Important Notice:

Not Yet Approved by FEMA

Subject to Change per FEMA Review

CHANDLER / GILBERT
FLOODPLAIN DELINEATION STUDY
PHASE 3
UPRR/ Arizona Avenue Watershed

CONTRACT FCD 2008C042

TECHNICAL DATA NOTEBOOK

Volume 3
(Sections 5S & 5N,
Appendix E)

June 2010

Prepared for:

Federal Emergency Management Agency
Risk Studies Division
Federal Insurance Administration
500 C Street, SW Room 422
Washington, DC 20472

Submitted by:

David Evans and Associates, Inc.
2141 E. Highland Avenue, Suite 200
Phoenix, Arizona 85016
(602) 678-5151

on behalf of:

Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009
(602) 506-1501

CHANDLER / GILBERT
FLOODPLAIN DELINEATION STUDY
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Registered Professional Engineer (Civil) CERTIFICATE NO. 43817 JOEL R. HORNBURG Date Signed 6/25/10 ARIZONA, U.S.A.
Expires: 3/31/2012

Registered Professional Engineer (Civil) CERTIFICATE NO. 45616 JASON COLEMAN DATE SIGNED 3/31/09 ARIZONA, U.S.A.
EXPIRES 12/31/09

Expires 3-31-10
Registered Professional Engineer (Civil) CERTIFICATE NO. 25972 MICHAEL D. HEATON Date Signed 3/31/09 ARIZONA, U.S.A.

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Registered Professional Engineer (Civil) CERTIFICATE NO. 43617 JOEL R. HORNBURG Date Signed 1/21/10 ARIZONA, U.S.A.

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(Volume 4)

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Preface

This floodplain delineation study was conducted for the Flood Control District of Maricopa County (FCDMC) by David Evans and Associates, Inc. (DEA). The study area is divided into three (3) Phases. Phase 1 consists of the area between the East Maricopa Floodway and Eastern Canal, which results in floodplain delineation along the Eastern Canal. Phase 2 consists of the area between the Eastern Canal and the Consolidated Canal, which results in floodplain delineation along the Consolidated Canal. Phase 3 consists of the area between the Consolidated Canal and Union Pacific Railroad, which results in floodplain delineation along the Union Pacific Railroad. Each Phase is further subdivided into north and south regions. This report addresses Phase 3 – South and North, UPRR/ Arizona Avenue Watershed.

David Evans and Associates prepared the hydrologic and hydraulic analyses for Phase 3 - South, and Project Engineering Consultants (PEC) prepared the hydrologic and hydraulic analyses for Phase 3 - North.

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Section 5S: PHASE 3 – SOUTH, HYDRAULIC ANALYSIS

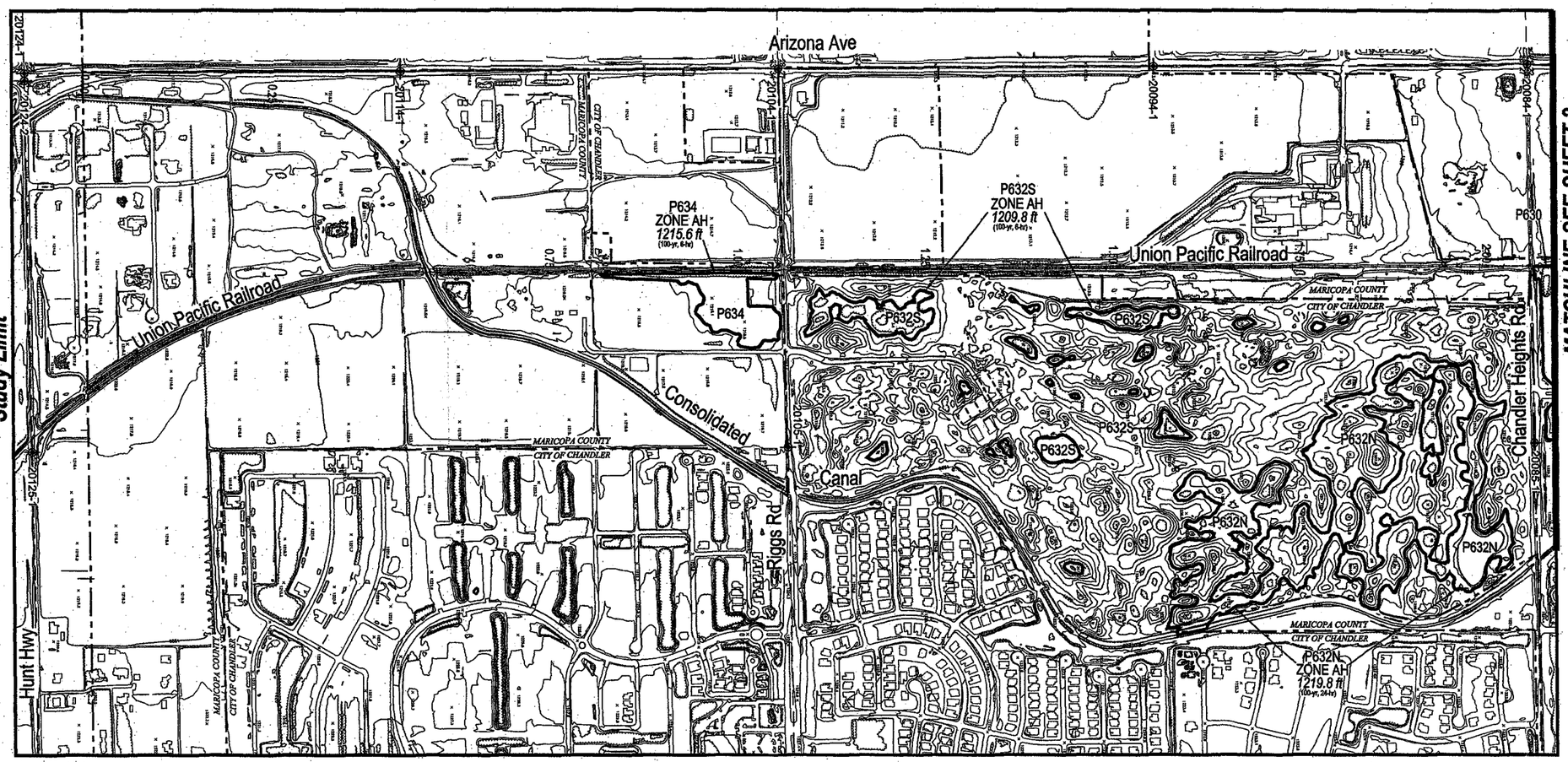
5S.1 Method Description

David Evans and Associates prepared the hydraulic analysis for Phase 3 - South. There are no conveyance areas within Phase 3 – South of this project, therefore there are no Zone AE delineations. The hydraulic analysis is limited to the storage routing within the HEC-1 model, as described in Section 4S.3.2, Volume 2, resulting in delineations of Zone AH.

5S.2 Work Study Maps

The detailed delineation for Chandler Gilbert FDS, Phase 3 – South, UPRR/ Arizona Avenue Watershed is presented on 1"= 400', 2' contour interval base mapping with attendant orthographic aerial photography. The work study maps and Index Sheet are presented with this Technical Data Notebook (TDN) on 9 -24"x36" sheets with Phase 3 –South depicted on Sheets 1- 5 and Phase 3 – North depicted on Sheets 6-9. Reduced-scale copies of the work study maps, Sheets 1 – 4, are included on the following pages. The full-size sheets are contained in Volume 4 of the TDN.

The work study maps include floodplain boundaries, zone designations, road names, state-plane coordinate grid (section lines, corporate boundaries and stream names/numbers). Floodplains shown on the work maps are the result of HEC-1 storage modeling.

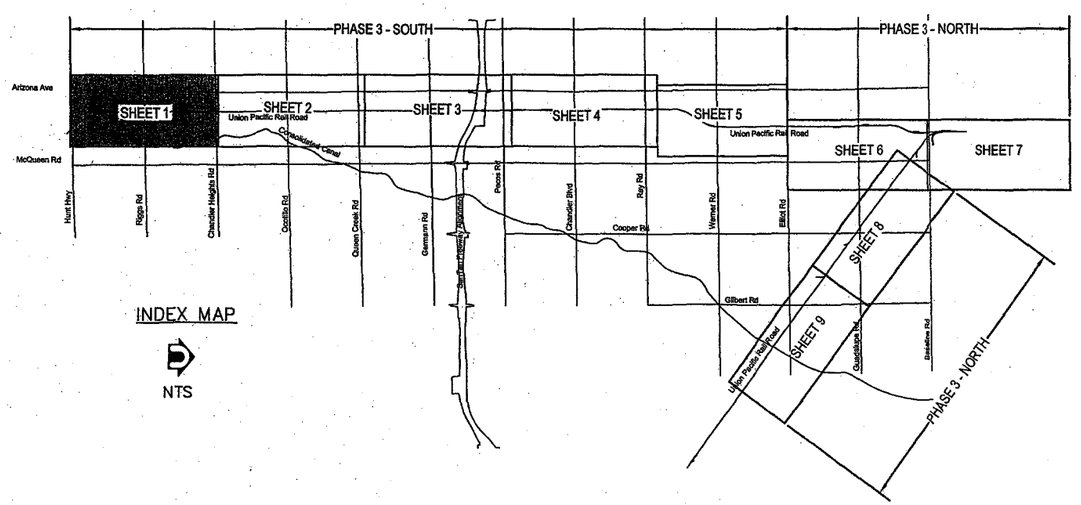


Topographic Mapping Data:
Stewart Geo Technologies, Inc.
Flight Date: 4/12/03
Flown for 2-ft contour interval
at Scale 1" = 200'

UPRR/ARIZONA AVE. WATERSHED

Control Datums: GPS - NGS
Horizontal - Maricopa County GDACS (NAD 83)
Vertical - Maricopa County GDACS (NAVD 88)
Conversion Factor: NGVD29 = NAVD88 - 1.6'

Note: The Hydraulic Baseline is measured along the Centerline of the UPRR Line.



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NTS

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CHANDLER/GILBERT FLOODPLAIN DELINEATION STUDY PHASE 3 – SOUTH UPRR/ARIZONA AVE. WATERSHED

CONTRACT FCD 2008C042

LEGEND

- 100-YR FLOODPLAIN BOUNDARY
- 2.00 HYDRAULIC BASE LINE WITH RIVER MILE
- × 1232.7 SPOT ELEVATION
- 1260 BASE FLOOD ELEVATIONS
- ZONE AE ZONE DESIGNATIONS
- 20562-1M ERM LOCATION
- 26 25 / 35 36 SECTION LINES AND SECTION LABELS
- CITY OF CHANDLER / MARICOPA COUNTY JURISDICTIONAL BOUNDARY

0 200' 400' 800'
SCALE: 1"=400'
2 ft contour interval

ELEVATION REFERENCE MARKS

LABEL	NORTHING	EASTING	ELEV.	DESCRIPTION
20084-1	812335.11	723046.91	1214.34	FD 4" BC IN HH 0.8' DN NO STAMPING NOTE- FND ON CL OF AZ AVE. AND CHANDLER HEIGHTS.
20085-1	812372.12	725693.85	1225.54	FD 3" AZ HIGHWAY DPT BC IN HH 0.45' DN NO STAMPING NOTE-FND ON CL CHANDLER HGHTS
20094-1	809690.01	723063.30	1214.35	FD 4" BC IN HH 0.8' DN NO STAMPING NOTE-FND ON CL OF AZ AVE AND CLOUD ROAD ON MEDIAN.
20104-1	807049.53	723077.53	1213.46	FD 4" BC IN HH 0.7' DN NO STAMPING NOTE- FND ON CL OF AZ AVE. AND RIGGS
20105-1	807101.55	725723.98	1218.37	FD 1 1/2 " AL CAP FL NO STAMPING NOTE- FND ON CL OF RIGGS NORTH OF WEST WALL OF TOMS AUTO REPAIR
20114-1	804401.15	723092.77	1216.61	FD 4" BC IN HH 0.7' DN NO STAMPING NOTE- FND ON CL OF AZ. AVE.
20124-1	801758.45	723103.83	1217.16	FD 3" DOT BC IN HH 0.9' DN NO STAMPING
20124-2	801759.40	723157.80	1218.21	FD 3" ADOT BC IN HH 0.55' DN NO STAMPING
20125-1	801802.17	725750.49	1222.36	FD 3" MCDOT BC IN HH 0.55' DN STAMPED "T25 R36 S34 S3" NOTE-FND IN EAST BOUND LANE EAST OF RR TRACKS

DATE	REVISION	BY

Registered Professional Engineer (Civil) — Certificate No. 48616 — JASON COLEMAN — Date Signed 3-31-09 — ARIZONA, U.S.A. — EXP. 12/31/2009

DAVID EVANS AND ASSOCIATES INC.
2141 E. Highland Ave., Suite 200
Phoenix Arizona 85016
Phone: 602.678.5151

EXHIBIT F
FLOODPLAIN DELINEATION WORK MAP

	BY	DATE
DESIGN	NBL	02/09
DESIGN CHK.	JAJC	02/09
PLANS	NBL	02/09
PLANS CHK.	JAJC	02/09

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 9

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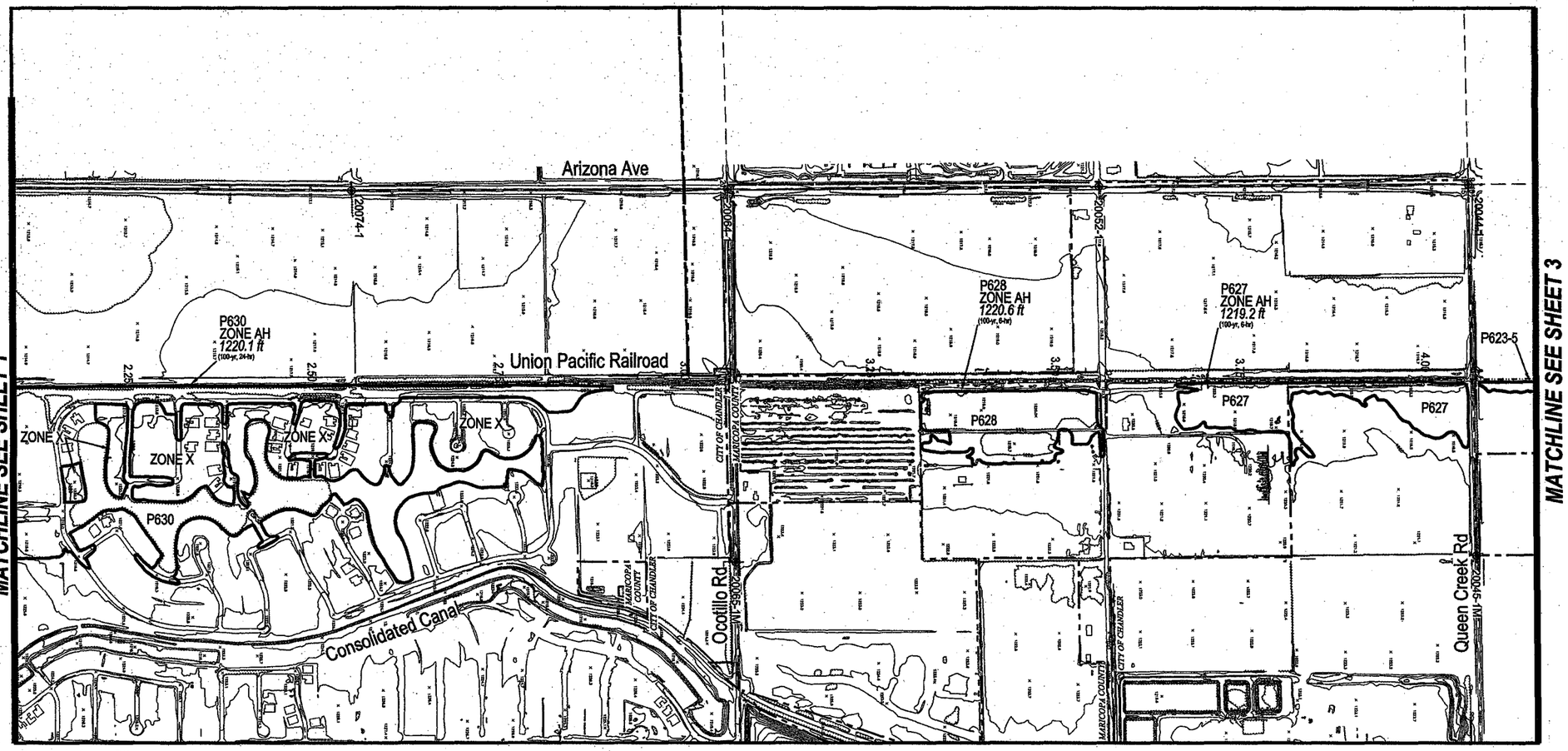
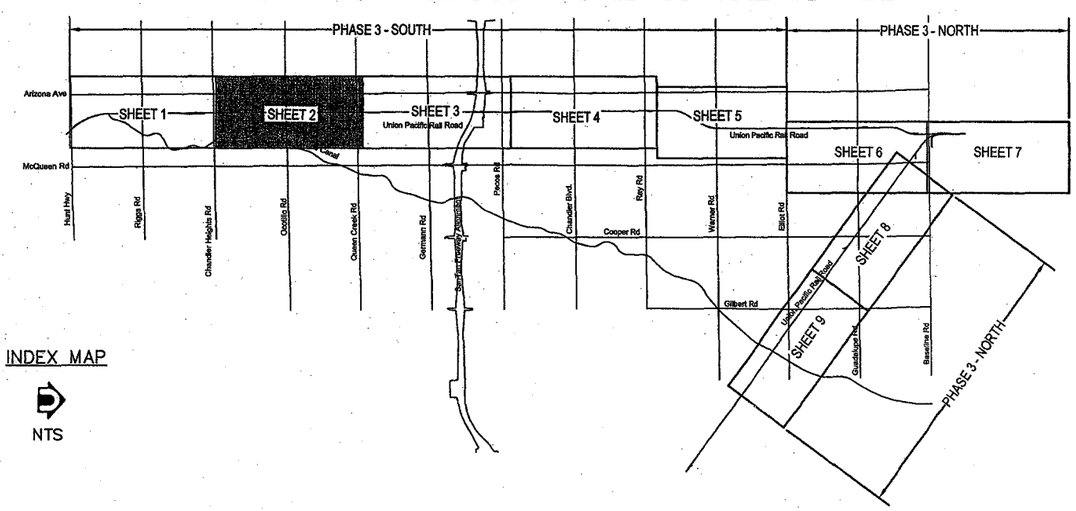


Topographic Mapping Data:
Stewart Geo Technologies, Inc.
Flight Date: 4/12/03
Flown for 2-ft contour interval
at Scale 1" = 200'

UPRR/ARIZONA AVE. WATERSHED

Control Datums: GPS - NGS
Horizontal - Maricopa County GDACS (NAD 83)
Vertical - Maricopa County GDACS (NAVD 88)
Conversion Factor: NGVD29 = NAVD88 - 1.7'

Note: The Hydraulic Baseline is measured along the Centerline of the UPRR Line.



INDEX MAP

NTS

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CHANDLER/GILBERT FLOODPLAIN DELINEATION STUDY PHASE 3 – SOUTH UPPR/ARIZONA AVE. WATERSHED

CONTRACT FCD 2008C042

LEGEND

- 100–YR FLOODPLAIN BOUNDARY
- 2.00 HYDRAULIC BASE LINE WITH RIVER MILE
- × 1232.7 SPOT ELEVATION
- 1260 BASE FLOOD ELEVATIONS
- ZONE AE ZONE DESIGNATIONS
- 20562-1M ERM LOCATION
- 26 25 / 35 36 SECTION LINES AND SECTION LABELS
- CITY OF CHANDLER / MARICOPA COUNTY JURISDICTIONAL BOUNDARY

SCALE: 1" = 400'
0 200' 400' 800'
2 ft contour interval

ELEVATION REFERENCE MARKS

LABEL	NORTHING	EASTING	ELEV.	DESCRIPTION
20044-1	822915.39	723025.23	1216.04	FD 3" CHANDLER BC IN HH 0.4' DN NO STAMPING NOTE- FND AT CL CL OF AZ AVE. AND OC. WISTRADDLES
20045-1M	822961.06	725652.80	1221.34	FD 1" IP FL WING ID NOTE-FND JUST NORTH OF CL OF OC REFURBISHED SET 2" AL CAP 0.4' DN STAMPED "T2S R5E 1/4 S10 S15 2001 RLS 16573"
20052-1	820455.64	733600.67	1241.91	FD 3" MCDOT BC IN HH 0.7' DN NO STAMPING NOTE-FND ON CL COOPER
20064-1	817626.14	723061.99	1219.11	FD 3" CHANDLER BC IN HH 0.8' DN NO STAMPING NOTE- FND ON CL OF AZ AVE AND IN EASTBOUND LANE OF OCOTILLO. WISRADDLES
20065-1M	817669.12	725702.07	1224.67	FD 1/2" RB W/O ID FL NOTE- FND ON CL OCOTILLO REFURBISHED SET 2" MARICOPA COUNTY AL CAP STAMPED "T2S-R5E 1/4 S15-S22 2001 RLS 15573" NOTE- 0.1
20074-1	814960.31	723072.06	1217.23	FD 4" BC IN HH 0.85' DN NO STAMPING NOTE- FND ON CL OF AZ AVE.

DATE	REVISION	BY

Registered Professional Engineer (Civil) CERTIFICATE NO. 45616 JASON COLEMAN Date Signed 12/31/08 ARIZONA, U.S.A.
EXP. 12/31/2009

DAVID EVANS AND ASSOCIATES INC.
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EXHIBIT F
FLOODPLAIN DELINEATION WORK MAP

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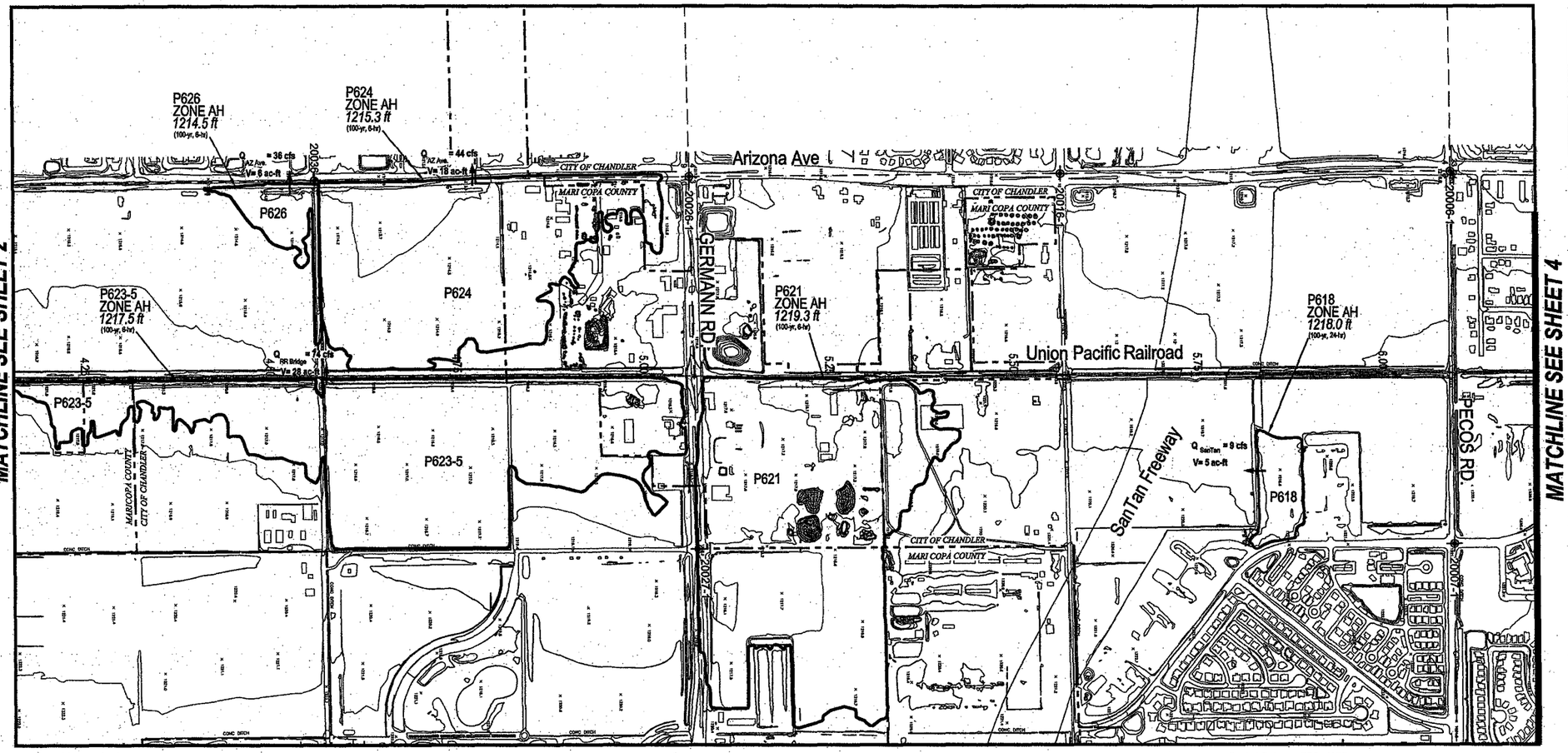
PLANS	NBL	02/09
PLANS CHK.	JAJC	02/09

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 2 OF 9



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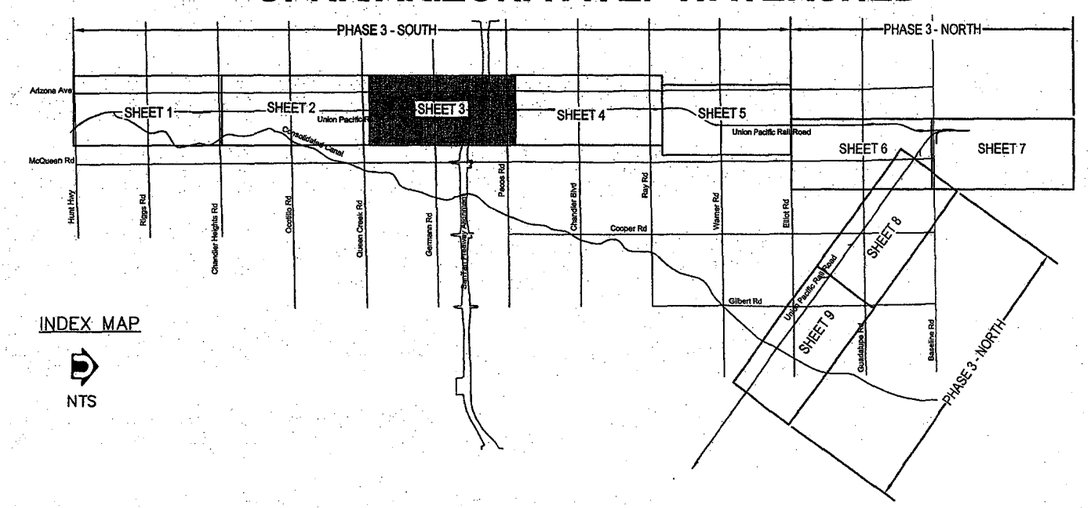
at Scale 1" = 200'

UPRR/ARIZONA AVE. WATERSHED



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Vertical - Maricopa County GDACS (NAVD 88)
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Note: The Hydraulic Baseline is measured along the Centerline of the UPRR Line.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CHANDLER/GILBERT FLOODPLAIN DELINEATION STUDY PHASE 3 – SOUTH UPPR/ARIZONA AVE. WATERSHED

CONTRACT FCD 2008C042

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- 20562-1M ERM LOCATION
- 29 25 / 32 36 SECTION LINES AND SECTION LABELS
- CITY OF CHANDLER / MARICOPA COUNTY JURISDICTIONAL BOUNDARY

0 200' 400' 800'
SCALE: 1" = 400'
2 ft contour interval

ELEVATION REFERENCE MARKS

LABEL	NORTHING	EASTING	ELEV.	DESCRIPTION
20006-1	833641.58	722933.77	1216.34	FD 3" CHANDLER BC IN HH 0.6' DN NO STAMPING NOTE-FND IN CENTER OF NORTHBOUND LANES ON AZ AVE.
20007-1	833656.88	725578.34	1220.86	FD 3" CHANDLER BC IN HH 0.25' DN STAMPED "19" NOTE-FND IN WESTBOUND LANR OF PECOS AND IN CL OF HAMILTON. FND W/ STRADDLES.
20016-1	830854.05	722951.83	1219.65	FD 3" CHANDLER BC IN HH 0.4 DN NO STAMPING NOTE-FND IN CENTER OF SOUTH BOUND LANES ON AZ AVE. W STRADDLES.
20026-1	828205.39	722972.19	1216.68	FD 3" CHANDLER BC IN HH 0.6' DN NO STAMPING NOTE- FND IN NORTHBOUND LANES ON AZ AVE. WSTADDLES
20027-1	828256.01	725615.99	1217.70	FD 3" CHANDLER BC IN HH 0.65' DN NO STAMPING NOTE-FND ON CL GERMANN
20036-1	825560.61	722996.23	1215.15	FD 3" CHANDLER BC FL NO STAMPING NOTE-FND CL AZ AVE. AND INLINE W/ POWERPOLES TO WEST. W STRADDLES.

DATE	REVISION	BY

Registered Professional Engineer (Civil) CERTIFICATE NO. 45616 JASON J. COLEMAN Date Signed 2/12/09 ARIZONA, U.S.A.
EXP. 12/31/2009

DAVID EVANS AND ASSOCIATES INC.
2141 E. Highland Ave., Suite 200
Phoenix Arizona 85016
Phone: 602.678.5151

EXHIBIT F
FLOODPLAIN DELINEATION WORK MAP

	BY	DATE
DESIGN	NBL	02/09
DESIGN CHK.	JAJC	02/09
PLANS	NBL	02/09
PLANS CHK.	JAJC	02/09

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 3 OF 9

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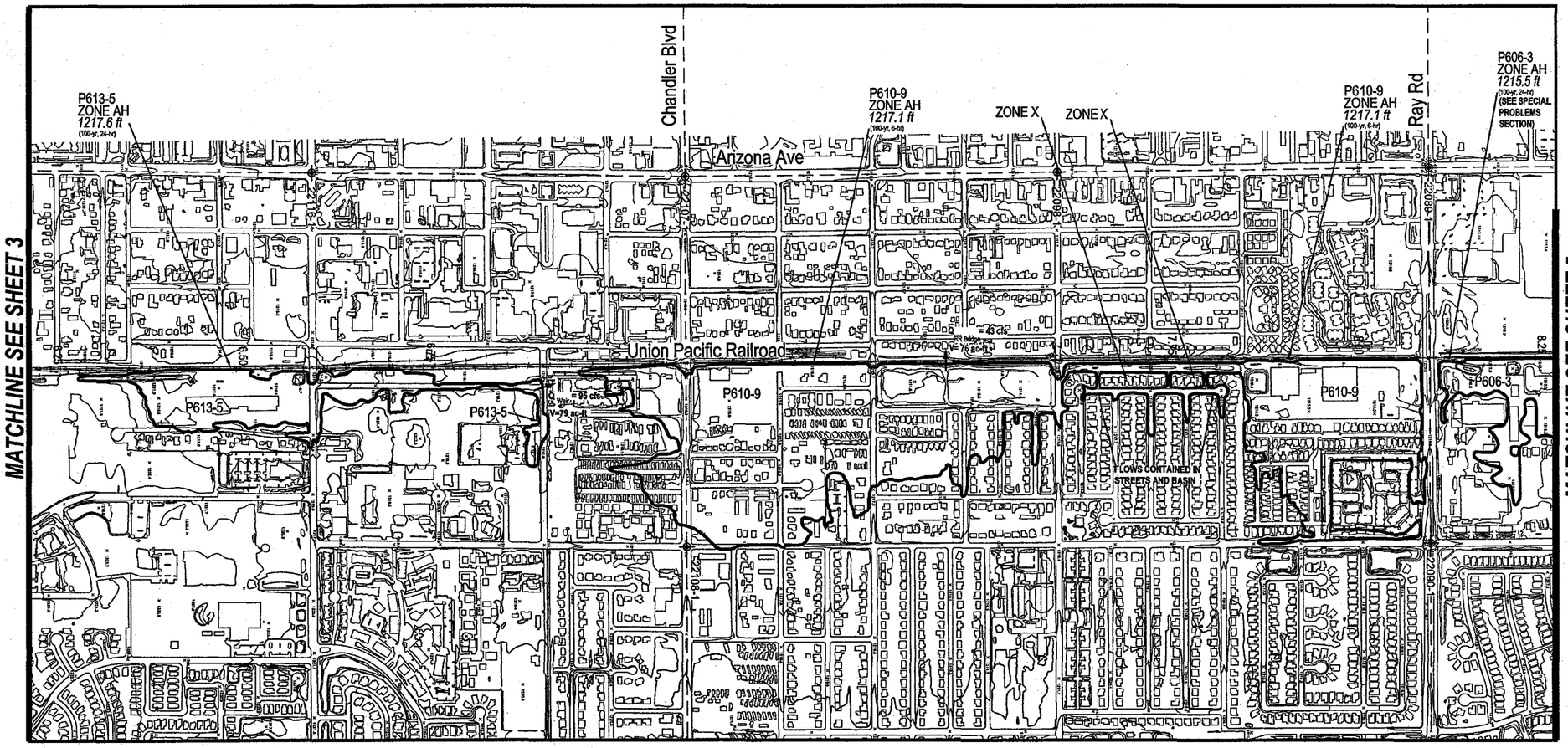

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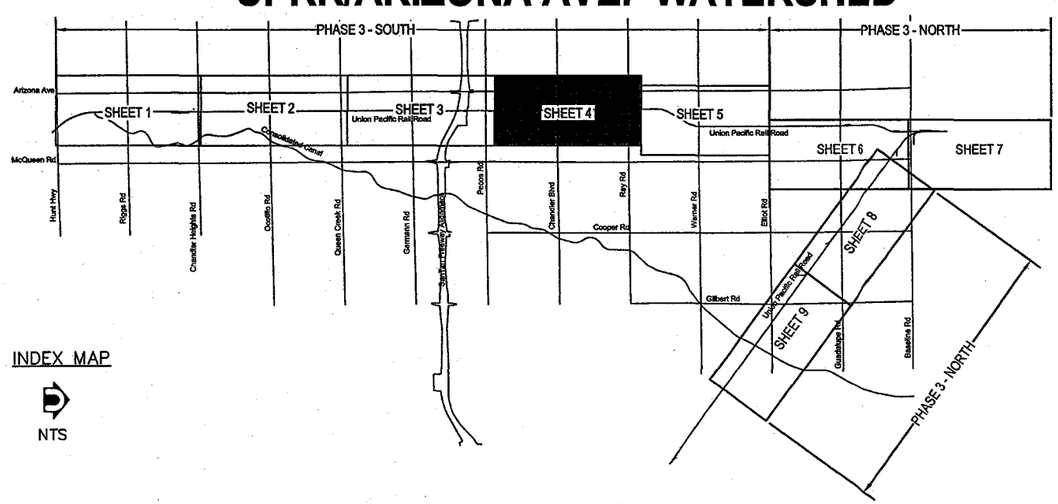
Flown for 2-ft contour interval
at Scale 1" = 200'

UPRR/ARIZONA AVE. WATERSHED



INDEX MAP

NTS

Control Datums: GPS - NGS
Horizontal - Maricopa County GDACS (NAD 83)
Vertical - Maricopa County GDACS (NAVD 88)
Conversion Factor: NGVD29 = NAVD88 - 1.8'

Note: The Hydraulic Baseline is measured along the Centerline of the UPRR Line.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CHANDLER/GILBERT FLOODPLAIN DELINEATION STUDY PHASE 3 – SOUTH UPPR/ARIZONA AVE. WATERSHED

CONTRACT FCD 2008C042

LEGEND

- 100-YR FLOODPLAIN BOUNDARY
- 2.00 HYDRAULIC BASE LINE WITH RIVER MILE
- X 1250.7 SPOT ELEVATION
- 1260 BASE FLOOD ELEVATIONS
- ZONE AE ZONE DESIGNATIONS
- 20562-1M ERM LOCATION
- 26 25 / 35 36 SECTION LINES AND SECTION LABELS
- CITY OF CHANDLER / MARICOPA COUNTY JURISDICTIONAL BOUNDARY

0 200' 400' 800'
SCALE: 1" = 400'
2 ft contour interval

ELEVATION REFERENCE MARKS

LABEL	NORTHING	EASTING	ELEV.	DESCRIPTION
22089-1	844205.86	722926.21	1213.62	FD 3" ADOT BC IN HH 0.6' ON NO STAMPING
22090-1	812422.36	728343.29	1226.78	FD 3" CHANDLER BC IN HH 0.6' ON NO STAMPING
22098-1	841571.70	722958.65	1211.35	FD 3" ADOT BC IN HH 0.6' ON NO STAMPING
22107-1	838931.92	722991.66	1213.3	FD 3" CHANDLER BC IN HH 0.6' ON NO STAMPING
22108-1	838941.08	725626.75	1217.67	FD 3" CHANDLER BC IN HH 0.5' ON NO STAMPING
22116-1	836286.54	722963.04	1211.02	FD 3" CHANDLER BC IN HH 0.5' ON NO STAMPING

DATE	REVISION	BY

Registered Professional Engineer (Civil) CERTIFICATE NO. 43817 JOEL R. HORNBURG ARIZONA U.S.A.
EXPIRES 03/31/2012

DAVID EVANS AND ASSOCIATES INC.
2141 E. Highland Ave., Suite 200
Phoenix Arizona 85016
Phone: 602.678.5151

EXHIBIT F
FLOODPLAIN DELINEATION WORK MAP

	BY	DATE
DESIGN	NBL	02/09
DESIGN CHK.	JAJC	02/09
PLANS	NBL	02/09
PLANS CHK.	JAJC	02/09

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 4 OF 9

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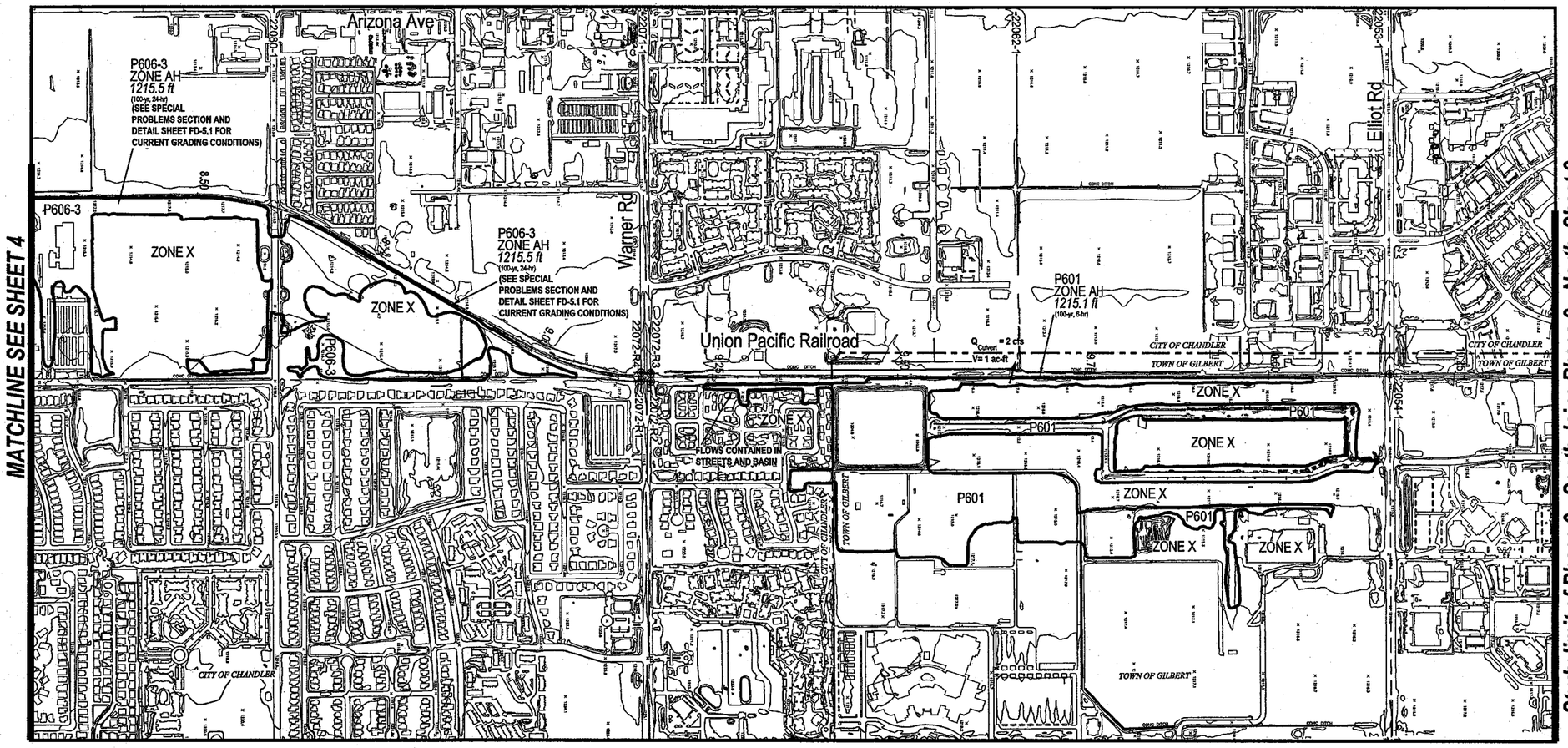

Topographic Mapping Data:
Stewart Geo Technologies, Inc.
Flight Date: 4/12/03
Flown for 2-ft contour interval
at Scale 1" = 200'

UPRR/ARIZONA AVE. WATERSHED

Control Datums: GPS - NGS
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Vertical - Maricopa County GDACS (NAVD 88)
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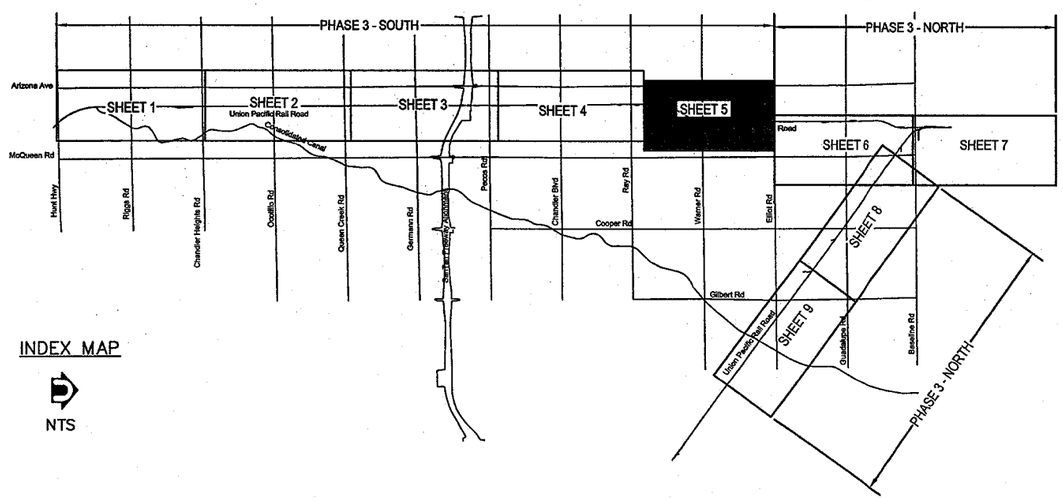
Note: The Hydraulic Baseline is measured along the Centerline of the UPRR Line.



INDEX MAP

NTS

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CHANDLER/GILBERT FLOODPLAIN DELINEATION STUDY PHASE 3 – SOUTH UPPR/ARIZONA AVE. WATERSHED

CONTRACT FCD 2008C042

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0 200' 400' 800'
SCALE: 1"= 400'
2 ft contour interval

ELEVATION REFERENCE MARKS

LABEL	NORTHING	EASTING	ELEV.	DESCRIPTION
22053-1	854777.57	722863.65	1210.64	FD 3" AZ HIGHWAY DPT BC IN HH 0.2' DN STAMPED "STA/ ELEV"
22054-1	854788.90	725523.43	1218.48	FD CPS EPOXIED FL IN PVMT NOTE- CL OF ELLIOT ROAD AND 15FT +/- WEST OF RR TRACKS
22062-1	852124.33	722877.93	1211.31	FD 3" MCHD AL CAP FL NO STAMPING
22071-1	849470.59	722883.22	1212.00	FD BRASS CAP STEM IN CONC IN HH 0.3' DN
22072-R1	849456.87	725576.88	1222.75	FD 2 1/2" BC FL STAMPED "W.C. 43.13 TO 1/4 COR"
22072-R2	849525.56	725524.03	1222.51	FD 2 1/2" BC FL STAMPED "W.C. 45.96 TO 1/4 COR"
22072-R3	849525.17	725524.03	1221.94	FD 2 1/2" BC FL STAMPED "W.C. 43.25 TO 1/4 COR"
22072-R4	849456.36	725518.85	1222.11	FD 2 1/2" BC FL STAMPED "W.C. 46.50 TO 1/4 COR"
22080-1	846840.53	722905.34	1211.73	FD 3" ADOT BC IN HH 0.2' DN NO STAMPING

DATE	REVISION	BY

Registered Professional Engineer (Civil) CERTIFICATE NO. 43817 JOEL R. HORNBURG Date Signed 1/21/10 ARIZONA U.S.A.
EXPIRES 03/31/2012

DAVID EVANS AND ASSOCIATES INC.
2141 E. Highland Ave., Suite 200
Phoenix Arizona 85016
Phone: 602.678.5151

EXHIBIT F
FLOODPLAIN DELINEATION WORK MAP

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DESIGN CHK.	JAJC	02/09
PLANS	NBL	02/09
PLANS CHK.	JAJC	02/09
SUBMITTED BY:		DATE

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 5 OF 9

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5S.3 Parameter Estimation

See Section 4S, Volume 2 for details on the storage routing methodology.

5S.3.1 Roughness Coefficients

No roughness coefficient estimation was required for Phase 3 – South.

5S.3.2 Cross-section descriptions

No cross-sections were required for the hydraulic analysis.

5S.4 Modeling Considerations

5S.4.1 Hydraulic Jump and drop analysis

No hydraulic jump or drop analyses were experienced in this study.

5S.4.2 Bridge or Culverts

No culverts or bridges are modeled as part of the hydraulic analyses.

5S.4.3 Levees and Dikes

There are no levees or dikes within the project area.

5S.4.4 Islands and Flow Splits

In general, small islands were not delineated on the workmaps. Islands that were delineated in the previous study and that were also shown as dry in the new study were delineated as such.

5S.4.5 Ineffective Flow Areas

There are no areas of ineffective flow in Phase 3 - South.

5S.4.6 Supercritical Flow

There are no areas of supercritical flow in Phase 3 - South.

5S.4.7 Floodway modeling

No floodway was delineated for this study.

5S.4.8 Special problems encountered during the study

See Special Problems Section 4S.5, Volume 2.

5S.4.9 Calibration

No hydraulic calibration was performed during this study.

5S.5 Hydraulic analysis results

A summary table of all ponded areas is located in Appendix DS.4. The floodplain results are depicted on the Workmaps, Exhibit F located in Volume 4.

Section 5N: PHASE 3 – NORTH, HYDRAULIC ANALYSIS

5N.1 Method Description

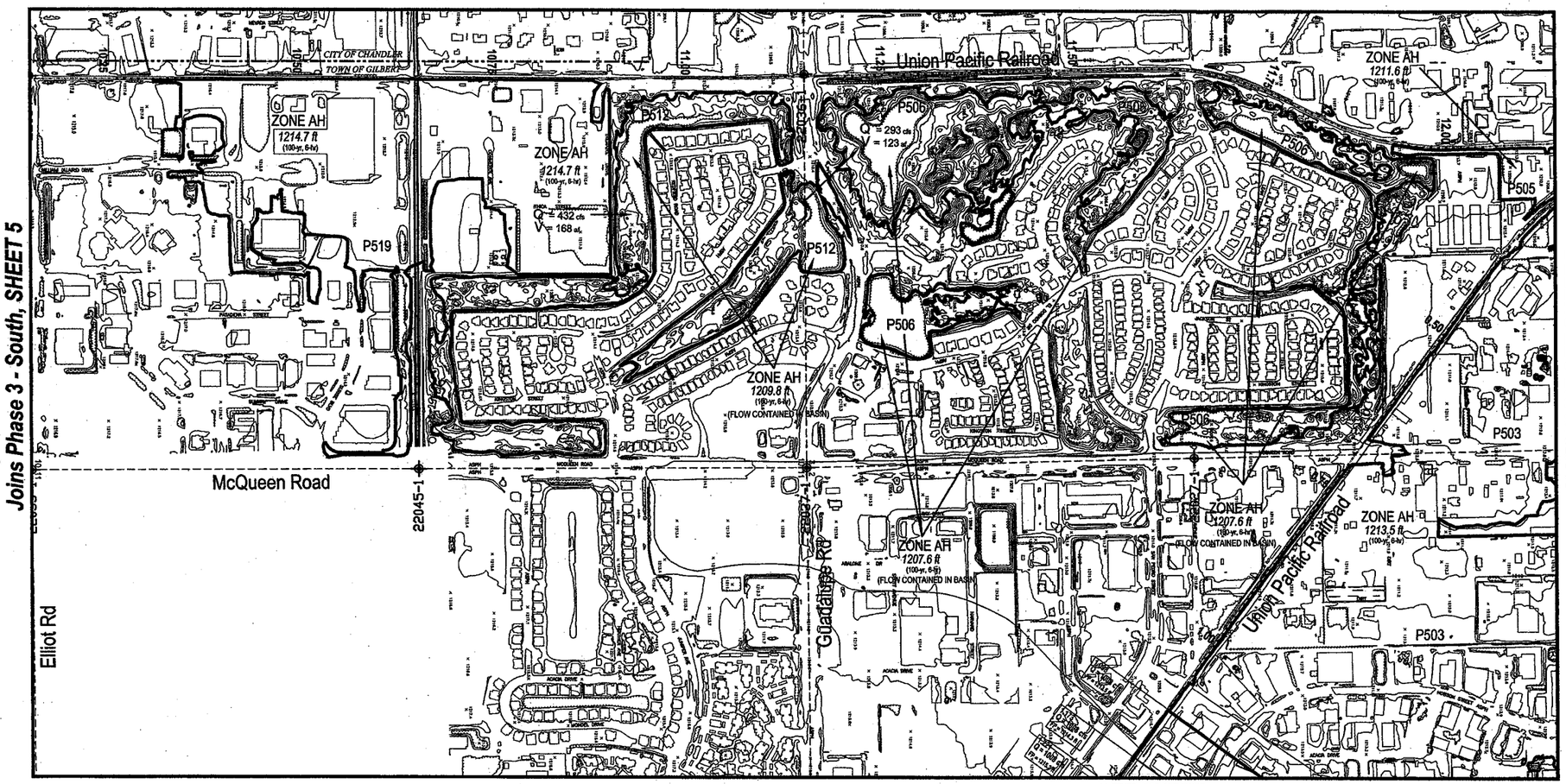
Project Engineering Consultants prepared the hydraulic analysis for Phase 3- North. The U.S. Army Corp of Engineers HEC-RAS v. 3.1.3 (reference 1) was used to perform step-backwater profile calculations for conveyance between ponding areas. These areas are mapped as Zone AE on the Workmaps (see Exhibit F, Phase 3 -North, Sheets 6-9). Cross-sections were cut using Land Development Desktop V. 3. The geometry data was imported into HEC-RAS. Downstream pond elevations were used as the starting downstream boundary condition.

5N.2 Work Study Maps

The detailed delineation for Chandler Gilbert FDS, Phase 3 – North, UPRR/ Arizona Avenue Watershed is presented on 1"= 400', 2' contour interval base mapping with attendant orthographic aerial photography. The work study maps and Index Sheet are presented with this Technical Data Notebook (TDN) on 9 -24"x36" sheets with Phase 3 –South depicted on Sheets 1- 5 and Phase 3 –North depicted on Sheets 6-9. Reduced-scale copies of the work study maps, Sheets 6 – 9, are included on the following pages. The full-size sheets are contained in Volume 4 of the TDN.

The work study maps include cross-section locations, floodplain boundaries, zone designations, road names, state-plane coordinate grid (section lines, corporate boundaries and stream names/numbers). Floodplains shown on the work maps are a combination of HEC-1 storage modeling and HEC-RAS conveyance modeling.

Study Limit of Phase 3 - North
Joins Phase 3 - South, SHEET 5



MATCHLINE SEE SHEET 7

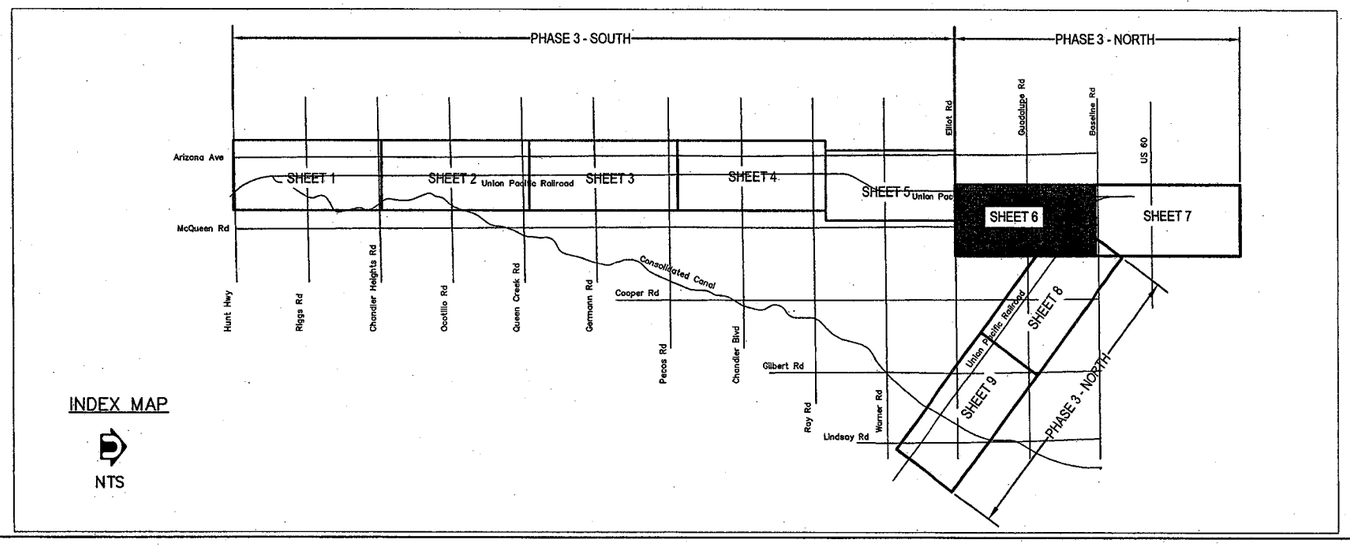
SEE SHEET 8

Topographic Mapping Data:
Stewart Geo Technologies, Inc.
Flight Date: 4/12/03
Flown for 2-ft contour interval
at Scale 1" = 200'

Control Datums: GPS - NGS
Horizontal - Maricopa County GDACS (NAD 83)
Vertical - Maricopa County GDACS (NAVD 88)
Conversion Factor: NGVD29 = NAVD88 - 1.80'

Note: The Hydraulic Baseline is measured from the centerline of the UPRR Lines.

UPRR / ARIZONA AVENUE WATERSHED



INDEX MAP

NTS

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CHANDLER/GILBERT FLOODPLAIN DELINEATION STUDY PHASE 3 - NORTH UPRR/ARIZONA AVENUE WATERSHED

CONTRACT FCD 2008C042

LEGEND

- 100-YR FLOODPLAIN BOUNDARY
- 2.00 HYDRAULIC BASE LINE WITH RIVER MILE
- 7,892 Q = 146 cfs FP = 1266.9 ft CROSS SECTION
- x 1252.7 SPOT ELEVATION
- 1260 BASE FLOOD ELEVATIONS
- ZONE AE ZONE DESIGNATIONS
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0 200' 400' 800'
SCALE: 1" = 400'
2 ft contour interval

ELEVATION REFERENCE MARKS

LABEL	NORTHING	EASTING	ELEV.	DESCRIPTION
22027-1	862718.25	728091.14	1211.80	FD 3" GILBERT BC FL NO STAMPING
22036-1	860060.62	725502.78	1214.69	FD 3" GILBERT BC IN HH 0.35" DN NO STAMPING NOTE - IN MEDIAN ISLAND 10 FT WEST OF RR TRACKS
22037-1	860066.72	728159.59	1213.45	FD 3" GILBERT BC IN HH 0.4" DN NO STAMPING
22045-1	857431.92	728171.52	1218.18	FD 3" GILBERT BC IN HH 0.4" DN NO STAMPING
22055-1	854799.61	728182.87	1218.11	FD 3" GILBERT BC IN HH 0.8" DN NO STAMPING

DATE	REVISION	BY

EXPIRES 3-31-10
Registered Professional Engineer (Civil)
CERTIFICATE NO. 25972
MICHAEL D. HEATON
3-31-09
Date Signed
ARIZONA, U.S.A.

PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4
PHOENIX, ARIZONA 85021

EXHIBIT F
FLOODPLAIN DELINEATION WORK MAP

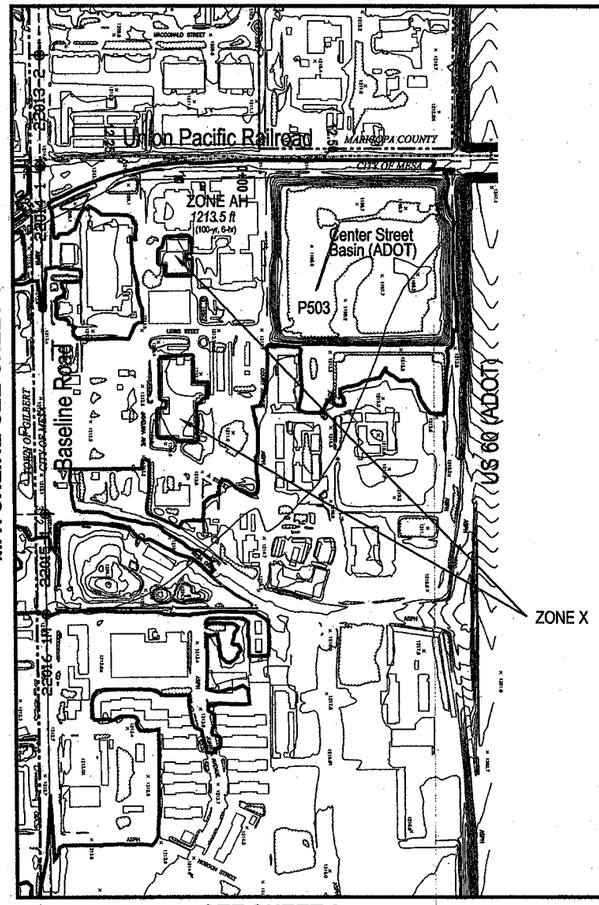
	BY	DATE
DESIGN	YX	3/09
DESIGN CHK.	MDH	3/09
PLANS	YX	3/09
PLANS CHK.	MDH	3/09

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 6 OF 9



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Flight Date: 4/12/03
Flown for 2-ft contour interval
at Scale 1" = 200'

UPRR / ARIZONA AVENUE WATERSHED

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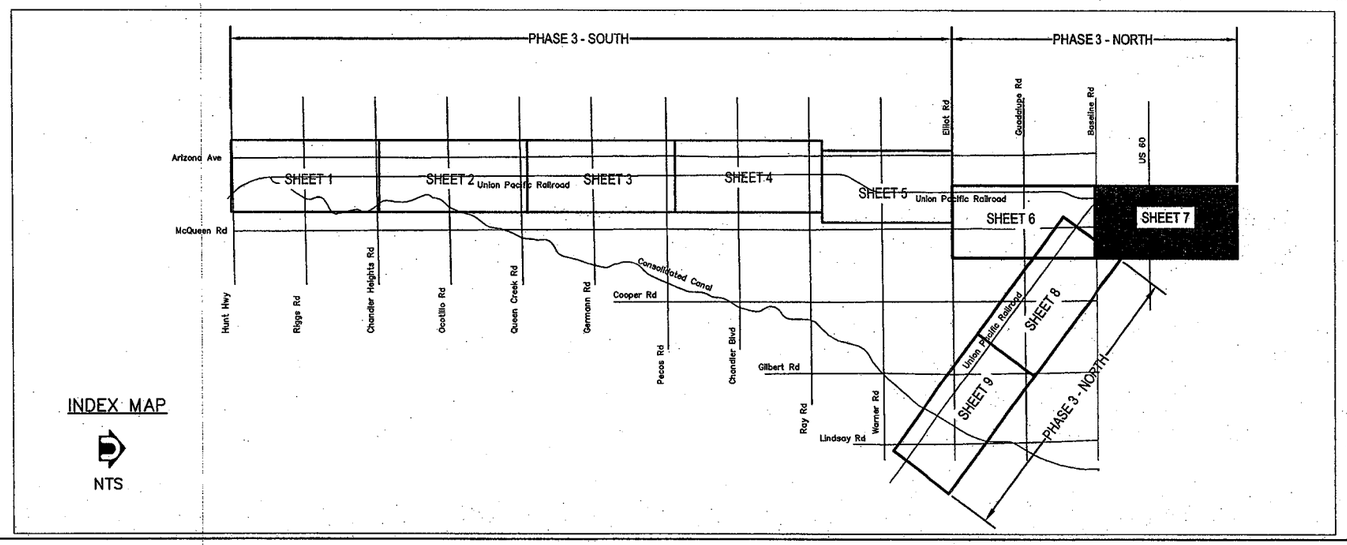

INDEX MAP

NTS

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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0 200' 400' 800'
SCALE: 1" = 400'
2 ft contour interval

ELEVATION REFERENCE MARKS

LABEL	NORTHING	EASTING	ELEV.	DESCRIPTION
22013-1	865358.45	725351.82	1213.58	FD 2-1/2" MESA BC IN HH 0.6' DN NO STAMPING
22014-1	865360.01	725987.91	1215.06	FD 3" MARICOPA COUNTY BC IN HH 0.5' DN NO STAMPING NOE IN MEDIAN ISLAND 30 FT EAST OF RR TRACKS
22015-1	865374.87	728022.70	1213.05	FD 3" MESA IN HH 0.6' DN NO STAMPING
22016-1M	865379.52	728616.52	1214.41	FD 1/2" RB W/1" PLAS CAP FL STAMPED "BRW INC RLS 28739" REPLACED 1" PLAS CAP W/2" MARICOPA COUNTY AL CAP FL STAMPED "SC T1N R6E S34 S35 2003 RLS 21752"

DATE	REVISION	BY

EXPIRES 3-31-10
Registered Professional Engineer (Civil)
CERTIFICATE NO. 25972
MICHAEL D. HEATON
Date Signed 3-31-09
ARIZONA, U.S.A.

PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4
PHOENIX, ARIZONA 85021

EXHIBIT F
FLOODPLAIN DELINEATION WORK MAP

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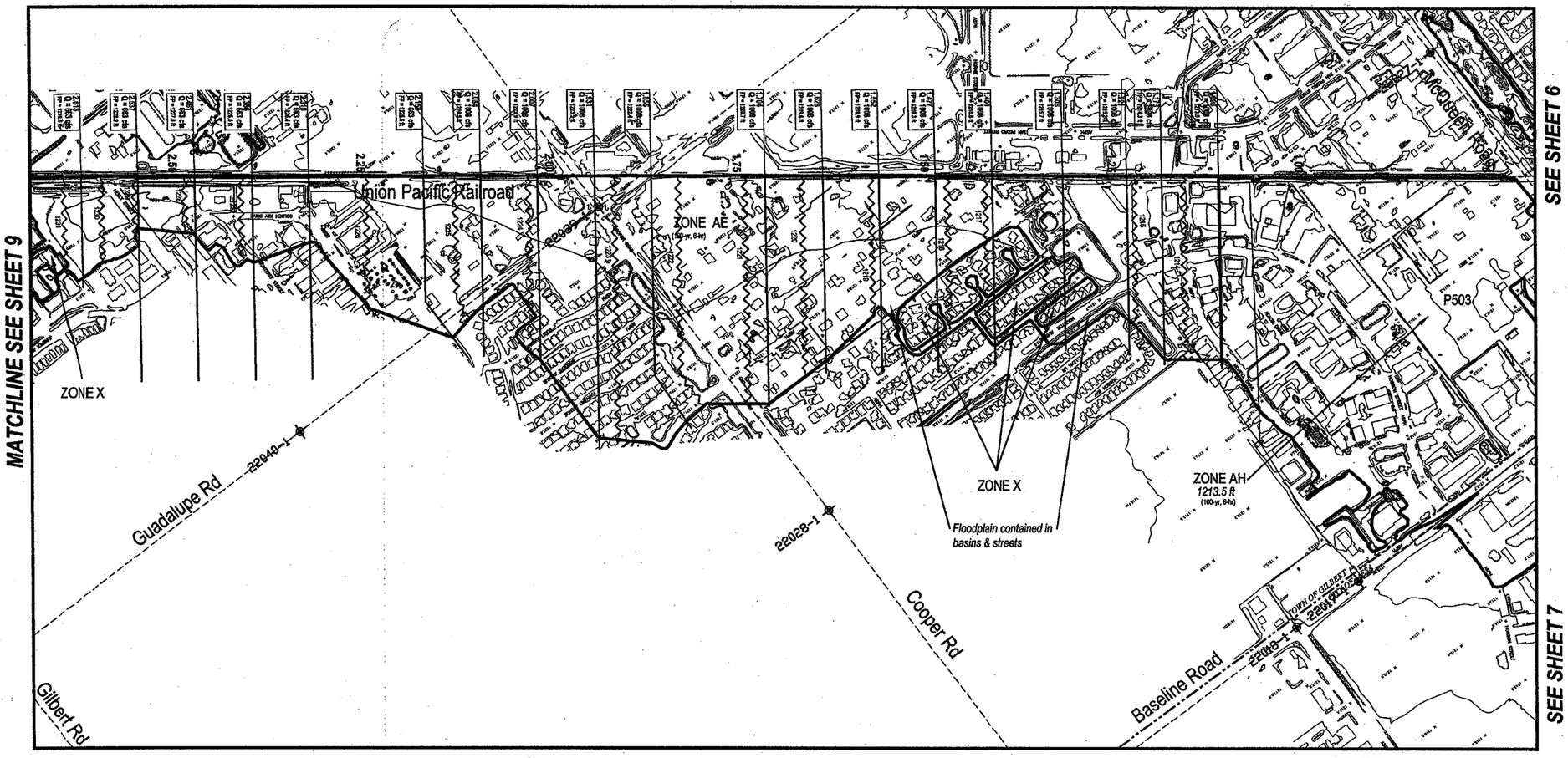
DESIGN	YX	3/09
DESIGN CHK.	MDH	3/09
PLANS	YX	3/09
PLANS CHK.	MDH	3/09

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 7 OF 9



Topographic Mapping Data:
Stewart Geo Technologies, Inc.
Flight Date: 4/12/03
Flown for 2-ft contour interval
at Scale 1" = 200'

UPRR / ARIZONA AVENUE WATERSHED

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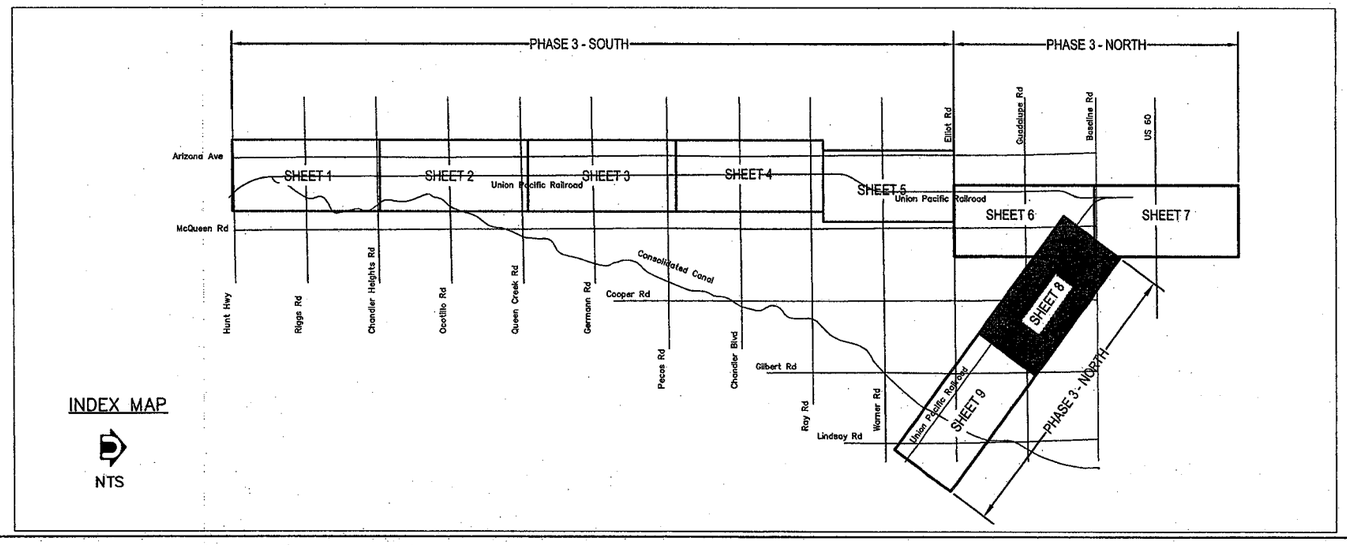

INDEX MAP

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0 200' 400' 800'
SCALE: 1" = 400'
2 ft contour interval

ELEVATION REFERENCE MARKS

LABEL	NORTHING	EASTING	ELEV.	DESCRIPTION
22017-1	865395.54	730712.78	1215.93	FD 1" STL P 0.3' DN W/O ID NOTE-IN MEDIAN ISLAND
22018-1	865399.66	731255.73	1216.39	FD 3" MESA BC IN HH 0.75' DN NO STAMPING
22027-1	862718.25	728091.14	1211.80	FD 3" GILBERT BC FL NO STAMPING
22028-1	862777.33	733428.75	1220.99	FD 3" GILBERT BC IN HH 0.5' DN NO STAMPING
22039-1	860111.66	733455.28	1222.47	FD 3" GILBERT BC IN HH 0.5' DN NO STAMPING
22040-1	860134.90	736083.66	1228.35	FD 3" MCDOT BC IN HH 0.45 DN NO STAMPING

DATE	REVISION	BY

EXPIRES 3-31-10
Registered Professional Engineer (Civil) CERTIFICATE NO. 22972 MICHAEL D. HEATON Date Signed 3-31-09 ARIZONA U.S.A.

PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4
PHOENIX, ARIZONA 85021

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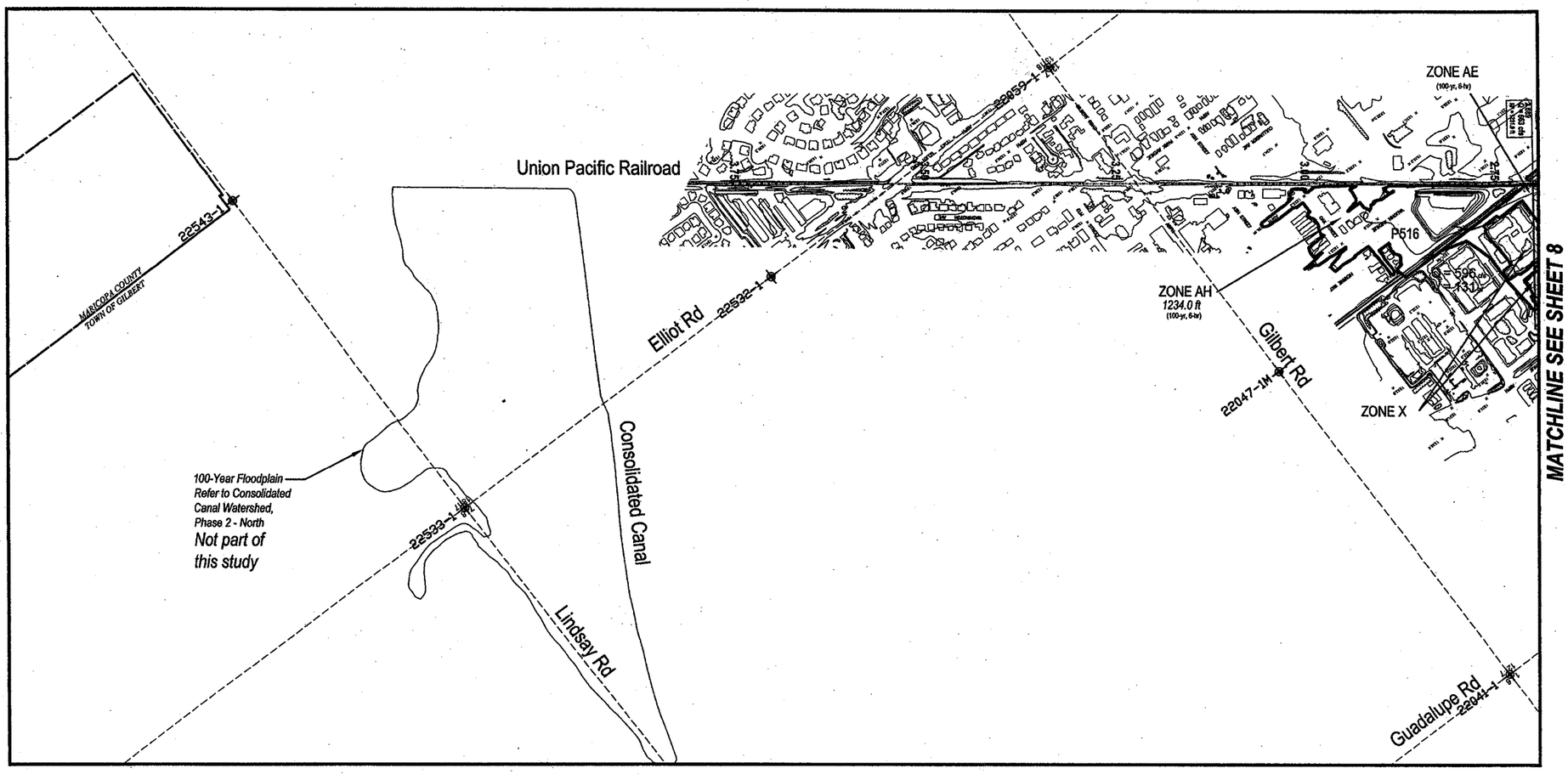
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SUBMITTED BY: DATE:

SHEET 8 OF 9



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UPRR / ARIZONA AVENUE WATERSHED

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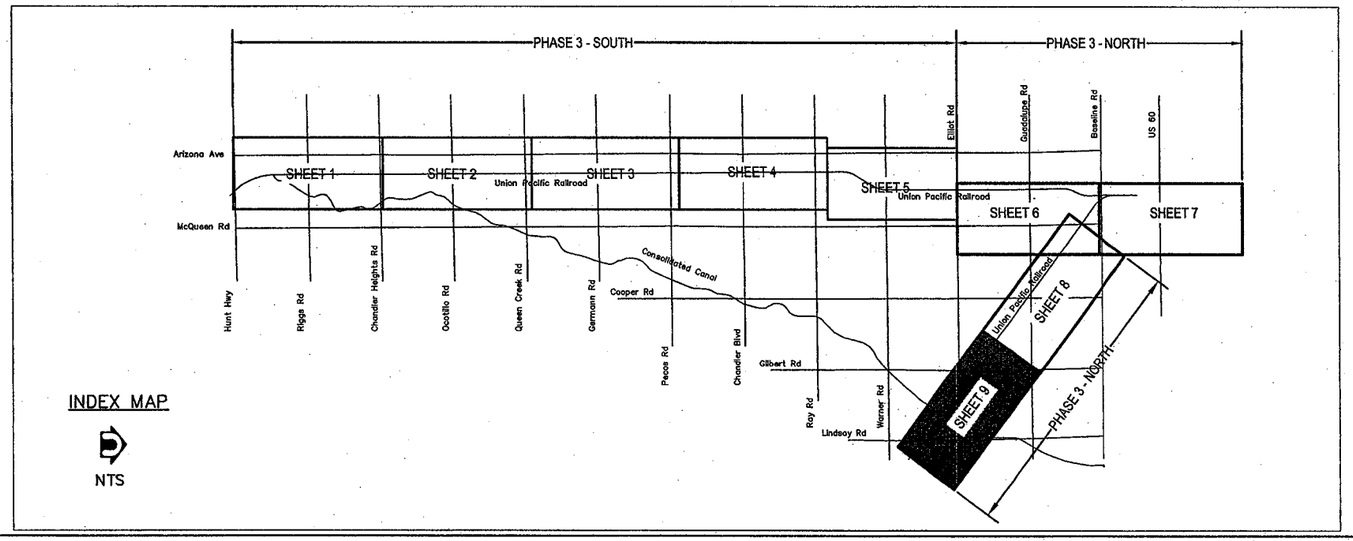

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0 200' 400' 800'
SCALE: 1" = 400'
2 ft contour interval

ELEVATION REFERENCE MARKS

LABEL	NORTHING	EASTING	ELEV.	DESCRIPTION
22041-1	860158.61	730720.89	1233.23	FD 3" GILBERT BC IN HH 0.45' DN NO STAMPING
22047-1M	857525.58	738764.86	1237.13	FD PK NAIL FL, REPLACED W/ ½" RB W/2" MARICOPA COUNTY AL CAP FL STAMPED "T1S T5E ¼ T6E S12 S35 21782"
22059-1	854897.20	738806.80	1239.49	FD 3" GILBERT BC IN HH 0.4' DN NO STAMPING
22532-1	854913.54	741215.52	1241.16	FD 3"MCHD BC IN HH0.4' DN STAMPED "STA 24+9.01 1239.96"
22533-1	854931.80	743865.3	1245.69	FD 3" MCHD BC IN HH 0.4' DN STAMPED "STA 50+59.38 12244.54"
22543-1	852291.4	743883.8	1250.5	FD 3" GILBERT BC IN HH 0.45' DN NO STAMPING
22534-1	854951.9	746511.3	1250.42	FD 3" GILBERT BC IN HH 0.45' DN NO STAMPING

DATE	REVISION	BY

EXPIRES 3-31-10
Registered Professional Engineer (Civil)
CERTIFICATE NO. 25972
MICHAEL D. HEATON
3-31-09
Date Signed
ARIZONA U.S.A.

PROJECT ENGINEERING CONSULTANTS, LTD.
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SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 9 OF 9

5N.3 Parameter Estimation

HEC-RAS v3.1.3 was used to determine the flow width and depth for each cross section. This model is based on the Manning's equation:

$$Q=A\ {}^{1.49}/_{n}\ R^{2/3}\ S^{1/2}$$

Where:

Q = 100-year discharge in cubic feet per second (cfs)
A = The cross-sectional area of the cross section at the corresponding depth in square feet
n = Manning's roughness coefficient
R = Hydraulic radius in feet
S = Friction slope

5N.3.1 Roughness Coefficients

The Chandler / Gilbert Watershed is not a riverine environment. The area consists of mostly ponded areas with short reaches of conveyance from one ponded area to another. There are no natural washes conveying flow. Runoff is routed through agricultural fields or within street sections within the urban areas. Manning's n-values were taken from the Chandler/Gilbert PFDS, Phase 1, Eastern Canal Watershed report located in Appendix EN.1, Volume 4 of the Phase 1 TDN, and applied to similar areas in Phase 3 – North.

5N.3.2 Cross-section descriptions

Cross section data were sampled from the digital terrain model associated with the base map using various software tools available in AutoCAD Land Development Desktop Version 3. The base map used is described in Section 5N.2 (above).

Cross sections are labeled according to river mile increasing in the upstream direction, using the thalweg of the conveyance along the Union Pacific Railroad lines as the station 10,000 reference point. Cross section stationing is from left to right if viewed in the downstream direction and spaced as closely as necessary for the modeling.

5N.4 Modeling Considerations

5N.4.1 Hydraulic Jump and drop analysis

No hydraulic jump or drop analyses were experienced in this study.

5N.4.2 Bridge or Culverts

No culverts or bridges are modeled as part of the hydraulic analyses.

5N.4.3 Levees and Dikes

There are no levees or dikes within the project area.

5N.4.4 Islands and Flow Splits

In general, small islands were not delineated on the workmaps. Islands that were delineated in the previous study and that were also shown as dry in the new study were delineated as such.

5N.4.5 Ineffective Flow Areas

The effect of ineffective flow areas was simulated by increasing the Manning's n value in those areas of the cross section thought to be ineffective. Deeper parts of retention basins on cross sections were designated ineffective using the available options in HEC-RAS 3.1.3.

5N.4.6 Supercritical Flow

Supercritical flow does not occur for significant lengths along any reach in this study.

5N.4.7 Floodway modeling

No floodway was delineated for this study.

5N.4.8 Special problems encountered during the study

See Special Problems Section 4N.5, Volume 2.

5N.4.9 Calibration

No hydraulic calibration was performed during this study.

5N.5 Hydraulic analysis results

The conveyance starts at the intersection of the Union Pacific Railroad and the Western Canal, flows northwesterly along the railroad, and ends at about a half mile west of Cooper Road at Pond P503. Cross-sections 1.098 through 2.689 represent this reach (see Workmap Exhibit F, Sheets 8 and 9, located in Volume 5 of this report). Peak flows at 516RR (663 cfs) and CP509 (1008 cfs) from the 100-year 6-hour HEC-1 output are used as flow rates at the flow changing cross sections 2.689 and 2.084 respectively.

See Appendix EN.2, for the HEC-RAS model, cross-sections and results.

5N.6 References

1. *U.S. Army Corp of Engineers HEC-RAS vs 3.1.3*, May 2003.

2. *Volume 2, Hydraulics, Drainage Design Manual for Maricopa County, Arizona*, October, 2002.

APPENDIX E: HYDRAULIC ANALYSIS SUPPORTING DOCUMENTATION

Appendix E: Table of Contents

ES & EN.1 ROUGHNESS COEFFICIENT ESTIMATION

ES & EN.2 CROSS-SECTION PLOTS

ES & EN.3 EXPANSION AND CONTRACTION COEFFICIENTS

ES & EN.4 ANALYSIS OF STRUCTURES

ES & EN.5 HYDRAULIC CALCULATIONS

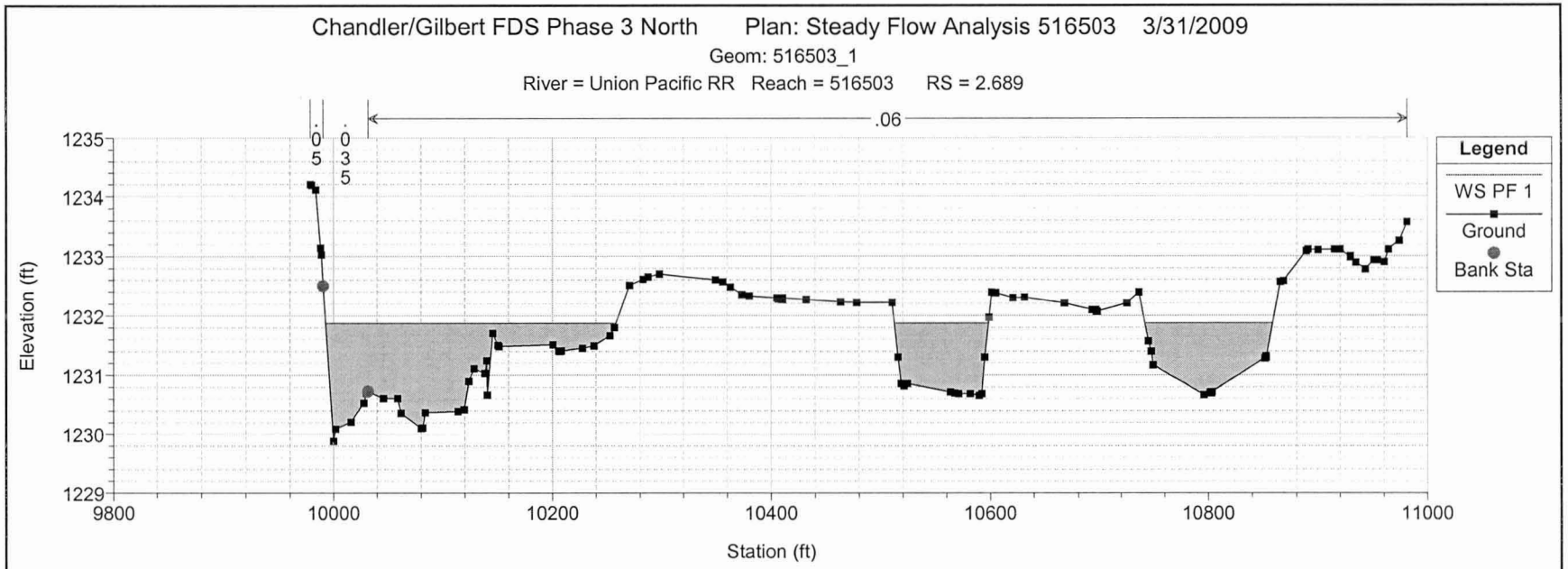
ES & EN.6 SPECIAL PROBLEMS

ES & EN.1 Roughness Coefficient Estimation

Manning's n or k Values

	River	Reach	River Station	Frctn (n/K)	n #1	n #2	n #3
1	Union Pacific RR	516503	2.689	n	0.05	0.035	0.06
2	Union Pacific RR	516503	2.613	n	0.05	0.035	0.06
3	Union Pacific RR	516503	2.537	n	0.05	0.035	0.06
4	Union Pacific RR	516503	2.461	n	0.05	0.035	0.06
5	Union Pacific RR	516503	2.386	n	0.05	0.035	0.06
6	Union Pacific RR	516503	2.31	n	0.05	0.035	0.06
7	Union Pacific RR	516503	2.158	n	0.05	0.035	0.06
8	Union Pacific RR	516503	2.084	n	0.05	0.035	0.06
9	Union Pacific RR	516503	2.007	n	0.05	0.035	0.06
10	Union Pacific RR	516503	1.931	n	0.05	0.035	0.06
11	Union Pacific RR	516503	1.855	n	0.05	0.035	0.06
12	Union Pacific RR	516503	1.704	n	0.05	0.035	0.06
13	Union Pacific RR	516503	1.628	n	0.05	0.035	0.06
14	Union Pacific RR	516503	1.552	n	0.05	0.035	0.06
15	Union Pacific RR	516503	1.477	n	0.05	0.035	0.06
16	Union Pacific RR	516503	1.401	n	0.05	0.035	0.06
17	Union Pacific RR	516503	1.306	n	0.05	0.035	0.06
18	Union Pacific RR	516503	1.221	n	0.05	0.035	0.06
19	Union Pacific RR	516503	1.173	n	0.05	0.035	0.06
20	Union Pacific RR	516503	1.098	n	0.05	0.035	0.06

ES & EN.2 Cross-section Plots


Chandler/Gilbert FDS Phase 3 North Plan: Steady Flow Analysis 516503 3/31/2009
Geom: 516503_1
River = Union Pacific RR Reach = 516503 RS = 2.689
.05
.035
.06
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1235
1234
1233
1232
1231
1230
1229
9800
10000
10200
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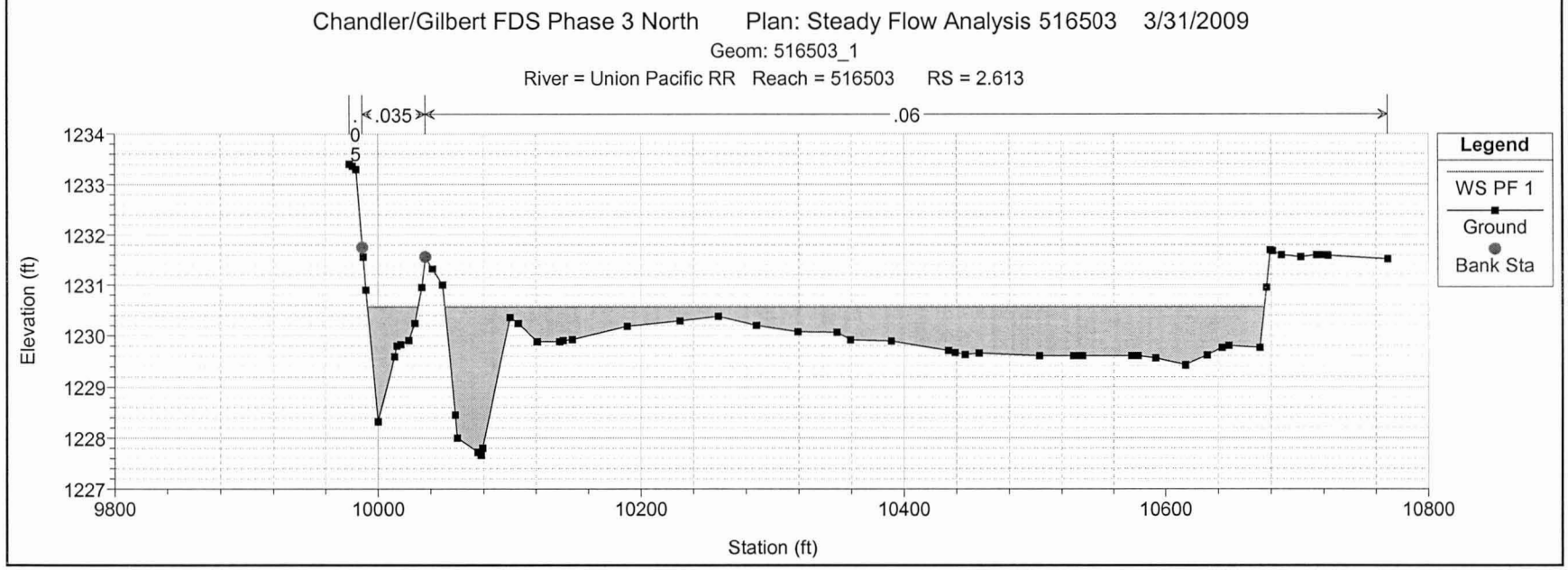
10800
11000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.06
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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1231
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9800
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10200
10400
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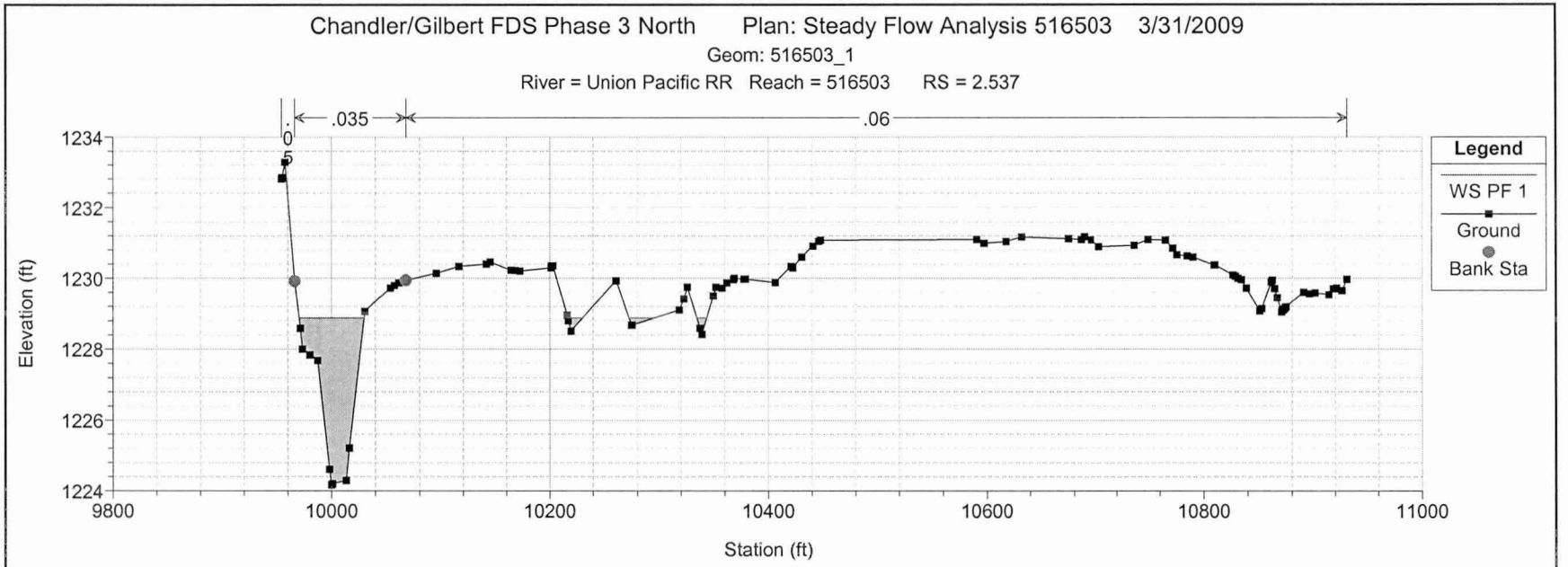
10800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.035
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Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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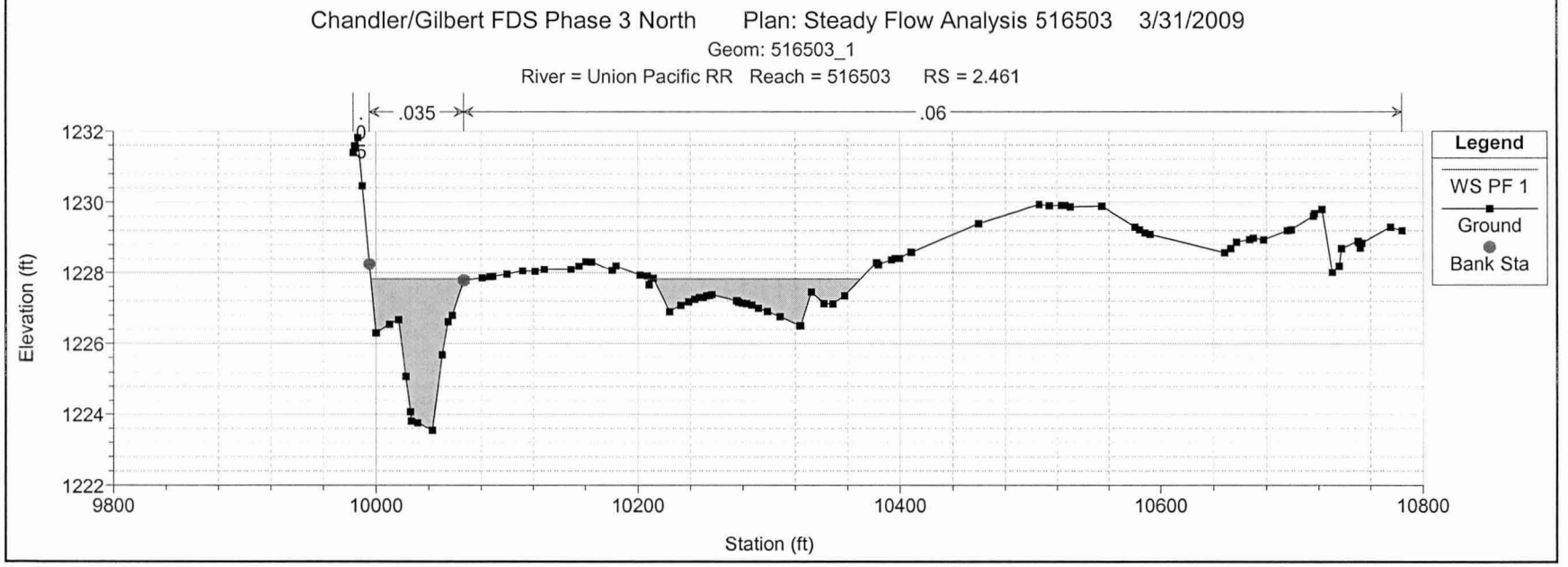
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Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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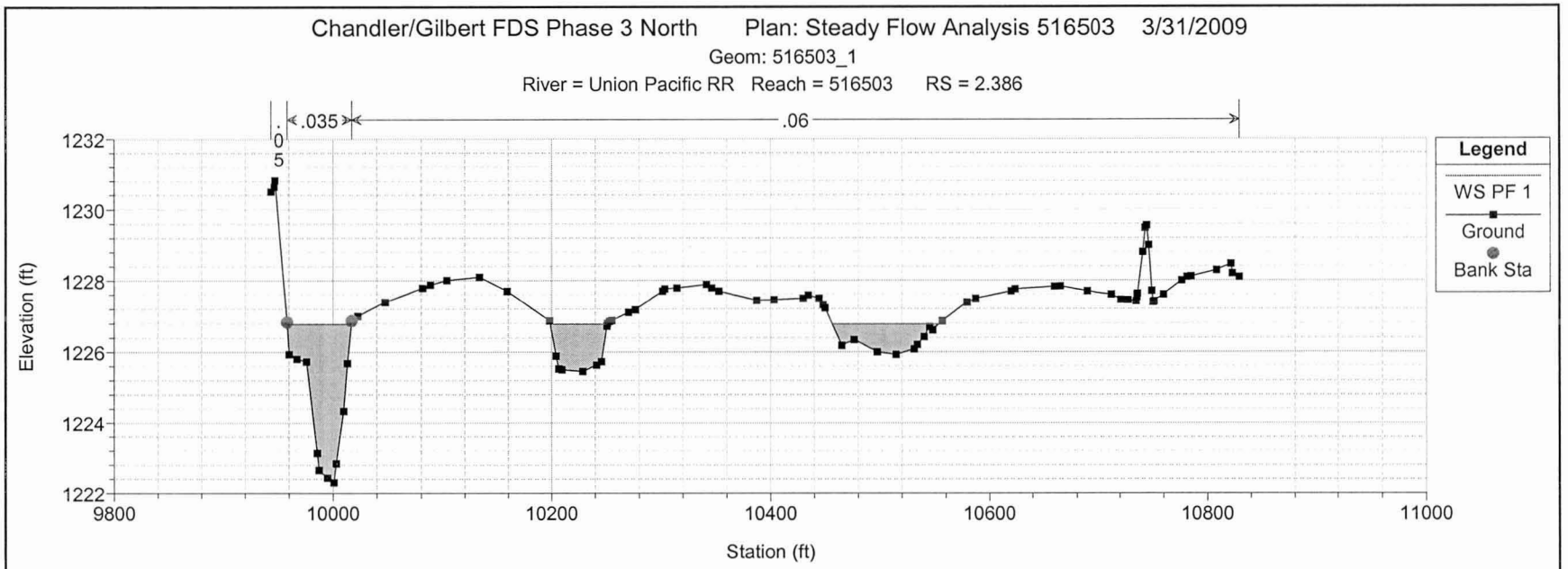
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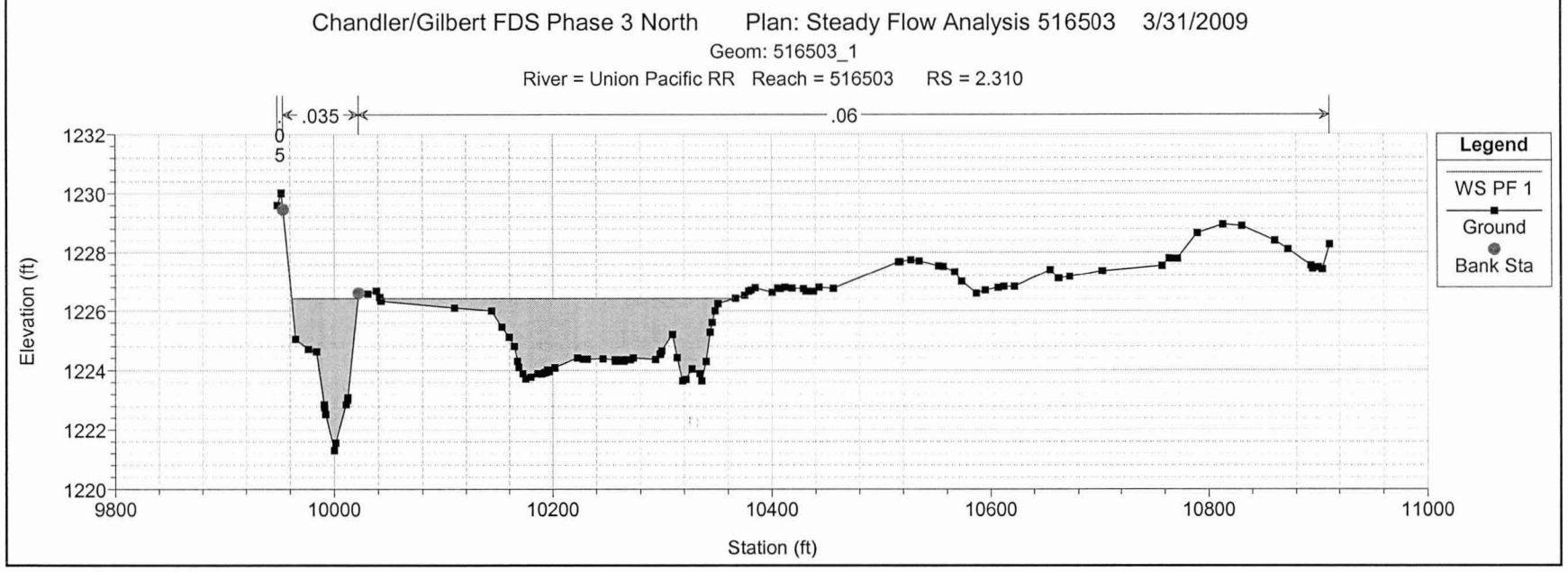
.05
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta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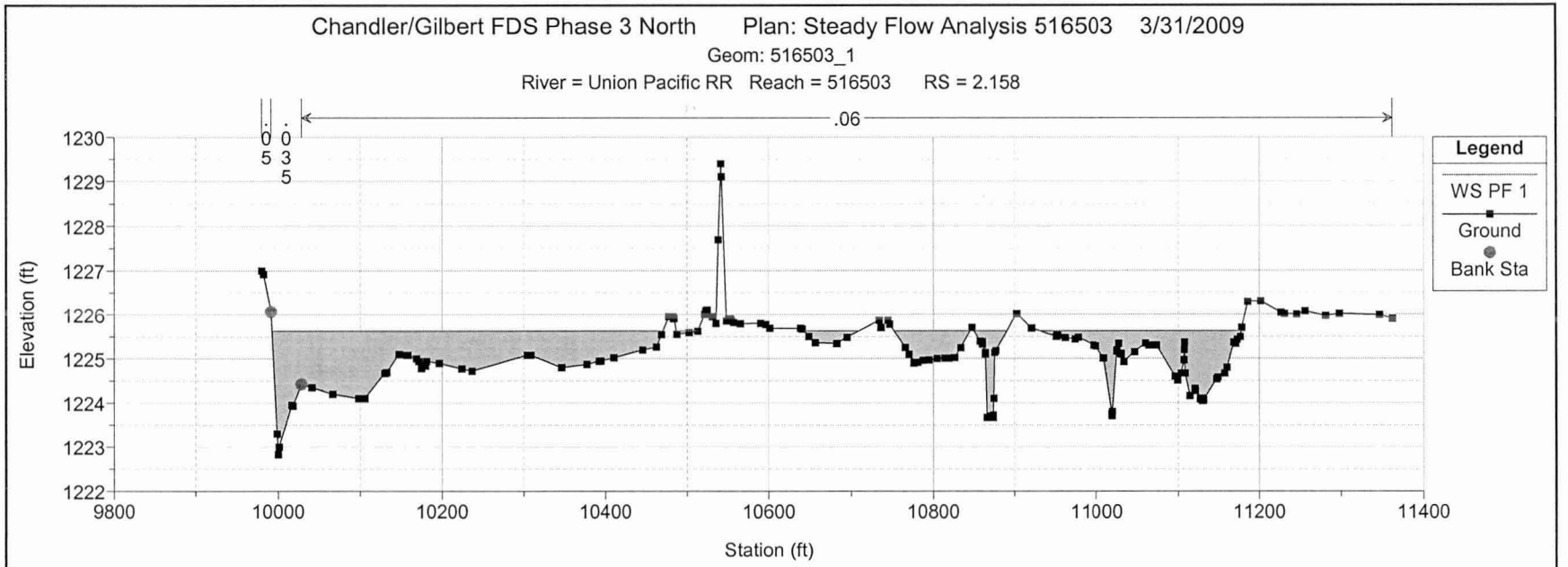
.05
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta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.05
.035
Elevation (ft)
1230
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1225
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1222
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10400
10600
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11000
11200
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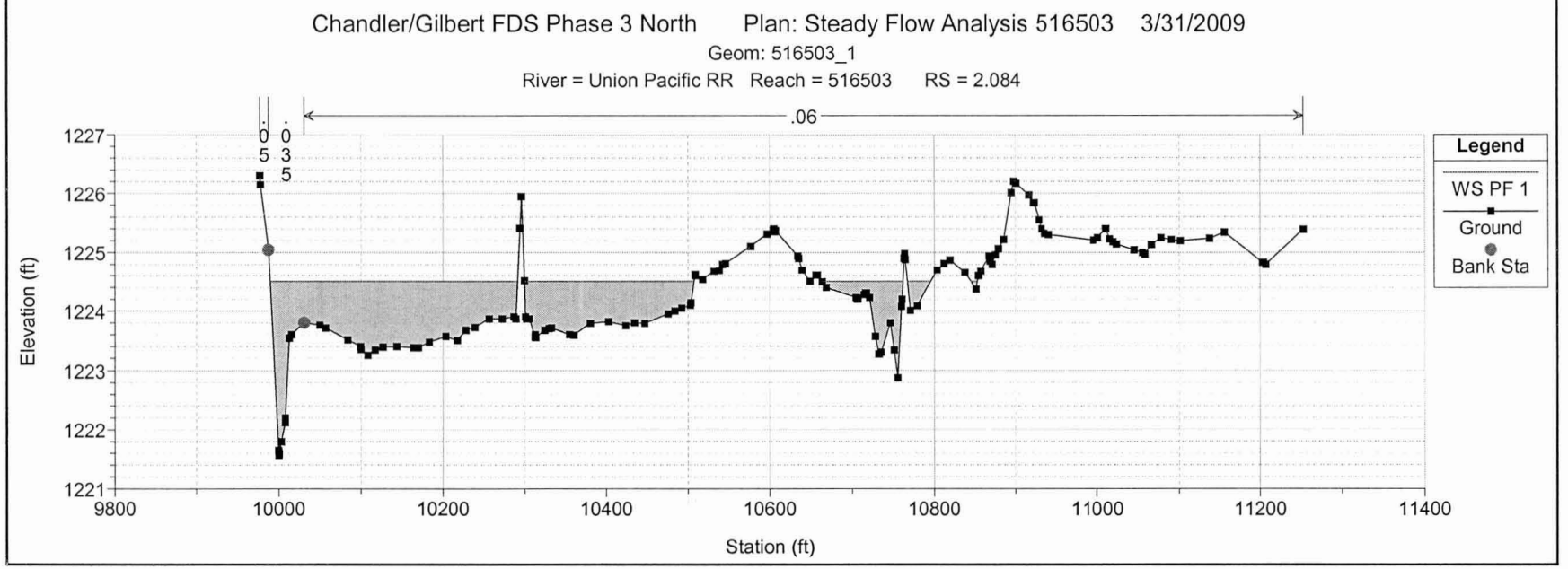
Station (ft)
Legend
WS PF 1
Ground
Bank Sta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.035
Elevation (ft)
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10600
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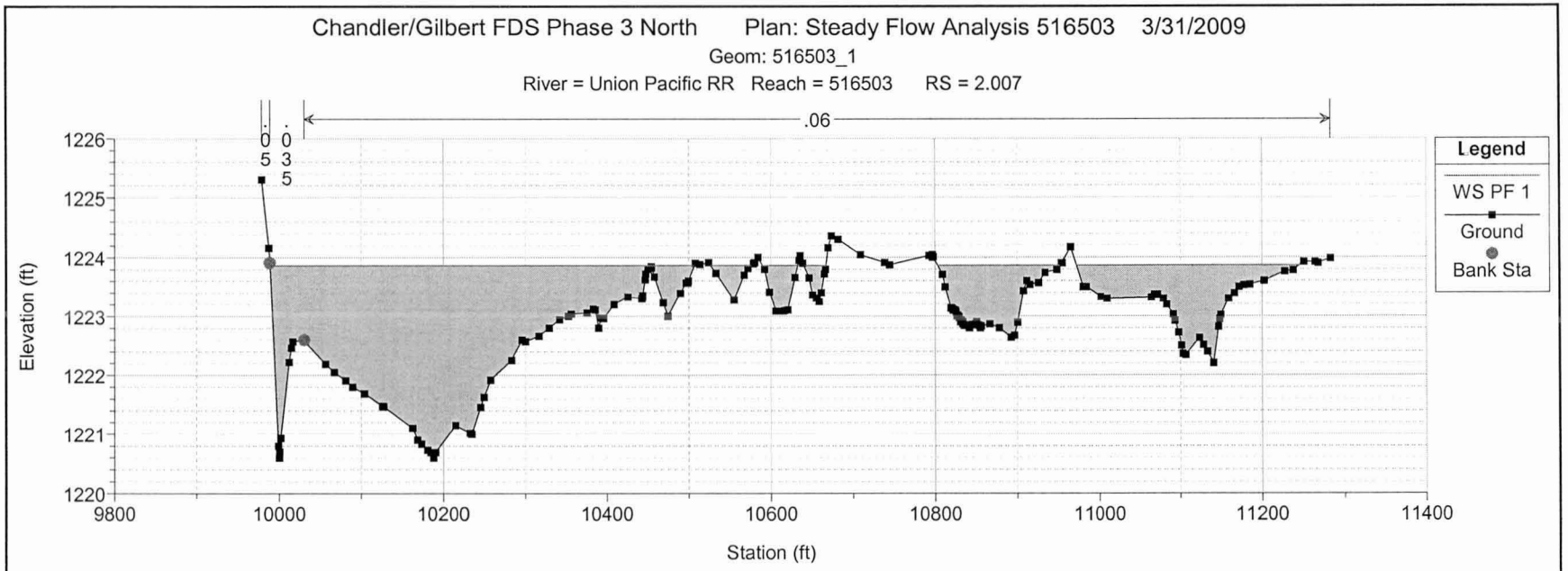
11200
11400
Station (ft)
Legend
WS PF 1
Ground
Bank Sta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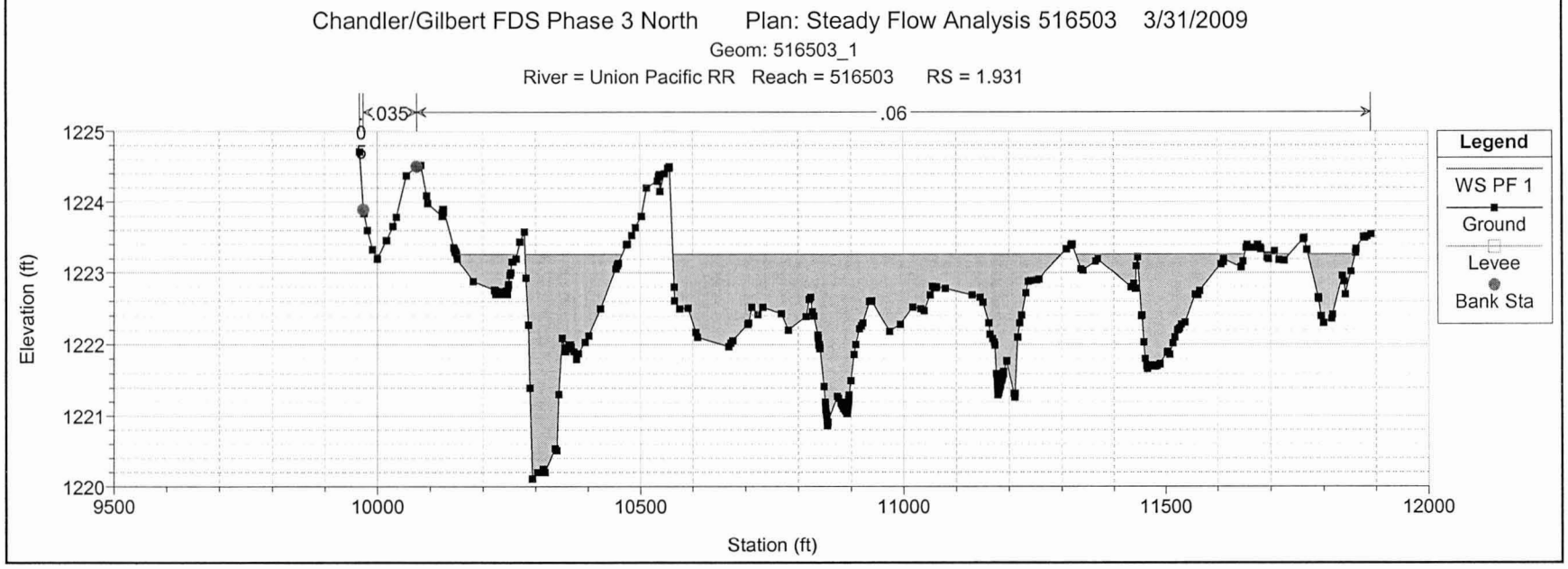
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)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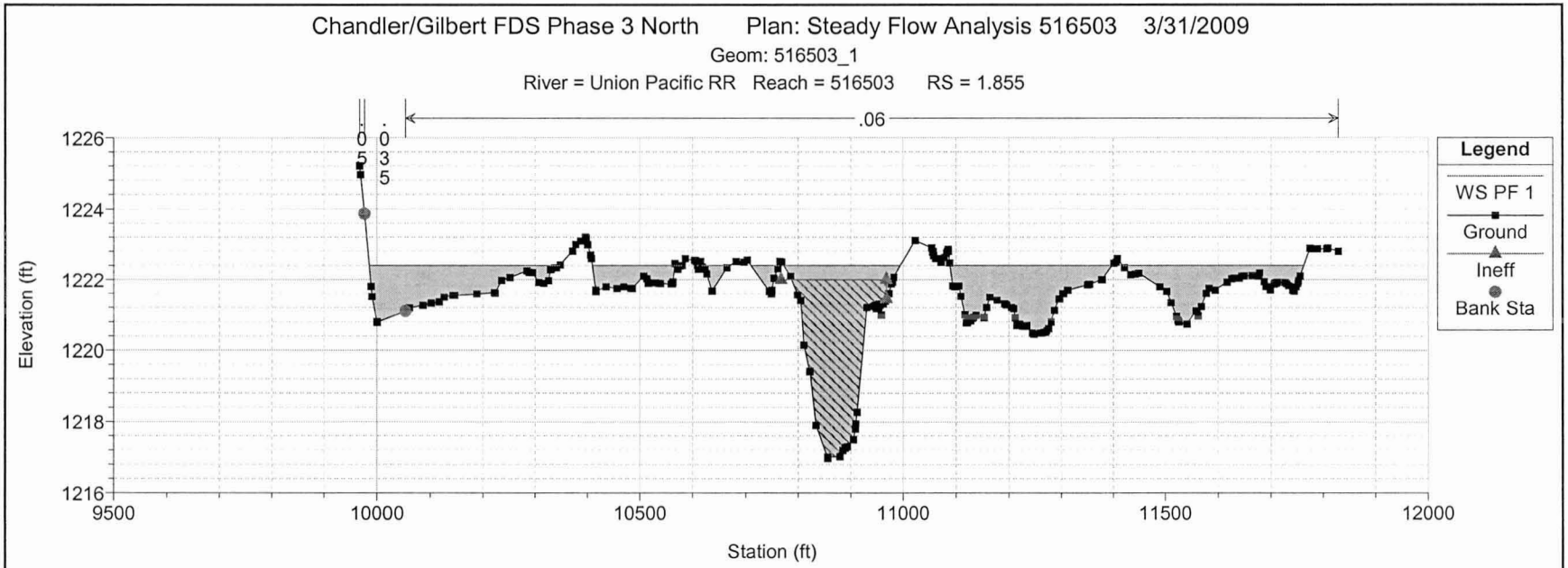
Legend
WS PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)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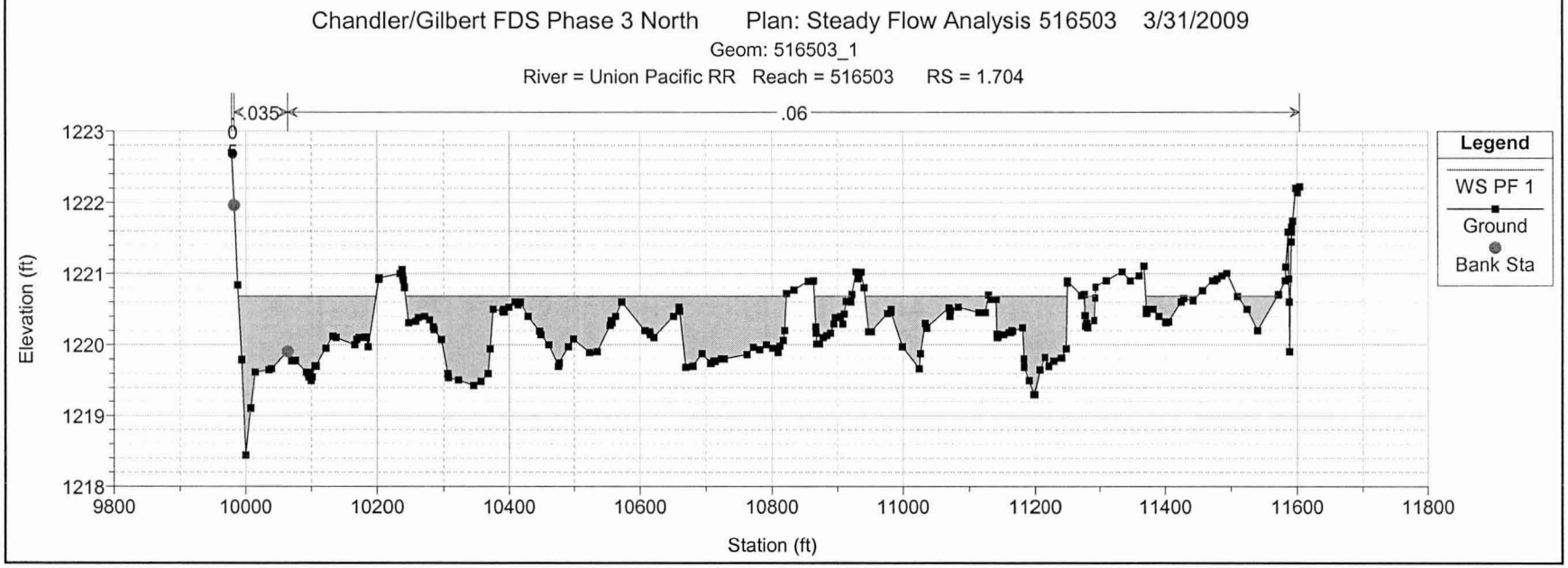
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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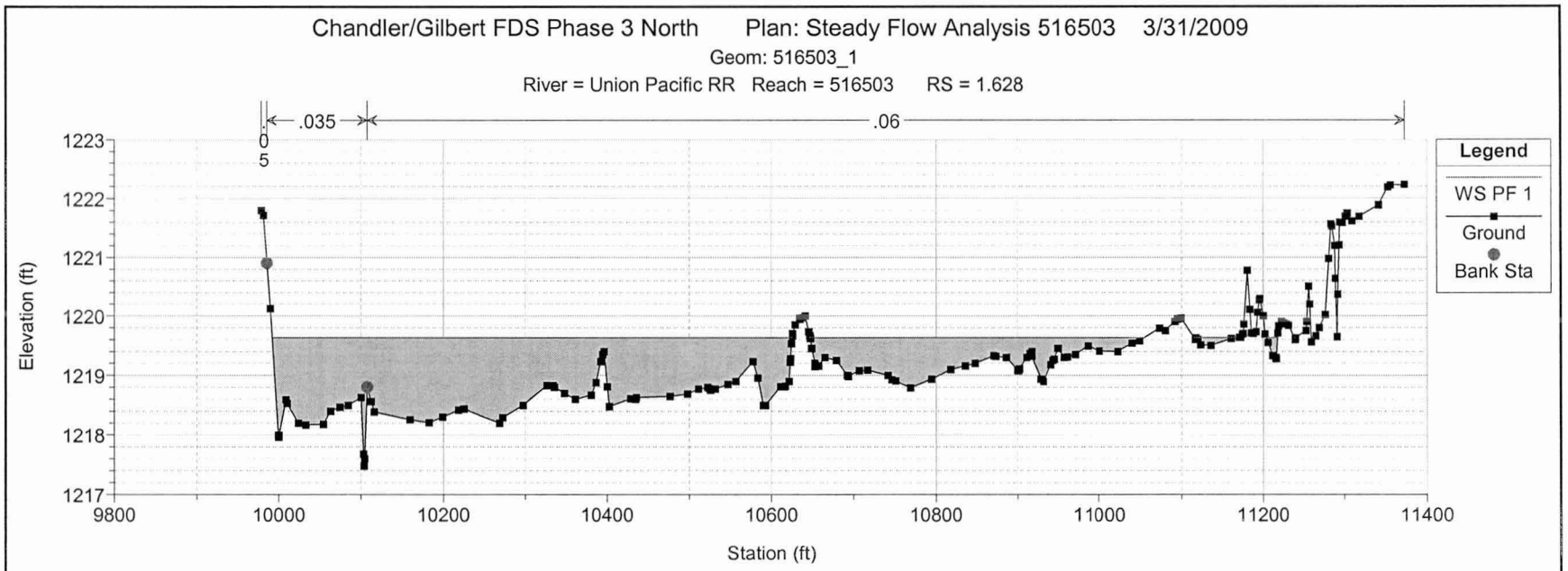
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)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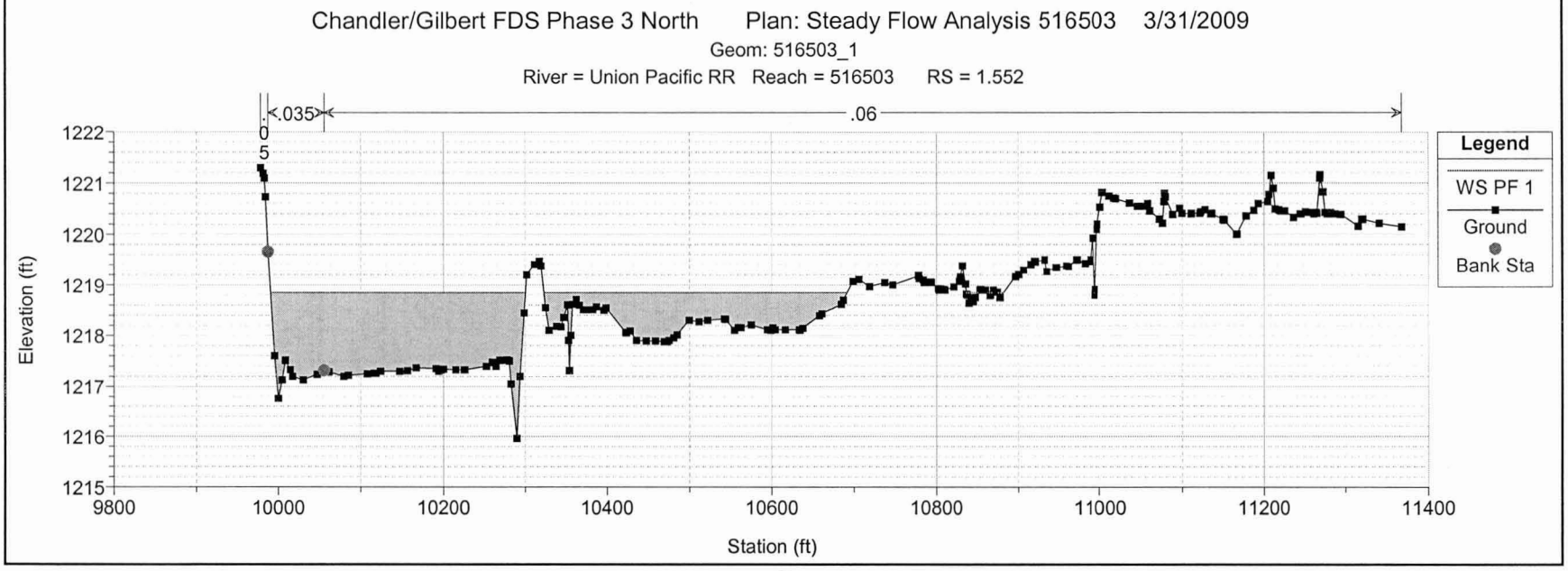
.05
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta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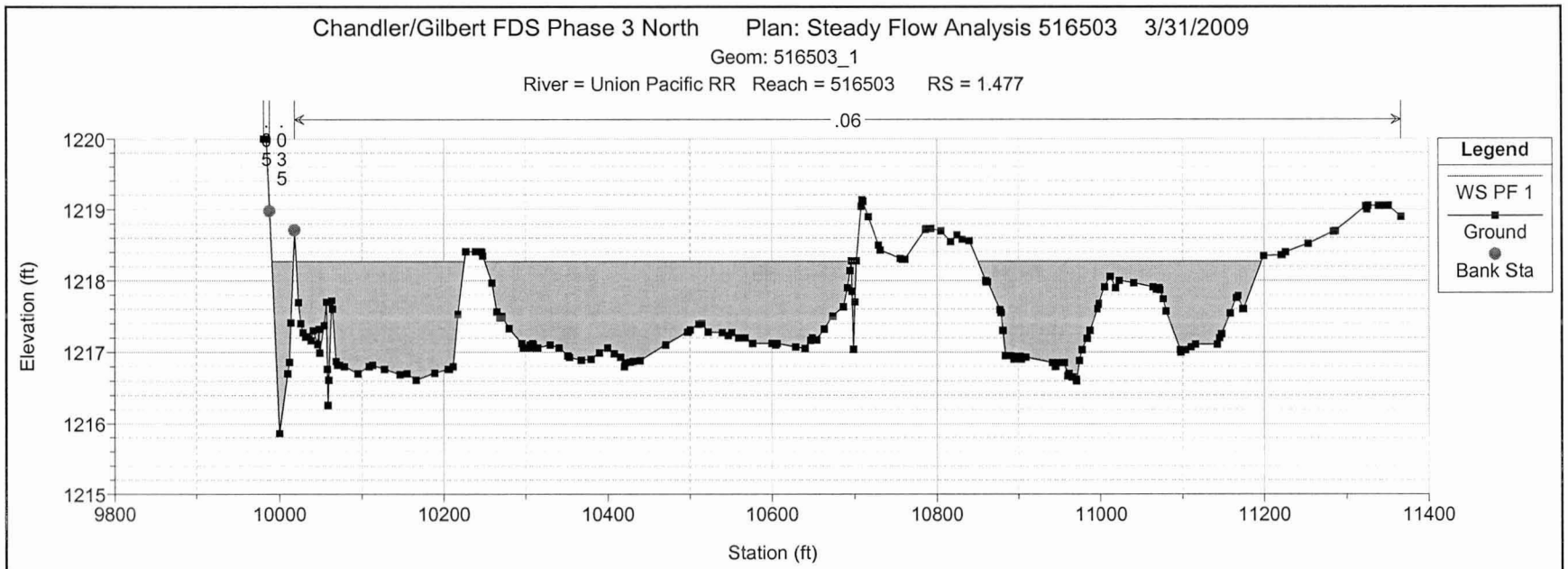
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Bank Sta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.06
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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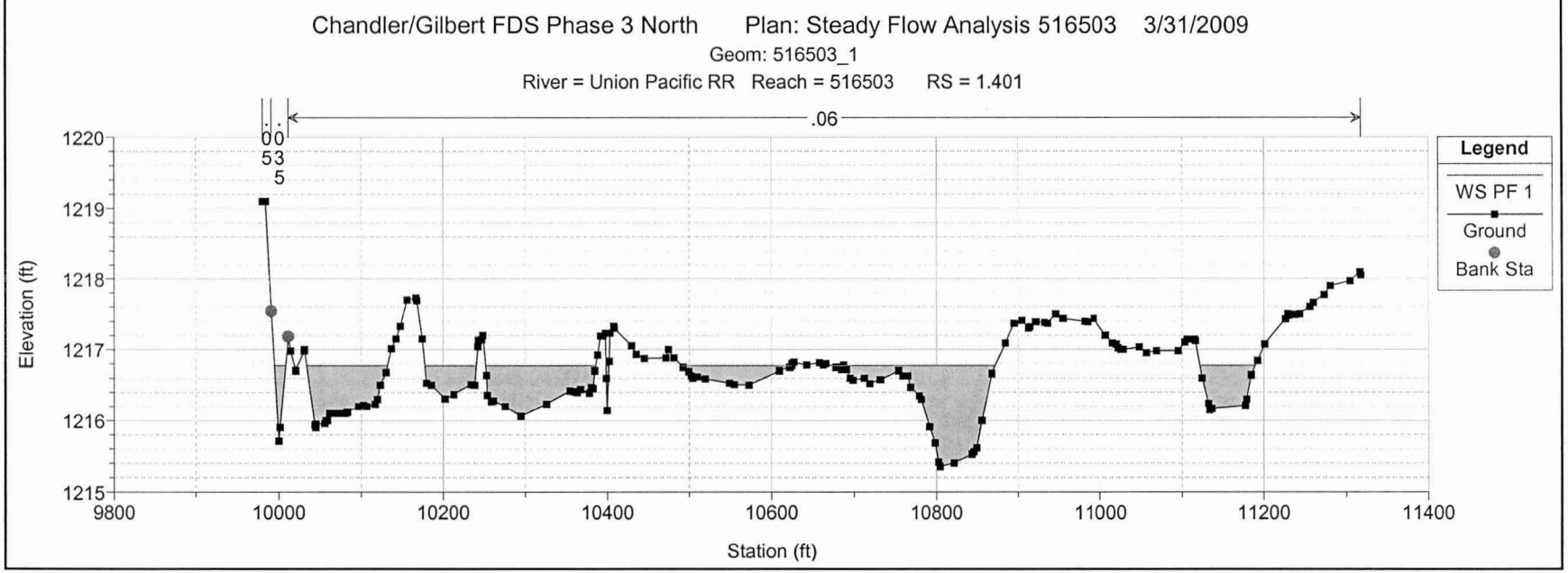
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Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
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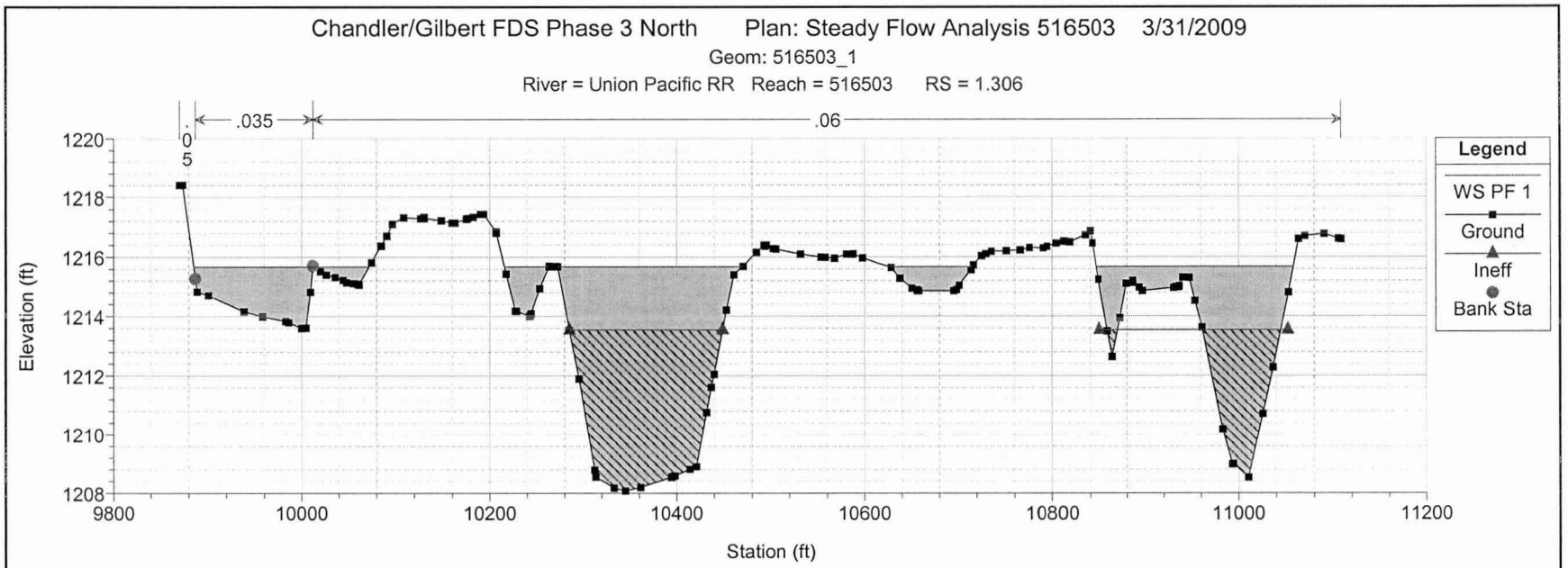
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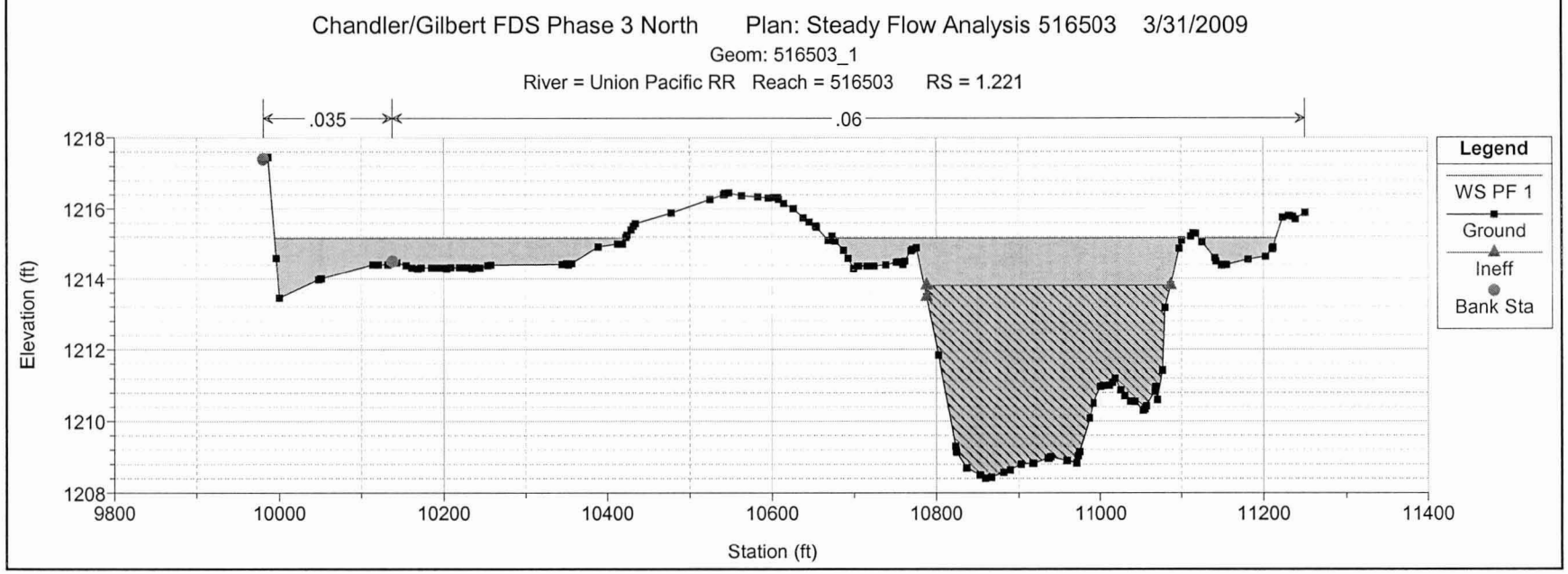
.06
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta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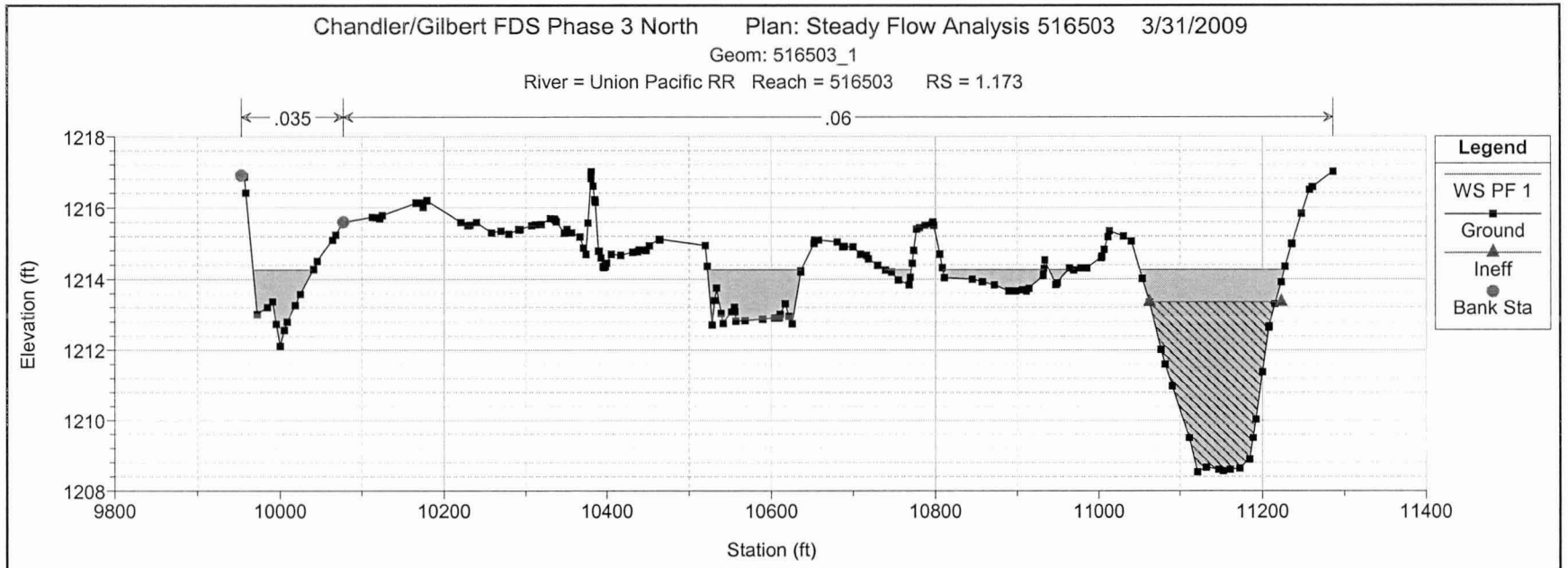
Elevation (ft)
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta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Elevation (ft)
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1216
1214
1212
1210
1208
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10000
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10600
10800
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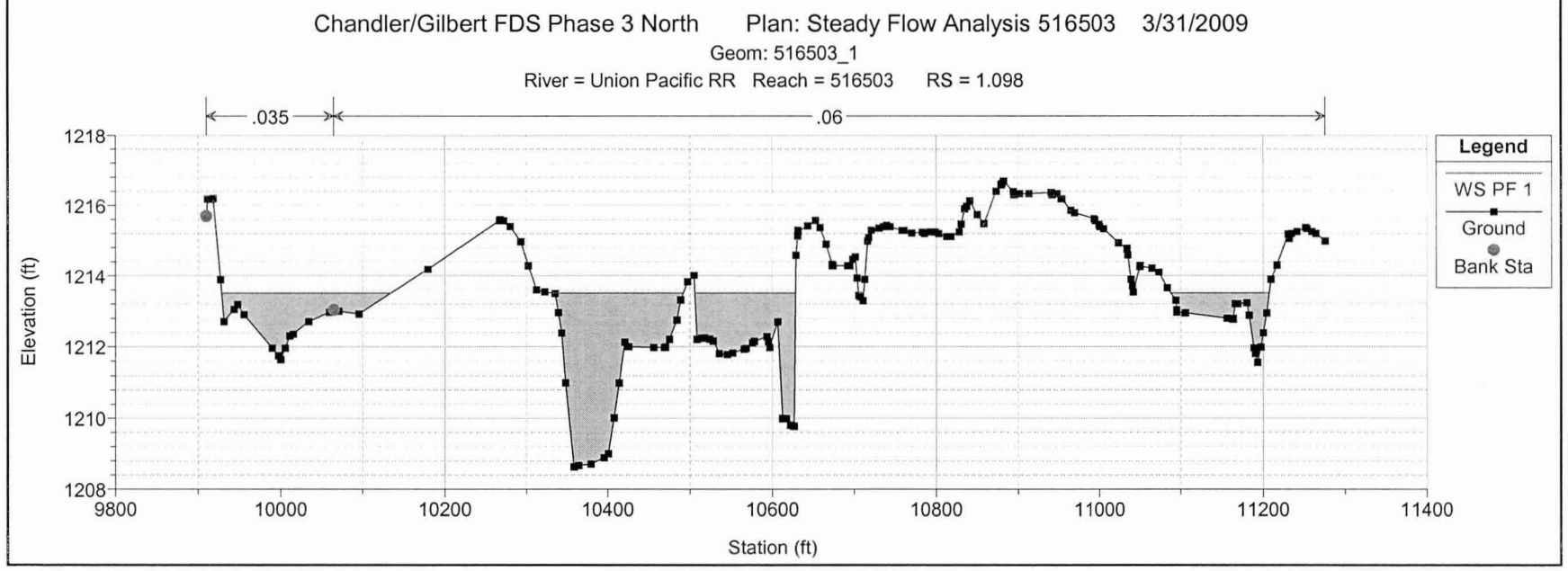
11200
11400
Station (ft)
Legend
WS PF 1
Ground
Ineff
Bank Sta


Chandler/Gilbert FDS Phase 3 North Plan: Steady Flow Analysis 516503 3/31/2009
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River = Union Pacific RR Reach = 516503 RS = 1.098
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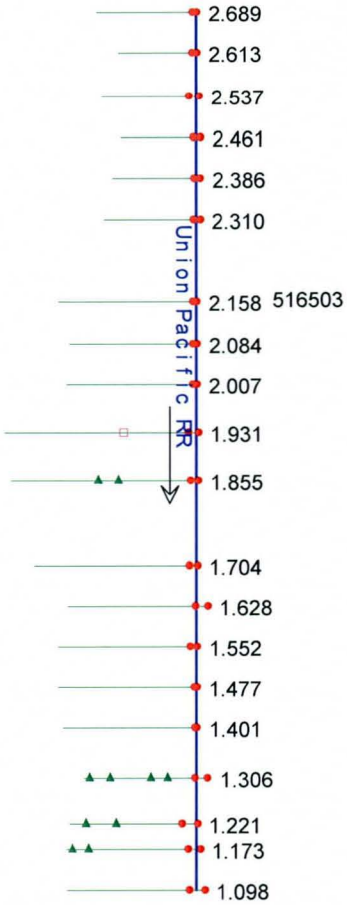
.06
Elevation (ft)
1218
1216
1214
1212
1210
1208
9800
10000
10200
10400
10600
10800
11000
11200
11400
Station (ft)
Legend
WS PF 1
Ground
Bank Sta

ES & EN.3 Expansion and Contraction Coefficients

	River	Reach	River Station	Contraction	Expansion
1	Union Pacific RR	516503	2.689	0.1	0.3
2	Union Pacific RR	516503	2.613	0.1	0.3
3	Union Pacific RR	516503	2.537	0.1	0.3
4	Union Pacific RR	516503	2.461	0.1	0.3
5	Union Pacific RR	516503	2.386	0.1	0.3
6	Union Pacific RR	516503	2.31	0.1	0.3
7	Union Pacific RR	516503	2.158	0.1	0.3
8	Union Pacific RR	516503	2.084	0.1	0.3
9	Union Pacific RR	516503	2.007	0.1	0.3
10	Union Pacific RR	516503	1.931	0.1	0.3
11	Union Pacific RR	516503	1.855	0.1	0.3
12	Union Pacific RR	516503	1.704	0.1	0.3
13	Union Pacific RR	516503	1.628	0.1	0.3
14	Union Pacific RR	516503	1.552	0.1	0.3
15	Union Pacific RR	516503	1.477	0.1	0.3
16	Union Pacific RR	516503	1.401	0.1	0.3
17	Union Pacific RR	516503	1.306	0.1	0.3
18	Union Pacific RR	516503	1.221	0.1	0.3
19	Union Pacific RR	516503	1.173	0.1	0.3
20	Union Pacific RR	516503	1.098	0.1	0.3

ES & EN.4 Analysis of Structures

ES & EN.5 Hydraulic Calculations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2.158
516503
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1.931
1.855
1.704
1.628
1.552
1.477
1.401
1.306
1.221
1.173
1.098
Union Pacific RR

HEC-RAS Plan: 516503 River: Union Pacific RR Reach: 516503 Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
516503	2.689	PF 1	663.00	1229.88	1231.87		1231.93	0.003141	3.07	436.68	468.18	0.45
516503	2.613	PF 1	663.00	1228.32	1230.57		1230.60	0.003044	2.39	529.14	662.88	0.41
516503	2.537	PF 1	663.00	1224.17	1228.88		1229.17	0.003038	4.33	159.81	105.91	0.48
516503	2.461	PF 1	663.00	1223.54	1227.82		1227.99	0.002537	3.59	263.24	238.64	0.43
516503	2.386	PF 1	663.00	1222.30	1226.77		1226.96	0.002568	3.83	252.44	208.04	0.43
516503	2.310	PF 1	663.00	1221.30	1226.42		1226.46	0.000634	2.02	603.06	385.11	0.22
516503	2.158	PF 1	663.00	1222.83	1225.63		1225.66	0.001666	2.53	676.17	952.67	0.33
516503	2.084	PF 1	1008.00	1221.57	1224.50		1224.61	0.006494	4.31	503.23	644.61	0.63
516503	2.007	PF 1	1008.00	1220.60	1223.86		1223.88	0.000806	1.72	1144.58	1059.97	0.23
516503	1.931	PF 1	1008.00	1223.20	1223.27	1222.50	1223.28	0.001080	0.15	1265.33	1502.18	0.14
516503	1.855	PF 1	1008.00	1220.78	1222.40		1222.43	0.001709	2.15	1055.39	1515.06	0.33
516503	1.704	PF 1	1008.00	1218.44	1220.68		1220.73	0.004077	2.90	765.14	1311.15	0.49
516503	1.628	PF 1	1008.00	1217.48	1219.63		1219.66	0.001844	2.13	868.43	1111.42	0.33
516503	1.552	PF 1	1008.00	1216.76	1218.85		1218.90	0.002046	2.58	707.12	706.30	0.36
516503	1.477	PF 1	1008.00	1215.86	1218.27		1218.28	0.001146	1.80	1100.83	1028.94	0.27
516503	1.401	PF 1	1008.00	1215.71	1216.77	1216.71	1216.94	0.039626	5.52	318.37	717.37	1.33
516503	1.306	PF 1	1008.00	1213.60	1215.67		1215.69	0.000782	1.54	981.85	731.96	0.22
516503	1.221	PF 1	1008.00	1213.46	1215.16		1215.19	0.001706	1.84	883.05	956.88	0.31
516503	1.173	PF 1	1008.00	1212.11	1214.26	1213.94	1214.38	0.008026	3.88	423.18	540.92	0.67
516503	1.098	PF 1	1008.00	1211.64	1213.51	1210.99	1213.53	0.000917	1.24	855.81	613.66	0.22

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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

****

PROJECT DATA
Project Title: Chandler/Gilbert FDS Phase 3 North
Project File : CGFDP3N.prj
Run Date and Time: 3/31/2009 7:59:49 AM

Project in English units

Project Description:
One conveyance analysis is included in this model.

Modeling analysis was
conducted by Project Engineering Consultants.
Updated on 03/10/2009.

The
conveyance starts at the cross section of the Union Pacific Railroad and the
Western Canal, runs NW along the railroad and ends at about a half mile west of
Cooper Road.

Geometry data used in this model is the 2-ft contour map along
the railroad. Flow data is the hydrologic modeling output (100-yr 6-hr).

Peak flows at 516RR and CP509 from the HEC-1 output are used as flow rates
at the flow changing cross sections.

****

PLAN DATA

Plan Title: Steady Flow Analysis 516503
Plan File : p:\2002\az02069 Chandler Gilbert FDS\Phase3\Phase3_fema\HEC-RAS\update2\CGFDP3N.p01

Geometry Title: 516503_1
Geometry File : p:\2002\az02069 Chandler Gilbert FDS\Phase3\Phase3_fema\HEC-RAS\update2\CGFDP3N.g02

Flow Title : Steady Flow Data for 516503_1
Flow File : p:\2002\az02069 Chandler Gilbert FDS\Phase3\Phase3_fema\HEC-RAS\update2\CGFDP3N.f02

Plan Summary Information:

Number of:	Cross Sections =	20	Multiple Openings =	0
	Culverts =	0	Inline Structures =	0
	Bridges =	0	Lateral Structures =	0

Computational Information

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

Computation Options

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


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

FLOW DATA

Flow Title: Steady Flow Data for 516503_1
Flow File : p:\2002\az02069 Chandler Gilbert FDS\Phase3\Phase3_fema\HEC-RAS\update2\CGFDP3N.f02

Flow Data (cfs)
*************************************************************
* River           Reach           RS      *            PF 1 *
* Union Pacific RR516503          2.689   *             663 *
* Union Pacific RR516503          2.084   *            1008 *
* Union Pacific RR516503          1.855   *            1008 *
*************************************************************

Boundary Conditions
*****************************************************************************************************
****
* River           Reach           Profile          *            Upstream                 Downstream
*
*****************************************************************************************************
****
* Union Pacific RR516503          PF 1             *                                Known WS =
1213.51 *
*****************************************************************************************************
****

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

GEOMETRY DATA

Geometry Title: 516503_1
Geometry File : p:\2002\az02069 Chandler Gilbert FDS\Phase3\Phase3_fema\HEC-RAS\update2\CGFDP3N.g02

CROSS SECTION


RIVER: Union Pacific RR
REACH: 516503             RS: 2.689

INPUT
Description:
Station Elevation Data    num=     109
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9978.81  1234.2 9980.16 1234.19 9983.74 1234.11 9988.34 1233.14 9988.92 1233.03
  9990.5  1232.5   10000 1229.88   10002 1230.0910016.11 1230.2110028.02 1230.53
10030.25  1230.710031.92 1230.7310045.94 1230.6110058.77 1230.6110061.84 1230.36
10080.39  1230.110081.55 1230.1110084.01 1230.3710114.02 1230.3910119.54 1230.42
10123.55  1230.910128.41 1231.1110138.33 1231.0310139.89 1231.24 10140.4 1230.67
10145.46  1231.710150.14  1231.510151.31 1231.4810200.37 1231.5110205.61 1231.41
10206.66  1231.410207.98 1231.4110227.46 1231.4510237.94 1231.4910252.85 1231.66
10256.74  1231.810270.72 1232.5110282.97 1232.6110287.77 1232.6510297.91  1232.7
10349.33  1232.610356.02 1232.5710362.89 1232.4810373.56 1232.3510380.35 1232.33
10405.22  1232.310406.67 1232.2810410.02 1232.2710410.27 1232.2810410.39 1232.27
10410.48  1232.310431.71 1232.2710463.11 1232.2310477.95 1232.2210509.98 1232.22
10515.45  1231.310518.43 1230.86   10521 1230.8210524.09 1230.8610563.66 1230.72
10567.36  1230.710571.25 1230.6910581.67 1230.6910589.77 1230.66 10592.1 1230.69
10594.96  1231.310598.87 1231.9710601.22 1232.39 10604.2 1232.3810605.14 1232.38
10620.49  1232.3 10631.2 1232.3110667.52 1232.21   10692  1232.110696.12 1232.07
10696.83  1232.110698.43 1232.0710725.19 1232.2110736.39 1232.3910744.87 1231.57
10747.61  1231.410749.04 1231.1710796.01 1230.6710801.58 1230.71 10802.2 1230.72
10802.83  1230.710803.42 1230.72 10851.3 1231.28   10852 1231.2910852.31 1231.32
 10852.5  1231.310865.49 1232.5710868.18 1232.5810888.93 1233.0810890.74 1233.11
10899.78  1233.110914.67 1233.11 10918.9 1233.11 10919.8 1233.1110929.15 1232.98
10929.37    123310934.32 1232.8910943.05 1232.7810950.87 1232.9310953.95 1232.93
10960.22  1232.910964.14 1233.11   10974 1233.2610981.08 1233.57
```

```
Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9978.81     .05  9990.5    .03510031.92     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9990.510031.92           400.04   407.6  431.68             .1        .3

CROSS SECTION OUTPUT  Profile #PF 1
**********************************************************************************************
* E.G. Elev (ft)          * 1231.93  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.06  * Wt. n-Val.              *          *   0.035  *   0.060  *
* W.S. Elev (ft)          * 1231.87  * Reach Len. (ft)         *  400.04  *  407.60  *  431.68  *
* Crit W.S. (ft)          *         * Flow Area (sq ft)       *          *   57.85  *  378.82  *
* E.G. Slope (ft/ft)      *0.003141  * Area (sq ft)            *          *   57.85  *  378.82  *
* Q Total (cfs)           *  663.00  * Flow (cfs)              *          *  177.73  *  485.27  *
* Top Width (ft)          *  468.18  * Top Width (ft)          *          *   39.14  *  429.04  *
* Vel Total (ft/s)        *    1.52  * Avg. Vel. (ft/s)        *          *    3.07  *    1.28  *
* Max Chl Dpth (ft)       *    1.99  * Hydr. Depth (ft)        *          *    1.48  *    0.88  *
* Conv. Total (cfs)       * 11830.7  * Conv. (cfs)             *          *  3171.5  *  8659.2  *
* Length Wtd. (ft)        *  426.72  * Wetted Per. (ft)        *          *   39.43  *  429.76  *
* Min Ch El (ft)          * 1229.88  * Shear (lb/sq ft)        *          *    0.29  *    0.17  *
* Alpha                   *    1.62  * Stream Power (lb/ft s)  *          *    0.88  *    0.22  *
* Frctn Loss (ft)         *    1.32  * Cum Volume (acre-ft)    *    0.00  *   18.99  *  157.48  *
* C & E Loss (ft)         *    0.01  * Cum SA (acres)          *    0.02  *   12.39  *  154.00  *
**********************************************************************************************

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.

  Profile #PF 1
**********************************************************************************************
***************
*           * Pos       * Left Sta  * Right Sta *     Flow *     Area *     W.P. *  Percent *
Hydr * Velocity *
*           *           * (ft)      * (ft)      *    (cfs) *  (sq ft) *     (ft) *     Conv
*Depth(ft) *   (ft/s) *
* 1         * Chan      * 9990.50   * 10000.86  *    21.52 *     8.85 *     8.35 *     3.25 *
1.10 *     2.43 *
* 2         * Chan      * 10000.86  * 10011.21  *    61.67 *    18.15 *    10.36 *     9.30 *
1.75 *     3.40 *
* 3         * Chan      * 10011.21  * 10021.56  *    54.78 *    16.90 *    10.36 *     8.26 *
1.63 *     3.24 *
* 4         * Chan      * 10021.56  * 10031.92  *    39.76 *    13.95 *    10.36 *     6.00 *
1.35 *     2.85 *
* 5         * ROB       * 10031.92  * 10269.21  *   234.54 *   189.95 *   226.66 *    35.38 *
0.84 *     1.23 *
* 6         * ROB       * 10269.21  * 10506.50  *          *          *          *          *
*          *
* 7         * ROB       * 10506.50  * 10743.79  *   124.71 *    89.25 *    88.48 *    18.81 *
1.01 *     1.40 *
* 8         * ROB       * 10743.79  * 10981.08  *   126.02 *    99.62 *   114.62 *    19.01 *
0.87 *     1.27 *
**********************************************************************************************
***************

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: Union Pacific RR
REACH: 516503             RS: 2.613

INPUT
Description:
Station Elevation Data    num=      68
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
**********************************************************************************
 9978.18  1233.4 9980.45 1233.36 9983.13  1233.3 9987.92 1231.75 9988.63 1231.56
 9990.63  1230.9   10000 1228.3210012.27 1229.5810014.09 1229.7910017.19 1229.82
```

```
10023.26  1229.910027.85 1230.2410033.23 1230.9510036.01 1231.5610041.18 1231.32
10048.71    123110058.48 1228.4510060.13    122810075.71 1227.7210078.09 1227.66
10079.19  1227.810100.07 1230.3610106.21 1230.2410120.74 1229.8810137.84 1229.88
10140.56  1229.910147.41 1229.9210189.55 1230.1810229.88 1230.2910259.03 1230.38
10288.05  1230.210319.21 1230.0710348.77 1230.0610359.07 1229.9110390.02 1229.89
10433.84  1229.710438.96 1229.66 10446.6 1229.6210457.17 1229.6510503.22  1229.6
10528.67  1229.610531.62  1229.610535.37  1229.610573.71  1229.610578.13  1229.6
10578.74  1229.610592.17 1229.5510614.87 1229.4210631.48 1229.6110642.86 1229.76
10647.92  1229.8 10671.3 1229.7610676.37 1230.9510679.31  1231.710681.01 1231.68
10687.71  1231.6 10702.6 1231.5610714.56  1231.610714.62  1231.610714.68  1231.6
10716.54  1231.610717.46  1231.610718.57  1231.610719.78  1231.610720.98  1231.6
10722.08  1231.610722.99 1231.5910768.78 1231.52

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9978.18     .05 9987.92    .03510036.01     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9987.9210036.01           400.02  428.92  508.51              .1       .3

CROSS SECTION OUTPUT  Profile #PF 1
*********************************************************************************************
* E.G. Elev (ft)         * 1230.60  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.03  * Wt. n-Val.              *          *   0.035  *   0.060  *
* W.S. Elev (ft)         * 1230.57  * Reach Len. (ft)        *  400.02  *  428.92  *  508.51  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      *          *   39.99  *  489.15  *
* E.G. Slope (ft/ft)     *0.003044  * Area (sq ft)           *          *   39.99  *  489.15  *
* Q Total (cfs)          *  663.00  * Flow (cfs)              *          *   95.40  *  567.60  *
* Top Width (ft)         *  662.88  * Top Width (ft)          *          *   38.50  *  624.38  *
* Vel Total (ft/s)       *    1.25  * Avg. Vel. (ft/s)        *          *    2.39  *    1.16  *
* Max Chl Dpth (ft)      *    2.91  * Hydr. Depth (ft)        *          *    1.04  *    0.78  *
* Conv. Total (cfs)      * 12017.0  * Conv. (cfs)             *          *  1729.1  * 10287.9  *
* Length Wtd. (ft)       *  463.17  * Wetted Per. (ft)        *          *   38.92  *  624.98  *
* Min Ch El (ft)         * 1228.32  * Shear (lb/sq ft)        *          *    0.20  *    0.15  *
* Alpha                  *    1.26  * Stream Power (lb/ft s)  *          *    0.47  *    0.17  *
* Frctn Loss (ft)        *    1.41  * Cum Volume (acre-ft)    *    0.00  *   18.53  *  153.18  *
* C & E Loss (ft)        *    0.03  * Cum SA (acres)          *    0.02  *   12.03  *  148.78  *
*********************************************************************************************

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.

  Profile #PF 1
*********************************************************************************************
***************
*           * Pos       * Left Sta  * Right Sta *     Flow *     Area *     W.P. *  Percent *
Hydr * Velocity *
*           *           * (ft)      * (ft)      *    (cfs) *  (sq ft) *     (ft) *     Conv
*Depth(ft) *   (ft/s) *
* 1         * Chan      * 9987.92   * 9999.94   *    20.01 *     9.05 *     8.41 *     3.02 *
1.12 *     2.21 *
* 2         * Chan      * 9999.94   * 10011.96  *    57.33 *    19.68 *    12.09 *     8.65 *
1.64 *     2.91 *
* 3         * Chan      * 10011.96  * 10023.99  *    15.73 *     9.04 *    12.04 *     2.37 *
0.75 *     1.74 *
* 4         * Chan      * 10023.99  * 10036.01  *     2.32 *     2.23 *     6.38 *     0.35 *
0.35 *     1.04 *
* 5         * ROB       * 10036.01  * 10219.20  *   191.15 *   154.96 *   169.34 *    28.83 *
0.92 *     1.23 *
* 6         * ROB       * 10219.20  * 10402.39  *    62.47 *    81.74 *   183.19 *     9.42 *
0.45 *     0.76 *
* 7         * ROB       * 10402.39  * 10585.59  *   211.45 *   169.90 *   183.19 *    31.89 *
0.93 *     1.24 *
* 8         * ROB       * 10585.59  * 10768.78  *   102.54 *    82.54 *    89.25 *    15.47 *
0.93 *     1.24 *
*********************************************************************************************
***************

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: Union Pacific RR
REACH: 516503 RS: 2.537

INPUT
Description:
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9954.36	1232.8	9954.77	1232.84	9957.39	1233.28	9966.44	1229.91	9971.63	1228.58
9973.51	1228	9980.33	1227.83	9987.46	1227.68	9998.32	1224.61	10000	1224.17
10001.09	1224.2	10013.57	1224.29	10016.46	1225.21	10030.61	1229.06	10053.47	1229.73
10057.1	1229.8	10061.04	1229.87	10067.6	1229.95	10095.26	1230.14	10116.15	1230.34
10141.19	1230.4	10145.02	1230.46	10164.15	1230.23	10168.11	1230.22	10172.38	1230.21
10200.89	1230.3	10201.12	1230.34	10201.46	1230.35	10202.93	1230.35	10215.83	1228.95
10217.01	1228.8	10219.59	1228.5	10260.95	1229.93	10260.97	1229.93	10275.27	1228.67
10318.56	1229.1	10322.62	1229.42	10325.86	1229.75	10337.32	1228.58	10339.23	1228.41
10349.6	1229.5	10351.92	1229.75	10357.67	1229.73	10361.85	1229.87	10367.91	1229.96
10368.59	123	10377.54	1229.98	10378.9	1229.98	10406.24	1229.88	10420.8	1230.34
10422.35	1230.3	10430.6	1230.6	10440.77	1230.91	10446.13	1231.05	10447.9	1231.08
10590.67	1231.1	10597.07	1230.99	10617.41	1231.04	10631.75	1231.17	10674.38	1231.12
10686.29	1231.1	10689.31	1231.18	10695.54	1231.09	10703.04	1230.89	10736	1230.93
10748.82	1231.1	10764.86	1231.08	10771.49	1230.85	10775.13	1230.66	10784.54	1230.63
10789.86	1230.6	10809.48	1230.38	10809.8	1230.38	10826.58	1230.09	10828.55	1230.06
10831.05	123	10834.21	1229.96	10838.48	1229.73	10850.62	1229.07	10852.41	1229.14
10861.1	1229.9	10861.92	1229.95	10864.12	1229.71	10866.55	1229.45	10870.28	1229.04
10870.78	1229.1	10871.93	1229.1	10872.95	1229.13	10873.87	1229.16	10874.7	1229.19
10890.81	1229.6	10896.2	1229.56	10901.45	1229.59	10913.91	1229.54	10918.08	1229.7
10920.32	1229.7	10921.16	1229.73	10926.15	1229.65	10930.64	1229.97		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9954.36	.05	9966.44	.035	10067.6	.06

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9966.44	10067.6	400.04	408.37	434.58	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1229.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.29	Wt. n-Val.		0.035	0.060
W.S. Elev (ft)	1228.88	Reach Len. (ft)	400.04	408.37	434.58
Crit W.S. (ft)		Flow Area (sq ft)		152.57	7.24
E.G. Slope (ft/ft)	0.003038	Area (sq ft)		152.57	7.24
Q Total (cfs)	663.00	Flow (cfs)		659.95	3.05
Top Width (ft)	105.91	Top Width (ft)		59.46	46.45
Vel Total (ft/s)	4.15	Avg. Vel. (ft/s)		4.33	0.42
Max Chl Dpth (ft)	4.71	Hydr. Depth (ft)		2.57	0.16
Conv. Total (cfs)	12029.0	Conv. (cfs)		11973.6	55.4
Length Wtd. (ft)	410.47	Wetted Per. (ft)		60.71	46.54
Min Ch El (ft)	1224.17	Shear (lb/sq ft)		0.48	0.03
Alpha	1.08	Stream Power (lb/ft s)		2.06	0.01
Frctn Loss (ft)	1.14	Cum Volume (acre-ft)	0.00	17.58	150.28
C & E Loss (ft)	0.04	Cum SA (acres)	0.02	11.54	144.87

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.

Profile #PF 1

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	Chan	9966.44	9991.73	49.70	23.51	21.55	7.50	1.11	2.11
2	Chan	9991.73	10017.02	545.88	106.36	25.77	82.33	4.21	5.13

```
* 3          * Chan       * 10017.02  * 10042.31  *    64.36 *    22.70 *    13.39 *     9.71 *
1.76 *     2.84 *
* 4          * Chan       * 10042.31  * 10067.60  *          *          *          *          *
*          *
* 5          * ROB        * 10067.60  * 10283.36  *     1.76 *     4.24 *    24.54 *     0.27 *
0.17 *     0.42 *
* 6          * ROB        * 10283.36  * 10499.12  *     1.29 *     2.99 *    21.99 *     0.19 *
0.14 *     0.43 *
*****************************************************************************************************
***************

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: Union Pacific RR
REACH: 516503             RS: 2.461

INPUT
Description:
Station Elevation Data    num=     101
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9983.05  1231.4 9984.11 1231.58 9986.46 1231.81  9989.7 1230.46 9995.27 1228.25
   10000  1226.310010.07 1226.5410016.82 1226.6710022.41 1225.0810025.83 1224.06
10026.61  1223.810031.31 1223.7510042.47 1223.5410049.91 1225.6810054.55 1226.62
10057.86  1226.810066.67 1227.7810068.19 1227.7910080.62 1227.8610086.61 1227.89
10088.75  1227.910099.81 1227.9610111.71 1228.0610121.32 1228.0410128.47  1228.1
10149.13  1228.110155.16 1228.1910160.53 1228.3210164.84 1228.3110180.48 1228.08
 10183.4  1228.210201.69 1227.9410207.29 1227.9110208.71 1227.6610211.65 1227.85
10224.13  1226.910232.63 1227.0810238.66 1227.1810243.22 1227.2510246.83  1227.3
10249.79  1227.3 10252.3 1227.3510254.48 1227.36 10256.4 1227.3810275.04 1227.21
10275.84  1227.210276.71 1227.1710279.53 1227.1510282.85 1227.1310286.89 1227.09
10291.99    122710298.77 1226.9110308.39 1226.7610323.44 1226.5110323.93  1226.5
10324.17  1226.510332.31 1227.4610341.84 1227.1310348.59 1227.1210357.56 1227.35
10381.98  1228.310383.17 1228.24 10393.4 1228.3810396.13 1228.4210399.51 1228.42
10408.32  1228.610408.46 1228.59 10408.6 1228.5910459.75  1229.410505.86 1229.94
10514.07  1229.9 10523.2 1229.9110525.41 1229.9110529.63 1229.8710554.66 1229.89
10580.27  1229.310583.77 1229.2310587.95 1229.1410591.92  1229.110648.29 1228.58
10652.92  1228.710657.46 1228.8810667.15 1228.95   10670 1228.9910677.71 1228.94
10695.64  1229.210698.43 1229.2210698.99 1229.23 10715.8 1229.61 10716.7 1229.68
10722.46  1229.810730.37 1228.0210735.52  1228.210737.29  1228.710750.01  1228.9
 10750.3  1228.910750.62 1228.86 10751.8 1228.7110753.06 1228.8410775.23  1229.3
 10784.1  1229.2

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9983.05     .05 9995.27    .03510066.67     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9995.2710066.67           400.03  402.75   409.8              .1       .3

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 1227.99  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.17  * Wt. n-Val.              *          *   0.035  *   0.060  *
* W.S. Elev (ft)         * 1227.82  * Reach Len. (ft)         *  400.03  *  402.75  *  409.80  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)       *          *  155.83  *  107.41  *
* E.G. Slope (ft/ft)     *0.002537  * Area (sq ft)            *          *  155.83  *  107.41  *
* Q Total (cfs)          *  663.00  * Flow (cfs)              *          *  559.93  *  103.07  *
* Top Width (ft)         *  238.64  * Top Width (ft)          *          *   70.36  *  168.28  *
* Vel Total (ft/s)       *    2.52  * Avg. Vel. (ft/s)        *          *    3.59  *    0.96  *
* Max Chl Dpth (ft)      *    4.28  * Hydr. Depth (ft)        *          *    2.21  *    0.64  *
* Conv. Total (cfs)      * 13163.9  * Conv. (cfs)             *          * 11117.5  *  2046.4  *
* Length Wtd. (ft)       *  403.94  * Wetted Per. (ft)        *          *   71.54  *  168.42  *
* Min Ch El (ft)         * 1223.54  * Shear (lb/sq ft)        *          *    0.34  *    0.10  *
* Alpha                  *    1.74  * Stream Power (lb/ft s)   *          *    1.24  *    0.10  *
* Frctn Loss (ft)        *    1.03  * Cum Volume (acre-ft)    *    0.00  *   16.14  *  149.71  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)          *    0.02  *   10.94  *  143.80  *
*****************************************************************************************
```

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.

Profile #PF 1

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	Chan	9995.27	10013.12	43.87	20.75	17.12	6.62	1.23	2.11
2	Chan	10013.12	10030.97	164.59	47.07	18.26	24.83	2.64	3.50
3	Chan	10030.97	10048.82	316.08	69.39	18.11	47.67	3.89	4.56
4	Chan	10048.82	10066.67	35.39	18.63	18.05	5.34	1.04	1.90
5	ROB	10066.67	10246.03	16.98	21.57	44.67	2.56	0.48	0.79
6	ROB	10246.03	10425.38	86.08	85.84	123.74	12.98	0.69	1.00

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: Union Pacific RR
REACH: 516503 RS: 2.386

INPUT
Description:
Station Elevation Data num= 87

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9943.67	1230.5	9946.37	1230.64	9947.24	1230.82	9958.43	1226.83	9960.32	1225.93
9967.4	1225.8	9976.25	1225.73	9985.82	1223.13	9987.46	1222.65	9995.04	1222.43
10001	1222.3	10003.11	1222.84	10009.77	1224.33	10013.31	1225.68	10017.08	1226.87
10022.65	1227	10047.47	1227.39	10081.28	1227.79	10088.48	1227.88	10103.49	1228.01
10133.35	1228.11	10158.96	1227.71	10197.94	1226.87	10204.15	1225.88	10206.41	1225.52
10209.29	1225.51	10228.65	1225.45	10241.1	1225.63	10245.72	1225.73	10250.66	1226.72
10251.18	1226.8	10252.9	1226.85	10255.06	1226.88	10270.37	1227.11	10276.79	1227.18
10301.46	1227.71	10303.61	1227.77	10314.53	1227.79	10341.73	1227.89	10346.39	1227.79
10353.01	1227.71	10387.43	1227.44	10403.28	1227.46	10429.8	1227.51	10434.47	1227.59
10444.06	1227.51	10447.87	1227.32	10449.59	1227.23	10464.97	1226.18	10476.25	1226.34
10497.26	1227	10514.25	1225.92	10531.05	1226.08	10533.92	1226.2	10540.1	1226.42
10545.03	1226.71	10548.01	1226.61	10556.77	1226.86	10579.19	1227.38	10587.1	1227.49
10619.78	1227.71	10623.61	1227.76	10660.13	1227.83	10664.46	1227.84	10688.95	1227.7
10712.01	1227.61	10720.86	1227.46	10727.33	1227.45	10734.58	1227.42	10735.41	1227.53
10735.58	1227.6	10735.9	1227.63	10740.77	1228.8	10742.97	1229.48	10744.18	1229.55
10746.01	1227	10748.83	1227.71	10750.33	1227.39	10750.99	1227.42	10759.57	1227.6
10776.19	1227	10780.92	1228.11	10784.58	1228.12	10808.14	1228.29	10821.32	1228.47
10822.43	1228.21	10828.85	1228.1						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9943.67	.05	9958.43	.035	10017.08	.06

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9958.43	10017.08	400.03	402.37	408.37	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1226.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.035	0.060
W.S. Elev (ft)	1226.77	Reach Len. (ft)	400.03	402.37	408.37

* Crit W.S. (ft)	*	* Flow Area (sq ft)	*	*	141.43 *	111.01 *
* E.G. Slope (ft/ft)	*0.002568	* Area (sq ft)	*	*	141.43 *	111.01 *
* Q Total (cfs)	* 663.00	* Flow (cfs)	*	*	542.03 *	120.97 *
* Top Width (ft)	* 208.04	* Top Width (ft)	*	*	58.22 *	149.82 *
* Vel Total (ft/s)	* 2.63	* Avg. Vel. (ft/s)	*	*	3.83 *	1.09 *
* Max Chl Dpth (ft)	* 4.47	* Hydr. Depth (ft)	*	*	2.43 *	0.74 *
* Conv. Total (cfs)	* 13083.6	* Conv. (cfs)	*	*	10696.3 *	2387.3 *
* Length Wtd. (ft)	* 404.45	* Wetted Per. (ft)	*	*	59.48 *	150.07 *
* Min Ch El (ft)	* 1222.30	* Shear (lb/sq ft)	*	*	0.38 *	0.12 *
* Alpha	* 1.77	* Stream Power (lb/ft s)	*	*	1.46 *	0.13 *
* Frctn Loss (ft)	* 0.46	* Cum Volume (acre-ft)	* 0.00	*	14.76 *	148.69 *
* C & E Loss (ft)	* 0.05	* Cum SA (acres)	* 0.02	*	10.34 *	142.30 *

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.

Profile #PF 1

*	* Pos	* Left Sta	* Right Sta	* Flow	* Area	* W.P.	* Percent	* Hydr	* Velocity
*	*	* (ft)	* (ft)	* (cfs)	* (sq ft)	* (ft)	* Conv	*Depth(ft)	* (ft/s) *
* 1	* Chan	* 9958.43	* 9973.09	* 21.96	* 12.82	* 14.73	* 3.31	* 0.88	* 1.71 *
* 2	* Chan	* 9973.09	* 9987.76	* 105.77	* 33.24	* 15.08	* 15.95	* 2.27	* 3.18 *
* 3	* Chan	* 9987.76	* 10002.42	* 313.73	* 63.21	* 14.71	* 47.32	* 4.31	* 4.96 *
* 4	* Chan	* 10002.42	* 10017.08	* 100.57	* 32.15	* 14.96	* 15.17	* 2.24	* 3.13 *
* 5	* ROB	* 10017.08	* 10220.02	* 28.71	* 22.35	* 21.57	* 4.33	* 1.04	* 1.28 *
* 6	* ROB	* 10220.02	* 10422.96	* 46.18	* 34.40	* 31.08	* 6.96	* 1.11	* 1.34 *
* 7	* ROB	* 10422.96	* 10625.91	* 46.08	* 54.26	* 97.42	* 6.95	* 0.56	* 0.85 *

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: Union Pacific RR
REACH: 516503 RS: 2.310

INPUT
Description:
Station Elevation Data num= 123

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9948.56	1229.6	9952.11	1230	9952.28	1230.02	9953.88	1229.46	9965.02	1225.04
9976.66	1224.7	9983.93	1224.62	9990.81	1222.86	9991.25	1222.75	9992.09	1222.52
10000	1221.3	10001.45	1221.56	10010.98	1222.85	10012.16	1223.01	10012.38	1223.09
10022.5	1226.6	10030.76	1226.58	10038.49	1226.68	10041.34	1226.46	10042.3	1226.33
10109.54	1226.1	10143.37	1226	10152.73	1225.45	10159.64	1225.11	10164.47	1224.8
10167.37	1224.3	10168.54	1224.11	10172.25	1223.91	10174.94	1223.72	10179.72	1223.78
10185.96	1223.91	10189.34	1223.89	10191.47	1223.92	10192.91	1223.93	10193.99	1223.94
10194.83	1224	10195.52	1223.96	10196.1	1223.96	10196.59	1223.97	10201.68	1224.08
10222.63	1224.4	10228.02	1224.37	10231.37	1224.37	10245.85	1224.38	10257.06	1224.35
10257.28	1224.3	10257.53	1224.35	10257.82	1224.35	10258.14	1224.35	10258.52	1224.35
10258.95	1224.3	10262.31	1224.34	10262.86	1224.34	10263.49	1224.34	10264.24	1224.34
10265.12	1224.3	10266.18	1224.35	10267.46	1224.35	10269.04	1224.35	10271.01	1224.35
10273.54	1224.4	10293.66	1224.36	10297.64	1224.52	10298.62	1224.54	10299.48	1224.64
10309.19	1225.2	10313.59	1224.41	10318.44	1223.65	10321.6	1223.7	10327.29	1224.04
10334.31	1223.9	10336.01	1223.65	10339.93	1224.29	10343.7	1225.28	10345.67	1225.61
10348.22	1226	10350.94	1226.24	10366.91	1226.43	10374.98	1226.53	10378.62	1226.67
10380.82	1226.7	10384.83	1226.78	10400.37	1226.63	10405.38	1226.77	10407.61	1226.75

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10411.79  1226.810418.32 1226.7710428.65 1226.7510431.08 1226.6710437.77 1226.67
10442.81  1226.810455.94 1226.76 10515.5 1227.6710517.09 1227.6810526.83 1227.74
 10534.3  1227.710552.26 1227.5410556.41 1227.5210567.04 1227.3310573.34 1227.01
10586.78  1226.610594.86  1226.710606.71 1226.7910611.98 1226.8310621.75 1226.83
 10654.8  1227.410662.04 1227.1210671.87 1227.1710703.26 1227.3610757.32 1227.55
10763.93  1227.8 10765.4 1227.7910771.25 1227.79 10789.3 1228.6510812.81 1228.95
10830.21  1228.910860.31  1228.410872.56  1228.110893.66 1227.5610895.43 1227.45
10900.53  1227.510904.38 1227.4310910.98 1228.27

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9948.56     .05 9953.88    .035 10022.5     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9953.88 10022.5           800.05  808.25  830.03             .1       .3

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 1226.46  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.04  * Wt. n-Val.              *          *   0.035  *   0.060  *
* W.S. Elev (ft)         * 1226.42  * Reach Len. (ft)         *  800.05  *  808.25  *  830.03  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)       *          *  160.52  *  442.54  *
* E.G. Slope (ft/ft)     *0.000634  * Area (sq ft)            *          *  160.52  *  442.54  *
* Q Total (cfs)          *  663.00  * Flow (cfs)              *          *  324.23  *  338.77  *
* Top Width (ft)         *  385.11  * Top Width (ft)          *          *   60.45  *  324.66  *
* Vel Total (ft/s)       *    1.10  * Avg. Vel. (ft/s)        *          *    2.02  *    0.77  *
* Max Chl Dpth (ft)      *    5.12  * Hydr. Depth (ft)        *          *    2.66  *    1.36  *
* Conv. Total (cfs)      * 26337.9  * Conv. (cfs)             *          * 12880.2  * 13457.7  *
* Length Wtd. (ft)       *  822.02  * Wetted Per. (ft)        *          *   61.78  *  325.23  *
* Min Ch El (ft)         * 1221.30  * Shear (lb/sq ft)        *          *    0.10  *    0.05  *
* Alpha                  *    1.90  * Stream Power (lb/ft s)  *          *    0.21  *    0.04  *
* Frctn Loss (ft)        *    0.80  * Cum Volume (acre-ft)    *    0.00  *   13.37  *  146.09  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)          *    0.02  *    9.79  *  140.08  *
*****************************************************************************************

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.

  Profile #PF 1
*****************************************************************************************
***************
*           * Pos       * Left Sta  * Right Sta *     Flow *     Area *     W.P. *  Percent *
Hydr * Velocity *
*           *           * (ft)      * (ft)      *    (cfs) *  (sq ft) *     (ft) *     Conv
*Depth(ft) *   (ft/s) *
* 1         * Chan      * 9953.88   * 9971.04   *    11.99 *    11.25 *     9.77 *     1.81 *
1.18 *     1.07 *
* 2         * Chan      * 9971.04   * 9988.19   *    46.85 *    32.04 *    17.29 *     7.07 *
1.87 *     1.46 *
* 3         * Chan      * 9988.19   * 10005.34  *   188.38 *    74.07 *    17.44 *    28.41 *
4.32 *     2.54 *
* 4         * Chan      * 10005.34  * 10022.50  *    77.01 *    43.15 *    17.28 *    11.62 *
2.59 *     1.78 *
* 5         * ROB       * 10022.50  * 10244.62  *   152.51 *   230.52 *   203.13 *    23.00 *
1.14 *     0.66 *
* 6         * ROB       * 10244.62  * 10466.74  *   186.26 *   212.02 *   122.10 *    28.09 *
1.74 *     0.88 *
*****************************************************************************************
***************

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: Union Pacific RR
REACH: 516503             RS: 2.158

INPUT
Description:
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```
Station Elevation Data    num=     161
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9980.29    1227 9982.15 1226.92 9991.24 1226.06 9998.76  1223.3   10000 1222.83
10001.14    122310016.53 1223.9510018.09 1223.9310028.56 1224.4210041.27 1224.35
10066.57  1224.2 10098.5  1224.110105.82  1224.110130.31 1224.67 10132.4 1224.69
10147.51  1225.1 10156.6 1225.0810156.95 1225.0810157.57 1225.0810158.37 1225.08
10168.89    122510171.67 1224.9410174.83 1224.78 10179.6 1224.8410181.24 1224.94
10196.51  1224.910224.44 1224.7710236.77 1224.7210303.96 1225.0810308.61 1225.08
10346.05  1224.810377.02 1224.8710392.07 1224.9410394.24 1224.9510409.89 1225.02
10445.26  1225.2 10462.1 1225.2610468.39 1225.5410477.27 1225.9510482.54 1225.95
10483.41  1225.910484.04 1225.9110487.59 1225.5510502.44 1225.5910512.89 1225.62
10521.35    122610522.96 1226.0810524.38  1226.110524.72  1226.110530.91 1225.95
10535.33  1225.810538.36 1227.6910541.43 1229.3910542.03  1229.110548.24 1225.85
10550.87  1225.910553.14  1225.910554.31 1225.8710557.11 1225.8210565.45 1225.79
10590.34  1225.810596.51 1225.7710601.53 1225.6910638.68 1225.6910640.61 1225.67
 10648.9  1225.510656.44 1225.3610682.22 1225.3410694.53 1225.4810733.77 1225.86
10736.03  1225.710744.28 1225.8610746.59 1225.7810765.87 1225.2510770.45 1225.09
10776.44  1224.910777.54 1224.9210780.74 1224.9210787.06 1224.9610795.06 1224.97
10804.58    122510814.61 1225.0110819.12 1225.0110826.33 1225.0210833.84 1225.24
10847.52  1225.710857.55 1225.3910860.13 1225.3810860.64 1225.3310863.81 1225.14
10863.83  1225.110866.15 1223.6710867.14 1223.6710867.99 1223.6710868.68 1223.67
10869.56  1223.710870.96 1223.6710872.91 1223.67 10873.7 1223.6710873.82 1223.72
10874.39  1224.110875.69 1225.1410877.04 1225.1810902.42 1226.0110920.68 1225.69
10951.44  1225.510952.48 1225.5310961.34 1225.4710973.26 1225.4410977.24 1225.48
10995.98  1225.310999.54 1225.2811009.11 1225.0111018.99 1223.7511019.37 1223.71
11019.69  1223.811024.92 1225.1611025.09  1225.211027.18 1225.3411029.85 1225.12
11030.37  1225.1 11033.6 1224.9311046.75 1225.1511059.88 1225.3511064.13  1225.3
11072.93  1225.311095.89  1224.611099.05 1224.5111103.42 1224.6711106.77 1224.97
 11107.3  1225.211107.45 1225.3711108.39 1224.6711114.21 1224.1611120.43 1224.32
11120.43  1224.311120.86 1224.2711126.98 1224.0911128.65 1224.0811129.54 1224.05
11130.33  1224.111131.16 1224.0611147.12 1224.5411148.53 1224.5811157.06 1224.67
 11159.8  1224.811168.29 1225.3711170.59 1225.3411172.35 1225.43 11176.3 1225.49
11178.02  1225.711185.56 1226.2911201.46  1226.311226.36 1226.0411230.58 1226.01
11245.69    122611256.05 1226.0711281.33 1225.9711297.87 1226.0111346.35 1225.99
11362.28  1225.9

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9980.29     .05 9991.24    .03510028.56     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9991.2410028.56           400.03  420.39  273.83             .1       .3

CROSS SECTION OUTPUT  Profile #PF 1
*********************************************************************************************
* E.G. Elev (ft)          * 1225.66  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.03  * Wt. n-Val.              *          *   0.035  *   0.060  *
* W.S. Elev (ft)          * 1225.63  * Reach Len. (ft)         *  400.03  *  420.39  *  273.83  *
* Crit W.S. (ft)          *          * Flow Area (sq ft)       *          *   64.67  *  611.50  *
* E.G. Slope (ft/ft)      *0.001666  * Area (sq ft)            *          *   64.67  *  611.50  *
* Q Total (cfs)           *  663.00  * Flow (cfs)              *          *  163.50  *  499.50  *
* Top Width (ft)          *  952.67  * Top Width (ft)          *          *   36.14  *  916.52  *
* Vel Total (ft/s)        *    0.98  * Avg. Vel. (ft/s)        *          *    2.53  *    0.82  *
* Max Chl Dpth (ft)       *    2.80  * Hydr. Depth (ft)        *          *    1.79  *    0.67  *
* Conv. Total (cfs)       * 16243.4  * Conv. (cfs)             *          *  4005.7  * 12237.6  *
* Length Wtd. (ft)        *  310.66  * Wetted Per. (ft)        *          *   36.70  *  918.31  *
* Min Ch El (ft)          * 1222.83  * Shear (lb/sq ft)        *          *    0.18  *    0.07  *
* Alpha                   *    2.16  * Stream Power (lb/ft s)  *          *    0.46  *    0.06  *
* Frctn Loss (ft)         *    1.05  * Cum Volume (acre-ft)    *    0.00  *   11.28  *  136.05  *
* C & E Loss (ft)         *    0.01  * Cum SA (acres)          *    0.02  *    8.90  *  128.25  *
*********************************************************************************************

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.

  Profile #PF 1
*********************************************************************************************
***************
*           * Pos       * Left Sta  * Right Sta *     Flow *     Area *     W.P. *  Percent *
Hydr * Velocity *
```

```
*           *           * (ft)      * (ft)      *    (cfs) *  (sq ft) *     (ft) *     Conv
*Depth(ft) *   (ft/s) *
* 1         * Chan      * 9991.24   * 10000.57  *    25.65 *    12.14 *     8.66 *     3.87 *
1.49 *     2.11 *
* 2         * Chan      * 10000.57  * 10009.90  *    66.55 *    22.18 *     9.35 *    10.04 *
2.38 *     3.00 *
* 3         * Chan      * 10009.90  * 10019.23  *    42.85 *    17.03 *     9.34 *     6.46 *
1.83 *     2.52 *
* 4         * Chan      * 10019.23  * 10028.56  *    28.45 *    13.32 *     9.34 *     4.29 *
1.43 *     2.14 *
* 5         * ROB       * 10028.56  * 10361.99  *   292.23 *   307.65 *   333.45 *    44.08 *
0.92 *     0.95 *
* 6         * ROB       * 10361.99  * 10695.42  *    39.75 *    73.81 *   187.43 *     6.00 *
0.39 *     0.54 *
* 7         * ROB       * 10695.42  * 11028.85  *    65.50 *   111.47 *   248.34 *     9.88 *
0.45 *     0.59 *
* 8         * ROB       * 11028.85  * 11362.28  *   102.02 *   118.57 *   149.08 *    15.39 *
0.80 *     0.86 *
*****************************************************************************************************
***************

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: Union Pacific RR
REACH: 516503             RS: 2.084

INPUT
Description:
Station Elevation Data    num=     147
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 9977.05  1226.3  9977.9 1226.15 9987.46 1225.04 9999.72 1221.65   10000 1221.57
 10000.4  1221.610003.13  1221.810007.78 1222.1210008.04  1222.2 10012.9 1223.54
10015.59  1223.6 10030.9  1223.810049.97 1223.7610057.04 1223.71 10084.1 1223.51
 10099.3  1223.410100.16 1223.3510108.44 1223.2510117.12 1223.3410126.57 1223.39
10143.54  1223.410164.14 1223.3810169.84 1223.3810183.29 1223.4710203.64 1223.57
10217.86  1223.510227.97 1223.6710239.23 1223.7210256.77 1223.8710272.46 1223.87
10287.05  1223.910289.44 1223.8710294.23 1225.4110296.23 1225.95 10299.4 1224.52
10300.65  1223.9 10301.9 1223.8710302.93 1223.8710305.46 1223.87 10312.6 1223.56
10312.91  1223.610313.71 1223.5510324.52 1223.6710329.68  1223.710332.74 1223.71
10355.02  1223.610360.08 1223.5910380.36 1223.7910402.49 1223.8210423.74 1223.75
10434.29  1223.810446.81 1223.79 10475.4 1223.9510483.97    122410492.38 1224.05
10503.01  1224.1 10503.5 1224.14 10503.6 1224.1410503.75 1224.1410508.36 1224.62
10508.91  1224.610509.07 1224.6210517.87 1224.5410532.07 1224.6810538.13 1224.69
10542.16  1224.810545.98 1224.8110576.71  1225.110597.02 1225.3110604.34 1225.38
10604.85  1225.410605.71 1225.3510606.84 1225.3710633.96 1224.94   10635  1224.9
10639.43  1224.710648.86 1224.5110655.95 1224.6110657.45 1224.6110663.44  1224.5
10668.29  1224.410704.46 1224.2310705.95 1224.2210706.02 1224.2210706.16 1224.22
10706.26  1224.210707.04 1224.2110714.42 1224.2810716.01 1224.3110716.67 1224.31
10716.97  1224.310721.05 1224.2310728.02 1223.57   10732 1223.2710734.78  1223.3
10746.09  1223.810750.67 1223.3410755.32 1222.8810759.93 1224.0810760.52  1224.2
10763.14  1224.910763.61 1224.9810764.46 1224.8810770.59 1224.01 10779.2 1224.09
10803.68  1224.710812.14 1224.81 10819.3 1224.8710837.78 1224.6610851.19 1224.37
10854.05  1224.610854.89 1224.6110857.37 1224.6810867.22 1224.9410868.56 1224.85
10871.42  1224.810875.32 1224.9610879.01 1225.0610885.34 1225.2210894.73 1226.01
10898.05  1226.210900.36 1226.1710916.48 1225.9710922.51 1225.8410928.67 1225.55
10932.05  1225.410935.54 1225.3210940.75  1225.310995.02 1225.2111000.76 1225.25
11010.62  1225.411015.03 1225.2311019.15 1225.1811023.44 1225.1411044.72 1225.04
11054.94    122511058.29 1224.9711066.04 1225.1311077.55 1225.2511090.57 1225.22
11101.38  1225.2 11137.4 1225.2411155.81 1225.3411202.58 1224.8311204.13 1224.83
11206.91  1224.8 11252.8 1225.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9977.05     .05 9987.46    .035 10030.9     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9987.46 10030.9           400.03  400.01     400             .1       .3
```

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1224.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.035	0.060
W.S. Elev (ft)	1224.50	Reach Len. (ft)	400.03	400.01	400.00
Crit W.S. (ft)		Flow Area (sq ft)		59.52	443.72
E.G. Slope (ft/ft)	0.006494	Area (sq ft)		59.52	443.72
Q Total (cfs)	1008.00	Flow (cfs)		256.42	751.58
Top Width (ft)	644.61	Top Width (ft)		41.50	603.12
Vel Total (ft/s)	2.00	Avg. Vel. (ft/s)		4.31	1.69
Max Chl Dpth (ft)	2.93	Hydr. Depth (ft)		1.43	0.74
Conv. Total (cfs)	12509.0	Conv. (cfs)		3182.1	9326.9
Length Wtd. (ft)	400.00	Wetted Per. (ft)		42.11	603.75
Min Ch El (ft)	1221.57	Shear (lb/sq ft)		0.57	0.30
Alpha	1.71	Stream Power (lb/ft s)		2.47	0.50
Frctn Loss (ft)	0.71	Cum Volume (acre-ft)	0.00	10.68	132.73
C & E Loss (ft)	0.03	Cum SA (acres)	0.02	8.52	123.48

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.

Profile #PF 1

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	Chan	9987.46	9998.32	37.27	11.00	9.25	3.70	1.23	3.39
2	Chan	9998.32	10009.18	159.92	28.23	11.00	15.87	2.60	5.66
3	Chan	10009.18	10020.04	37.83	11.89	11.00	3.75	1.09	3.18
4	Chan	10020.04	10030.90	21.40	8.40	10.86	2.12	0.77	2.55
5	ROB	10030.90	10336.38	502.78	268.95	297.71	49.88	0.90	1.87
6	ROB	10336.38	10641.85	180.21	116.38	170.88	17.88	0.68	1.55
7	ROB	10641.85	10947.33	68.59	58.39	135.17	6.80	0.43	1.17

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: Union Pacific RR
REACH: 516503 RS: 2.007

INPUT
Description:
Station Elevation Data num= 192

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9979.1	1225.3	9987.55	1224.16	9989.03	1223.91	9999.11	1220.8	10000	1220.6
10000.45	1220.7	10001.93	1220.93	10011.99	1222.22	10014.9	1222.46	10016.8	1222.57
10030.59	1222.61	10031.45	1222.57	10056.46	1222.19	10067.29	1222.05	10081.02	1221.91
10089.44	1221.81	10103.86	1221.69	10126.45	1221.48	10127.17	1221.48	10127.58	1221.47
10162.5	1221.11	10168.43	1220.91	10173.51	1220.83	10180.62	1220.73	10184.44	1220.69
10188.14	1220.6	10190.5	1220.69	10214.93	1221.15	10232.55	1221.02	10232.8	1221.02
10234.42	1221	10245.2	1221.46	10249.32	1221.63	10257.55	1221.92	10283.16	1222.25
10295.67	1222.61	10299.85	1222.57	10316.38	1222.66	10328.88	1222.81	10341.71	1222.94
10352.55	1223	10356.15	1223.04	10375.14	1223.06	10382.83	1223.12	10385.56	1223.11
10389.79	1222.81	10392.49	1222.97	10395.6	1222.96	10408.54	1223.21	10425.36	1223.33
10442.54	1223.31	10443.51	1223.33	10443.73	1223.35	10446.84	1223.62	10447.33	1223.72

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10450.25  1223.810454.25 1223.8410454.49 1223.82 10457.9 1223.6710468.83 1223.23
10474.58    1223   10490 1223.3910497.09 1223.57 10499.2 1223.5710499.86  1223.6
10508.18  1223.910513.87 1223.8810524.26 1223.9110533.05 1223.7310555.04 1223.28
10567.33  1223.710572.01 1223.8110578.57 1223.89 10579.7 1223.9110580.47 1223.91
10584.07    122410592.26  1223.810598.11 1223.4110605.86 1223.0910614.82 1223.09
10616.58  1223.110620.31 1223.1110629.07 1223.6610634.05 1223.9510635.32 1224.03
10638.41  1223.910646.36 1223.65 10650.6 1223.3610655.17 1223.31 10658.4 1223.25
10660.99  1223.410664.92 1223.7210666.24  1223.810669.45 1224.1610673.63 1224.36
 10681.6  1224.3 10709.2 1224.0410738.51 1223.9110744.45 1223.8710792.63 1224.03
10796.62    1224 10796.8 1224.0410797.01 1224.0310798.09 1224.0110808.88 1223.71
10812.07  1223.510819.06 1223.1410819.64 1223.13 10820.3 1223.1310821.06 1223.12
10821.94  1223.110822.95 1223.1110824.12  1223.110824.59  1223.110825.44 1223.07
10826.49    122310827.31 1223.02 10828.1    122310828.83 1222.9910829.43 1222.97
10830.75  1222.910831.21 1222.9310831.57 1222.9210833.45 1222.8810833.62 1222.87
10833.76  1222.910835.17 1222.8410835.92 1222.84 10836.3 1222.8410839.07 1222.85
10841.47  1222.810843.75 1222.8510845.75 1222.8610847.49 1222.8610849.01 1222.87
10850.34  1222.9 10851.5 1222.8510852.52 1222.85 10853.4 1222.8410854.17 1222.84
10854.83  1222.810855.41 1222.8310855.92 1222.8310856.35 1222.8310866.34 1222.87
10877.96  1222.810892.36 1222.6410896.54 1222.6710900.51 1222.8910907.34 1223.43
10911.82  1223.610915.36 1223.5410926.16 1223.5710934.21 1223.7410948.36 1223.79
10953.96  1223.910964.39 1224.1710979.67  1223.510983.12  1223.511001.52 1223.33
11009.49  1223.311064.01 1223.3211067.92 1223.37 11071.4 1223.3711071.98 1223.36
11078.74  1223.311083.21  1223.211091.31 1223.0311093.25 1222.9211097.68 1222.72
11101.22  1222.5   11103 1222.3611106.73 1222.3411123.66 1222.6311128.61 1222.51
11133.58  1222.411140.81  1222.211147.09 1222.8211148.63 1222.9511150.13 1223.02
11159.47  1223.311166.45 1223.3911172.25  1223.511178.18 1223.5311185.58 1223.54
11202.38  1223.611227.68 1223.7611237.55 1223.7811250.82 1223.9211264.32 1223.92
11268.33  1223.911282.85 1223.98

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  9979.1     .05 9989.03    .03510030.59     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9989.0310030.59           400.03  475.99  648.97              .1       .3

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 1223.88  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.              *          *   0.035  *   0.060  *
* W.S. Elev (ft)         * 1223.86  * Reach Len. (ft)         *  400.03  *  475.99  *  648.97  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)       *          *   71.56  * 1073.03  *
* E.G. Slope (ft/ft)     *0.000806  * Area (sq ft)            *          *   71.56  * 1073.03  *
* Q Total (cfs)          * 1008.00  * Flow (cfs)              *          *  123.00  *  885.00  *
* Top Width (ft)         * 1059.97  * Top Width (ft)          *          *   41.40  * 1018.57  *
* Vel Total (ft/s)       *    0.88  * Avg. Vel. (ft/s)        *          *    1.72  *    0.82  *
* Max Chl Dpth (ft)      *    3.26  * Hydr. Depth (ft)        *          *    1.73  *    1.05  *
* Conv. Total (cfs)      * 35505.7  * Conv. (cfs)             *          *  4332.7  * 31173.0  *
* Length Wtd. (ft)       *  638.41  * Wetted Per. (ft)        *          *   42.01  * 1018.94  *
* Min Ch El (ft)         * 1220.60  * Shear (lb/sq ft)        *          *    0.09  *    0.05  *
* Alpha                  *    1.23  * Stream Power (lb/ft s)  *          *    0.15  *    0.04  *
* Frctn Loss (ft)        *    0.59  * Cum Volume (acre-ft)    *    0.00  *   10.08  *  125.77  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)          *    0.02  *    8.14  *  116.03  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.

  Profile #PF 1
*****************************************************************************************
***************
*          * Pos       * Left Sta  * Right Sta *     Flow *     Area *     W.P. *  Percent *
Hydr * Velocity *
*          *           * (ft)      * (ft)      *    (cfs) *  (sq ft) *     (ft) *     Conv
*Depth(ft) *   (ft/s) *
* 1        * Chan      * 9989.03   * 9999.42   *    24.45 *    16.15 *    10.70 *     2.43 *
1.58 *     1.51 *
* 2        * Chan      * 9999.42   * 10009.81  *    58.06 *    26.93 *    10.50 *     5.76 *
2.59 *     2.16 *
* 3        * Chan      * 10009.81  * 10020.20  *    22.62 *    15.25 *    10.42 *     2.24 *
1.47 *     1.48 *
* 4        * Chan      * 10020.20  * 10030.59  *    17.88 *    13.23 *    10.39 *     1.77 *
1.27 *     1.35 *
```

```
* 5          * ROB       * 10030.59  * 10343.65  *   697.31 *   659.29 *   313.11 *     69.18 *
2.11 *     1.06 *
* 6          * ROB       * 10343.65  * 10656.72  *    57.94 *   140.30 *   273.13 *      5.75 *
0.51 *     0.41 *
* 7          * ROB       * 10656.72  * 10969.79  *    51.83 *   105.63 *   158.75 *      5.14 *
0.67 *     0.49 *
* 8          * ROB       * 10969.79  * 11282.85  *    77.92 *   167.80 *   273.95 *      7.73 *
0.61 *     0.46 *
*****************************************************************************************************
***************

Warning: Divided flow computed for this cross-section.

CROSS SECTION


RIVER: Union Pacific RR
REACH: 516503              RS: 1.931

INPUT
Description:
Station Elevation Data    num=     374
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9965.97 1224.71 9973.43 1223.89 9974.27 1223.84 9981.11  1223.6 9990.61 1223.33
   10000  1223.2 10017.2 1223.4610029.03 1223.6610035.84 1223.7910054.77 1224.37
10074.84  1224.510077.95 1224.4910082.38 1224.5210093.38 1224.0910095.59 1223.98
10122.74  1223.810123.05 1223.8510123.34 1223.8510123.61 1223.8510123.85 1223.86
10124.07  1223.910124.27 1223.8610124.45 1223.8610124.61 1223.8610124.76 1223.86
10124.89  1223.9 10144.5 1223.3610145.03 1223.3510145.65 1223.3510146.17 1223.34
10146.77  1223.310147.34 1223.3210147.87 1223.3110148.41  1223.310148.94 1223.29
10149.46  1223.310149.98 1223.2710150.48 1223.2710150.98 1223.2510151.46 1223.25
10151.96  1223.210181.68 1222.8810221.91 1222.7610222.34 1222.75 10224.2 1222.75
 10224.6  1222.710225.01 1222.74 10227.1 1222.7410227.48 1222.7410227.86 1222.74
10230.19  1222.710230.52 1222.7410230.86 1222.7410233.44 1222.7410233.73 1222.74
10240.29  1222.710241.74 1222.7410242.66 1222.7410243.84 1222.7510245.32 1222.75
10246.57  1222.710247.84 1222.7910248.18 1222.8110248.81 1222.84 10251.7 1222.97
10253.11    122310255.34 1223.1610255.42 1223.1610256.38 1223.1610257.18 1223.16
 10262.9  1223.210270.14 1223.4410278.73 1223.5810281.62 1222.9310286.32 1222.27
 10289.1  1221.410293.94 1220.1110303.81  1220.210314.05 1220.25 10315.2 1220.23
10317.79  1220.210336.78 1220.5410340.28 1220.5110344.37 1221.3110350.67 1222.09
10357.06  1221.910357.14 1221.9410359.31 1221.94 10361.1 1221.9510362.45 1221.95
10363.51    122210364.36 1221.9510365.08 1221.9510365.69 1221.9510366.21 1221.96
10366.68    1222 10367.1 1221.9610367.48 1221.9610367.83 1221.9610368.16 1221.96
10373.36  1221.910378.07  1221.810381.75 1221.8710394.42 1222.0310401.83 1222.12
10423.83  1222.510453.82 1223.0610455.88  1223.1   10457 1223.1210458.04 1223.14
10473.18  1223.410475.47 1223.41 10483.6 1223.5310490.72 1223.6410502.37  1223.8
10512.52  1224.210532.84  1224.310535.12 1224.3610537.04 1224.3910537.79 1224.15
   10546  1224.410552.81 1224.4810554.99 1224.48 10555.6  1224.510556.01 1224.49
10564.66  1222.810565.52 1222.6110575.27  1222.5 10591.4 1222.5110605.91 1222.17
10609.31  1222.110668.39 1221.9710672.47 1222.0210676.24 1222.0510704.76 1222.28
10706.17  1222.310712.15 1222.52 10723.5 1222.4210732.99 1222.5210767.83 1222.43
10781.44  1222.210814.57 1222.3910820.65 1222.6310823.58 1222.6610826.89 1222.46
10829.65  1222.410836.91 1222.1310837.86 1222.0910838.57 1221.9910838.83    1222
10839.18    122210839.75    122210840.33 1221.9610840.67 1221.9410848.43 1221.42
10850.78  1221.210850.91  1221.210851.05 1221.1910851.21 1221.1710851.39 1221.15
 10851.6  1221.110851.84 1221.1110852.12 1221.0810852.44 1221.0610852.82 1221.02
10853.28    122110853.85 1220.9310854.57 1220.87 10854.7 1220.86 10855.1 1220.87
10855.55  1220.910855.99  1220.9 10856.4 1220.9110873.89 1221.2810875.89 1221.25
10880.19  1221.210880.38 1221.1910880.59 1221.1910880.81 1221.1910881.05 1221.18
10881.31  1221.210881.58 1221.1810881.88 1221.17 10882.2 1221.1710882.55 1221.16
10882.94  1221.210883.36 1221.1510883.82 1221.1410884.33 1221.1410884.89 1221.13
10885.52  1221.110886.23 1221.1110887.03  1221.110887.94 1221.0910888.99 1221.07
10890.21  1221.110891.65 1221.0310892.21 1221.0310892.35 1221.0410892.56 1221.05
10892.76  1221.110892.95 1221.0810893.13 1221.09 10893.3  1221.110893.46 1221.11
10893.61  1221.110893.75 1221.1310893.89 1221.1410894.03 1221.1510894.15 1221.16
10894.27  1221.210894.39 1221.17 10894.5 1221.1810894.61 1221.1910894.72 1221.19
10894.82  1221.210894.91 1221.2110895.01 1221.21 10895.1 1221.2210895.19 1221.22
10895.27  1221.210895.35 1221.2310895.43 1221.2410895.51 1221.2410895.59 1221.25
10895.66  1221.310895.73 1221.26 10895.8 1221.2610899.52  1221.510905.36 1221.86
10908.64    122210915.93 1222.2210919.63 1222.2610922.79  1222.310934.96  1222.6
10938.06  1222.610939.26 1222.6110973.02 1222.1810993.81 1222.2811017.36 1222.52
11032.45  1222.511039.15 1222.4711050.45 1222.6911055.12 1222.8111061.08 1222.79
11062.81  1222.811079.13 1222.7811130.14 1222.6911145.75 1222.6611151.01 1222.59
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11162.01  1222.3 11163.9 1222.1411169.06 1222.0811172.36 1222.0311173.36 1221.99
11176.33  1221.611176.69  1221.611177.13 1221.5511177.72 1221.4811178.51 1221.38
11179.17  1221.3 11180.3 1221.3311181.81 1221.3711183.06 1221.4111184.11 1221.44
   11185  1221.511185.77  1221.511186.43 1221.5211187.01 1221.5311187.53 1221.55
11187.98  1221.611188.39 1221.5811188.76 1221.5911189.09  1221.611189.38 1221.61
11189.66  1221.6 11189.9 1221.6311196.09 1221.7711209.53 1221.3211211.01 1221.27
11211.18  1221.3 11211.2 1221.2711211.36  1221.311211.52 1221.3211216.74  1222.1
11220.64  1222.311224.38 1222.4111232.62 1222.7211237.08 1222.8811241.17 1222.89
11252.94  1222.911257.69 1222.9111308.93 1223.3411316.67 1223.39 11318.7 1223.41
11319.81  1223.411335.89 1223.0611339.88 1223.0411363.91 1223.1711368.87  1223.2
11433.08  1222.811438.36 1222.8511441.84 1222.7811443.25  1223.111446.37 1223.23
11453.45  1222.411453.68 1222.4111453.96 1222.4111454.41 1222.4111457.78 1222.03
 11460.4  1221.811463.41 1221.7111464.12 1221.6911464.98 1221.6711473.48 1221.71
11478.83  1221.711482.94 1221.7111488.78 1221.7311502.36 1221.89 11502.6 1221.89
11504.53  1221.9 11507.3 1221.86 11507.5 1221.86 11513.7 1222.0211517.26  1222.1
11522.36  1222.211525.18 1222.2111526.58 1222.23 11530.2 1222.28 11537.4 1222.31
11556.71  1222.711562.26 1222.6911565.82 1222.7511606.47 1223.1311611.11 1223.16
11611.42  1223.211644.23 1223.08 11645.1 1223.0911648.08 1223.1711654.44 1223.36
11656.37  1223.411657.36 1223.36 11664.1 1223.36 11668.4 1223.3611673.85 1223.36
11675.88  1223.411679.95 1223.3611681.56 1223.3411693.16 1223.22 11695.1 1223.25
11695.74  1223.211707.23 1223.3111716.24 1223.1911725.62 1223.1811762.23 1223.48
11763.17  1223.5 11768.7 1223.3311790.05 1222.6611790.96 1222.64 11795.8  1222.4
11800.02  1222.311815.18 1222.3611817.22 1222.4211835.74 1222.9611838.95 1222.88
11841.29  1222.711851.95 1223.0211861.09 1223.2911862.23 1223.3411876.16 1223.51
11878.48  1223.511881.11 1223.52 11882.7 1223.5211890.68 1223.55

Manning's n Values         num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************
 9965.97     .05 9973.43    .03510074.84     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9973.4310074.84           400.03  473.32  648.97             .1       .3
Right Levee     Station=10712.15      Elevation=  1222.5

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 1223.28  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.01  * Wt. n-Val.              *          *   0.035  *   0.060  *
* W.S. Elev (ft)          * 1223.27  * Reach Len. (ft)        *  400.03  *  473.32  *  648.97  *
* Crit W.S. (ft)          * 1222.50  * Flow Area (sq ft)      *          *    0.32  * 1265.01  *
* E.G. Slope (ft/ft)      *0.001080  * Area (sq ft)           *          *    0.32  * 1265.01  *
* Q Total (cfs)           * 1008.00  * Flow (cfs)             *          *    0.05  * 1007.95  *
* Top Width (ft)          * 1502.18  * Top Width (ft)         *          *    9.36  * 1492.82  *
* Vel Total (ft/s)        *    0.80  * Avg. Vel. (ft/s)       *          *    0.15  *    0.80  *
* Max Chl Dpth (ft)       *    3.16  * Hydr. Depth (ft)       *          *    0.03  *    0.85  *
* Conv. Total (cfs)       * 30679.0  * Conv. (cfs)            *          *     1.4  * 30677.6  *
* Length Wtd. (ft)        *  631.81  * Wetted Per. (ft)       *          *    9.36  * 1494.03  *
* Min Ch El (ft)          * 1223.20  * Shear (lb/sq ft)       *          *    0.00  *    0.06  *
* Alpha                   *    1.00  * Stream Power (lb/ft s) *          *    0.00  *    0.05  *
* Frctn Loss (ft)         *    0.85  * Cum Volume (acre-ft)   *    0.00  *    9.68  *  108.35  *
* C & E Loss (ft)         *    0.00  * Cum SA (acres)         *    0.02  *    7.87  *   97.32  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.

  Profile #PF 1
*****************************************************************************************
***************
*          * Pos       * Left Sta  * Right Sta *     Flow *     Area *     W.P. *  Percent *
Hydr * Velocity *
*          *           * (ft)      * (ft)      *    (cfs) *  (sq ft) *     (ft) *     Conv
*Depth(ft) *   (ft/s) *
* 1        * Chan      * 9973.43   * 9998.78   *     0.01 *     0.09 *     3.67 *     0.00 *
0.03 *     0.12 *
* 2        * Chan      * 9998.78   * 10024.13  *     0.04 *     0.22 *     5.69 *     0.00 *
0.04 *     0.16 *
* 3        * Chan      * 10024.13  * 10049.49  *          *          *          *          *
*          *
* 4        * Chan      * 10049.49  * 10074.84  *          *          *          *          *
*          *
* 5        * ROB       * 10074.84  * 10712.15  *   428.76 *   480.91 *   450.29 *    42.54 *
1.07 *     0.89 *
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* 6          * ROB       * 10712.15  * 11104.99  *   342.75 *   398.20 *   393.04 *    34.00 *
1.01 *     0.86 *
* 7          * ROB       * 11104.99  * 11497.84  *   165.32 *   250.25 *   367.37 *    16.40 *
0.68 *     0.66 *
* 8          * ROB       * 11497.84  * 11890.68  *    71.12 *   135.65 *   283.34 *     7.06 *
0.48 *     0.52 *
*****************************************************************************************************
***************

Warning: Divided flow computed for this cross-section.

CROSS SECTION


RIVER: Union Pacific RR
REACH: 516503             RS: 1.855

INPUT
Description:
Station Elevation Data    num=     252
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9967.54  1225.2 9969.17 1224.96 9977.22 1223.87 9989.05 1221.81 9990.88 1221.51
   10000  1220.810000.44  1220.810000.56 1220.7810000.65 1220.7810000.78 1220.78
10053.15  1221.1 10060.3 1221.1910085.85 1221.2610101.64 1221.3310117.05 1221.36
10125.88  1221.510142.61 1221.5510146.07 1221.5510188.16 1221.5910221.18 1221.63
10223.16  1221.610235.84 1221.9810251.27 1222.0610283.79 1222.2510288.04 1222.21
10294.98  1222.210306.89 1221.9210316.11  1221.910325.53 1221.9710328.67 1222.28
10330.28  1222.310337.12 1222.3410340.92 1222.3410348.19 1222.4210371.52 1222.81
10377.41    122310386.93  1223.110396.07 1223.2110397.73 1223.1710400.48 1222.99
10405.79  1222.710407.47  1222.610415.69  1221.710416.03 1221.6610416.54 1221.67
10435.59  1221.810456.57 1221.7510468.87  1221.810482.42 1221.7610485.39 1221.75
10507.47  1222.110513.19 1222.0310516.13  1221.910518.53 1221.9110529.02 1221.91
10535.71  1221.910539.06 1221.8910559.49 1221.8810559.97 1221.8810560.78 1221.88
 10562.2  1221.910562.59 1221.9410566.47 1222.46   10572  1222.310576.05 1222.39
 10580.2  1222.410586.49  1222.610603.49 1222.5510605.48 1222.5410606.98 1222.52
10609.23  1222.410610.88  1222.310614.86 1222.5210618.23 1222.3610619.04 1222.32
10623.23  1222.310626.75 1222.1710636.83 1221.68 10664.4 1222.3410681.94 1222.52
10696.77  1222.510702.97 1222.5610745.04 1221.6710748.79 1221.5910749.29 1221.61
10749.81  1221.710753.64 1222.0410754.04 1222.0410761.28 1222.3110765.49 1222.52
10768.56  1222.510785.55 1222.0910798.56 1221.5610804.73 1221.4110810.89 1220.14
10821.62  1219.4 10822.3 1219.4110834.02  1217.910856.41 1216.9710856.46 1216.97
 10856.5    121710879.04 1217.0210884.62 1217.1910888.93 1217.2610890.35 1217.28
10893.72  1217.310904.81 1217.4910908.86  1217.810909.65 1217.9410912.14 1218.27
 10930.5  1221.210943.27 1221.24 10945.9 1221.2710947.71 1221.2110949.01 1221.17
10953.68  1221.310955.84 1221.2710958.07 1220.9910961.24  1221.310965.14 1221.38
 10972.6  1221.610976.88 1221.8810979.72 1221.9310981.69 1222.0711023.01 1223.11
11053.86  1222.911055.69 1222.7811056.53  1222.811057.88 1222.6811061.83 1222.61
11063.31  1222.611071.78 1222.4911072.05 1222.4911077.62 1222.6311082.06 1222.75
11083.59  1222.8 11085.1 1222.8611085.82  1222.811088.17 1222.4811094.02 1221.82
11097.81  1221.811104.15 1221.8211104.88 1221.8211105.46 1221.8211109.46 1221.52
11117.12    122111119.94 1220.7711120.46 1220.7711121.31 1220.7811127.44 1220.83
11131.02  1220.911132.81 1220.9311137.59 1220.9811137.63 1220.98 11152.9 1220.92
11158.17  1221.211164.33  1221.511177.57 1221.4211192.53 1221.3111196.05 1221.28
11205.11  1221.211209.65 1221.1711212.35 1220.9111215.45  1220.711215.61  1220.7
 11216.8  1220.711219.78 1220.7411220.28 1220.7211226.62 1220.6811230.13 1220.67
11234.77  1220.711245.24 1220.4911247.63 1220.4611248.57 1220.4511261.16 1220.49
11266.68  1220.511269.77 1220.51 11272.2 1220.5511274.66 1220.6111276.52 1220.61
11280.74  1220.811287.38 1221.1211295.96 1221.4511296.53 1221.4611303.37  1221.6
11311.29  1221.711349.06 1221.8611351.55 1221.8711351.92 1221.8711352.47 1221.87
11376.24    122211376.41    122211379.41    122211401.11 1222.4711405.73  1222.5
11408.05  1222.6 11421.5 1222.3411433.58 1222.1411442.45 1222.1611449.54 1222.18
 11489.6  1221.811502.55 1221.6711510.72 1221.3411521.38 1220.9511523.93 1220.84
11525.51  1220.811541.02 1220.7411541.07 1220.7411541.09 1220.7411557.95 1221.11
11560.22  1221.111562.11 1220.9711568.27 1221.2311577.58 1221.6111583.29 1221.76
11594.43  1221.7 11617.3 1221.9311625.97 1222.0311630.98 1222.0411639.93 1222.04
11645.25  1222.111649.65 1222.1111664.74 1222.1211674.72 1222.1211675.65 1222.12
11676.66  1222.111676.96 1222.1211678.26 1222.1911687.17 1221.9511690.38 1221.81
11695.39  1221.811698.46 1221.71 11705.6 1221.8711706.69  1221.9 11708.3 1221.91
11710.16  1221.911712.23 1221.9311727.44 1221.9211729.86 1221.8911733.56 1221.83
11741.34  1221.711744.26 1221.6811747.77  1221.811751.16  1221.911752.62 1221.97
11755.55  1222.111774.26 1222.8911777.39 1222.8811788.96 1222.8811806.83 1222.88
11808.94  1222.911828.71  1222.8
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Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9967.54     .05 9977.22    .03510053.15     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9977.2210053.15           800.06  834.52  630.56             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
10767.5410967.54    1222       T

CROSS SECTION OUTPUT  Profile #PF 1
*********************************************************************************************
* E.G. Elev (ft)         * 1222.43  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.              *          *   0.035  *   0.060  *
* W.S. Elev (ft)         * 1222.40  * Reach Len. (ft)        *  800.06  *  834.52  *  630.56  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)      *          *   91.61  *  963.78  *
* E.G. Slope (ft/ft)     *0.001709  * Area (sq ft)           *          *   91.61  * 1479.23  *
* Q Total (cfs)          * 1008.00  * Flow (cfs)             *          *  196.90  *  811.10  *
* Top Width (ft)         * 1515.06  * Top Width (ft)         *          *   67.50  * 1447.55  *
* Vel Total (ft/s)       *    0.96  * Avg. Vel. (ft/s)       *          *    2.15  *    0.84  *
* Max Chl Dpth (ft)      *    5.43  * Hydr. Depth (ft)       *          *    1.36  *    0.67  *
* Conv. Total (cfs)      * 24381.1  * Conv. (cfs)            *          *  4762.6  * 19618.5  *
* Length Wtd. (ft)       *  675.16  * Wetted Per. (ft)       *          *   67.61  * 1448.59  *
* Min Ch El (ft)         * 1220.78  * Shear (lb/sq ft)       *          *    0.14  *    0.07  *
* Alpha                  *    1.61  * Stream Power (lb/ft s) *          *    0.31  *    0.06  *
* Frctn Loss (ft)        *    1.70  * Cum Volume (acre-ft)   *    0.00  *    9.18  *   87.91  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *    0.02  *    7.45  *   75.42  *
*********************************************************************************************

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.

  Profile #PF 1
*********************************************************************************************
***************
*           * Pos       * Left Sta  * Right Sta *     Flow *     Area *     W.P. *  Percent *
Hydr * Velocity *
*           *           * (ft)      * (ft)      *    (cfs) *  (sq ft) *     (ft) *     Conv
*Depth(ft) *   (ft/s) *
* 1         * Chan      * 9977.22   * 9996.20   *    11.89 *     8.22 *    10.65 *     1.18 *
0.78 *     1.45 *
* 2         * Chan      * 9996.20   * 10015.19  *    68.06 *    29.52 *    19.00 *     6.75 *
1.56 *     2.31 *
* 3         * Chan      * 10015.19  * 10034.17  *    62.46 *    28.03 *    18.98 *     6.20 *
1.48 *     2.23 *
* 4         * Chan      * 10034.17  * 10053.15  *    54.50 *    25.83 *    18.98 *     5.41 *
1.36 *     2.11 *
* 5         * ROB       * 10053.15  * 10410.35  *   161.50 *   200.88 *   294.59 *    16.02 *
0.68 *     0.80 *
* 6         * ROB       * 10410.35  * 10767.54  *    74.01 *   122.75 *   277.19 *     7.34 *
0.44 *     0.60 *
* 7         * ROB       * 10767.54  * 10967.54  *    40.86 *    74.75 *   195.57 *     4.05 *
0.38 *     0.55 *
* 8         * ROB       * 10967.54  * 11398.13  *   367.77 *   347.21 *   336.69 *    36.48 *
1.03 *     1.06 *
* 9         * ROB       * 11398.13  * 11828.71  *   166.97 *   218.19 *   344.55 *    16.56 *
0.63 *     0.77 *
*********************************************************************************************
***************

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: Union Pacific RR
```

REACH: 516503 RS: 1.704

INPUT
Description:
Station Elevation Data num= 233

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9978.46	1222.7	9982.35	1221.96	9987.7	1220.84	9993.55	1219.79	10000	1218.44
10007.22	1219.11	10007.66	1219.11	10014.49	1219.62	10035.12	1219.65	10039.27	1219.67
10064.21	1219.91	10064.27	1219.88	10069.9	1219.78	10075.45	1219.78	10092.39	1219.62
10094.73	1219.61	10096.09	1219.62	10096.25	1219.58	10096.4	1219.55	10097.37	1219.55
10099.53	1219.51	10099.93	1219.55	10101.19	1219.55	10101.58	1219.55	10105.38	1219.71
10107.5	1219.71	10107.76	1219.71	10122.74	1219.95	10133.21	1220.12	10133.38	1220.12
10137.96	1220.11	10166.33		122	10169.21	1220.07	10172.36	1220.11	10182.27	1220.11
10183.67	1220.1	10186.3	1219.97	10202.82	1220.92	10203.06	1220.94	10203.14	1220.94
10233.97		122	10236.98	1221.06	10237.95	1220.96	10238.75	1220.91	10240.29	1220.81
10240.39	1220.81	10247.18	1220.31	10257.36	1220.33	10257.71	1220.33	10261.35	1220.38
10270.92	1220.41	10278.54	1220.35	10284.37	1220.25	10285.52	1220.21	10296.71	1220.07
10306.3	1219.61	10307.21	1219.54	10322.33	1219.51	10345.24	1219.43	10356.41	1219.49
10367.68	1219.61	10370.34	1219.94	10375.18	1220.51	10390.17	1220.47	10390.95	1220.46
10391.04	1220.51	10392.32	1220.46	10399.29	1220.53	10408.85	1220.61	10413.62	1220.56
10417.55	1220.6	10428.9	1220.41	10446.52	1220.19	10448.4	1220.14	10460.2	1220
10475.36	1219.71	10476.39	1219.74	10490.47	1219.97	10498.34	1220.08	10523.06	1219.89
10534.72	1219.91	10554.69	1220.27	10555.87	1220.34	10557.6	1220.31	10563.06	1220.4
10572.08	1220.61	10607.57	1220.21	10614.52	1220.18	10615.46	1220.14	10621.39	1220.1
10651.2	1220.41	10659.32	1220.52	10659.53	1220.53	10660.16	1220.47	10669.54	1219.69
10680.05	1219.71	10693.76	1219.87	10707.09	1219.74	10712.09	1219.77	10713.14	1219.77
10722.74	1219.81	10727.28	1219.81	10761.94	1219.86	10771.31	1219.96	10781.25	1219.93
10791.24		122	10800.82	1219.95	10809.33	1219.89	10811.63	1219.98	10817.24	1220.06
10819.08	1220.21	10822.08	1220.72	10833.45	1220.77	10855.04	1220.89	10861.42	1220.89
10863.11	1220.91	10866.71	1220.25	10867.24	1220.16	10867.88	1220.01	10872.14	1220.01
10877.85	1220.11	10883.23	1220.13	10889.12	1220.16	10894.33	1220.29	10896.28	1220.38
10904.08	1220.41	10907.61	1220.29	10909.86	1220.43	10913.07	1220.61	10917.74	1220.61
10920.12	1220.6	10921.9	1220.71	10928.11	1221.03	10930.91	1220.93	10935.7	1221.02
10940.3	1220.81	10947.21	1220.18	10951.52	1220.18	10975.86	1220.44	10980.87	1220.5
10981.57	1220.51	10981.63	1220.46	10998.55	1219.97	11024.56	1219.67	11025.97	1219.87
11033.59	1220.31	11035.69	1220.23	11035.81	1220.24	11069.67	1220.52	11070.58	1220.49
11070.78	1220.41	11071.54	1220.48	11083.34	1220.53	11114.45	1220.45	11124.48	1220.45
11129.2	1220.7	11133	1220.64	11140.96	1220.64	11142.4	1220.15	11142.6	1220.1
11142.84	1220.11	11143.38	1220.11	11152.37	1220.14	11160.11	1220.17	11162.67	1220.17
11164.53	1220.21	11165.74	1220.19	11180.86	1220.24	11182.86	1219.81	11183.41	1219.69
11191.28	1219.51	11198.71	1219.31	11206.94	1219.65	11214.79	1219.82	11215.06	1219.82
11221.19	1219.71	11228.37	1219.77	11239.7	1219.81	11246.5	1219.94	11248.23	1220.87
11248.41	1220.91	11270.31	1220.69	11274.13	1220.71	11275.42	1220.41	11276.17	1220.26
11277.76	1220.31	11279.42	1220.24	11290.1	1220.34	11291.7	1220.66	11292.24	1220.81
11309.43	1220.91	11333.88	1221.03	11346.47	1220.9	11360.1	1220.97	11367.28	1221.11
11370.83	1220.51	11371.01	1220.44	11371.57	1220.45	11371.76	1220.45	11372.08	1220.45
11381.32	1220.51	11390.29	1220.41	11400.47	1220.32	11401.17	1220.31	11405.34	1220.32
11424.14	1220.61	11427.94	1220.65	11442.04	1220.62	11456.55	1220.76	11471.91	1220.9
11474.73	1220.91	11478.21	1220.93	11486	1220.97	11493.05	1221.01	11509.54	1220.68
11523.89	1220.51	11539.51	1220.21	11571.38	1220.71	11571.81	1220.71	11581.78	1220.9
11582.84	1221.11	11586.26	1221.59	11587.19	1220.93	11587.2	1220.93	11587.71	1220.6
11588.43	1219.91	11590.97	1221.45	11591.21	1221.59	11591.53	1221.66	11593.07	1221.74
11598	1222.21	11600.71	1222.14	11604.32	1222.22				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9978.46	.05	9982.35	.035	10064.21	.06

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9982.35	10064.21		400.03	400.01	400	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1220.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.035	0.060
W.S. Elev (ft)	1220.68	Reach Len. (ft)	400.03	400.01	400.00
Crit W.S. (ft)		Flow Area (sq ft)		84.06	681.08
E.G. Slope (ft/ft)	0.004077	Area (sq ft)		84.06	681.08
Q Total (cfs)	1008.00	Flow (cfs)		243.90	764.10
Top Width (ft)	1311.15	Top Width (ft)		75.63	1235.52
Vel Total (ft/s)	1.32	Avg. Vel. (ft/s)		2.90	1.12
Max Chl Dpth (ft)	2.24	Hydr. Depth (ft)		1.11	0.55

* Conv. Total (cfs)	* 15786.8	* Conv. (cfs)	*	*	3819.9	* 11966.9	*
* Length Wtd. (ft)	* 400.00	* Wetted Per. (ft)	*	*	75.90	* 1236.96	*
* Min Ch El (ft)	* 1218.44	* Shear (lb/sq ft)	*	*	0.28	* 0.14	*
* Alpha	* 1.72	* Stream Power (lb/ft s)	*	*	0.82	* 0.16	*
* Frctn Loss (ft)	* 1.05	* Cum Volume (acre-ft)	*	0.00 *	7.50	* 72.27	*
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	*	0.02 *	6.08	* 56.00	*

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.

Profile #PF 1

*	* Pos	* Left Sta (ft)	* Right Sta (ft)	* Flow (cfs)	* Area (sq ft)	* W.P. (ft)	* Percent Conv	* Hydr Depth(ft)	* Velocity (ft/s)	*
* 1	* Chan	* 9982.35	* 10002.81	* 57.08	* 18.28	* 14.47	* 5.66	* 1.28	* 3.12	*
* 2	* Chan	* 10002.81	* 10023.28	* 85.79	* 26.83	* 20.50	* 8.51	* 1.31	* 3.20	*
* 3	* Chan	* 10023.28	* 10043.75	* 57.12	* 21.01	* 20.47	* 5.67	* 1.03	* 2.72	*
* 4	* Chan	* 10043.75	* 10064.21	* 43.92	* 17.94	* 20.47	* 4.36	* 0.88	* 2.45	*
* 5	* ROB	* 10064.21	* 10449.24	* 270.51	* 222.18	* 341.84	* 26.84	* 0.65	* 1.22	*
* 6	* ROB	* 10449.24	* 10834.27	* 294.56	* 242.06	* 372.74	* 29.22	* 0.65	* 1.22	*
* 7	* ROB	* 10834.27	* 11219.29	* 153.09	* 156.38	* 333.72	* 15.19	* 0.47	* 0.98	*
* 8	* ROB	* 11219.29	* 11604.32	* 45.93	* 60.45	* 188.66	* 4.56	* 0.32	* 0.76	*

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.
Warning: The energy loss was 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: Union Pacific RR
REACH: 516503 RS: 1.628

INPUT
Description:
Station Elevation Data num= 194

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9978.9	1221.8	9979.23	1221.8	9981.66	1221.72	9985.96	1220.9	9990.02	1220.12
9999.91	1218	10000	1217.96	10000.41	1217.99	10008.81	1218.59	10010.48	1218.53
10023.91	1218.21	10033.21	1218.17	10054.4	1218.18	10063.19	1218.41	10074.36	1218.47
10084.53	1218.51	10100.47	1218.63	10103.17	1217.68	10104.01	1217.48	10104.61	1217.6
10107.88	1218.81	10112.47	1218.56	10116.08	1218.39	10159.44	1218.26	10182.6	1218.21
10198.84	1218.31	10218.61	1218.42	10225.25	1218.44	10268.41	1218.2	10272.1	1218.29
10297.29	1218.51	10326.65	1218.83	10333.75	1218.83	10335.67	1218.81	10347.94	1218.7
10361.36	1218.61	10380.66	1218.67	10386.51	1218.88	10392	1219.23	10394.48	1219.35
10396.49	1219.41	10400.28	1218.81	10402.79	1218.48	10428.45	1218.61	10429.43	1218.61
10434.61	1218.61	10435.59	1218.63	10476.52	1218.65	10497.89	1218.69	10511.19	1218.77
10522.54	1218.81	10524.57	1218.78	10526.13	1218.75	10531.78	1218.77	10546.89	1218.85
10556.73	1218.91	10577.66	1219.23	10583.65	1218.96	10590.21	1218.51	10590.69	1218.5
10593.05	1218.51	10611.71	1218.81	10612.63	1218.81	10615.8	1218.81	10617.27	1218.82
10621.78	1218.91	10623.13	1219.22	10623.33	1219.28	10624.44	1219.53	10625.87	1219.66
10626.09	1219.71	10628.93	1219.85	10634.37	1219.96	10635.15	1219.94	10638.35	1219.97
10641.53	1220	10645.54	1219.73	10647.01	1219.66	10647.69	1219.62	10649.2	1219.45
10652.8	1219.21	10653.03	1219.15	10657.41	1219.16	10665.21	1219.31	10679.26	1219.25

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10692.06    121910692.65    121910693.67 1218.9810706.93 1219.0810717.14 1219.09
10741.72    121910746.25 1218.9310751.21 1218.9110769.06 1218.7910794.65 1218.94
   10818  1219.110836.08 1219.1610847.74  1219.210870.54 1219.3310873.52 1219.32
10886.13  1219.310900.18 1219.0910900.87 1219.0810901.07 1219.0910902.07 1219.11
10910.84  1219.310914.85 1219.3710917.72  1219.410917.78 1219.3210928.49 1218.94
10931.47  1218.910940.92 1219.18 10943.6 1219.2510945.48 1219.2710949.59 1219.45
 10956.8  1219.310960.64 1219.3110970.69 1219.3510985.77 1219.4911000.54 1219.41
11023.01  1219.411040.13 1219.5411048.91 1219.5811073.38 1219.7911080.23 1219.75
11091.98  1219.911094.85 1219.9411095.32 1219.9511096.62 1219.9511099.32 1219.96
11116.61  1219.611117.53 1219.6311120.05  1219.611123.18 1219.5111123.38 1219.51
11135.62  1219.511160.68 1219.6211170.36 1219.6411172.21 1219.6411174.12 1219.69
11175.14  1219.711176.12 1219.8611180.27 1220.7811183.28 1220.1111185.05 1219.71
11187.72  1219.711191.19 1219.7311192.77 1220.0611194.96 1220.2711195.58  1220.3
11199.86    122011201.84 1219.6911205.63 1219.5511211.49 1219.3311215.25  1219.3
11215.54 1219.2811215.84 1219.2811217.77 1219.7111218.85 1219.8311222.29  1219.9
11223.68 1219.8711225.12 1219.88 11228.1 1219.8611230.95 1219.8411239.61  1219.6
11239.62 1219.6311239.64 1219.6311239.74 1219.6311252.89 1219.7511253.37  1219.9
11256.01 1220.5111257.16  1220.211259.53 1219.5611264.88 1219.6611269.14  1219.8
11276.45 1220.0211280.95 1220.9811283.49 1221.5711284.51 1221.5311288.07  1221.2
11288.88 1220.6411291.29 1219.6511292.08 1220.3711293.85 1221.2111294.38  1221.6
11297.46 1221.5911301.46  1221.7 11303.6 1221.7511309.26 1221.6211318.11  1221.7
11341.97 1221.8911352.92 1222.1911356.17 1222.2211372.84 1222.23

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
  9978.9     .05 9985.96    .03510107.88     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9985.9610107.88            400.02  400.01     400              .1       .3

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 1219.66  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.03  * Wt. n-Val.              *          *   0.035  *   0.060  *
* W.S. Elev (ft)         * 1219.63  * Reach Len. (ft)         *  400.02  *  400.01  *  400.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)       *          *  146.89  *  721.54  *
* E.G. Slope (ft/ft)     *0.001844  * Area (sq ft)            *          *  146.89  *  721.54  *
* Q Total (cfs)          * 1008.00  * Flow (cfs)              *          *  313.09  *  694.91  *
* Top Width (ft)         * 1111.42  * Top Width (ft)          *          *  115.58  *  995.84  *
* Vel Total (ft/s)       *    1.16  * Avg. Vel. (ft/s)        *          *    2.13  *    0.96  *
* Max Chl Dpth (ft)      *    2.15  * Hydr. Depth (ft)        *          *    1.27  *    0.72  *
* Conv. Total (cfs)      * 23473.0  * Conv. (cfs)             *          *  7290.7  * 16182.2  *
* Length Wtd. (ft)       *  400.00  * Wetted Per. (ft)        *          *  116.21  *  996.23  *
* Min Ch El (ft)         * 1217.48  * Shear (lb/sq ft)        *          *    0.15  *    0.08  *
* Alpha                  *    1.52  * Stream Power (lb/ft s)  *          *    0.31  *    0.08  *
* Frctn Loss (ft)        *    0.78  * Cum Volume (acre-ft)    *    0.00  *    6.44  *   65.83  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)          *    0.02  *    5.20  *   45.75  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.

  Profile #PF 1
*****************************************************************************************
***************
*          * Pos       * Left Sta  * Right Sta *     Flow *     Area *     W.P. *  Percent *
Hydr * Velocity *
*          *           * (ft)      * (ft)      *    (cfs) *  (sq ft) *     (ft) *     Conv
*Depth(ft) *   (ft/s) *
* 1        * Chan      * 9985.96   * 10016.44  *    52.81 *    27.10 *    24.35 *     5.24 *
1.12 *     1.95 *
* 2        * Chan      * 10016.44  * 10046.92  *    99.89 *    43.46 *    30.48 *     9.91 *
1.43 *     2.30 *
* 3        * Chan      * 10046.92  * 10077.40  *    85.37 *    39.55 *    30.48 *     8.47 *
1.30 *     2.16 *
* 4        * Chan      * 10077.40  * 10107.88  *    75.02 *    36.79 *    30.89 *     7.44 *
1.21 *     2.04 *
* 5        * ROB       * 10107.88  * 10424.12  *   421.44 *   362.18 *   316.34 *    41.81 *
1.15 *     1.16 *
* 6        * ROB       * 10424.12  * 10740.36  *   192.91 *   220.20 *   294.44 *    19.14 *
0.75 *     0.88 *
* 7        * ROB       * 10740.36  * 11056.60  *    79.04 *   132.39 *   314.63 *     7.84 *
0.42 *     0.60 *
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* 8          * ROB        * 11056.60  * 11372.84  *      1.53 *      6.77 *     70.81 *      0.15 *
0.10 *      0.23 *
*****************************************************************************************************
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Warning: Divided flow computed for this cross-section.

CROSS SECTION


RIVER: Union Pacific RR
REACH: 516503              RS: 1.552

INPUT
Description:
Station Elevation Data     num=      233
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*******************************************************************************
 9978.47  1221.3 9981.63 1221.19 9983.09  1221.1 9984.31 1220.73 9987.66 1219.66
 9995.76  1217.6   10000 1216.7610004.57 1217.1310008.61 1217.5110014.51 1217.33
10017.27  1217.210030.29 1217.1310047.24 1217.2410056.06 1217.3210061.62 1217.29
10079.28  1217.210084.98 1217.22 10108.2 1217.2510116.18 1217.2610118.33 1217.26
10124.09  1217.310146.68  1217.310156.29 1217.3110166.68 1217.3710190.93 1217.35
10193.98  1217.310197.34 1217.3310200.01 1217.3410215.11 1217.3310225.75 1217.33
10252.27  1217.410259.18 1217.4710263.86  1217.410268.23 1217.5110277.31 1217.52
10280.17  1217.510282.44 1217.05 10289.3 1215.9610293.35  1217.2 10298.6 1218.45
10301.53  1219.210311.32 1219.4110317.04 1219.4710319.28 1219.3810324.85 1218.55
 10328.9  1218.110338.27 1218.1810343.86 1218.1710346.86 1218.3610351.64 1218.61
10352.82  1217.910353.92 1217.3110355.81    1218 10357.8 1218.6210362.45 1218.71
10366.04  1218.6 10371.2 1218.5110378.18 1218.5110382.23 1218.5110386.95 1218.57
10395.92  1218.510398.33 1218.5510422.62 1218.0610423.34 1218.0510427.96 1218.09
10435.58  1217.910447.52 1217.8910458.73 1217.89 10469.4 1217.8810472.84 1217.88
 10475.1  1217.910480.88 1217.9510484.97 1218.0110499.89  1218.310511.59 1218.27
10522.02  1218.310542.63 1218.3310542.79 1218.3310543.13 1218.3310543.83 1218.32
10554.88  1218.110559.47 1218.1610562.56 1218.1510575.27 1218.2110594.83 1218.11
10599.11  1218.110601.47 1218.1510604.05 1218.1110616.47 1218.1110633.29 1218.11
10634.46  1218.1 10637.8 1218.1410657.69 1218.3910660.96 1218.43 10684.6 1218.62
10686.92  1218.710698.81 1219.0710705.74 1219.1110718.71 1218.9710737.11 1219.05
10746.91    121910778.25 1219.1810778.52 1219.19 10778.6 1219.1910779.17 1219.13
10783.92  1219.110785.44 1219.0510792.79 1219.0610793.81 1219.0510802.34 1218.93
10803.17  1218.9 10805.5 1218.9210805.68 1218.9110806.51 1218.9110808.79 1218.91
10810.28  1218.9 10821.3 1218.9610828.04 1219.07 10828.5 1219.0710829.09 1219.12
10829.16  1219.1 10829.4 1219.1610831.82 1219.3810835.52 1219.0210836.78 1218.82
10837.82  1218.810839.79 1218.6410843.31 1218.7410845.17 1218.6710847.47 1218.75
10853.23  1218.910854.06 1218.91 10859.7  1218.910865.38 1218.7910866.23  1218.8
10869.67  1218.910874.56 1218.8610877.62 1218.7510896.67 1219.1710900.43 1219.21
10906.34  1219.310915.68 1219.4110920.01 1219.4610920.24 1219.46 10920.5 1219.47
10932.35  1219.510934.98 1219.2710946.75 1219.35 10958.6 1219.3810961.43 1219.37
10971.51  1219.510981.27 1219.4310987.91 1219.4710987.99  1219.510990.91 1219.93
 10993.6  1218.810993.64 1218.8110993.66 1218.82 10993.9 1218.9110996.89  1220.1
 10997.3  1220.211000.58 1220.5311003.68 1220.82 11011.7 1220.7511017.18 1220.71
11019.59  1220.711036.02 1220.6111045.64 1220.5511049.94 1220.5511051.59 1220.55
11058.24  1220.6 11060.8 1220.4611072.39  1220.311076.17 1220.2211077.74 1220.64
11078.39  1220.811079.56 1220.7311088.28 1220.3911096.64 1220.5111099.72 1220.41
11110.66  1220.411110.98 1220.4111121.42 1220.4111122.21 1220.4411127.73 1220.48
11134.45  1220.411135.25 1220.4111136.16  1220.411149.73 1220.2911151.03 1220.28
11166.07    122011166.84 1220.0111177.63 1220.3611178.01 1220.3611187.07 1220.47
11192.72  1220.611204.26 1220.6411205.79 1220.7811208.75 1221.1511211.27  1220.9
11213.52  1220.511218.13 1220.4811220.63 1220.4611225.41 1220.4611236.39 1220.33
 11244.4  1220.411245.25  1220.411251.03 1220.4411253.42 1220.4311260.64 1220.43
11261.42  1220.4 11263.5 1220.4311264.64 1220.4311265.21 1220.4111268.84  1221.1
11268.93  1221.111269.31 1221.1611272.58 1220.8311275.29 1220.4311277.42 1220.43
11278.16  1220.411281.15 1220.4311281.46 1220.4311282.99 1220.41 11285.6  1220.4
11287.94  1220.411294.39 1220.3911315.62 1220.1611319.64 1220.2911319.69 1220.29
11321.26  1220.311341.22 1220.2211368.01 1220.15

Manning's n Values         num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************
 9978.47     .05 9987.66    .03510056.06     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
       9987.6610056.06            400.03  400.01     400              .1       .3
```

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1218.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.035	0.060
W.S. Elev (ft)	1218.85	Reach Len. (ft)	400.03	400.01	400.00
Crit W.S. (ft)		Flow Area (sq ft)		101.89	605.23
E.G. Slope (ft/ft)	0.002046	Area (sq ft)		101.89	605.23
Q Total (cfs)	1008.00	Flow (cfs)		262.70	745.30
Top Width (ft)	706.30	Top Width (ft)		65.22	641.09
Vel Total (ft/s)	1.43	Avg. Vel. (ft/s)		2.58	1.23
Max Chl Dpth (ft)	2.89	Hydr. Depth (ft)		1.56	0.94
Conv. Total (cfs)	22285.0	Conv. (cfs)		5807.8	16477.2
Length Wtd. (ft)	400.00	Wetted Per. (ft)		65.50	642.29
Min Ch El (ft)	1216.76	Shear (lb/sq ft)		0.20	0.12
Alpha	1.40	Stream Power (lb/ft s)		0.51	0.15
Frctn Loss (ft)	0.60	Cum Volume (acre-ft)	0.00	5.30	59.74
C & E Loss (ft)	0.01	Cum SA (acres)	0.02	4.37	38.24

Warning: Divided flow computed for this cross-section.

Profile #PF 1

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	Chan	9987.66	10004.76	44.95	19.19	14.17	4.46	1.38	2.34
2	Chan	10004.76	10021.86	67.03	26.31	17.12	6.65	1.54	2.55
3	Chan	10021.86	10038.96	78.87	28.99	17.10	7.82	1.70	2.72
4	Chan	10038.96	10056.06	71.84	27.41	17.10	7.13	1.60	2.62
5	ROB	10056.06	10384.05	572.25	405.27	306.46	56.77	1.33	1.41
6	ROB	10384.05	10712.04	172.58	197.74	307.73	17.12	0.64	0.87
7	ROB	10712.04	11040.02	0.48	2.22	28.10	0.05	0.08	0.22

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: Union Pacific RR
REACH: 516503 RS: 1.477

INPUT
Description:
Station Elevation Data num= 201

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9981.08	1220	9984.23	1220	9984.56	1220	9988.39	1218.98	10000	1215.86
10010.03	1216.71	0011.94	1216.86	10013.73	1217.41	10018.33	1218.71	10022.93	1217.69
10025.62	1217.41	0028.49	1217.27	10031.78	1217.21	10034	1217.22	10038.46	1217.16
10041	1217.31	0046.55	1217.11	10047.99	1217.32	10049.01	1216.99	10054.14	1217.37
10056.82	1217.71	0057.92	1216.76	10058.74	1216.26	10059.76	1216.61	10063.18	1217.72
10064.21	1217.61	0068.68	1216.87	10070.43	1216.82	10072.89	1216.82	10078.58	1216.8
10095.01	1216.71	0108.94	1216.81	10112.99	1216.82	10127.58	1216.76	10146.46	1216.69
10154.71	1216.71	0166.17	1216.61	10188.61	1216.71	10205.4	1216.76	10206.69	1216.76
10211.28	1216.81	0217.35	1217.53	10226.85	1218.41	10238.52	1218.41	10245.33	1218.41
10246.8	1218.41	0247.69	1218.35	10258.99	1217.97	10264.94	1217.56	10268.88	1217.48
10271.24	1217.5	10279.9	1217.33	10295.21	1217.12	10297.27	1217.06	10302.03	1217.06
10305.34	1217.11	0308.29	1217.12	10309.37	1217.11	10311.45	1217.06	10314.47	1217.06
10329.58	1217.11	0340.44	1217.06	10351.22	1216.95	10353.05	1216.93	10367.72	1216.89
10379.24	1216.9	10389.3	1216.99	10399.37	1217.06	10407.48	1216.98	10415.13	1216.93
10419.83	1216.81	0420.95	1216.85	10426.78	1216.86	10430.2	1216.87	10438.78	1216.88
10470.3	1217.11	0496.97	1217.28	10498.12	1217.28	10500.27	1217.31	10510.96	1217.39

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10514.29  1217.410522.34 1217.2810539.39 1217.2710546.73 1217.2310550.91 1217.27
10559.19  1217.210567.34  1217.210576.52 1217.1210600.02 1217.1210603.51 1217.12
10604.44  1217.110606.19 1217.1210628.92 1217.0710639.98 1217.05 10646.6 1217.16
10648.61  1217.210653.85 1217.17   10663 1217.3210673.45  1217.510686.07 1217.63
10691.29  1217.9 10694.2 1218.1410696.06 1218.2810696.84 1217.8510698.36 1217.04
10700.15  1217.7 10701.9 1218.2810708.12 1219.04 10708.9 1219.1310710.28 1219.11
10716.89  1218.9   10729 1218.510731.08 1218.4310755.29 1218.3110758.08  1218.3
10760.78  1218.3 10786.1 1218.7210787.14 1218.7310787.35 1218.7310792.64 1218.73
 10805.1  1218.710816.98 1218.5510824.57 1218.6410831.13 1218.5810839.49 1218.56
10859.76    121810860.34 1217.9810862.03 1217.9810877.29 1217.5910878.58 1217.55
10880.83  1217.310883.87 1216.9510883.88 1216.9510888.17 1216.9510890.28 1216.95
10894.07  1216.910895.79 1216.94 10897.4 1216.9410898.92 1216.9410901.72 1216.94
10903.02  1216.910905.46 1216.93 10906.6 1216.9310908.77 1216.9310941.32 1216.85
10945.16  1216.810950.25 1216.8510952.91 1216.8510954.97 1216.85 10959.7 1216.67
 10960.7  1216.710964.29 1216.6510964.85 1216.65 10969.6 1216.6210969.64 1216.62
10969.73  1216.610973.35 1216.8810976.42 1217.0310982.31 1217.19   10986  1217.3
 10995.4  1217.610997.14 1217.6610997.53 1217.6811004.85 1217.9111011.54 1218.06
11017.76  1217.911022.38    121811040.12 1217.9711063.57 1217.9111067.66 1217.88
11071.08  1217.911072.31 1217.8711076.03 1217.7411079.65 1217.5711096.95 1217.03
11097.77    121711103.28 1217.0311109.94 1217.0711115.69 1217.1111142.49 1217.11
11145.02  1217.2 11147.7 1217.2511157.79 1217.5411165.26 1217.7611167.65 1217.79
11173.01  1217.611174.62  1217.611199.29 1218.3511220.59 1218.3611221.48 1218.36
11225.73  1218.4 11253.6 1218.5211284.42 1218.6911286.79  1218.711323.36 1219.04
11324.62    121911325.89 1219.0511338.59 1219.05 11345.1 1219.0511350.93 1219.05
11366.04  1218.9

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
 9981.08     .05 9988.39    .03510018.33     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9988.3910018.33           400.03  400.01     400             .1       .3

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 1218.28  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.01  * Wt. n-Val.              *          *   0.035  *   0.060  *
* W.S. Elev (ft)         * 1218.27  * Reach Len. (ft)         *  400.03  *  400.01  *  400.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)       *          *   36.93  * 1063.90  *
* E.G. Slope (ft/ft)     *0.001146  * Area (sq ft)            *          *   36.93  * 1063.90  *
* Q Total (cfs)          * 1008.00  * Flow (cfs)              *          *   66.54  *  941.46  *
* Top Width (ft)         * 1028.94  * Top Width (ft)          *          *   25.73  * 1003.20  *
* Vel Total (ft/s)       *    0.92  * Avg. Vel. (ft/s)        *          *    1.80  *    0.88  *
* Max Chl Dpth (ft)      *    2.41  * Hydr. Depth (ft)        *          *    1.43  *    1.06  *
* Conv. Total (cfs)      * 29779.9  * Conv. (cfs)             *          *  1965.9  * 27813.9  *
* Length Wtd. (ft)       *  400.00  * Wetted Per. (ft)        *          *   26.29  * 1004.97  *
* Min Ch El (ft)         * 1215.86  * Shear (lb/sq ft)        *          *    0.10  *    0.08  *
* Alpha                  *    1.13  * Stream Power (lb/ft s)  *          *    0.18  *    0.07  *
* Frctn Loss (ft)        *    1.34  * Cum Volume (acre-ft)    *    0.00  *    4.66  *   52.08  *
* C & E Loss (ft)        *    0.01  * Cum SA (acres)          *    0.02  *    3.95  *   30.69  *
*****************************************************************************************

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

  Profile #PF 1
*****************************************************************************************************
***************
*           * Pos       * Left Sta  * Right Sta *     Flow *     Area *     W.P. *  Percent *
Hydr * Velocity *
*           *           * (ft)      * (ft)      *    (cfs) *  (sq ft) *     (ft) *     Conv
*Depth(ft) *   (ft/s) *
* 1         * Chan      * 9988.39   * 9995.88   *     3.01 *     3.15 *     5.01 *     0.30 *
0.65 *     0.96 *
* 2         * Chan      * 9995.88   * 10003.36  *    31.64 *    15.27 *     7.64 *     3.14 *
2.04 *     2.07 *
* 3         * Chan      * 10003.36  * 10010.84  *    26.32 *    13.58 *     7.51 *     2.61 *
1.81 *     1.94 *
* 4         * Chan      * 10010.84  * 10018.33  *     5.57 *     4.93 *     6.13 *     0.55 *
0.83 *     1.13 *
```

```
* 5          * ROB       * 10018.33  * 10355.26  *   367.66 *   382.33 *   311.25 *    36.47 *
1.23 *     0.96 *
* 6          * ROB       * 10355.26  * 10692.19  *   346.11 *   380.61 *   336.95 *    34.34 *
1.13 *     0.91 *
* 7          * ROB       * 10692.19  * 11029.11  *   146.53 *   180.41 *   189.22 *    14.54 *
0.96 *     0.81 *
* 8          * ROB       * 11029.11  * 11366.04  *    81.16 *   120.55 *   167.55 *     8.05 *
0.72 *     0.67 *
*****************************************************************************************************
***************

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.
Warning: The energy loss was 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: Union Pacific RR
REACH: 516503              RS: 1.401

INPUT
Description:
Station Elevation Data     num=      187
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
*****************************************************************************************
 9980.51  1219.1 9983.02  1219.1 9983.99  1219.1  9991.2 1217.54   10000 1215.71
10001.63  1215.910011.88 1217.1810014.06 1216.9810020.64  1216.710030.71 1216.98
10030.87    121710043.57 1215.9410044.29 1215.9410044.35 1215.9410044.43 1215.94
10044.55  1215.910044.73 1215.9410045.03 1215.95 10055.5 1215.9610056.91    1216
   10059    121610061.55  1216.110062.25  1216.110065.47  1216.110065.96  1216.1
10068.79  1216.1 10071.1  1216.110072.14  1216.110074.14  1216.110075.81  1216.1
 10077.2  1216.110078.62  1216.110079.84  1216.110082.05 1216.1110083.21 1216.12
10097.05  1216.210102.83 1216.2210106.92  1216.210116.86 1216.2310119.88  1216.3
10123.38  1216.510130.32 1216.6810136.62 1217.01 10142.1 1217.1510147.31 1217.33
 10155.9  1217.710166.85 1217.7310167.79 1217.6910174.47 1217.1510179.53 1216.53
10185.75  1216.510201.95 1216.3110212.93 1216.3710233.94 1216.5110235.37 1216.51
10237.62  1216.510238.58  1216.510242.57 1217.0410243.06 1217.1310246.98 1217.14
10248.47  1217.210252.84 1216.6410253.97 1216.3610258.78 1216.2710261.51 1216.28
10275.69  1216.2 10294.6 1216.0610325.85 1216.2310354.08 1216.4210359.29 1216.41
10362.85  1216.410367.22 1216.4410377.74 1216.3910380.09 1216.4710382.21 1216.45
10384.27  1216.710388.05 1216.9210391.53 1217.1910394.54 1217.1910397.37 1217.23
10398.45  1216.610399.53 1216.1410401.89 1216.8310403.08 1217.2310407.63 1217.33
 10408.3  1217.310429.39 1217.0510435.05 1216.9310444.77 1216.8710471.47 1216.88
10474.55    121710481.22 1216.8810492.23 1216.7510499.39 1216.6910502.68 1216.63
10504.29  1216.610509.74 1216.6210519.53 1216.5910548.87 1216.5310554.82 1216.51
10572.77  1216.510609.63  1216.710621.75 1216.7510622.38 1216.7510624.41 1216.77
10624.71  1216.810626.86 1216.8210642.29 1216.7810657.99 1216.8110662.49 1216.78
10665.52  1216.810677.81 1216.7510684.74 1216.7210686.94 1216.7810690.32 1216.72
10694.98  1216.610698.34 1216.5710712.08  1216.610718.78 1216.5210731.35 1216.58
10753.74  1216.7 10759.2 1216.6310764.67 1216.6310768.17 1216.4710779.07 1216.35
10781.46  1216.310791.78 1215.9110798.28 1215.6810802.65 1215.4110804.35 1215.35
10821.72  1215.410843.31 1215.5210843.44 1215.53 10845.7 1215.5610849.41 1215.61
10855.72    121610867.71 1216.6610884.28 1217.0910895.28 1217.3710904.78 1217.41
10912.55  1217.310914.35 1217.3210921.35 1217.3910932.09 1217.3810936.03 1217.37
10946.07  1217.510954.31 1217.4410980.77  1217.410984.34 1217.3910992.11 1217.44
11006.19  1217.211014.69 1217.0911019.37 1217.0711021.83 1217.0211024.94    1217
11027.53    121711047.28 1217.0311056.25 1216.9511068.41 1216.9811095.07 1216.98
11103.05  1217.111105.88 1217.1411109.18 1217.1411115.07 1217.1411115.93 1217.12
11124.24  1216.611132.25 1216.2411133.41 1216.1511136.37 1216.1711177.51 1216.21
11178.77  1216.311184.25 1216.6411192.25 1216.8411200.98 1217.0711226.12 1217.43
11228.94  1217.511229.53 1217.4811229.66 1217.4811238.01 1217.4911243.72  1217.5
11255.87  1217.611260.09 1217.6611273.43 1217.77 11280.8  1217.911304.82 1217.97
 11316.7  1218.1 11317.6 1218.05

Manning's n Values         num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************
 9980.51     .05  9991.2    .03510011.88     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
        9991.210011.88              500     500     500              .1       .3
```

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1216.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.		0.035	0.060
W.S. Elev (ft)	1216.77	Reach Len. (ft)	500.00	500.00	500.00
Crit W.S. (ft)	1216.71	Flow Area (sq ft)		7.33	311.04
E.G. Slope (ft/ft)	0.039626	Area (sq ft)		7.33	311.04
Q Total (cfs)	1008.00	Flow (cfs)		40.42	967.58
Top Width (ft)	717.37	Top Width (ft)		13.71	703.66
Vel Total (ft/s)	3.17	Avg. Vel. (ft/s)		5.52	3.11
Max Chl Dpth (ft)	1.42	Hydr. Depth (ft)		0.53	0.44
Conv. Total (cfs)	5063.7	Conv. (cfs)		203.0	4860.7
Length Wtd. (ft)	500.00	Wetted Per. (ft)		13.89	704.15
Min Ch El (ft)	1215.71	Shear (lb/sq ft)		1.30	1.09
Alpha	1.05	Stream Power (lb/ft s)		7.20	3.40
Frctn Loss (ft)	1.20	Cum Volume (acre-ft)	0.00	4.46	45.76
C & E Loss (ft)	0.04	Cum SA (acres)	0.02	3.77	22.85

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

Profile #PF 1

	Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)
1	Chan	9991.20	9996.37	0.48	0.23	1.51	0.05	0.15	2.12
2	Chan	9996.37	10001.54	24.83	3.98	5.26	2.46	0.77	6.24
3	Chan	10001.54	10006.71	14.70	2.89	5.21	1.46	0.56	5.08
4	Chan	10006.71	10011.88	0.41	0.23	1.91	0.04	0.12	1.80
5	ROB	10011.88	10338.31	410.13	127.22	252.38	40.69	0.50	3.22
6	ROB	10338.31	10664.74	75.82	40.80	184.99	7.52	0.22	1.86
7	ROB	10664.74	10991.17	382.64	110.91	198.74	37.96	0.56	3.45
8	ROB	10991.17	11317.60	99.00	32.10	68.04	9.82	0.47	3.08

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: Union Pacific RR
REACH: 516503 RS: 1.306

INPUT
Description:
Station Elevation Data num= 145

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9870.28	1218.4	9871.69	1218.41	9873.76	1218.41	9887.06	1215.27	9889.06	1214.83
9901.05	1214.7	9938.77	1214.16	9958.25	1213.99	9983.04	1213.83	9986.12	1213.79
10000	1213.6	10004.71	1213.61	10009.56	1214.82	10012.26	1215.7	10020.37	1215.52
10026.33	1215.4	10035.8	1215.32	10044.49	1215.22	10048.07	1215.15	10055.64	1215.12
10059.52	1215.1	10061.22	1215.07	10074.78	1215.81	10084.94	1216.37	10090.73	1216.7

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10096.63  1217.110108.53 1217.3210126.57 1217.29 10128.7 1217.2910130.11 1217.34
10130.31  1217.310148.32 1217.2210159.91 1217.1410163.27 1217.1410175.26 1217.27
10176.63  1217.310182.13 1217.3410190.16 1217.4410193.47 1217.4410206.66 1216.85
10207.03  1216.810217.63 1215.4310227.26 1214.1810228.02 1214.1710228.64 1214.17
10242.79    121410243.48 1214.0510244.11 1214.0910253.38 1214.9410263.44 1215.67
10263.95  1215.710265.31 1215.6710271.12 1215.69 10272.6 1215.6710285.35 1213.53
10295.61  1211.910312.16 1208.7810313.36 1208.5510333.07 1208.1810345.36 1208.08
10361.55  1208.210394.36 1208.5410395.59 1208.5710398.08 1208.59 10414.1 1208.81
10421.27  1208.910432.02 1210.7610436.69 1211.6110439.89 1212.0510452.67 1214.21
10460.74  1215.4 10470.6 1215.6810484.54 1216.1510492.71 1216.3910493.79 1216.36
10494.96  1216.410502.31 1216.2810502.33 1216.2810505.18 1216.2610531.46 1216.09
10553.38    121610557.95 1215.9910567.88 1215.9610580.55 1216.0910586.63 1216.08
10587.73  1216.110597.86 1215.9710628.09 1215.6410637.88 1215.2810650.54 1214.95
10656.08  1214.910656.41 1214.8610657.25 1214.8610657.87 1214.8610695.52 1214.86
10698.36  1214.910701.19 1215.0510713.69 1215.5710716.38 1215.7310724.98 1216.04
10729.31  1216.110735.35 1216.1810750.83  1216.210765.58 1216.2310775.91 1216.31
10790.08  1216.310794.37 1216.3510804.21 1216.4610811.85 1216.5310812.86 1216.52
10817.82  1216.510834.57 1216.7310839.91 1216.8710842.44 1216.4610849.31 1215.24
10858.95  1213.510864.22 1212.6410872.49 1213.9410879.14 1215.1110886.06 1215.15
 10886.2  1215.210886.46 1215.1410893.11 1214.9810896.52 1214.8610930.22 1214.97
10932.99    121510935.64 1214.9910936.36 1215.0310940.12 1215.3110941.58 1215.31
10947.23  1215.310953.46 1214.5210961.05 1213.6310983.12 1210.18 10993.3 1208.98
10994.57    120911010.38 1208.5311025.92 1210.7111036.58 1212.2911052.75 1214.81
11063.36  1216.611070.19  1216.7 11090.4 1216.7711105.73 1216.6111108.48 1216.59

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
 9870.28     .05 9887.06    .03510012.26     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9887.0610012.26              450     450     450             .1       .3
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
10285.2710448.73 1213.54       T
10850.2811052.28 1213.54       T

CROSS SECTION OUTPUT  Profile #PF 1
**********************************************************************************************
* E.G. Elev (ft)         * 1215.69  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.02  * Wt. n-Val.              *   0.050  *   0.035  *   0.060  *
* W.S. Elev (ft)         * 1215.67  * Reach Len. (ft)         *  450.00  *  450.00  *  450.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)       *    0.34  *  184.65  *  796.86  *
* E.G. Slope (ft/ft)     *0.000782  * Area (sq ft)            *    0.34  *  184.65  * 1739.74  *
* Q Total (cfs)          * 1008.00  * Flow (cfs)              *    0.09  *  283.69  *  724.22  *
* Top Width (ft)         *  731.96  * Top Width (ft)          *    1.70  *  125.11  *  605.16  *
* Vel Total (ft/s)       *    1.03  * Avg. Vel. (ft/s)        *    0.28  *    1.54  *    0.91  *
* Max Chl Dpth (ft)      *    7.59  * Hydr. Depth (ft)        *    0.20  *    1.48  *    1.32  *
* Conv. Total (cfs)      * 36043.4  * Conv. (cfs)             *     3.4  * 10143.8  * 25896.2  *
* Length Wtd. (ft)       *  450.00  * Wetted Per. (ft)        *    1.74  *  125.45  *  608.02  *
* Min Ch El (ft)         * 1213.60  * Shear (lb/sq ft)        *    0.01  *    0.07  *    0.06  *
* Alpha                  *    1.19  * Stream Power (lb/ft s)  *    0.00  *    0.11  *    0.06  *
* Frctn Loss (ft)        *    0.50  * Cum Volume (acre-ft)    *    0.00  *    3.36  *   34.00  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)          *    0.01  *    2.97  *   15.34  *
**********************************************************************************************

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.

  Profile #PF 1
**********************************************************************************************
***************
*          * Pos       * Left Sta  * Right Sta *     Flow *     Area *     W.P. *  Percent *
Hydr * Velocity *
*          *           * (ft)      * (ft)      *    (cfs) *  (sq ft) *     (ft) *     Conv
*Depth(ft) *   (ft/s) *
* 1        * LOB       * 9882.87   * 9887.06   *     0.09 *     0.34 *     1.74 *     0.01 *
0.20 *     0.28 *
* 2        * Chan      * 9887.06   * 9918.36   *    35.75 *    31.04 *    31.35 *     3.55 *
0.99 *     1.15 *
* 3        * Chan      * 9918.36   * 9949.66   *    65.99 *    44.81 *    31.30 *     6.55 *
1.43 *     1.47 *
```

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* 4          * Chan       * 9949.66   * 9980.96   *    89.88 *    53.94 *    31.30 *     8.92 *
1.72 *     1.67 *
* 5          * Chan       * 9980.96   * 10012.26  *    92.07 *    54.86 *    31.49 *     9.13 *
1.76 *     1.68 *
* 6          * ROB        * 10012.26  * 10285.27  *    44.75 *    83.51 *   119.49 *     4.44 *
0.70 *     0.54 *
* 7          * ROB        * 10285.27  * 10448.73  *   390.88 *   348.21 *   164.30 *    38.78 *
2.13 *     1.12 *
* 8          * ROB        * 10448.73  * 10850.28  *    34.47 *    70.38 *   115.23 *     3.42 *
0.61 *     0.49 *
* 9          * ROB        * 10850.28  * 11052.28  *   253.05 *   292.13 *   203.35 *    25.10 *
1.45 *     0.87 *
* 10         * ROB        * 11052.28  * 11108.48  *     1.07 *     2.62 *     5.65 *     0.11 *
0.47 *     0.41 *
*****************************************************************************************************
***************

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: Union Pacific RR
REACH: 516503             RS: 1.221

INPUT
Description:
Station Elevation Data    num=     152
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
 9980.96  1217.4 9981.24 1217.45 9982.95 1217.45 9984.73 1217.45 9986.43 1217.45
 9996.35  1214.6   10000 1213.4610048.12 1213.9810050.88 1214.0110051.12 1214.01
 10051.4    121410051.47 1214.0110114.57 1214.4110120.63 1214.41 10132.2 1214.41
10137.81  1214.510141.79 1214.4710142.89 1214.4710154.53 1214.3910161.35 1214.32
10168.92  1214.310172.51 1214.3210185.25 1214.3210192.21 1214.3210200.66 1214.32
10203.51  1214.310208.72 1214.3310219.24 1214.3310220.44 1214.3310228.78 1214.33
10234.41  1214.310238.89 1214.3310241.97 1214.3210243.66 1214.32 10253.5 1214.39
10256.97  1214.410344.46 1214.4210345.28 1214.4210347.44 1214.4210349.56 1214.44
10352.04  1214.410352.39 1214.4410354.07 1214.4410356.29 1214.4410388.46 1214.92
10412.47    121510418.51    121510422.58 1215.1910423.99 1215.2510428.96  1215.4
10431.68  1215.510434.07 1215.58 10477.9 1215.8810524.99 1216.2610541.58 1216.39
10542.31  1216.410543.32 1216.4410547.82 1216.4510563.11 1216.3710582.91 1216.34
10595.27  1216.310602.15 1216.3210606.63 1216.32 10608.1 1216.2610614.53 1216.15
 10625.9    121610637.82 1215.7410645.31 1215.6210652.81 1215.5110653.88 1215.47
10668.31  1215.110673.04 1215.2210676.69 1215.0810686.81 1214.8210692.69 1214.59
10699.12  1214.310703.68 1214.3710705.54 1214.3710715.56 1214.3710724.44 1214.37
10738.44  1214.410751.32 1214.4810753.61 1214.4910759.65 1214.4110761.92 1214.51
 10769.5  1214.810771.12 1214.8410775.99 1214.8910788.51 1213.4810803.07 1211.83
10823.61  1209.310824.32 1209.1910824.51 1209.1710825.02 1209.1310836.94 1208.69
 10853.3  1208.510859.63 1208.4110867.29 1208.4310881.44 1208.5710889.73 1208.64
10902.86  1208.810917.54 1208.8210935.86 1208.9610936.83 1208.9610938.83    1209
10958.16  1208.9 10969.7 1208.8310971.73 1209.0310973.27 1209.1410986.07 1210.08
10991.21  1210.511000.34 1210.9711003.86 1210.9911010.79    121111014.65 1211.08
11017.93  1211.211024.94 1210.8711029.76 1210.7111036.79 1210.5611042.31 1210.55
11052.61  1210.3 11054.8 1210.3311056.38 1210.4311066.82 1210.8311067.82 1210.96
11070.14  1210.611076.34 1211.4211079.57 1213.1711086.47 1213.8111097.12 1214.87
11100.43  1215.111111.35 1215.21 11114.3  1215.311117.52 1215.2911125.06 1215.05
11140.94  1214.6 11142.4  1214.511149.12 1214.39 11150.8  1214.4 11151.7 1214.41
11154.89  1214.411181.16 1214.5611202.34 1214.6411210.34 1214.8511210.66 1214.86
11211.23  1214.911222.94 1215.7511230.34  1215.811231.36 1215.7911235.19 1215.77
11238.22  1215.711250.28 1215.88

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 9980.96     .05 9980.96    .03510137.81     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9980.9610137.81              250     250     250              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
10788.5111086.47 1213.81       T
```

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1215.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.035	0.060
W.S. Elev (ft)	1215.16	Reach Len. (ft)	250.00	250.00	250.00
Crit W.S. (ft)		Flow Area (sq ft)		154.79	728.26
E.G. Slope (ft/ft)	0.001706	Area (sq ft)		154.79	1907.05
Q Total (cfs)	1008.00	Flow (cfs)		285.30	722.71
Top Width (ft)	956.88	Top Width (ft)		143.40	813.47
Vel Total (ft/s)	1.14	Avg. Vel. (ft/s)		1.84	0.99
Max Chl Dpth (ft)	6.75	Hydr. Depth (ft)		1.08	0.90
Conv. Total (cfs)	24403.5	Conv. (cfs)		6906.9	17496.5
Length Wtd. (ft)	250.00	Wetted Per. (ft)		143.66	814.62
Min Ch El (ft)	1213.46	Shear (lb/sq ft)		0.11	0.10
Alpha	1.28	Stream Power (lb/ft s)		0.21	0.09
Frctn Loss (ft)	0.80	Cum Volume (acre-ft)		1.60	15.16
C & E Loss (ft)	0.01	Cum SA (acres)		1.59	8.01

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.

Profile #PF 1

Pos	Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	Percent Conv	Hydr Depth(ft)	Velocity (ft/s)

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: Union Pacific RR
REACH: 516503 RS: 1.173

INPUT
Description:
Station Elevation Data num= 216

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9953.28	1216.9	9956.61	1216.86	9956.76	1216.86	9958.59	1216.41	9972.04	1213.01
9984.24	1213.2	9990.85	1213.37	9995.1	1212.73	10000	1212.11	10005.25	1212.56
10008.6	1212.8	10018.41	1213.26	10024.59	1213.58	10040.91	1214.28	10045.27	1214.51
10064.32	1215.11	10068.25	1215.24	10077.58	1215.61	10112.57	1215.74	10117.57	1215.73
10121.71	1215.71	10124.96	1215.79	10166.06	1216.13	10170.77	1216.13	10174.71	1216.02
10179.24	1216.21	10220.83	1215.59	10229.04	1215.51	10231.08	1215.52	10239.27	1215.59
10257.99	1215.31	10269.35	1215.35	10279.38	1215.27	10291.27	1215.39	10291.33	1215.39
10291.38	1215.41	10291.43	1215.39	10291.48	1215.39	10291.53	1215.39	10291.58	1215.39
10291.62	1215.41	10291.66	1215.39	10291.71	1215.39	10291.75	1215.39	10291.79	1215.39
10291.83	1215.41	10291.87	1215.38	10291.91	1215.38	10291.95	1215.38	10291.99	1215.38
10292.03	1215.41	10292.07	1215.39	10292.11	1215.39	10292.15	1215.39	10292.19	1215.39
10292.23	1215.41	10292.28	1215.39	10292.32	1215.39	10292.36	1215.39	10292.41	1215.39
10292.45	1215.4	10292.5	1215.41	10292.55	1215.4	10292.6	1215.41	10292.65	1215.4
10292.7	1215.41	10292.76	1215.41	10307.07	1215.51	10311.59	1215.53	10318.82	1215.54
10330.01	1215.71	10335.11	1215.69	10335.87	1215.66	10337.4	1215.61	10347.31	1215.29
10350.34	1215.41	10350.92	1215.39	10356.25	1215.31	10366.61	1215.19	10370.73	1214.87
10374.04	1214.71	10376.26	1215.58	10380.07	1216.81	10380.36	1216.92	10380.61	1217
10382.72	1216.61	10384.77	1216.21	10385.46	1216.16	10389.3	1214.79	10390.48	1214.79
10392.61	1214.61	10394.92	1214.35	10396.06	1214.33	10397.57	1214.35	10399.57	1214.45
10405.25	1214.71	10416.58	1214.67	10431.31	1214.75	10437.19	1214.77	10439.06	1214.82
10447.49	1214.81	10447.73	1214.82	10451.62	1214.93	10463.79	1215.12	10463.93	1215.12
10464.21	1215.11	10464.66	1215.12	10519.84	1214.94	10522.01	1214.36	10528.27	1212.71
10531.33	1213.41	10533.32	1213.76	10539.08	1213.03	10541.6	1212.75	10551.51	1213.07

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10555.23  1213.210555.67 1213.0710556.74 1212.8110568.27 1212.8310589.53 1212.87
10603.92  1212.910608.07  1212.9 10609.2 1212.9110609.84 1212.9210610.98 1213.01
10616.69  1213.310621.14 1212.9510625.07 1212.7410635.67 1214.2110635.84 1214.23
10651.91    121510652.64 1215.0910652.76  1215.110657.52  1215.110680.28 1215.04
10686.87  1214.9 10688.2 1214.9210688.38 1214.9210689.18 1214.9110699.68  1214.9
10708.58  1214.710715.94 1214.6610718.51 1214.5710729.84 1214.3910739.16 1214.26
10746.42  1214.210755.07 1213.9810767.94 1213.8410769.26 1214.0510771.83 1214.44
10773.51  1214.810777.18  1215.4 10780.7 1215.4410787.19 1215.5110796.22 1215.55
 10797.1  1215.610798.08  1215.510805.28  1214.710808.69 1214.3210811.18 1214.04
10844.96    121410857.43 1213.9310872.19 1213.8410889.73 1213.6710898.14 1213.67
10906.01  1213.710911.41 1213.6710914.47 1213.7410931.59  1214.110931.86 1214.15
10932.57  1214.310933.85 1214.53 10947.3 1213.8610947.51 1213.8510947.59 1213.85
10949.03  1213.910963.11 1214.3110968.22 1214.2610977.01 1214.3110984.31 1214.31
11003.14  1214.611003.91 1214.6411006.49 1214.8311011.68 1215.1911013.22 1215.35
11031.01  1215.2 11040.5 1215.0611054.11 1214.0211062.74 1213.3511076.86 1212.01
11081.62  1211.6 11090.5 1210.9811111.03  1209.511121.34 1208.5311131.88 1208.66
11146.86  1208.611152.09 1208.5611160.49  1208.611172.13 1208.6411183.88 1208.89
11188.28  1209.5 11191.8 1210.0311199.72 1211.3811207.51 1212.63 11207.8 1212.67
11214.98  1213.311222.54 1213.9211227.14 1214.3511235.28 1214.9811235.51    1215
11235.82    121511247.37 1215.8411257.38 1216.4911260.49 1216.5711261.32 1216.57
11286.17    1217

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
************************************************
 9953.28     .05 9953.28    .03510077.58     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9953.2810077.58              400     400     400              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
11062.7411222.54 1213.35       T

CROSS SECTION OUTPUT  Profile #PF 1
*********************************************************************************************
* E.G. Elev (ft)         * 1214.38  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.11  * Wt. n-Val.              *          *   0.035  *   0.060  *
* W.S. Elev (ft)         * 1214.26  * Reach Len. (ft)         *  400.00  *  400.00  *  400.00  *
* Crit W.S. (ft)         * 1213.94  * Flow Area (sq ft)       *          *   76.06  *  347.12  *
* E.G. Slope (ft/ft)     *0.008026  * Area (sq ft)            *          *   76.06  *  850.87  *
* Q Total (cfs)          * 1008.00  * Flow (cfs)              *          *  295.31  *  712.69  *
* Top Width (ft)         *  540.92  * Top Width (ft)          *          *   73.43  *  467.49  *
* Vel Total (ft/s)       *    2.38  * Avg. Vel. (ft/s)        *          *    3.88  *    2.05  *
* Max Chl Dpth (ft)      *    5.73  * Hydr. Depth (ft)        *          *    1.04  *    0.74  *
* Conv. Total (cfs)      * 11251.5  * Conv. (cfs)             *          *  3296.3  *  7955.3  *
* Length Wtd. (ft)       *  400.00  * Wetted Per. (ft)        *          *   73.74  *  468.75  *
* Min Ch El (ft)         * 1212.11  * Shear (lb/sq ft)        *          *    0.52  *    0.37  *
* Alpha                  *    1.30  * Stream Power (lb/ft s)  *          *    2.01  *    0.76  *
* Frctn Loss (ft)        *    0.82  * Cum Volume (acre-ft)    *          *    0.94  *    7.24  *
* C & E Loss (ft)        *    0.03  * Cum SA (acres)          *          *    0.96  *    4.34  *
*********************************************************************************************

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.

  Profile #PF 1
*********************************************************************************************
***************
*           * Pos        * Left Sta  * Right Sta *     Flow *     Area *     W.P. *  Percent *
Hydr * Velocity *
*           *            * (ft)      * (ft)      *    (cfs) *  (sq ft) *     (ft) *     Conv
*Depth(ft) *   (ft/s) *
*           *            *           *           *          *          *          *          *
*           *
*********************************************************************************************
***************

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: Union Pacific RR
REACH: 516503 RS: 1.098

INPUT
Description:
Station Elevation Data num= 192

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9910.1	1215.7	9911.35	1216.18	9913.06	1216.18	9914.83	1216.18	9916.54	1216.18
9918.31	1216.2	9927.11	1213.89	9931.54	1212.71	9943.7	1213.05	9947.83	1213.19
9955.65	1212.9	9989.53	1211.96	9997.23	1211.74	10000	1211.64	10005.53	1211.96
10011.1	1212.3	10015.27	1212.35	10034.12	1212.71	10059.6	1212.97	10064.99	1213.03
10071.2	1213	10095.98	1212.92	10179.6	1214.19	10266.76	1215.57	10267.28	1215.57
10267.72	1215.6	10271.91	1215.57	10280	1215.41	10292.77	1214.97	10302.18	1214.3
10312.03	1213.6	10322.26	1213.55	10334.94	1213.51	10339.04	1212.96	10343.14	1212.38
10347.86	1211	10358.55	1208.63	10364.17	1208.67	10379.27	1208.71	10395.27	1208.89
10400.46	1209	10407.63	1210.01	10413.8	1210.99	10420.71	1212.12	10424.72	1212
10425.5	1212	10455.86	1211.97	10468.96	1211.97	10469.94	1211.97	10470.28	1211.99
10475.21	1212.2	10484.44	1212.75	10488.74	1213.32	10497.18	1213.83	10505.03	1214.02
10508.42	1212.2	10514.05	1212.23	10517.67	1212.24	10523.94	1212.21	10528.12	1212.15
10535.48	1211.8	10545.39	1211.78	10551.63	1211.82	10565.61	1211.92	10568.13	1211.95
10575.86	1212.1	10578.16	1212.14	10593.4	1212.27	10594.96	1212.13	10597	1211.97
10606.62	1212.7	10612.28	1209.99	10612.9	1209.98	10613.32	1209.98	10616.66	1209.98
10621.9	1209.8	10625.4	1209.78	10626.28	1209.77	10628.65	1214.59	10630.95	1215.14
10631.06	1215.3	10631.43	1215.26	10643.03	1215.42	10652.66	1215.58	10658.24	1215.37
10665.64	1214.9	10673.02	1214.33	10673.42	1214.3	10673.96	1214.3	10691.68	1214.3
10694.69	1214.3	10698.28	1214.48	10701.38	1214.54	10703.48	1213.94	10705.43	1213.44
10707.72	1213.4	10710.67	1213.29	10712.99	1213.9	10716.28	1214.99	10717.78	1215.09
10720.96	1215.3	10730.39	1215.36	10735.72	1215.4	10739.62	1215.44	10741.03	1215.4
10744.01	1215.4	10758.32	1215.29	10761.01	1215.29	10770.25	1215.22	10783.08	1215.24
10785.88	1215.2	10792.29	1215.25	10794.72	1215.25	10796.4	1215.25	10799	1215.24
10803.27	1215.2	10813.04	1215.12	10818.02	1215.12	10828.06	1215.25	10830.55	1215.47
10834.76	1215.9	10837.21	1215.98	10841.06	1216.13	10850.47	1215.74	10858.5	1215.49
10873.47	1216.4	10879.37	1216.58	10880.36	1216.62	10882.63	1216.69	10894.65	1216.39
10895.22	1216.3	10898.77	1216.34	10901.77	1216.34	10913.91	1216.34	10941.01	1216.37
10942.31	1216.3	10948.04	1216.34	10948.27	1216.34	10953.03	1216.19	10963.87	1215.86
10968.44	1215.8	10992.81	1215.63	10993.9	1215.59	10994.24	1215.57	10999.45	1215.46
11000.48	1215.4	11005.18	1215.34	11023.75	1214.94	11034.34	1214.79	11034.49	1214.76
11035.25	1214.6	11039.43	1213.9	11040.94	1213.71	11042.14	1213.54	11050.17	1214.27
11050.31	1214.3	11050.45	1214.29	11064.83	1214.22	11073.37	1214.11	11083.47	1213.66
11094.11	1213.3	11094.95	1213.03	11095.09	1212.97	11105.32	1212.94	11105.35	1212.95
11156.16	1212.8	11162.2	1212.78	11162.21	1212.78	11163.38	1212.77	11163.5	1212.79
11165.89	1213.2	11168.88	1213.21	11179.95	1213.23	11182.64	1212.88	11188.33	1211.96
11190.13	1211.8	11192.75	1211.56	11196.89	1211.98	11199.89	1212.38	11204.19	1212.94
11209.43	1213.9	11216.64	1214.31	11230.48	1215.19	11231.44	1215.06	11231.7	1215.07
11234.63	1215.2	11241.19	1215.26	11251.54	1215.37	11253.5	1215.34	11259.33	1215.26
11264.26	1215.2	11275.71	1214.99						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9910.1	.05	9910.1	.035	10064.99	.06

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9910.1	10064.99	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1213.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.035	0.060
W.S. Elev (ft)	1213.51	Reach Len. (ft)			
Crit W.S. (ft)	1210.99	Flow Area (sq ft)		128.90	726.90
E.G. Slope (ft/ft)	0.000917	Area (sq ft)		128.90	726.90
Q Total (cfs)	1008.00	Flow (cfs)		159.40	848.60
Top Width (ft)	613.66	Top Width (ft)		136.45	477.21
Vel Total (ft/s)	1.18	Avg. Vel. (ft/s)		1.24	1.17
Max Chl Dpth (ft)	4.88	Hydr. Depth (ft)		0.94	1.52
Conv. Total (cfs)	33292.6	Conv. (cfs)		5264.7	28027.9
Length Wtd. (ft)		Wetted Per. (ft)		136.61	481.77
Min Ch El (ft)	1211.64	Shear (lb/sq ft)		0.05	0.09
Alpha	1.00	Stream Power (lb/ft s)		0.07	0.10
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

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

Warning: Divided flow computed for this cross-section.

  Profile #PF 1
*****************************************************************************************
***************
*           * Pos       * Left Sta  * Right Sta *     Flow *     Area *     W.P. *  Percent *
Hydr * Velocity *
*           *           * (ft)      * (ft)      *    (cfs) *  (sq ft) *     (ft) *     Conv
*Depth(ft) *   (ft/s) *
*           *           *           *           *          *          *          *          *
*          *
*****************************************************************************************
***************

Warning: Divided flow computed for this cross-section.

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

SUMMARY OF MANNING'S N VALUES

River:Union Pacific RR
*****************************************************************
*     Reach      *   River Sta.   *   n1    *   n2    *   n3    *
*****************************************************************
*516503          *    2.689       *      .05*     .035*      .06*
*516503          *    2.613       *      .05*     .035*      .06*
*516503          *    2.537       *      .05*     .035*      .06*
*516503          *    2.461       *      .05*     .035*      .06*
*516503          *    2.386       *      .05*     .035*      .06*
*516503          *    2.310       *      .05*     .035*      .06*
*516503          *    2.158       *      .05*     .035*      .06*
*516503          *    2.084       *      .05*     .035*      .06*
*516503          *    2.007       *      .05*     .035*      .06*
*516503          *    1.931       *      .05*     .035*      .06*
*516503          *    1.855       *      .05*     .035*      .06*
*516503          *    1.704       *      .05*     .035*      .06*
*516503          *    1.628       *      .05*     .035*      .06*
*516503          *    1.552       *      .05*     .035*      .06*
*516503          *    1.477       *      .05*     .035*      .06*
*516503          *    1.401       *      .05*     .035*      .06*
*516503          *    1.306       *      .05*     .035*      .06*
*516503          *    1.221       *      .05*     .035*      .06*
*516503          *    1.173       *      .05*     .035*      .06*
*516503          *    1.098       *      .05*     .035*      .06*
*****************************************************************

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

SUMMARY OF REACH LENGTHS

River: Union Pacific RR
*****************************************************************
*     Reach      *   River Sta.   *  Left   * Channel *  Right  *
*****************************************************************
*516503          *    2.689       *  400.04*    407.6*   431.68*
*516503          *    2.613       *  400.02*   428.92*   508.51*
*516503          *    2.537       *  400.04*   408.37*   434.58*
*516503          *    2.461       *  400.03*   402.75*    409.8*
*516503          *    2.386       *  400.03*   402.37*   408.37*
*516503          *    2.310       *  800.05*   808.25*   830.03*
*516503          *    2.158       *  400.03*   420.39*   273.83*
*516503          *    2.084       *  400.03*   400.01*      400*
*516503          *    2.007       *  400.03*   475.99*   648.97*
*516503          *    1.931       *  400.03*   473.32*   648.97*
*516503          *    1.855       *  800.06*   834.52*   630.56*
*516503          *    1.704       *  400.03*   400.01*      400*
*516503          *    1.628       *  400.02*   400.01*      400*
*516503          *    1.552       *  400.03*   400.01*      400*
*516503          *    1.477       *  400.03*   400.01*      400*
*516503          *    1.401       *     500*      500*      500*
*516503          *    1.306       *     450*      450*      450*
*516503          *    1.221       *     250*      250*      250*
```

*516503	* 1.173	* 400*	400*	400*
*516503	* 1.098	* 0*	0*	0*

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SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Union Pacific RR

Reach	River Sta.	Contr.	Expan.
*516503	* 2.689	* .1*	.3*
*516503	* 2.613	* .1*	.3*
*516503	* 2.537	* .1*	.3*
*516503	* 2.461	* .1*	.3*
*516503	* 2.386	* .1*	.3*
*516503	* 2.310	* .1*	.3*
*516503	* 2.158	* .1*	.3*
*516503	* 2.084	* .1*	.3*
*516503	* 2.007	* .1*	.3*
*516503	* 1.931	* .1*	.3*
*516503	* 1.855	* .1*	.3*
*516503	* 1.704	* .1*	.3*
*516503	* 1.628	* .1*	.3*
*516503	* 1.552	* .1*	.3*
*516503	* 1.477	* .1*	.3*
*516503	* 1.401	* .1*	.3*
*516503	* 1.306	* .1*	.3*
*516503	* 1.221	* .1*	.3*
*516503	* 1.173	* .1*	.3*
*516503	* 1.098	* .1*	.3*

ES & EN.6 Special Problems