5015.3	990.9	5016.4	991	5024.9	991.7	5040.1	990.5	5046.2	990
5048.8	989.8	5050.3	989.9	5056.8	989.5	5059.4	989.5	5106.8	989.2
5156.7	989	5156.8	989	5156.9	989	5206.8	989.2	5234.3	989.8
5236.8	989.9	5241.1	990.4	5246.4	991.1	5247.2	991.1	5250.9	991.2
5268	991.5	5271.2	990	5275.8	987.8	5283.8	991.4	5284.8	991.6
5285.1	991.6	5287.6	989.8	5289	990.5	5290.6	991.6	5303.7	991.4
5309.7	990.4	5333.1	990.5	5342.6	990.5	5676.8	991.4	6269.9	992.8
6276.3	993.8	6276.8	993.9	6278.1	992.8	6279.1	992.2	6280.9	992.8
6282.4	993.5	6291.2	993.5	6296.1	993.6	6296.8	993.2	6299.4	992.2
6302.1	992.4	6304.8	992.7	6353.3	992.8	6417.8	992.9	6473.7	992.9
6600	993.3								

Manning's n Values num= 1

Sta	n Val
5000	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	495	495	495	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5400	6600	993

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5268	5304	991.5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	992.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.035	
E.G. Elev (ft)	992.01	Reach Len. (ft)	495.00	495.00	495.00
Crit W.S. (ft)		Flow Area (sq ft)		742.87	
E.G. Slope (ft/ft)	0.000085	Area (sq ft)		1088.36	
Q Total (cfs)	440.00	Flow (cfs)		440.00	
Top Width (ft)	930.88	Top Width (ft)		930.88	
Vel Total (ft/s)	0.59	Avg. Vel. (ft/s)		0.59	
Max Chl Dpth (ft)	3.00	Hydr. Depth (ft)		1.86	
Conv. Total (cfs)	47613.2	Conv. (cfs)		47613.2	
Length Wtd. (ft)		Wetted Per. (ft)		400.48	
Min Ch El (ft)	989.00	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.01	
Frctn Loss (ft)		Cum Volume (acre-ft)	3.85	98.57	
C & E Loss (ft)		Cum SA (acres)	8.21	101.32	

Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note - The user has entered a known water surface elevation at this cross section.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 1.677

INPUT
Description: RM 1.677
Station Elevation Data num= 54

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	992.83	5000.1	992.5	5004.7	992.4	5005.3	992.2	5006.3	992.4
5011.2	991.8	5011.8	991.8	5019.1	992.5	5019.9	992.5	5020.1	991.8
5022.7	992.6	5026.5	992.5	5029.9	992.3	5038.9	992.3	5042.8	992.4
5050.9	992.4	5056.1	991.9	5056.6	991.9	5059.1	991.9	5070.8	992.2
5095.8	991.6	5238.3	991.5	5241.6	992.1	5243.2	992.3	5244	992.5
5245.7	992.5	5265	992.5	5271.2	989.2	5276.2	987.1	5279.3	988.7
5284.5	991	5292.3	990.6	5296.7	990.6	5305.6	989.6	5306.8	989.5
5316.3	989.5	5522.8	990	5861.9	990.8	6267.5	991.7	6268.8	992
6271.9	992.6	6275.1	991.4	6275.4	991.3	6275.7	991.4	6279.8	992.1
6286.6	991.9	6292.2	991.6	6293.1	991.2	6295.5	990.1	6296.1	990.2
6300	990.7	6370.6	991.2	6426.1	991.3	6600	991.9		

Manning's n Values num= 1

Sta	n Val
5000	.035

Bank Sta: Left 5000 Right 6600 Lengths: Left 500 Channel 500 Right 500 Coeff Contr. .1 Expan. .3

Right Levee Station= 6271.9 Elevation= 992.6

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5265	5284.5	991

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	990.75	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.035	
E.G. Elev (ft)	990.78	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	990.25	Flow Area (sq ft)		347.18	
E.G. Slope (ft/ft)	0.001656	Area (sq ft)		347.18	
Q Total (cfs)	440.00	Flow (cfs)		440.00	
Top Width (ft)	552.53	Top Width (ft)		552.53	
Vel Total (ft/s)	1.27	Avg. Vel. (ft/s)		1.27	
Max Chl Dpth (ft)	1.25	Hydr. Depth (ft)		0.63	
Conv. Total (cfs)	10812.1	Conv. (cfs)		10812.1	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		552.59	
Min Ch El (ft)	989.50	Shear (lb/sq ft)		0.06	
Alpha	1.00	Stream Power (lb/ft s)		0.08	
Frctn Loss (ft)	1.77	Cum Volume (acre-ft)	3.85	90.41	
C & E Loss (ft)	0.01	Cum SA (acres)	8.21	92.89	

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

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

CROSS SECTION RIVER: Southern Pacific

REACH: Tolleson 2 RS: 1.582

INPUT

Description: RM 1.582

Station Elevation Data num= 66

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	990.7	5000.5	990.7	5000.7	990.7	5001.2	990.9	5004.9	990.5
5006.4	990.1	5011.8	990.3	5015.3	990.3	5019.8	989.3	5021.2	989
5050.5	987.9	5050.7	987.9	5051.1	987.9	5100.7	987.7	5104.2	987.7
5147.3	987.8	5156.3	985.8	5159.8	985.7	5170.7	985.8	5179.4	987.8
5197.4	987.5	5200.7	987.5	5203.8	987.5	5228.4	987.9	5232.7	988.1
5243.1	989	5255.7	989.1	5261.5	989	5267.7	987	5272.4	985.4
5274.3	986.3	5279	988.8	5288.2	988.8	5291.8	988.7	5296.8	988.4
5300.7	988.2	5304.1	988.2	5329.8	988	5460.1	988.6	5488.1	988.7
5658.2	988.6	5676.7	988.6	5759.7	988.8	5915.1	989.5	5930.2	989.4
6071.4	989.5	6110.4	989.5	6196	989.5	6238.9	989.6	6255.5	989.6
6257.7	990	6261.3	990.5	6262.7	990	6264.6	989.1	6267.8	990.4
6268.5	990.7	6276.6	990.4	6282.9	990.2	6284.9	989.3	6286.6	988.5
6288.9	988.9	6292.4	989.4	6331.2	989.5	6433	989.6	6463.9	989.7
6600	989.7								

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5300.7	.035

Bank Sta: Left 5000 Right 6600 Lengths: Left 500 Channel 500 Right 500 Coeff Contr. .1 Expan. .3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5000	5255.7	989.1

Right Levee Station= 6268.5 Elevation= 990.7

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5050	5180	992	5256	5280	989

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	988.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.035	
E.G. Elev (ft)	989.00	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	988.83	Flow Area (sq ft)		184.04	
E.G. Slope (ft/ft)	0.012013	Area (sq ft)		265.57	
Q Total (cfs)	440.00	Flow (cfs)		440.00	
Top Width (ft)	592.40	Top Width (ft)		592.40	
Vel Total (ft/s)	2.39	Avg. Vel. (ft/s)		2.39	
Max Chl Dpth (ft)	1.41	Hydr. Depth (ft)		0.37	
Conv. Total (cfs)	4014.4	Conv. (cfs)		4014.4	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		504.09	
Min Ch El (ft)	987.50	Shear (lb/sq ft)		0.27	
Alpha	1.00	Stream Power (lb/ft s)		0.65	
Frctn Loss (ft)	1.92	Cum Volume (acre-ft)	3.85	86.89	
C & E Loss (ft)	0.02	Cum SA (acres)	8.21	86.32	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Note - Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 1.487

INPUT
Description: RM 1.487
Station Elevation Data num= 42

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	988.7	5003.7	988.8	5004.3	988.6	5004.5	988.9	5007.3	988.5
5008.2	988.5	5009.6	988.5	5017.2	988.5	5019.2	988.3	5022.1	987.9
5053.7	988.2	5077.3	988.2	5153.2	988.1	5153.7	988.1	5154	988
5232.6	987	5255	986.9	5261.9	987.5	5266.6	988.2	5268.6	987
5275.7	983.1	5281.8	985.7	5285.5	987.4	5297.6	987.2	5298.4	987.2
5298.8	987.2	5305.3	986.1	5345	986.1	5365.7	986.1	5750.9	986.6
5824.8	986.8	5898.9	987.1	5966.7	987.1	6043.6	986.9	6112.4	987.1
6183.5	987.3	6244.7	987.4	6323.8	987.5	6378	987.6	6470.5	987.9
6556.1	987.9	6600	988						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5232.6	.04	5255	.03	5305.3	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	465	465	465	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5000	5266.6	988.2

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5060	5210	989	5262	5286	987.5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	987.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.035	
E.G. Elev (ft)	987.06	Reach Len. (ft)	465.00	465.00	465.00
Crit W.S. (ft)	986.63	Flow Area (sq ft)		361.67	
E.G. Slope (ft/ft)	0.001910	Area (sq ft)		363.75	
Q Total (cfs)	440.00	Flow (cfs)		440.00	
Top Width (ft)	708.95	Top Width (ft)		708.95	

Vel Total (ft/s)	1.22	Avg. Vel. (ft/s)			1.22
Max Chl Dpth (ft)	0.94	Hydr. Depth (ft)			0.53
Conv. Total (cfs)	10069.0	Conv. (cfs)			10069.0
Length Wtd. (ft)	465.00	Wetted Per. (ft)			682.26
Min Ch El (ft)	986.10	Shear (lb/sq ft)			0.06
Alpha	1.00	Stream Power (lb/ft s)			0.08
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)		3.85	83.28
C & E Loss (ft)	0.01	Cum SA (acres)		8.21	78.85

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 1.399

INPUT
Description: RM 1.399
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	988	5007.3	987	5014.4	987	5016.9	986.8	5020.9	986.2
5038.3	986.3	5051.7	986.3	5063.5	986.1	5077.7	986	5080.1	985.8
5095.1	984.9	5119.1	985	5143.9	985.1	5168.5	985.1	5196.3	985.3
5210.6	985.4	5242.1	985.2	5251.8	985.3	5261	986.2	5265.6	986.5
5270.8	983.1	5273.8	981.1	5275.4	982	5281.5	985.6	5287.4	985.7
5296.7	985.9	5300.8	985.4	5304.9	984.5	5307.6	984.5	5311.5	984.5
5313.2	984.5	5315.8	984.6	5388.8	985.8	5510.6	984.8	5516.2	984.8
5677.4	985.1	5679	985.1	5682.2	985.1	5835.6	985.5	5836.4	985.5
5977.2	985.6	5978.5	985.6	6121.8	986	6123.2	986	6250.7	986.2
6252.4	986.2	6365.6	986.3	6558.4	987	6560.9	987	6562.9	987
6600	987.1								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.07	5251.8	.03	5300.8	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	66	66	66	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5155	988	5730	6600	988

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5150	5220	988	5265.5	5296	986

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	986.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.036	
E.G. Elev (ft)	986.97	Reach Len. (ft)	66.00	66.00	66.00
Crit W.S. (ft)	985.37	Flow Area (sq ft)		902.11	
E.G. Slope (ft/ft)	0.000063	Area (sq ft)		1874.70	
Q Total (cfs)	440.00	Flow (cfs)		440.00	
Top Width (ft)	1463.93	Top Width (ft)		1463.93	
Vel Total (ft/s)	0.49	Avg. Vel. (ft/s)		0.49	
Max Chl Dpth (ft)	2.47	Hydr. Depth (ft)		1.77	
Conv. Total (cfs)	55317.1	Conv. (cfs)		55317.1	
Length Wtd. (ft)	66.00	Wetted Per. (ft)		512.09	
Min Ch El (ft)	984.50	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	3.85	71.33	
C & E Loss (ft)	0.02	Cum SA (acres)	8.21	67.26	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 1.387

INPUT
Description: RM 1.387, RSKD-440 CFS, 115th Ave.
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	988	5009.1	987.7	5009.4	987.7	5009.7	987.7	5010.8	987.7
5145.2	987.2	5151.7	987.1	5234.8	986.5	5241	986.4	5351.6	986.3
5368.4	986.3	5474.8	986.4	5505.4	986.5	5615.9	986.7	5659.6	986.8
5754.6	986.8	5822.9	987.4	5908.7	987.6	5963.8	987.5	6134.3	988
6148	988	6163.6	988	6220.1	988.3	6349.7	989	6370.6	988.9
6401.4	989	6590.4	988.7	6600	988.7				

Manning's n Values num= 1

Sta	n Val
5000	.015

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	59	59	59	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	986.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.		0.015	
E.G. Elev (ft)	986.94	Reach Len. (ft)	59.00	59.00	59.00
Crit W.S. (ft)	986.78	Flow Area (sq ft)		141.92	
E.G. Slope (ft/ft)	0.004872	Area (sq ft)		141.92	
Q Total (cfs)	450.00	Flow (cfs)		450.00	
Top Width (ft)	456.97	Top Width (ft)		456.97	
Vel Total (ft/s)	3.17	Avg. Vel. (ft/s)		3.17	
Max Chl Dpth (ft)	0.48	Hydr. Depth (ft)		0.31	
Conv. Total (cfs)	6447.1	Conv. (cfs)		6447.1	
Length Wtd. (ft)	59.00	Wetted Per. (ft)		456.97	
Min Ch El (ft)	986.30	Shear (lb/sq ft)		0.09	
Alpha	1.00	Stream Power (lb/ft s)		0.30	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	3.85	69.81	
C & E Loss (ft)	0.05	Cum SA (acres)	8.21	65.80	

Warning - The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 1.376

INPUT
Description: RM 1.376
surveyed top of rail included in cross section
Station Elevation Data num= 70

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	987.3	5014.3	987.1	5018.6	987.1	5028.7	986.3	5031.1	986.2
5042.6	985.7	5058.6	984.3	5059.2	984.3	5075.1	984.4	5077.7	984.1
5089.9	983.6	5092.9	983.6	5094.6	983.6	5097.7	983.4	5108.5	983.4
5119.9	983.5	5173.3	983.8	5191.3	983.8	5208.6	983.9	5279.7	984
5293.1	984	5305.8	983.9	5368.2	984	5384.4	984	5435.5	984.3
5453.9	984.5	5471.7	984.4	5534.8	984.6	5545.5	984.7	5555.7	984.7
5631.2	984.7	5640.2	984.7	5648.8	984.7	5758.8	985.1	5769.7	985.1
5780.2	985.1	5851.3	985.5	5859.7	985.5	5867.8	985.5	5972.1	985.6
5975	985.6	5977.7	985.7	5980.4	985.7	6041.3	985.8	6087.2	986
6088.6	986	6090.1	986	6178.3	985.8	6179.7	985.8	6210.2	986.2
6222.6	986.3	6232.4	986.4	6245.8	988	6250.7	988.1	6258.3	988.2

6274.6	988.4	6282.5	988.3	6293.7	988.5	6301.4	988.5	6307.8	988.6
6323.6	988.8	6336	988.5	6342.4	988.4	6374.3	988.3	6403.8	988.4
6432.9	988.4	6461.5	988.6	6489.6	988.8	6561.1	988.3	6600	988.3

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5108.5	.035	6222.6	.03	6323.6	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	410	410	410	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5185	987	5585	6600	987

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	986.38	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.035	
E.G. Elev (ft)	986.38	Reach Len. (ft)	410.00	410.00	410.00
Crit W.S. (ft)	984.47	Flow Area (sq ft)		872.73	
E.G. Slope (ft/ft)	0.000052	Area (sq ft)		1830.58	
Q Total (cfs)	450.00	Flow (cfs)		450.00	
Top Width (ft)	1202.40	Top Width (ft)		1202.40	
Vel Total (ft/s)	0.52	Avg. Vel. (ft/s)		0.52	
Max Chl Dpth (ft)	2.98	Hydr. Depth (ft)		2.18	
Conv. Total (cfs)	62328.1	Conv. (cfs)		62328.1	
Length Wtd. (ft)	410.00	Wetted Per. (ft)		400.00	
Min Ch El (ft)	983.40	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	3.85	68.47	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	64.68	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 1.298

INPUT
Description: RM 1.298, INTERPOLATED Q=360 CFS, Begin DILA Q=120 CFS TO SOUTH DIVERSION

Station Elevation Data num= 86

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	986.2	5002.4	985.4	5003.2	985.4	5004.1	985.1	5011.2	983.9
5025.3	983.9	5025.7	983.9	5035.4	982.5	5039.7	982.5	5050.7	982.7
5100.6	983.1	5101	983.1	5150.6	984	5199.7	984	5200.6	984
5249.4	984.2	5250.6	984.2	5251.8	984.2	5300.6	984.1	5302.1	984.1
5350.6	984.3	5398.6	984.2	5400.6	984.2	5448.3	984.1	5450.6	984.1
5498.1	984.1	5500.6	984.1	5503.2	984.1	5550.6	984.6	5553.5	984.6
5600.6	984.4	5603.8	984.4	5650.6	984.7	5696.9	984.9	5700.6	984.9
5746.7	984.8	5750.6	984.8	5754.6	984.9	5758.6	984.9	5895.8	984.7
5900.6	984.7	5901.6	984.9	5906.2	984.9	5950.6	985.2	5995.3	985.2
6000.6	985.2	6045	985.1	6050.6	985.1	6056.3	985.1	6100.6	985.5
6106.5	985.5	6150.6	985.6	6194.2	985.7	6200.6	985.7	6203.3	985.7
6236	985.9	6239.2	986.6	6240.6	987	6241.4	986.4	6244.4	984.8
6250.2	987.1	6250.6	987.2	6251.9	987.3	6258.7	988	6266.5	987.2
6268	987.1	6268.6	986.9	6274.8	985.8	6277.8	986.4	6278.3	986.5
6281.3	986.5	6290.7	986.6	6300.6	986.7	6343.4	986.6	6350.6	986.5
6357.9	986.5	6400.6	986.3	6404.4	986.3	6423.7	986.6	6429.5	986.6
6446.8	986.7	6459.8	986.8	6470.8	986.5	6483.8	986.6	6522.1	986.4
6600	986.7								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.04	5050.7	.035	6236	.03	6274.8	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Right Levee Station= 6240.6 Elevation= 987

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	986.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.035	
E.G. Elev (ft)	986.37	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	983.73	Flow Area (sq ft)		2256.80	
E.G. Slope (ft/ft)	0.000006	Area (sq ft)		2256.80	
Q Total (cfs)	360.00	Flow (cfs)		360.00	
Top Width (ft)	1238.16	Top Width (ft)		1238.16	
Vel Total (ft/s)	0.16	Avg. Vel. (ft/s)		0.16	
Max Chl Dpth (ft)	3.87	Hydr. Depth (ft)		1.82	
Conv. Total (cfs)	142421.7	Conv. (cfs)		142421.7	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		1238.81	
Min Ch El (ft)	982.50	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	3.85	49.23	
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	53.19	

Warning - The cross-section end points had to be extended vertically for the computed water surface.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 1.203

INPUT
Description: RM 1.203, Interpolated Q=270 CFS, DILA Q=120 CFS TO SOUTH DIVERSION
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	985.8	5000.2	985.3	5005.1	985.2	5010.3	984.3	5011.8	984
5016.3	983.9	5025.3	983.9	5029.9	982.7	5032.1	982.2	5037.4	982.4
5050.2	982.7	5100.2	983.3	5100.4	983.3	5150.2	983.8	5150.5	983.8
5190.6	983.8	5200.7	983.8	5393.8	984.2	5425.1	984.3	5474.2	984.5
5505.6	984.6	5536.9	984.5	5581.2	984.6	5612.6	984.7	5643.9	984.8
5675.3	984.9	5727.2	985.1	5765.4	985.3	5954.1	985.6	6157.6	985.5
6196.9	985.5	6200.2	985.5	6201.5	985.5	6234.8	985.8	6239.6	987.3
6243	984.8	6246	986.3	6248.6	987.3	6252.1	987.9	6255.5	988
6255.9	988	6266.2	987.2	6269.3	986.5	6272.2	985.8	6275.5	986.2
6276.5	986.3	6281.6	986.4	6300.2	986.5	6346.4	986.4	6350.2	986.4
6396.3	986.3	6400.2	986.3	6443.1	986.7	6443.2	986.7	6479.4	987
6508.2	986.8	6531.6	987.1	6550.9	987.1	6567.2	987.2	6600	987.2

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.04	5050.2	.035	6234.8	.03	6281.6	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	345	345	345	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5500	6600	987

Right Levee Station= 6239.6 Elevation= 987.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	986.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.036	
E.G. Elev (ft)	986.37	Reach Len. (ft)	345.00	345.00	345.00
Crit W.S. (ft)	983.62	Flow Area (sq ft)		1250.62	
E.G. Slope (ft/ft)	0.000008	Area (sq ft)		2069.04	
Q Total (cfs)	270.00	Flow (cfs)		270.00	
Top Width (ft)	1236.62	Top Width (ft)		1236.62	
Vel Total (ft/s)	0.22	Avg. Vel. (ft/s)		0.22	
Max Chl Dpth (ft)	4.17	Hydr. Depth (ft)		2.50	
Conv. Total (cfs)	96247.9	Conv. (cfs)		96247.9	
Length Wtd. (ft)	345.00	Wetted Per. (ft)		501.24	
Min Ch El (ft)	982.20	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	3.85	24.41	

C & E Loss (ft)	0.01	Cum SA (acres)	8.21	38.99

Warning - The cross-section end points had to be extended vertically for the computed water surface.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 1.138

INPUT
Description: RM 1.138, CPKA2-220 CFS, End DILA Q=120 SOUTH DIVERSION,

surveyed top of rail included in cross section
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	985.9	5033	984.2	5086	986.5	5168	986.2	5270	986.1
5375	986.4	5475	986.7	5578	986.7	5683	986.4	5785	986.5
5887	986.6	5990	986.8	6092	986.9	6196	987	6299	988.2

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.04	5086	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6299	38	38	38	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	986.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.040	
E.G. Elev (ft)	986.36	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)		Flow Area (sq ft)		115.72	
E.G. Slope (ft/ft)	0.003117	Area (sq ft)		115.72	
Q Total (cfs)	220.00	Flow (cfs)		220.00	
Top Width (ft)	280.71	Top Width (ft)		280.71	
Vel Total (ft/s)	1.90	Avg. Vel. (ft/s)		1.90	
Max Chl Dpth (ft)	2.10	Hydr. Depth (ft)		0.41	
Conv. Total (cfs)	3940.4	Conv. (cfs)		3940.4	
Length Wtd. (ft)		Wetted Per. (ft)		281.20	
Min Ch El (ft)	984.20	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)		0.15	
Frctn Loss (ft)		Cum Volume (acre-ft)	3.85	15.76	
C & E Loss (ft)		Cum SA (acres)	8.21	32.98	

Warning - Divided flow computed for this cross-section.
Warning - The cross-section end points had to be extended vertically for the computed water surface.
Note - The user has entered a known water surface elevation at this cross section.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 1.131

INPUT
Description: RM 1.131
Station Elevation Data num= 66

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	985.89	5000.1	985.8	5002.3	985.1	5004.8	985.2	5007.7	984.7
5013	984	5021.3	984.2	5027.4	984.4	5029.8	984.4	5040.8	984.4
5044.6	983.4	5048	982.4	5052.7	983.8	5056.3	984.9	5059.7	984.6
5060.2	984.5	5068	984.7	5083.3	984.7	5088.7	984.7	5100.3	984.7
5139.5	984.8	5147.1	984.9	5154.6	984.8	5272.7	985	5279.7	985
5286.7	985	5293.6	985.1	5406.2	985.2	5414	985.2	5421.7	985.2
5429.3	985.2	5601.2	985.5	5607.9	985.5	5614.5	985.6	5621	985.6
5627.4	985.6	5738.6	985.7	5745.5	985.7	5752.5	985.7	5848	985.8
5857.1	985.8	5866	985.8	5962.7	985.9	5972.7	985.9	5982.6	986
5992.4	985.9	6002.1	986	6167.2	986.2	6175.3	986.2	6183.4	986.2
6243.7	986.3	6249.1	986.3	6253.9	986.3	6262.9	986.7	6269	986.9
6280.9	987.3	6286.1	987.6	6288.1	987.7	6292	987.5	6294.5	987.5
6349.7	987.5	6358	987.5	6370.7	987.5	6515.8	987.8	6554.5	988

```
    6600   988.2

Manning's n Values          num=       2
     Sta   n Val     Sta   n Val
    5000     .04  5052.7    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          5000    6600              120     120     120            .1        .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
    5090    6600     986

CROSS SECTION OUTPUT    Profile #PF#1

  W.S. Elev (ft)              985.55   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                 0.07   Wt. n-Val.                            0.039
  E.G. Elev (ft)              985.62   Reach Len. (ft)            120.00    120.00     120.00
  Crit W.S. (ft)              984.91   Flow Area (sq ft)                    105.32
  E.G. Slope (ft/ft)        0.002282   Area (sq ft)                         334.09
  Q Total (cfs)               220.00   Flow (cfs)                           220.00
  Top Width (ft)              610.61   Top Width (ft)                       610.61
  Vel Total (ft/s)              2.09   Avg. Vel. (ft/s)                       2.09
  Max Chl Dpth (ft)             3.15   Hydr. Depth (ft)                       1.18
  Conv. Total (cfs)           4605.0   Conv. (cfs)                         4605.0
  Length Wtd. (ft)            120.00   Wetted Per. (ft)                      89.96
  Min Ch El (ft)              982.40   Shear (lb/sq ft)                       0.17
  Alpha                         1.00   Stream Power (lb/ft s)                 0.35
  Frctn Loss (ft)               0.24   Cum Volume (acre-ft)         3.85      15.56
  C & E Loss (ft)               0.01   Cum SA (acres)               8.21      32.59


CROSS SECTION          RIVER: Southern Pacific
REACH: Tolleson 2         RS: 1.109

INPUT
Description: RM 1.109
Station Elevation Data      num=      27
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    5000  985.93  5000.1   985.9    5015   984.1    5020   984.5    5040   984.4
    5045   984.4    5050   981.9    5060   984.5    5100   984.3    5150   984.7
    5200   984.6    5350   985.2    5450   985.4    5500   985.1    5550   985.4
    5650   985.3    5700   985.6    5750   985.6    5900   985.3    6050   985.8
    6100   985.6    6200   985.9    6350   985.4    6400   985.6    6475   985.5
    6500   985.3    6600   985.8

Manning's n Values          num=       2
     Sta   n Val     Sta   n Val
    5000     .04    5050    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          5000    6600              500     500     500            .1        .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
    5125    6600     986
Right Levee     Station=    5700      Elevation=   985.6

CROSS SECTION OUTPUT    Profile #PF#1

  W.S. Elev (ft)              985.33   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                 0.05   Wt. n-Val.                            0.037
  E.G. Elev (ft)              985.38   Reach Len. (ft)            500.00    500.00     500.00
  Crit W.S. (ft)              984.71   Flow Area (sq ft)                    126.56
  E.G. Slope (ft/ft)        0.001719   Area (sq ft)                         257.69
  Q Total (cfs)               220.00   Flow (cfs)                           220.00
  Top Width (ft)              525.92   Top Width (ft)                       525.92
  Vel Total (ft/s)              1.74   Avg. Vel. (ft/s)                       1.74
  Max Chl Dpth (ft)             3.43   Hydr. Depth (ft)                       1.05
  Conv. Total (cfs)           5305.6   Conv. (cfs)                         5305.6
  Length Wtd. (ft)            500.00   Wetted Per. (ft)                     121.21
  Min Ch El (ft)              981.90   Shear (lb/sq ft)                       0.11
  Alpha                         1.00   Stream Power (lb/ft s)                 0.19
```

Frctn Loss (ft)	1.40	Cum Volume (acre-ft)	3.85	14.74
C & E Loss (ft)	0.00	Cum SA (acres)	8.21	31.03

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 1.014

INPUT
Description: RM 1.014
Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	986	5004.5	985.4	5012.3	983.7	5013.1	983.5	5014.1	983.5
5024.6	983.5	5033.4	983.5	5033.8	983.5	5034.3	983.3	5040.1	981.5
5043.2	982.5	5046.2	983.5	5052.1	983	5052.3	983	5097.3	983.6
5147.3	983.6	5197.3	983.5	5247.3	983.7	5247.4	983.7	5297.3	983.7
5347.3	984.3	5397.2	984	5397.3	984	5397.4	984	5447.4	984
5497.3	984	5547.3	984.2	5597.3	984.3	5647.3	984.2	5697.4	984.2
5747.3	984.3	5747.4	984.3	5797.3	984.4	5847.2	984.3	5847.3	984.3
5897.4	984.1	5947.4	984.1	5997.3	984.6	6047.2	984.2	6047.3	984.2
6097.2	984.7	6097.3	984.7	6097.4	984.7	6147.4	984.3	6197.4	984.5
6247.3	984.5	6297.1	984.1	6297.3	984.1	6347.4	983.9	6397.4	984.1
6447.3	984.2	6497.3	984.2	6547.4	984.4	6597.4	984.4	6600	984.5

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.04	5052.1	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5597.3	6600	500	500	500	.1	.3

Right Levee Station= 5997.3 Elevation= 984.6

CROSS SECTION OUTPUT Profile #PF#1

			Left OB	Channel	Right OB
W.S. Elev (ft)	983.93	Element			
Vel Head (ft)	0.05	Wt. n-Val.	0.037		
E.G. Elev (ft)	983.98	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	983.76	Flow Area (sq ft)	126.94		
E.G. Slope (ft/ft)	0.005295	Area (sq ft)	126.94		
Q Total (cfs)	220.00	Flow (cfs)	220.00		
Top Width (ft)	305.65	Top Width (ft)	305.65		
Vel Total (ft/s)	1.73	Avg. Vel. (ft/s)	1.73		
Max Chl Dpth (ft)	2.43	Hydr. Depth (ft)	0.42		
Conv. Total (cfs)	3023.3	Conv. (cfs)	3023.3		
Length Wtd. (ft)	500.00	Wetted Per. (ft)	306.36		
Min Ch El (ft)	983.90	Shear (lb/sq ft)	0.14		
Alpha	1.00	Stream Power (lb/ft s)	0.24		
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	3.12	13.27	
C & E Loss (ft)	0.01	Cum SA (acres)	6.45	28.01	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 0.919

INPUT
Description: RM 0.919
Station Elevation Data num= 82

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	984.7	5000.3	984.1	5000.4	984.1	5003	984.1	5004.1	984.1
5005.7	983.8	5011.5	982.3	5019	982.6	5021.9	982.8	5028.8	983
5035.3	983	5038.2	981.9	5041.4	980.9	5045.6	982.3	5046.7	982.8

5047.7	982.6	5051.7	981.9	5091.8	982.4	5095.9	982.5	5096.7	982.5
5096.9	982.5	5146.7	982.3	5196.3	982.5	5196.7	982.5	5246.2	982.8
5246.7	982.8	5296.1	982.8	5296.7	982.8	5297.4	982.8	5346.7	983.1
5347.5	983.1	5396.7	983	5445.7	982.9	5446.7	982.9	5495.6	983
5496.7	983	5497.9	983	5546.7	983	5548	983	5596.7	983.2
5645.1	983	5646.7	983	5695	983	5696.7	983	5744.9	983.1
5746.7	983.1	5748.5	983.1	5796.7	983.5	5798.6	983.5	5846.7	982.9
5894.6	983.4	5896.7	983.4	5944.4	983.1	5946.7	983.1	5949	983.1
5996.7	983.4	5999.1	983.4	6046.7	983.2	6049.3	983.2	6096.7	983.6
6143.9	983.4	6146.7	983.4	6193.8	983.5	6196.7	983.6	6199.6	983.5
6246.7	983.3	6249.8	983.3	6296.7	982.9	6299.9	982.9	6346.7	983
6393.3	983	6396.7	983	6400.1	983	6446.7	983	6450.3	983.1
6496.7	983.4	6500.4	983.4	6546.7	983.2	6592.7	983.1	6596.7	983.1
6600	983.1	6780	984						

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.04	5051.7	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5596.7	6780	195	195	195	.1	.3

Right Levee Station= 5996.7 Elevation= 983.4

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	983.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.036	0.035	
E.G. Elev (ft)	983.27	Reach Len. (ft)	195.00	195.00	195.00
Crit W.S. (ft)	982.66	Flow Area (sq ft)	300.13	49.52	
E.G. Slope (ft/ft)	0.000638	Area (sq ft)	300.13	49.52	
Q Total (cfs)	220.00	Flow (cfs)	203.64	16.36	
Top Width (ft)	878.64	Top Width (ft)	588.91	289.72	
Vel Total (ft/s)	0.63	Avg. Vel. (ft/s)	0.68	0.33	
Max Chl Dpth (ft)	2.36	Hydr. Depth (ft)	0.51	0.17	
Conv. Total (cfs)	8706.6	Conv. (cfs)	8059.1	647.6	
Length Wtd. (ft)	195.00	Wetted Per. (ft)	589.83	289.73	
Min Ch El (ft)	982.90	Shear (lb/sq ft)	0.02	0.01	
Alpha	1.10	Stream Power (lb/ft s)	0.01	0.00	
Frctn Loss (ft)	0.35	Cum Volume (acre-ft)	0.67	12.98	
C & E Loss (ft)	0.01	Cum SA (acres)	1.32	26.35	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 0.883

INPUT
Description: RM 0.883
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	984	5020	983	5058	982.3	5190	982.3	5280	984
5325	984	5538	983	5730	983	5815	982.1	5990	982.2
6420	982.5	6925	984	7380	984	7488	984.3		

Manning's n Values num= 1

Sta	n Val
5000	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	7488	305	305	305	.1	.3

Right Levee Station= 5280 Elevation= 984

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	982.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.035	
E.G. Elev (ft)	982.90	Reach Len. (ft)	305.00	305.00	305.00

Crit W.S. (ft)	982.71	Flow Area (sq ft)	71.23
E.G. Slope (ft/ft)	0.018331	Area (sq ft)	71.23
Q Total (cfs)	220.00	Flow (cfs)	220.00
Top Width (ft)	180.83	Top Width (ft)	180.83
Vel Total (ft/s)	3.09	Avg. Vel. (ft/s)	3.09
Max Chl Dpth (ft)	0.66	Hydr. Depth (ft)	0.39
Conv. Total (cfs)	1624.9	Conv. (cfs)	1624.9
Length Wtd. (ft)	305.00	Wetted Per. (ft)	180.84
Min Ch El (ft)	982.10	Shear (lb/sq ft)	0.45
Alpha	1.00	Stream Power (lb/ft s)	1.39
Frctn Loss (ft)	3.20	Cum Volume (acre-ft)	12.71
C & E Loss (ft)	0.00	Cum SA (acres)	25.29

Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 0.824

INPUT
Description: RM 0.824
Station Elevation Data num= 80

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	982.3	5000.4	981.6	5000.7	981.6	5005.1	981.6	5006.2	981.6
5007.4	981.6	5009.3	981.5	5010.2	981.4	5011.4	981.4	5016.6	980.9
5018.8	980.8	5020.5	979.6	5025	976.5	5031.5	979.8	5032.6	980.4
5033.4	980.8	5034.5	980.8	5035.2	980.8	5036.8	980.8	5045.6	981
5046.9	981	5047.2	981	5059	980.7	5066.5	980.6	5072.5	980.3
5079.3	980.2	5086.9	980.9	5087	980.9	5094.6	979.6	5112.3	979.1
5123.8	978.9	5143.3	978.4	5219.7	980.2	5247.7	980.5	5302.2	980.1
5388.1	979.1	5398.6	979.2	5412.7	979.1	5417.3	979.1	5418.5	979.1
5424.2	979.2	5485.3	979.3	5511.5	979.4	5535.1	979.5	5556.4	979.4
5623.2	979.5	5652.8	979.2	5680.5	978.9	5716.1	978.8	5746.8	978.8
5776	979.1	5816.3	979.1	5849.5	978.9	5881.3	978.9	5912.5	978.7
5946.6	978	5979.5	978.6	6020.1	978.7	6054.5	978.5	6087.9	979.1
6120.2	978.9	6156.2	978.8	6190.6	978.6	6212	978.5	6246.6	978.5
6254.9	978.7	6289.5	978.7	6296.8	978.6	6312.6	978.5	6320	978.5
6390	978.3	6447	980	6460	978	6484	977.8	6508	978
6600	978.5	6660	978.4	6725	978.5	6790	978.3	6830	978.6

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.04	5047.2	.03	5412.7	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6830	500	500	500	.1	.3

Right Levee Station= 5247.7 Elevation= 980.5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	979.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.033	
E.G. Elev (ft)	979.70	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	979.33	Flow Area (sq ft)		72.24	
E.G. Slope (ft/ft)	0.006841	Area (sq ft)		72.24	
Q Total (cfs)	220.00	Flow (cfs)		220.00	
Top Width (ft)	106.79	Top Width (ft)		106.79	
Vel Total (ft/s)	3.05	Avg. Vel. (ft/s)		3.05	
Max Chl Dpth (ft)	3.06	Hydr. Depth (ft)		0.68	
Conv. Total (cfs)	2659.8	Conv. (cfs)		2659.8	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		108.50	
Min Ch El (ft)	976.50	Shear (lb/sq ft)		0.28	
Alpha	1.00	Stream Power (lb/ft s)		0.87	
Frctn Loss (ft)	3.71	Cum Volume (acre-ft)		12.21	
C & E Loss (ft)	0.01	Cum SA (acres)		24.28	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 0.730

INPUT
Description: RM 0.730
Station Elevation Data num= 75

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	978.8	5002.6	978.8	5018.5	976.3	5025.9	975	5028.8	973
5032.4	970.7	5035.9	972.2	5041.3	975.4	5041.9	975.2	5043.9	975.3
5054.8	975.4	5055	975.4	5060.5	975.5	5091.3	976	5092.3	976
5141.3	975.8	5142.7	975.8	5191.2	975.9	5193.1	975.9	5241.2	975.8
5288.6	975.7	5291.3	975.7	5338.2	976	5341.3	976	5344.4	976
5391.3	975.7	5437.4	975.8	5441.3	975.8	5445.2	975.8	5491.3	975.4
5495.7	975.5	5541.3	975.9	5546.1	975.9	5591.3	976	5596.5	976.1
5641.2	976	5685.3	975.6	5691.3	975.5	5734.9	975.5	5741.3	975.5
5747.7	975.5	5791.3	975.8	5798.2	975.8	5841.3	975.8	5848.6	975.8
5891.3	975.7	5899	975.7	5941.3	975.6	5982.9	975.3	5991.3	975.3
6030	975.7	6038.6	975.7	6082.2	975.8	6091.3	975.8	6100.7	975.8
6141.3	975.9	6181.3	975.9	6191.3	976	6201.5	975.9	6241.3	975.7
6251.9	975.7	6291.3	975.6	6330	975.9	6341.3	975.9	6352.7	975.8
6391.3	975.8	6429.2	975.2	6441.3	975.1	6453.6	975	6491.3	974.8
6528.4	974.9	6541.3	975.1	6578	975	6591.3	974.9	6600	974.8

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.04	5054.8	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Right Levee Station= 5091.3 Elevation= 976

CROSS SECTION OUTPUT Profile #PF#1

			Left OB	Channel	Right OB
W.S. Elev (ft)	975.72	Element			
Vel Head (ft)	0.26	Wt. n-Val.		0.040	
E.G. Elev (ft)	975.98	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	974.57	Flow Area (sq ft)		54.21	
E.G. Slope (ft/ft)	0.008041	Area (sq ft)		54.21	
Q Total (cfs)	220.00	Flow (cfs)		220.00	
Top Width (ft)	52.56	Top Width (ft)		52.56	
Vel Total (ft/s)	4.06	Avg. Vel. (ft/s)		4.06	
Max Chl Dpth (ft)	5.02	Hydr. Depth (ft)		1.03	
Conv. Total (cfs)	2453.4	Conv. (cfs)		2453.4	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		55.14	
Min Ch El (ft)	970.70	Shear (lb/sq ft)		0.49	
Alpha	1.00	Stream Power (lb/ft s)		2.00	
Frctn Loss (ft)	4.58	Cum Volume (acre-ft)		11.48	
C & E Loss (ft)	0.03	Cum SA (acres)		23.37	

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 0.635

INPUT
Description: RM 0.635
Station Elevation Data num= 84

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	977.6	5006.2	976.2	5029.6	970.9	5030.4	970.7	5031.7	970
5037.9	966.3	5042.7	968.8	5048.1	971.5	5048.2	971.5	5048.6	971.6
5058.9	971.6	5060.8	971.6	5061.8	971.6	5063.9	971.6	5093.3	972.2
5093.8	972.2	5107.7	972.3	5143.7	972.5	5143.9	972.5	5193.7	972.1
5243.2	972.5	5243.7	972.5	5244.3	972.5	5293.7	972.1	5294.5	972.1
5343.8	972.2	5344.7	972.2	5393.8	972.4	5394.9	972.4	5443.7	971.9
5492.2	972	5493.8	972.1	5542	972.4	5543.8	972.4	5591.8	972.3

5593.7	972.3	5641.6	972.1	5643.7	972.1	5645.9	972.1	5693.7	972.2
5741.1	972.3	5743.7	972.3	5746.3	972.3	5793.8	972.7	5840.8	972.2
5843.7	972.2	5846.7	972.3	5893.8	972.6	5896.9	972.6	5943.7	972.4
5947.2	972.4	5993.8	972.1	5997.4	972.1	6043.8	972.6	6089.8	973
6093.8	973	6097.8	973	6143.7	972.6	6148	972.6	6193.8	972.7
6198.2	972.7	6243.8	972.6	6288.9	972.6	6293.7	972.6	6338.8	972.6
6343.7	972.6	6352.5	972.5	6395	972.2	6397.9	972.3	6404	972.4
6426.5	972.6	6428.6	972.6	6434.1	972.7	6442.9	972.7	6444.3	972.6
6447.4	972.7	6454.7	972.7	6498.6	972.7	6499.8	972.8	6516.3	972.7
6575.3	972.6	6588.5	972.7	6594	972.8	6600	972.8		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.04	5048.6	.03	5093.3	.035	6404	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Right Levee Station= 5143.7 Elevation= 972.5

CROSS SECTION OUTPUT Profile #PF#1

			Left OB	Channel	Right OB
W.S. Elev (ft)	970.83	Element			
Vel Head (ft)	0.55	Wt. n-Val.		0.040	
E.G. Elev (ft)	971.37	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	970.22	Flow Area (sq ft)		37.10	
E.G. Slope (ft/ft)	0.010565	Area (sq ft)		37.10	
Q Total (cfs)	220.00	Flow (cfs)		220.00	
Top Width (ft)	16.87	Top Width (ft)		16.87	
Vel Total (ft/s)	5.93	Avg. Vel. (ft/s)		5.93	
Max Chl Dpth (ft)	4.53	Hydr. Depth (ft)		2.20	
Conv. Total (cfs)	2140.3	Conv. (cfs)		2140.3	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		19.17	
Min Ch El (ft)	966.30	Shear (lb/sq ft)		1.28	
Alpha	1.00	Stream Power (lb/ft s)		7.57	
Frctn Loss (ft)	2.28	Cum Volume (acre-ft)		10.96	
C & E Loss (ft)	0.16	Cum SA (acres)		22.97	

Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 0.540

INPUT
Description: RM 0.540
Station Elevation Data num= 75

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	973.9	5003.5	973.9	5004.5	973.9	5006.4	973.5	5008.4	973.1
5013.4	972.2	5028.7	969.2	5033.4	965.9	5035	964.7	5036.6	965.5
5041.6	968.3	5044.7	968.4	5045	968.5	5048.4	968.8	5055.6	968.8
5059.6	968.8	5083.1	968.8	5090.6	968.8	5091.4	968.7	5139.4	968.6
5144.2	968.6	5192.4	968.4	5239.8	968.6	5286.5	968.1	5294.6	968.1
5341.6	968.2	5387.9	968.1	5396.1	968.1	5442.4	968	5488	968.2
5499.1	968.3	5544.9	968.6	5590	968.3	5634.4	968.4	5649.9	968.4
5694.6	968.5	5738.7	968	5782.2	968.4	5800	968.5	5843.7	968.4
5886.9	968.8	5929.4	968.5	5947.7	968.5	5990.4	968.6	6032.5	968.9
6058	968.9	6100.6	968.8	6142.6	968.6	6151.7	968.6	6191.9	968.6
6231.6	969	6241.8	969	6281.7	968.8	6292.1	968.8	6332	968.7
6341.9	968.6	6381.6	968.9	6396.1	969	6416.9	969.1	6419.9	969.5
6430.2	969.4	6431.7	969.3	6434.6	968.3	6436.6	967.4	6437.7	968.1
6440.2	969.9	6447.6	968.8	6448.4	968.6	6453.8	968.6	6491.8	968.6
6502	968.8	6541.8	969.4	6581.1	969.9	6591.8	970	6600	969.8

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val

5000	.05	5048.4	.035	6416.9	.03	6453.8	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	500	500	500	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
5350	6600	970

Right Levee Station= 6231.6 Elevation= 969

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	968.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.039	
E.G. Elev (ft)	968.93	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	968.56	Flow Area (sq ft)		162.14	
E.G. Slope (ft/ft)	0.002535	Area (sq ft)		547.37	
Q Total (cfs)	220.00	Flow (cfs)		220.00	
Top Width (ft)	1193.12	Top Width (ft)		1193.12	
Vel Total (ft/s)	1.36	Avg. Vel. (ft/s)		1.36	
Max Chl Dpth (ft)	4.21	Hydr. Depth (ft)		0.51	
Conv. Total (cfs)	4369.4	Conv. (cfs)		4369.4	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		323.19	
Min Ch El (ft)	964.70	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)		0.11	
Frctn Loss (ft)	2.40	Cum Volume (acre-ft)		7.60	
C & E Loss (ft)	0.01	Cum SA (acres)		16.03	

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

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

Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

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

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 0.446

INPUT
Description: RM 0.446
Station Elevation Data num= 94

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	970.5	5017.2	967.8	5034	965.2	5034.2	965.2	5035.8	965.3
5039.3	965.4	5040.4	965.1	5046.5	963.2	5048	963.7	5059.4	967.2
5063.7	967.1	5068.9	966.9	5082.5	965.9	5084	965.9	5129	966.5
5134	966.5	5139.3	966.5	5184	966.8	5191	966.8	5234	966.8
5274.5	966.5	5284.1	966.4	5323	966.3	5334.1	966.4	5371.5	966.5
5384.1	966.4	5397.6	966.3	5434.2	966.1	5468.5	966.4	5484.2	966.4
5500.9	966.4	5534.2	966.2	5565.5	966.3	5584.2	966.4	5614	966.4
5634.2	966.3	5662.5	966.2	5684.3	966	5711	966	5734.3	966
5759.5	966.1	5784.4	966.1	5810.8	966.2	5834.4	966.3	5856.5	966.1
5884.4	966.1	5914	966.1	5934.4	966.3	5938.6	966.1	5971.7	965.9
5984.4	966.1	6017.4	966.6	6034.5	966.7	6046.5	966.5	6082.2	966.6
6084.5	966.7	6120.6	966.7	6134.5	966.7	6147.5	966.8	6184.5	966.8
6192.7	966.7	6232.2	966.6	6234.6	966.7	6275.6	966.5	6284.6	966.4
6327.2	966.5	6334.6	966.5	6336.2	966.5	6380.4	966.8	6383.4	966.8
6384.6	966.8	6385.5	966.8	6392.3	966.9	6412.9	966.9	6421.5	966.7
6426.1	966.4	6427.2	966	6434.6	963.6	6435.3	963.4	6438.1	965.3
6438.5	965.3	6444.4	964.9	6446.4	964.8	6447.7	964.7	6449.6	964.7
6483.3	964.3	6484.3	964.3	6488	964.2	6533.2	965.1	6536.5	965.1
6561.1	964.8	6584	964.5	6584.7	964.5	6600	964.7		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.05	5048	.03	5129	.035	6412.9	.03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
5000 6600 310 310 310 .1 .3
Ineffective Flow num= 1
Sta L Sta R Elev
5600 6600 970
Right Levee Station= 6392.3 Elevation= 966.9

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	966.40	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.		0.041	
E.G. Elev (ft)	966.52	Reach Len. (ft)	310.00	310.00	310.00
Crit W.S. (ft)	966.40	Flow Area (sq ft)		77.25	
E.G. Slope (ft/ft)	0.012424	Area (sq ft)		182.20	
Q Total (cfs)	220.00	Flow (cfs)		220.00	
Top Width (ft)	679.86	Top Width (ft)		679.86	
Vel Total (ft/s)	2.85	Avg. Vel. (ft/s)		2.85	
Max Chl Dpth (ft)	3.20	Hydr. Depth (ft)		0.27	
Conv. Total (cfs)	1973.7	Conv. (cfs)		1973.7	
Length Wtd. (ft)	310.00	Wetted Per. (ft)		291.40	
Min Ch El (ft)	963.20	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		0.59	
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)		3.42	
C & E Loss (ft)	0.04	Cum SA (acres)		5.28	

Warning - The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note - Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION RIVER: Southern Pacific
REACH: Tolleson 2 RS: 0.387

INPUT
Description: RM 0.387, El Mirage Road, Beginning WSE=964.00 per EXISTING FEMA STUDY.
Station Elevation Data num= 105

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	970.1	5002.1	970.1	5011.9	968.3	5032.5	968.2	5033.8	968.2
5041.8	967.4	5042	967.4	5051	963.1	5051.9	962.6	5053	963.1
5058.5	965.5	5063.2	967.6	5064.5	968	5065.7	968.2	5079.8	967.4
5089.8	967.1	5094	966.8	5101.3	966.1	5110.7	965.2	5130.9	964.4
5135.5	964.3	5143.8	964.1	5146.9	964	5171.6	963.5	5173.7	963.5
5180.1	963.5	5187.7	963.3	5197.8	963.2	5219.1	963.3	5226.8	963.3
5247.7	963.2	5277.9	963.3	5280.7	963	5308.1	962.9	5350.5	963.1
5379.7	963.3	5386.7	963.2	5431.4	963.2	5479.7	963.2	5505.6	962.9
5535.2	962.8	5562.2	962.7	5567.4	962.7	5598.1	962.8	5637	963
5668.2	962.9	5716.4	962.8	5748.3	962.7	5781.4	962.6	5808.6	962.6
5838.7	962.3	5840	962.5	5858.5	962.8	5878	963.1	5889.6	963.4
5891.5	963.4	5925.9	963.6	5935.3	963.9	5937.8	963.9	5957.7	964.2
5976.1	964.3	5980	964.3	6013.1	964.7	6051.7	964.7	6060.3	964.5
6071.2	964.8	6101.6	964.9	6148	965	6159.8	964.7	6170.2	964.8
6229.2	964.7	6239.9	964.8	6251.9	964.6	6262.2	964.6	6307.9	964.8
6323.2	964.8	6363.4	964.9	6368.4	964.9	6371.1	964.8	6379.1	964.8
6383.7	964.8	6387.9	964.5	6388.1	964.5	6388.5	964.5	6393.2	964.5
6403.3	964.5	6404.7	964.4	6406.7	964.5	6410.1	964.3	6412	962.9
6414	964.4	6417.2	964.5	6419.4	964.7	6423.9	964.5	6431.5	964.4

6436.3	964.1	6440.4	963.9	6453.3	963.5	6458.8	963.5	6485	963.9
6499.2	963.8	6524.5	963.4	6533.7	963.6	6587.6	963.8	6600	963.7

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5219.1	.025

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6600	0	0	0	.1	.3

Right Levee Station= 6148 Elevation= 965

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	964.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.025	
E.G. Elev (ft)	964.00	Reach Len. (ft)			
Crit W.S. (ft)	962.98	Flow Area (sq ft)		778.19	
E.G. Slope (ft/ft)	0.000023	Area (sq ft)		778.19	
Q Total (cfs)	220.00	Flow (cfs)		220.00	
Top Width (ft)	803.48	Top Width (ft)		803.48	
Vel Total (ft/s)	0.28	Avg. Vel. (ft/s)		0.28	
Max Chl Dpth (ft)	1.70	Hydr. Depth (ft)		0.97	
Conv. Total (cfs)	45530.3	Conv. (cfs)		45530.3	
Length Wtd. (ft)		Wetted Per. (ft)		804.17	
Min Ch El (ft)	962.30	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning - Divided flow computed for this cross-section.

CROSS SECTION RIVER: Canal
REACH: Canal Split RS: 6.317

INPUT
Description: RM 6.317, BEGIN CANAL SPLIT, HEC-1 CPSH1-160 CFS
Station Elevation Data num= 124

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1027	5002.2	1026.9	5011.1	1026.8	5022.9	1024.7	5024	1024.5
5024.6	1024.5	5025.9	1024.5	5033.5	1024.4	5043.2	1027.7	5045.9	1028.4
5051.8	1029.3	5088.5	1029.8	5094.2	1029.9	5100.4	1029.7	5127.9	1028.6
5144.2	1029.2	5144.6	1029.2	5144.8	1029.2	5158.8	1027.8	5180.3	1027.6
5195	1028	5196.6	1028.2	5199.2	1028	5209.2	1027.5	5231.4	1026.2
5236.4	1026	5239.7	1025.6	5245.3	1025.1	5246.7	1024.9	5255.4	1021.9
5257.3	1022.2	5265.1	1024.8	5280.7	1024.8	5289.4	1024.7	5296.1	1024.6
5322	1025	5327	1025.2	5332.2	1026.8	5341.5	1027.4	5345.5	1027.5
5351	1026.2	5354.2	1026	5381.9	1024.9	5392.5	1024.9	5398.3	1025.6
5408.1	1026.2	5414.6	1024.9	5424.5	1025.3	5430.5	1025.4	5432.3	1025.2
5438.2	1025.2	5441.4	1025.4	5444.9	1025.9	5447.1	1026.8	5459.4	1027.3
5467.2	1027.7	5469.9	1025.6	5470.4	1025.6	5471.5	1025.6	5491.9	1025.7
5500	1027.1	5501.5	1027.4	5528	1026.6	5529.5	1026.6	5538.7	1026.1
5544.4	1026.1	5549.5	1026	5581.5	1026.6	5587.7	1026.7	5594.6	1026.3
5606.5	1026.9	5640.4	1026.9	5644.7	1026.4	5675	1026.4	5694.7	1026.4
5715.9	1026.5	5744.7	1026.2	5754.8	1026.3	5783.3	1026.4	5794.7	1026.1
5802	1026.6	5829	1027	5844.8	1026.6	5852.6	1026.4	5854.7	1026.4
5864.9	1025	5890.2	1024.8	5916	1024.8	5924.3	1024.9	5932.7	1025.4
5940.4	1025.8	5943.4	1025.8	5944	1025.6	5944.2	1025.7	5950.4	1026.3
5981.8	1026.6	5994.9	1026.5	6012.4	1026.6	6044.9	1026.5	6080.1	1026.6
6095	1026.5	6108.8	1026.6	6145	1027	6184.1	1026.9	6195	1026.9
6205.1	1026.9	6245.1	1026.9	6253.3	1026.9	6295.1	1027	6301.5	1027
6345.1	1027.3	6392.3	1026.8	6395.2	1026.8	6399.7	1026.3	6438.2	1021.7
6445.1	1020.9	6468.8	1021	6494.6	1021.1	6496.6	1021.1	6546.1	1020.6
6790	1020.7	7040	1022	7080	1028	7240	1029.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.04	5467.2	.03	5538.7	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5467.2	7240	171	171	171	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
6295.1	7240	1030

Blocked Obstructions num= 4

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5467.2	1030	5467.2	5501.5	1027.4	5852.6	5981.8	1026.6
6392.3	7080	1026.6						

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1027.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.035	
E.G. Elev (ft)	1027.96	Reach Len. (ft)	171.00	171.00	171.00
Crit W.S. (ft)	1026.62	Flow Area (sq ft)		1072.05	
E.G. Slope (ft/ft)	0.000009	Area (sq ft)		2082.13	
Q Total (cfs)	160.00	Flow (cfs)		160.00	
Top Width (ft)	1612.51	Top Width (ft)		1612.51	
Vel Total (ft/s)	0.15	Avg. Vel. (ft/s)		0.15	
Max Chl Dpth (ft)	1.96	Hydr. Depth (ft)		1.29	
Conv. Total (cfs)	54776.6	Conv. (cfs)		54776.6	
Length Wtd. (ft)	171.00	Wetted Per. (ft)		828.59	
Min Ch El (ft)	1026.00	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		40.71	
C & E Loss (ft)	0.00	Cum SA (acres)		31.99	

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

CROSS SECTION RIVER: Canal
REACH: Canal Split RS: 6.285

INPUT
Description: RM 6.285
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1028.57	5039	1027.77	5122	1027.01	5125.3	1027.25	5161.57	1027.2
5269.46	1027.37	5378.52	1027.45	5409	1027.19	5409.41	1027.68	5417.66	1027.51
5429.6	1027.48	5464.93	1027.18	5573.24	1027.18	5724.78	1027.58	5909.72	1027.88
6146.99	1028.84	6320.75	1029.31	6558.72	1030.04	6738.69	1030.95		

Manning's n Values num= 1

Sta	n Val
5000	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6738.69	329	329	329	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1027.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.035	
E.G. Elev (ft)	1027.95	Reach Len. (ft)	329.00	329.00	329.00
Crit W.S. (ft)		Flow Area (sq ft)		469.04	
E.G. Slope (ft/ft)	0.000153	Area (sq ft)		469.04	
Q Total (cfs)	160.00	Flow (cfs)		160.00	
Top Width (ft)	897.25	Top Width (ft)		897.25	
Vel Total (ft/s)	0.34	Avg. Vel. (ft/s)		0.34	
Max Chl Dpth (ft)	0.94	Hydr. Depth (ft)		0.52	
Conv. Total (cfs)	12919.9	Conv. (cfs)		12919.9	
Length Wtd. (ft)	329.00	Wetted Per. (ft)		897.50	
Min Ch El (ft)	1027.01	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)		35.70	
C & E Loss (ft)	0.00	Cum SA (acres)		27.06	

CROSS SECTION RIVER: Canal
REACH: Canal Split RS: 6.222

INPUT
Description: RM 6.222
Station Elevation Data num= 94

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1026.6	5001.7	1026.6	5008.6	1026.5	5015	1024.8	5017.9	1024
5030.2	1023.2	5037.1	1022.9	5048.3	1023.3	5063.3	1023.8	5067.4	1023.8
5068.2	1023.8	5115.6	1023.9	5124	1023.8	5163.8	1023.9	5682.8	1025
5723	1025.2	5746.5	1025.3	5786.8	1025.2	5791.4	1025.2	5813.9	1025.2
5830.4	1025.3	5841.6	1025.5	5856.7	1025.4	5857.7	1025.7	5861.1	1026.9
5862.8	1026.3	5863.5	1026	5863.7	1025.8	5865.4	1026.2	5868.2	1027
5871.6	1028.1	5881.8	1027.9	5892.3	1027.7	5897.8	1027.6	5899.6	1026.9
5902.7	1025.9	5908	1025.8	5924.7	1025.4	5928.7	1026.6	5931.8	1027.5
5936.2	1027.4	5953.7	1026.7	5959.2	1023.7	5964	1021.1	5974.9	1015.7
5978.4	1013.9	6001.1	1014	6001.5	1014	6001.9	1014.2	6018	1022.8
6021.6	1024.7	6025.8	1026.7	6026.5	1026.7	6030.7	1026.5	6060.5	1026.6
6064	1026.7	6098.7	1027.2	6114.1	1027.3	6150.7	1027.2	6164.1	1027.2
6202.7	1027.4	6214.1	1027.5	6238.6	1028.3	6264.4	1028.9	6265.8	1029.2
6298.5	1029.4	6305.1	1029.4	6306.6	1029.4	6314.1	1029.2	6314.2	1029.3
6319.9	1028.8	6324.3	1028.5	6330.4	1029.2	6331.7	1029.4	6343.8	1030.2
6345.9	1030.3	6348	1030.4	6357.5	1030.7	6370.9	1031.1	6385.4	1031.1
6393.8	1030.8	6398.7	1030.7	6402	1030.5	6409.3	1030.1	6439.7	1030.9
6441.8	1030.9	6463.2	1030.6	6464.3	1030.7	6465.9	1030.7	6507.6	1031.7
6514.3	1031.8	6514.6	1031.8	6564.4	1032	6600	1031.9		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.035	5871.6	.03	6060.5	.02

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5871.6	6600	500	500	500	.1	.3

Blocked Obstructions num= 3

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5871.6	1030	5897.8	5931.8	1027.5	5953.7	6025.8	1026.5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1027.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.026	
E.G. Elev (ft)	1027.91	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)		Flow Area (sq ft)		293.64	
E.G. Slope (ft/ft)	0.000107	Area (sq ft)		293.64	
Q Total (cfs)	160.00	Flow (cfs)		160.00	
Top Width (ft)	345.05	Top Width (ft)		345.05	
Vel Total (ft/s)	0.54	Avg. Vel. (ft/s)		0.54	
Max Chl Dpth (ft)	1.41	Hydr. Depth (ft)		0.85	
Conv. Total (cfs)	15482.7	Conv. (cfs)		15482.7	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		345.20	
Min Ch El (ft)	1026.50	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)		32.82	
C & E Loss (ft)	0.00	Cum SA (acres)		22.37	

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

CROSS SECTION RIVER: Canal
REACH: Canal Split RS: 6.127

INPUT
Description: RM 6.127
Station Elevation Data num= 83

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1026.2	5006.9	1026.4	5016.9	1023.9	5018.7	1023.4	5028.8	1023.1
5029.9	1023	5033.9	1022.9	5034.4	1022.8	5099.7	1023	5205.5	1023.4
5832.6	1025.5	5849.3	1025.4	5871.1	1025.3	5875.1	1026	5875.9	1026.4
5876.5	1026	5877.6	1025.3	5878.6	1024.7	5879.1	1025	5879.3	1025.2
5879.5	1025.2	5879.8	1025.4	5880.2	1025.7	5880.9	1026	5881.9	1026.6
5882.7	1027.3	5883.5	1027.5	5885.1	1028.3	5901.7	1027.8	5909.8	1027.5
5911.2	1027	5915	1025.6	5930.3	1025.3	5939.1	1025.1	5945.9	1027.5

5946.3	1027.6	5948.5	1027.6	5967.1	1027.1	5976.3	1023.2	5985.5	1017.9
5987.4	1016.8	5988.9	1016.9	5993.9	1016.7	6007.4	1016.5	6018.6	1016.5
6022.4	1018.3	6032.8	1023.1	6038	1024.5	6043.3	1026.2	6062.4	1026.6
6082.8	1027	6088.2	1027	6102.8	1027.2	6112	1027.2	6133.3	1027.3
6140.5	1027.1	6152	1026.8	6152.6	1026.8	6153.6	1026.8	6183.7	1027.6
6184.7	1027.6	6214.5	1027.7	6233.1	1027.8	6233.7	1027.8	6260.2	1028.9
6270.9	1029.3	6274.7	1029.5	6289.4	1030.3	6294.4	1030.5	6320.9	1032.2
6327.8	1032.6	6331.4	1032.2	6333	1032.2	6338.3	1032.3	6343.1	1031.8
6360.8	1032.4	6383	1032.9	6429.8	1033.4	6433.1	1033.5	6456.9	1033.4
6481.8	1033.4	6582.5	1033.5	6600	1033.4				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.035	5885.1	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5885.1	6600	500	500	500	.1	.3

Blocked Obstructions num= 3

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
4950	5885.1	1030	5909.8	5946.3	1027.6	5967.1	6062.4	1026.6

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1027.82	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.030	
E.G. Elev (ft)	1027.82	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)		Flow Area (sq ft)		228.05	
E.G. Slope (ft/ft)	0.000333	Area (sq ft)		228.05	
Q Total (cfs)	160.00	Flow (cfs)		160.00	
Top Width (ft)	332.88	Top Width (ft)		332.88	
Vel Total (ft/s)	0.70	Avg. Vel. (ft/s)		0.70	
Max Chl Dpth (ft)	1.22	Hydr. Depth (ft)		0.69	
Conv. Total (cfs)	8774.2	Conv. (cfs)		8774.2	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		333.12	
Min Ch El (ft)	1026.60	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.01	
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)		29.83	
C & E Loss (ft)	0.00	Cum SA (acres)		18.48	

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

CROSS SECTION RIVER: Canal
REACH: Canal Split RS: 6.033

INPUT
Description: RM 6.033, Interpolated Q=100 CFS (halfway between 160 cfs upstream and 90 cfs downstream, also note that most of the inflow at RSSG diverts into DIRJ4).

Station Elevation Data num= 83

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1028.75	5003.3	1026.4	5008.2	1025.7	5013.9	1025.3	5016.4	1025.2
5018.5	1025.1	5029.7	1025.2	5034.2	1025.3	5035.7	1025.2	5047	1025.3
5051.6	1025.3	5077.5	1024.3	5105.2	1023.9	5135.8	1024.1	5188.8	1024.2
5252	1024.3	5349.8	1024.2	5411.6	1024.4	5435.9	1024.3	5444.9	1024.3
5580.9	1024.8	5664.5	1025	5700.1	1025.8	5772.7	1025.8	5822.4	1026
5856.7	1026.1	5892.9	1026	5894.9	1026	5896.9	1026.3	5904.6	1027.2
5906.7	1027.3	5916.9	1028.2	5917.6	1028.2	5922.5	1027.9	5926.6	1027.9
5927.8	1027.1	5930.7	1025.4	5955.9	1025.5	5956.4	1025.6	5957.1	1026
5961.3	1028.7	5964.4	1028.75	5974	1028.75	5978	1028.75	5986.1	1028.75
5989.3	1028.75	5994.4	1028.75	6002	1028.6	6007.2	1028.75	6016.3	1028.75
6020.4	1028.75	6025.8	1028.7	6032.9	1028.3	6043.7	1027.9	6055	1027.5
6077.9	1027.3	6080.8	1027.2	6082.3	1027	6133.5	1026.9	6151.3	1026.9
6172.6	1027	6194.5	1027	6217	1027	6311.4	1027.5	6324.3	1027.6
6331.9	1027.6	6333.3	1027.6	6337.7	1027.5	6351.7	1027.7	6469.5	1027.8
6476.6	1027.8	6480.6	1027.8	6481.3	1027.8	6484	1027.8	6491.8	1027.9
6567.4	1028	6596.2	1027.9	6600	1027.9	6700	1028.2	6800	1028.5
6900	1028.7	7000	1028.9	7100	1029.1				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5051.6	.035	5917.6	.03	6020.4	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5974	7100	500	500	500	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
6400	7100	1029

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5000	5974	1030

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1027.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.035	
E.G. Elev (ft)	1027.57	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1027.21	Flow Area (sq ft)		114.79	
E.G. Slope (ft/ft)	0.001328	Area (sq ft)		114.79	
Q Total (cfs)	100.00	Flow (cfs)		100.00	
Top Width (ft)	271.63	Top Width (ft)		271.63	
Vel Total (ft/s)	0.87	Avg. Vel. (ft/s)		0.87	
Max Chl Dpth (ft)	0.66	Hydr. Depth (ft)		0.42	
Conv. Total (cfs)	2744.4	Conv. (cfs)		2744.4	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		271.65	
Min Ch El (ft)	1026.90	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.03	
Frctn Loss (ft)	0.45	Cum Volume (acre-ft)		27.86	
C & E Loss (ft)	0.00	Cum SA (acres)		15.01	

Warning - Divided flow computed for this cross-section.

CROSS SECTION RIVER: Canal
REACH: Canal Split RS: 5.938

INPUT
Description: RM 5.938
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1026.8	5001.3	1026.8	5005.4	1026.4	5017.5	1023.7	5019.3	1024
5020.7	1024	5036.4	1023.9	5044.9	1024.1	5049	1024.2	5057.5	1024.2
5069.2	1024.1	5115.9	1023.8	5119.3	1023.7	5205.9	1024.3	5218.4	1024.4
5219.3	1024.4	5392	1024.7	5419.5	1024.8	5498	1025.3	5519.5	1025.3
5653.6	1025.4	5719.7	1025.6	5749.7	1025.5	5769.7	1025.4	5791.3	1025.5
5819.8	1025.7	5846.1	1025.7	5869.8	1025.8	5881.2	1025.7	5910	1025.4
5916.2	1027	5916.7	1027.2	5917.4	1026.8	5919.8	1025.4	5920.1	1025.3
5920.3	1026	5922.5	1026.8	5926.1	1026.83	5935.1	1026.83	5940.8	1026.83
5945.5	1026	5947.2	1025.4	5950.2	1025.4	5967.7	1025.4	5972.4	1026.83
5973.5	1026.83	5977.7	1026.83	5995.6	1026.83	6008.1	1026.1	6011.3	1025.9
6013.7	1026	6019.9	1026.3	6084.8	1026.5	6119.9	1026.6	6135.6	1026.7
6170	1026.8	6183.9	1026.8	6220	1027	6258.9	1026.7	6270.1	1026.7
6280.4	1026.8	6320.1	1027.2	6328.7	1027.3	6370.1	1027.7	6376.9	1027.6
6420.1	1027.2	6425.1	1027.2	6470.2	1027.5	6518.7	1027.4	6520.2	1027.4
6560.8	1027.9	6570.2	1028	6570.6	1028	6600	1028	6700	1028.2
6800	1028.4	6900	1028.7	7000	1029				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5049	.035	5926.1	.03	5995.6	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5926.1	7000	500	500	500	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5926.1	1030	5939	5971	1026.83

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1027.11	Element	Left OB	Channel	Right OB

Vel Head (ft)	0.01	Wt. n-Val.		0.034	
E.G. Elev (ft)	1027.11	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)		Flow Area (sq ft)		160.05	
E.G. Slope (ft/ft)	0.000661	Area (sq ft)		160.05	
Q Total (cfs)	100.00	Flow (cfs)		100.00	
Top Width (ft)	384.95	Top Width (ft)		384.95	
Vel Total (ft/s)	0.62	Avg. Vel. (ft/s)		0.62	
Max Chl Dpth (ft)	1.21	Hydr. Depth (ft)		0.42	
Conv. Total (cfs)	3890.4	Conv. (cfs)		3890.4	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		385.76	
Min Ch El (ft)	1025.90	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.01	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)		26.28	
C & E Loss (ft)	0.00	Cum SA (acres)		11.24	

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

CROSS SECTION RIVER: Canal
REACH: Canal Split RS: 5.843

INPUT
Description: RM 5.843, CPSG1 Q=90 CFS
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1026.85	5003.2	1026.6	5013.5	1024.3	5017.9	1023.2	5026.4	1023.3
5031.1	1023.2	5039.1	1023.3	5039.4	1023.2	5039.8	1023.1	5042.3	1023.3
5051	1023.3	5085.3	1023.6	5088.8	1023.6	5136.6	1023.5	5138.9	1023.4
5141	1023.4	5188.9	1023.7	5191.5	1023.7	5429.6	1023.6	5489.2	1023.6
5618.1	1024.4	5675.8	1024.7	5699.9	1024.8	5711	1024.8	5739.4	1024.9
5765.5	1025	5789.4	1025.3	5815.4	1025	5839.5	1024.8	5867.7	1024.8
5889.5	1025	5902.5	1025.1	5911.1	1025.2	5925	1025	5928.6	1025.8
5931.5	1026.5	5932.8	1026.1	5934.2	1025.6	5938.3	1026.85	5939.5	1026.85
5940.3	1026.85	5940.6	1026.85	5945.2	1026.85	5955.3	1026.85	5958.9	1026.2
5960.2	1025.4	5965.5	1025.4	5976.6	1025.5	5983.7	1025.6	5986.9	1026.85
5989.1	1026.85	5989.2	1026.85	5989.6	1026.85	5999.4	1026.85	6003.7	1026.85
6005.5	1026.85	6009.5	1026.85	6012.5	1026.85	6025.2	1025.8	6090.8	1025.9
6128.4	1026	6239.8	1026.5	6351.2	1026.7	6390	1026.4	6390.6	1026.6
6490	1026.7	6494.4	1027	6540.1	1027.1	6582.1	1027.7	6590.1	1027.8
6598.8	1027.8	6600	1027.8	6700	1027.9	6800	1027.8	6900	1028
7000	1028.2								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.035	5955.3	.03	5999.4	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5955.3	7000	241	241	241	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
6490	7000	1030

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5955.3	1030	5955.3	5989.1	1026.85

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1027.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.035	
E.G. Elev (ft)	1027.02	Reach Len. (ft)	241.00	241.00	241.00
Crit W.S. (ft)	1026.17	Flow Area (sq ft)		323.83	
E.G. Slope (ft/ft)	0.000079	Area (sq ft)		324.68	
Q Total (cfs)	90.00	Flow (cfs)		90.00	
Top Width (ft)	548.59	Top Width (ft)		548.59	
Vel Total (ft/s)	0.28	Avg. Vel. (ft/s)		0.28	
Max Chl Dpth (ft)	1.22	Hydr. Depth (ft)		0.61	
Conv. Total (cfs)	10135.3	Conv. (cfs)		10135.3	
Length Wtd. (ft)	241.00	Wetted Per. (ft)		534.95	
Min Ch El (ft)	1025.80	Shear (lb/sq ft)		0.00	

Alpha	1.00	Stream Power (lb/ft s)	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	23.50
C & E Loss (ft)	0.00	Cum SA (acres)	5.88

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

CROSS SECTION RIVER: Canal
REACH: Canal Split RS: 5.798

INPUT
Description: RM 5.798, 81ST AVENUE
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1026.95	5040.88	1026.82	5148.87	1026.4	5249.9	1027	5358.02	1027.72
5461.83	1028.29	5562.03	1028.91	5669.03	1029.47	5774.22	1029.86	5878.13	1029.35
5982.93	1029.59	6084.44	1029.94						

Manning's n Values num= 1

Sta	n Val
5000	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6084.44	259	259	259	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1026.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.035	
E.G. Elev (ft)	1026.96	Reach Len. (ft)	259.00	259.00	259.00
Crit W.S. (ft)		Flow Area (sq ft)		57.83	
E.G. Slope (ft/ft)	0.008324	Area (sq ft)		57.83	
Q Total (cfs)	90.00	Flow (cfs)		90.00	
Top Width (ft)	227.03	Top Width (ft)		227.03	
Vel Total (ft/s)	1.56	Avg. Vel. (ft/s)		1.56	
Max Chl Dpth (ft)	0.52	Hydr. Depth (ft)		0.25	
Conv. Total (cfs)	986.5	Conv. (cfs)		986.5	
Length Wtd. (ft)		Wetted Per. (ft)		227.03	
Min Ch El (ft)	1026.40	Shear (lb/sq ft)		0.13	
Alpha	1.00	Stream Power (lb/ft s)		0.21	
Frctn Loss (ft)		Cum Volume (acre-ft)		22.44	
C & E Loss (ft)		Cum SA (acres)		3.74	

Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note - The user has entered a known water surface elevation at this cross section.

CROSS SECTION RIVER: Canal
REACH: Canal Split RS: 5.749

INPUT
Description: RM 5.749
Station Elevation Data num= 117

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1026	5004.5	1025.4	5006.3	1025.5	5009.5	1024.9	5015.3	1023.5
5023.9	1021.6	5043.4	1022	5049.1	1022.2	5056.3	1023.1	5058.6	1023.4
5094.5	1022.6	5102.4	1023.2	5109.5	1023.2	5115.6	1022.5	5115.9	1022.3
5121.4	1022.4	5133.9	1023.1	5153.3	1023.7	5158.2	1023.9	5160.1	1023.9
5170.6	1024.1	5180.5	1024.2	5191.6	1023.9	5198.7	1023.4	5205.9	1023
5209.6	1022.9	5221.5	1023	5257.4	1023.2	5259.7	1023.2	5270.3	1023.2
5308.9	1023.2	5309.2	1023.4	5334.1	1023.4	5355	1023.5	5359.7	1023.6
5370.1	1024	5371.3	1024	5371.6	1024	5372	1024	5372.6	1024
5373.5	1024.1	5376.1	1024.1	5379.5	1024.1	5409.8	1024.4	5431.6	1024.6
5451.1	1024.4	5503.8	1024.1	5538.9	1024.2	5573.3	1024.2	5606.5	1024.4
5610.2	1024.3	5701.5	1025.3	5703	1025.3	5711.7	1025.5	5714.2	1025.5
5733.7	1025.4	5807.5	1024.7	5826.2	1024.8	5850.7	1025	5860.1	1025
5870.9	1025.3	5899.9	1025.5	5907.7	1025.6	5927.4	1026.3	5937.3	1026.4

5938.7	1026.4	5940.3	1026.4	5942.9	1026.4	5953.6	1026.4	5958.1	1026.4
5960.2	1026.4	5967.7	1026.4	5969.1	1026.4	5969.9	1026.4	5974	1025.4
5987	1025.9	5997	1026.3	5998.3	1026.4	6003.7	1026.4	6007.7	1026.4
6010.2	1026.4	6020.1	1026.4	6028.8	1026.4	6039.7	1026.4	6042.4	1026.4
6048.4	1026.4	6048.8	1026.4	6069.8	1022.9	6071.1	1022.6	6072.6	1022.6
6082.9	1022.4	6110.3	1021.8	6146	1021.9	6165.9	1021.6	6167.5	1021.8
6169.8	1022	6171.7	1022.5	6173.9	1022.9	6175.4	1023.2	6176.8	1023.6
6192.6	1027.4	6202.9	1027.7	6210.4	1028.1	6249.4	1028.1	6260.4	1028.2
6265.6	1028.2	6270.5	1028.2	6384	1028.9	6410.5	1028.9	6509.5	1029.4
6510	1029.4	6510.6	1029.4	6511.5	1029.4	6537.4	1029.5	6560.6	1029.6
6561.5	1029.6	6600	1029.5						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
5000	.03	5807.5	.03	6202.9	.015

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5953.6	6600	500	500	500	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5953.6	1030	5953.6	6003.7	1026.4

CROSS SECTION OUTPUT Profile #PF#1

			Left OB	Channel	Right OB
W.S. Elev (ft)	1026.34	Element			
Vel Head (ft)	0.00	Wt. n-Val.		0.030	
E.G. Elev (ft)	1026.34	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)		Flow Area (sq ft)		510.92	
E.G. Slope (ft/ft)	0.000002	Area (sq ft)		510.92	
Q Total (cfs)	90.00	Flow (cfs)		90.00	
Top Width (ft)	139.01	Top Width (ft)		139.01	
Vel Total (ft/s)	0.18	Avg. Vel. (ft/s)		0.18	
Max Chl Dpth (ft)	4.74	Hydr. Depth (ft)		3.68	
Conv. Total (cfs)	60021.4	Conv. (cfs)		60021.4	
Length Wtd. (ft)	500.00	Wetted Per. (ft)		139.87	
Min Ch El (ft)	1021.60	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		20.75	
C & E Loss (ft)	0.00	Cum SA (acres)		2.65	

CROSS SECTION RIVER: Canal
REACH: Canal Split RS: 5.654

INPUT
Description: RM 5.654, RSSE Q=140 CFS
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1026.4	5000.2	1025	5004	1024	5006.7	1023.6	5009.4	1023.2
5013.6	1022.2	5016.9	1021.4	5027.4	1023.4	5028.6	1023.6	5028.9	1023.5
5053.4	1021.1	5070.6	1021.7	5075	1021.8	5076.8	1021.9	5078	1021.9
5080.4	1021.9	5126.4	1022	5128.6	1022	5130.5	1022	5177.9	1022.1
5178.6	1022.1	5180.6	1022.1	5228.6	1022.3	5228.9	1022.3	5234.9	1022.3
5277.1	1022.3	5278.7	1022.3	5325.3	1022.2	5328.7	1022.2	5333.5	1022.3
5351.3	1022.5	5353.3	1022.5	5360.9	1022.5	5366	1023.2	5369.8	1023.7
5373	1023.5	5377.6	1023.1	5378.7	1023.1	5378.9	1023.1	5382.9	1023
5394.3	1023.4	5396	1023.4	5397	1023.3	5409	1022.3	5418	1022.7
5428.7	1023.1	5431	1023.4	5442.6	1023.2	5506.6	1023.5	5508.4	1023.4
5518	1023.5	5536.4	1023.4	5549.7	1023.2	5569.5	1022.6	5577.3	1022.4
5583.6	1022.6	5606.8	1023.1	5618.2	1023.4	5627	1023.6	5644.2	1023.6
5679	1023.9	5721	1023.2	5735.2	1023.1	5737.5	1023.1	5751.7	1023.2
5788.4	1024.1	5808.7	1023.9	5829	1023.8	5847.4	1023.9	5857.4	1023.7
5872.3	1023.7	5878.2	1023.7	5880.1	1023.7	5892.3	1024.2	5894.5	1024.2
5935.3	1025.2	5935.9	1025.2	5939.2	1025.1	5943.6	1025.5	5947	1025.9
5960.6	1026.34	5970.5	1026.34	5979.1	1026.34	5979.7	1026.34	5980.2	1026.34
5982.3	1026.2	5986.6	1025.1	6010.5	1024.9	6012.6	1024.9	6013.9	1025.2
6020.4	1026.34	6026.7	1026.34	6029.2	1026.34	6035	1026.34	6040.4	1026.34
6056.3	1026.1	6060.8	1025.8	6063.3	1025.6	6067.2	1024.7	6077	1022.3
6091.2	1022.1	6129.3	1021.5	6166.7	1021.9	6185.2	1021.9	6190.2	1022.1
6197.4	1024	6201.7	1024.9	6202.8	1025.2	6203.8	1025.5	6205.2	1025.8
6206.6	1026.2	6211.8	1027.4	6217.4	1027.3	6229.3	1027	6241.7	1027

6279.3	1027.4	6319.9	1027.5	6329.4	1027.5	6346.3	1027.6	6429.5	1028
6434.6	1028.1	6527.9	1028.5	6529.5	1028.5	6531.1	1028.5	6572.6	1028.4
6579.6	1028.3	6600	1027.9						

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	6201.7	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5979.1	6600	450	450	450	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5000	5979.1	1030	5979.1	6020.4	1026.34

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1026.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.030	
E.G. Elev (ft)	1026.34	Reach Len. (ft)	450.00	450.00	450.00
Crit W.S. (ft)	1022.19	Flow Area (sq ft)		581.89	
E.G. Slope (ft/ft)	0.000004	Area (sq ft)		581.89	
Q Total (cfs)	140.00	Flow (cfs)		140.00	
Top Width (ft)	166.51	Top Width (ft)		166.51	
Vel Total (ft/s)	0.24	Avg. Vel. (ft/s)		0.24	
Max Chl Dpth (ft)	4.84	Hydr. Depth (ft)		3.49	
Conv. Total (cfs)	67055.8	Conv. (cfs)		67055.8	
Length Wtd. (ft)	450.00	Wetted Per. (ft)		167.47	
Min Ch El (ft)	1021.50	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		14.48	
C & E Loss (ft)	0.00	Cum SA (acres)		0.89	

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

CROSS SECTION RIVER: Canal
REACH: Canal Split RS: 5.578

INPUT
Description: RM 5.578, RSSE-200 CFS, End Canal Split, WSE= 1026.34 per JEF, Inc Weir Analysis.

Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5000	1026.34	5039	1026.3	5081	1026.28	5156	1026.24	5268	1025.77
5382	1026.13	5499	1026.34	5565	1026.36	5641	1026.48	5697	1026.12
5806	1026.22	5951	1026.3	6579	1028				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
5000	.03	5951	.02

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
5000	6579	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1026.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.030	
E.G. Elev (ft)	1026.33	Reach Len. (ft)	800.00	800.00	800.00
Crit W.S. (ft)		Flow Area (sq ft)		106.93	
E.G. Slope (ft/ft)	0.008880	Area (sq ft)		106.93	
Q Total (cfs)	140.00	Flow (cfs)		140.00	
Top Width (ft)	719.77	Top Width (ft)		719.77	
Vel Total (ft/s)	1.31	Avg. Vel. (ft/s)		1.31	
Max Chl Dpth (ft)	0.53	Hydr. Depth (ft)		0.15	
Conv. Total (cfs)	1485.7	Conv. (cfs)		1485.7	
Length Wtd. (ft)	0.00	Wetted Per. (ft)		719.77	
Min Ch El (ft)	1025.77	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)		0.11	

Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	5.92
C & E Loss (ft)	0.00	Cum SA (acres)	

Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note - The user has entered a known water surface elevation at this cross section.

SUMMARY OF MANNING'S N VALUES

River:Southern Pacific

Reach	River Sta.	n1	n2	n3	n4	n5
Tolleson 1	7.287	.08	.035	.04		
Tolleson 1	7.264	.08	.035			
Tolleson 1	7.227	.08	.035			
Tolleson 1	7.169	.08	.035			
Tolleson 1	7.074	.08	.035			
Tolleson 1	7.033	.08	.035			
Tolleson 1	6.980	.07	.035			
Tolleson 1	6.885	.06	.035			
Tolleson 1	6.782	.035	.03	.03		
Tolleson 1	6.723	.035	.03	.035		
Tolleson 1	6.696	.035	.03	.035		
Tolleson 1	6.601	.035	.03	.035		
Tolleson 1	6.549	.035	.03	.035		
Tolleson 1	6.532	.02				
Tolleson 1	6.506	.04	.03	.035		
Tolleson 1	6.412	.03	.035			
RR Split	6.317	.03	.035			
RR Split	6.285	.03				
RR Split	6.222	.035	.03	.02		
RR Split	6.127	.035	.03			
RR Split	6.033	.03	.035	.03	.035	
RR Split	5.938	.03	.035	.03	.035	
RR Split	5.843	.035	.03	.035		
RR Split	5.749	.03	.03	.015		
RR Split	5.654	.03	.05	.03	.015	
Tolleson 2	5.539	.02				
Tolleson 2	5.530	.03	.015	.015		
Tolleson 2	5.465	.03	.035	.03	.015	.035
Tolleson 2	5.370	.03	.025	.035		
Tolleson 2	5.319	.035	.04	.015	.035	
Tolleson 2	5.275	.03	.035	.015	.03	.035
Tolleson 2	5.181	.03	.035	.015	.035	
Tolleson 2	5.086	.03	.05	.035		
Tolleson 2	5.054	.03	.06	.035		
Tolleson 2	5.047	.03				
Tolleson 2	5.040	.03	.035	.03	.035	
Tolleson 2	4.991	.04	.035	.03	.035	
Tolleson 2	4.896	.04	.035	.03	.035	
Tolleson 2	4.802	.04	.035	.03	.035	
Tolleson 2	4.707	.04	.035	.03	.035	
Tolleson 2	4.612	.04	.035	.03	.035	
Tolleson 2	4.577	.04	.035	.03	.035	
Tolleson 2	4.567	.015				
Tolleson 2	4.559	.03	.09			
Tolleson 2	4.518	.03	.09			
Tolleson 2	4.423	.03	.09			
Tolleson 2	4.328	.03	.09			
Tolleson 2	4.234	.03	.09			
Tolleson 2	4.139	.03	.09			
Tolleson 2	4.044	.03	.04			
Tolleson 2	3.949	.03	.04	.03		

Tolleson 2	3.855	.035				
Tolleson 2	3.760	.03	.035			
Tolleson 2	3.665	.03	.035			
Tolleson 2	3.583	.03	.04	.035		
Tolleson 2	3.568	.015				
Tolleson 2	3.535	.03	.035			
Tolleson 2	3.476	.03	.035			
Tolleson 2	3.411	.035				
Tolleson 2	3.287	.03	.035			
Tolleson 2	3.192	.035	.03	.035		
Tolleson 2	3.083	.035				
Tolleson 2	3.050	.03				
Tolleson 2	3.037	.03	.035			
Tolleson 2	3.031	.03				
Tolleson 2	2.908	.03	.035	.03		
Tolleson 2	2.851	.035				
Tolleson 2	2.718	.03	.035	.03	.035	
Tolleson 2	2.624	.03	.035			
Tolleson 2	2.529	.03	.035			
Tolleson 2	2.434	.03	.035			
Tolleson 2	2.366	.03	.035	.03	.035	
Tolleson 2	2.352	.03				
Tolleson 2	2.342	.03	.035			
Tolleson 2	2.245	.04	.03	.035	.03	.035
Tolleson 2	2.229	.04	.03	.035		
Tolleson 2	2.150	.05	.035	.03	.035	
Tolleson 2	2.056	.06	.035	.03	.035	
Tolleson 2	1.961	.035				
Tolleson 2	1.870	.04	.03	.035	.03	.035
Tolleson 2	1.863	.04	.03			
Tolleson 2	1.856	.04	.03	.035	.03	.035
Tolleson 2	1.771	.035				
Tolleson 2	1.677	.035				
Tolleson 2	1.582	.03	.035			
Tolleson 2	1.487	.03	.04	.03	.035	
Tolleson 2	1.399	.07	.03	.035		
Tolleson 2	1.387	.015				
Tolleson 2	1.376	.03	.035	.03	.04	
Tolleson 2	1.298	.04	.035	.03	.035	
Tolleson 2	1.203	.04	.035	.03	.035	
Tolleson 2	1.138	.04	.035			
Tolleson 2	1.131	.04	.035			
Tolleson 2	1.109	.04	.035			
Tolleson 2	1.014	.04	.035			
Tolleson 2	0.919	.04	.035			
Tolleson 2	0.883	.035				
Tolleson 2	0.824	.04	.03	.035		
Tolleson 2	0.730	.04	.035			
Tolleson 2	0.635	.04	.03	.035	.03	
Tolleson 2	0.540	.05	.035	.03	.035	
Tolleson 2	0.446	.05	.03	.035	.03	
Tolleson 2	0.387	.03	.025			

River:Canal

Reach	River Sta.	n1	n2	n3	n4
Canal Split	6.317	.04	.03	.035	
Canal Split	6.285	.035			
Canal Split	6.222	.035	.03	.02	
Canal Split	6.127	.035	.03		
Canal Split	6.033	.03	.035	.03	.035
Canal Split	5.938	.03	.035	.03	.035
Canal Split	5.843	.035	.03	.035	
Canal Split	5.798	.035			
Canal Split	5.749	.03	.03	.015	
Canal Split	5.654	.03	.03		
Canal Split	5.578	.03	.02		

SUMMARY OF REACH LENGTHS

River: Southern Pacific

Reach	River Sta.	Left	Channel	Right
Tolleson 1	7.287	124	124	124
Tolleson 1	7.264	192	192	192
Tolleson 1	7.227	308	308	308
Tolleson 1	7.169	500	500	500
Tolleson 1	7.074	218	218	218
Tolleson 1	7.033	282	282	282
Tolleson 1	6.980	500	500	500
Tolleson 1	6.885	545	545	545
Tolleson 1	6.782	312	312	312
Tolleson 1	6.723	143	143	143
Tolleson 1	6.696	500	500	500
Tolleson 1	6.601	273	273	273
Tolleson 1	6.549	0	0	0
Tolleson 1	6.532	135	135	135
Tolleson 1	6.506	500	500	500
Tolleson 1	6.412	500	500	500
RR Split	6.317	171	171	171
RR Split	6.285	329	329	329
RR Split	6.222	500	500	500
RR Split	6.127	500	500	500
RR Split	6.033	500	500	500
RR Split	5.938	500	500	500
RR Split	5.843	500	500	500
RR Split	5.749	500	500	500
RR Split	5.654	0	0	0
Tolleson 2	5.539	48	48	48
Tolleson 2	5.530	345	345	345
Tolleson 2	5.465	500	500	500
Tolleson 2	5.370	270	270	270
Tolleson 2	5.319	230	230	230
Tolleson 2	5.275	500	500	500
Tolleson 2	5.181	500	500	500
Tolleson 2	5.086	170	170	170
Tolleson 2	5.054	35	35	35
Tolleson 2	5.047	45	45	45
Tolleson 2	5.040	260	260	260
Tolleson 2	4.991	500	500	500
Tolleson 2	4.896	500	500	500
Tolleson 2	4.802	500	500	500
Tolleson 2	4.707	500	500	500
Tolleson 2	4.612	185	185	185
Tolleson 2	4.577	55	55	55
Tolleson 2	4.567	40	40	40
Tolleson 2	4.559	220	220	220
Tolleson 2	4.518	500	500	500
Tolleson 2	4.423	500	500	500
Tolleson 2	4.328	500	500	500
Tolleson 2	4.234	500	500	500
Tolleson 2	4.139	500	500	500
Tolleson 2	4.044	500	500	500
Tolleson 2	3.949	500	500	500
Tolleson 2	3.855	500	500	500
Tolleson 2	3.760	500	500	500
Tolleson 2	3.665	437.16	437.16	437.16
Tolleson 2	3.583	75.84	75.84	75.84
Tolleson 2	3.568	177	177	177
Tolleson 2	3.535	310	310	310
Tolleson 2	3.476	400	400	400
Tolleson 2	3.411	655	575	480
Tolleson 2	3.287	500	500	500
Tolleson 2	3.192	575	575	575
Tolleson 2	3.083	174	174	174
Tolleson 2	3.050	66.5	66.5	66.5

Tolleson 2	3.037	33.5	33.5	33.5
Tolleson 2	3.031	650	650	650
Tolleson 2	2.908	300	350	500
Tolleson 2	2.851	700	700	500
Tolleson 2	2.718	500	500	500
Tolleson 2	2.624	500	500	500
Tolleson 2	2.529	500	500	500
Tolleson 2	2.434	361	361	361
Tolleson 2	2.366	75	75	75
Tolleson 2	2.352	49	49	49
Tolleson 2	2.342	485	485	485
Tolleson 2	2.245	85	85	85
Tolleson 2	2.229	417	417	417
Tolleson 2	2.150	500	500	500
Tolleson 2	2.056	500	500	500
Tolleson 2	1.961	480	480	480
Tolleson 2	1.870	35	35	35
Tolleson 2	1.863	40	40	40
Tolleson 2	1.856	445	445	445
Tolleson 2	1.771	495	495	495
Tolleson 2	1.677	500	500	500
Tolleson 2	1.582	500	500	500
Tolleson 2	1.487	465	465	465
Tolleson 2	1.399	66	66	66
Tolleson 2	1.387	59	59	59
Tolleson 2	1.376	410	410	410
Tolleson 2	1.298	500	500	500
Tolleson 2	1.203	345	345	345
Tolleson 2	1.138	38	38	38
Tolleson 2	1.131	120	120	120
Tolleson 2	1.109	500	500	500
Tolleson 2	1.014	500	500	500
Tolleson 2	0.919	195	195	195
Tolleson 2	0.883	305	305	305
Tolleson 2	0.824	500	500	500
Tolleson 2	0.730	500	500	500
Tolleson 2	0.635	500	500	500
Tolleson 2	0.540	500	500	500
Tolleson 2	0.446	310	310	310
Tolleson 2	0.387	0	0	0

River: Canal

Reach	River Sta.	Left	Channel	Right
Canal Split	6.317	171	171	171
Canal Split	6.285	329	329	329
Canal Split	6.222	500	500	500
Canal Split	6.127	500	500	500
Canal Split	6.033	500	500	500
Canal Split	5.938	500	500	500
Canal Split	5.843	241	241	241
Canal Split	5.798	259	259	259
Canal Split	5.749	500	500	500
Canal Split	5.654	450	450	450
Canal Split	5.578	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Southern Pacific

Reach	River Sta.	Contr.	Expan.
Tolleson 1	7.287	.1	.3
Tolleson 1	7.264	.1	.3
Tolleson 1	7.227	.1	.3
Tolleson 1	7.169	.1	.3

Tolleson 1	7.074	.1	.3
Tolleson 1	7.033	.1	.3
Tolleson 1	6.980	.1	.3
Tolleson 1	6.885	.1	.3
Tolleson 1	6.782	.1	.3
Tolleson 1	6.723	.1	.3
Tolleson 1	6.696	.1	.3
Tolleson 1	6.601	.1	.3
Tolleson 1	6.549	.1	.3
Tolleson 1	6.532	.1	.3
Tolleson 1	6.506	.1	.3
Tolleson 1	6.412	.1	.3
RR Split	6.317	.1	.3
RR Split	6.285	.1	.3
RR Split	6.222	.1	.3
RR Split	6.127	.1	.3
RR Split	6.033	.1	.3
RR Split	5.938	.1	.3
RR Split	5.843	.1	.3
RR Split	5.749	.1	.3
RR Split	5.654	.1	.3
Tolleson 2	5.539	.1	.3
Tolleson 2	5.530	.1	.3
Tolleson 2	5.465	.1	.3
Tolleson 2	5.370	.1	.3
Tolleson 2	5.319	.1	.3
Tolleson 2	5.275	.1	.3
Tolleson 2	5.181	.1	.3
Tolleson 2	5.086	.1	.3
Tolleson 2	5.054	.1	.3
Tolleson 2	5.047	.1	.3
Tolleson 2	5.040	.1	.3
Tolleson 2	4.991	.1	.3
Tolleson 2	4.896	.1	.3
Tolleson 2	4.802	.1	.3
Tolleson 2	4.707	.1	.3
Tolleson 2	4.612	.1	.3
Tolleson 2	4.577	.1	.3
Tolleson 2	4.567	.1	.3
Tolleson 2	4.559	.1	.3
Tolleson 2	4.518	.1	.3
Tolleson 2	4.423	.1	.3
Tolleson 2	4.328	.1	.3
Tolleson 2	4.234	.1	.3
Tolleson 2	4.139	.1	.3
Tolleson 2	4.044	.1	.3
Tolleson 2	3.949	.1	.3
Tolleson 2	3.855	.1	.3
Tolleson 2	3.760	.1	.3
Tolleson 2	3.665	.1	.3
Tolleson 2	3.583	.1	.3
Tolleson 2	3.568	.1	.3
Tolleson 2	3.535	.1	.3
Tolleson 2	3.476	.1	.3
Tolleson 2	3.411	.1	.3
Tolleson 2	3.287	.1	.3
Tolleson 2	3.192	.1	.3
Tolleson 2	3.083	.1	.3
Tolleson 2	3.050	.1	.3
Tolleson 2	3.037	.1	.3
Tolleson 2	3.031	.1	.3
Tolleson 2	2.908	.1	.3
Tolleson 2	2.851	.1	.3
Tolleson 2	2.718	.1	.3
Tolleson 2	2.624	.1	.3
Tolleson 2	2.529	.1	.3
Tolleson 2	2.434	.1	.3
Tolleson 2	2.366	.1	.3
Tolleson 2	2.352	.1	.3
Tolleson 2	2.342	.1	.3
Tolleson 2	2.245	.1	.3

Tolleson 2	2.229	.1	.3
Tolleson 2	2.150	.1	.3
Tolleson 2	2.056	.1	.3
Tolleson 2	1.961	.1	.3
Tolleson 2	1.870	.1	.3
Tolleson 2	1.863	.1	.3
Tolleson 2	1.856	.1	.3
Tolleson 2	1.771	.1	.3
Tolleson 2	1.677	.1	.3
Tolleson 2	1.582	.1	.3
Tolleson 2	1.487	.1	.3
Tolleson 2	1.399	.1	.3
Tolleson 2	1.387	.1	.3
Tolleson 2	1.376	.1	.3
Tolleson 2	1.298	.1	.3
Tolleson 2	1.203	.1	.3
Tolleson 2	1.138	.1	.3
Tolleson 2	1.131	.1	.3
Tolleson 2	1.109	.1	.3
Tolleson 2	1.014	.1	.3
Tolleson 2	0.919	.1	.3
Tolleson 2	0.883	.1	.3
Tolleson 2	0.824	.1	.3
Tolleson 2	0.730	.1	.3
Tolleson 2	0.635	.1	.3
Tolleson 2	0.540	.1	.3
Tolleson 2	0.446	.1	.3
Tolleson 2	0.387	.1	.3

River: Canal

Reach	River Sta.	Contr.	Expan.
Canal Split	6.317	.1	.3
Canal Split	6.285	.1	.3
Canal Split	6.222	.1	.3
Canal Split	6.127	.1	.3
Canal Split	6.033	.1	.3
Canal Split	5.938	.1	.3
Canal Split	5.843	.1	.3
Canal Split	5.798	.1	.3
Canal Split	5.749	.1	.3
Canal Split	5.654	.1	.3
Canal Split	5.578	.1	.3

Profile Output Table - Standard Table 1

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Canal	Canal Split	6.317	160	1026.00	1027.96	1027	1028	0.000	0.15	1072.05	1612.51	0
Canal	Canal Split	6.285	160	1027.01	1027.95		1028	0.000	0.34	469.04	897.25	0
Canal	Canal Split	6.222	160	1026.50	1027.91		1028	0.000	0.54	293.64	345.05	0
Canal	Canal Split	6.127	160	1026.60	1027.82		1028	0.000	0.70	228.05	332.88	0
Canal	Canal Split	6.033	100	1026.90	1027.56	1027	1028	0.001	0.87	114.79	271.63	0
Canal	Canal Split	5.938	100	1025.90	1027.11		1027	0.001	0.62	160.05	384.95	0
Canal	Canal Split	5.843	90	1025.80	1027.02	1026	1027	0.000	0.28	323.83	548.59	0
Canal	Canal Split	5.798	90	1026.40	1026.92		1027	0.008	1.56	57.83	227.03	1
Canal	Canal Split	5.749	90	1021.60	1026.34		1026	0.000	0.18	510.92	139.01	0
Canal	Canal Split	5.654	140	1021.50	1026.34	1022	1026	0.000	0.24	581.89	166.51	0
Canal	Canal Split	5.578	140	1025.77	1026.30		1026	0.009	1.31	106.93	719.77	1
Southern Pacific	Tolleson 1	7.287	1020	1033.80	1036.46	1036	1037	0.034	3.97	257.00	602.26	1
Southern Pacific	Tolleson 1	7.264	1020	1032.90	1035.61	1035	1036	0.003	1.53	667.97	1347.83	0
Southern Pacific	Tolleson 1	7.227	1020	1033.40	1035.19	1035	1035	0.002	1.42	719.03	1219.33	0
Southern Pacific	Tolleson 1	7.169	1020	1031.60	1034.27	1034	1034	0.005	1.86	547.87	1246.57	0
Southern Pacific	Tolleson 1	7.074	1020	1029.60	1033.55	1033	1034	0.001	1.14	892.03	1550.64	0
Southern Pacific	Tolleson 1	7.033	1020	1028.90	1032.89	1033	1033	0.025	3.71	275.27	535.92	1
Southern Pacific	Tolleson 1	6.980	1020	1028.50	1031.83	1031	1032	0.002	1.79	569.90	862.28	0
Southern Pacific	Tolleson 1	6.885	1020	1027.70	1031.49	1030	1031	0.000	0.90	1135.41	1130.76	0
Southern Pacific	Tolleson 1	6.782	1020	1028.90	1030.58	1031	1031	0.013	3.99	255.94	561.43	1
Southern Pacific	Tolleson 1	6.723	1020	1026.50	1029.89	1029	1030	0.001	1.50	678.86	1071.56	0
Southern Pacific	Tolleson 1	6.696	1020	1026.30	1029.76	1029	1030	0.001	1.27	804.82	1212.05	0
Southern Pacific	Tolleson 1	6.601	1020	1025.60	1029.62	1028	1030	0.000	0.66	1537.65	1475.93	0

Southern Pacific	Tolleson 1	6.549	1490	1025.40	1029.57	1028	1030	0.000	0.68	2177.18	1809.40	0
Southern Pacific	Tolleson 1	6.532	1490	1028.29	1029.46		1030	0.003	2.67	558.11	1007.68	1
Southern Pacific	Tolleson 1	6.506	1490	1025.80	1028.44	1028	1029	0.006	2.51	592.45	937.59	1
Southern Pacific	Tolleson 1	6.412	1490	1025.10	1028.02	1027	1028	0.000	1.00	1490.01	1180.80	0
Southern Pacific	RR Split	6.317	1170	1021.90	1026.35	1026	1027	0.006	4.59	255.01	223.12	1
Southern Pacific	RR Split	6.285	1170	1023.20	1026.37	1025	1026	0.000	1.24	944.74	770.53	0
Southern Pacific	RR Split	6.222	1170	1022.90	1026.30		1026	0.000	0.76	1533.98	852.96	0
Southern Pacific	RR Split	6.127	1170	1022.80	1026.24	1024	1026	0.000	0.66	1765.46	873.20	0
Southern Pacific	RR Split	6.033	1230	1023.90	1026.14		1026	0.000	1.05	1168.10	890.70	0
Southern Pacific	RR Split	5.938	1230	1023.70	1025.73		1026	0.002	1.67	738.46	878.41	0
Southern Pacific	RR Split	5.843	1280	1023.10	1025.25		1025	0.001	1.19	1072.69	908.77	0
Southern Pacific	RR Split	5.749	1280	1021.60	1024.80	1024	1025	0.001	2.08	615.62	430.54	0
Southern Pacific	RR Split	5.654	1280	1021.10	1024.33	1023	1024	0.001	1.72	744.09	849.83	0
Southern Pacific	Tolleson 2	5.539	980	1022.20	1024.18		1024	0.000	0.91	1075.40	891.50	0
Southern Pacific	Tolleson 2	5.530	980	1021.50	1022.54	1023	1023	0.016	4.40	222.52	370.69	1
Southern Pacific	Tolleson 2	5.465	980	1018.60	1020.89		1021	0.002	1.98	495.41	513.30	0
Southern Pacific	Tolleson 2	5.370	980	1017.10	1020.79	1019	1021	0.000	0.89	1106.42	1222.38	0
Southern Pacific	Tolleson 2	5.319	760	1019.30	1020.43		1021	0.014	4.21	180.63	281.07	1
Southern Pacific	Tolleson 2	5.275	760	1016.90	1019.53	1019	1020	0.002	2.27	335.10	1238.83	0
Southern Pacific	Tolleson 2	5.181	760	1016.40	1017.98	1018	1018	0.005	1.90	399.81	1142.21	0
Southern Pacific	Tolleson 2	5.086	760	1015.30	1016.80	1016	1017	0.001	1.19	637.77	1122.41	0
Southern Pacific	Tolleson 2	5.054	760	1014.40	1015.84	1016	1016	0.057	3.83	198.31	761.50	1
Southern Pacific	Tolleson 2	5.047	760	1013.97	1015.45		1015	0.004	1.79	424.03	1039.86	0
Southern Pacific	Tolleson 2	5.040	760	1013.70	1015.28	1015	1015	0.003	1.87	405.70	628.88	0
Southern Pacific	Tolleson 2	4.991	760	1011.80	1013.92		1014	0.011	2.80	271.47	487.34	1
Southern Pacific	Tolleson 2	4.896	760	1010.70	1012.92		1013	0.001	1.14	664.67	761.45	0
Southern Pacific	Tolleson 2	4.802	760	1009.60	1012.22	1012	1012	0.002	1.71	443.17	630.02	0
Southern Pacific	Tolleson 2	4.707	760	1008.70	1010.79	1010	1011	0.003	1.84	413.08	725.27	

0													
Southern Pacific	Tolleson 2	4.612		760	1007.80	1010.05	1009	1010	0.001	1.40	541.67	461.08	
0													
Southern Pacific	Tolleson 2	4.577		780	1008.10	1009.87	1009	1010	0.001	1.34	580.97	646.25	
0													
Southern Pacific	Tolleson 2	4.567		780	1009.10	1009.76	1010	1010	0.001	2.15	362.37	768.83	
0													
Southern Pacific	Tolleson 2	4.559		780	1008.50	1009.71		1010	0.004	1.88	415.67	782.11	
0													
Southern Pacific	Tolleson 2	4.518		780	1007.50	1009.14	1009	1009	0.002	1.68	464.47	813.26	
0													
Southern Pacific	Tolleson 2	4.423		780	1006.60	1008.74		1009	0.000	1.10	711.82	715.40	
0													
Southern Pacific	Tolleson 2	4.328		780	1005.90	1008.35	1008	1008	0.001	1.56	501.08	811.92	
0													
Southern Pacific	Tolleson 2	4.234		780	1006.30	1007.47		1008	0.003	1.51	516.53	634.96	
0													
Southern Pacific	Tolleson 2	4.139		780	1005.00	1006.72		1007	0.001	1.20	651.67	719.90	
0													
Southern Pacific	Tolleson 2	4.044		780	1004.30	1005.97	1005	1006	0.002	1.97	395.24	659.56	
0													
Southern Pacific	Tolleson 2	3.949		780	1003.60	1005.30	1004	1005	0.001	1.13	690.09	931.91	
0													
Southern Pacific	Tolleson 2	3.855		780	1002.20	1003.88	1004	1004	0.019	3.34	233.85	533.93	
1													
Southern Pacific	Tolleson 2	3.760		780	1001.50	1003.22	1002	1003	0.001	0.92	851.03	1005.14	
0													
Southern Pacific	Tolleson 2	3.665		780	1000.40	1003.18		1003	0.000	0.38	2047.47	1265.98	
0													
Southern Pacific	Tolleson 2	3.583		850	999.40	1003.17		1003	0.000	0.29	2970.52	1306.37	
0													
Southern Pacific	Tolleson 2	3.568		850	1001.90	1003.10		1003	0.001	2.02	421.37	727.02	
0													
Southern Pacific	Tolleson 2	3.535		850	989.70	998.94	991	999	0.000	0.42	2000.93	454.75	
0													
Southern Pacific	Tolleson 2	3.476		850	989.30	998.94	991	999	0.000	0.41	2057.78	375.89	
0													
Southern Pacific	Tolleson 2	3.411		850	997.50	998.59	999	999	0.021	4.48	189.92	308.37	
1													
Southern Pacific	Tolleson 2	3.287		850	989.80	997.65	993	998	0.000	1.53	556.66	153.93	
0													
Southern Pacific	Tolleson 2	3.192		850	989.80	997.65	991	998	0.000	0.64	1320.56	259.37	
0													
Southern Pacific	Tolleson 2	3.083		970	995.40	997.59		998	0.001	1.41	686.26	492.31	
0													
Southern Pacific	Tolleson 2	3.050		970	994.70	997.41	997	997	0.001	1.50	646.52	934.13	
0													
Southern Pacific	Tolleson 2	3.037		970	995.70	997.00	997	997	0.017	3.46	280.06	732.45	
1													
Southern Pacific	Tolleson 2	3.031		970	994.20	996.50	996	997	0.002	1.80	538.50	990.97	
0													
Southern Pacific	Tolleson 2	2.908		970	993.30	995.91		996	0.001	1.27	761.88	578.47	
0													
Southern Pacific	Tolleson 2	2.851		970	993.70	995.08	995	995	0.022	4.33	224.23	391.50	
1													

Southern Pacific	Tolleson 2	2.718	970	989.50	994.11	992	994	0.000	0.84	1160.78	991.97	0
Southern Pacific	Tolleson 2	2.624	970	987.90	994.09	991	994	0.000	0.50	1925.44	1165.72	0
Southern Pacific	Tolleson 2	2.529	970	988.90	994.08	991	994	0.000	0.36	2659.40	1278.73	0
Southern Pacific	Tolleson 2	2.434	970	988.20	994.07	990	994	0.000	0.33	2935.82	1307.34	0
Southern Pacific	Tolleson 2	2.366	970	988.40	994.07	991	994	0.000	0.45	2173.45	1282.68	0
Southern Pacific	Tolleson 2	2.352	930	991.50	994.03		994	0.001	1.51	616.15	446.33	0
Southern Pacific	Tolleson 2	2.342	930	990.80	994.03	992	994	0.000	0.87	1068.35	1574.26	0
Southern Pacific	Tolleson 2	2.245	930	991.10	993.97	992	994	0.000	0.83	1124.55	1226.06	0
Southern Pacific	Tolleson 2	2.229	930	991.20	993.91	993	994	0.002	1.72	539.68	833.32	0
Southern Pacific	Tolleson 2	2.150	930	990.20	993.29	993	993	0.001	1.26	738.41	1129.39	0
Southern Pacific	Tolleson 2	2.056	930	990.20	992.39		992	0.002	1.40	665.43	943.09	0
Southern Pacific	Tolleson 2	1.961	630	988.50	992.16		992	0.000	0.57	1106.93	990.00	0
Southern Pacific	Tolleson 2	1.870	565	989.20	992.04	990	992	0.000	1.10	513.57	803.42	0
Southern Pacific	Tolleson 2	1.863	565	988.80	992.04		992	0.000	0.93	609.14	262.19	0
Southern Pacific	Tolleson 2	1.856	500	988.50	992.04	989	992	0.000	0.69	725.37	282.50	0
Southern Pacific	Tolleson 2	1.771	440	989.00	992.00		992	0.000	0.59	742.87	930.88	0
Southern Pacific	Tolleson 2	1.677	440	989.50	990.75	990	991	0.002	1.27	347.18	552.53	0
Southern Pacific	Tolleson 2	1.582	440	987.50	988.91	989	989	0.012	2.39	184.04	592.40	1
Southern Pacific	Tolleson 2	1.487	440	986.10	987.04	987	987	0.002	1.22	361.67	708.95	0
Southern Pacific	Tolleson 2	1.399	440	984.50	986.97	985	987	0.000	0.49	902.11	1463.93	0
Southern Pacific	Tolleson 2	1.387	450	986.30	986.78	987	987	0.005	3.17	141.92	456.97	1
Southern Pacific	Tolleson 2	1.376	450	983.40	986.38	984	986	0.000	0.52	872.73	1202.40	0
Southern Pacific	Tolleson 2	1.298	360	982.50	986.37	984	986	0.000	0.16	2256.80	1238.16	0
Southern Pacific	Tolleson 2	1.203	270	982.20	986.37	984	986	0.000	0.22	1250.62	1236.62	0
Southern Pacific	Tolleson 2	1.138	220	984.20	986.30		986	0.003	1.90	115.72	280.71	1
Southern Pacific	Tolleson 2	1.131	220	982.40	985.55	985	986	0.002	2.09	105.32	610.61	0
Southern Pacific	Tolleson 2	1.109	220	981.90	985.33	985	985	0.002	1.74	126.56	525.92	0
Southern Pacific	Tolleson 2	1.014	220	983.90	983.93	984	984	0.005		126.94	305.65	

0													
Southern Pacific	Tolleson 2	0.919		220	982.90	983.26	983	983	0.001	0.33	349.65	878.64	
0													
Southern Pacific	Tolleson 2	0.883		220	982.10	982.76	983	983	0.018	3.09	71.23	180.83	
1													
Southern Pacific	Tolleson 2	0.824		220	976.50	979.56	979	980	0.007	3.05	72.24	106.79	
1													
Southern Pacific	Tolleson 2	0.730		220	970.70	975.72	975	976	0.008	4.06	54.21	52.56	
1													
Southern Pacific	Tolleson 2	0.635		220	966.30	970.83	970	971	0.011	5.93	37.10	16.87	
1													
Southern Pacific	Tolleson 2	0.540		220	964.70	968.91	969	969	0.003	1.36	162.14	1193.12	
0													
Southern Pacific	Tolleson 2	0.446		220	963.20	966.40	966	967	0.012	2.85	77.25	679.86	
1													
Southern Pacific	Tolleson 2	0.387		220	962.30	964.00	963	964	0.000	0.28	778.19	803.48	
0													

Profile Output Table - Standard Table 2

River	Reach	River Sta	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Canal	Canal Split	6.317	1027.96	1027.96	0.00	0.00	0.00		160.00		1612.51
Canal	Canal Split	6.285	1027.95	1027.95	0.00	0.04	0.00		160.00		897.25
Canal	Canal Split	6.222	1027.91	1027.91	0.00	0.09	0.00		160.00		345.05
Canal	Canal Split	6.127	1027.82	1027.82	0.01	0.25	0.00		160.00		332.88
Canal	Canal Split	6.033	1027.57	1027.56	0.01	0.45	0.00		100.00		271.63
Canal	Canal Split	5.938	1027.11	1027.11	0.01	0.09	0.00		100.00		384.95
Canal	Canal Split	5.843	1027.02	1027.02	0.00	0.06	0.00		90.00		548.59
Canal	Canal Split	5.798	1026.96	1026.92	0.04				90.00		227.03
Canal	Canal Split	5.749	1026.34	1026.34	0.00	0.00	0.00		90.00		139.01
Canal	Canal Split	5.654	1026.34	1026.34	0.00	0.01	0.00		140.00		166.51
Canal	Canal Split	5.578	1026.33	1026.30	0.03	0.00	0.00		140.00		719.77
Southern Pacific	Tolleson 1	7.287	1036.71	1036.46	0.24	0.78	0.06		1020.00		602.26
Southern Pacific	Tolleson 1	7.264	1035.65	1035.61	0.04	0.43	0.00		1020.00		1347.83
Southern Pacific	Tolleson 1	7.227	1035.22	1035.19	0.03	0.90	0.00		1020.00		1219.33
Southern Pacific	Tolleson 1	7.169	1034.32	1034.27	0.05	0.74	0.01		1020.00		1246.57
Southern Pacific	Tolleson 1	7.074	1033.57	1033.55	0.02	0.44	0.02		1020.00		1550.64
Southern Pacific	Tolleson 1	7.033	1033.10	1032.89	0.21	1.18	0.05		1020.00		535.92
Southern Pacific	Tolleson 1	6.980	1031.88	1031.83	0.05	0.37	0.01		1020.00		862.28
Southern Pacific	Tolleson 1	6.885	1031.50	1031.49	0.01	0.65	0.02		1020.00		1130.76
Southern Pacific	Tolleson 1	6.782	1030.83	1030.58	0.25	0.84	0.06		1020.00		561.43
Southern Pacific	Tolleson 1	6.723	1029.92	1029.89	0.04	0.14	0.00		1020.00		1071.56
Southern Pacific	Tolleson 1	6.696	1029.78	1029.76	0.02	0.16	0.01		1020.00		1212.05
Southern Pacific	Tolleson 1	6.601	1029.62	1029.62	0.01	0.04	0.00		1020.00		1475.93
Southern Pacific	Tolleson 1	6.549	1029.58	1029.57	0.01	0.00	0.01		1490.00		1809.40
Southern Pacific	Tolleson 1	6.532	1029.57	1029.46	0.11				1490.00		1007.68
Southern Pacific	Tolleson 1	6.506	1028.54	1028.44	0.10	0.47	0.02		1490.00		937.59
Southern Pacific	Tolleson 1	6.412	1028.04	1028.02	0.02	0.08	0.00		1490.00		1180.80
Southern Pacific	RR Split	6.317	1026.68	1026.35	0.33	0.19	0.09		1170.00		223.12
Southern Pacific	RR Split	6.285	1026.39	1026.37	0.02	0.08	0.00		1170.00		770.53
Southern Pacific	RR Split	6.222	1026.31	1026.30	0.01	0.06	0.00		1170.00		852.96
Southern Pacific	RR Split	6.127	1026.25	1026.24	0.01	0.09	0.00		1170.00		873.20
Southern Pacific	RR Split	6.033	1026.16	1026.14	0.02	0.38	0.00		1230.00		890.70
Southern Pacific	RR Split	5.938	1025.77	1025.73	0.04	0.49	0.01		1230.00		878.41
Southern Pacific	RR Split	5.843	1025.27	1025.25	0.02	0.40	0.00		1280.00		908.77
Southern Pacific	RR Split	5.749	1024.86	1024.80	0.07	0.48	0.01		1280.00		430.54
Southern Pacific	RR Split	5.654	1024.38	1024.33	0.05	0.17	0.01		1280.00		849.83
Southern Pacific	Tolleson 2	5.539	1024.19	1024.18	0.01				980.00		891.50
Southern Pacific	Tolleson 2	5.530	1022.84	1022.54	0.30	1.50	0.07		980.00		370.69
Southern Pacific	Tolleson 2	5.465	1020.95	1020.89	0.06	0.13	0.01		980.00		513.30
Southern Pacific	Tolleson 2	5.370	1020.80	1020.79	0.01	0.07	0.03		980.00		1222.38
Southern Pacific	Tolleson 2	5.319	1020.70	1020.43	0.27	1.04	0.06		760.00		281.07
Southern Pacific	Tolleson 2	5.275	1019.60	1019.53	0.08	1.56	0.01		760.00		1238.83
Southern Pacific	Tolleson 2	5.181	1018.04	1017.98	0.06	1.20	0.01		760.00		1142.21
Southern Pacific	Tolleson 2	5.086	1016.82	1016.80	0.02	0.73	0.02		760.00		1122.41
Southern Pacific	Tolleson 2	5.054	1016.07	1015.84	0.23				760.00		761.50
Southern Pacific	Tolleson 2	5.047	1015.49	1015.45	0.05	0.16	0.00		760.00		1039.86
Southern Pacific	Tolleson 2	5.040	1015.34	1015.28	0.05	1.29	0.01		760.00		628.88
Southern Pacific	Tolleson 2	4.991	1014.04	1013.92	0.12	1.07	0.03		760.00		487.34
Southern Pacific	Tolleson 2	4.896	1012.95	1012.92	0.02	0.68	0.00		760.00		761.45
Southern Pacific	Tolleson 2	4.802	1012.26	1012.22	0.05	1.42	0.00		760.00		630.02

Southern Pacific	Tolleson 2	4.707	1010.84	1010.79	0.05	0.75	0.01	760.00	725.27
Southern Pacific	Tolleson 2	4.612	1010.08	1010.05	0.03	0.18	0.00	760.00	461.08
Southern Pacific	Tolleson 2	4.577	1009.90	1009.87	0.03	0.06	0.00	780.00	646.25
Southern Pacific	Tolleson 2	4.567	1009.83	1009.76	0.07	0.07	0.01	780.00	768.83
Southern Pacific	Tolleson 2	4.559	1009.76	1009.71	0.05	0.57	0.00	780.00	782.11
Southern Pacific	Tolleson 2	4.518	1009.19	1009.14	0.04	0.42	0.01	780.00	813.26
Southern Pacific	Tolleson 2	4.423	1008.76	1008.74	0.02	0.37	0.00	780.00	715.40
Southern Pacific	Tolleson 2	4.328	1008.39	1008.35	0.04	0.88	0.00	780.00	811.92
Southern Pacific	Tolleson 2	4.234	1007.51	1007.47	0.04	0.76	0.00	780.00	634.96
Southern Pacific	Tolleson 2	4.139	1006.74	1006.72	0.02	0.71	0.00	780.00	719.90
Southern Pacific	Tolleson 2	4.044	1006.03	1005.97	0.06	0.70	0.01	780.00	659.56
Southern Pacific	Tolleson 2	3.949	1005.32	1005.30	0.02	1.25	0.02	780.00	931.91
Southern Pacific	Tolleson 2	3.855	1004.05	1003.88	0.17	0.77	0.05	780.00	533.93
Southern Pacific	Tolleson 2	3.760	1003.24	1003.22	0.01	0.05	0.00	780.00	1005.14
Southern Pacific	Tolleson 2	3.665	1003.18	1003.18	0.00	0.01	0.00	780.00	1265.98
Southern Pacific	Tolleson 2	3.583	1003.17	1003.17	0.00	0.00	0.01	850.00	1306.37
Southern Pacific	Tolleson 2	3.568	1003.16	1003.10	0.06			850.00	727.02
Southern Pacific	Tolleson 2	3.535	998.95	998.94	0.00	0.00	0.00	850.00	454.75
Southern Pacific	Tolleson 2	3.476	998.94	998.94	0.00	0.01	0.03	850.00	375.89
Southern Pacific	Tolleson 2	3.411	998.90	998.59	0.31	0.33	0.08	850.00	308.37
Southern Pacific	Tolleson 2	3.287	997.68	997.65	0.04	0.02	0.01	850.00	153.93
Southern Pacific	Tolleson 2	3.192	997.65	997.65	0.01	0.03	0.00	850.00	259.37
Southern Pacific	Tolleson 2	3.083	997.62	997.59	0.03	0.17	0.00	970.00	492.31
Southern Pacific	Tolleson 2	3.050	997.44	997.41	0.03	0.24	0.02	970.00	934.13
Southern Pacific	Tolleson 2	3.037	997.19	997.00	0.19	0.16	0.04	970.00	732.45
Southern Pacific	Tolleson 2	3.031	996.55	996.50	0.05	0.60	0.01	970.00	990.97
Southern Pacific	Tolleson 2	2.908	995.94	995.91	0.03	0.55	0.03	970.00	578.47
Southern Pacific	Tolleson 2	2.851	995.37	995.08	0.29	0.27	0.08	970.00	391.50
Southern Pacific	Tolleson 2	2.718	994.12	994.11	0.01	0.03	0.00	970.00	991.97
Southern Pacific	Tolleson 2	2.624	994.09	994.09	0.00	0.01	0.00	970.00	1165.72
Southern Pacific	Tolleson 2	2.529	994.08	994.08	0.00	0.01	0.00	970.00	1278.73
Southern Pacific	Tolleson 2	2.434	994.07	994.07	0.00	0.01	0.00	970.00	1307.34
Southern Pacific	Tolleson 2	2.366	994.07	994.07	0.00	0.00	0.00	970.00	1282.68
Southern Pacific	Tolleson 2	2.352	994.06	994.03	0.04	0.01	0.01	930.00	446.33
Southern Pacific	Tolleson 2	2.342	994.04	994.03	0.01	0.06	0.00	930.00	1574.26
Southern Pacific	Tolleson 2	2.245	993.98	993.97	0.01	0.03	0.00	930.00	1226.06
Southern Pacific	Tolleson 2	2.229	993.95	993.91	0.05	0.63	0.01	930.00	833.32
Southern Pacific	Tolleson 2	2.150	993.31	993.29	0.02	0.89	0.00	930.00	1129.39
Southern Pacific	Tolleson 2	2.056	992.42	992.39	0.03	0.25	0.01	930.00	943.09
Southern Pacific	Tolleson 2	1.961	992.16	992.16	0.01	0.10	0.00	630.00	990.00
Southern Pacific	Tolleson 2	1.870	992.06	992.04	0.02	0.01	0.00	565.00	803.42
Southern Pacific	Tolleson 2	1.863	992.05	992.04	0.01	0.01	0.00	565.00	262.19
Southern Pacific	Tolleson 2	1.856	992.05	992.04	0.01	0.04	0.00	500.00	282.50
Southern Pacific	Tolleson 2	1.771	992.01	992.00	0.01			440.00	930.88
Southern Pacific	Tolleson 2	1.677	990.78	990.75	0.02	1.77	0.01	440.00	552.53
Southern Pacific	Tolleson 2	1.582	989.00	988.91	0.09	1.92	0.02	440.00	592.40
Southern Pacific	Tolleson 2	1.487	987.06	987.04	0.02	0.08	0.01	440.00	708.95
Southern Pacific	Tolleson 2	1.399	986.97	986.97	0.00	0.01	0.02	440.00	1463.93
Southern Pacific	Tolleson 2	1.387	986.94	986.78	0.16	0.01	0.05	450.00	456.97
Southern Pacific	Tolleson 2	1.376	986.38	986.38	0.00	0.01	0.00	450.00	1202.40
Southern Pacific	Tolleson 2	1.298	986.37	986.37	0.00	0.00	0.00	360.00	1238.16
Southern Pacific	Tolleson 2	1.203	986.37	986.37	0.00	0.01	0.01	270.00	1236.62
Southern Pacific	Tolleson 2	1.138	986.36	986.30	0.06			220.00	280.71
Southern Pacific	Tolleson 2	1.131	985.62	985.55	0.07	0.24	0.01	220.00	610.61
Southern Pacific	Tolleson 2	1.109	985.38	985.33	0.05	1.40	0.00	220.00	525.92

Southern Pacific	Tolleson 2	1.014	983.98	983.93	0.05	0.70	0.01	220.00		305.65
Southern Pacific	Tolleson 2	0.919	983.27	983.26	0.01	0.35	0.01	203.64	16.36	878.64
Southern Pacific	Tolleson 2	0.883	982.90	982.76	0.15	3.20	0.00		220.00	180.83
Southern Pacific	Tolleson 2	0.824	979.70	979.56	0.14	3.71	0.01		220.00	106.79
Southern Pacific	Tolleson 2	0.730	975.98	975.72	0.26	4.58	0.03		220.00	52.56
Southern Pacific	Tolleson 2	0.635	971.37	970.83	0.55	2.28	0.16		220.00	16.87
Southern Pacific	Tolleson 2	0.540	968.93	968.91	0.03	2.40	0.01		220.00	1193.12
Southern Pacific	Tolleson 2	0.446	966.52	966.40	0.13	0.03	0.04		220.00	679.86
Southern Pacific	Tolleson 2	0.387	964.00	964.00	0.00				220.00	803.48

ERRORS WARNINGS AND NOTES

Errors Warnings and Notes for Plan : Exist. Cond.

```
River: Southern Pacific  Reach: Tolleson 1     RS: 7.287     Profile: PF#1
      Warning - The energy equation could not be balanced within the specified number of iterations.  The program selected the
                water surface that had the least amount of error between computed and assumed values.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
                the need for additional cross sections.
      Warning - During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
                water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
                program defaulted to critical depth.
River: Southern Pacific  Reach: Tolleson 1     RS: 7.227     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 1     RS: 7.169     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 1     RS: 7.074     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 1     RS: 7.033     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
                the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 1     RS: 6.980     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 1     RS: 6.885     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 1     RS: 6.782     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 1     RS: 6.723     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
River: Southern Pacific  Reach: Tolleson 1     RS: 6.696     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 1     RS: 6.601     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 1     RS: 6.549     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 1     RS: 6.532     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
```

Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note - The user has entered a known water surface elevation at this cross section.
River: Southern Pacific Reach: Tolleson 1 RS: 6.506 Profile: PF#1
Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Southern Pacific Reach: Tolleson 1 RS: 6.412 Profile: PF#1
Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - A flow split was encountered. The program first calculated the momentum of both channels below the junction. An energy balance was performed across the junction from the stream with the highest momentum downstream to the section upstream.
River: Southern Pacific Reach: RR Split RS: 6.317 Profile: PF#1
Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Southern Pacific Reach: RR Split RS: 6.285 Profile: PF#1
Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Southern Pacific Reach: RR Split RS: 6.222 Profile: PF#1
Warning - Divided flow computed for this cross-section.
River: Southern Pacific Reach: RR Split RS: 6.127 Profile: PF#1
Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Southern Pacific Reach: RR Split RS: 6.033 Profile: PF#1
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Southern Pacific Reach: RR Split RS: 5.938 Profile: PF#1
Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Southern Pacific Reach: RR Split RS: 5.843 Profile: PF#1
Warning - Divided flow computed for this cross-section.
River: Southern Pacific Reach: RR Split RS: 5.749 Profile: PF#1
Warning - Divided flow computed for this cross-section.
River: Southern Pacific Reach: RR Split RS: 5.654 Profile: PF#1
Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Southern Pacific Reach: Tolleson 2 RS: 5.539 Profile: PF#1
Warning - The cross-section end points had to be extended vertically for the computed water surface.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note - The user has entered a known water surface elevation at this cross section.
River: Southern Pacific Reach: Tolleson 2 RS: 5.530 Profile: PF#1
Warning - The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

```
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
                the need for additional cross sections.
      Warning - During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
                water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
                program defaulted to critical depth.
River: Southern Pacific  Reach: Tolleson 2     RS: 5.465     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 5.370     Profile: PF#1
      Warning - The cross-section end points had to be extended vertically for the computed water surface.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 5.319     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The cross-section end points had to be extended vertically for the computed water surface.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
                the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 5.275     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
                the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 5.181     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
                the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 5.086     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 5.054     Profile: PF#1
      Warning - The energy equation could not be balanced within the specified number of iterations.  The program used critical
                depth for the water surface and continued on with the calculations.
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Note -    The user has entered a known water surface elevation at this cross section.
River: Southern Pacific  Reach: Tolleson 2     RS: 5.040     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
                the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 4.991     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
```

```
                the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 4.896     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 4.802     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
                the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 4.707     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 4.612     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
River: Southern Pacific  Reach: Tolleson 2     RS: 4.567     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 4.518     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 4.423     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 4.328     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
River: Southern Pacific  Reach: Tolleson 2     RS: 4.234     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 4.139     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 4.044     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 3.949     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
                the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 3.855     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 3.760     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 3.665     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
```

```
      Warning - The cross-section end points had to be extended vertically for the computed water surface.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 3.583     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The cross-section end points had to be extended vertically for the computed water surface.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 3.568     Profile: PF#1
      Warning - The cross-section end points had to be extended vertically for the computed water surface.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
                the need for additional cross sections.
      Note -    The user has entered a known water surface elevation at this cross section.
River: Southern Pacific  Reach: Tolleson 2     RS: 3.476     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 3.411     Profile: PF#1
      Warning - The energy equation could not be balanced within the specified number of iterations.  The program used critical
                depth for the water surface and continued on with the calculations.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
                the need for additional cross sections.
      Warning - During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
                water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
                program defaulted to critical depth.
River: Southern Pacific  Reach: Tolleson 2     RS: 3.287     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 3.192     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 3.083     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 3.050     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 3.037     Profile: PF#1
      Warning - The energy equation could not be balanced within the specified number of iterations.  The program used critical
                depth for the water surface and continued on with the calculations.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Warning - During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
                water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
                program defaulted to critical depth.
River: Southern Pacific  Reach: Tolleson 2     RS: 3.031     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 2.908     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
```

```
River: Southern Pacific  Reach: Tolleson 2     RS: 2.851     Profile: PF#1
     Warning - The energy equation could not be balanced within the specified number of iterations.  The program used critical
               depth for the water surface and continued on with the calculations.
     Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
               This may indicate the need for additional cross sections.
     Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
               the need for additional cross sections.
     Warning - During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
               water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
               program defaulted to critical depth.
River: Southern Pacific  Reach: Tolleson 2     RS: 2.718     Profile: PF#1
     Warning - Divided flow computed for this cross-section.
     Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
               This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 2.624     Profile: PF#1
     Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
               This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 2.366     Profile: PF#1
     Warning - The cross-section end points had to be extended vertically for the computed water surface.
     Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
               This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 2.352     Profile: PF#1
     Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
               This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 2.245     Profile: PF#1
     Warning - Divided flow computed for this cross-section.
     Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
               This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 2.229     Profile: PF#1
     Warning - Divided flow computed for this cross-section.
River: Southern Pacific  Reach: Tolleson 2     RS: 2.056     Profile: PF#1
     Warning - Divided flow computed for this cross-section.
     Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
               This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 1.961     Profile: PF#1
     Warning - The cross-section end points had to be extended vertically for the computed water surface.
     Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
               This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 1.870     Profile: PF#1
     Warning - The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Pacific  Reach: Tolleson 2     RS: 1.863     Profile: PF#1
     Warning - The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Pacific  Reach: Tolleson 2     RS: 1.856     Profile: PF#1
     Warning - The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Pacific  Reach: Tolleson 2     RS: 1.771     Profile: PF#1
     Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
               This may indicate the need for additional cross sections.
     Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
               the need for additional cross sections.
     Note -    The user has entered a known water surface elevation at this cross section.
River: Southern Pacific  Reach: Tolleson 2     RS: 1.677     Profile: PF#1
     Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
               This may indicate the need for additional cross sections.
     Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
               the need for additional cross sections.
```

```
River: Southern Pacific  Reach: Tolleson 2     RS: 1.582     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
                the need for additional cross sections.
      Warning - The parabolic search method failed to converge on critical depth.  The program will try the cross section
                slice/secant method to find critical depth.
      Note -    Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
                used.
River: Southern Pacific  Reach: Tolleson 2     RS: 1.487     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 1.399     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 1.387     Profile: PF#1
      Warning - The energy equation could not be balanced within the specified number of iterations.  The program used critical
                depth for the water surface and continued on with the calculations.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Warning - During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
                water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
                program defaulted to critical depth.
River: Southern Pacific  Reach: Tolleson 2     RS: 1.376     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 1.298     Profile: PF#1
      Warning - The cross-section end points had to be extended vertically for the computed water surface.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 1.203     Profile: PF#1
      Warning - The cross-section end points had to be extended vertically for the computed water surface.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 1.138     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The cross-section end points had to be extended vertically for the computed water surface.
      Note -    The user has entered a known water surface elevation at this cross section.
River: Southern Pacific  Reach: Tolleson 2     RS: 1.109     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
                the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 1.014     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 0.919     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Southern Pacific  Reach: Tolleson 2     RS: 0.883     Profile: PF#1
```

Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: Southern Pacific Reach: Tolleson 2 RS: 0.824 Profile: PF#1
Warning - Divided flow computed for this cross-section.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: Southern Pacific Reach: Tolleson 2 RS: 0.730 Profile: PF#1
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: Southern Pacific Reach: Tolleson 2 RS: 0.635 Profile: PF#1
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: Southern Pacific Reach: Tolleson 2 RS: 0.540 Profile: PF#1
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Note - Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Southern Pacific Reach: Tolleson 2 RS: 0.446 Profile: PF#1
Warning - The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning - Divided flow computed for this cross-section.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note - Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Southern Pacific Reach: Tolleson 2 RS: 0.387 Profile: PF#1
Warning - Divided flow computed for this cross-section.
River: Canal Reach: Canal Split RS: 6.317 Profile: PF#1
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Canal Reach: Canal Split RS: 6.222 Profile: PF#1
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Canal Reach: Canal Split RS: 6.127 Profile: PF#1
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
River: Canal Reach: Canal Split RS: 6.033 Profile: PF#1
Warning - Divided flow computed for this cross-section.
River: Canal Reach: Canal Split RS: 5.938 Profile: PF#1
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

```
                This may indicate the need for additional cross sections.
River: Canal  Reach: Canal Split     RS: 5.843     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Canal  Reach: Canal Split     RS: 5.798     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Note -    The user has entered a known water surface elevation at this cross section.
River: Canal  Reach: Canal Split     RS: 5.654     Profile: PF#1
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
River: Canal  Reach: Canal Split     RS: 5.578     Profile: PF#1
      Warning - Divided flow computed for this cross-section.
      Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
                This may indicate the need for additional cross sections.
      Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
                the need for additional cross sections.
      Note -    The user has entered a known water surface elevation at this cross section.
```

Appendix F: Erosion and Sediment Transport Analysis Supporting Documentation

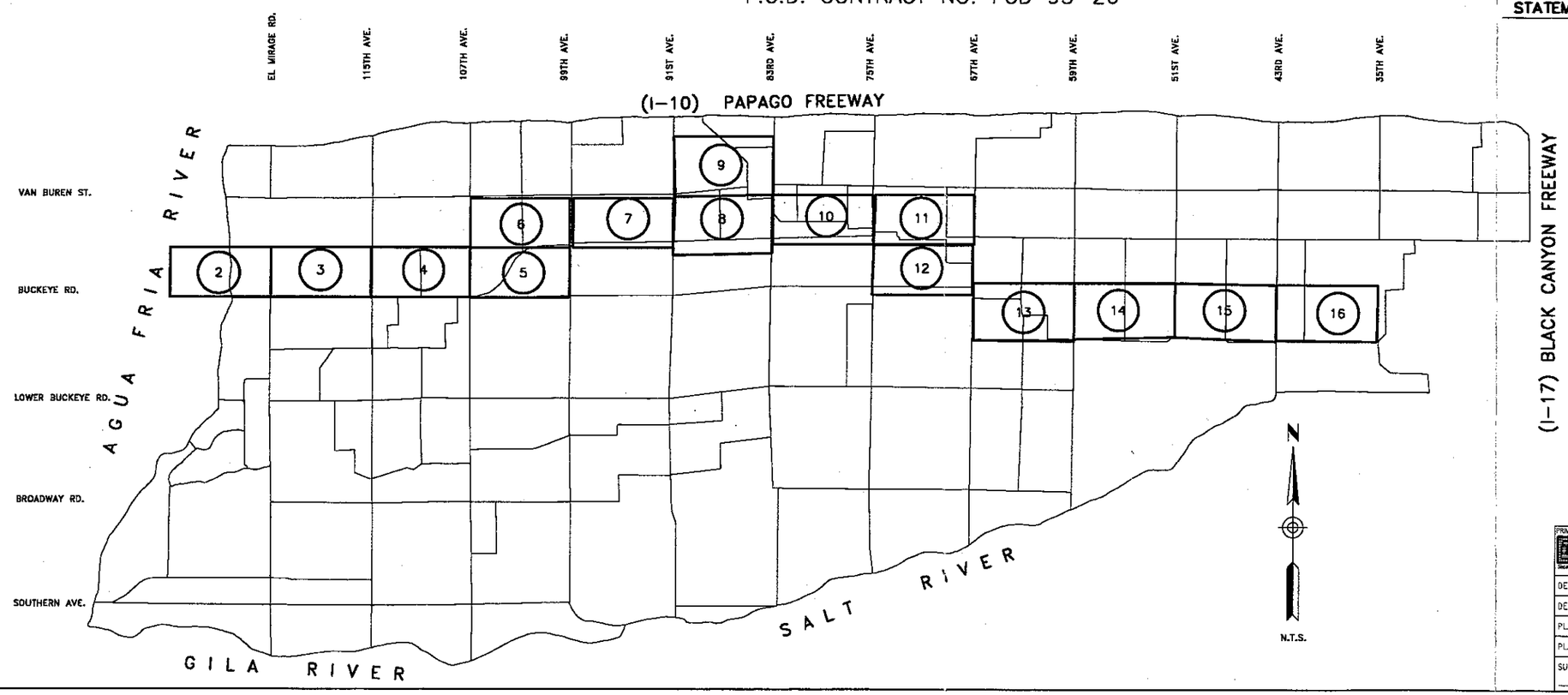
Not Used.

Appendix G: HEC-1 and HEC-RAS Input Files on Diskette
Reduced-Scale Floodplain Delineation Maps

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

TOLLESON AREA FLOODPLAIN DELINEATION

F.C.D. CONTRACT NO. FCD 95-26



LEGEND

- 100-yr FLOODPLAIN BOUNDARY
- HYDRAULIC BASE LINE AND RIVER MILE.
- ELEVATION REFERENCE MARK
- BASE FLOOD ELEVATION
- ZONE AH ZONE DESIGNATION

CROSS SECTION DATA

RM= RIVER MILE STATION

WS= FLOODPLAIN WATER SURFACE ELEVATION

Q = 100-yr FLOW RATE IN CUBIC FEET PER SECOND (CFS)

NOTES

1. ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929
2. ALL HORIZONTAL COORDINATES USE ARIZONA STATE PLANE COORDINATES BASED ON THE 1927 NORTH AMERICAN DATUM
3. RIVER MILE STATIONING BASED UPON HYDRAULIC BASELINE ALONG THE SOUTHERN PACIFIC RAILROAD.

STATEMENTS OF PROFESSIONAL REGISTRANTS

THE GROUND CONTROL SURVEY WAS PREPARED UNDER MY DIRECT SUPERVISION:

THE HYDROLOGIC VALUES USED FOR THE FLOODPLAIN DELINEATION, AS WELL AS THE FLOODPLAIN DELINEATION WERE PREPARED UNDER MY DIRECT SUPERVISION:

Registered Professional Engineer (Civil) CERTIFICATE NO. 21684 BRIAN J. FRY ARIZONA, U.S.A.

FLOWN BY:
KENNEY AERIAL MAPPING INC.
FLIGHT DATE MARCH 28,1994

PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS

SUB CONSULTANT: JE Fuller Hydrology & Geomorphology, Inc.

	BY	DATE
DESIGN	DOF	01/99
DESIGN CHK.	BJF	01/99
PLANS	PAF/JEV	01/99
PLANS CHK.	BJF	01/99

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

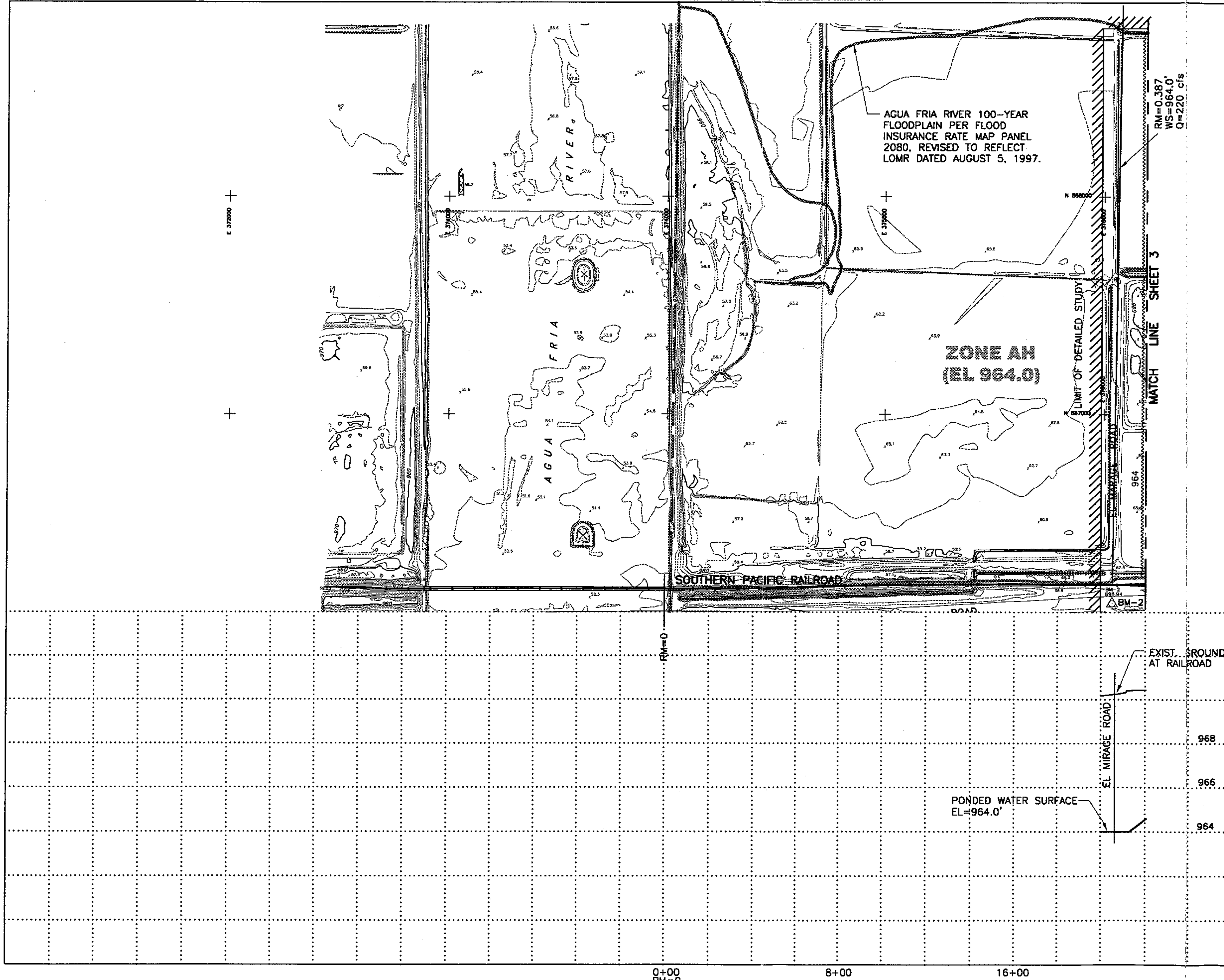
RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 16

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1"= 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY KAMINSKI-HUBBARD ENGINEERING INC. AND PROJECT ENGINEERING CONSULTANTS, LTD.



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

TOLLESON AREA FLOODPLAIN DELINEATION

"FCD CONTRACT # 95-26"

LEGEND

- BUILDING
- SINGLE RESIDENTIAL BUILDING
- ROAD/PAVEMENT
- DIRT ROAD
- HIDDEN ROAD/HIDDEN PAVEMENT
- CURB
- HIDDEN CURB
- RAILROAD
- INDEX CONTOUR
- DEPRESSED INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSED INTERMEDIATE CONTOUR
- WASH/ DRAINAGE/WATERLINE
- IRRIGATION DITCH
- TREE LINE
- SPOT ELEVATION
- HORIZONTAL & VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
BM-2	968.94	BCHH El Mirage & Buckeye.

INDEX MAP

SCALE: 1" = 200'
CONTOUR INTERVAL = 2 FEET

PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS

SUB CONSULTANT: JE Fuller Hydrology & Geomorphology, Inc.

	BY	DATE
DESIGN	DCF	11-99
DESIGN CHK.	BJF	11-99
PLANS	PAF	11-99
PLANS CHK.	BJF	11-99

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

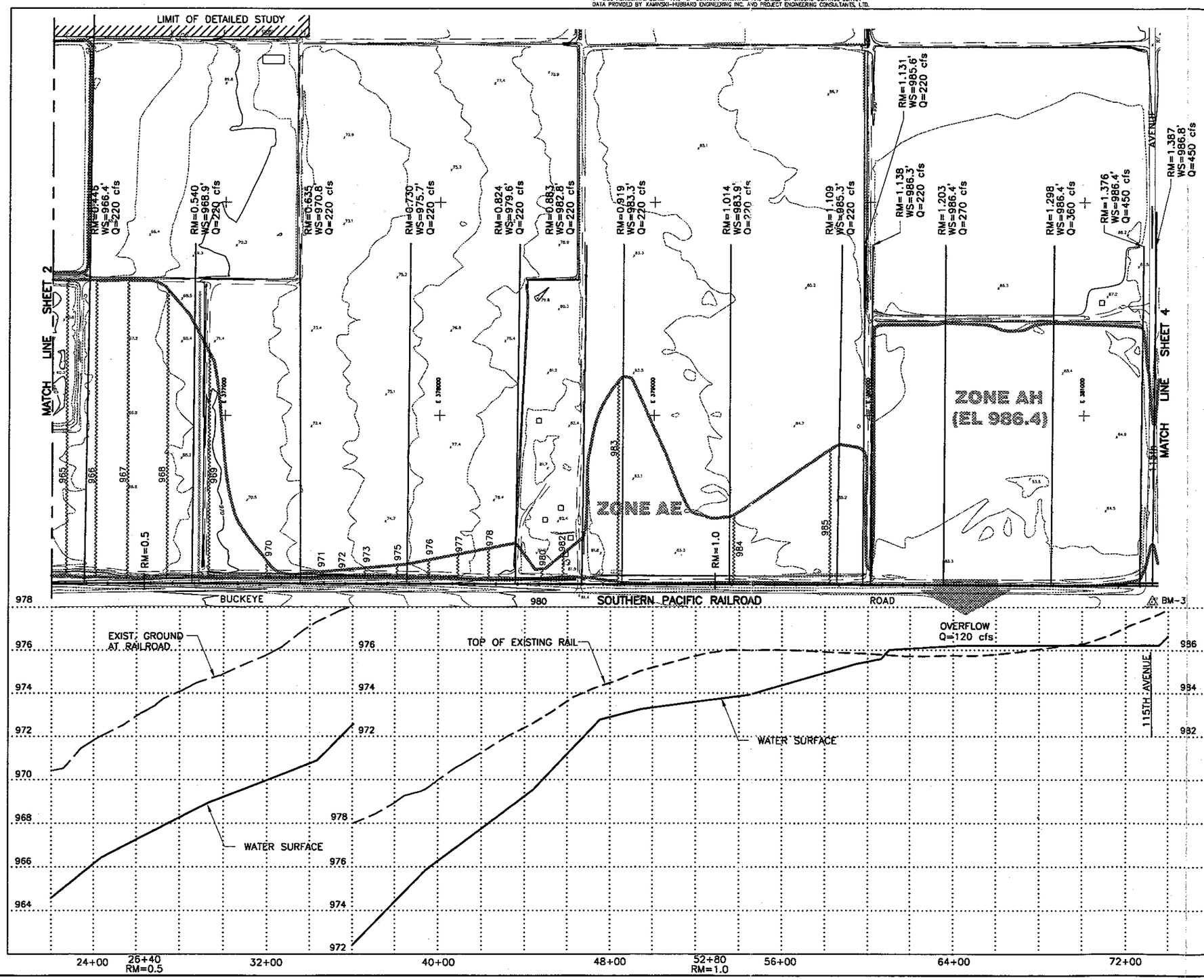
RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 2 of 16

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1"=200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY KAMINSKI-HUBBARD ENGINEERING INC. AND PROJECT ENGINEERING CONSULTANTS, LTD.



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

TOLLESON AREA FLOODPLAIN DELINEATION "FCD CONTRACT # 95-26"

LEGEND

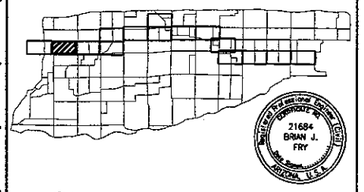
- BUILDING
- SINGLE RESIDENTIAL BUILDING
- ROAD/PAVEMENT
- DIRT ROAD
- HIDDEN ROAD/HIDDEN PAVEMENT
- CURB
- HIDDEN CURB
- RAILROAD
- INDEX CONTOUR
- DEPRESSED INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSED INTERMEDIATE CONTOUR
- WASH/ DRAINAGE/WATERLINE
- IRRIGATION DITCH
- TREE LINE
- SPOT ELEVATION
- HORIZONTAL & VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
BM-3	987.09	BCHH 115 Ave. & Buckeye Rd.

INDEX MAP



0 200' 400' 600'
SCALE: 1" = 200'
CONTOUR INTERVAL = 2 FEET

PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS

SUB CONSULTANT: JE Fuller Hydrology & Geomorphology, Inc.

	BY	DATE
DESIGN	DCF	11-99
DESIGN CHK.	BJF	11-99
PLANS	PAF	11-99
PLANS CHK.	BJF	11-99

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

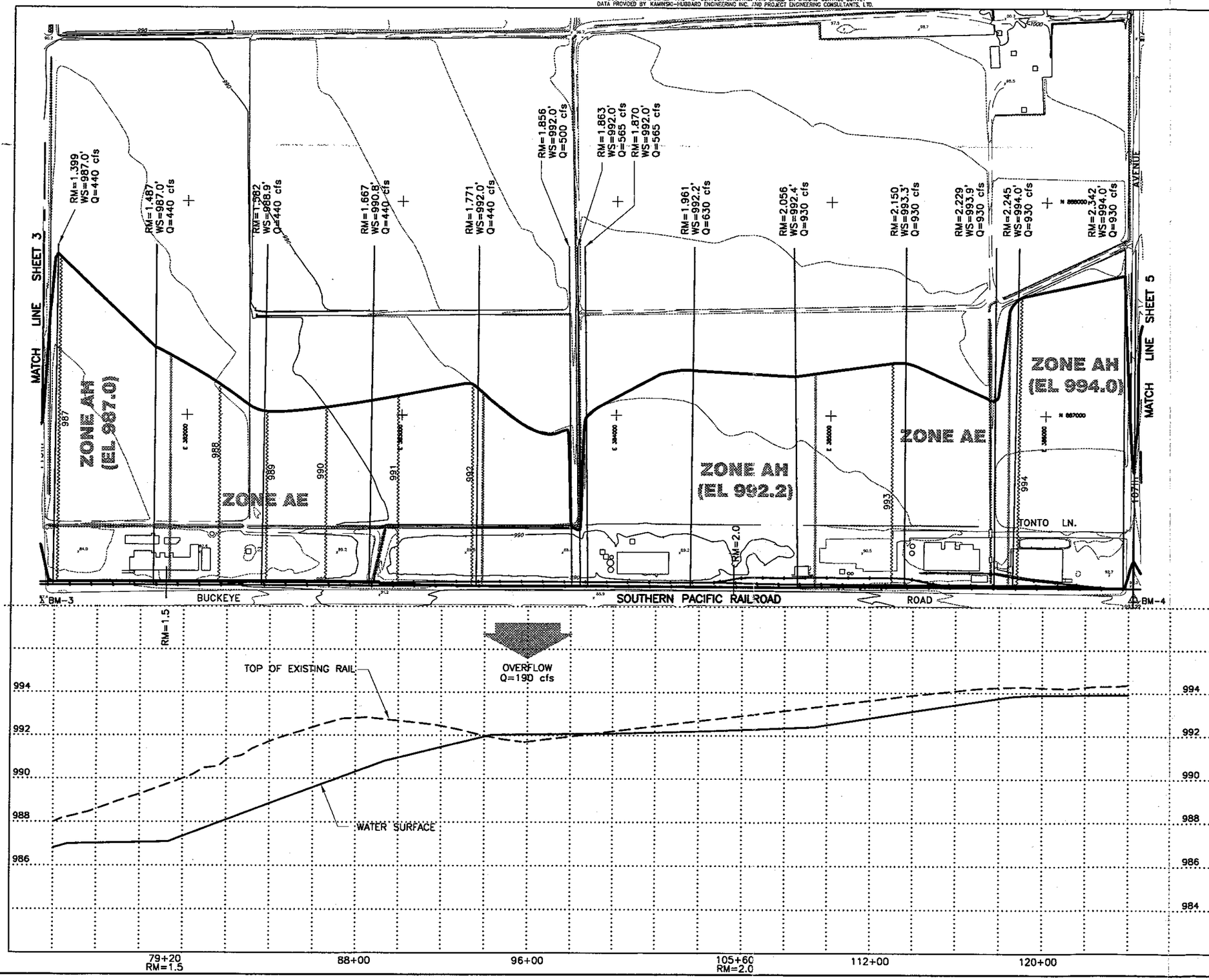
RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 3 OF 16

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1"= 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY KAMINSKI-HUBBARD ENGINEERING INC. AND PROJECT ENGINEERING CONSULTANTS, LTD.



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

TOLLESON AREA FLOODPLAIN DELINEATION "FCD CONTRACT # 95-26"

LEGEND

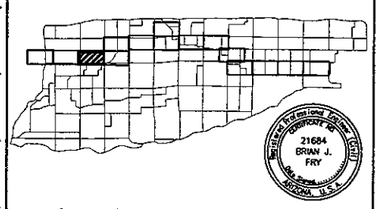
- BUILDING
- SINGLE RESIDENTIAL BUILDING
- ROAD/PAVEMENT
- DIRT ROAD
- HIDDEN ROAD/HIDDEN PAVEMENT
- CURB
- HIDDEN CURB
- RAILROAD
- INDEX CONTOUR
- DEPRESSED INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSED INTERMEDIATE CONTOUR
- WASH/ DRAINAGE/WATERLINE
- IRRIGATION DITCH
- TREE LINE
- SPOT ELEVATION
- HORIZONTAL & VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
BM-3	987.09	BCHH 115 Ave. & Buckeye Rd.
BM-4	993.22	BCHH 107th Ave. & Buckeye Rd.

INDEX MAP



0 200' 400' 600'
SCALE: 1" = 200'
CONTOUR INTERVAL = 2 FEET

PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS

SUB CONSULTANT: JE Fuller Hydrology & Geomorphology, Inc.

	BY	DATE
DESIGN	DCF	05/99
DESIGN CHK.	BJF	05/99
PLANS	PAF/JEV	05/99
PLANS CHK.	BJF	05/99

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

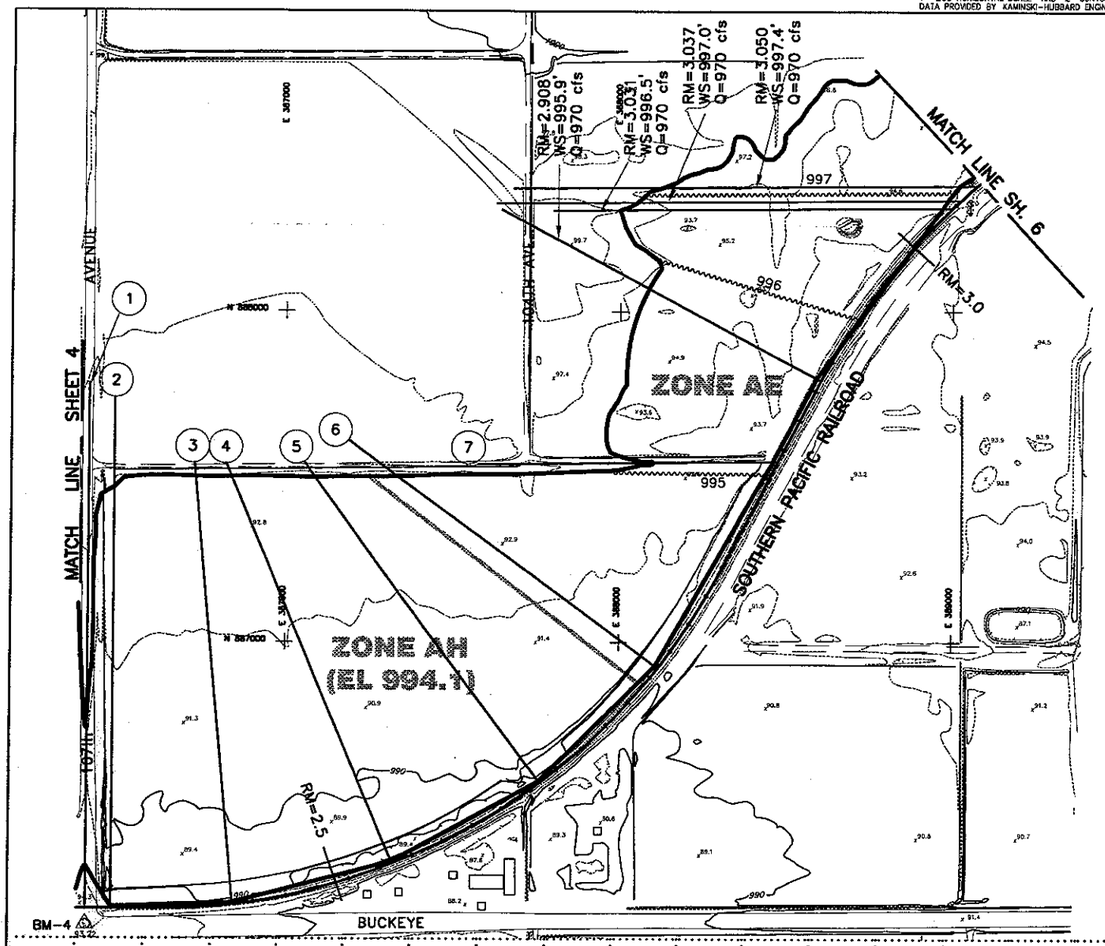
RECOMMENDED BY: DATE

APPROVED BY: DATE

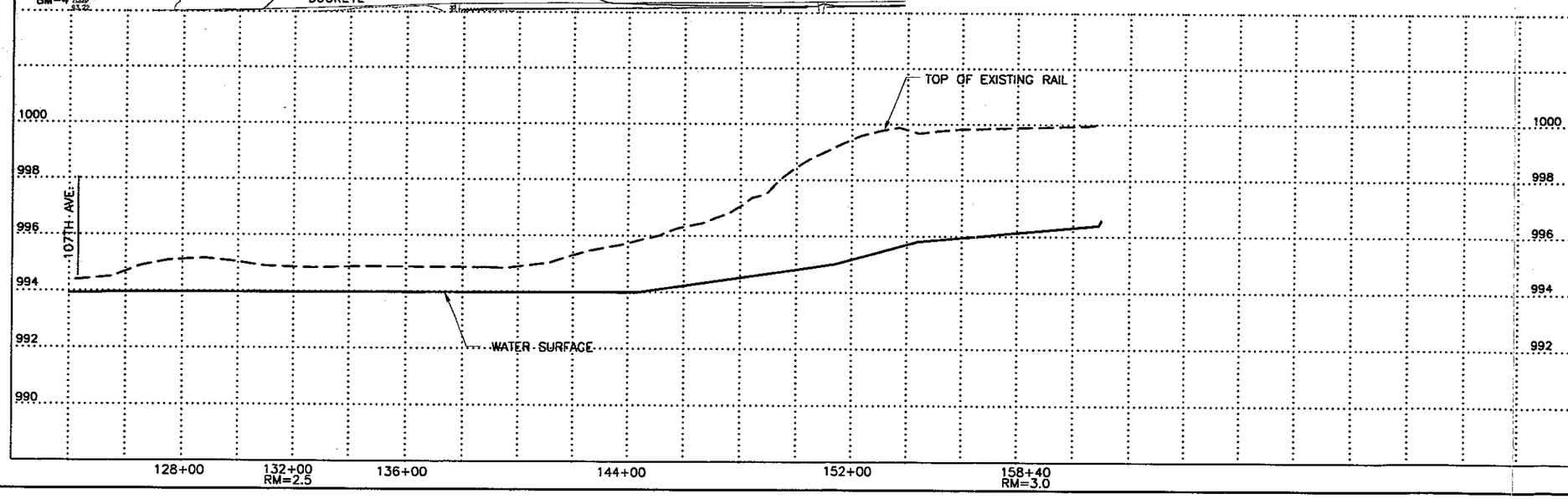
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 4 OF 16

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1"= 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY KAMINSKI-HUBBARD ENGINEERING INC. AND PROJECT ENGINEERING CONSULTANTS, LTD.



SECTION	RM	WS	Q (cfs)
1	2.352	994.0'	930
2	2.366	994.1'	970
3	2.434	994.1'	970
4	2.529	994.1'	970
5	2.624	994.1'	970
6	2.718	994.1'	970
7	2.851	995.1'	970



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

TOLLESON AREA FLOODPLAIN DELINEATION
"FCD CONTRACT # 95-26"

LEGEND

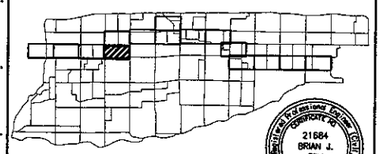
- BUILDING
- SINGLE RESIDENTIAL BUILDING
- ROAD/PAVEMENT
- DIRT ROAD
- HIDDEN ROAD/HIDDEN PAVEMENT
- CURB
- HIDDEN CURB
- RAILROAD
- INDEX CONTOUR
- DEPRESSED INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSED INTERMEDIATE CONTOUR
- WASH/ DRAINAGE/WATERLINE
- IRRIGATION DITCH
- TREE LINE
- SPOT ELEVATION
- HORIZONTAL & VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
BM-4	993.22	BCHH 107 Ave. & Buckeye Rd.

INDEX MAP



REGISTERED PROFESSIONAL ENGINEER (CIVIL) 21684 BRIAN J. FRY ARIZONA, U.S.A.

0 200' 400' 600'
SCALE: 1" = 200'
CONTOUR INTERVAL = 2 FEET

PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS

SUB CONSULTANT: JE Fuller Hydrology & Geomorphology, Inc.

	BY	DATE
DESIGN	DCF	05/99
DESIGN CHK.	BJF	05/99
PLANS	PAF/JEV	05/99
PLANS CHK.	BJF	05/99

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

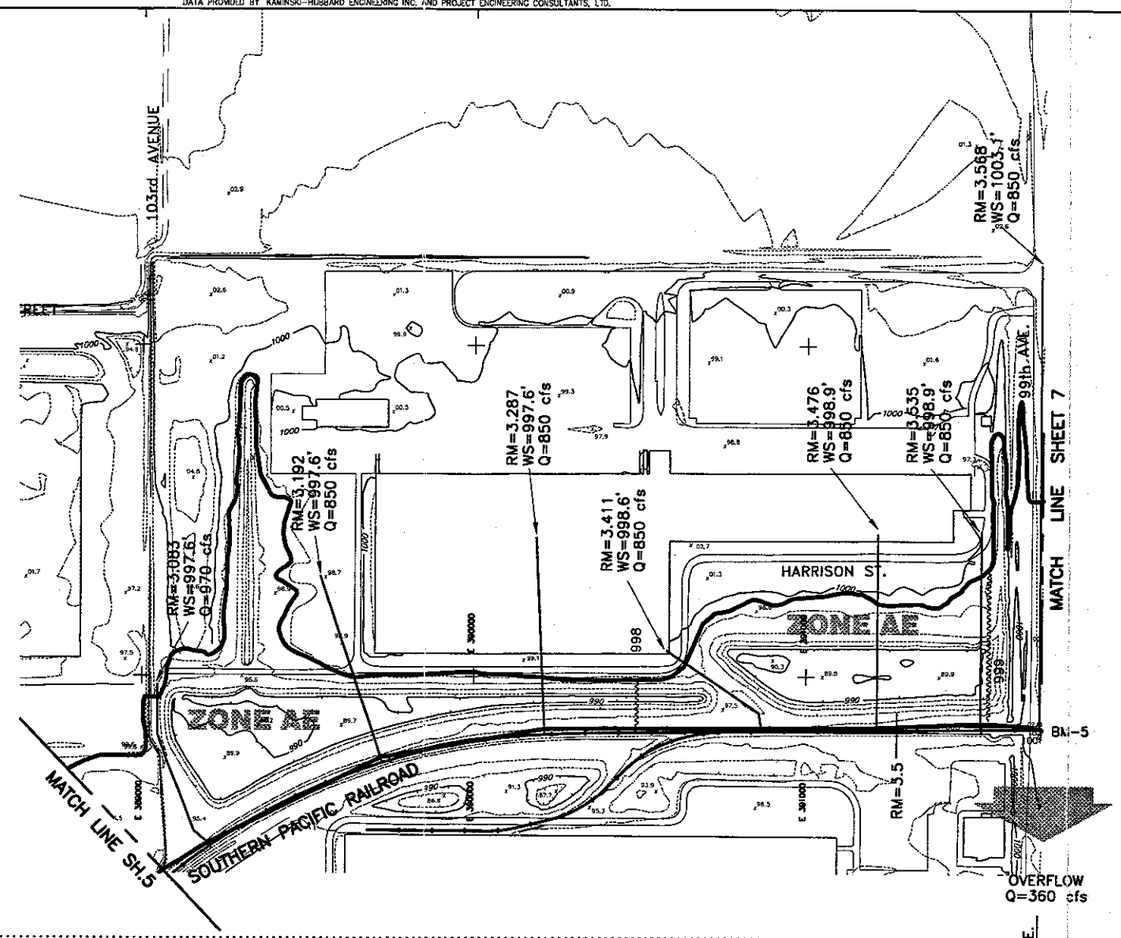
RECOMMENDED BY: DATE

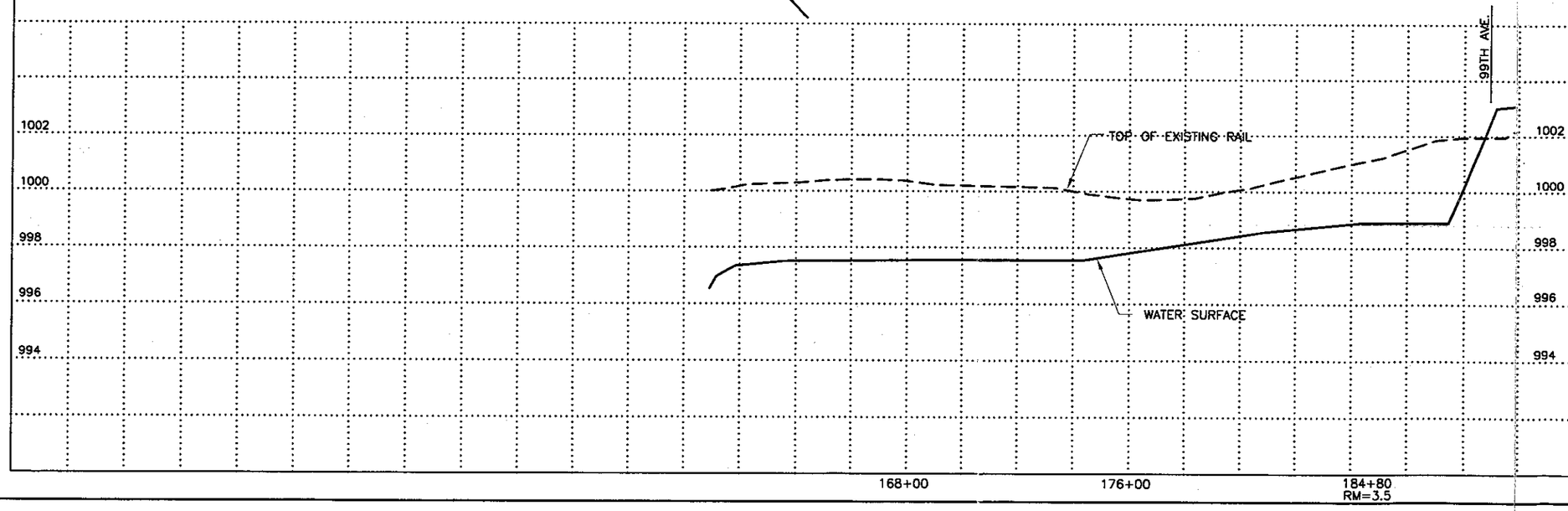
APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 5 OF 16

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1"= 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY KAMINSKI-HUBBARD ENGINEERING INC. AND PROJECT ENGINEERING CONSULTANTS, LTD.





FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

TOLLESON AREA FLOODPLAIN DELINEATION
"FCD CONTRACT # 95-26"

LEGEND

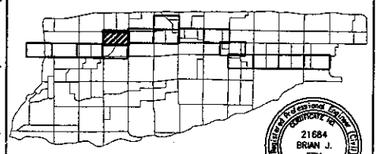
- BUILDING
- SINGLE RESIDENTIAL BUILDING
- ROAD/PAVEMENT
- DIRT ROAD
- HIDDEN ROAD/HIDDEN PAVEMENT
- CURB
- HIDDEN CURB
- RAILROAD
- INDEX CONTOUR
- DEPRESSED INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSED INTERMEDIATE CONTOUR
- WASH/ DRAINAGE/WATERLINE
- IRRIGATION DITCH
- TREE LINE
- SPOT ELEVATION
- HORIZONTAL & VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
BM-5	1001.80	BCHH 99th Ave. & R.R. Crossing, East 1/4 Sec. 8.

INDEX MAP



CERTIFICATE NO. 21684 BRIAN J. FRY ARIZONA, U.S.A.

0 200' 400' 600'
SCALE: 1" = 200'
CONTOUR INTERVAL = 2 FEET

PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS

SUB CONSULTANT: JE Fuller Hydrology & Geomorphology, Inc.

	BY	DATE
DESIGN	DOF	05/99
DESIGN CHK.	BJF	05/99
PLANS	PAF/JEV	05/99
PLANS CHK.	BJF	05/99

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

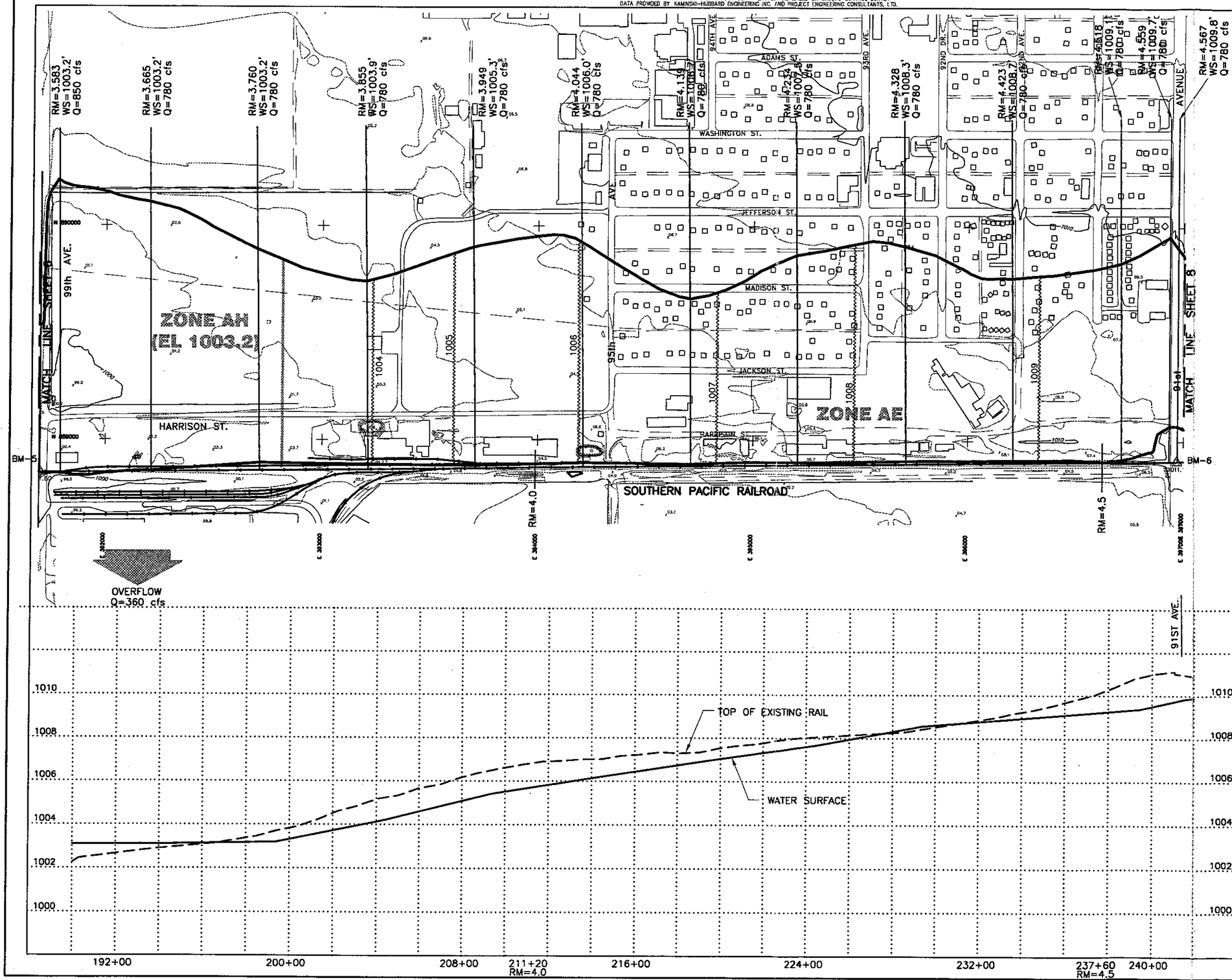
RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 6 OF 16

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1"= 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY KAMINSKI-HUBBARD ENGINEERING INC. AND PROJECT ENGINEERING CONSULTANTS, LTD.



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

TOLLESON AREA FLOODPLAIN DELINEATION
"FCD CONTRACT # 95-26"

LEGEND

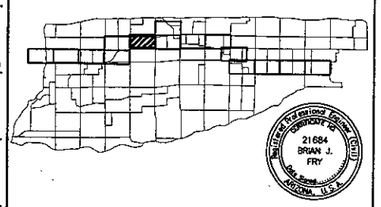
- BUILDING
- SINGLE RESIDENTIAL BUILDING
- ROAD/PAVEMENT
- DIRT ROAD
- HIDDEN ROAD/HIDDEN PAVEMENT
- CURB
- HIDDEN CURB
- RAILROAD
- INDEX CONTOUR
- DEPRESSED INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSED INTERMEDIATE CONTOUR
- WASH/ DRAINAGE/WATERLINE
- IRRIGATION DITCH
- TREE LINE
- SPOT ELEVATION
- HORIZONTAL & VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
BM-5	1001.80	BCHH 99th Ave. & R.R. Crossing, East 1/4 Sec. 8.
BM-6	1011.11	BCHH 91st Ave. & R.R. Crossing, East 1/4 Sec. 9.

INDEX MAP



0 200' 400' 600'
SCALE: 1" = 200'
CONTOUR INTERVAL = 2 FEET

PRIME CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS

SUB CONSULTANT:
JE Fuller
Hydrology & Geomorphology, Inc.

	BY	DATE
DESIGN	DCF	05/99
DESIGN CHK.	BJF	05/99
PLANS	PAF/JEV	05/99
PLANS CHK.	BJF	05/99

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

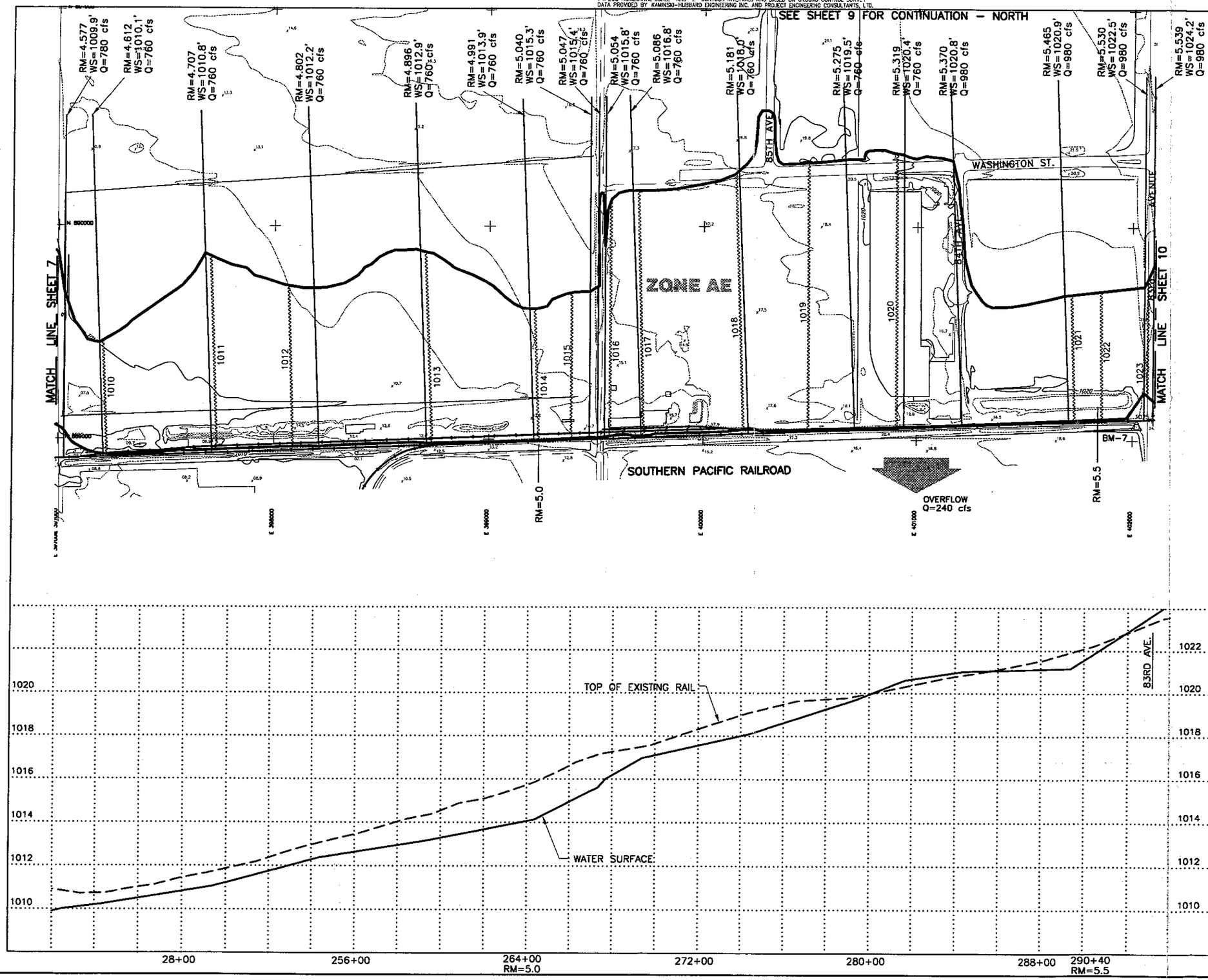
RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 7 OF 16

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1"= 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY KAMINSKI-HUBBARD ENGINEERING INC. AND PROJECT ENGINEERING CONSULTANTS, LTD.



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

TOLLESON AREA FLOODPLAIN DELINEATION "FCD CONTRACT # 95-26"

LEGEND

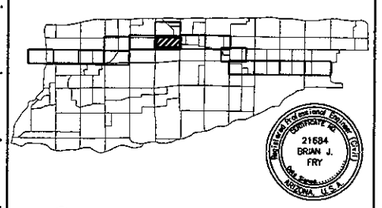
- BUILDING
- SINGLE RESIDENTIAL BUILDING
- ROAD/PAVEMENT
- DIRT ROAD
- HIDDEN ROAD/HIDDEN PAVEMENT
- CURB
- HIDDEN CURB
- RAILROAD
- INDEX CONTOUR (1110)
- DEPRESSED INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSED INTERMEDIATE CONTOUR
- WASH/ DRAINAGE/WATERLINE
- IRRIGATION DITCH
- TREE LINE
- SPOT ELEVATION (21.4)
- HORIZONTAL & VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
BM-7	1025.79	Alum. Cap on Irr. Box South Side Center, West Side of 83rd Ave. At Railroad Xing.

INDEX MAP



0 200' 400' 600'
SCALE: 1" = 200'
CONTOUR INTERVAL = 2 FEET

PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS

SUB CONSULTANT: JE Fuller Hydrology & Geomorphology, Inc.

	BY	DATE
DESIGN	DCF	05/99
DESIGN CHK.	BJF	05/99
PLANS	PAF/JEV	05/99
PLANS CHK.	BJF	05/99
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

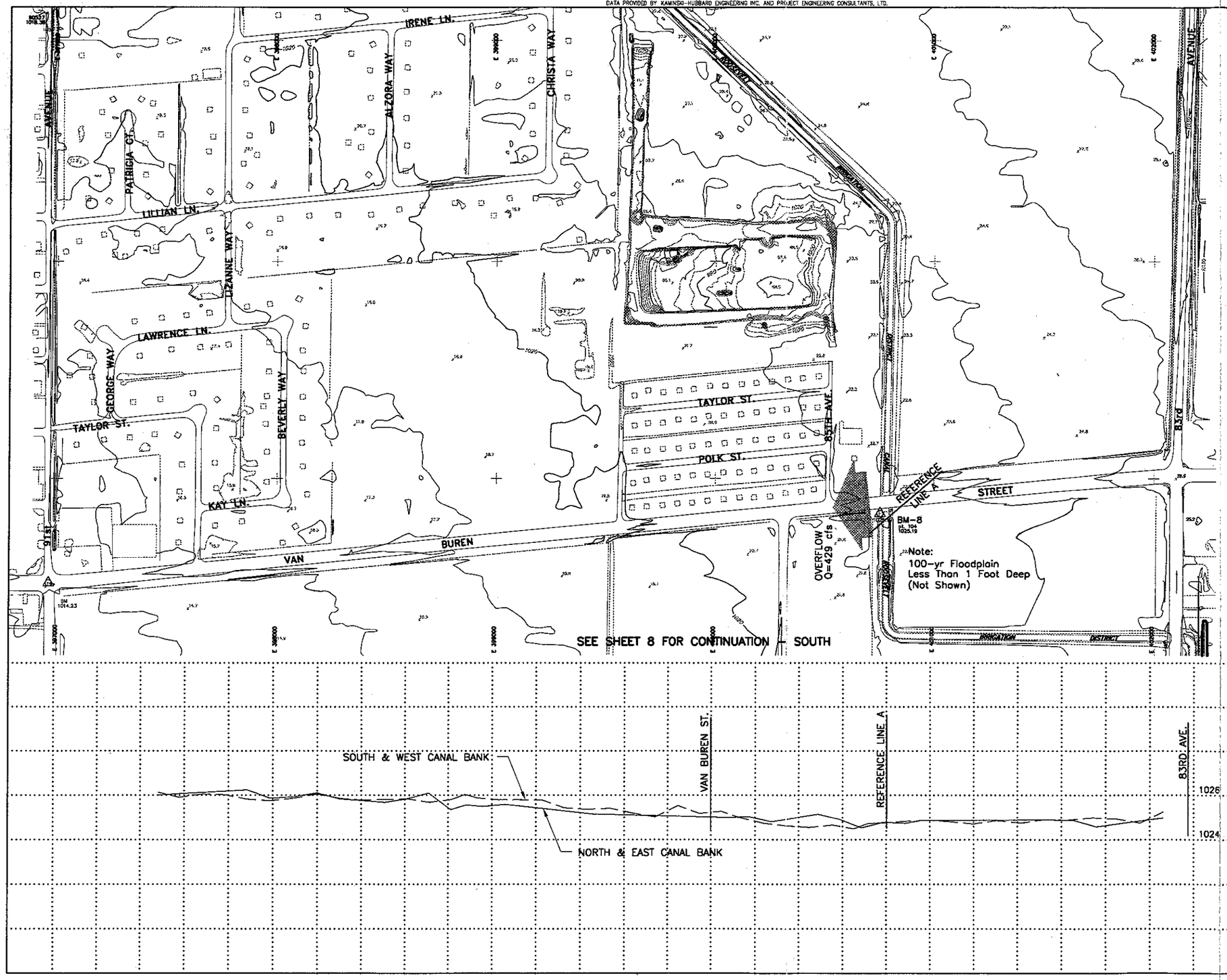
RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 8 OF 16

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1"= 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY KAMINSKI-HUBBARD ENGINEERING INC. AND PROJECT ENGINEERING CONSULTANTS, LTD.



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

TOLLESON AREA FLOODPLAIN DELINEATION "FCD CONTRACT # 95-26"

LEGEND

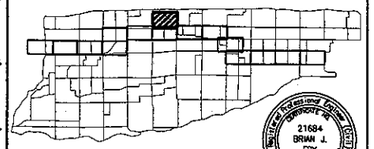
- BUILDING
- SINGLE RESIDENTIAL BUILDING
- ROAD/PAVEMENT
- DIRT ROAD
- HIDDEN ROAD/HIDDEN PAVEMENT
- CURB
- HIDDEN CURB
- RAILROAD
- INDEX CONTOUR
- DEPRESSED INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSED INTERMEDIATE CONTOUR
- WASH/ DRAINAGE/WATERLINE
- IRRIGATION DITCH
- TREE LINE
- SPOT ELEVATION
- HORIZONTAL & VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
BM-8	1025.19	B.C. Top HDWL South Side of Van Buren at R.I.D. Canal & East of 85th Ave.

INDEX MAP



Registered Professional Engineer (Civil) CERTIFICATE NO. 21684 BRIAN J. FRY ARIZONA, U.S.A.

0 200' 400' 600'
SCALE: 1" = 200'
CONTOUR INTERVAL = 2 FEET

PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS

SUB CONSULTANT: JE Fuller Hydrology & Geomorphology, Inc.

	BY	DATE
DESIGN	DOF	05/99
DESIGN CHK.	BJF	05/99
PLANS	PAF/JEV	05/99
PLANS CHK.	BJF	05/99

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

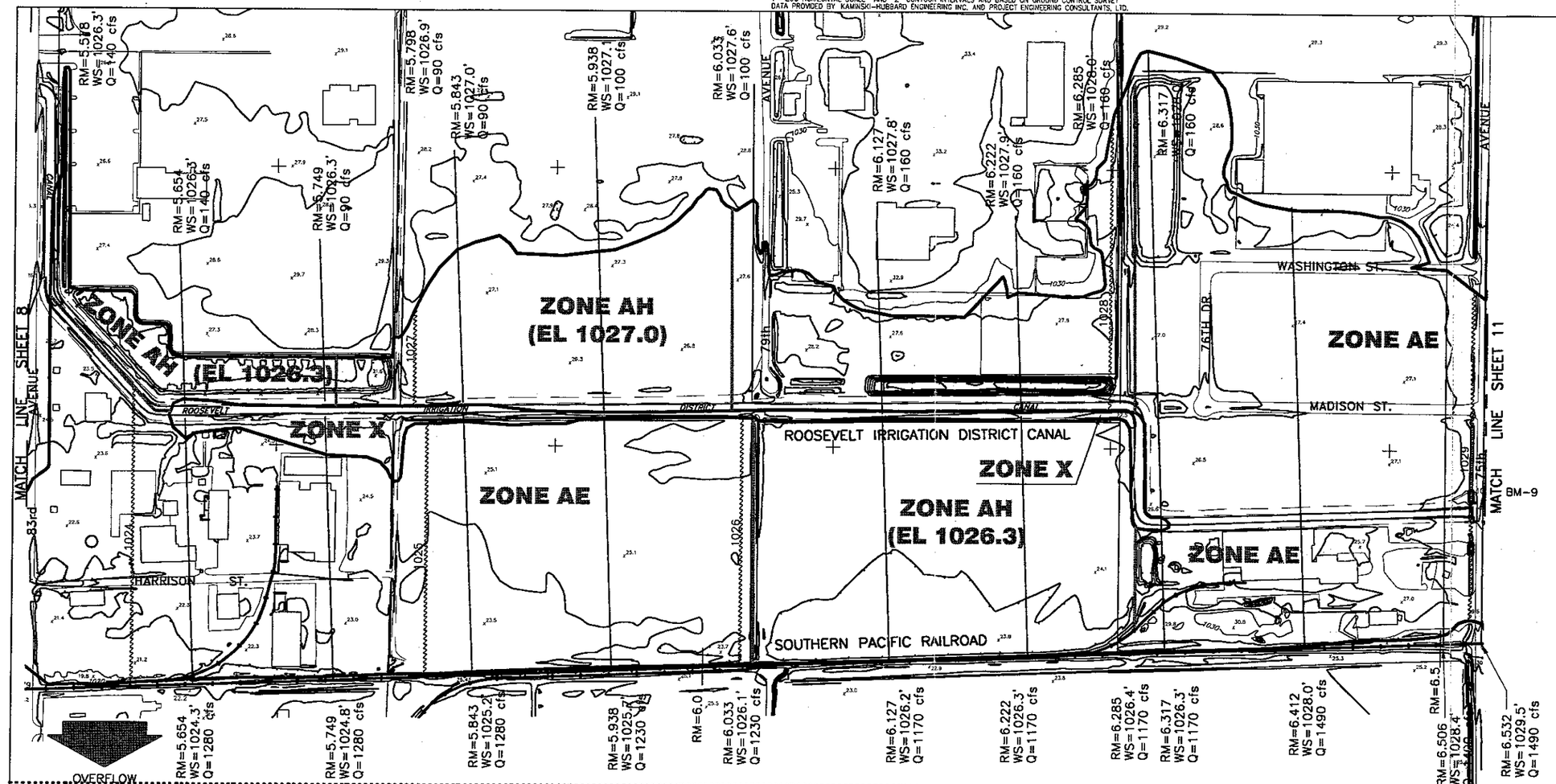
RECOMMENDED BY: DATE

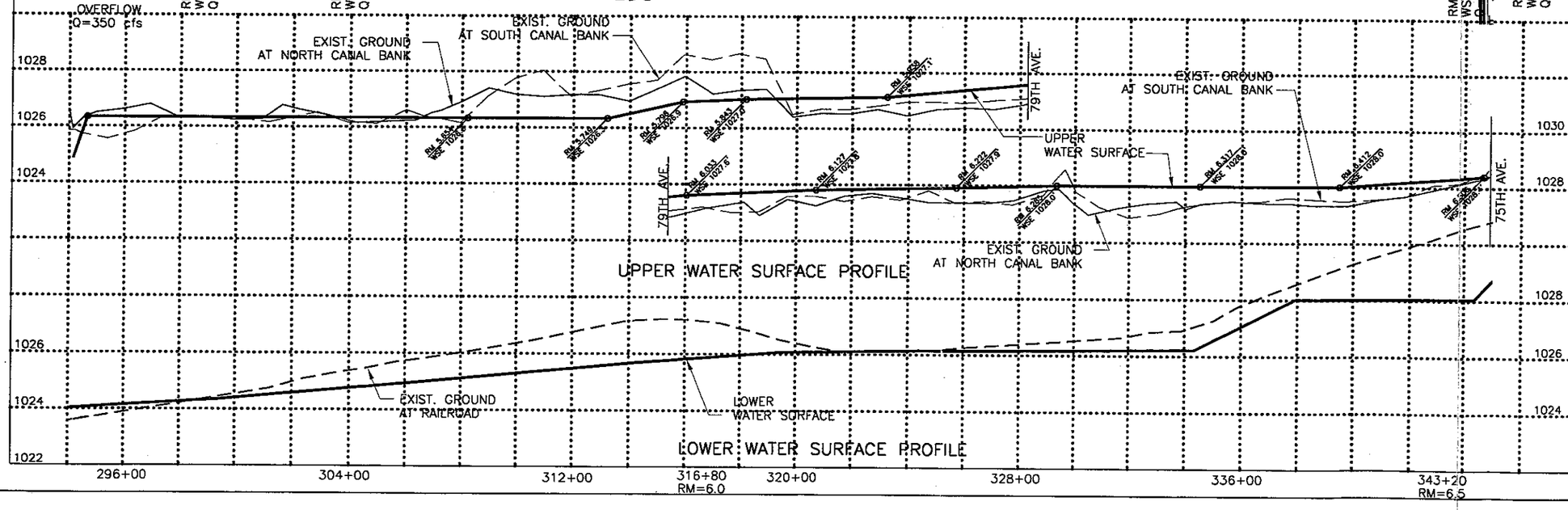
APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 9 OF 16

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS 1"=200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY DATA PROVIDED BY KAMINSKI-HUBBARD ENGINEERING INC. AND PROJECT ENGINEERING CONSULTANTS, LTD.





FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

TOLLESON AREA FLOODPLAIN DELINEATION

"FCD CONTRACT # 95-26"

LEGEND

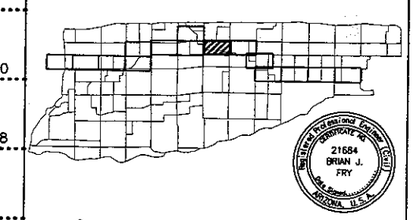
- BUILDING
- SINGLE RESIDENTIAL BUILDING
- ROAD/PAVEMENT
- DIRT ROAD
- HIDDEN ROAD/HIDDEN PAVEMENT
- CURB
- HIDDEN CURB
- RAILROAD
- INDEX CONTOUR
- DEPRESSED INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSED INTERMEDIATE CONTOUR
- WASH/ DRAINAGE/WATERLINE
- IRRIGATION DITCH
- TREE LINE
- 21.4 SPOT ELEVATION
- HORIZONTAL & VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
BM-9	1029.71	Maricopa Co. Brass Cap 75th Ave. Bridge At R.I.D. Canal NE Wing Wall.

INDEX MAP



0 200' 400' 600'

SCALE: 1" = 200'

CONTOUR INTERVAL = 2 FEET

PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS

SUB CONSULTANT: JE Fuller Hydrology & Geomorphology, Inc.

	BY	DATE
DESIGN	DCF	11/99
DESIGN CHK.	BJF	11/99
PLANS	PAF/JEV	11/99
PLANS CHK.	BJF	11/99

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

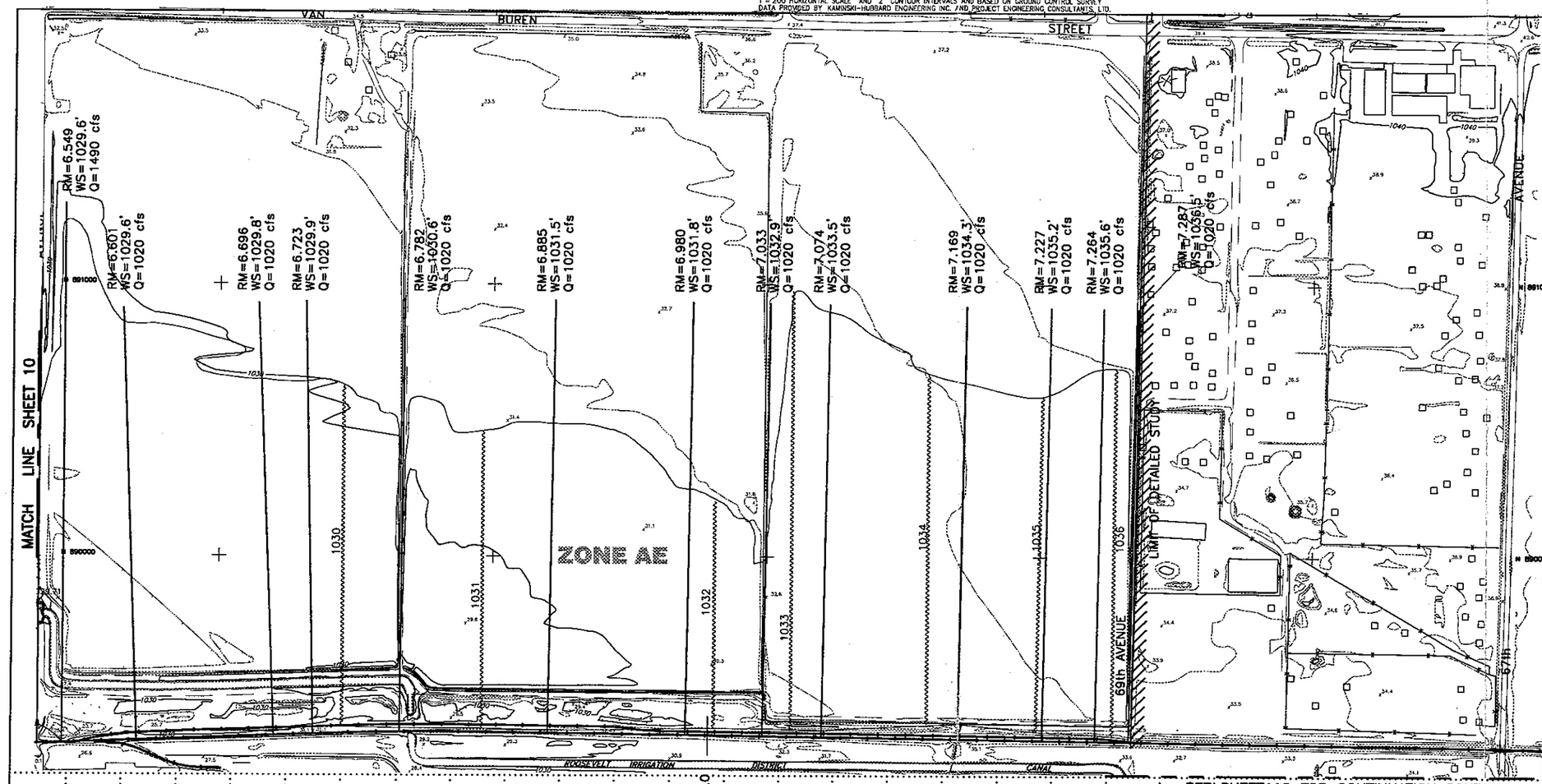
RECOMMENDED BY: DATE

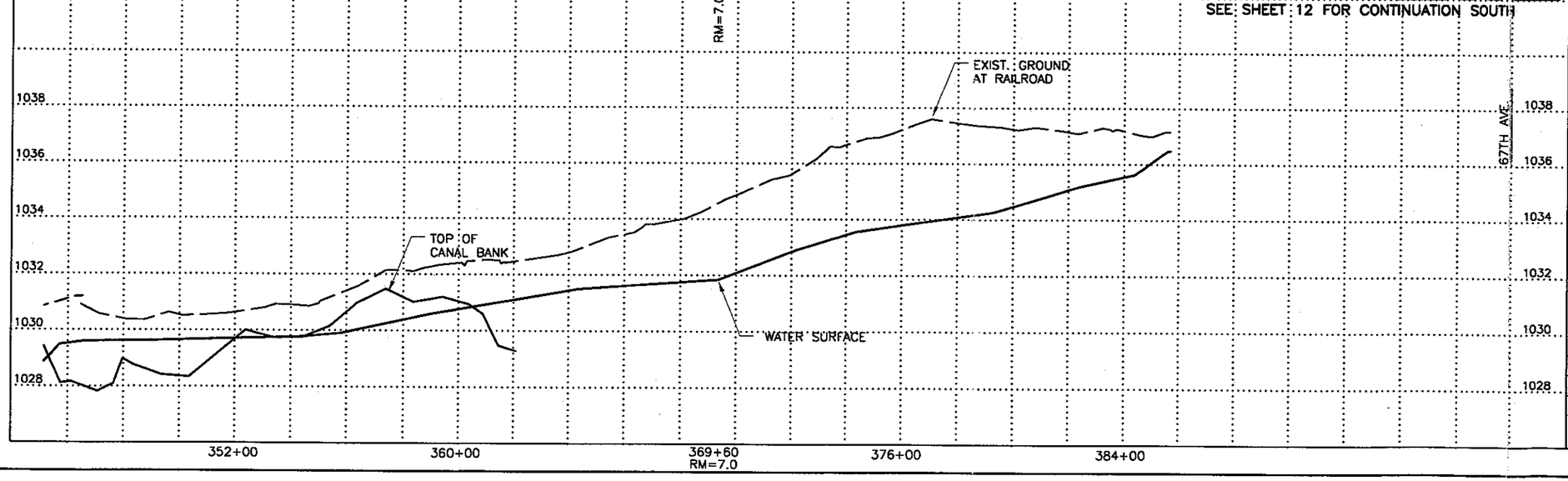
APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 10 OF 16

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY KAMINSKI-HUBBARD ENGINEERING INC. AND PROJECT ENGINEERING CONSULTANTS, LTD.





FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

TOLLESON AREA FLOODPLAIN DELINEATION "FCD CONTRACT # 95-26"

LEGEND

- BUILDING
- SINGLE RESIDENTIAL BUILDING
- ROAD/PAVEMENT
- DIRT ROAD
- HIDDEN ROAD/HIDDEN PAVEMENT
- CURB
- HIDDEN CURB
- RAILROAD
- INDEX CONTOUR
- DEPRESSED INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSED INTERMEDIATE CONTOUR
- WASH/ DRAINAGE/WATERLINE
- IRRIGATION DITCH
- TREE LINE
- SPOT ELEVATION
- HORIZONTAL & VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
BM-9	1029.71	Maricopa Co. Brass Cap 75th Ave. Bridge At R.I.D. Canal NE Wing Wall.

INDEX MAP

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 21684 BRIAN J. FRY ARIZONA U.S.A.

0 200' 400' 600'
SCALE: 1" = 200'
CONTOUR INTERVAL = 2 FEET

PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS

SUB CONSULTANT: JE Fuller Hydrology & Geomorphology, Inc.

	BY	DATE
DESIGN	DCF	01/99
DESIGN CHK.	BJF	01/99
PLANS	PAF/JEV	01/99
PLANS CHK.	BJF	01/99

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

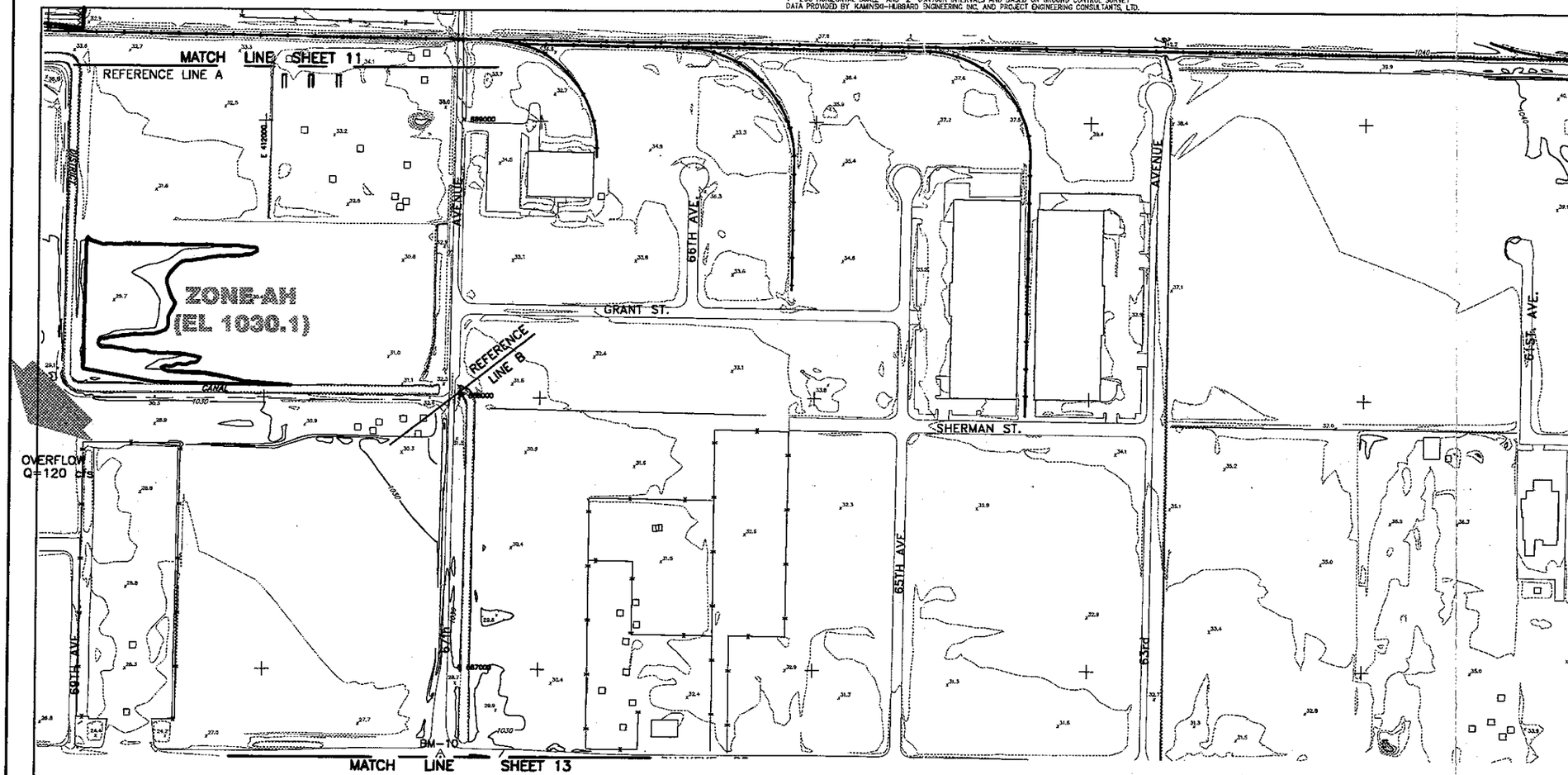
RECOMMENDED BY: DATE

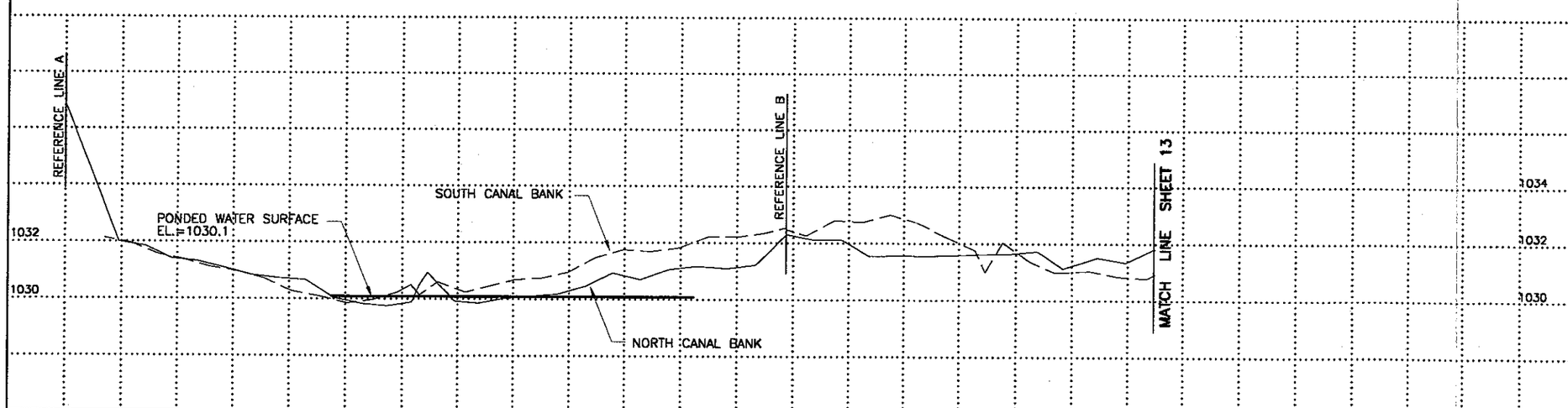
APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 11 OF 16

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1"= 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY KAMINSKI-HUBBARD ENGINEERING INC. AND PROJECT ENGINEERING CONSULTANTS, LTD.





FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

TOLLESON AREA FLOODPLAIN DELINEATION "FCD CONTRACT # 95-26"

LEGEND

- BUILDING
- SINGLE RESIDENTIAL BUILDING
- ROAD/PAVEMENT
- DIRT ROAD
- HIDDEN ROAD/HIDDEN PAVEMENT
- CURB
- HIDDEN CURB
- RAILROAD
- INDEX CONTOUR
- DEPRESSED INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSED INTERMEDIATE CONTOUR
- WASH/ DRAINAGE/WATERLINE
- IRRIGATION DITCH
- TREE LINE
- SPOT ELEVATION
- HORIZONTAL & VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
BM-10	1029.06	BCHH 67th Ave. & Buckeye Rd.

INDEX MAP

0 200' 400' 600'
SCALE: 1" = 200'
CONTOUR INTERVAL = 2 FEET

PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS

SUB CONSULTANT: JE Fuller Hydrology & Geomorphology, Inc.

	BY	DATE
DESIGN	DCF	10/98
DESIGN CHK.	BJF	10/98
PLANS	PAF/JEV	10/98
PLANS CHK.	BJF	10/98
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

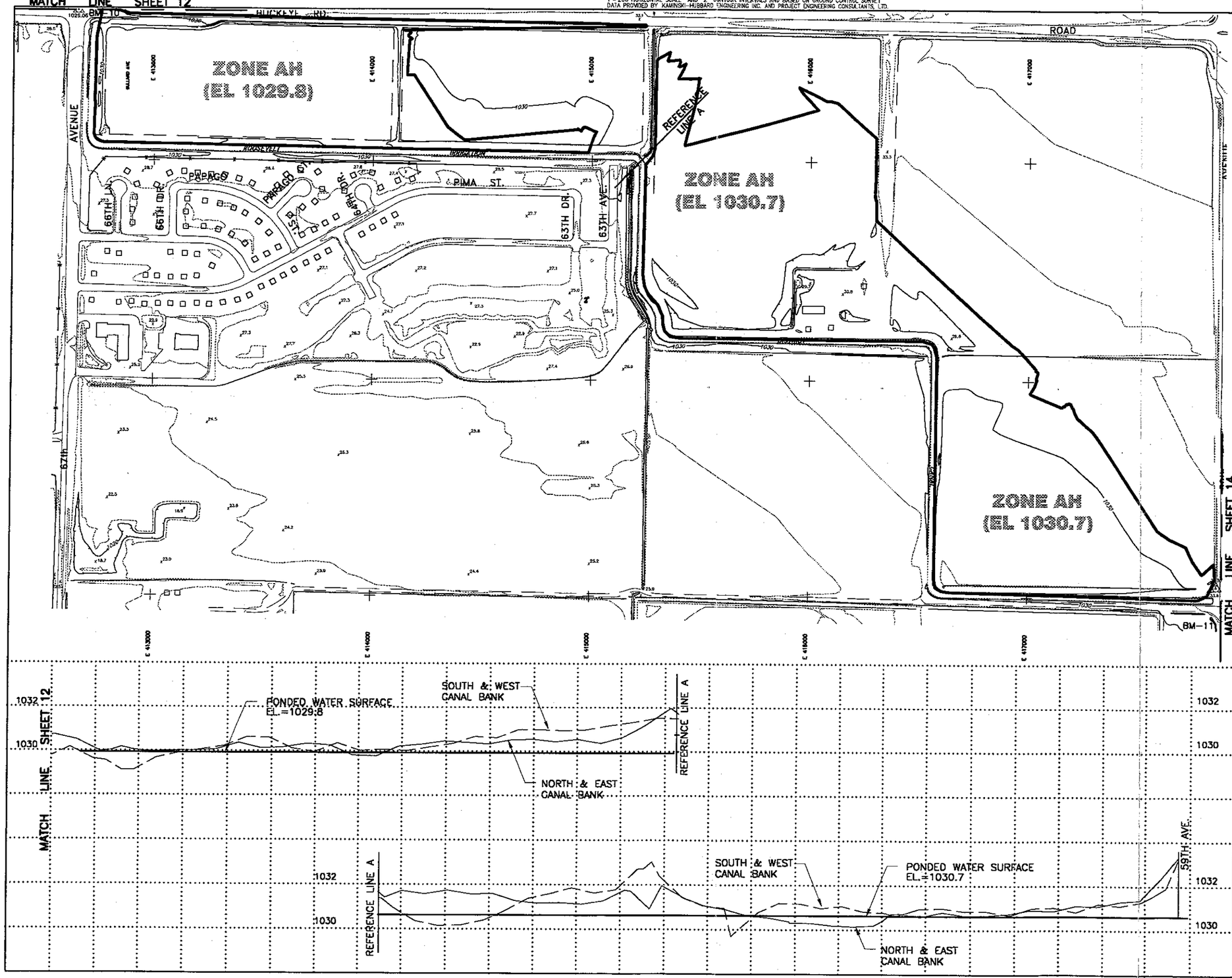
RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 12 OF 16

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1"= 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY KAMINSKI-HUBBARD ENGINEERING INC. AND PROJECT ENGINEERING CONSULTANTS, LTD.



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

TOLLESON AREA FLOODPLAIN DELINEATION
"FCD CONTRACT # 95-26"

LEGEND

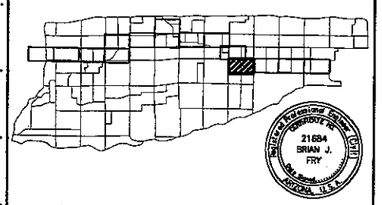
- BUILDING
- SINGLE RESIDENTIAL BUILDING
- ROAD/PAVEMENT
- DIRT ROAD
- HIDDEN ROAD/HIDDEN PAVEMENT
- CURB
- HIDDEN CURB
- RAILROAD
- INDEX CONTOUR
- DEPRESSED INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSED INTERMEDIATE CONTOUR
- WASH/ DRAINAGE/WATERLINE
- IRRIGATION DITCH
- TREE LINE
- SPOT ELEVATION
- HORIZONTAL & VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
BM-10	1029.06	BCHH 67th Ave. & Buckeye Rd.
BM-11	1037.19	BC Atop N.W. Abutment Over Center of Canal. South of Int. 59th Ave. & Buckeye Rd.

INDEX MAP



0 200' 400' 600'
SCALE: 1" = 200'
CONTOUR INTERVAL = 2 FEET

PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS

SUB CONSULTANT: JE Fuller Hydrology & Geomorphology, Inc.

	BY	DATE
DESIGN	DCF	10/98
DESIGN CHK.	BJF	10/98
PLANS	PAF/JEV	10/98
PLANS CHK.	BJF	10/98

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

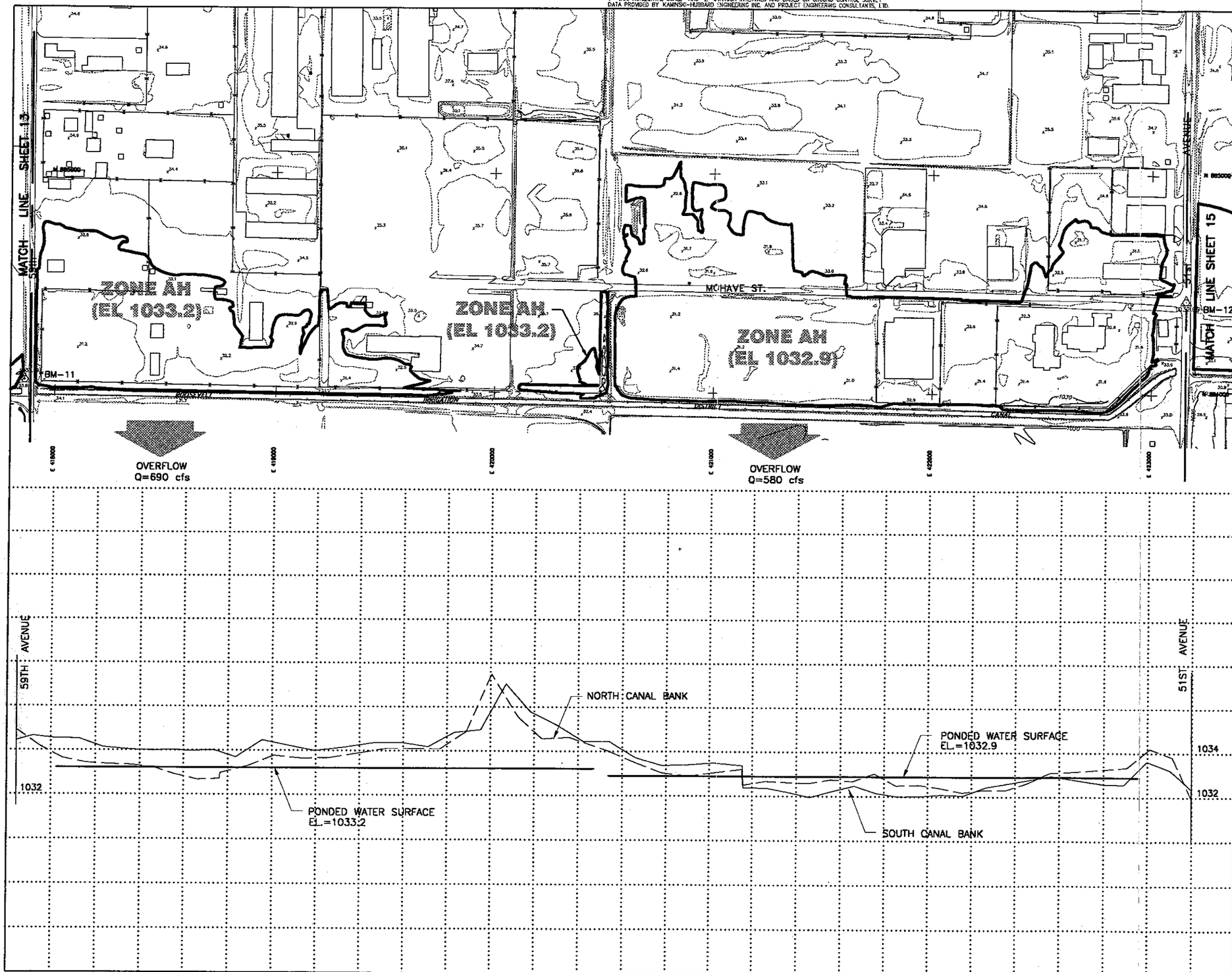
APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SUBMITTED BY: DATE:

SHEET 13 OF 16

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1"=200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY KAMINSKI-HUBBARD ENGINEERING INC. AND PROJECT ENGINEERING CONSULTANTS, LTD.



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

TOLLESON AREA FLOODPLAIN DELINEATION "FCD CONTRACT # 95-26"

LEGEND

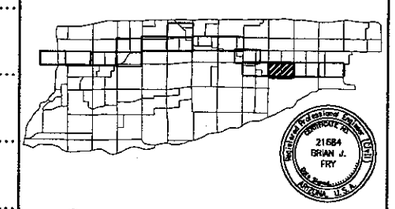
- BUILDING
- SINGLE RESIDENTIAL BUILDING
- ROAD/PAVEMENT
- DIRT ROAD
- HIDDEN ROAD/HIDDEN PAVEMENT
- CURB
- HIDDEN CURB
- RAILROAD
- INDEX CONTOUR
- DEPRESSED INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSED INTERMEDIATE CONTOUR
- WASH/ DRAINAGE/WATERLINE
- IRRIGATION DITCH
- TREE LINE
- SPOT ELEVATION
- HORIZONTAL & VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
BM-11	1037.19	BC Atop N.W. Abutment Over Center of Canal. South of Int. 59th Ave. & Buckeye Rd.
BM-12	1032.66	BC FL Int. of 51st. & Mohave.

INDEX MAP



N

0 200' 400' 600'

SCALE: 1" = 200'

CONTOUR INTERVAL = 2 FEET

PRIME CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS

SUB CONSULTANT:
JE Fuller
Hydrology & Geomorphology, Inc.

	BY	DATE
DESIGN	DCF	10/98
DESIGN CHK.	BJF	10/98
PLANS	PAF/JEV	10/98
PLANS CHK.	BJF	10/98
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

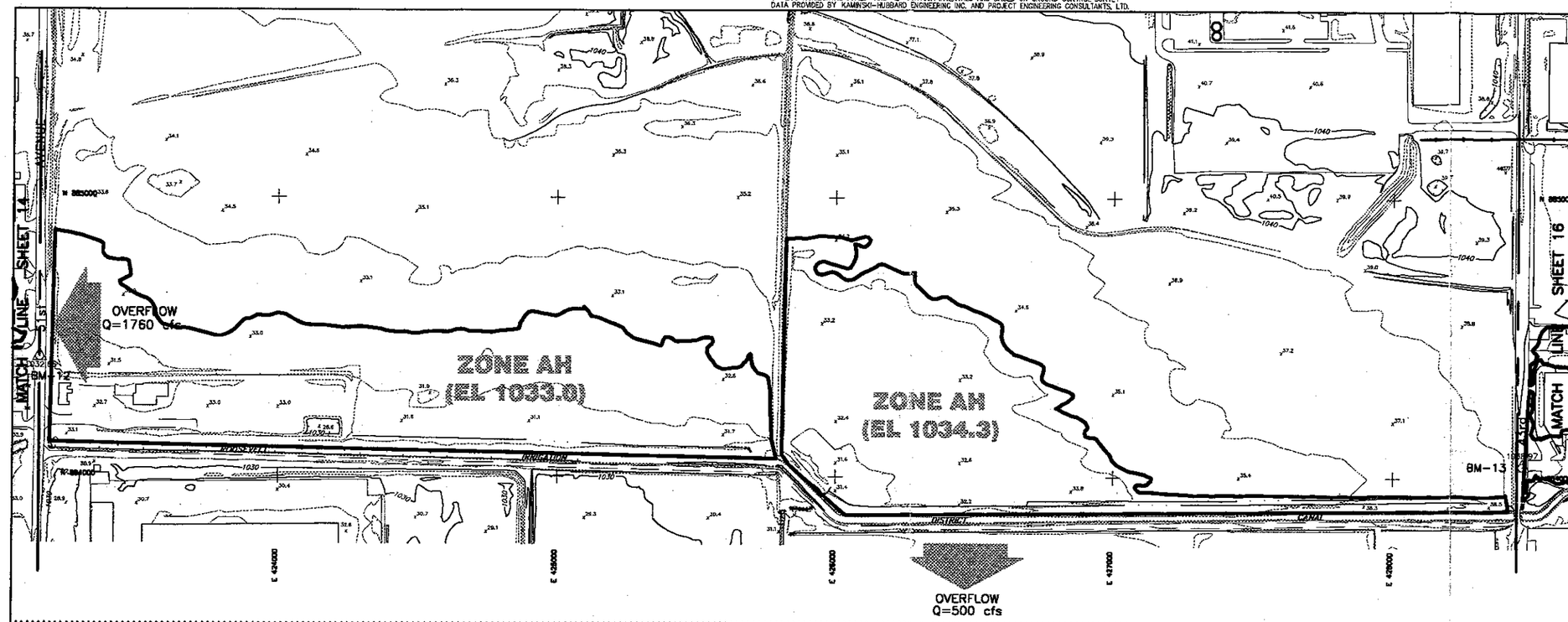
RECOMMENDED BY: DATE

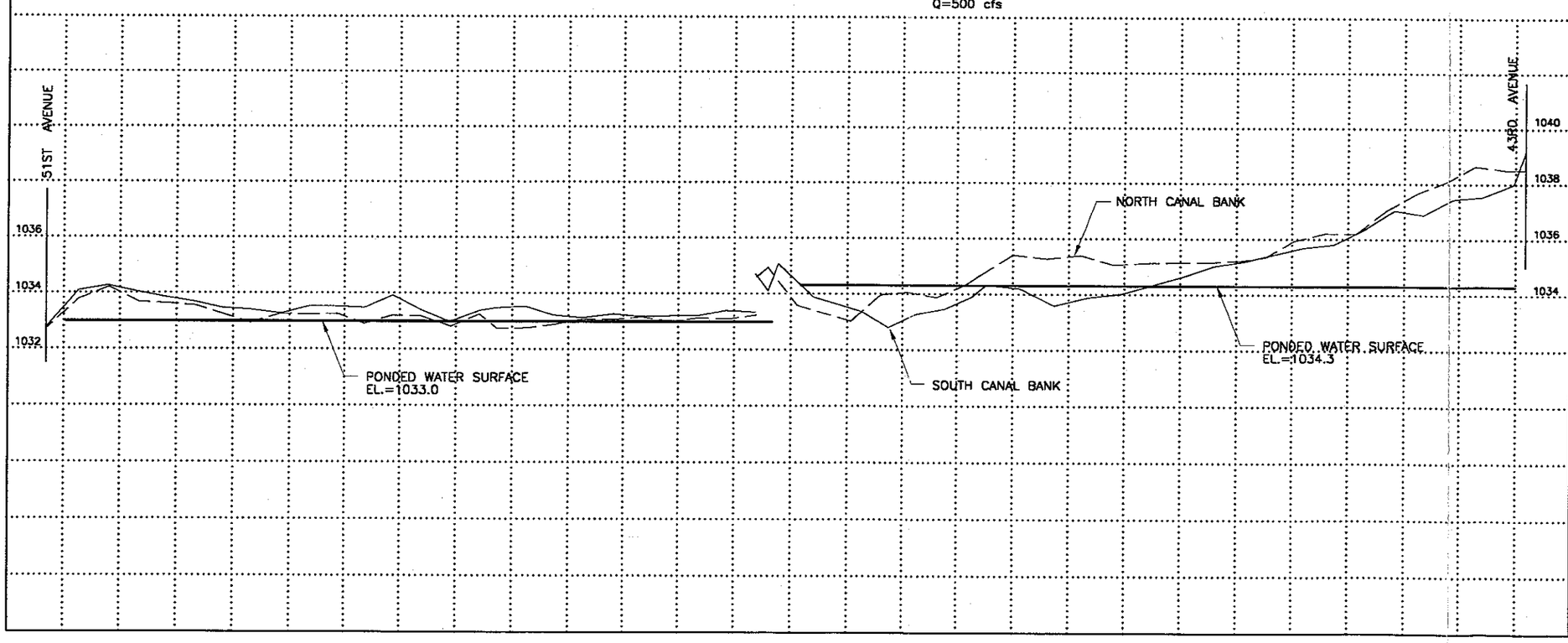
APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 14 OF 16

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1"= 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY KAMINSKI-HUBBARD ENGINEERING INC. AND PROJECT ENGINEERING CONSULTANTS, LTD.





FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

TOLLESON AREA FLOODPLAIN DELINEATION "FCD CONTRACT # 95-26"

LEGEND

- BUILDING
- SINGLE RESIDENTIAL BUILDING
- ROAD/PAVEMENT
- DIRT ROAD
- HIDDEN ROAD/HIDDEN PAVEMENT
- CURB
- HIDDEN CURB
- RAILROAD
- INDEX CONTOUR
- DEPRESSED INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSED INTERMEDIATE CONTOUR
- WASH/ DRAINAGE/WATERLINE
- IRRIGATION DITCH
- TREE LINE
- SPOT ELEVATION
- HORIZONTAL & VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
BM-12	1032.66	BC FL Int. 51st Ave. & Mohave.
BM-13	1038.97	BC FL ~140' North RID Canal in CL 43rd Ave.

INDEX MAP

0 200' 400' 600'

SCALE: 1" = 200'
CONTOUR INTERVAL = 2 FEET

PRIME CONSULTANT: DIBBLE & ASSOCIATES CONSULTING ENGINEERS

SUB CONSULTANT: JE Fuller Hydrology & Geomorphology, Inc.

	BY	DATE
DESIGN	DCF	10/98
DESIGN CHK.	BJF	10/98
PLANS	PAF/JEV	10/98
PLANS CHK.	BJF	10/98
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

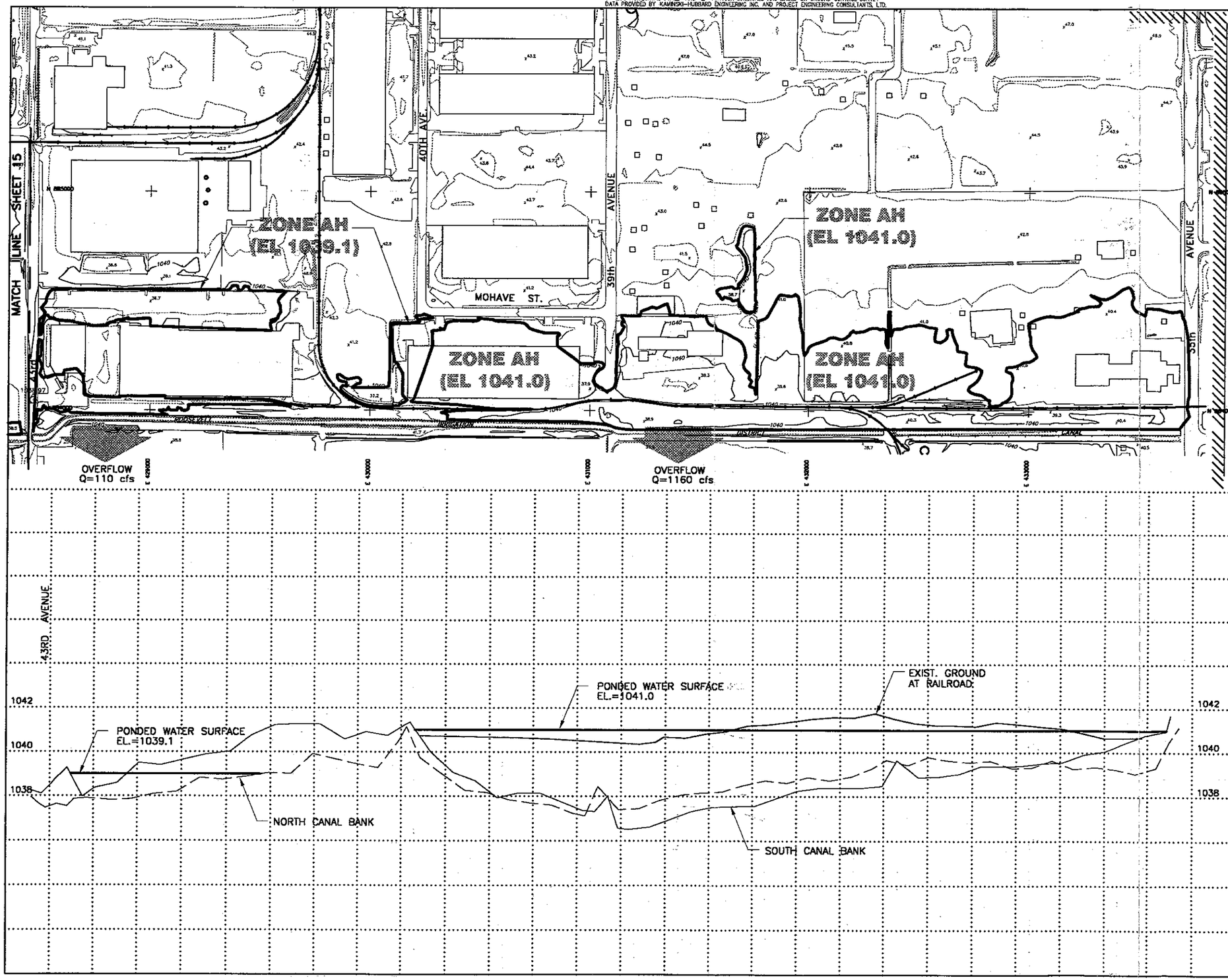
RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 15 OF 16

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1"= 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY KAMINSKI-HUBBARD ENGINEERING INC. AND PROJECT ENGINEERING CONSULTANTS, LTD.



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

TOLLESON AREA FLOODPLAIN DELINEATION "FCD CONTRACT # 95-26"

LEGEND

- BUILDING
- SINGLE RESIDENTIAL BUILDING
- ROAD/PAVEMENT
- DIRT ROAD
- HIDDEN ROAD/HIDDEN PAVEMENT
- CURB
- HIDDEN CURB
- RAILROAD
- INDEX CONTOUR
- DEPRESSED INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSED INTERMEDIATE CONTOUR
- WASH/ DRAINAGE/WATERLINE
- IRRIGATION DITCH
- TREE LINE
- SPOT ELEVATION
- HORIZONTAL & VERTICAL CONTROL POINT
- VERTICAL CONTROL POINT

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
U.E. #42	1041.23	Cotton Picker Spindle @ Back Edge of 5.5 ft South of Traffic Signal on west side of 35th Ave.

INDEX MAP

0 200' 400' 600'
SCALE: 1" = 200'
CONTOUR INTERVAL = 2 FEET

PRIME CONSULTANT:
DIBBLE & ASSOCIATES
CONSULTING ENGINEERS

SUB CONSULTANT:
JE Fuller
Hydrology & Geomorphology, Inc.

	BY	DATE
DESIGN	DCF	10/98
DESIGN CHK.	BJF	10/98
PLANS	PAF/JEV	10/98
PLANS CHK.	BJF	10/98

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 16 OF 16

Community:	Maricopa County, Arizona
NFIP Community Number:	04013
County:	Maricopa
State:	Arizona
Date Study Prepared:	March 1999
Study Contractor:	Dibble and Associates
Internal Project Number:	9532
Attn:	Brian J. Fry, P.E. 2633 East Indian School Road, Suite 401 Phoenix, AZ 85016-6763 (602) 957-1155
Flooding Sources:	Southern Pacific Railroad Roosevelt Irrigation District Canal

```
*****************************************************************************
*                  TOLLESON AREA FLOODPLAIN DELINEATION STUDY               *
*                              FCD Contract 95-26                           *
*                  Flood Control District of Maricopa County                *
*****************************************************************************
```

HEC-RAS Files Were Prepared For The Existing Condition Floodplain and Floodway for the Tolleson Area. The hydrology was based upon HEC-1.

The HEC-1 input and output files are supplied.

All HEC-RAS input and output files are supplied.

Output files have the same main file name as the input files listed below. To extract output files, type "PKUNZIP x" where "x" equals the main file name (no file extension is needed). The PKUNZIP.EXE file is included for your use.

File Name	Description	Type File	File Date
Tolleson.Dat	HEC-1 hydrology model.	HEC-1 Input File	05-06-99
hec1-out.zip	Use PKUNZIP to extract Tolleson.out	HEC-1 Output file	05-~~06~~ 13-99
ras-rep.zip	Use PKUNZIP to extract Tol_ras.rep	HEC-RAS Report file	05-~~07~~ 13-99
Tol_ras.Prj	Natural Conditions Floodplain	HEC-RAS Project File	05-06-99
Tol_ras.f01	Natural Conditions Floodplain	HEC-RAS Flow File	05-06-99
Tol_ras.g01	Natural Conditions Floodplain	HEC-RAS Geometry File	05-06-99
Tol_ras.p02	Natural Conditions Floodplain	HEC-RAS Plan File	05-06-99

The HEC-1 output file is dated 5-6-99

The zip file is dated 5-13-99

The report file is dated 5-7-99

The zip file is dated 5-13-99